SWADESHI VIJNANA ANDOLANA-KARNATAKA

ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

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(Ennobling motherhood, and enabling women for leadership in Science)

6TH NATIONAL WOMEN'S SCIENCE CONGRESS

Rashtriya Mahila Vijnana Sammelana

7-8th November 2013, RAICHUR

PROCEEDINGS

Organised by

MATRU VEDIKE (Women Scientists Forum)

SWADESHI VIJNANA ANDOLANA-KARNATAKA

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Foreword

FORWARD TO THE FOREFRONT

Swadeshi Vijnana Andolana-Karnataka (SVAK) is the biggest science movement of Karnataka with the largest number of dynamic District Units, and Academic Faculties (Vedikes). It is not confined to modern sciences but gives a greater thrust to traditional sciences and Scientific Heritage. In addition to being a popular science movement it gives greater emphasis on professional levels including research and entrepreneurship. SVAK covers the entire spectrum of Sciences-spiritual, social and secular-material sciences. Most of its activities are carried out through its Vedikes. Matru Vedike is the Academic Forum of Women Scientists, and Yuva Vidyarthi Vedike is for youth and students.

Most of the Women's organizations throughout the world are "activist" movements leading mostly to conflicts and negativity in society while Matru Vedike is typically a "positivist" movement aiming at the overall elevation of women in society, especially amongst the woman scientists. A career in science, engineering and technology (SET) is highly demanding, and requires total concentration, dedication, commitment and involvement. At the same tine, a woman has her natural duty of motherhood. Madame Marie Curie is the ideal model for women scientists. She received a Nobel Prize in Physics (1903) along with her husband and a second Nobel Prize in Chemistry (1911). It is prudent to recall that her daughter Irene Joliot Curie got all her training & inspiration from her parents, especially her mother; and she got the Nobel Prize in 1935! Marie Curie is thus an ideal model, as a scientist and as a mother (Mata). It is for this reason that Matru Vedike decided to conduct the National Women's Science Congress from 7th November the birth anniversary of Madame Marie Curie. The Mahila Vijnana Puraskara is also named after Madame Marie Curie. As an important coincidence, November 7th is also the birth anniversary of Sir. Dr. C. V. Raman. We are indeed blessed by this coincidence. We recall how Raman inspired a galaxy of leaders in Science- K. S. Krishnan, Vikram Sarabhai, Homi Bhabha, Ramanathan, Pisharoty et al. We have also instituted the C. V. Raman Mahila Vijnana Puraskara for outstanding contribution in Chemical, Physical and Mathematical Sciences.

We have the Motto "ennobling motherhood and enabling women for leadership in science" for our Matru Vedike.

The Main objective of this Science Congress is to present before women the vast scope and opportunities in SET along with the exciting possibilities for pleasure, happiness and contentment in a career of diverse nature-teaching, research, industry or business. By this process, we hope to attract a larger percentage of women to SET and later encourage them to rise to greater levels of achievement. Of more than 300 individuals who received Nobel Prize, hardly a dozen were Women-If more women are encouraged into science, more of them will be candidates for the Nobel. Certainly, they can be empowered to become leaders in science.

The second objective is to build a camaraderie amongst women. This will initiate a process of creating pride and confidence amongst them. Women should encourage other women to come up in their profession. Competence will come out of confidence.

The next objective is to lead them on to the frontline areas of SET, and finally to the forefront of leadership in entrepreneurship, science administration (eg. Dr. Manju Sharma) and technocracy (Dr. Sudha Murty, Dr. Kiran Mazundar Shaw) and the like. Scientific acumen is quite distinct from socio-political acumen. India has an abundance in the sociopolitical leadership from amongst women, and we are indeed fortunate. We miss such abundance of scientific acumen amongst women in India especially at the level of top leadership. It is to analyse the reasons for this imbalance that we have the Focal Theme (i) Problems and Prospects of Women in Science for an in-depth and open discussion in 2008 and (ii) The Need of Women leadership in S & T in 2009. In subsequent years, the Focal Themes were (iii) Women's leadership in Education & Research in 2010; (iv) Women in Engineering, Technology, Entrepreneurship & Industry in 2011; (v) Women in Education in 2012; (vi) Women's Education: Retrospects & Prospects in 2013. The outcome may not be the final word in this topic, but it will certainly open up a national debate. That is all what we expect from this series of annual Women's Science Congress. The power of women is creativity, and this power of creativity becomes manifold when she is educated; once this power of women with education becomes more effective with the power of modern SET. Hence our stress is on women's education especially in SET.

We are indeed happy to note that there is a perceptible change in the attitude of authorities to recognize meritorious women for positions of power. The Country had a DG-ICMR (Dr. G. V. Satyavati); and now we have a DDG for ICAR (Dr. Meena Kumari); a Director for a CSIR Laboratory (Dr. M. Lakshmi Kantam); a Director for DRDO (Dr. Sashi Bala Singh); a Project Director for Agni Missiles of DRDO (Dr. Tessy Thomas); a Project Director for RISAT in ISRO; many women Vice Chancellors of Universities, Institutions, and many CEO's of Corporates. We are happy that our programs in Swadeshi Vijnana Andolana-Karnataka (SVAK) acted as a catalyst to initiate this process involving (a) an attitudinal change among the male-dominated authorities; and (b) an acquisition of courage, confidence and competence amongst women in Science to face the challenges. Yes, there are miles to go to reach the goal.

A word on our "modus operandi". Many of the Seminars, Congress or Symposia in India are just a "Conference of a few selected speakers", and nothing fresh or novel or original will come out of such conference. We have scrupulously avoided such an approach, and deliberately opened up the arena to any one who has something to present before the public. Each one will get an almost equal chance for presentation. We hope to succeed. Time will judge. We have to evolve a new class of literature-the women's literature in science. We have to project the exclusive identity of women scientists. In 2008, we had just 62 papers and in 2009 we received more than double this number! And it is gratifying that this trend is catching up with succeeding Congress.

In India, women scientists come from different backgrounds: rich or poor families, educated or illiterate parents, different religious denominations (Hindu, Christian, Islam, Sikh, Parsee etc.,), diverse cast groups, diverse language areas, urban or rural families etc. In spite of all these divergent backgrounds, the problems faced by women in science are more or less similar, and have to be tackled unitedly. And this process should be continued for years before a sane and sensible condition is created for a conducive atmosphere for a creative career in science- It is for this reason that SVAK decided to conduct the National Women's Science Congress annually on 7th November, and present the Marie Curie Mahila Vijnana Puraskara to an eminent women scientist, and the C. V. Raman Mahila Vijnana Puraskara to an outstanding scientists in the field of Chemical, Physical and Mathematical Sciences. The receipients of these puraskaras include such outstanding women scientists as (1) Dr. Vijayalakshmi Ravindranath, Founder-Director, National Brain Research Center (now IISc, Bangalore) (2) Dr. G. V. Satyavati, the first and only woman DG of ICMR; (3) Dr. Sujata Ramadorai, Professor at TIFR and member, Knowledge Commission; (4) Dr. Meena Kumari, the first women to become DDG, ICAR; (5) Prof. Rohini Godbole, IISc, Bangalore; (6) Dr. Vaidehi Ganesan, Senior Scientist, IGCAR and now Professor, Satyabhama University.; (7) Dr. Tessy Thomas, Project Director, Agni Missiles, DRDO; (8) Dr. H. S. Savithri, IISc, Bangalore and (9) Smt. N. Valarmathi, Project Director, RISAT, ISRO, Bangalore.

SVAK conducts the Kannada Vijnana Sammelana (Karnataka Science Congress) on 15th September every year when the prestigious Visvesvaraya Vijnana Puraskara is presented to erudite scholars in spiritual, social and / or Secular-material sciences. And one of the three annual Puraskaras goes exclusively to Women (Dr. Gangubhai Hangal, Dr. R. Nagarathna, Dr. Vijayalakshmi Deshmane, Dr. Vijayalakshmi Basavaraj, Prof. M. S. Shaila; Dr. Sudha Murty; Dr. Meera Kausal, Dr. S. R. Savithri and Dr. Meena R. Chandawarkar).

Rashtirya Mahila Vijnana Sammelana is our humble attempt to take women in Science forward towards the forefront of SET – to encourage and empower women scientists to take up frontline leadership without losing or loosening the unqueness of the feminine qualities. Bharatiya women can and will certainly achieve this unique objective. Hail the legacy Madame Marie Curie ! Hail the legacy of Sir C. V. Raman and Indian scientific achievements!

Prof. K. I. VASU
Stapaka / Poshaka / Margadarshaka of
Swadeshi Vijnana Andolana-Karnataka
Chief Coordinator, NWSC-2014

Shri. H. RAMESH
General Secretary
Swadeshi Vijnana Andolana-Karnataka
Coordinator, NWSC-2014

Prof. H. S. Savithri (Mrs)
Dept of Biochemistry, IISc, Bangalore (Marie Curie Mahila Vijnana Puraskara-2013)

Lecture at Inaugural Function of 6th NWSC

Dignitanes on the dais an my dear friends,
At the outset, I would like to thank Martru Vedike and the Swadeshi Vigyana Andolana, Karnataka for conferring the prestigious Marie Curie Mahila Vigyana Puraskar on me; I am very pleased to receive this award instituted in the name of the most accomplished woman scientist and mother of mankind. She is the gold standard for women at all times. She has set an example for how every woman should strive to achieve her best.

In my own case, I hail from a middle class family. The motivation to do my best came from my mother who had only high school education but wanted her four daughters to be highly qualified as wither doctors, engineers or scientists. She made sure that all of us achieved this by being with us while we studied as children also doing her own work at the same time. Fortunately at that time we had very little diversions such as TV, Mobile, Face Book etc. **In** the present time, it requires even greater motivation to excel in studies and in profession and use the modern facilities available moderately and for useful ends.

All women who want to excel in their profession will necessarily have to play two different roles. For example, when it comes to home, I need to play the role of wife, mother, daughter in law, mother in law and grandmother and also be a good host to all visitors. Once at work, I need to play the role of scientist, teacher and research supervisor to young students. On no day what happens at home affects my work in the lab. Similarly, the success and failures of my profession does not affect my personal life at home. This kind of switching on and off is very important to be successful in both profession and family. It has the advantage of relieving the stresses caused by one role when you forget that role and assume the other role.

Coincidentally, as this happens to be the birth anniversary of Sir C.V. Raman, I am reminded of an incident that occurred when I was a pre-university student. My father encouraged me to join a summer school organized by the science forum of National College, Bangalore. There was a fee to be paid and it was indeed my father's vision about education that made him pay the same even though money was in short supply in our home. This was a very inspiring program. There were lectures by faculty from IISc and we had the freedom to interact with them and ask questions. Most importantly, we were taken to Raman Research Institute where we had the good fortune to listen to Prof. Raman and see his wonderful collection of crystals. Raman was interested in vision and colour blindness amongst Indian population at that time and examined all of us individually by asking us to identify different objects in colour pictures. I felt elated that I could spend a minute with the Noble Laureate. This motivated me further to study science.

I was fortunate to get admission to B. Sc (Hons), Chemistry in central college in my own home town. Such opportunities are difficult nowadays with the increase in the number of students aspiring to study in good coileges. 1 was also fortunate to get admission for M.Sc. in the same college and for Ph.D. in IISc under the guidance of a distinguished enzymologist, Prof. N. Appaji Rao. The first experiment he asked me to do was to demonstrate the activity of an enzyme called aspartate transcarbomylase in the crude extract of mung bean seedlings. I had the beginners luck and the assay worked the very first time and then I was asked to repeat six times with different batches of enzyme to validate the method. One needs to be perseverant, intuitive, and very hard working to succeed in experimental science. I could further demonstrate the kinetic and regulatory mechanisms of the enzyme. I had the good fortune meanwhile to get married to M.R.N. Murthy, an outstanding student of Prof. Venkatesan, Department of Organic Chemistry, IISc. The first thing he did for me was to write a program to analyze my data by an iterative procedure that would accurately estimate the kinetic constants and since then we have had an active collaboration throughout our research career. I wound up submitting my thesis 10 days before my son was born! I had all along full co operation from my parents, parents in laws and Murthy and so I could meet the dead line! If the husband and wife are in the same profession and complement each other's work, that is the most ideal situation for women to grow.

As a researcher, the choice of the problem and the long term goals are the key components for success. I am happy to say that we chose to work on viruses that infect plants in our country in this program organized by Swadeshi Vigyana Andolana. It is of paramount importance to work on solving problems relevant to our country. When we began our research work on molecular biology of plant viruses, the emphasis of research in the country was mainly on epidemiology and disease control. However, to evolve effective strategies of controlling plant viral diseases, it is necessary to isolate and characterize disease causing viruses. During the course of our study, we have isolated and characterized several new species of

viruses native to our country and determined their genomic sequences. We have also investigated several aspects of their life cycle using techniques of modem molecular biology. Such studies have helped in developing sensitive diagnostic tools and delineate regions of the genome important in the viral life cycle. Such gene segments were used for generating transgenic plants resistant to viral infection. This kind of basic research has also lead to practical applications. It has been fascinating to understand the molecular design of life using viruses as model systems.

Once again I would like to thank you all for this honour and I sincerely hope that your organization and work will inspire young women to excel in family and public life and fulfil the motto of Matru Vedike "ennobling motherhood and enabling women for leadership in science".

ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

FOCAL THEME
WOMEN'S EDUCATION: RETROSPECTS & PROSPECTS

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SISTER NIVEDITA (MARGARET ELIZABETH NOBLE) : HER DISCOURSES ON WOMEN'S EDUCATION.

"My life is given to India
In it I shall live and die".

Aindrila chakraborty
T-204, Purva Fairmont,24th main,25th cross,HSR Layout, Sector-II, Bangalore-560102.

Margaret Elizabeth Noble (28th Oct 1967-13th Oct 1911) better known to the rest of the world as 'Sister Nivedita's mission was to carry the banner of Vivekananda to every corner of India .She became prophet messenger to the cultural and political life of India.

At the suggestion of Vivekananda, Nivedita came to India in (1898) and dedicated the remaining fourteen years of her life for the 'Jana -desha-dharma', the people, the land and the religion of the country of her adoption. There were many distinguish personalities in contemporary in India, but none could perhaps outweigh the totality of contribution made by Nivedita. The term 'India' to her was not a geographical or ethnic entity, not a clan caste or blood group, neither a subject country, but India was an idea, an ideal, a legend, a symbol, a movement, a thought, asummation without the tyranny of geography. She is to study with meticulous care Indian ways of life, thoughts, legends, arts and architecture so that she might be fully equipped to play the role of "the mistress, servant, friend in one" to India. She became thoroughly Indianised in outlook. She also saw clear before her eyes the path that must be followed to instill into India fresh life and vigour, so that she might be the dynamic nation, that every Indian's cherished dream was to see. Her life was one consuming effort to one herself with the Indian experience. She was not merely Indians champion before the world, but also a patriot among patriots and a messenger among messengers to the Indian people.After studying the world in which she was to work, she wanted to evolve an educational method that would be "qualitatively true and universally applicable to the work of modern education of Indian women."

"India as she is , is a problem which can only be read by the light of Indian
history. Only by a gradual and loving study of how she came to be, can we
grow to understand what the country actually is, what the intention of her
evolution, and what sleeping potentiality may be".
-Sister Nivedita.

Swami Vivekananda felt keenly, that there was no chance for the welfare of the country, unless the condition of women was improved, just as he used to say, "It is not possible for a bird to fly on only one wing". So he paid great attention to the uplift of women in India in his scheme for the regeneration of the nation. At that time, he could not find any woman in this country, who could shoulder this responsibility, and so his choice fell upon Sister Nivedita then Miss Margaret Elizabeth Noble (28thOct.186 -13th Oct.1911).Nivedita met Swami Vivekananda in London in (1895). Vivekananda was on the look out for a woman, who could help in the amelioration of the lot of women in India, without whose upliftment no real regeneration of India, could be possible. He wrote to her, "Let me tell you frankly that I am now convinced that you have a great future in the work for India. What was wanted was not a man, but a woman; a real lioness, to work for the Indians, women especially. 1.Sister Nivedita responded whole-heartedly to this clarion call of her Guru, and fulfilled his expectations to the letter and spirit by her life and work. Sister Nivedita- a foreigner, adopted this country as her own motherland, and till her death, toiled ceaselessly to mitigate the sufferings of countless Indians. Her life is a profile of courage and devotion- a tribute to humanity. Swami Vivekananda once said to Nivedita "...you have the making in you of a world- mover"...2.Nivedita turned her world moving power to move the dormant life of Bengal and India. She had made this hapless country her own and gave her life-blood. She played an extraordinary role in the awakening of Bengal and India, at a crucial juncture of history. She nurtured all the cultural and political movements of the time.

With her manifold intellectual interests, Margaret had one deep rooted trouble, namely, the growing consciousness of uncertainty and despair with regard to religion. Though, since her childhood, she had come under various religious influences, none of them could satisfy her. It was at this time that Swami Vivekananda, the great Hindu Yogi went to London to preach Vedanta and his words 'came as living water to men perishing of thirst'. She met Vivekananda first in November, (1895). His teachings aroused her dormant religious aspirations and desire to serve humanity unselfishly, and she finally decided to take the plunge.[1]Thus, within a few months, Margaret's life unexpectedly changed its course and purpose.

Swami Vivekananda was not Nivedita's Guru in a general way; he was the mighty flood that carried Nivedita from a far distant land to the shores of India. It was he who for all time made Nivedita, "the Dedicated', Vivekananda paid great attention to the uplift of women in India, in his scheme for the regeneration of the country. As he could not find any woman in this country who could shoulder this responsibility, his choice fell upon Sister Nivedita. Nivedita had dedicated her life, all her heart and soul, to the service of India, while introducing her to a Calcutta audience;Swamiji had aptly described her as a 'Gift of England to India'. Many talented and noble ladies of the West responded to the call of Vivekananda, such as, Miss. Muller, Mrs Ole Bull, Miss Josephine Macleod, etc., but none, perhaps offered herself at the feet of her master with such complete self-dedication as Nivedita. That an English lady could root out the prejudices of the English character, enter so deeply and intimately into the spirit and soul of Indian culture and civilization, shed her instinctive national loyalty, make India her home and the service of the Indian people the consecrated mission of her life, is indeed a testimony to the genius, dynamic personality and spiritual stature of Swami Vivekananda.[2]

It was Nivedita's mission to carry the banner of Vivekananda to every corner of India. She became the Prophet's messenger to the cultural and political life of India. At the suggestion of Vivekananda, Nivedita came to India in (1898) and dedicated the remaining fourteen years of her life for the 'jana-desha-dharma', the people, the land and the religion of the country of her adoption. There were many distinguished personalities in contemporary India, but none could perhaps outweigh the totality of contributions made by Nivedita. The term India to her was not a geographical or ethnic entity, not a clan, caste or blood group, not a subject country, not a black show. She was not a white woman in search of a black God, but India was an idea, an ideal, a legend, a symbol, a movement, a thought, and a summation without the tyranny of geography. She had studied with meticulous care Indian ways of life, thoughts, legends, arts and architecture, so that, she might be fully equipped to play the role, her master wanted her to play- the role of 'the mistress, servant, friend in one' to India. She had become thoroughly 'Indianised' in outlook and she loved and understood India better than an enlightened Indian. In fact, she with her perceptivity, read into many details of Indian life a meaning and a purpose that sophisticated Westernised Indians would fail to recognise. She also saw clear before her eyes the path that must be followed to instil into India fresh life and vigour, so that she might be the dynamic nation that every Indian's cherished dream was to see.

Rabindranath Tagore called her, "mother of the people" (LOKAMATA); Dr.Jagadish Chandra Bose likened her to the "Lady of the Lamp" and Sri Aurobindo thought she was "Fire" (SIKHAMOYEE). She was philosopher and guide to GokhaleandTilak, and 'Mahashweta' to Abanindranath and Nandalal. Youngmen of the Dawn Society swore by her. Nivedita lived uptoSwamiji's expectations. No son or daughter of India loved her more than Nivedita. Not a problem arose in the country in those years - whether social, political, or educational; whether affecting man, woman or youth-about which she did not feel concerned. She tried to restore India's lost glory and prestige through her activities, utterances and writings. S.K. Ratcliffe, the noted editor of the Statesman, once wrote, "The influences that have gone to the shaping of New India are still obscure, but this may be said with complete assurance that among them all, there has been no single factor that has surpassed, or equalled, the character and life and words of Sister Nivedita."

Environment produces an infinite complexity of feelings and yearnings. Some of these find expression in external work, while some remain dormant. Margaret's external activities brought about an unfoldment of the strength and subtlety of her intellectual understanding and an expansion of her natural faculties. But, at this time, her deep religious feeling agitated her profoundly. She felt uncertain and insecure, for though, since her childhood, she had come under various religious influences, none of them could satisfy her.[3]

Neither the church nor its doctrines could sustain her till she met Swami Vivekananda in 1895. His teachings seemed to light up all her previous experiences and gave her a new life with a new meaning.

The prevailing mood of cultured European thought then was one of doubt and negation. There was lack of feeling and faith in all spheres of life. It was natural, therefore, that an earnest seeker after Truth like Margaret, who could not adapt thereligious instruction of her childhood to her own mental growth, should experience an anguished sense of uncertainty and void. Her own generous outlook and a readiness to get Truth from whatever direction it came, however, led her to accept the Swami's Vedantic doctrine as a whole.

One day, during a conversation, the Swami turned to her and said : "I have plans for the women of my own country in which you, I think, could be of great help to me", and it was then she knew that she had heard a call that would change her life. For years she had waited for some light to dispel the darkness that was obscuring her progress. She now saw a ray of light and hopefully desired to follow it.

As the shores of England were left behind, Margaret's thoughts about an uncertain future flitted across her mind like the shadows of passing vapours. She was going to the land of her dreams, but what would it be like?

During the first few days, she went sight-seeing with English friends, Messrs' MacDonald, Dodson and Arbuthnot. She saw the Eden Gardens, the Botanical Gardens, the Museum and the Fort. On one Sunday she attended the church services. But her main interest lay in seeing the 'Hindu quarter', so whenever she was alone she hired a cab and drove through the streets in the northern part of the town. She cultivated the acquaintance of Indians like Dr. J. C, Boseand his sister Labanyaprabha Bose who conducted a school, the Tagore and Mataji and SaralaGhoshal. She also visited such educational institutions as Miss Bose's school, the Bethune CollegeandMataji'sPathshala[4].The Swami had made arrangements for her to take lessons in Bengali.

Swamiji insisted on Margaret imbibing the Hindu way of life without sacrificing her personality. That was not an easy thing to do. Margaret had come to India intent on working for women's education as Swamiji had asked her to do. She grew impatient as Swamiji took his own time to ask her to begin the work. Actually Swamiji was leaving her alone to prepare herself for work according to Indian ideals of self-dedication. Now amidst the bewildered ecstasy thataccompanied Margaret Noble's transformation into Nivedita, Swamiji hinted that the hour for her taking up work for women's education had come.

This period was one of intense stress for Nivedita, who was made to feel that she was still far from complete identification with Indian life. The strain was indeed as great as to make Mrs Bull intervene and Swami Vivekananda announced his intention to withdraw for a few days to seek means of peace. That very announcement made Nivedita resign herself to his will. Swamiji indeed returned in an aura of peace. Yet the journey to Amarnath on which Nivedita accompanied the Swami, contributed to Nivedita's complete adaption to Hindu-life. She saw the Swami in transition of realization from Shiva to the Mother, in self-abnegation so complete that he believed that everything was done by the Mother's will, that he had not the power to do anything himself and was transcending himself into complete union with the Universal will. The impact of all this on Nivedita was great.

An incident in Kashmir which left a most painful impression on Nivedita was the disallowance by the British Resident of the gift by the Maharajah of Kashmir of a piece of land to Swami Vivekananda who would have used it to house a Math and a Sanskrit College. This incident brought home to Nivedita the real nature of British subjection of India. She returned to Calcutta where Swamiji had preceded her, on November 1, 1898. She then adapted herself to Hindu etiquette, thereby earning the approbation not only of Mother Saradamani who in any case had been benign in her attitude towards her but of the orthodox women-most of them old widows-who lived with the Mother. It was time at last for Nivedita to begin the work which had always been in her view. She had, under Swamiji's inspiration, studied the habits and bents of mind of the people among whom she had to work; for her method of education had to be adjusted to those habits and bents of mind. A series of meetings were held at Balaram Bose's house at Bagbazar to prepare the ground for founding of the school.It was clear to her that the school would be only tentative and experimental in the early stages. For she did not want to follow any stereotyped method of work. After studying the world in which she was to work, she wanted to evolve an educational method that would be "qualitatively true and universally applicable to the work of modern education of Indian women." She had learnt from the Swami that to teach against the aspirations of the taught is to court ill results instead of good and that new ideals have to be approached through the old, the unfamiliar has to be reached through the familiar. So, Nivedita made honest efforts to make herself familiar with the aims and aspirations of the people amongst whom she lived.

On Sunday November 13, the Mother performed the opening of the school at 16, Bosepara Lane. A few girls of the neighbourhood were Nivedita's first pupils. She plunged earnestly into the school work. With a little reading and writing she introduced painting, clay work and sewing. She went into ecstasy over the handwork of the girls and wrote to Mrs Bull on May 31 : "I find the children here have as much artistic power as any I ever saw. Their brush work is wonderfully good considering their chances and their colour is excellent. And how they love sewing and manual occupation, you just cannot imagine".[5]

Before long, she won the hearts of the children who came to her, and the confidence of the mothers. The proud, reserved, orthodox women of the Neighbourhood found in Nivedita a good friend. Full welcome was accorded to her at any time of the day or night and they felt happy if they found a chance of helping her. Their little acts of kindness like sending milk or fruits when necessary, never missed Nivedita's attention. She gratefully acknowledged them. The pure, sweet, shy and reticent ladies charmed Nivedita and she always praised them in speech and writing.

While Sister Nivedita, considered the school to be the essential part of her work, she was also called upon to

extend her activities in a number of directions including public speaking. After the celebration on December, 9 of the installation of Sri Ramkrishna's picture at Belur Math, the Math started functioning in an organised manner. Nivedita gave lessons to the Brahmacharis or new initiates, in Botany, Drawing, Physiology and Sewing, spoke at the weekly meetings of the Mission, gave lectures on Education at the BrahmoSamaj, and started a teachers' training class which was attended by many distinguished ladies. She also taught history at an American missionary school. A speech on "Kali" which she made on February 13, 1899, at Albert Hall proved to be controversial. Dr MahendralalSarkar, an eminent scientist and doctor of those days, who was one of a distinguished assembly, questioned Nivedita's wisdom in preaching the Kali cult while they were fighting, Dr Sarkar said to remove superstitions of that nature. A gentleman present at the meeting replied forcefully and stampede ensued. All the same, Nivedita was invited to speak on Kali at the Kalighat temple. Before she spoke there, she gave an inspiring lecture at the Minerva Theatre on "Young India Movement." Swamiji and other Monks attended this lecture. Nivedita's speech at the Kalighat temple was a lucid discourse on the significance of Kali worship. She answered all the objections raised at the Albert Hall meeting and delineated the character of Kali both as the Mother and the Destroyer.[6]

Actually the first decade of the 20th century may be called an epoch-making period in Indian history. With the first political stirrings in the country, the British Government, headed by Lord Curzon, adopted strong measures to check the forces of nationalism. But ironically enough, it intensified the desire of the people for political advancement, and in some instances, stirred the patriotic feelings of the people to their very depths. And all these political events, naturally as it has been perceived earlier, brought about a change in the life and work of Nivedita. Her letters since (1900) show her growing interest in the political destiny of India.

Nivedita'swork during the following ten years shows how India and her future became her chief concern. Another fact that explains her active work during these years was her stay in Calcutta, which was the seat of the Government then and which witnessed the beginning of a great national movement. Nivedita could neither sit idle nor remain indifferent during this period of unrest and turmoil. She brought the full force of her intellectual and moral powers to bear upon the national movement.

Even with moderate leaders like Mr Gokhale, Nivedita had long discussions on various topics of national interest.

To Nivedita, her vision of freedom for the country always filled her heart with joy. Actually to Nivedita "isms" made no difference. The other event of the year that evoked much protest from different quarters of India was the Universities Commission. Lord Curzon had called an educational conference at Simla in 1901, which was followed by the appointment of the Universities Commission in (1902). On the basis of the Commission a Universities Act was passed in 1904. From one end of the country to the other, educated people protested against its illiberal provisions. Referring to it, the eminent educationist and Congress leader Mr.Surendranath Banerjee wrote: "Of the many disservices which Lord Curzon had done to India, his so-called reform of the universities was the most far- reaching in its consequences. Under the plea of efficiency he had officialised the Calcutta Municipality; under the same plea he now proceeded to officialise the universities, and to bring the entire system of higher education under the control of Government. Efficiency was his watchword; popular sentiment counted for nothing, and in his mad worship of this fetish Lord Curzon set popular opinion at open defiance. "About the Commission Nivedita indignantly wrote in a letter what she felt. We have had a Universities Commission lately, which has done its very best to kill all education, and especially all science education. This is THE point in India's wrongs that fires me, the right of India to be India, the right of India to think for herself, the right of India to knowledge. Were this not the great grievance I might be fired by her right to bread, to justice, to other things, but this outweighs all.Having been an educationist herself, she naturally felt a deep interest in the educational problem. When the Universities Act was before the Legislative Council in 1904, Nivedita was touring Behar and the United Provinces. She spoke on the educational problems in India more than once, calling it the problem of problems. Not being a politician, she did not make a capital grievance out of it. Nor did her indignation lead her to criticize and complain only. A constructive thinker and worker that she was, she urged the people to rise to the occasion, face the situation squarely and grasp the opportunity to promote national education, instead of looking up to the Government for help.

With her characteristic vigour, incisive logic and earnestness she said during a lecture at Bankipore-The educational policy which is now being followed gives anything but University education. The Indian Universities Bill attempts to narrow the sphere of education in this country. But I am not going to make a political speech. My object is to make you think and think. I am ceaselessly thinking on the educational problem. Sometimes, I find a way out and sometimes I do not. I have come here to help you in thinking out for yourself, for I have a belief in the power of right thought.The educational problem is one of national life, and so one ignorant of your national life cannot contribute in any

way to your wants. A foreigner can do so only when he acts with a correct ideal of national life and adjusts his deeds to the influences of the times. A foreigner cannot help you and you must help yourselves .It is for you to do and you should not crouch before the Government like monkeys to get done by the Government what you ought to do for yourself. ...You must look at the educational policy of the Government in a different attitude. By the Bill before the Legislative Council many of the schools are to be disaffiliated and then will come your turn to sweep out the hypnotism out of the past. ...You must be grateful to Government for the threatened disaffiliation of the schools as such disaffiliation will allow you much freedom of thought. But you must not sit back and thank the Government. You must work, work and work and remake the meaning of Education.[7]

Nivedita was a humanist and a public worker in every field-patriotism, education, politics, nationalism, industry, history, moral reform, social service, feminism, and what not. ...During the glorious Bengali revolution (1905-10), Nivedita was a name to conjure with in young Bengali. She was a colleague of almost everybody who was anybody in the movement of those days at Calcutta. ...If Vivekananda had not done anything but import Nivedita into the Indian sphere of activity his life-work would have still remained exceedingly epoch-making and fruitful. She was his miraculous discovery for India and grew into one of the profoundest treasures of the Indian people. [8]

Kali the Mother was Nivedita's first book that was published. The book depicted 'Kali' as she appears to man in anguish as the Terrible, who plays with him as with a child and thereby shelters him in love. The complicated conception was adequately explained in the book, which consisted of essays on various aspects of the subject. Two of its chapters "The story of Kali" and "The Vision of Shiva" were written in India, while the rest of the book was written in America in (1899). Behind the writing of this book was also Swamiji's inspiration.

The book was published in (1900) and was favourably reviewed. It cannot be called biographical, though it contains biographical accounts of two Hindu Saints - RamPrasad and Sri Ramkrishna. Her interpretation of Kali, the Goddess is her own contribution to the theological and philosophical Ideas of the Hindus.Nivedita's "Siva"," Buddha" and "An Indian study of Love and Death" -all three written in beautiful poetic proses are also her contribution to the theological and philosophical ideas of the Hindus.

The two article of Nivedita, "Lambs Among Wolves" and "Aggressive Hinduism", which were later published in book form, were meant to counteract the half-truths and untruths about Indian social life spread in the West by Christian missionaries for their selfish ends. The defiant and aggressive note of the articles speaks of Nivedita's authority, knowledge and conviction. These two articles together with The Web of Indian Life and Studies from an Eastern Home attracted much attention as being systematic attempts to reveal the inner life of India. The sweetness of the Hindu way of life and the wide survey of women as they live and think in different parts of India reveal to many Indians themselves the wealth of interest and romance that lie hidden in their homes. The intense sympathy, kindness and love of Nivedita for India animate every sentence of the books.

Sister Nivedita stresses the point that nationality cannot survive without a strong sense of civic duty among the people. The ramifications of this position are fully set out in the book. Hints on National Education in India are a masterly discussion of the requirements of a truly national education. The Introduction to the book calls for a compulsory period of service for young, educated people in the cause of spread of primary education. The papers on education that Sister Nivedita presents in the book stress (i) the need for education being strictly oriented to the understanding of Indian life; (ii) describes the three elements of education as mental preparedness for learning, absorption of the common social concepts and full human development; (iii) emphasises the need for training of the emotion no less than that of the intellect; (iv) points to the need for directing education to the; duty of nation-making; (v) calls for inspiring education with national ideals based on national history and geography. Sister Nivedita proceeds to write on the illusion of the craze for foreign culture for its own sake. She includes in the book an essay on a subject on which she was never tired of writing -namely, the right type of education for Indian women.Ancillary to this essay is "The Project of the Ramakrishna School for Girls." "Suggestions for the Indian Vivekananda Societies" discusses the method and purpose of training of young men for social work. "Notes on Historical Research" gives useful pointers to students of history. "A Note on Co-operation" is emphatic in tone. "The Place of the Kindergarten in Indian Schools" is an exhaustive and delightful discourse on the education of very young children. Two essays on "Manual Training as a Part of General Education in India" complete the compendium on national education that the book really is.[9]

A brief review of Sister Nivedita's "Interpretation of the course of Indian History", also unfailing throws much deserved light on her literary activities- Nivedita keenly felt the need for a thorough rewriting and reconstruction of India's history on a truthful and sound basis. In her writings we find abundant proofs of her knowledge of Indian history- particularly religious history. But she felt that there was need for re-discovering India from her

ancient past to later phases. At her time knowledge of Indian history was very limited and inadequate. Available historical works at the time were mostly written by British. In these works distorted accounts were furnished of India's history. That made the task of re-writing of India's history on truly national lines all the more urgent.

In an interesting letter to the historian Dr.RadhaKumud Mukherjee, Sister Nivedita strongly emphasised the need for proper historical research in India. In this connection she mentioned several points. We may note these one by one. She wrote:
(i) In all that you do, be dominated by the normal air. Remember that Truth, in its fullness, is revealed, not only through the intellect, but also through the heart, and the will.

The historical research-worker must have a strong moral sense and a deep regard for truth. This meant that even if some unpleasant facts were found, these also had to be recorded. Another implication of proper research was that the approach was not only to be intellectual, but it was also to be guided by the heart and will. That is to say, a deep feeling and a firm determination were also to be guiding factors, there was to be the element of sympathy, and also the will to know.

(ii) Never be contented with the ideas and the wisdom which are gathered study. We are bodies, as well as minds. We have other senses and other faculties, besides those of language, nm^ limbs, as well as brains. Use the body. Use all the senses; use even the limbs, in the pursuit of truth. That which is learned, not only with the mind, by means of manuscripts and books, but also through the eyes and the touch, by travel and by work, is really known. Therefore, if you want to understand India, visit the great historic centres of each age.

In other words, all the powers of mind and body must be used to the full. Important historical centres must also be visited in order to gain the right perspective.

(iii) Never forget the future. 'By means of the Past to understand the Present, for the conquest of the Future'. Let this be your motto. Knowledge without a purpose is mere pedantry.

This is a highly significant instruction. Historians usually become too much involved in the past. To discover and reveal the past becomes often the consuming passion of the historian. In that event historical research misses its true aim. It becomes purposeless. The right procedure will be to know first the past, then to understand the past in the light of the present, then with the fund of knowledge thus acquired the attempt should be made to mould the future. Thereby a high purpose is fulfilled.
(iv) And now comes the question of the scope of your work, the question of what your are actually to do. On two points I know you to be clear,- first, you are determined, whatever you do, through it to serve the Indian Nationality, and second, you know that to do this, you must make yourself a world-authority in that particular branch of work.[10]

Thus, the historian is to have two high ambitions. First, through his knowledge he must endeavour to serve the cause of the nation. Secondly, he should study his subject so deeply and widely that he may become an international authority in his branch of specialisation.

She also points out that the field of labour may be wide to such extent that the Indian may truly assimilate the modern spirit. Three elements are important- Modern science, Indian History; and the world-sense or geography. A person may specialise in any one of those three, but he may also try to have a broad background of historical knowledge.

To illustrate the above point, she said :
(v) If you were a worker in science, you might read a good deal of History, in interesting forms, as recreation. And so on. One of the modes by which a line of high research becomes democratised is just this.
(vi) But whatever you do, plunge into it heart and soul. Believe that, in a sense, it alone,- this modern form of knowledge, young though it be,- is true. Carry into it no prepossessions, no prejudices. Do not try, through it, to prove that your ancestors understood all things...[11]
In other words the spirit of work must be thoroughly scientific, absolutely free from any bias or prejudice. There should not in particular, be the tendency to glorify the past (our ancestors) in an emotional way.
(vii) And now as to the subject itself. Already you have progressed in the direction of History and Indian Economics. It is to be supposed therefore that your work itself will be somewhere in this region. But side by side with your own specialism... do not forget to interest yourself in subjects as whole.
In this context Nivedita suggests that a person studying history must study geography also. Similarly, the specialist in geography must study history also. This is a very practical suggestion, because there is a close interconnection between the two subjects. Another point made by Nivedita in this context is :
Again if Indian History be your work of research, read the finest European treatises on western History. They may not always be valuable for their facts, but they are priceless for their methods.
This is also a highly instructive suggestion. This will not only broaden the horizon of knowledge, but will ensure a thorough training in methods of historical research. To Nivedita it is India, the spirit and soul of India, that should catch the imagination of the Indian historian. He should feel intensely the heartbeat of the Indian people. Indian

nationalism should be the mainspring of his inspiration no matter in what branch of history he is specialising.[12]

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GOVERNMENT SCHOOL EDUCATION: A CASE STUDY

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The focal theme of the conference is Women's education retrospects and prospects. The authors of this paper have chosen the topic "Government School Education" to highlight the relevance of school children's education which is also an important aspect with respect to women's education. As Nelson Mandela quoted "Education is the most powerful weapon which you can use to change the world", thus providing quality education is an important aspect of the society. Today there are many schools, managed by either private or government sectors. Since not many children can afford to go to private schools the only other option would be to opt out for government schools. To attract more students the government devised various schemes like mid-day meals, free books, free education etc. In spite of all these facilities, the percentage of students going to school is not 100%. Why? What could be the reason? Is it something to do with the curriculum? Or something to do with the teaching methods employed by government schools? Or due to constraints imposed by parents? ---

Several of these questions are answered in the present paper. The authors provide the role of various NGO's in imparting and improving education in government schools. The co-author is a volunteer in an NGO initiative group and presents her innovative programs built for the purpose. The objective is to inculcate interest in learning among various children in the school. Besides the authors are conducting an experiment as a case study. The authors hope that with the skilful efforts, the organization can attract more number of children with the designed technology.

Keywords: Women education, Government School, Initiative, Learning, Children

I. Introduction: Right to Education is the fundamental right under the constitution of India, a right of every citizen. Education is an important aspect for a country's growth. It is thus the responsibility of the government to achieve 100% literacy. Today, there is a proliferation of private and government aided schools in the country. Many schools are funded by the government to provide free education for all. Despite which many parents are still hesitant to send their children to school. Government took various measures to attract more children and thus started with the concept of mid –day meals programme and many others which still not being attracted by all students, irrespective of states in India. They are struggling hard to achieve their goal.

Albeit the fee structure of the private schools is on a higher side the quality of education is improvising day by day. A few months back we spoke to few parents who send their children to private schools, and they expressed their happiness with their children's education. They are taught creative thinking, problem solving skills, experiment based learning, visual learning etc.

Unfortunately the education in India has become commercialised. In this paper we shall know about few problems identified with respect to education in Government schools and the role of few Ngo's, and their initiatives to combat them. The case study is taken with respect to Teach Bangalore-A Volunteer based initiative. The aim and objective of this initiative is to provide free computers and basic education of the same to middle school government children.

II. Problems/Issues/Methodologies: The focal theme of the paper is Women's education. The problems and issues concerned with government school education irrespective of genders is relevant in this context and thus it is an important part of the study. Everyone has problems or the problem is everywhere. Only thing that makes difference in individuals is how problem is tackled. Amongst the various problems in different fields, domains lets in this section concentrate on few important hitches in Government School Education, the steps taken to combat these issues are discussed in the following section.

* With an ever increasing usage and wide range of applications of computers these days, it is very crucial for everyone to know how to use it. But with respect to children to succeed in their careers they should have good knowledge of its functionality and the usability. These days there are many scholarly articles, videos that are present on internet which can enable them to learn better and quicker. The students during 2000's were taught the basics functions like creating a document, excel sheet etc. But these days those basics are taught right from primary school and the complexity of the syllabus increases gradually. It's nice to see this change in the syllabus and students being given quality and required knowledge which is on par with the technological advancements. Unfortunately the same case doesn't hold good for government school children. There are not many computers nor many dedicated teachers for the same. Why Government school children be deprived of advanced education?

* It is said that Mathematics is the queen of all sciences. For anyone to be successful in his/her career one should have a strong foundation of the same. It was again known that Government Middle School Children needed more knowledge on basic Maths. As stated earlier there are lot of articles available on web to improve one's skills strong .Unfortunately due to limited access not every student can access them.

III. Solutions /Experiments Adopted: We have just quoted two problems with respect to Government School Education. In this section let's see how various NGO's or organizations came up with solution for the problems faced.

* Based on one of the input mentioned in the KIG Report 2020 [1] "Teach Bangalore" a volunteer driven programme was born.
* Teach Bangalore is aimed at providing basic computer knowledge to government schools. It also aimed at providing Basic English knowledge to the middle school children, which gives the momentum for them to learn in future. A 60 hr. syllabus is framed for the same. The second author is a volunteer for this programme. The classes are conducted on Saturdays. While teaching them and taking feedback from the students few points that we noticed were:

1. All children are equally enthusiastic to learn.
2. There was one student who told me this : ಮ್ಯಾಂನನಗೆ ಊರಿಗೆ ಹೋಗೊಕ್ಕೆ ಇಷ್ಟ ಇಲ್ಲಮ್ಯಾಂಯಾಕೆಂದ್ರೆ ಅಲ್ಲಿಗೆ ಹೋದ್ರೆ ನಮ್ಮೆ ಅಮ್ಮ ಅಪ್ಪ ಸ್ಕೂಲ್ಗೆಕಳ್ಸ ಅಂದ್ರೆ ಕೆಲಸಮಾಡು ಅಂತಾರೆ ಮಾಂ" which tells that there are still parents who are still unwilling to send their children to school.

* Samarpan –An Infosys CSR wing[2] started with an initiative to translate basic maths conceptual videos from[3] to Kannada and give them to government school children.
* Government donates computer to high school students through its MahithiSindhu project, Infosys also donates computers to government middle school students. Spark-Rural Reach Program is one such initiative of E & R Unit Infosys aims to provide basic computer knowledge to rural government school across Karnataka where in volunteers travel on weekends to spend quality time with students.
* With an idea to attract more and more children Note book drive an initiative of Samarpan, program was conceptualised. It is the largest volunteer driven program. Under this program notebooks are distributed to rural children .Currently around 50,000 books are being distributed.
* Above solutions mostly were interacting with children. With a main aim of education people in astrophysics and science Bharat GyanVigyanSamiti[4] conducts various workshops to teachers mostly teachers from Government schools on astrophysics, natural occurring phenomena's etc .They also provide the teachers with innovative methodologies to teach the students.

IV.Conclusion: We have quoted the solutions and problems that we saw when we were part of the initiatives. Most of the methodologies implemented have given positive results. So, let's all join hands in giving our best to the society and improve the government school education, thereby enabling them towards the better prospectus.

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WOMEN ENGINEERS IN INDIA

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Engineers are the best in the world and the engineering system prevailing should cater to the needs of these engineers and the world. But, where are we today? The authors of this paper discuss the contribution of women engineers in India, particularly; this has direct relevance to the focal theme of this conference. The current scenario calls for improving engineering education system in India for women.

All modern societies recognize that education and a careerare not only the right of a woman, but key factor that contributes to the economic and social development of a nation. In spite of this recognition, the participation and contribution of women in many professions is insignificant. This is most evident in the field of engineering, where women represent a large untapped source of talent.

In India, the participation of women in engineering was negligible till the early 1980s. It is only in the past 15 years that their enrolment has shown an increasing trend. This movement began first in the southern states and has gradually spread to other parts of the country. However, with the increase in numbers, women engineers are facing many problems in their careers.

Gender disparities in engineering exist around the world and special efforts are being made by institutions, governments and professional organizations to rectify these.

Keywords: Women Engineers, Engineering Education System, Movement, Gender.

1. Introduction : One of the major aims of education is the development of wholesome personality. Possession of relevant knowledge, creation of new knowledge, and the capacity for its application has become the determinants in the strength of a nation. Consequently, technical education has come to the center stage and is today the most important agent for change and development. Engineering refers to the professional art of applying science to the optimum conversion of the resources of nature to the uses of humankind.

India has the potential to be a global technology leader. Indian industry is competing globally in software and even in areas such as automobiles, chemicals and engineering equipment. A critical issue for the future success of Indian industry is the growth of engineering education in India. Engineers today solve all sorts of problems, and one of their most important tools is their own creativity. Most of the things that make our lives safer, more enjoyable, and more productive are products of engineering. Engineering surrounds us, part of every aspect of our lives. The job of the engineer is to combine the knowledge and tools of today with dreams of tomorrow to create the world of the future.Engineering has been called "design under constraint." Engineers create elegant solutions while working within various limitations, such as the laws of nature, the desires of consumers, or local statutes. As we take on the challenges facing us, it will be engineers and their creativity that design the world we want and turn ideas into reality. The different perspectives would include methodology.

All modern societies recognize that education and a career are not only the right of a woman, but key factor that contributes to the economic and social development of a nation. In spite of this recognition, the participation and contribution of women in many professions is insignificant. This is most evident in the field of engineering, where women represent a large untapped source of talent.

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Gender disparities in engineering exist around the world and special efforts are being made by institutions, governments and professional organizations to rectify these.

2. Approach

2.1Features : Women, cognitively and hormonally, think and feel differently from men and have different aptitudes. Women prefer dealing with people as against things. General perceptions of women are that they are soft, caring & emotional. Whereas that for men are that they are intellectual, rational and logical. They are workers. Men are comparatively less emotional. Women are concerned about others and are effective and natural caretakers. In all, women's biological role & responsibil ities are as mothers and home-makers and men are considered as bread winners.

2.2 Society's Perspectives : The status of women in society at all levels is inferior to that of men. In some impoverished communities in India, education and health particularly for women are issues of low priority.Girls are often taken away from school to do house work and take care of younger siblings when both the parents go to work. Unfortunately, most girls feel obliged to yield to parental pressure. Even some of the labor incentive economic activities done by women are poorly rewarded, being unskilled or low-skilled jobs.

2.3 Strengths Relevant to Engineering : Women have the following strengthswhich are relevant and suitable for engineering field:

* Competency in programming languages
* It is evident from the way women do home making, that women have the capability of planning, coordination,inventory management and quality control. Butsomehow these capabilities of women are not amplyexploited in engineering.
* Having a liking towards life science, women fit in aptly for the areas which combine life science and engineering like Bioengineering or Biotechnology.

3. Observations, Results & Discussions

3.1 Historical Perspectives : Engineering education in India started during the British era. Prior to Independence, the country had handful of engineering institutions. The participation of women in engineering was negligible till the early 1980s. It is only in the past 15 years that their enrolment has shown an increasing trend [1].

3.2 Current Scenario

3.2.1 Engineering Education : Over 50 years from 1951 to 2001, there has been nearly a 50-fold increase in the intake capacity. Due to advancement created in the information technology, during the last few years, we can find effective growth in the intake specially, in the field of Computer Science Engineering and Electronics. Most preferred branches are Computer Science Engineering, Electronics, Electrical, Chemical, Biotechnology, Biomedical and Civil engineering in that order of preference.

Table 1 shows the branch wise distribution of women engineers during the year 1975-1990 and 1991-2010 in two separate parts. From the table, it can be observed that, over years, the number of women graduates is increasing. The intake of women candidates in the branches of computer science and electronics has considerably increased due to advancements in information technology. And also there is a considerable decrease in the intake of women in Civil and Electrical Engineering branches.

Women's Engineering Colleges in India

There are a very few Engineering college especially for women. They are listed below.

* AnjammaAgi Reddy Engineering College for Women, Hyderabad, Andhra Pradesh
* Bhoj Reddy Engineering College for Women, Hyderabad, Andhra Pradesh
* Government Mahila Engineering College, Ajmer, Rajasthan
* Greentech College of Engineering for Women, Salem, Tamil Nadu
* Idhaya Engineering College for Women, Chinnasalem, Tamil Nadu
* Indira Gandhi Institute of Technology, Delhi
* L B S Institute of Technology for Women, Thiruvananthapuram, Kerala
* Mahila Institute of Technology, Meerut, Uttar Pradesh
* MKSSS's Cummins College of Engineering for Women, Pune, Maharashtra
* P.S.R.Rengasamy college of engineering for women, Sivakasi, Tamil Nadu
* Rajasthan College of Engineering for Women, Jaipur, Rajasthan
* Sree Buddha college of engineering for women, Elavumthitta, Kerala
* Usha Mittal Institute of Technology, Mumbai, Maharashtra
* Vivekananda College of Engineering for Women, Bangalore, Karnataka
* Women's Institute of Technology, Darbhanga, Bihar

Table 1: Branch wise distribution of women engineers

Branch	1975 90 (Per Cent)	1991 2010 (Per Cent)
Civil	26.4	19.1
Computer Science	6.2	17.8
Electrical	32.5	16.1
Electronics	30.4	37.1
Mechanical	4.5	9.3

Table 2: Year wise distribution of Women graduates from some institutions

	1975-80	1981-85	1986-90	1991-95	1996-2000
No. of women	170	676	1318	2213	4537
Total no. of graduates	14556	16251	16861	22614	27456
Per cent of women	1.2	4.16	7.8	9.78	16.5

3.2.2 Engineering Employment : In US, 11% of the engineering workforce in 2003 was women whereas 9.6% of engineers in Australia are women. In India, Technical Educational Institutions (TEIs) provide the largest avenue for employment whichis about 21% of the total woman employment. Employment in the large-scale private sector industry is 18.4 %. On the whole, the percentage of women engineers works out to be 6.1 %. Number of women faculty is high in the departments like electronics, computers, etc. Interestingly in some cases, they are more in number than men! This is the indication of the trend that's going to pick up for the years to come.

3.2.3 Nature of Job: The preferred areas for employment by women are [1] Teaching, Computer, design, R and D, Project planning, Maintenance and troubleshooting, Production, Construction/Commissioning, Consultancy and Management in that order. Women have started becoming remarkable engineers. An interesting and increasing trend observed in Bangalore, the heaven of computer engineers, is that many companies have started choosing women to head a team of techies (DNA, 2013). Many are moving up to higher positions like Chief Executive Officer, Professor, etc. However the percentage of women engineers who successfully move up the ladder is small. The number of women engineering faculty members is quite considerable at the Assistant Professor level which is the entry level. The number decreases remarkably and is very small at the highest level i.e., in the cadre of full professor.

4. Challenges

4.1 Entry to Engineering : Though we can see growth in the number of women engineers, still many potential and deserving women are not entering engineering. There exist many reasons for this and need to be understood. Some of them are listed below:

* Most of the parents perceive that the expenditure on the education of their daughter/s is of no use and waste of money as they think that their daughter/s will not remain with them throughout their life.
* Due to lack of proper exposure, women have inaccurate perception of the engineering workplace. Hence do not opt for engineering.

4.2 Employment : After graduation, many girls, do not continue in this domain due to different reasons mentioned below:

First Entry: Finding the first job after graduation is the major hurdle for women. They may experience difficulty in being called for campus interviews. Many firms require references to get a job which can be difficult in case of rural women.

***Attitude**:* The jobs require determination to succeed resilience and personal belief. Women still need to develop these traits, playing an important role in all their decisions. Women engineers do not and cannot join male colleagues in informal groups and there seems to be certain amount of self-exclusion.

Gender Discrimination:Women face gender discrimination at various stages of professional life. There is difference in the way women and men are perceived in terms of expertise or competency in the workplace. Regarding many tasks, still there exists an assumption that only men can do it!! This leads to devaluing of women's work styles and biased assessment of their efforts,resulting in unequal pay and promotion. Women are eitherisolated or relegated to 'female' roles of note-taker,organizer or manager (Jenny Marder, 2012). Women haveto do better than men to get equal professional recognition.

Practical Training:Women get less or no chance for practical training. Due to this, they feel less comfortable

in engineering than men. They lack the professional role confidence that male engineers seem to acquire easily. Women find that there is too large a gap between the idea of being an engineer and the practice of it.

***Employers**:* When it comes to married women, some employers seem to be biased. They feel women, after marriage, will leave office without finishing the job or that she is disinterested. They have to really work hard to convince others that they are the same persons with same efficiency and sincerity even though now they are married.

***Distance**:* Major problem for women is that of travelling long distances. Many women miss job opportunities just because the interviews are far away. Women cannot take up jobs involving travel. There is reluctance of family towards letting them stay alone. Married women necessarily look for a job in the vicinity of the place of their stay, at least in the same city.

5. Conclusions-Remedial measures: No one can say what the future will bring, but one thing is certain: Engineers will play a major role in shaping the world of tomorrow.

To increase the number of women in the engineering field: Women need to be given guidance on course selection in early stage. The parents, teachers and counselors have to recognize engineering as an appropriate and legitimate career choice for women.

Individual Level: Discipline, punctuality, hard work and obedience are stated to be the qualities of women engineers and the same need to be nurtured to make their best use in career building also. They need proper mentorship. Women have to overcome the feeling of insecurity. They have to develop better language and speak up & express with confidence.

Employers:Justice to women should be ensured all levels of employment. Gender bias should be avoided in the process of selection of engineering staff. A woman member is to be incorporated in the selection committee. Female engineers should not to be judged by their appearance but by their ability & performance. Parental leaves.

6. References

[1] MrityunjayaKappali, 'Women Engineers-Some issues'
[2] P P Parikh, S P Sukhatme, 'Women Engineers in India'

WOMEN EDUCATION: RETROSPECTS & PROSPECTS

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ABSTRACT: "Education is one of the most important means of empowering women with the knowledge, skills and self-confidence necessary to participate fully in the development process."It is a milestone of their liberation as it enables them to responds to the challenges, to confront their traditional role and change their life. Education is important for everyone, but it is especially significant for girls and women. It is an entry point to other opportunities, and their achievements can have ripple effects within the family and across generations. It help them to recognize the importance of health care and how to seek it for themselves and their children, as well as to know their rights and to gain confidence to claim them. Investing in girl's education is one of the most effective ways to reduce poverty, gender gap ,domestic violence, infant mortality rate, and growth of population here by helpful in social, economic and political development of the nation. Along with education, Female Inheritance Right's is another significant factor which plays an important role in women's liberation and empowerment. The concept of women empowerment was introduced at the International Women's Conference at Nairobi in 1985. It defined empowerment as a redistribution of social power and control of resources in favour of women. The National Policy on Education 1986, Mahila Samakhya Project 1987,The National Commission of Women set up by an Act of Parliament in 1990,and many NGO's aim to empower women by educating them and to safeguard the right and legal entitlements of women. Empowerment can be measured by a women's relative physical mobility, economic security, decision making ability, freedom from domestic violence, and political awareness and participation. Liberation and empowerment is impossible unless women come together and decide to self-empower themselves. Progressive and resourceful women in the society need to come forward to help their less privileged sisters in as many ways as possible.

Key words: Empowering, self-confidence, gender-gap, infant mortality, female inheritance right, liberation, social mobility and self-empower.

INTRODUCTION: "I measure the progress of a community by the degree of progress which women have achieved." -Dr. B.R. Ambedkar.

" Education is one of the most important means of empowering women with knowledge, skills and self-confidence necessary to participate fully in the development process."It is a milestone of their liberation as it enables them to responds to the challenges, to confront their traditional role and change

their life. Education is important for everyone, but it is especially significant for girls and women. It is an entry point to other opportunities, and their achievements can have ripple effects within the family and across generation. Educating girls and women today continues to have life-changing effects on families, communities, and countries. Research over the years has shown that education is a key factor in reducing poverty, improving mortality, and encouraging democracy and citizenship. It helps them to know their rights and to gain confidence to claim them. Investing in girl's education is one of the most effective ways to reduce gender gap, dowry menace, domestic violence, infant mortality rate, and growth of population.

The place of the women in society is one of the fundamental aspects of any civilization, ancient or modern. Modern education and facilities have influenced much empowerment.

WOMEN'S EMPOWERMENT: Women's security, Decision-making power, and social mobility are three indicators for women's empowerment. Women empowerment has emerged as an important global issue in recent times. Empowerment is a multi-dimensional social process that helps people to gain control over their own lives. A women's empowerment begins with conscious perceptions about herself and her rights, her capabilities and her potentials, awareness of how gender and socio- cultural and political forces affect her. Over the years women have made great marches in many areas with notable development, reducing some gender gaps and improving their position of dignity and equality. The concept of empowerment was introduced at the International Women's Conference at Nairobi in 1985.The Conference defined Empowerment as a redistribution of social power and control of resources in favour of women. Thus the process of empowerment is multi- dimensional and it enables individuals and groups to realize their full destiny and powers in all spheres of life.

In India, women empowerment is a challenging task as we need to acknowledge the fact that gender based discrimination is a deep rooted social malice practiced in India in various forms since many generations. The malice cannot be wiped away within a few years. Formulating laws, legislations and policies are not enough as it is seen that most of the times these laws and policies just remain on paper. We have to accept the fact that things are not going to change overnight but because of this we cannot stop taking action either. The ground level actions should be focused towards changing the social attitude and practices prevalent in the society which are highly biased against women. When women's status is low, family size tends to be large, which makes more difficult for families to thrive. Population and development and reproductive health programs are more effective when they address the educational opportunities, status and empowerment of women. When women are empowered, whole families benefits, and they march towards the progress and prosperity. National and Rural development is impossible without empowering women.

HISTORICAL PERSPECTIVE: Women empowerment in India has a long and affluent history. The position of women in a society is the true index of its cultural and spiritual attainment. In the Rig Vedic age, women enjoyed a high position in Indian society. They had full freedom for spiritual and intellectual development. Women married at a mature age and were equal partners of their husbands in the performance of spiritual and temporal duties. They were free to attend public assemblies and were active participant in social activities. As the society grew complex, with the "four- varna system" based on occupation and birth , the status of women begin to decline.

In the history of our country, even Medieval India was not women's age –it was supposed to be the 'dark age' for them. Medieval India saw many foreign invasions that resulted in the decline in women's status. When foreign conqueror's like Muslims marched into the Indian society, they brought with them their own culture. In order to protect themselves from the barbarous invaders, Indian women started using 'purdah ' and other norms like Sati, Jauhar , and Child Marriage entered in the society. Girls were not allowed access to education and were treated as the material being. The parents married off their daughters at the age of 8-10 to get relieved from their responsibility.

With the advent of the British rule, a unique fusion of western and eastern thoughts took place. In India, a far reaching transformation took place in political, economical, and cultural spheres , giving scope to rethinking of values. Indian socio-religious reformers launched a campaign against social evils, especially relating to the treatment of women, took up a challenge to erase child marriage, female infanticide, purdah system, sati, subjugation of widows, etc that was prevailing in the society.

In the beginning of the 20th century, the scope of women's movement began to grow rapidly, with a large number of women themselves making definite efforts in the fields of education and health. The trend towards feminism found powerful response in the country and the movements of liberation grew with remarkable vigour, and helped them in entering in Indian National Movements.

MODERN INDIAN WOMEN: The status of women in modern India is a sort of paradox in a way that if on one hand a woman is at the peak of the ladder of success, and on the other hand she is mutely suffering the violence afflicted on her by her own family members. The women in modern times have achieved a lot but in reality they have still a long journey to complete. Their path is full of hurdles. The women have left the secured domain of their home and stepped into the competitive world, fully armored with their talents. There are many problems women in India have to face in their daily

routine. These problems have become part and parcel of the lives of the Indian women and the most pitiable state is that, most of them have accepted it as their destiny in our society. This thought of woman acted as a boost in the male dominant society and has given birth to many problems.

The main problems of Indian women includes- malnutrition, maternal mortality, large family, female infanticide, poor economic condition, honour killing, ill treatment at home due to dowry problem and lack of power , and over worked with meager pay, gender discrimination, harassment and insecurity at work places.

ROLE OF EDUCATION: Worldwide, educating women is considered to be one of the most important factors towards bringing a change in their current scenario. Empowering them to take decision regarding their own marriage, family planning, health and life at large, can be facilitated through education. Let us have a glance on changes brought up by women's education at present.

- Investing in girl's education is one of the most effective ways to reduce poverty, prevent female foeticide, female mortality rate, and gender gap.
- Though, women's literacy rates are significantly lower than men, education helps girls and women to know their rights and to gain confidence to claim them.
- Girls who have been educated are likely to marry later and to have smaller and healthier families.
- The employment opportunity has empowered women economically and this has reduced to some extent the Dowry menace, harassment, violence against them. But still it is witnessed among uneducated, backward, and rural area.
- Governments Educational policies such as free compulsory primary and secondary education to all children had a positive impact on the women of rural and marginal groups .
- Participation of rural women in Panchayat Raj system and increase in the number of women being elected to the LokSabha and State Assemblies , is an indication to their political empowerment.
- Decision making power and social mobility is higher –among employed urban women than rural and less educated women.
- Women's economic participation in development has changed women from their traditional role as 'reproducer' to 'manager' and 'CEO'S' of corporate world.
- The proposal to open an exclusive bank for women was the highlight of the year 2013-14 budget.
- Indo-American cosmonauts Kalpana Chawla and Sunitha Williams conquering the space and making a record, is an excellent example of education as means of women's empowerment and liberation .

RECOMMENDATION:

- The education of girls should be given as much importance as that of boys and equal amount of money should be spent on both.
- Experienced and educated ladies should be appointed to draw up plans for the expansion of women's education.
- Arrangement for higher education for girls should be made in villages and towns.
- Women Teacher's should be encouraged and they should be given Teacher Training Course.
- Lady Inspecting Staff should be appointed in greater number to inspect girl's school and college to check their educational standard, security and hygiene.
- Major emphasis should be laid on women's participation in vocational, technical and professional education at different levels and to eliminate sex stereotyping in vocational and professional courses and to promote women's participate in non – traditional occupation, as well as in existing emergent technologies.
- Implementation of severe Laws and Policies to prevent atrocities against women. Violence against women in India is widespread. The present enforcement of laws and sentencing of perpetrators rarely match the crime, and it is a long and arduous process, the gap is further widened by influence and money power.
- The Indian media must focus on women issues in a decisive way, and programmes to strengthen women development should be enforced and news adversely affecting their development should be censored or banned.
- Better civic amenities should be provided to make them comfortable outside the vicinities of their homes.
- Sensitizing the police force to women's problem
- Encouraging free and quality education with good infrastructure and security to women right from rural level.

CONCLUSION: Educating women is certainly the need of the hour, but this alone would not change the current scenario. The discrimination happens regardless of whether a woman is educated or not. Men and women are two wheels of the cart. Both are important to run the society. Its high time to change the mindset of society. Hence, men must participate equally in the empowerment of women. To reemphasize once again, women's empowerment cannot take place unless women come together and decide to self-empower themselves. It should be all round in nature. Self- empowerment can begin by addressing day to day issues faced by individual women and tackling them with a mindset of improving the overall living conditions of women at every level and strata of the society. A revolutionary movement has to be build up which awakens the individual self in each and every woman for creative and generative action.

"Give a book and a pen to every child" said Mallala, a sixteen year old Pakistani girl, a Noble prize winner of 2013. She was shot thrice by Taliban for boldly continuing her education against the norms laid by them. In this regard, like Mallala, many courageous, progressive and resourceful women and men in the society need to come forward to help the less privileged women in as many ways as possible. This shall

help us to sow the seed for real women empowerment in India.

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ಮಹಿಳಾ ಸಂವೇದನಕ್ಕೆ ಲೇಖಕಿಯರ ಕೊಡುಗೆ

ಡಾ. ಶಕುಂತಲಾ ಗೋಪಶೆಟ್ಟಿ
ಸಹ ಪ್ರಾಧ್ಯಾಪಕರು, ಎಸ್.ಎಸ್.ಆರ್.ಜಿ ಮಹಿಳಾ ಮಹಾವಿದ್ಯಾಲಯ, ರಾಯಚೂರು.

ಸಾಹಿತ್ಯ ಜೀವನದ ಕೈಗನ್ನಡಿ ಹಾಗೂ ಪಡಿನೆಳಲು ಅಭಿವ್ಯಕ್ತಿಯ ಒಂದು ಪ್ರಮುಖ ಸಾಧನೆ ಬಹು ಕಾಲದಿಂದಲೂ ವಿಶ್ವದಲ್ಲೆಲ್ಲ ವ್ಯಕ್ತಿಗಳು ತಮ್ಮ ಅನುಭವಗಳನ್ನು, ಭಾವನೆಗಳನ್ನು ಸಮಕಾಲೀನ ಸಮಾಜದ ಪರಿಸ್ಥಿತಿಗಳನ್ನು ತಮ್ಮ ಜಯ– ಸೋಲುಗಳನ್ನು ಬರಹಗಳ ಮೂಲಕ ದಾಖಲಿಸುತ್ತಾ ಬಂದಿದ್ದಾರೆ. ಸಾಹಿತ್ಯವೆಂದರೆ ಬರವಣಿಗೆಗಳ ಸಮರೂಪವಾದ ಸಮಷ್ಟಿಯಲ್ಲ. ವಿವಿಧ ಕಾಲಸ ವಿವಿಧ ದೇಶದ ಪರಿಸ್ಥಿತಿಗನುಗುಣವಾಗಿ ಸಾಹಿತ್ಯವು ಸೃಷ್ಟಿಯಾಗುತ್ತವೆ. ಸಾಹಿತ್ಯವು ಪ್ರಗತಿಪೂರ್ವ ಹೋರಾಟಕ್ಕೆ ನಾಂದಿ ಹಾಡುತ್ತವೆ.

ಮಹಿಳಾ ಹೋರಾಟಕ್ಕೆ ಸಾಹಿತ್ಯದ ಪಾತ್ರ ಎಷ್ಟು ಮಹತ್ವವಾದದ್ದು ಎನ್ನುವದು ವಿಶ್ವದಲ್ಲೆಲ್ಲಾ ಸ್ತ್ರೀ ಪುರುಷರ ಅಸಮಾನತೆಯ ವಿರುದ್ಧ ಧ್ವನಿಗಳು ಎದ್ದಿದ್ದು ಸಾಹಿತ್ಯದ ಮೂಲಕವೇ ಬರಹವು ಗಂಭೀರ ಸ್ವರೂಪದ್ದಾಗಿರಬಹುದು ಇಲ್ಲ ಲಘುವಾಗಿರಬಹುದು ಆ ಬರಹದಲ್ಲಿ ಭಂಡಾಯದ ಧ್ವನಿ, ಪ್ರಶ್ನೆ ಅಥವಾ ಪ್ರತಿಭಟನೆಗಳು ವ್ಯಕ್ತವಾಗಿದ್ದರೆ ಆ ಬರಹವು ಮಹಿಳಾ ಸಂವೇದನಕ್ಕೆ ಸ್ಫೂರ್ತಿಯನ್ನು ನೀಡಿದೆ ಎಂದರೆ ಅತಿಶಯೋಕ್ತಿಯಾಗಲಾರದು.

ಸಾಹಿತ್ಯದ ಕ್ಷೇತ್ರವು ಬಹುಕಾಲ ಲಿಂಗಪೂರ್ವಗ್ರಹಗಳಿಂದ ವಿಮುಕ್ತಿಯನ್ನು ಪಡೆದಿರಲಿಲ್ಲ. ಹಾಗೆಂದ ಮಾತ್ರಕ್ಕೆ ಇಂದು ಎಲ್ಲಾ ಸಾಹಿತ್ಯವು ಲಿಂಗಸಮಾನತೆಗೆ ಬದ್ಧವಾಗಿದೆ ಎಂದು ಅಥೈಸಬಾರದು ಆದರೆ ಸಾಹಿತ್ಯದಲ್ಲಿ ಮಹಿಳಾ ಧ್ವನಿಗಳು ಬಹು ಪ್ರಬಲವಾಗಿ ಕೇಳಲಾರಂಬಿಸಿದ್ದು ಕಳೆದ ಶತಮಾನದಿಂದಲೇ ಇದಕ್ಕೆ ಮುನ್ನ ಮಹಿಳೆಯರು ಸಾಹಿತ್ಯ ಕ್ಷೇತ್ರದಲ್ಲಿ ಪ್ರವೇಶಿಸಿರಲಿಲ್ಲವೆಂದಲ್ಲಾ ಆದರೆ ಇತರ ಕ್ಷೇತ್ರಗಳಂತೆ ಸಾಹಿತ್ಯ ಕ್ಷೇತ್ರದಲ್ಲಿಯೂ ಮಹಿಳೆಯರನ್ನು ಕುರಿತಂತೆ ನಕಾರಾತ್ಮಕ ಭಾವನೆಗಳು ಜಾರಿಯಲ್ಲಿದ್ದು, ಮಹಿಳೆಯೂ ಬರೆದಿದ್ದು ಲಘುವಾಗಿ ಕಾಣುವುದು

ಕಂಡುಬರುತ್ತಿತ್ತು. ಅಡಿಗೆ ಮನೆಯಲ್ಲಿ ಬಂದಿತಳಾದ ಮಹಿಳೆಯು ಅಡಿಗೆ ಪಧಾರ್ಥಗಳ ಹಾಗೆ ಬದುಕಿರುವಾಗ ಬಿಡುಗಡೆಯ ಧ್ವನಿಯೂ ಸಾಹಿತ್ಯದ ಮೂಲಕ ಹೊರಬಂದಿತು. ಆಂಲ ಸಾಹಿತ್ಯ ಕ್ಷೇತ್ರಕ್ಕೆ ಮಹಿಳಾ ಪರವಾದ ಬರಹಗಳನ್ನು ನೀಡಿದ ಜೇನ್ ಆಸ್ಟಿನ್, ಜಾರ್ಜ್‌ಎಲಿಯೆಟ್ ಮತ್ತು ವರ್ಜಿನಿಯಾದ ವೂಲ್ಫ್ ಅವರನ್ನು ವಿಶೇಷವಾಗಿ ಸ್ಮರಿಸಿ ಅನಂತರ ಆಂಗ್ಲಭಾಷೆಯಲ್ಲಿ ಕೃತಿಗಳು ರಚಿತವಾಗಿದ್ದು ಕಳೆದ ಶತಮಾನಗಳಲ್ಲಿ ಸ್ತ್ರೀ ಲೇಖಕಿಯರೆಂದೇ ತಮ್ಮನ್ನು ಗುರುತಿಸಿಕೊಳ್ಳುವಂತಹ ಸಾಹಿತ್ಯ ರಚನೆಕಾರರ ಒಂದು ಗುಂಪೇ ಯುರೋಪ್ ಮತ್ತು ಉತ್ತರ ಅಮೇರಿಕಾ ಖಂಡಗಳ ವಿವಿಧ ದೇಶಗಳಲ್ಲಿ ಅಸ್ತಿತ್ವಕ್ಕೆ ಬಂದದ್ದು ಮಹಿಳಾಪರ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸದಲ್ಲಿ ಒಂದು ಮೈಲುಗಲ್ಲು.

ಕನ್ನಡ ಸಾಹಿತ್ಯಕ್ಕೆ ಸುಮಾರು 1500 ವರ್ಷಗಳ ಇತಿಹಾಸವಿದೆ. ಆದರೆ ಸ್ತ್ರೀ ವಿಷಯದ ಕುರಿತು ಪ್ರತಿನಿಧಿಸುವ ಸಾಹಿತ್ಯ ರಚನೆಯಾಗಲಿಲ್ಲ ಹತ್ತನೇಯ ಶತಮಾನದಲ್ಲಿ ಅತ್ತಿಮಬ್ಬೆ ರನ್ನನ ಸಾಹಿತ್ಯೀಕ ಚಟುಚಟಿಕೆಗೆ ಬೆಂಬಲ ಸ್ಫೂರ್ತಿನೀಡಿ ಸಮಾಜಮುಖಿಯಾಗಿ ನಡೆದ ಧ್ವನಿ ಕೇಳಿಸುತ್ತದೆ. ಇನ್ನೂ 12ನೇ ಶತಮಾನದ ಶರಣ ಸಾಹಿತ್ಯದಲ್ಲಿ ಮಹಿಳಾ ಸಂವೇದನದ ಮೊದಲ ಮಹಿಳೆಯರು. ಇವರ ವಚನಗಳಲ್ಲಿ ಪ್ರಗತಿಪರ ಚಿಂತನೆಯ ಮಜಲುಗಳನ್ನು ಗುರುತಿಸುವುದು ಕಂಡುಬರುತ್ತದೆ. ಸಾಹಿತ್ಯ, ಧರ್ಮ, ಜ್ಞಾನ, ಭಕ್ತಿ ಇವುಗಳಲ್ಲೆಲ್ಲ ಪರುಷರ ಹಾಗೂ ಮೇಲ್ಜಾತಿಯವರ ಎಂಬ ನಂಬಿಕೆಯು ಬೇರೂರಿವ ಕಾಲದಲ್ಲಿ ಅಕ್ಕಮಾದೇವಿ, ಸಂಕವ್ವೆ, ಕಾಳವ್ವೆ, ಗುಗ್ಗವ್ವೆ, ಸತ್ಯಕ್ಕ ಮುಂತಾದ ವಚನಕಾರ್ತಿಯರು ಕೇವಲ ಪರುಷ ಪ್ರಧಾನ ವ್ಯವಸ್ಥೆಗಷ್ಟೇ ಅಲ್ಲ ಜಾತಿ ವ್ಯವಸ್ಥೆಗೂ ಸವಾಲೊಡ್ಡಿದ್ದು ಗಮನಾರ್ಹ. ನಂತರ ಸಂಚಿಹೊನ್ನಮ್ಮ ತನ್ನ ಹದಿಬಧೆಯ ಧರ್ಮದಲ್ಲಿ ಸಮಕಾಲೀನ ಸಮಾಜದ ಧೋರಣೆಗಳಾದ ಪುರುಷ ಪ್ರಧಾನತೆ, ಸ್ತ್ರೀಯರ ಪರಾಧೀನತೆ, ಪಾತಿವ್ರತ್ಯಕ್ಕೆ ಮಹತ್ವ ನೀಡುತ್ತಾ, ಸಂಪ್ರದಾಯದ ಸಂಕೋಲೆಯೊಳಗೆ ಬಂಧಿತಳಾದಂತೆ ಕಂಡರೂ ಸ್ತ್ರೀಯರ ಸಂವೇದನೆಗಳನ್ನು ಹೇಳುವ ಮಾತುಗಳು 'ಕುವರಿಯಾದೊಡೆ ಕುಂದೇನು' 'ಪೆಣ್ಣುಪೆಣ್ಣೆಂದೇಕೆ ಬೀಳುಗಳೆವರು ಕಣ್ಣುಕಾಣದ ಗಾವಿಲರು' ಎನ್ನುವ ಮಾತುಗಳಲ್ಲಿ ಸ್ತ್ರೀಭ್ರೂಣ ಹತ್ಯೆ, ಹೆಣ್ಣು ಶಿಶು ಹತ್ಯೆ ಅಸಮಾನತೆ ಇವುಗಳಿಗೆ ಹಂಗಿಸುವಂತಿದೆ.

ಹತ್ತೊಂಬತ್ತನೆಯ ಶತಮಾನದಿಂದಿಷ್ಟೇ ಮಹಿಳಾ ಸಾಹಿತ್ಯ ಸಾಕಷ್ಟು ಪ್ರಮಾಣದಲ್ಲಿ ಮಹಿಳೆಯ ಬದುಕು ಬದಲಾವಣೆ ಬೆಳವಣಿಗೆಯ ಮೂಲಕ ಪ್ರತಿನಿಧಿಸುತ್ತದೆ. ಮೊದಲ ಘಟ್ಟದಲ್ಲಿ ತಿರುಮಲಾಂಬ, ಆರ್. ಕಲ್ಯಾಣಮ್ಮ, ಶಾಂತಾಬಾಯಿ ನೀಲಗಾರ, ಕೊಡಗಿನ ಗೌರಮ್ಮ, ಸರಸ್ವತಿಬಾಯಿ ರಾಜವಾಡೆ, ಲೀಲಾವತಿ ಕಾಮತ್ ಇವರು ವಿಧವಾ ವಿವಾಹ ಸಮಸ್ಯೆ, ವರದಕ್ಷಿಣೆ ಸಮಸ್ಯೆ, ಬಾಲ್ಯವಿವಾಹ ಮುಂತಾದ ಸಾಮಾಜಿಕ ಸಮಸ್ಯೆಗಳನ್ನು ತಮ್ಮ ಕಾದಂಬರಿ ನಾಟಕಗಳ ಮೂಲಕ ಗುರುತಿಸುತ್ತಾರೆ.

ಎರಡನೇಯ ಘಟ್ಟದಲ್ಲಿ ತ್ರಿವೇಣಿ, ಎಂ.ಕೆ. ಇಂದಿರಾ, ವಾಣಿ, ಅನುಪಮಾ ನಿರಂಜನ್, ಆರಂಭ ಪಟಾಭಿ ಮುಂತಾದ 150 ಲೇಖಕಿಯರು ಮಹಿಳೆಯರ ನೂರಾರು ಸವಾಲುಗಳನ್ನು, ಸಂವೇದನೆಗಳನ್ನು 1950 ರಿಂದ 1975ರ 25ವರ್ಷಗಳ ಅವಧಿಯಲ್ಲಿ ಪ್ರತಿನಿಧಿಸುತ್ತಿದ್ದು ಕಂಡುಬರುತ್ತದೆ. ಇನ್ನು ಸಂಕೀರ್ಣವಾಗುತ್ತಿರುವ ಇಂದಿನ ಆಧುನಿಕ ಸಮಾಜದಲ್ಲಿ ಮಹಿಳಾ ಲೇಖಕಿಯರು ಒಂದು ನಿಶ್ಚಿತ ತಿರುವನ್ನು ತಂದುಕೊಟ್ಟರು. ಎಂ.ಕೆ. ಜಯಲಕ್ಷ್ಮೀ ಅವರಿಂದ ರಚಿತವಾದ ಮಂಗಳ ವಾದ್ಯ ಮೊಳಗಿತು, ಹೆಚ್. ಏ ಸಾವಿತ್ರಮ್ಮನವರ ಸೀತೆ,ರಾಮ, ರಾವಣ ಮತ್ತು ವಿಮುಕ್ತಿ, ಸಾರ ಅಬುಬ್ಕರರ ಸಹನಾ ಮತ್ತು ವಜ್ರಗಳು, ಗೀತಾ ನಾಗಭೂಷಣರ ಹಸಿ ಮಾಂಸ ಮತ್ತು ಹದ್ದು, ಅನುಪಮ ನಿರಂಜನರ ಆಳ, ವೀಣಾ

ಶಾಂತೆಶ್ವರರ ಗಂಡಸರು, ಸವಿತಾ ನಾಗಭೂಷಣರ ಸ್ತ್ರೀಲೋಕ, ವೈದೇಹಿಯ ಅವರ ಅಡುಗೆ ಮನೆಯ ಹುಡುಗಿ, ಅಸ್ಪೃಶ್ಯ ಹೀಗೆ ಇತ್ಯಾದಿ ಕೃತಿಗಳು ಮಹಿಳೆಯರಿಗೆ ತಮ್ಮದೇ ಆದ ಒಂದು ವ್ಯಕ್ತಿತ್ವ ಇದೆ ಎಂಬುದು ಸ್ಥಾಪಿಸಿರುವದು ಹಾಗೂ ಸಾಂಸ್ಥಿಕ ಬಂಧನಗಳಿಂದ ವಿಮುಕ್ತಿ ಪಡೆಯಬೇಕೆನ್ನುವ ಹಂಬಲ ಅದಕ್ಕಾಗಿ ನಡೆಸುವ ಹೋರಾಟದಲ್ಲಿ ವಿಧವಾ ವಿವಾಹಕ್ಕೆ ಮಾನ್ಯತೆ, ಮಾತೃತ್ವ, ಪಾತಿವ್ರತ್ಯ, ಪರಾಧೀನತೆ ಮುಂತಾದ ಮೂಲಗಳನ್ನು ಪ್ರಶ್ನಿಸುವದರ ಜೊತೆ ಜೊತೆಗೆ ಲೇಖಕಿಯರು ಈ ಎಲ್ಲಾ ಸಾಮಾಜಿಕ ಚಿಂತನೆಗಳನ್ನೊಳಗೊಂಡ ಸಾಹಿತ್ಯದ ಜೊತೆಗೆ ಪ್ರವಾಸ ಸಾಹಿತ್ಯ, ಆತ್ಮಕಥನ, ಸಾಹಿತ್ಯ ವಿಮರ್ಶೆ, ಸಂಶೋಧನೆಯಲ್ಲೂ ಗಣನೀಯವಾದ ಕೊಡುಗೆಯನ್ನು ನೀಡಿದ್ದಾರೆ.

ಒಟ್ಟಿನಲ್ಲಿ 90ರ ದಶಕದ ನಂತರ ಬರವಣಿಗೆಯನ್ನು ಗಮನಿಸಿದಾದ ಬರವಣಿಗೆಯು ಸ್ತ್ರೀ ದೃಷ್ಟಿಯ ವಿಮರ್ಶೆ, ಚರಿತ್ರೆಯ ಪುನರ್ಲೇಖನಗಳ ಒಲವು ಮತ್ತು ತಾಯ್ತನ, ಮೌಲ್ಯಗಳ ಮರುಚಿಂತನೆ ಹೀಗೆ ಇವೆಲ್ಲವುಗಳನ್ನು ನೋಡಿದರೆ ಮಹಿಳಾ ಸಂವೇದನಕ್ಕೆ ಮಹಿಳಾ ಲೇಖಕಿಯರ ಕೊಡುಗೆ ಅಪಾರವಾಗಿದೆ.

ಸಾಹಿತ್ಯ ಜೀವನದ ಕೈಗನ್ನಡಿ ಹಾಗೂ ಪಡಿನೆಳಲು. ಅಭಿವ್ಯಕ್ತಿಯ ಒಂದು ಪ್ರಮುಖ ಸಾಧನ. ಬಹುದಿನಗಳಿಂದಲೂ ವಿಶ್ವದಲ್ಲೆಲ್ಲಾ ವ್ಯಕ್ತಿಗಳು ತಮ್ಮ ಅನುಭವಗಳನ್ನು, ಭಾವನೆಗಳನ್ನು ಸಮಕಾಲಿನ ಸಮಾಜ ಪರಿಸ್ಥಿತಿಗಳನ್ನು ತಮ್ಮ ಜಯದ ಹಾಗೆ ಸೋಲುಗಳನ್ನು ಬರಹಗಳ ಮೂಲಕ ದಾಖಲಿಸುತ್ತಾ ಬಂದಿದ್ದಾರೆ. ಸಾಹಿತ್ಯವೆಂದರೆ, ಬರವಣಿಗೆಗಳ ಒಂದು ಸಮರೂಪ ಸಮಷ್ಟಿಯಲ್ಲ. ವಿವಿಧ ಕಾಲ, ವಿವಿಧ ದೇಶ, ವಿವಿಧ ಗುಂಪು ಮತ್ತು ವರ್ಗಗಳಲ್ಲಿ ಆಯಾ ಕಾಲದ, ದೇಶದ ಪರಿಸ್ಥಿತಿಗನುಗುಣವಾಗಿ ಸಾಹಿತ್ಯವು ಸೃಷ್ಟಿಯಾಗುತ್ತದೆ. ಸಾಹಿತ್ಯ ಪ್ರಗತಿಪೂರ್ವ ಹೋರಾಟಕ್ಕೆ ನಾಂದಿ ಹಾಡುತ್ತದೆ. ಮಹಿಳಾ ಹೋರಾಟಕ್ಕೆ ಸಾಹಿತ್ಯದ ಪಾತ್ರ ಎಷ್ಟು ಮಹತ್ವವಾದದ್ದು ಎನ್ನುವುದು ವಿಶ್ವದಲ್ಲೆಲ್ಲಾ ಸ್ತ್ರೀ ಪುರುಷರ ಅಸಮಾನತೆಯ ವಿರುದ್ಧ ದ್ವನಿಗಳೆದ್ದಿದ್ದು ಸಾಹಿತ್ಯದ ಮೂಲಕವೇ. ಬರಹವು ಗಂಭೀರ ಸ್ವರೂಪದ್ದಾಗಿರಬಹುದು ಇಲ್ಲ ಲಘುವಾಗಿರಬಹುದು ಆ ಬರಹದಲ್ಲಿ ಬಂಡಾಯದ ದ್ವನಿ ಪ್ರಶ್ನೆ ಅಥವಾ ಪ್ರತಿಭಟನೆಗಳು ವ್ಯಕ್ತವಾಗಿದ್ದರೆ, ಆ ಬರಹವು ಮಹಿಳಾ ಸಂವೇದನಕ್ಕೆ ಸ್ಪೂರ್ತಿಯನ್ನು ನೀಡಿದೇ ಎಂದರೆ ಅತಿಶಯೋಕ್ತಿಯಾಗಲಾರದು.

ಸಾಹಿತ್ಯ ಕ್ಷೇತ್ರವು ಬಹುಕಾಲ ಲಿಂಗಪೂರ್ವ ಗ್ರಹಗಳಿಂದ ವಿಮುಕ್ತಿಯನ್ನು ಪಡೆದಿರಲಿಲ್ಲ. ಹಾಗೆಂದ ಮಾತ್ರಕ್ಕೆ ಇಂದು ಎಲ್ಲಾ ಸಾಹಿತ್ಯವು ಲಿಂಗ ಸಮಾನತೆಗೆ ಬದ್ಧವಾಗಿವೆ ಎಂದು ಅರ್ಥೈಸಬಾರದು. ಆದರೆ, ಸಾಹಿತ್ಯದಲ್ಲಿ ಮಹಿಳಾ ದ್ವನಿಗಳು ಬಹು ಪ್ರಬಲವಾಗಿ ಕೇಳಲಾರಂಭಿಸಿದ್ದು, ಕಳೆದ ಶತಮಾನದಿಂದಲೆ, ಇದಕ್ಕೆ ಮುನ್ನ ಮಹಿಳೆಯರು ಸಾಹಿತ್ಯ ಕ್ಷೇತ್ರದಲ್ಲಿ ಪ್ರವೇಶಿಸಿರಲಿಲ್ಲವೆಂದಲ್ಲ. ಆದರೆ ಇತರ ಕ್ಷೇತ್ರಗಳಂತೆ ಸಾಹಿತ್ಯ ಕ್ಷೇತ್ರವು ಮಹಿಳೆಯರನ್ನು ಕುರಿತಂತೆ ನಕಾರಾತ್ಮಕ ಭಾವನೆಗಳು ಜಾರಿಯಲ್ಲಿದ್ದು, ಮಹಿಳೆಯು ಬರೆದಿದ್ದು ಲಘುವಾಗಿ ಕಾಣುವುದು ಕಂಡುಬರುತ್ತಿತ್ತು. ಆಂಗ್ಲ ಸಾಹಿತ್ಯ ಕ್ಷೇತ್ರಕ್ಕೆ ಮಹಿಳಾ ಪರವಾದ ಬರಹಗಳನ್ನು ನೀಡಿದ ಜೇನ್ ಆಸ್ಟಿನ್, ಜಾರ್ಜ ಎಲಿಯಟ್, ವರ್ಜೆನಿಯಾದ ವೂಲ್ಫ್ ಅವರನ್ನು ಇಲ್ಲಿ ವಿಶೇಷವಾಗಿ ಸ್ಮರಿಸ ಬಹುದು. ಅನಂತರದಲ್ಲಿ ಆಂಗ್ಲ ಭಾಷೆಯಲ್ಲಿ ಅನೇಕ ಕೃತಿ ಗಳು ರಚಿತವಾಗಿದ್ದು, ಕಳೆದ ಶತಮಾನದಲ್ಲಿ ಸ್ತ್ರೀ ಲೇಖಕಿಯ ರೆಂದೇ ತಮ್ಮನ್ನು ಗುರುತಿಸಿಕೊಳ್ಳುವಂತಹ ಸಾಹಿತ್ಯ ರಚನಕಾರರ ಒಂದು ದೊಡ್ಡ ಗುಂಪೇ ಯುರೋಪ್ ಮತ್ತು ಉತ್ತರ ಅಮೇರಿಕಾ ಖಂಡಗಳ ವಿವಿಧ ದೇಶಗಳಲ್ಲಿ ಆಸ್ತಿತ್ವಕ್ಕೆ ಬಂದದ್ದು ಮಹಿಳಾ ಪರ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸದಲ್ಲಿ ಒಂದು ಪ್ರಮುಖ ಮೈಲಿಗಲ್ಲು.

ಕನ್ನಡ ಸಾಹಿತ್ಯಕ್ಕೆ ಸುಮಾರು 1500 ವರ್ಷಗಳ ಇತಿಹಾಸವಿದೆ. ಆದರೆ ಸ್ತ್ರೀ ವಿಷಯ ಕುರಿತು ಪ್ರತಿದ್ವನಿಸುವ ಸಾಹಿತ್ಯ ರಚನೆಯಾಗಿರಲಿಲ್ಲ. ಹಾಗಾಗ್ಗೆ ಅಲ್ಲಲ್ಲಿ ಸ್ತ್ರೀಯರಿಂದ ಸ್ತ್ರೀ ಶೋಷಣೆಯ ವಿರುದ್ಧ ದ್ವನಿಗಳು ಕೇಳಿಬರುತ್ತಿದ್ದವು ಮಾತ್ರ. ಹತ್ತನೇ ಶತಮಾನದಲ್ಲಿ ಅತ್ತಿಮಬ್ಬೆ ರನ್ನನ ಸಾಹಿತ್ಯಿಕ ಚಟುವಟಿಕೆಗೆ ಬೆಂಬಲ, ಸ್ಪೂರ್ತಿ ನೀಡಿರುವುದು ಗಮನಾರ್ಹವಾಗಿದೆ. ವಿಧವೆಯಾದ ಅತ್ತಿಮಬ್ಬೆ ಇತರ ಸ್ತ್ರೀಯರಂತೆ ರಾಜ ಸುಖವನ್ನು ಅನುಭವಿಸುವುದಾಗಲೀ, ಒಂದು ಚಿಪ್ಪಿನಲ್ಲಿ ಅವಿತು ಕುಳಿತಿರುವುದಾಗಲೀ ಹಾಗೂ ಸಹಗಮನ ಮಾಡದೇ ತನ್ನ ಸಂಪತ್ತನ್ನು ಸಾಹಿತ್ಯ ಕೃಷಿಗಾಗಿ ವಿನಿಯೋಗಿಸಿದ್ದು ಸಮಾಜ ಮುಖಿಯಾಗಿ ನಡೆದ ದ್ವನಿ ಇಲ್ಲಿಂದ ಪ್ರಾರಂಭವಾಯಿತು.

ಹನ್ನೆಡನೇಯ ಶತಮಾನದ ಶರಣ ಸಾಹಿತ್ಯ ಸ್ತ್ರೀ ಪರವಾದ ಹೋರಾಟಗಳಿಗೆ ಭದ್ರ ಬುನಾದಿಯನ್ನು ಹಾಕಿತು. ಸ್ಥಾಪಿತ ಮೌಲ್ಯಗಳ ವಿರುದ್ಧ ಹೊರಬಂದ ಅಕ್ಕಮಹಾದೇವಿಯ ಬದುಕು ಹಾಗು ಬರಹಗಳು ತೋರಿಸುತ್ತವೆ. ಅಕ್ಕ ಮಹಿಳಾ ಸಂವೇದನದ ಮೊಟ್ಟ ಮೊದಲನೆಯ ಮಹಿಳೆ ಎಂದರೆ ತಪ್ಪಾಗಲಾರದು. ಹಾಗೆಯೇ ಶರಣ ಸಾಹಿತ್ಯದಲ್ಲಿ ಪ್ರಗತಿಪರ ಚಿಂತನೆಯ ಮಜಲುಗಳನ್ನು ಗುರುತಿಸುವುದಕ್ಕೆ ಇರುವ ಮತ್ತೊಂದು ಸಾಧ್ಯತೆಯೆಂದರೆ ಜಾತಿ ವ್ಯವಸ್ಥೆಗೆ ಅದು ಒಡ್ಡಿದಂತಹ ಸವಾಲು, ಸಾಹಿತ್ಯ, ಧರ್ಮ, ಜ್ಞಾನ, ಭಕ್ತಿ ಇವುಗಳೆಲ್ಲ ಪುರುಷರ ಹಾಗೂ ಮೇಲ್ಜಾತಿಯವರ ಸ್ವತ್ತು ಎಂಬ ನಂಬಿಕೆಯು ಬೇರೂರಿರುವ ಕಾಲದಲ್ಲಿ ಸಂಕವ್ವ, ಗೊಗ್ಗವ್ವ, ಸತ್ಯಕ್ಕ ಮುಂತಾದವರು ಕೇವಲ ಪುರುಷ ಪ್ರಧಾನ ವ್ಯವಸ್ಥೆಗಷ್ಟೇ ಅಲ್ಲ ಜಾತಿ ವ್ಯವಸ್ಥೆಗೂ ಸವಾಲೊಡ್ಡಿದ್ದು ಗಮನಾರ್ಹ. ಕನ್ನಡ ಸಾಹಿತ್ಯದಲ್ಲಿ ಎದ್ದ ಮತ್ತೊಂದು ಪ್ರಮುಖ ಸ್ತ್ರೀ ದ್ವನಿಯೆಂದರೆ ಹೊನ್ನಮ್ಮ. ಹದಿಬದೆಯ ಧರ್ಮದಲ್ಲಿ ಸಮಕಾಲಿನ ಸಮಾಜದ ದೋರಣೆಗಳು ಹಾಗೂ ಪುರುಷ ಪ್ರಧಾನತೆ ಮತ್ತು ಸ್ತ್ರೀಯ ಪರಾಧಿನತೆ ಪಾತಿವ್ರತ್ಯಕ್ಕೆ ಮಹತ್ವ ನೀಡುತ್ತಾ ಸಂಪ್ರದಾಯದ ಸಂಕೋಲೆಯೊಳಗೆ ಬಂಧಿತಳಾದಂತೆ ಕಂಡರೂ ಸ್ತ್ರೀಯರ ಸಂವೇದನೆಗಳನ್ನು ಸ್ತ್ರೀ ಪರ ಸಾಲುಗಳು ಹೀಗೆ – **"ಕುವರಿಗಾದೊಡೆ ಕುಂದೆನು", "ಪೆಣ್ಣು ಪೆಣ್ಣೆಂದೇಕೆ ಬೀಳುಗಳೆವರು ಕಣ್ಣು ಕಾಣದ ಗಾವೆಲರು"** ಎನ್ನುವ ಆಕೆಯ ಮಾತುಗಳು ಸ್ತ್ರೀ ಬ್ರೂಣ ಹತ್ಯೆ, ಹೆಣ್ಣು ಶಿಶು ಹತ್ಯೆ, ಅಸಮಾನತೆ ಇವುಗಳಿಗೆ ಹಂಗಿಸುವಂತಿದೆ. ಸಂಚಿ ಹೊನ್ನಮ್ಮ ಸ್ತ್ರೀ ಸಮಾನತೆಯ ಸಂವೇದನದಿಂದ ಬಹುದೂರವಿದ್ದರೂ ಕನ್ನಡ ಸಾಹಿತ್ಯವನ್ನು ಮಹಿಳಾ ದೃಷ್ಟಿಕೋನದಿಂದ ವಿಶ್ಲೇಸುವಾಗ ಆಕೆಯ ಕೊಡುಗೆಯನ್ನು ಸ್ಮರಿಸಬೇಕಾಗುವುದು.

ಹತ್ತೊಂತ್ತನೆಯ ಶತಮಾನದಿಂದಷ್ಟೇ ಮಹಿಳಾ ವಿಷಯಗಳನ್ನು ಕುರಿತು ಚರ್ಚಿಸುವುದು ದಾಖಲೆಯಾಗಿರುವುದು. ಕಳೆದ ನೂರು ವರ್ಷಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಕ್ಷೇತ್ರದಲ್ಲಿ ಮಹಿಳೆಯ ಸ್ಥಾನವನ್ನು

ಗುರುತಿಸಿಕೊಳ್ಳುವುದು ಮತ್ತು ಅವಳಿಗೆ ಸಿಕ್ಕಿರುವ ಸ್ಥಾನಮಾನದ ಹಿಂದಿನ ಸಾಂಸ್ಕೃತಿಕ ಒತ್ತಡ, ಒತ್ತಾಸೆಗಳನ್ನು ಅವರ ಸೃಜನಶೀಲತೆಯ ಅಧ್ಯಯನದಿಂದ ಕಂಡುಕೊಳ್ಳಬಹುದಾಗಿದೆ.

ಸಂಕಿರಣವಾಗುತ್ತಿರುವ ಇಂದಿನ ಸಮಾಜದಲ್ಲಿ ಸಾಹಿತ್ಯವನ್ನು ಕಲೆಗಾಗಿ ಕಲೆ ಎನ್ನದೆ ಸಾಹಿತ್ಯವೆನ್ನುವುದು ಸಮಾಜೋ–ಸಾಂಸ್ಕೃತಿಕ ಚಟುವಟಿಕೆಯಿಂದ ಅಲ್ಲಿ ರಾಜಕೀಯ ಮತ್ತು ಆರ್ಥಿಕ ವಿಷಯಗಳು ತಮ್ಮ ಪ್ರಭಾವನ್ನು ಬೀರುತ್ತಿವೆ ಎಂಬ ಎಚ್ಚರಿಕೆಯಿಂದ ಸಾಹಿತ್ಯ ಕುರಿತು ವ್ಯಾಕ್ಯಾನ ಒಳಗೊಳ್ಳುತ್ತದೆ.

ಸಾಹಿತ್ಯವನ್ನು ಸಮಾಜೋ ಸಾಂಸ್ಕೃತಿಕ ಚಟುವಟಿಕೆಯೆಂದು ಗುರುತಿಸಿಕೊಳ್ಳುವುದರಿಂದ ಮಹಿಳೆಯ ಸಂವೇದನಕ್ಕೆ ಸಾಹಿತ್ಯದಿಂದ ಅವಳು ಬಯಸುವ ಬಿಡುಗಡೆ ಸಿಗುತ್ತವೆಯೋ ಅಥವಾ ಅನೇಕ ಬಾರಿ ಸಂಸ್ಕೃತಿಯ ರಾಯಭಾರಿಯಂತೆ ಕೆಲಸ ಮಾಡುವ ಸಾಹಿತ್ಯವು ಅವಳ ಅಧೀನತೆಯನ್ನು ಬಲಪಡಿಸುವುದಿಲ್ಲ. ತಾನೆ ಎಂಬ ಪ್ರಶ್ನೆಗಳನ್ನು ನಾವು ಕೇಳಿಕೊಳ್ಳಬೇಕಾಗುತ್ತದೆ. ಸಾಹಿತ್ಯ ಮತ್ತು ಮಹಿಳೆ ಎಂದಾಗ ಸಂಸ್ಕೃತಿಯ ಪ್ರಶ್ನೆಯನ್ನು ಬಿಟ್ಟಂತು ಮಾತಾಡುವುದಿಲ್ಲ.

ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯಲ್ಲಿ ಆಲಕ್ಷಕ್ಕೊಳದಾದ ಮಹಿಳಾ ಸಾಹಿತ್ಯ ತನ್ನದೇ ವಿಶಿಷ್ಟ ಕ್ರಮ ಹಾಗೂ ಸಾಮರ್ಥ್ಯಗಳಲ್ಲಿ ತನ್ನಷ್ಟಕ್ಕೆ ಅಭಿವ್ಯಕ್ತಿಗೊಳ್ಳುತ್ತಲೆ ಬಂದಿವೆ. ಪ್ರಾರಂಭದ ಕಾದಂಬರಿಗಾರ್ತಿಯರು ಶ್ರೀಮತಿ ಶಾಂತಾಬಾಯಿ ನೀಲಗಾರ, ತಿರುಮಲಾಂಭ, ಕಲ್ಯಾಣಮ್ಮ, ಶ್ಯಾಮಲಾದೇವಿ, ಕೊಡಗಿನ ಗೌರಮ್ಮ, ಸರಸ್ವತಿಬಾಯಿ ರಾಜವಾಡ, ಲೀಲಾವತಿ ಕಾಮತ್ ನಂತರ ತ್ರಿವೇಣಿ, ಎಂ.ಕೆ ಇಂದಿರಾ. ಜಯಲಕ್ಷ್ಮೀ ಶ್ರೀನಿವಾಸನ್ ಮುಂತಾದ ಲೇಖಕಿಯರು ಕೌಟುಂಬಿಕ ಬದುಕಿನಲ್ಲಿ ಹೊಸ ಅಲೋಚನೆಗಳನ್ನು ತಮ್ಮ ಕಾದಂಬರಿಗಳ ಮೂಲಕ ವ್ಯಕ್ತಪಡಿಸಿದರು. ಆರಂಭದ ಲೇಖಕಿಯಾಗಿ ರಾಷ್ಟ್ರೀಯ ಮನೋಬಾವನೆಯನ್ನು ಹೊಂದಿದ್ದ ತಿರುಮಲಾಂಭ ಅವರು ಚಿಗುರು, ಕಂಬನಿ ಕಥಾಸಂಕಲನಗಳನ್ನು ರಚಿಸಿದ ಇವರು ವಿಧವಾ ಸಮಸ್ಯೆ, ವರದಕ್ಷಿಣೆ ಸಮಸ್ಯೆ, ಬಾಲ್ಯವಿವಾಹ ಮುಂತಾದ ಸಾಮಾಜಿಕ ಸಮಸ್ಯೆಗಳನ್ನು ಕುರಿತಂತೆ ಕಾದಂಬರಿ ಹಾಗೂ ನಾಟಕಗಳ ಮೂಲಕ ಗುರುತಿಸಿದರು. ಸುಮಾರು ಆರು ಕಾದಂರಿಗಳನ್ನು ಎಂಟು ನಾಟಕಗಳನ್ನು ಬರೆದ ತಿರುಮಲಾಂಭ ಅವರ ನಿಶಾಕಾಂತ ಕಾದಂಬರಿಯಲ್ಲಿ ಪರಂಪರಯನ್ನುಳಿಸಿಕೊಂಡು ಬರಬೇಕೆಂಬ ಉತ್ಕಟತೆ ನವನಾಗರೀಕತೆಯಲ್ಲಿ ಭಾವಿ ನಾಗರೀಕರು ಹದಗೆಡುತ್ತಿದ್ದಾರೆ ಎನ್ನುವ ಸೂಚನೆ ಎಲ್ಲಾ ಕಾದಂಬರಿ ಹಾಗೂ ನಾಟಕಗಳಲ್ಲಿ ಕಂಡುಬರುತ್ತದೆ. ಸುಶೀಲೆ, ಸಭಾ, ವಿದ್ಯುಲ್ಲತಾ, ವಿರಾಗಿಣಿ, ವಿಕ್ರಮ, ನಿಶಾಕಾಂತ ಮೊದಲಾದ ಕಾದಂಬರಿಗಳು ದಕ್ಷಾಕನ್ಯ, ಹರಿಣಿ, ಚಂದ್ರವದನೆ, ರಮಾನಂದ, ವಿವೇಕೋದಯ, ಮಾತೃನಂದಿನಿ, ಪೂರ್ಣಕಲಾ, ಮಣಿಮಾಲೆ ಇವುಗಳೆಲ್ಲಲ್ಲಾ ಸನಾತನ ಹಾಗೂ ಸಂಪ್ರದಾಯದಲ್ಲಿದ್ದರೂ ಅವರು ಅಂದಿನ ಸಮಾಜದಲ್ಲಿ ಕಂಡುಬರುತ್ತಿದ್ದ ಹಳೆಯ ಮತ್ತು ಹೊಸ ಬದುಕಿನ ರೀತಿಗಳ ಘರ್ಷಣೆ ಹಾಗೂ ಸಾಮಾಜಿಕ ಸಮಸ್ಯೆಗಳಾದ ಕನ್ಯಾವಿತಂತುಗಳ ಬದುಕಿನ ಗೋಳು ಸ್ತ್ರೀ ವಿದ್ಯಾಭ್ಯಾಸಕ್ಕೆ ಅಡೆತಡೆಗಳು, ಧರ್ಮದ ಹೆಸರಿನಲ್ಲಿ ನಡೆಸುತ್ತಿದ್ದ ಕುಟಿಲ ಕುತಂತ್ರಗಳು ಇವೆಲ್ಲವುಗಳನ್ನು ಬಿಡಿಸಲು ಯತ್ನಿಸುವುದು ಕಂಡುಬರುತ್ತದೆ.

ಸ್ವತಃ ಲೇಖಕಿಯರಾದ ತಿರುಮಲಾಂಭರವರಿಂದಲೇ ಸ್ತ್ರೀ ಸಂವೇದನ ಪ್ರಾರಂಭವೆನ್ನುವ ಹಾಗೆ ಸಂಪಾದನೆ, ಪ್ರಕಾಶನ, ಬರಹ ಈ ಮೂರನ್ನು ತಮ್ಮ ಜೀವಿತ ಕಾಲದುದ್ದಕ್ಕೂ ಕೈಗೊಂಡರು. ಅವರಂತೆ ಮತ್ತೊರ್ವ ಲೇಖಕರಿಯರಾದ ಆರ್. ಕಲ್ಯಾಣಮ್ಮನವರು ರಚಿಸಿದ ಕಾದಂಬರಿಗಳು ಬಹುಪಾಲು ಕೃತಿಗಳು ಸಾಮಾಜಿಕವಾಗಿರುವುದೇ ವೈಶಿಷ್ಟ್ಯ. ಪ್ರಿಯವಧೆ, ನಿರ್ಬಾಗ್ಯ ವನಿತೆ, ಸುಕಲತೆ, ಭಕ್ತ ಮೀರಾ, ನೀರದ, ಮಾಧವಿ, ಶಹಾಜಾನ, ರಣಧೀರ ಈ ಎಲ್ಲಾ ಕೃತಿಗಳಲ್ಲೂ ಸಮಾಜದ ಕಲ್ಯಾಣದ ವಿಷಯಗಳನ್ನೊಳಗೊಂಡ ಚಿಂತನೆ ಅಲ್ಲಿಯೂ ಕೂಡ ವರದಕ್ಷಿಣ ಪದ್ದತಿ, ಬಾಲ್ಯವಿವಾಹ, ವಿಧವಾ ವಿವಾಹ, ಪ್ರೌಢ ವಿವಾಹ ಮಹಿಳೆ, ಶಿಕ್ಷಣ ಕೊಡುವ ಅವಶ್ಯಕತೆ ಈ ವಿಷಯಗಳನ್ನೊಳಗೊಂಡಿರುವುದು. ಹಾಗೂ ಈ ಲೇಖಕಿಯ ಅಗಾಧವಾದ ನಾಡು ನುಡಿಗಾಗಿ ಪರಿಶ್ರಮಿಸುವ ಇವರ ಸೇವೆಯನ್ನು ಕಂಡು ಆಲೂರು ವೆಂಕಟರಾಯರು, ಕೆ.ವಿ. ಪುಟ್ಟಪ್ಪ, ಮುರವೀಡು ಕೃಷ್ಣರಾಯರು ಅವರ ಸಾಹಿತ್ಯವನ್ನು ಗೌರವಿಸಿ ಆತ್ಮವಿಶ್ವಾಸ ಬೆಳೆಯಲು ಪ್ರೋತ್ಸಾಹಿಸಿತು. ಅವರ ನಾಟಕವನ್ನು ಗಮನಿಸಿದಾಗ ನಿರ್ಮಲೆ ನಾಟಕದಲ್ಲಿ ಪ್ರೌಢ ವಿವಾಹಕ್ಕಾಗಿ ನಾಗೇಂದ್ರ ತನ್ನ ಮಗಳ ವಿಷಯದಲ್ಲಿ ಹೆಂಡತಿಯಿಂದ ಬಂದ ವಿರೋಧ, ರಾಧೆ ತನ್ನ ಮಗಳಿಗೆ ಪ್ರೌಢ ವಿವಾಹ ಮಾಡಿದರೆ ಸಮಾಜ ತಮ್ಮನ್ನು ಬಹಿಷ್ಕರಿಸಿ ದೂರ ಮಾಡಬಹುದೇನೋ ಎಂಬ ಆತಂಕ ಆದ್ದರಿಂದ ಒಂದು ಇಕ್ಕಟ್ಟಿಗೆ ಬಂದುನಿಲ್ಲುತ್ತದೆ. ಈ ವಸ್ತು ವಿಷಯದಲ್ಲಿ ಕಲ್ಯಾಣಮ್ಮನವರು ಸ್ತ್ರೀಯರಿಗೆ ಶಿಕ್ಷಣದ ಅವಶ್ಯಕತೆಯನ್ನು ಸೂಚಿಸುತ್ತಾರೆ. ನಂತರ ಹಿಂದೂ ಬಾಗ್ಯೋದಯ ನಾಟಕದಲ್ಲಿ ಸ್ತ್ರೀಯರನ್ನು ರಾಜಕೀಯ ಹಾಗೂ ಸಾಮಾಜಿಕ ಕಾರ್ಯಕ್ಷೇತ್ರಕ್ಕೆ ಕರೆದೊಯ್ಯೋವುದು. ಭಾರತ ಪಾರತಂತ್ರಕ್ಕೆ ಒಳಗಾದಾಗ' ಸಾಮಾಜಿಕ ರಾಷ್ಟ್ರೀಯ ಕಾರ್ಯದಲ್ಲಿ ಪುರುಷರಷ್ಟೇ ಸ್ತ್ರೀಯರ ಅವಶ್ಯಕತೆಯಿದೆ. ಅವರಿಗೂ ಸ್ಥಾನಮಾನಗಳು ಕಾಯ್ದಿರಿಸಬೇಕಾಗುವುದು. ಪುರುಷನಿಗಿಂತ ಮಹಿಳೆಯು ಯಾವುದರಲ್ಲಿ ಕಡಿಮೆ ಎಂದು ಪ್ರಶ್ನಿಸುತ್ತಾ ಸ್ತ್ರೀ

ಜಾಗೃತರಾಗಿದ್ದರು. ಇದಲ್ಲದೆ ತಮಗೆ ನ್ಯಾಯವಾಗಿ ಕೊಡಬೇಕಾದದ್ದನ್ನು ಕೊಟ್ಟರೆ ಸರಿ ಇಲ್ಲದಿದ್ದಲ್ಲಿ ನಿಮ್ಮ ಏರ್ಪಾಡಿಗೆ ನಾವು ಒಪ್ಪುವುದಿಲ್ಲ ಎಂದು ಹೇಳುವಲ್ಲಿ ಆಕೆಯ ದಿಟ್ಟ ನಿಲುವು ಪ್ರತಿಭಟನಾ ಸಾಮರ್ಥ್ಯವು ವ್ಯಕ್ತವಾಗುತ್ತದೆ.

ಮತ್ತೊರ್ವ ಲೇಖಕಿಯರಾದ ತ್ರಿವೇಣಿಯವರು ಮನೋವಿಜ್ಞಾನ ಶಾಸ್ತ್ರದ ತಳಹದಿಯ ಮೇಲೆ ರಚಿತವಾಗಿರುವ ಕಥಾಸಂಕಲನಗಳು ಹಾಗೂ ಕಾದಂಬರಿಗಳು ವಿಶೇಷ ವಸ್ತು ವಿಷಯವಾಗಿ ಸಮಕಾಲಿನ ಪೀಳಿಗೆಯ ಮನೋಧರ್ಮವನ್ನು ಅರಿತು ಹೊಸ ಸಂವೇಧನೆಗೆ ಸ್ಪಂಧಿಸಿದ್ದಾರೆ. ತ್ರಿವೇಣಿಯವರು ತಮ್ಮ ಕಾದಂಬರಿಗಳಲ್ಲಿ ಕ್ರಾಂತಿಯ ಅಲೆಗಳನ್ನು ಎಬ್ಬಿಸದೇ ಹೊದರೂ ಹೆಣ್ಣಿನ ಜೀವನದಲ್ಲಿ ಉದ್ಭವಿಸುವ ಗೊಂದಲಗಳನ್ನು ಹಾಗೂ ಸಮಾಜವು ಹೆಣ್ಣಿನ ವಿಷಯದಲ್ಲಿ ದ್ವಿಮುಖ ದೋರಣೆಗಳನ್ನು ಚಿತ್ರಿಸಿರುವರು. ಸ್ತ್ರೀವಾದದ ಛಾಯೆಯನ್ನು ತಮ್ಮ ಮೊದಲ ಹೆಜ್ಜೆ ಕೀಲು ಗೊಂಬೆ, ದೂರದಬೆಟ್ಟ, ಕಂಕಣ ಕಾದಂಬರಿಗಳಲ್ಲಿ ಸಮಾಜದಲ್ಲಿರುವ ದ್ವಂದದ ಹಾಗೂ ನೈತಿಕತೆ ಲಿಂಗಪೂರ್ವಗಳಿಂದ ಕೂಡಿದ ಸಾಮಾಜಿಕರಣ ವಿವಾಹಕ್ಕೆ ಈ ಸಮಾಜ ನೀಡುವ ಪ್ರಾಶಸ್ತ್ಯ

ಮುಂತಾದ ವಿಚಾರಗಳ ಗಮನ ಸೆಳೆದ ತ್ರಿವೇಣಿ ಸಾಮಾಜಿಕ ವ್ಯವಸ್ಥೆಗೆ ಪ್ರಶ್ನಿಸುವ ಮನಸ್ಸನ್ನು ಗುರುತಿಸಬಹುದು.

1950 ರಿಂದ 1975 ರ ವರೆಗೆ ಸುಮಾರು 25 ವರ್ಷಗಳಲ್ಲಿ 150 ಕಾದಂಬರಿಗಾರ್ತಿಯರು ಕಾಣಸಿಗುತ್ತಾರೆ. ವಾಣಿ, ಎಂ.ಕೆ. ಇಂದಿರಾ, ವಸಂತದೇವಿ, ತ್ರಿವೇಣಿ, ದೇವಕಿಮೂರ್ತಿ, ಅನುಪಮ ನಿರಂಜನ್, ಯಮುನಾಮೂರ್ತಿ, ಪಾರ್ವತಿ ಹೆಚ್.ಎಸ್., ಆರ್ಯಾಂಭ ಪಟ್ಟಾಭಿ, ಮಂಗಳ ಸತ್ಯನ್, ಚಿ.ನ. ಮಂಗಳ, ಗೀತಾ ಕುಲಕರ್ಣಿ, ಪ್ರೇಮಾಬಟ್ ಜಯಲಕ್ಷ್ಮೀ ಹೆಚ್.ಎನ್. ಪಂಕಜಾ ಎ., ಜಯಲಕ್ಷ್ಮೀ ಎಂ.ಕೆ. ಹೀಗೆ 150 ಲೇಖಕಿಯರು ತಮ್ಮ ಸಾಹಿತ್ಯದಲ್ಲಿ ಸ್ತ್ರೀವಾದಿ ನಿಲುವುಗಳಿಂದ ರಚಿಸಿರುವುದು ಕಂಡು ಬರುತ್ತದೆ. ಸಂಖ್ಯೆಯಲ್ಲಿ ಹೇರಳವಾಗಿ ಕಂಡರೂ ಕೆಲವು ಲೇಖಕಿಯರಾದ ತ್ರಿವೇಣಿ, ಎಂ.ಕೆ. ಇಂದಿರಾ, ಅನುಪಮ ನಿರಂಜನ್ ಇವರ ಸಾಹಿತ್ಯವು ಈ ಹಿಂದೆ ಪುರುಷ ಸಾಹಿತ್ಯ ಲೋಕವಾಗಿದ್ದ ಸಾಹಿತ್ಯ ಲೋಕವು ಎದ್ದು ಕುಳಿತು ಕಣ್ಣು ತಿಕ್ಕಿಕೊಂಡು ನೋಡಬೇಕಾದ ಪರಿಸ್ಥಿತಿ ಬಂದಿತು. ಅತ್ಯಂತ ಜನಪ್ರಿಯವಾಗುತ್ತಿದ್ದ ತ್ರಿವೇಣಿಯ ಕಾದಂಬರಿಗಳು ಮನೋವಿಜ್ಞಾನಕ್ಕೆ ಸಂಬಂಧಿಸಿದರೆ, ವೈದ್ಯೆಯಾಗಿ ಸ್ಥಾನ ಗಳಿಸಿರುವ ಅನುಪಮ ನಿರಂಜನ್ ಅವರು ಸಾಹಿತ್ಯ ವಲಯದಲ್ಲಿ ತಮ್ಮನ್ನು ಗುರುತಿಸಿಕೊಂಡು ಸಾಮಾಜಿಕ ಧೋರಣೆಗಳನ್ನು ಪ್ರತಿನಿಧಿಸಿದರೆ, ಮನಸ್ಸಿನ ಮೂಲೆಗಳನ್ನು ಬಡಿದೆಬ್ಬಿಸಿರುವ ಫಣಿಯಮ್ಮನನ್ನು ಸೃಷ್ಟಿಸಿದ ಎಂ.ಕೆ. ಇಂದಿರಾ ಈ ಎಲ್ಲಾ ಲೇಖಕಿಯರನ್ನು ನೋಡಿದಾಗ ಸ್ತ್ರೀಯರು ಕೇವಲ ಅಡಿಗೆ ಮನೆಗೆ ಸ್ಥಿಮೀತವಾದವರಲ್ಲ ಎಂದು ಪ್ರಧಾನ ವಾಹಿನಿಗೆ ಅನ್ನಿಸಿರಬಹುದು. 1980–90 ರ ದಶಕದಲ್ಲಿ ಮಹಿಳೆಯರ ಸ್ವಜನ ಸಾಹಿತ್ಯವನ್ನು ಗಮನಿಸಿದಾಗ ಕಥೆಗಾರ್ತಿಯರು, ಕಾದಂಬರಿಗಾರ್ತಿಯರು, ಕವಿಯಿತ್ರಿಯರು ತಮ್ಮ ಸಾಹಿತ್ಯಿಕ ಕ್ರಿಯೆಗಳನ್ನು ಮುಂದುವರೆಸುತ್ತಿದ್ದಂತೆ ವೈದೇಹಿ ಮತ್ತು ಸಾರಾ ಅಬೂಬ್ಕರ್ ಅವರು ವಿಮರ್ಶಕರ ಗಮನ ಸೆಳೆದದ್ದನ್ನು ಇಲ್ಲಿ ಗಮನಿಸಬಹುದು. ನಿಸರ್ಗದ ಕಥನ ಕಲೆ, ಪ್ರಾದೇಶಿಕ ನೆಲೆಯ ಭಾವಕೋಶ, ಧ್ವನಿಪೂರ್ಣ ಭಾಷೆ ಇವುಗಳ ಮೂಲಕ ಉತ್ತಮ ಲೇಖಕಿಯರೆಂದು ವೈದೇಹಿಯು ಹೆಸರು ಮಾಡಿದರೆ ಅಲ್ಲಿಯತನಕ ಬುರ್ಕಾದ ಹಿಂದೆ ಮೌನವಾಗಿ ಉಳಿದಿದ್ದ ಮುಸ್ಲಿಮ್ ಹೆಣ್ಣುಮಕ್ಕಳ ಧ್ವನಿಗೆ ಸಾರಾ ಧ್ವನಿಯಾದರು. ಇವರೀರ್ವರು ಯಾವುದೇ ಕಟು ಸ್ತ್ರೀವಾದಿ ದೋರಣೆಗಳನ್ನಿಟ್ಟುಕೊಂಡು ಬೆದವರಲ್ಲ ಹಾಗೇ ಸವಿತಾ ನಾಗಭೂಷಣ, ಗೀತಾ ನಾಗಭೂಷಣ, ಬಾನುಮುಷ್ತಾಕ್, ಕೆ.ಎನ್. ಸಂದ್ಯಾರೆಡ್ಡಿ, ಬಿ.ಟಿ. ಜಾಹ್ನವಿ, ಪ್ರತಿಭಾ ನಂದಕುಮಾರ, ಕಮಲಾ ಹೆಮ್ಮಿಗೆ ಮುಂತಾದವರನ್ನು ಕಾಣಬಹುದು. ಇಷ್ಟೆಲ್ಲಾ ಸಾಹಿತ್ಯ ಅಭಿವ್ಯಕ್ತಿಯು ಮಹಿಳಾ ಸಂವೇದನದ ಸಾಂಕೇತಿಕವಾಗಿ ಸ್ತ್ರೀ ಸಾಹಿತ್ಯದಲ್ಲಿ ಕೆಲವು ಉತ್ಸಾಹ ಹುಟ್ಟಿಸುವ ಬೆಳವಣಿಗೆಗಳಾಗುತ್ತಿವೆ.

ಕಾವ್ಯ, ಸಣ್ಣ ಕತೆ, ಕಾದಂಬರಿ ಮುಂತಾದ ಹಳೆಯ ಒಲವುಗಳನ್ನು ಮುಂದುವರೆಸುತ್ತಾ ಬರುತ್ತಿರುವುದಲ್ಲದೇ ಪ್ರವಾಸ ಸಾಹಿತ್ಯ, ಆತ್ಮಕಥನ, ಸಾಹಿತ್ಯ ವಿಮರ್ಶೆ, ಸಂಶೋಧನೆ ಮುಂತಾದ ಕ್ಷೇತ್ರಗಳಲ್ಲಿ ಗಣನೀಯವಾಗಿ ಬರೆಯುತ್ತಿದ್ದಾರೆ. ಪಿ. ಚಂದ್ರಿಕಾ, ಹೆಚ್.ಎನ್. ಪುಷ್ಪ, ಲತಾ ಗುತ್ತಿ, ಭಗವತಿ, ಹೆಚ್.ಎಸ್. ಮುಕ್ತಾಯಕ್ಕ ಮುಂತಾ ಕವಿಯಿತ್ರಿಯರನ್ನು ಕಾಣಬಹುದು. ಪ್ರವಾಸ ಕಥನವನ್ನ ಸುನಂದಾ ಬೆಳಗಾವ್‌ಕರ್, ಹೆಚ್. ನಾಗವೇಣಿ, ಸುಮಂಗಳಾ ಬಾದರದಿನ್ನಿ, ಭಾಗೀರಥಿ ಹೆಗಡೆ ಮುಂತಾದ ಕತೆಗಾರ್ತಿಯರು ಹೆಚ್. ನಾಗವೇಣಿಯವರ ಗಾಂಧಿ ಬಂದ ಎನ್ನುವ ಕಾದಂಬರಿ ವೈದೇಹಿಯ ಅಡುಗೆ ಮನೆಯ ಹುಡುಗಿ, ಆಕಾಶಕ್ಕೆ ಹಾರುವ ತುಡಿತ ಹಾಗೂ ಇಂದಿನ ಧ್ವನಿಗಳ ಸೋಲಿನಲ್ಲಿ ಇಂದಿನ ಬಿಡುಗಡೆಯ ನಿರೀಕ್ಷೆ ಹಾಗೂ ಶೈಲಜಾ ಹಿರೇಮಠ, ಎಲ್.ಪಿ. ಸುಮಿತ್ರ ಮುಂತಾದ ವಿಮರ್ಶಾ ಸಂಶೋಧಕರು, ಹೆಚ್.ಸ್. ಶ್ರೀಮತಿ ಸಂಸ್ಕೃತ ಅದ್ಯಯನಕಾರ್ತಿಯರು ಕಾಣಸಿಗುತ್ತಾರೆ.

ಒಟ್ಟಿನಲ್ಲಿ ಸ್ತ್ರೀ ಪರ ಚಿಂತನೆಗೆ ಒಂದು ನಿಶ್ಚಿತ ತಿರುವನ್ನು ತಂದು ಕೊಟ್ಟವರು ಎಂ.ಕೆ. ಜಯಲಕ್ಷ್ಮೀ ಅವರಿಂದ ರಚಿತವಾಗಿರುವ ಮಂಗಳವಾಧ್ಯ ಮೊಳಗಿತು, ಹೆಚ್.ವಿ. ಸಾವಿತ್ರಮ್ಮ ಅವರ ಸೀತೆ ರಾಮ ರಾವಣ ಮತ್ತು ವಿಮುಕ್ತಿ, ಸಾರಾ ಅಬೂಬ್ಕರ್ ಅವರ ಸಹನಾ ಮತ್ತು ವಜ್ರಗಳು, ಗೀತಾ ನಾಗಭೂಷಣ ಅವರ ಹಸಿಮಾಂಸ ಮತ್ತು ಹದ್ದು, ಅನುಪಮ ನಿರಂಜನ್ ಅವರ ಆಳ, ವೀಣಾ ಶಾಂತೇಶ್ವರ ಅವರ ಗಂಡಸರು, ಚಂಪಾವತಿಯವರ ನೀಲಗಂಗ, ಸವಿತಾ ನಾಗಭೂಷಣರ ಸ್ತ್ರೀಲೋಕ, ವೈದೇಹಿಯವರ ಅಸ್ಪೃಶ್ಯ ಇತ್ಯಾದಿ ಕೃತಿಗಳಲ್ಲಿ ಮಹಿಳೆಗೆ ತನ್ನದೇ ಆದ ವ್ಯಕ್ತಿತ್ವ ಹೊಂದಿದೆ ಎಂದು ಸ್ಥಾಪಿಸುವುದು. ಸಾಂಸ್ಥಿಕ ಬಂಧನಗಳಿಂದ ಮಹಿಳೆ ವಿಮುಕ್ತಿಯನ್ನು ಪಡೆಯಬೇಕೆನ್ನುವ ಹಂಬಲ ಹಾಗೂ ಅದಕ್ಕಾಗಿ ನಡೆಯುವ ಹೋರಾಟ ಇಂದಿನ ಮೌಲ್ಯಗಳ ಪ್ರಶ್ನೆಯಲ್ಲಿ ವಿಧವಾ ವಿವಾಹಕ್ಕೆ ಮಾನ್ಯತೆ, ಮಾತೃತ್ವ, ಪಾತಿವ್ರತ್ಯ ಪರಾಧೀನತೆ ಮುಂತಾದ ವಿಷಯಗಳಲ್ಲಿ ಪ್ರಶ್ನಿಸುವುದು ಮಹಿಳಾ ಲೇಖಕಿಯರು ಮಹಿಳೆಯಿರಿಗೆ ಬೇಕಾಗುವ ಬದಲಾವಣೆ, ಬೆಳವಣಿಗೆ ಸಾಹಿತ್ಯದ ಮೂಲಕ ಪ್ರತಿನಿಧಿಸುತ್ತಾ ಮಹಿಳಾ ಸಂವೇದನಕ್ಕೆ ಅಪಾರ ಕೊಡುಗೆಯನ್ನು ನೀಡಿದ್ದಾರೆ.

WOMEN EMPOWERMENT

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Introduction: In ancient days woman was the Head of the family. She looked after the house hold, cattle, milking and cultivation, etc. She worked hard in the fields for growing the crops.

Gradually the Head of the family system went into the hands of men. Slowly the male domination increased and women were confined to houses only.

Women became instrumental to the male and their lives became miserable with the traditions like Sati, ect. So many social reformers like RajaRamMohanRai, Gurazada Appa Rao fought for the causes of women.

Later on so many policies were constituted in all the nations. The principles of gender equality is enshrined in the Indian constitution. The constitution not only grants equality to

women but also empowers the state to adopt measures of positive discrimination in favour of women.

Women's movement and a wide spread net work of non-Government oraganizatios which have strong grass roots presence and deep insight into women's concerns have contributed in inspiring initiatives for the Empowerment of women.
They are consisting of:
1. Poverty Eradiction
2. Adequate flow of credit through financial institutions
3. Woman contribution to socio-economic development
4. Equal wages in par with the male
5. Training and Extension of various programmes in Agricultural sector
6. Support services like cretches, homes for the aged

The social Empowerment of women like education, health, implementation of births and death registrations, registration of marriages, affordable methods of family planning, delaying age of marriages, etc .. should be implemented.

High risks due to mal nutrition, drinking water, sanitation, disposal of sewage, toilet facilities should be provided in rural areas as well as slums in urban areas.

All forms of violence against woman like physical and mental at domestic or social levels, sexual harassment at work places, dowry, trafficking of girls and women should be dealt very effectively.

Strict enforcement of specific measures on violence and gender related atrocities, to punish the culprits at the place of work, women cells in police stations , Mahila courts, counseling centres, Legal Aid centres etc. , expanded to eliminate violene and 'atrocities against women through Legalisation.

Eradication of poverty and hunger, Universal primary education achievement, promoting Gender equality and empower women, reducing child morality and improve maternal health should be achieved.
* Women are encouraged to form their own selfhelp groups
* Save money and adopt a policy of thrift
* Issue their own internal loans
* Undertake income generating activities and small scale business activities
* Attending the training programs conducted by the local and government bodies
* Get involved with local government initiatives * Learn about their rights, etc

Learning the skills through training programs , income generating activities like owning milking animals, small shops, tailoring, vermin culture, spice units, packing units etc ... will be the best means for earning income.

Women should be provided the 33 percent reservation in parliament in order to bring the problems of women in an effective manner and can represent their voice.

Empowerment of Women through employment and entrepreneurship in India
Women constitute the important segment of any community and perform multiple roles as mothers, housewives and wage and income earners. Empowerment of women means enhancing the self respected and self dignity of women recognizing women's contribution, becoming economically independent and self reliant and women controlling resource like and property.

"Woman is the companion of man, gifted with equal mental capacities. She has the right to participate in minute details of the activities of man and she has the same right of freedom and liberty as he. She is entitle to a supreme place in her own sphere of activity as man is in his" - Mahatma Gandhi.

Women constitute nearly half of the nation's population. They have tremendous latent potential to contribute to harnessing the technology for human and social development. Primarily rural women are concerned with the survival of their families but are generally unrecognized and placed at the bottom. They have less access to assets, resources, technology and credit.

Women have been identified as potential contributions for fostering the pace of economic development. But the opportunities that exist are in occupations that are insecure and low paid. Agriculture is the major sector in which 70 percent of the female working population is engaged. It is also a low wage occupation and income potential from agriculture depends on favorable climate conditions. Alternative employment opportunities are inaccessible to women due to their poverty and un-skilled nature.

Throughout the world, women's participation in economic activities is increasing. The role of women entrepreneurship is also increasing in India too, women are participating in large number in almost all the spheres of economic activity. From village to city, we can see large number of women workers and entrepreneurs contributing towards the national income of the country. At present the ladies working not only in the primary and secondary sectors, but also being successful in the Military and Defence field. So many women doctors, lawyers, scientists, teachers have shown that they are not less efficient to men, but are more efficient, intelligent and hardworking, etc. in this modem world everywhere the cost of living has increased, it becomes necessary for women to undertake economic activity and support their families. The Government and Non-Govt. organizations are giving more prominence to promote self employment among women and build women entrepreneurship. Special financial assistance is provided and training programs are organized for women to start their ventures.

Thus, empowerment is a process of awareness and capacity

building, leading to greater participation, greater decision making power and control of the transformative action. The empowerment of women covers both individual and collective transformation. It strengthens their innate ability through acquiring knowledge, power and experience.

The Constitution of India grants equality to women and empowers the State to adopt measures of positive discrimination in favor of women for neutralizing the cumulative socio-economic, educational and political disadvantages. The State has enacted many women-specific legislations to protect them against discrimination, violence and atrocities and prevent social evils like child marriages, dowry, rape, sati, etc.

Yet the Government at centre and States should have specific programs for promoting women entrepreneurship and getting their talent useful to the society. If Indian women's talent will be utilized properly. One day India will become an ideal country to others.

Empowerment of Women in Local Politics

Empowerment of women appears to be a much published concept of the 21 st century. The media to be talks about it, the local politicians talk about it, national leaders talk about it, policy maker's talk about it, and the intentional community talks about it. The ternl empowerment has different meaning in different socio-cultural and political settings. An exploration of the term associated with empowerment around the world led to lively discussion. The terms include self-strength, control, self-reliance, self-power, own choice, life of dignity, one's own rights, independence, own decision making, being free, awakening and capability and so on. Yet women are nowhere near to being full and equal participation in public policy choices that affects their lives. This lack of adequate political participation in decision making bodies has far reaching consequences. It deprives women of important right and responsibilities as citizens, their view points and perspectives tend to remain unheard or under represented and in some instances ignored while taking key decision on national building and while setting up provided certain provisions for women to political participation at different levels. In the context of women, power to dimension relates to caste, class, age, leadership, marital status, etc. power within the context of women implies collective action of women to promote their interests through various channels like markets, public institutions,local bodies, political organizations and community. The 73rd Amendment Act regarded as a milestone to participate in local politics.

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CODE SWITCHING AND CODE MIXING AS AN INTERVENTION STRATEGY IN MULTILINGUAL APHASIC: A CASE STUDY

Ms. Sharon George, Dr. B.S. Premalatha.

Introduction: Code switching is a linguistic phenomenon commonly occurring in bi- and multilingual speech communities. Code switching refers to the systematic use of two or more languages or varieties of the same language during oral or written discourse.Gumprez (1982) defined code switching as 'the juxtaposition within the same speech exchange of passages of speech belonging to two different grammatical systems or subsystems'. In code switched discourse, the items in question form part of the same speech act. They are tied together prosodically, as well as by semantic and syntactic relations equivalent to those that join passages in a single speech act. Code-mixing is the change of one language to another within the same utterance or in the same oral/written text. It is a common phenomenon in societies in which two or more languages are used. Studies of code-mixing enhance our understanding of the nature, processes and constraints of language(Myers-Scotton, 1993a; Boeschoten, 1998; Azuma, 1998).Code switching and code mixing are used interchangeablyas terms referring to both types of language mixing. India being a multilingual country the phenomenon of code switching and code mixing holds importance as citizens of India are exposed to more than one language. Research has been done to understand nature of code witching and code mixing across various languages in India (Wani, 2012; Appel&Muysken, 1987). In a language disorder such as Aphasia research has shown that code switching and code mixing is seen as a recovery pattern. This understanding is important for effective intervention.The nature of code switching and code mixing in Aphasics have in illustrated in many studies (Chengappa et al, 2004;Chengappa and Bhat, 2005). A deeper understanding and more research is required to understand the role of this phenomenon in intervention in speech and language related disorders.

Need for the study: Though there are studies available regarding Code switching and mixing phenomenon, all of them have described as observation from the subjects. There is a lacunae in terms of usage of code switching and code mixing for intervention of language and also assessment of recovery pattern in individuals with Aphasia. It aids in emphasize a message and qualify it. The phenomenon of code switching and mixing was seen to aid intervention of Aphasia and hence it needs to be studied for its contribution in speech and language intervention.

Aim of the study: The present paper is designed to study the nature of code switching and code mixing in an individual with multilingual aphasia and its contribution to intervention in Aphasia.

Method and materials: Fifty five year old male had come to the Institute with the complaint of not understanding and communicating properly following stroke. He was subjected to various language test to assess the language ability in terms of auditory verbal comprehension, spontaneous speech, naming and repetition. On examination, he was found to have deficits both in verbal expression and comprehension and diagnosed as having global aphasia. Pre morbid language history revealed that he was able to communicate in 3 languages such as Telugu, Kannada and English. The client was taken up for intensive language intervention that included improving auditory verbal comprehension, spontaneous speech.

Results and discussion: The client attended 13 session regularly. The interesting observation of the present study is that the client exhibited code switching and code mixing in all the three languages. The responses of the client was transcribed and analyzed to assess the nature of code switching and mixing and its contribution to intervention. The languages used were Kannada, Telugu and English. The primary language used was Kannada and the responses obtained by client was in Kannada, Telugu and English. The intervention was then focused on maximizing the verbal output for functional communication irrespective of language used by the client. The phenomenon of code switching and code mixing also aided in improving overall functional communication and maximizing verbal output in the client e.g When the clinician asked a question in Kannada, client was able to answer it in Telugu and from that utterance, the Kannada sentence of the same meaning was elicited. The same was observed between Kannada-English, English – Telugu. The client was able to achieve short utterances across all three languages.

Conclusion: Code switching and code mixing was seen as recovery pattern which aided in intervention. The phenomenon of code switching and mixing was analyzed and its contribution to recovery ad intervention was understood in terms of its effectiveness in aiding functional communication, word retrieval and improvement in overall verbal output.

Introduction: Aphasia is a language disorder characterized by disruption in speech and language caused by a disruption in brain activity. Code switching is a linguistic phenomenon commonly occurring in bi- and multilingual speech communities. Code switching refers to the systematic use of two or more languages or varieties of the same language during oral or written discourse. Gumprez (1982) defined code switching as 'the juxtaposition within the same speech exchange of passages of speech belonging to two different grammatical systems or subsystems'. In code switched

discourse, the items in question form part of the same speech act. They are tied together prosodically, as well as by semantic and syntactic relations equivalent to those that join passages in a single speech act. Code-mixing is the change of one language to another within the same utterance or in the same oral/written text. It is a common phenomenon in societies in which two or more languages are used. Studies of code-mixing enhance our understanding of the nature, processes and constraints of language (Myers-Scotton, 1993a; Boeschoten, 1998; Azuma, 1998).

Code switching and code mixing are used interchangeably as terms referring to both types of language mixing. India being a multilingual country the phenomenon of code switching and code mixing holds importance as citizens of India are exposed to more than one language. Types of code switching:

Poplack (1980) gave the following types of code switching:
1) Tag – switching – this involves the insertion of a tag in one language into an utterance which is otherwise entirely in the other language.
2) Intersentential switching – intersentential switching involves a switch at a clause or sentence boundary, where each clause or sentence is in one language or another.
3) Intrasentential switching – intrasentential switching involves, arguably, the greatest syntactic risk, and may be avoided by all but the most fluent bilinguals. This view has been put forward by Poplack.

All three types of code switching may be found within one and the same discourse.Code switching and code mixing has been seen as a recovery pattern in individuals with aphasia. Research has been done to understand nature of code switching and code mixing across various languages in India (Wani, 2012; Appel & Muysken, 1987). In a language disorder such as Aphasia research has shown that code switching and code mixing is seen as a recovery pattern. This understanding is important for effective intervention. The nature of code switching and code mixing in Aphasics have in illustrated in many studies (Chengappa et al, 2004; Chengappa and Bhat, 2005). A deeper understanding and more research is required to understand the role of this phenomenon in intervention in speech and language related disorders.

Various studies have reported the nature of code switching in aphasics. Chengappa et al (2004) studied language mixing and switching in Malayalam - English bilingual aphasics. The study compared code switching patterns in normal and aphasic subjects. The study reports that the aphasic patients code switch, borrow and translate more after the injury than before, and this code switching may actually be a compensatory mechanism in lexical accessing in the deficient language, it also reports that increase in mixing of the languages may be shown as a deficit.

Bhat and Chengappa (2005) studies Code switching in normal and aphasic Kannada- English bilinguals, the study reports that a monolingual situation is difficult for a bilingual aphasic to communicate. The results of the study also point to the importance of factors such as social context, pre and post morbid language skills and systematic analysis of bilingual's languages in different communicative contexts as important factors in evaluating code switching. The findings indicate clinical necessity of modifying existing methods of evaluation as well as therapy to suit the individual needs of bilingual aphasics considering the heterogeneous nature of the condition.

Aim: The present paper is designed to study the nature of code switching and code mixing in an individual with multilingual aphasia and its contribution to intervention in Aphasia.

Method and Material: Fifty five year old male had come to the Institute with the complaint of not understanding and communicating properly following stroke. Family members reported of no verbal output post stroke prior to the day of assessment at our institute. Medical history reports that client had left thalamic / basal ganglia acute hematoma with intraventricular extension and also had a history of hypertension and diabetes mellitus. He was subjected to various language test to assess the language ability in terms of auditory verbal comprehension, spontaneous speech, naming and repetition.Language history revealed the following on examination:

The following table indicates the languages known by the client and a comparison of change in language pre and post morbid in terms of spoken and written comprehension and spoken and written expression.

Languages	Pre Morbid				Post Morbid			
Known	Comprehend	Speak	Read	Write	Comprehend	Speak	Read	Write
Telugu	✓	✓	✓	✓	✓	×	×	×
Kannada	✓	✓	✓		✓	×	×	×
English	✓	✓	✓	✓	✓	×	×	×
Tamil	✓	✓	×	×	×	×	×	×
Hindi	✓	✓	✓	×	×	×	×	×

In terms of the communication behavior of the client pre morbid he was able to communicate verbally in all the languages mentioned above. Post morbid he communicated mainly using gestures. Verbal speech was absent. Overall examination revealed that the client's auditory verbal comprehension and production were affected. Deficits were present in tasks such as verbal repetition, naming, labelling, reading and writing. Hemiparesis was present on the right side. Function of articulators in terms of range of movement was assessed. Verbal output was absent. Based on the overall detailed assessment of speech and language the client was diagnosed as having global aphasia. The client was taken up for intensive language intervention that included improving auditory verbal comprehension, spontaneous speech.

Speech and Language Skills:

Spontaneous Speech: Spontaneous speech was affected. Client was non verbal. Utterance could be elicited by use by applying principles of melodic intonation therapy and phonetic cueing.

When prompted, the client is able to:

- greet (hello) ,respond to courtesy question 'How are you?' (Fine)
- utter his name, answer polar questions (yes/no).

A combination of principles of melodic intonation therapy and phonetic cueing was found beneficial for the client. At times visual cueing in the form of writing down a choice is required.

Auditory Verbal Combination:

The client is able to comprehend single words such as names of family members, objects within immediate surroundings, some food items etc when given choice making task and simple one step commands such as polar questions, questions with respect to well-being, activities of daily living etc but verbal repetition accompanied by gestural and written cue is required. He used to indicate by pointing or gesturing towards the intended person.Based on the above made observation the recommended goals were as follows:

- To work on improving auditory verbal comprehension of interrogatives with respect to functional communication skills and satisfaction of client's needs with aid of gestural and visual cueing accompanied by verbal repetition.
- To work on facilitation expression of speech to one to two word utterances with focus on functional communication skills.

Results and Discussion:

Intervention: The client attended 13 language intervention sessions. Kannada language was used during therapy. The observation in the first session was as follows:

Post-Morbid: Client is able to comprehend English, Kannada and Telugu. On stimulation is able to express using all three languages.Oral Peripheral Mechanism Examination: Function of articulators in terms of range of movement was affected.As the sessions progressed the improvement in speech and language was evident as well as the modification in intervention strategy to include code switching and mixing to aid in spontaneous verbal communication. The details are as follows:

***Goal*:** To work on improving auditory verbal comprehension of interrogatives with respect to functional communication skills and satisfaction of client's needs with aid of gestural and visual cueing accompanied by verbal repetition.

Activity1:

The client was asked questions pertaining to events that occurred in the day such as 'How are you?', 'Is your leg paining?', 'What did you eat today?'etc. The comprehension of everyday questions was aided by a verbal repetition, gestural and visual cueing in the form of written choices

Response

The client is able to comprehend interrogatives pertaining to everyday activities and immediate needs. His responses to specific interrogatives asked by the clinician is as follows:

Clinician: How are you?(English)
Client: Fine (spontaneous verbal output)(English).
Clinician: Did you eat breakfast today? (Kannada)
Client: Yes (with phonemic cueing) (English)
Clinician: Did you eat Idli or Pulao ?(Kannada) (with visual cueing in the form of written choices).
Client: Points to Pulao.
Says 'Pulao' with phonemic cueing.
Clinician: What did you eat today? (Kannada)
Client: Pulao (with phonemic cueing)
Clinician: Who has come with you today? (Kannada).
Client: Sandeep (with phonemic cueing) [referring to grandson).

Activity 2:

The client was given simple one step commands to follow using objects in his immediate environment.The client was prompted using gestural cues accompanied by verbal repetitions and gestural prompts.

Response:

Client is able to follow simple commands but requires repeated verbal repetitions.
Sample of the client's utterance is as follows:
Clinician: Pick up the pen (Kannada)
Client: Does not comprehend the first time on repeated repetition accompanied by gestural prompts able to do the activity.
Clinician: Put the pen on the book. (Kannada)
Client: able to do the activity with repeated gestural prompts and verbal repetition.

Goal: To work on facilitation expression of speech to one to two word utterances with focus on functional communication skills. Melodic intonation therapy in combination with phonetic cueing will be used

Activity 1:

he client was prompted to request for his needs such as food, water, indicate pain etc using one to two word utterances. Melodic intonation therapy in combination with phonetic cueing was used.

Response: Client is able to verbally produce words but requires phonemic cueing.
He is able to use 2 word utterances in some instances.
The following are the responses obtained from the client:
Clinician: How are you? (English)
Client: Fine (English). (Spontaneous)
Clinician: If you hungry, what will you say? (Kannada)
Client: /u:ta teva/ (give food) (combination of kannada and telugu); /u:ta/ was elicited, /teva/ was spontaneous but had to be elicited for repeated trials.
Clinician: If you want water, what will you say? (Kannada)
Client: /ni:ru teva/ (give water); combination of Kannada and Telugu, had to be elicited.
Clinician: If you hand is paining, what will you say?(Kannada)
Client: /kai nopi/(hand paining); combination of Kannada and Telugu, clinician tried to elicit /kai novu/(Kannada) but client spontaneously said /nopi/ which means pain in Telugu.
Clinician: if your leg is paining, what will you say?(Kannada)
Client: /kalige nopi/(leg paining), Telugu, clinician tried to elicit /kaalu nopi/ (Kannada-Telugu combination)client responded /kaalige nopi/ which is more grammatically correct.
Clinician: How will you call for help?(Kannada)
Client: /Sanjay banni/(sanjay come here), (Kannada); response was elicited.

Activity 2: Yes/no responses to polar interrogatives was practiced using melodic intonation therapy in combination with phonetic cueing.

Response :
Clinician: Did you eat pulao for breakfast? (Kannada)
Client: Yes (elicited) (English), he is also able to say /havudu/ (Kannada) but is more comfortable with saying Yes.
Clinician: Did you eat Idli for breakfast? (Kannada)
Client: No (English), he is also comfortable saying /illa/ (Kannada).
Clinician: Is this a pen?
Client: Yes (Spontaneous). (English)
Clinician: Do you want someone to help? (When the client's foot slipped from the foot rest) (Kannada)
Client: Yes (English), elicited.
Clinician: Are you sleepy?
Client: No (English) elicited.
Clinician: Is the pen on the book?
Client: No (English), spontaneous.
Clinician: Will you practice at home?
Client: Ok (English), spontaneous.
The use of code switching was more evident than code mixing in the session. By the end of 13 sessions principles of melodic intonation therapy was withdrawn and the intervention was focused on cueing and code switching and mixing to aid in verbal communication. Post 13 sessions of speech and language intervention the client was able to comprehend interrogatives, commands and statements pertaining to everyday situations. He was able to express in 1-2 word utterances which involved code switching intrasententially and code mixing intersententially.The use of words in one language was able to elicit the same word or a different word or words in the other language. This aided in increasing the overall spontaneous verbal output in the client, as when the client was unable to express in one language he was able to switch to another language thus improving the overall verbal communication. This also aided in use of one language to elicit same/similar response in another language that aided in the verbal output in one particular language. It has also opened a new possibility of using code switching and code mixing to aid intervention in bilingual/ multilingual individuals with aphasia. At the end of the 13 sessions the client was not only able to produce spontaneous utterances but also was able to use his knowledge of different languages to aid in more effective and efficient communication.

Conclusion: The nature of code switching and code mixing across different languages and as a recovery pattern in individuals with aphasia has been studied. This study focused on the use of the phenomenon of code switching and code mixing in intervention of an individual with multilingual aphasia. In the present study the phenomenon of code switching and mixing was analyzed and its contribution to recovery and intervention was understood in terms of its effectiveness in aiding functional communication, word retrieval and improvement in overall verbal output. It not only aided the verbal output in one language but also aided in spontaneous verbal output across languages. It also aided communication repair when a breakdown was faced in one of the language. Therefore this study gave an insight into using it as a strategy to help increase spontaneous verbal output in bilingual/multilingual individuals with aphasia. It draws attention towards moving away from a monolingual mode of intervention to a multilingual mode of intervention especially in India wheremultilingualism is a common phenomenon. Code switching and code mixing was seen as recovery pattern which aided in intervention.

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EFFECT OF MUSIC IN CHILD WITH AUTISM SPECTRUM DISORDER: AN OBSERVATION

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Background and need**:** Music therapy is a well-established professional health discipline that uses music as the therapeutic stimulus. Music can help in better learning for children, particularly those who have autism or other learning disabilities, since these activities provide unique sensory input and stimulation to the mind and body. Music impacts various forms of development including communication, social-emotional, and motor development in children with Autism Spectrum Disorders (ASDs). Singing in particular can serve as a valuable therapeutic tool because it is a universal form of musical expression that is as natural as speaking. Singing and dancing to music helps children develop proper voice control, motor planning/control, and fine and gross motor skills. Repetition through song can help children with autism or other learning disabilities learn to anticipate words, rhythms, and concepts. Music helps in enhancing mood, attention, and behavior to optimize the child's ability to learn and interact. The rising incidence of Autism Spectrum Disorders (ASDs) has led to a surge in the number of children needing autism interventions.

Main objective**:** The aim of the study is to assess the performance of child with autism spectrum disorder with music as a therapeutic tool.

Method: A single case study of a 4.11 year old child who had come to our center with a complaint of not speaking age appropriately. Child exhibited poor pre-linguistic skills, social interaction, and poor communication skills. Detailed speech and language assessment was done and the child was diagnosed as delayed speech and language skills secondary to pervasive developmental disorder and recommended for speech and language therapy. Child has been attending speech and language therapy thrice a week since 4 months. Singing has been inco-orporated as a tool to improve pre-linguistic skills, social interaction and communication skills. Melodic and rhythmic strategies, followed by fading of musical cues aided in generalization of targets and transfer to other environments. Re-assessment of speech and language skills was carried out after 4 months of therapy to evaluate the child's progress.

Results**:** Results revealed improved pre-linguistic skills, and social interaction. Child is able to communicate through pointing and vocalization to satisfy his needs.

Conclusion**:** Thus music as a therapeutic tool can serves as an integral component in helping the children with autism spectrum disorders.

Introduction: Autism is a lifelong devel-opmental disability. It is often referred to as ASD, or autism spectrum disorder. People with autism have three main types of impairment: difficulty with social communication, social interaction, and social imagination. An impairment in social com-munication impairment involves limited speech and difficulty in understanding facial expressions, tone of voice, and sarcasm. Au-tistic individuals may also have difficulty with social interaction, and find it hard to recognize and understand people's emotions and implicit social cues, thus impairing their ability to form relationships with others. Finally, a defect in social imagination makes it difficult for people to understand and predict other's behavior, understand abstract ideas, predict what can happen next, and prepare for change and plan for the future. Unfortunately, people with autism often have difficulty with these tasks. The rising incidence of Autism Spectrum Disorders (ASDs) has led to a surge in the number of children needing autism interventions.

Music impacts various forms of development including communication, social-emotional, and motor development in children with Autism Spectrum Disorders (ASDs). Music therapy is a well-established professional health discipline that uses music as the therapeutic stimulus. Musiccan help in better learning for children, particularly those who have autism or other learning disabilities, since these activities provide unique sensory input and stimulation to the mind and body.

The theory behind music therapy is that since people have an innate affinity for music, they should continue to respond to it even after physical, cognitive, or emotional disabilities. Singing in particular can serve as a valuable therapeutic tool

because it is a universal form of musical expression that is as natural as speaking. Singing and dancing to music helps children develop proper voice control, motor planning/ control, and fine and gross motor skills. Repetition through song can help children with autism or other learning disabilities learn to anticipate words, rhythms, and concepts. Music helps in enhancing mood, attention, and behavior to optimize the child's ability to learn and interact. Recent studies show that children with autism are more eager to listen to music than their peers. Autistic children are more likely to differentiate variations in pitch. Music-themed lessons can help increase patience, voluntary attention, memory, social interaction, eye contact, and the enjoymentof learning (Evans, 2007).Through music, children can learn sound initiation and speech production skills as well.

Objective of the study: To assess the performance of child with autism spectrum disorder with music as a therapeutic tool.

Method:A single case study of a 4.11 year old child who had come to our center with a complaint of not speaking age appropriately. Child mainly communicates non-verbally. Parent-child interaction is adequate. Childexhibited poor pre-linguistic behaviors like poor eye contact, attention span and concentration, sitting behavior, compliance and poor imitation skills. Oral peripheral mechanism examination reveals that all the articulators are structurally and functionally normal. Vegetative skills are adequate. Detailed speech and language assessment was done using formal tests like Receptive Expressive Emergent language scale (REELS), Diagnostic Statistical Manual for Children with Autism Spectrum Disorders (DSM IV), CommunicationDEALL Developmental Check list, Communication DEALL Pre-linguistic behaviour Checklist. According to Receptive Expressive Emergent language scale (REELS) child's receptive language age is 8-9 months and expressive language age is 6-7 months. According toDiagnostic statistical manual for children with Autism Spectrum Disorders (DSM IV), child satisfied the criteria for Autism Spectrum Disorders (ASD). Communication DEALL Developmental Check list reveals developmental delay in domains like gross motor, fine motor skills, activity of daily living,receptive and expressive language, social, emotional and cognitive skills. Communication DEALL Pre-requisites learning behaviour Checklist was also administered which assessed child's joint and sustained attention, eye contact, eye gaze, sitting tolerance and compliance. Child got a total score < 1-2 years. Singing has been incorporated as a tool to improve pre-linguistic skills like joint and sustained attention, eye contact, eye gaze, sitting tolerance and compliance. Language skills including receptive and expressive language skills. Receptive language skills include listening to short rhymes,Understands the meaning of most common verbs like eat, drink and brush, Understands the meaning of kinship terms.Expressive language includes naming three pictures, naming three toys.Language targets were selected based on Communication DEALL Developmental Check list.

Results and discussion: Re-assessment of speech and language skills has been carried out after 4 months of speech and language therapy and resultsrevealed thatin Communication DEALL Pre-requisites learning behaviour child obtained a total score between 2-3 years which shows significant improvement in pre-linguistic skills. In receptive language skills child is able to listen to rhymes for longer time and also able to understand the meaning of most common verbs like eat, drink and brush. Child is also able to imitate the action verbs and wave his hand for /hai/ and /bye/. In expressive language skills child is able to name /appi/ for apple and /baba/ for banana.Research supports connections between speech and singing, rhythm and motor behavior, memory for song and memory for academic material, and overall ability of preferred music to enhance mood, attention, and behavior to optimize the Childs ability to learn and interact. Therefore, one of the purposes of singing for children with autism is to provide the individual with an initial assist using melodic and rhythmic strategies, followed by fading of musical cues to aid in generalization and transfer to other environments.Martha R. Herbert (2005) stated that "Brain cells need to follow a regular rhythm to produce a response in the brain. For people with autism, there is less coordination of this rhythm from one point to another. Music helps by creating an organized and regular stimulus to the brain that helps the brain get organized to keep track of the rhythm."Music also helps in improving socio-behaviour skills – such as reducing off-task behaviour's; problematic classroom behaviour; emotion recognition; improving eye contact and increasing the initiation of interactions by children with autism.The act of listening to the music can help a person with autism learn a word, activity or appropriate behavior. Songs/ rhymes that teach the patient about noun, action verb phrases and helps the child understand language.Researchers have found that rhythmic entertainment is helpful in improving social behaviour, communication skills and aids with learning and memory. Actions/ movements to music provide a stimulating outlet that can reduce self-stimulatory behaviors such as hand flapping, twirling and encourage social behavior.Singing songs/rhymes can help the child to learn how to structure sentences.

Conclusion:: Music should be viewed as a tool for using existing and recommended treatments such as applied behavioral analysis, focused language stimulation and various techniques for stimulating speech sound production, imitation, joint attention and interaction. The relationship of music speech and language therapy is that music is simply a modality to use with children and families in the same way as we use pictures, motor movements, games, gestures, and/or

cueing. Thus, Music as a therapeutic tool can serve as an integral component in helping the children with autism spectrum disorders.

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EFFECT OF VERBAL WORKING MEMORY IN YOUNG AND ELDERLY

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Introduction: The term working memory refers to a brain system that provides temporary storage and manipulation of the information necessary for complex cognitive tasks such as language comprehension, learning and reasoning. Verbal working memory is a subset of working memory, commonly known as "short-term memory". It refers to the amount of verbal information the brain can hold and manipulate in order to achieve a goal or solve a problem. Verbal working memory assists in highly complex tasks of reading comprehension. This involves holding linguistic information about a sentence in the mind long enough to understand both that sentence and its relationship to the surrounding sentences.

Aim: The aim of the present study is to check the performance of individuals without language deficits at different ages in tasks that asses verbal working memory (auditory working memory task, digit ordering task).

Need of the study: Although there are many studies which examined the working memory capacity and the correlation of different tasks in working memory, there are limited studies supporting the performance of working memory on language. Hence, there is a need to study the performance of verbal working memory.

Method: The study involved 60 normal Kannada speaking individuals: 30 adults (ages between 19 and 35 years), and 30 elderly (60 years old or older). The selected subjects were submitted to verbal working memory assessment that includes auditory working memory tasks consists of repetition of 20 sentences by separating digits and numbers in the same order in two trails and digit ordering tasks includes repetition of digits with increasing in complexity of digits in two trials.

Result: Descriptive statistical analysis has been carried out to find the difference in the performance of verbal working memory tasks in younger and elderly. Results revealed that younger individuals performed better than elderly in digit ordering tasks and auditory verbal working memory tasks.

Conclusion: There is a decline in the performance of both auditory verbal memory and digit ordering tasks in elderly compared to that of younger. Thus as age increases the performance in verbal working memory tasks declines.

Introduction: Normal ageing is ageing which occurs without disease, that is there are a number of physiological changes, that do not involve a pathological process, and, though there may be bodily changes in the person, the person enjoys good function of mind and body, and is able to live independently, and with a good quality of life. Working memory is conceived as a short-duration limited-capacity memory system capable of simultaneously storing and

manipulating information in the service of accomplishing a task (Baddeley, 1995). Working memory refers to the set of attention, storage, planning and mental representation processes that work together during mental activities such as problem solving and reasoning. Various theoretical frameworks have been proposed to conceptualize the working memory.Baddeley's model (Baddeley& Hitch 1974, revised 1986, 2000, 2007; Baddeley)has been regarded as gold standard in the area of working memory research due to its ability to explain a majority of research data and its relative simplicity. Baddeley's revised working memory model, which contains the original three components plus the episodic buffer.

Verbal working memory is a subset of working memory, commonly known as "short-term memory". It refers to the amount of verbal information the brain can hold and manipulate in order to achieve a goal or solve a problem. Verbal working memory assists in highly complex tasks of reading comprehension. This involves holding linguistic information about a sentence in the mind long enough to understand both that sentence and its relationship to the surrounding sentences.The aim of the study is to evaluate the performance of verbal working memory in younger and elderly. Although there are many studies which examined the working memory capacity and the correlation of different tasks in working memory, there are limited studies supporting the performance of working memory on language. Hence, there is a need to study the performance of verbal working memory.

Methodology: A total of 30 participant's include15 adults (ages between 19 and 35 years), 15 elderly (60 years old or older). All the participants were native speakers of Kannada. Participants were given two tasks like auditory working memory task and digit ordering task. In auditory working memory task the subjects were instructed to listen to 10 sentences which consisted of digits and words and the subjects should separate the digits and words from the sentence in the same order of presentation. If the subjects failed to repeat in the first trail, they were given another trail. In digit ordering task subjects were instructed to listen to digits that were presented in increasing complexity of the digits and repeat it in ascending order of the digits. If the subjects failed to repeat in the first trail, they were given another trail. Stimuli had been adapted from a study of verbal working memory and sentence comprehension with age (Anjali 2010).

Statistical analysis: The statistical analysis was carried out using SPSS version 15.0. The mean and standard deviation were extracted. The mean and standard deviation were extracted. The data collected was analyzed using descriptive statistics; further ANOVA was performed to know the significant difference between the performances of verbal working memory tasks in younger andelderly.

Results and discussion: Results revealed that younger individuals performed better than elderly in verbal working memory tasks i.e. in both auditory verbal working memory task and digit ordering task younger individuals got higher mean score values than elderly

Tasks	Younger	Elderly
Digit ordering task	4.63	3.37
Auditory verbal working memory task	7.77	3.23

Table 1 depicts the mean values of younger and elderly in digit ordering and auditory verbal working memory task.

Results obtained in ANOVA reveals that p value<0.005 which shows that there is a significant difference between performance of younger and elderly in different tasks.

Carmen Dasí(2008) studied the performance of digit ordering test in younger and elderly and results revealed that performance of the task was lower for older group than younger one which fortify our findings.Wingfield& Stine (1991) stated that older adults have typically been found to have smaller working memory spans than younger adults.Salt house (2000) performed large scale Working memory experiments involving 120 males ranging in age from 20-79 years. Results revealed that age differences in the performance between younger and older tasks increased with both task complexity and increased demand on processing resources. Wiegersma and meertse(1994) found age related decline in performance when the tasks required subjective re-ordering of the sequenced items.

Conclusion: In our study there is a decline in the performance of both auditory verbal memory and digit ordering tasks in elderly compared to that of younger. Thus as age increases the performance in verbal working memory tasks declines.

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PARENTAL SATISFACTION WITH OUTCOME OF TRAINING INTERVENTION IN CHILDREN WITH SPEECH AND LANGUAGE DISORDERS

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Back ground and need: The compliance of children and their parents is very important for the outcome of speech language therapy in children. Speech-language therapy is the most frequently applied intervention method for the treatment of developmental disorders. The acceptance of speech and language therapy for children with speech and language delay by the parents and the child is an important factor for the effectiveness of therapy. Hence there is a need to assess the parental satisfaction for better rehabilitation.

Main objective: The present study aimed to assess the satisfaction of parents attending speech and language therapy.

Method: 15 parents of children with speech and language disorders attending speech and language therapy from past 6 months were asked to complete the therapy attitude questionnaire addressing the impact of training on areas as confidence in discipline skills, quality of parent-child interaction, the child's behavior and over all family adjustment. Parents were asked to rate each item on a 5 point rating scale were 1 indicates dissatisfaction of treatment or a worsening of problems and 5 indicates maximum satisfaction with treatment or improvement of problems.

Results: Descriptive statistical analysis has been carried out and the results reveals the ratings for the area of discipline skills is 4, Quality of parent child interaction is 4, child's behavior is 4, overall family adjustment is 5.

Conclusion: Parental feedback on satisfaction of treatment program guides speech language pathologist to plan for better treatment strategies and also helps the parents to communicate with the child in a better manner. Improves the parent-therapist interaction and also helps to monitor the progress of child over a period of time.

Introduction: Speech-language therapy is the most frequently applied intervention method for the treatment of developmental disorders.The acceptance of speech and language therapy for children with speech and language delays by the parents and the child is animportant factor for the effectiveness of therapy Hence there is a need to assess the parental satisfaction for better rehabilitation.Different styles of therapy may result from different needs of the patients with their specific problems. Personal experience of the therapists is also an important factor. Good cooperation between parents and therapists is of enormous importance as parents not only have to bring their children to therapy regularly, they often participate in the therapy doing exercises with their child at home and modify their everyday way of using language to optimize the circumstances for speech and language learning. The involvement of parents in the delivery of treatment is increasingly sought by professionals. Keilmann etal (2004) studied emotional satisfaction of parents and speech-language therapists with outcome of training intervention in children with speech and language disorders.169 questionnaires were given to parents attending speech and language therapy and 140 questionnaires for speech-language therapists concerning their satisfaction with the outcome of the intervention. Results revealed that majority of the parents were very satisfied with the outcome of the speech-language therapy, the professional knowledge of the speech-language therapists and the type of therapy. The speech-language therapists were in most cases pleased with the compliance of the parents.

Main objective: The present study aimedto assess the satisfaction of parents attending speech and language therapy.

Method:

Subjects: As children with speech and language deficits have problems understanding speech and expressing themselves, we did not ask the children directly, but tried to find out their views by asking their parents.The questionnaire was given to 15 parents in our outpatient department whose child had speech- language therapy from past 6 months.

The parents were asked to complete the assessing parental satisfaction of treatment programquestionnaire in the waiting room. The purpose of this questionnaire was to elicit the perceptions of parents on the services their children received in an anonymous way. The questions were adapted from

Therapy Attitude Inventory(TAI; Eyberg, 1974).The questionnaire was modified according to the Indian scenario. The questionnaire includes10 multiple-choice questions addressing the impact of parent training on areas such as confidence in discipline skills, quality of the parent- children interaction, and the child's behavior, and overall family adjustment. Parents were asked to rate each item on a scale from 1 to 5, where 1 indicates dissatisfaction with treatment or a worsening of problems and 5 indicates maximum satisfaction with treatment or improvement of problem. The 10 item scores are summed to yield a total score will be between 10 and 50.

Results and discussion: The data collected was analyzed using descriptive statisticsand the results reveals the ratings for the area of discipline skills is 4, Quality of parent child interaction is 4, child's behavior is 4, overall family adjustment is 5. The score obtained for discipline skills and Quality of parent child interaction is 4 probably because most of the parents were working and poor family support. In child's behavior the score obtained is also not reaching the maximum score of 5 because most of the parents are unable to spend time with the child to implement the new techniques counselled by speech language pathologist.

Conclusion: Parental feedback on satisfaction of treatment program guidesspeech language pathologist to plan for better treatment strategies andalso helps the parents to communicate with the child in a better manner. Improves the parent-therapist interaction and also helps to monitor the progress of child over a period of time.

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PROFILING THE CLASSIC TETRAD OF GERSTMANN'S SYNDROME: A CASE STUDY

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Introduction: Gerstmann's syndrome is a condition that results from damage to a specific area of the brain, probably the left parietal lobe in the region of the angular gyrus. It may occur after a stroke or in association with damage to the parietal lobe. It is characterized by four primary symptoms: Dysgraphia/agraphia which reflects deficiency in the ability to write**,** Dyscalculia/ acalculia which is reflected by difficulty in learning or comprehending mathematics or arithmetic signs, Finger agnosia characterised by an inability to distinguish between fingers on the hand and a characteristic feature of Left-right disorientation (Gerstmann, 1924). In addition to exhibiting the above symptoms, many adults also experience aphasia (difficulty in expressing oneself when speaking, in understanding speech, or in reading and writing).

Need and specific aim of the study: The prevalence of Gerstmann's syndrome, with a parietal lobe lesion manifesting the four classic symptoms is a rare condition. Hence it is of importance to profile the formal and informal measures used for assessment which may help in co-relating the clinical findings to that of the theoretical perspectives mentioned. As there are no standardized tools for assessment of dyslexia, dysgraphia, dyscalculia and agnosia in Indian population, the specific aim of the present study was to focus on the use of clinical measures, some standardized and some informal measures in assessing the four classic symptoms of Gerstmann's syndrome.

Method: A client B.M with Multiple craniotomy of the parietal lobe, secondary to left recurrent intraventricular meningioma was studied. B.M was a 40 year old right handed woman with a university degree (Masters in Finance), who was employed as a financial advisor at Infosys till her illness. B.M started developing multiple episodes of transient right sided weakness with speech difficulty during 2007. She was a known case of hypothyroidism and was under medication for the same since 30 years

of age. Following her frequent episodes of right sided weakness and speech difficulty, a neurological evaluation was done, which revealed intraventricular meningioma in the left parietal lobe. Surgical intervention was carried with left parietal craniotomy and excision of intraventricular meningioma during 2007. However due to recurrent occurrence of meningioma, multiple craniotomy procedures were done a second and third time during 2010 and 2013. Following the third craniotomy, B.M visited the place of evaluation with concerns of significant difficulty in writing, calculations and reading accompanied with a difficulty in speaking (Only for certain words; word retrieval deficits). A detailed assessment was carried out using formal measures such as Western Aphasia Battery (WAB) (Kertesz, 1982) for language, reading and writing deficits, and Addenbrooke's Cognitive Examination-Revised (ACE-R)(Mioshi, Dawson, Mitchell, Arnold,& Hodges, 2006) for profiling cognitive executive functions. Informal measures were carried out for assessing dyslexia and dysgraphia using the Phoneme grapheme correspondence (PGC) rules, Grapheme Phoneme Correspondence (GPC) rules and assessing word formation skills in both reading and writing using the phonotactic skills measure. Finger agnosia was assessed as a part of WAB subtest, auditory word recognition and also using informal commands of finger identification. Left-right disorientation was also assessed using informal measures.

Results & Discussion: On WAB, B.M achieved a score of 9/10 for fluency, 6.5/10 for comprehension, 3/10 for repetition and 7.3/10 for naming tasks. Based on the classification of subtype of aphasia, B.M belongs to the Wernicke's subtype. It is of critical importance here, to note that, the results of WAB give a "false positive impression of Wernicke's aphasia". Based on informal assessment and family feedback, the client has no difficulty in understanding and repeating information, but on repetition tasks in WAB, she scored less. This could be attributed to the fact that, WAB, as a standard test battery for Indian population may not be valid and reliable enough to sub categorize a person with an acquired language disorder. B.M could score 57/60 on reading tasks and, 65/100 for writing tasks. Though B.M has significant deficits in reading and writing characterized by her reading and writing sample, the lesser complexity of the stimuli and also the self-correction cues may have helped in obtaining better scores. Here, it is of importance to note that much of the relevant clinical information about B.M's dyslexic, dysgraphic and dyscalculalic features was listed down using informal measures of assessment. Apraxia of speech was not evident and it was also ruled out by a score of 60/60 on apraxia subtest. The combined scores for constructional, visuospatial & calculation tasks was 42/100. The poor scores for these tasks are in support of deficits in left-right orientation and calculation tasks. On ACE-R, B.M scored 16/18 for Attention & Orientation, 20/26 for memory, 3/14 for fluency, 16/26 for language and 11/16 for visuospatial skills. Poor fluency scores are also indicative of word-retrieval deficits and phoneme correspondence deficits for word naming. Good scores for tasks of attention, orientation and memory are suggestive of limited/no cognitive-executive function deficits.

Conclusion: Based on the findings of formal and informal measures, B.M presented with most of the symptoms of the classic tetrad of Gerstmann's syndrome: Dysgraphia, Dyscalculia, Finger agnosia and Left-right disorientation, along with mild expressive language deficits. The aim of compiling this case study is of more clinical significance as exposure to such a condition in a clinical setup is quite rare and the assessment with only formal tests tools may often result in a false positive diagnosis. Also, the measures used for assessing reading, writing and orientation skills are supported by theoretical constructs proposed in the acquisition of adult reading and writing processes. The detailed measures of assessment and profiling when discussed may be of clinical relevance.

Introduction: Gerstmann's syndrome is a condition that results from damage to a specific area of the brain, probably the left parietal lobe in the region of the angular gyrus. This constellation of four deficits, agraphia, acalculalia, right-left disorientation and finger agnosia was first described by Gerstmann (1930). It may occur after a stroke or in association with damage to the parietal lobe. When the four Gerstmann's symptoms co-exist, the lesion is almost always in the posterior left parietal lobe, often involving the parieto-occipital junction region.

Agraphia/Dysgraphia:

Agraphia refers to difficulties with writing (Roeltgen 2003). Because writing is a complex skill requiring the cooperation of a number of abilities, agraphia can result from lesions in many parts of the brain and a range of different deficits. The agraphia usually associated with Gerstmann's syndrome results in writing or printing that is well formed, but spelling and word order are often incorrect and omissions are frequent (Kinsbourne and Rosenfield 1974).

Acalculalia/Dyscalculalia:

Acalculalia is a deficit in calculating (Denburg and Tranel 2003). Calculation is another example of a very complex function that can be disturbed by lesions in many areas, including right parietal lesions that result in a difficulty with manipulating the spatial positions of figures.

Right-Left Disorientation:

Right-left orientation refers to the ability to differentiate right-left directionality or location, typically referring to physical

body parts of the individual as well as those of others. Right-left disorientation refers to confusion in discriminating a rightward direction from a leftward direction. Although this can be viewed as a spatial disorder, it is almost always consequent on a posterior left (or dominant) hemisphere lesion (Ogden, 2005).

Finger Agnosia:

Finger agnosia is the loss in the ability "to distinguish, name, or recognize the fingers", not only with the patient's own fingers, but also the fingers of others, and drawings and other representations of fingers (Gerstmann, 1924). If truly present as a part of Gerstmann's syndrome, it should present bilaterally (the individual should have difficulty identifying fingers on both hands) (Mendonza, 2007). Although it is one of the tetrad of symptoms in Gerstmann syndrome, it is also possible for finger agnosia to exist on its own without any other disorders. Usually, lesions to the left angular gyrus and posterior parietal areas can lead to finger agnosia.

Need and specific aim of the study: The prevalence of Gerstmann's syndrome, with a parietal lobe lesion manifesting the four classic symptoms is a rare condition (Rusconi, Pinel, Dehaene & Kleinschmidt, 2010). Hence it is of importance to profile the formal and informal measures used for assessment which may help in co-relating the clinical findings to that of the theoretical perspectives mentioned. As there are no standardized tools for the assessment of dyslexia, dysgraphia, dyscalculia and finger agnosia in the Indian population, the specific aim of the present study was to focus on the use of clinical measures, some standardized and some informal measures of assessing the four classic symptoms of Gerstmann's syndrome.

Method:

Case Presentation:

A client B.M with Multiple craniotomy of the parietal lobe, secondary to recurrent intraventricular meningioma was studied. B.M was a 40 year old right handed woman with a university degree (Masters in Finance), who was employed as a financial advisor at Infosys till her illness.

Medical History:

B.M started developing multiple episodes of transient right sided weakness with speech difficulty during 2007. She was a known case of hypothyroidism and was under medication for the same since 30 years of age. Following her frequent episodes of right sided weakness and speech difficulty, a neurological evaluation was done, which revealed an intraventricular meningioma in the left parietal lobe. Surgical intervention was carried out involving left parietal craniotomy and excision of intraventricular meningioma during 2007. However due to recurrent occurrence of meningioma, multiple craniotomy procedures were done a second and third time during 2010 and 2013. Following the third craniotomy, B.M visited the place of evaluation with concerns of significant difficulty in writing, calculations and reading accompanied with a difficulty in speaking (Only for certain words; word retrieval deficits).

Neurological-Radiological Investigations results:

MRI Brain- Plain & contrast revealed T1- iso intense, T2- heterogeneous hyper intense mass lesion in left parietal lobe extending up to the trigone of the lateral ventricle & showing intense enhancement on contrast.

Motor skills:

B. M presented with mild right sided weakness, but adequate gross motor function with good strength and coordination was observed. On observation of oral motor skills, groping errors during spontaneous speech were evident. On volitional command, no groping behaviours were present. This groping could also be attributed to deficits in word retrieval (central). Though groping was evident, precision of articulation with respect to production of speech sounds was intact. On volitional commands of speech tasks no groping behaviours were present, based on which the apraxia component was ruled out. This was also in accordance with the Western Aphasia Battery scores, where B. M scored 60/ 60 for the apraxia subtest.

Neuropsychological Examination:

B. M was very well oriented to the present scenario along with good registration, attention & orientation. B.M demonstrated fair performance on memory tasks with respect to recall, anterograde & retrograde memory. On Addenbrooke's Cognitive Examination Revised (ACE-R)(Mioshi, Dawson, Mitchell, Arnold,& Hodges, 2006), B.M scored 16/18 for Attention & Orientation, 20/26 for memory, 3/14 for fluency, 16/26 for language and 11/16 for the tasks of visuospatial skills. Poor verbal fluency scores were also indicative of word-retrieval deficits and phoneme correspondence deficits for word naming. Poor performance on both the tasks of phonemic & semantic fluency could also be due to poor semantic activation leading to poor word retrieval resulting in poor performance on these tasks. Good scores for tasks of attention, orientation and memory were suggestive of limited/no cognitive-executive function deficits.

Language Assessment using Formal test measures:

B. M underwent the English version of the Western Aphasia Battery (WAB) (Kertesz, 1982)**.** Her spontaneous speech was fluent. In summary, B. M's language status could be described as follows:

Comprehension: B. M showed fair performance on multistep commands inclusive of pointing, identification and discrimination. She had intact comprehension for single unidirectional to compound bi-directional commands. Preserved comprehension in post morbid status for Malayalam, English, Tamil, Kannada & Hindi was observed.

Expression: B. M's speech was fluent and was characterized by appropriate usage of relevant content words with mild deficits in usage of grammatical markers pertaining to use of complex sentences.

Naming: B.M was able to name most of the test items in WAB; however, many successful attempts at self correction were observed during this task. An additional assessment of B.M's naming abilities was done using items from the Boston Naming Test (BNT) and it was observed that she did not have any difficulty naming simple & common objects. However, for objects with a relatively longer name, phonemic cues were required to elicit a correct response. Phonemic paraphasias (phoneme transposition errors) were also observed for objects with a longer word length. B.M was aware of her mistake whenever she made an error while naming.

Repetition: Poor performance on repetition of sentences with increasing complexity was observed. B. M presented with fairly intact responses for tasks of repetition of simple sentences & word repetition.

On WAB, B.M achieved a score of 9/10 for fluency, 6.5/10 for comprehension, 3/10 for repetition and 7.3/10 for naming tasks. Based on the classification of subtype of aphasia, B.M belongs to the Wernicke's subtype. It is of critical importance here, to note that, the results of WAB give a false positive impression of "Wernicke's aphasia". Based on informal assessment and family feedback, the client had no difficulty in understanding and repeating information, but on repetition tasks in WAB, she scored less. Following this information from family, re-administration of repetition task alone in WAB was done the next day where the client achieved a score of 6.6/10 which gave an impression of "Conduction aphasia". In this case, false positive impressions of Wernicke's aphasia as well as Conduction aphasia were obtained, even though the lesion was not indicative of either of these 2 subtypes of aphasia. This suggests that, WAB as a standard test battery for Indian population may not be valid and reliable enough to sub categorize a person with an acquired language disorder. B.M achieved a score of 57/60 on reading tasks and 65/100 for writing tasks. Though, B.M had significant deficits in reading and writing characterized by her reading and writing sample, the lesser complexity of the stimuli and also the self-correction cues may have helped in obtaining better scores.

Here, it is of importance to note that much of the relevant clinical information about B.M's dyslexic, dysgraphic and dyscalculalic features was listed down using informal measures of assessment. The profiling of the classic tetrad of this syndrome was done as follows:

Finger Agnosia:

As Schilder, 1931 stated, finger agnosia is not a unitary disability but regroups a certain number of different performances depending on the way it is tested. The nature of the stimulation is important, as well as the mode of response. Poor performance on the auditory word recognition subtest in auditory verbal comprehension in WAB test for identification of fingers was suggestive of probable finger agnosia, which hinted for a more detailed assessment of finger agnosia using informal measures. B. M was tested in the following situations.

Situation I: B. M was asked to indicate which finger was used in different situations. For example, she was asked which finger is used to indicate direction, on which finger a wedding ring is placed, which finger is the biggest, the smallest, etc.

Situation II: B. M was instructed to touch the thumb to the middle finger.

Situation III: The client was instructed to touch the Right ring finger to the left ring finger.

Situation IV: The client was instructed to touch the Right ring finger to the left index finger.

Situation V: The client was instructed to shift her ring from the ring finger to the index finger.

Situation VI: B. M was instructed to transfer the pen from the tripod grasp of thumb, index finger, middle finger to the thumb, ring and little finger etc., which could not be done.

Out of a total of 10 questions, no responses were obtained.

Right–left discrimination:

As with finger agnosia, right–left discrimination is a very broad concept depending on verbal, sensory, conceptual and visuospatial factors (Benton, 1977; Denes, 1989). Following Benton and Sivan (Benton and Sivan, 1993), this judgement requires the analysis of operationally defined components such as orientation with respect to one's own body with or without visual guidance, orientation with respect to an examiner or picture facing the patient, or combined orientation with respect to one's own body and a person in front of the patient.

Informal assessment of neglect carried out through tasks of letter cancellation & line cancellation revealed no significant difficulty in identification of letters towards extreme right & extreme left. However mild deficits were evident in right left orientation manifested by difficulty in identification of objects (verbal command) towards right and left side. Poor orientation with respect to directions specifically to right & left was informally assessed which was manifested by poor identification of body parts on the subtest of auditory word recognition in auditory verbal comprehension in WAB test. The comprehensive score for constructional, Visuospatial & calculation tasks was 42/100. The poor scores for this task are also in support of deficits in left-right orientation and calculation tasks.

Agraphia/Dysgraphia:

Three types of agraphia are classically described: (i) aphasic agraphia, whose symptoms are paragraphias, simple omissions and substitutions or jargon agraphia but with well-formed letters, due to left temporal or subcortical hemisphere lesion; (ii) apraxic agraphia, characterized by a defective form of the letters and in the most severe case a scrawl, seen in most cases after left parietal lobe lesions, and (iii) spatial agraphia consisting in an erroneous management of space on the paper, with respect to either the horizontality or the

margin, observed more often following right parietal lesion (Roeltgen, 1985).

In relatively pure Gerstmann's syndrome, it is interesting to note that a peripheral dysgraphia is often present (Martory, 1996). On the contrary, central agraphia (with a phonological or lexical disturbance) is never observed (Lang, 1994).

B. M complained about her handwriting which she reported as being slow and resembling that of a child. She could easily produce sentences, without spatial dysgraphia. Spontaneous written production and writing to dictation were characterized by systematic confusions between lower case letters b and p and between d and q. The substitutions concerned exclusively a top-bottom letter reversal and not a left–right shift. B. M could correctly write all the letters of the alphabet in upper case. She could also produce the lower case letters, with the exception of b–p–d–q. Some letter omissions appeared in the middle or at the end of long words.

Informal analysis of writing sample revealed deficits in word formation evident by phonemic paraphasia's in writing also, although phonotactics of the word formation was intact. B. M presented with self correction of errors in writing also. Fair performance on phoneme to grapheme correspondence was seen on tasks of dictation. Poor performance for grapheme to phoneme correspondence was noticed with difficulty in spontaneous writing along with simultaneous verbal production of target words. B. M had difficulty in writing evident for performance on tasks of phonemic substitution tasks.

Acalculalia/Dyscalculia:

Hecaen et al. 1961 distinguished three types of mathematical disabilities: (i) aphasic acalculia whose origin lies in a language disturbance and corresponds to a left hemispheric lesion; (ii) spatial acalculia which is an incapacity to organize numbers in space in order to carry out operations and whose lesion is in the right hemisphere; (iii) anarithmetia corresponding to a loss of arithmetical procedures and occurring after bilateral lesions or accompanying dementia.

For B. M, every task requiring numbers was severely impaired. Poor performance was noted on identification of arithmetic markers. Spontaneous performance was fairly intact for single digit tasks of least complex addition & subtraction alone. Significant difficulty was exhibited with increase in complexity and also for more than 1 digit tasks on addition, subtraction, multiplication & division. In summary, B. M's acalculia corresponded to an aphasic acalculia along with an impairment of the Arabic-arithmetic system both for comprehension and production.

Dyslexia:

B. M presented with fairly intact performance on reading tasks for words with relatively less complexity. Significant deficits in use of grammatical markers such as suffixes were evident. Simplification & substitution of words, with elimination of suffixes into nouns (relatively- relevant) was observed, which could be a probable manifestation of semantic paraphasia. As observed, self correction of errors made on complex reading tasks was through syllable to syllable reading (Phoneme to phoneme reading). Evident omissions of prepositional markers and articles in reading were also noted.

Summary of Results:

On WAB, B.M achieved a score of 9/10 for fluency, 6.5/10 for comprehension, 3/10 for repetition and 7.3/10 for naming tasks. Based on the classification of subtype of aphasia, B.M belongs to the Wernicke's subtype. It is of critical importance here, to note that, the results of WAB give a false positive impression of "Wernicke's aphasia". Based on informal assessment and family feedback, the client had no difficulty in understanding and repeating information, but on repetition tasks in WAB, she scored less. Following this information from family, re-administration of repetition task alone in WAB was done the next day where the client achieved a score of 6.6/10 which gave an impression of "Conduction aphasia". In this case, false positive impressions of Wernicke's aphasia as well as Conduction aphasia were obtained, even though the lesion was not indicative of either of these 2 subtypes of aphasia. This suggests that, WAB as a standard test battery for Indian population may not be valid and reliable enough to sub categorize a person with an acquired language disorder. B.M achieved a score of 57/60 on reading tasks and 65/100 for writing tasks. Though, B.M had significant deficits in reading and writing characterized by her reading and writing sample, the lesser complexity of the stimuli and also the self-correction cues may have helped in obtaining better scores.

Conclusion: Based on the findings of formal and informal measures, B.M presented with most of the symptoms of the classic tetrad of Gerstmann's syndrome: Dysgraphia, Dyscalculia, Finger agnosia and Left-right disorientation, along with mild expressive language deficits. The aim of compiling this case study is of more clinical significance as exposure to such a condition in a clinical setup is quite rare and the assessment with only formal tests tools may often result in a false positive diagnosis. Also, the measures used for assessing reading, writing and orientation skills are supported by theoretical constructs proposed in acquisition of adult reading and writing processes. The detailed measures of informal assessment and profiling that are discussed may be of clinical relevance.

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CONCEPT DEVELOPMENT AND SOCIO-EMOTIONAL BEHAVIOR AMONG RURAL PRESCHOOL CHILDREN

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Abstract: A study on "Concept development and socio-emotional behavior among rural preschool children" was conducted during the year 2010-12. Sample comprised of 40 preschool children aged 3-5 years belonging to three anganwadis of Dharwad Taluk. Concept development was assessed using Boehm test of basic concepts-Revised and Socio-emotional behavior checklist was used to assess the socio-emotional behavior of children. Intervention programme was carried out for two months at the anganwadi centre to improve children's knowledge about different relational concepts and socio-emotional behavior. The results indicated that there were no significant differences between boys and girls on both concept development and socio-emotional behavior at pre and post test. Majority of children having medium level of concept development (79.06 %) and socio-emotional behavior (93%) at pre test increased to high level at post test (88.37 % and 58.1% respectively). Significant difference was observed between pre and post test scores. Majority of children answered almost all the items of stimulus package correctly after intervention. Therefore intervention was found to be effective in improving children's knowledge about different concepts as well as their socio-emotional behavior.

Introduction: Every child is endowed with certain biological inheritance at the time of birth. He gets the knowledge of the external world through sense organs, which are the gateways of knowledge. With any child, some concepts may be fully and accurately developed, others only partially developed, and still others quite inaccurate. Differences in particular areas appear from one child to the next depending on developmental level and experiences. The emphasis should start at an early stage, as these are critical years in a child's span since the rate of development is more rapid than at any other stage of development. To develop to his or her full potentials, a child, particularly in these years needs a stimulating environment.

Concept acquisition is the key to cognitive development. Concept is one of the most important things to understand when teaching children. The development of concepts is the linking together of ideas in a child's mind, so that they can process more complex lines of thought. The concepts provide an efficient way of organizing experience. They also serve as an important function for a range of cognitive tasks, including identifying objects in the world, forming analogies, making inferences that extend knowledge beyond what is already known. The most conservative estimate of children's concepts would be the number of words for which they know the meaning roughly 40,000 by age 10 and 60,000 by age 19, which over the first two decades of life is roughly one new concept every 90 waking minutes (Bloom, 2000; Miller, 1996).

Early childhood is a vital phase of life in terms of child's intellectual, emotional and social development. Social and emotional development involves the acquisition of a set of skills and has significant implications for current and later social functioning. If emotional development is fostered at a young age, children are more likely to settle well into school, work co-operatively, confidently, independently and behave appropriately. Socio-emotional development provides the foundation for how we feel about ourselves and how we experience others. This foundation begins the day we are born and continues to develop throughout our lifespan. The greatest influence on a child's socio-emotional development is the quality of the relationships that he develops with his primary caregivers. A child with poor relationships with peers tends to have, academic problem and later mental health

problems. The development of the social and emotional health of a child is essential to his appropriate behavior, understanding of life and transition to adulthood. Socio-emotional development helps to shape a child into what he will become later in life by teaching proper reactions to emotional matters. So there is a need to know the concept development and socio-emotional behaviours of preschool children and provide the necessary intervention.

Material and methods: Totally there were 159 children attending three anganwadis in uppinbetageri village at the time of survey. Among these children, 43 children (13 boys and 30 girls) in the age of 3-4 years were purposively selected.

Boehm Test of Basic Concepts-Revised was used to measure the concept development of children. The test consisted of 50 pictorial items and arranged in approximate order of increasing difficulty and divided evenly between two booklets-booklet 1 and booklet 2. Each booklet requires approximately 15-20 minutes for administering to kindergarten/preschool classes. The child is shown a picture and is requested to respond to a question by pointing to the correct picture in a multiple choice picture booklet. A score of '1' for correct answers and '0' for wrong answer was assigned. Based on total scores, children were categorized into low (0-16), medium (17-33) and high (34-50) levels of relational concept.

Mothers of preschool children were assessed for socio-emotional behavior of their children. The socio-emotional checklist consisted of 25 statements covering various dimensions of socio-emotional behavior of children namely social competence, attachment, emotional competence and temperament. It is a five point scale with responses always, frequently, occasionally, rarely and never with a score of 5, 4, 3, 2, and 1 respectively. Thus minimum score a child may get is '25' and maximum is '125'. Based on total scores, children were categorized into three groups of socio-emotional behavior as low (25-58), medium (59-92) and high (93-125)

The school based intervention was provided with the help of stimulation package. It includes worksheets on different concepts such as concept of shape/size, diameter, depth, space, direction, position and quantity. The intervention was carried out in respective anganwadis for a period of two moths i.e., two hours per day. The intervention was also carried out for mothers of these children in respective anganwadis twice a week for two hours per day. Mothers were imparted knowledge on scientific child care and use of age appropriate play materials. Various activities were also planned for behavioral and developmental intervention of these children. Post test assessment was carried out to know the impact of intervention on concept development and socio-emotional behavior of children.

Results and Discussion : Table 1 (Fig.1) depicts distribution of children based on relational concept scores at pre and post test. It is clear from the table that at pre test majority (79.06%) of children belonged to medium, followed by low (18.60%) and high (2.32%) level of relational concept. More number of children were seen in higher category (88.37%) of concept development after intervention, followed by medium level (11.62%) and none of them belonged to low level. Majority of children answered almost all the items of stimulus package correctly after intervention. Further it is evident from the same table that the mean concept development score at post test (42.47) was higher than pre test score (18.27). The difference in the mean value was found to be statistically significant. These results are supported by a study conducted by Manocha and Narang (2008) who found that preschool children who received intervention showed significant gains in concept development as compared to control group. Rani (2001) found mean gain in different aspects of cognition in three study groups and significantly higher mean gain in concept development of experimental group children. Hence it can be concluded that intervention had significant effect in improving the level of concept development of children.

Table 2 shows influence of gender on concept development of children at pre and post test. More number of the boys (76.92%) and girls (80%) belonged to medium category of concept development at pre test. However at post test more number of boys (100.0%) and girls (83.3%) were observed in high category of concept development compared to pre test in the same category. Further mean values of boys and girls at pre test was 18.70 and 18.15 respectively and at post test it was found to be 46.6 and 41.10 respectively. However, the difference was found to be statistically non significant, indicating that both boys and girls developed better understanding about relational concepts.

The distribution of children based on socio-emotional behavior scores at pre and post test is presented in Table 3 (Fig.2). Results showed that at pre test, majority of children (93%) were in medium level, followed by low (4.7%) and high (2.3%) level of socio-emotional behavior. Whereas at post test more than half (58.1%) of the children belonged to high level, followed by medium (41.9%) and none of the children belonged to low level of socio-emotional behavior. Further the comparison of mean scores of socio-emotional behavior of children at post test was found to be higher (92.07) than pre test (81.58). The difference was found statistically significant at 0.01 level of probability, indicating that intervention had influenced the socio-emotional behavior of children. Results of McCabe, P.C and Altamura, M (2011) are in line with the study indicating that intervention had significant positive impact on socio emotional development of children such as social competence, relationship with peers, academic and social success.

Table 4 presents gender wise distribution of children based on socio-emotional behavior scores at pre and post test.

Results indicated that at pre test cent per cent of boys and 90.90 per cent of girls belonged to medium level of socio-emotional behavior. Very few (6.06 and 3.03%) girls belonged to low and high category respectively, while none of the boys belonged to low and high category of socio-emotional behavior. At post test, most (80.0%) of the boys and more than half (51.51%) of the girls belonged to high level of socio-emotional behavior, while 20.0 per cent of boys and 48.48 per cent of girls belonged to medium category. None of the children were in low level of socio-emotional behavior. Further it is evident from the table that at post test both boys and girls had higher mean score (2.8 and 2.51 respectively) compared to the pre test (2.0 and 1.9 respectively). However, statistically non-significant difference was observed, indicating that there is no significant difference between boys and girls on their socio-emotional behavior. This could be because both anganwadi boys and girls have been given equal chance to share things, play with toy materials, participate in group activities, take turns, express needs and feelings with other children freely.

Conclusion : Children having medium level of concept development and socio-emotional behaviour at pre test increased to high level at post test. Majority of children answered almost all the items of stimulus package correctly after intervention. Therefore intervention was found to be effective in improving children's knowledge about different concepts. There was significant difference between pre test and post test scores with regard to concept development and socio-emotional behaviour of preschoolers. However gender had no influence on concept development and socio-emotional behaviour of children.

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Table 1: Distribution of children based on relational concept scores at pre and post test

N=43

Test	Concept Development			Total	Mean(SD)	't' value	$\chi 2$
	Low	Medium	High				
Pre test	8(18.60)	34(79.06)	1(2.32)	43(100.0)	18.27(7.10)	14.58**	57.9**
Post test	-	5(11.62)	38(88.37)	43(100.0)	42.47(8.00)		

Note: Numbers in the parenthesis indicate percentages, **- significant at 0.01 level

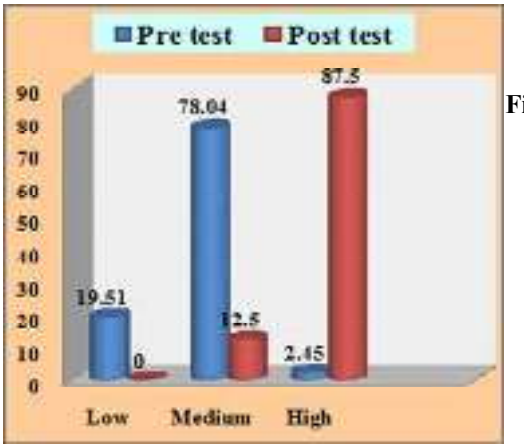

Fig.1. Distribution of children based on relational concept scores at pre and post test

Table 2: Influence of gender on concept development of children at pre and post test

N=43

Category	Pre test	Post test		
	Boys (n=13)	Girls (n=30)	Boys (n=13)	Girls (n=30)
Low	2(15.38)	6(20.0)	-	-
Medium	10(76.92)	24(80.0)	1(7.69)	5(16.7)
High	1(7.69)	-	12(92.30)	25(83.3)
Mean(SD)	18.70(5.60)	18.15(7.57)	46.6(2.63)	41.10(8.73)
't' value	0.211^{NS}		1.94^{NS}	
χ^2	2.79^{NS}		2.26^{NS}	

Note: Numbers in the parenthesis indicate percentages, NS- Non-Significant

Table 3: Distribution of children based on socio-emotional behavior scores at pre and post test

N=43

Test	Socio-emotional behavior			Mean(SD)	't' value
	Low	Medium	High		
Pre test	2(4.7)	40(93.0)	1(2.3)	81.58(8.27)	**7.33****
Post test	-	18(41.9)	25(58.1)	92.07(12.66)	

Note: Numbers in the parenthesis indicate percentages, **- significant at 0.01 level

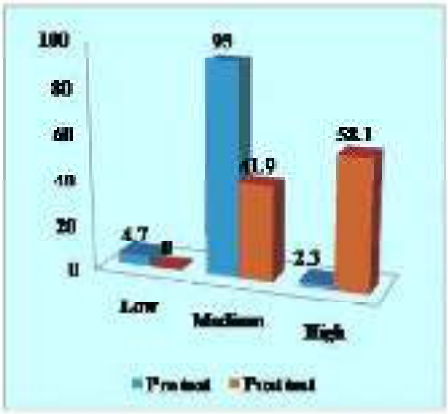

Fig.2. Distribution of children based on socio-emotional behavior scores at pre and post test

Table 4: Distribution of children based on socio-emotional behavior scores at pre and post test by gender

N=43

Category	Pre test		Post test	
	Boys (n=10)	Girls (n=33)	Boys (n=10)	Girls (n=33)
Low	-	2(6.06)	-	-
Medium	10(100.0)	30(90.90)	2(20.0)	16(48.48)
High	-	1(3.03)	8(80.0)	17(51.51)
Total	10(100.0)	33(100.0)	10(100.0)	33(100.0)
Mean	2.00(0.08)	1.9(0.3)	2.8(0.42)	2.51(0.50)
't' value	0.312 NS		1.61 NS	

Numbers in parenthesis indicate percentages

MAJOR LEARNING DISABILITIES IN PHYSICALLY CHALLENGED CHILDREN AND THE REMEDIAL MEASURES

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Communication skills refer to both oral and written skills, and it mostly depends on the acquisition of knowledge for a particular domain. Majority of the people suffer from lack of these skills and it is said that, they possess learning disorders. It is found that the major causes for learning disorders affect the acquisition, retention, understanding or use of verbal and non verbal information. These disorders greatly affect the learning processes in an individual who otherwise demonstrates average abilities necessary for thinking and reasoning.

Learning disorders result from impairments in one or more cognitive processes required to perceive, think, recall or to learn. Some of these processes include: communication skills, linguistic processing, visual processing and to process and retain information.

A relevant stimulus is required to understand and reciprocate knowledge that may influence learning. If there are significant dysfunctions in any of the above said cognitive processes, then the child probably has some type of learning disability. This paper discusses the Knowledge Engineering approach and proper diagnosis of learning disability. A case study is being conducted with anticipatory results for this purpose.

Keywords: Communication Skills, Learning Disability, Cognitive Abilities, Linguistic Processing.

1. Introduction: Learning disabilities are problems that affect the brain's ability to receive, process, analyze, or store information. These problems can make it difficult for a student to learn as quickly as someone who isn't affected by learning disabilities. But a learning disability doesn't have anything to do with a child's intelligence. Kids with learning disabilities aren't lazy or dumb. In fact, most are just as smart as everyone else. Their brains are simply wired differently. This difference affects how they receive and process information.Simply put, children with learning disabilities see, hear, and understand things differently. This can lead to trouble with learning new information and skills, and putting them to use. They just need to be taught in ways that are tailored to their unique learning styles. By learning more about learning disabilities in general, and child's learning difficulties in particular, we can help pave the way for success at school and beyond.
The most common types of learning disabilities involve problems with reading, writing, math, reasoning, listening, and speaking.

2. Methodology: The way our brains process information is extremely complex — it's no wonder things can get messed up sometimes. Take the simple act of looking at a picture, for example: Our brain not only has to form the lines into an image, it also has to recognize what the image stands for, relate that image to other facts stored in our memories, and then store this new information. It's the same thing with speech — we have to recognize the words, interpret their meaning, and figure out the significance of the statement to us. Many of these activities take place in separate parts of the brain, and it's up to our mind to link them all together.

2.1 Signs of Learning Disability: It is not possible to tell by looking that a child has a learning disability, which can make learning disabilities hard to diagnose. Because of the wide variations, there is no single symptom or profile that you can look to as proof of a problem. However, some warning signs are more common than others at different ages. By being aware of what they are, it may possible to catch a learning disorder early and quickly take steps to get the child help.
Learning disabilities usually first show up when a child has difficulty speaking, reading, writing, figuring out a math problem, communicating with a parent, or paying attention in class. The following checklist lists some common signs for learning disabilities. It is important to note that children who do not have learning disabilities ma still experience some of these difficulties at various times. The time for concern is when there is a consistent unevenness in the child's ability to master certain skills.

2.1.1 Preschool Signs and Symptoms

- Problems pronouncing words
- Trouble finding the right word
- Difficulty rhyming
- Trouble learning the alphabet, numbers, colors, shapes, days of the week
- Difficulty following directions or learning routines
- Difficulty controlling crayons, pencils, and scissors or coloring within the lines
- Trouble with buttons, zippers, snaps, learning to tie shoes

2.1.3 Ages 5-9 Signs and Symptoms

- Trouble learning the connection between letters and sounds
- Unable to blend sounds to make words
- Confuses basic words when reading
- Consistently misspells words and makes frequent reading errors
- Trouble learning basic math concepts
- Difficulty telling time and remembering sequences
- Slow to learn new skills

2.1.2 Ages 10-13 Signs and Symptoms

- Difficulty with reading comprehension or math skills
- Trouble with open-ended test questions and word problems
- Dislikes reading and writing; avoids reading aloud
- Spells the same word differently in a single document
- Poor organizational skills (bedroom, homework, desk is messy and disorganized)
- Trouble following classroom discussions and expressing thoughts aloud
- Poor handwriting

2.2 Different Types of Learning Disabilities

2.2.1 Learning Disabilities in Reading (Dyslexia)

There are two types of learning disabilities in reading. Basic reading problems occur when there is difficulty understanding the relationship between sounds, letters and words. Reading comprehension problems occur when there is an inability to grasp the meaning of words, phrases, and paragraphs.

Signs of reading difficulty include problems with:

- letter and word recognition
- understanding words and ideas
- reading speed and fluency
- general vocabulary skills

2.2.2 Learning Disabilities in Math (Dyscalculia)

Learning disabilities in math vary greatly depending on the child's other strengths and weaknesses. A child's ability to do math will be affected differently by a language learning disability, or a visual disorder or a difficulty with sequencing, memory or organization.

A child with a math–based learning disorder may struggle with memorization and organization of numbers, operation signs, and number "facts" (like 5+5=10 or 5x5=25). Children with math learning disorders might also have trouble with counting principles (such as counting by 2s or counting by 5s) or have difficulty telling time.

2.2.3 Learning Disabilities in Writing (Dysgraphia)

Learning disabilities in writing can involve the physical act of writing or the mental activity of comprehending and synthesizing information. Basic writing disorder refers to physical difficulty forming words and letters. Expressive writing disability indicates a struggle to organize thoughts on paper.

Symptoms of a written language learning disability revolve around the act of writing. They include problems with:
- neatness and consistency of writing
- accurately copying letters and words
- spelling consistency
- writing organization and coherence

2.2.4 Other Learning Disabilities

a) Dyspraxia-Difficulty with fine motor skills: Problems with hand-eye coordination, balance, manual dexterity

b) Dysphasia/Aphasia-Difficulty with language: Problems understanding spoken language, poor reading comprehension

c) Auditory processing disorder-Difficulty hearing differences between sounds: Problem with reading, comprehension, language

d) Visual Processing Disorder-Difficulty interpreting visual information: Problem with reading, math, maps, charts, symbols, pictures.

e) ADHD – Attention deficit hyperactivity disorder (ADHD), while not considered a learning disability, can certainly disrupt learning. Children with ADHD often have problems sitting still, staying focused, following instructions, staying organized, and completing homework.

f) Autism – Difficulty mastering certain academic skills can stem from pervasive developmental disorders such as autism and Asperger's syndrome. Children with autism spectrum disorders may have trouble communicating, reading body language, learning basic skills, making friends, and making eye contact.

3. Observation/Results

3.1 Characteristics of Dyslexic students
- Difficulty reading single words, spelling, connecting between letters and sounds
- Confusing small words such as ***to*** and ***at***
- Letter reversal such as ***d*** with ***b***, ***p*** with ***q***
- A child may read ***'bad'*** as ***'dab'*** , ***'tip'*** as ***'pit'***
- Confusion with ***before/after, right/left*** and so on
- Difficulty with handwriting, this can involve slower writing speed than average, poor handwriting characterized by irregularly formed letters, or inability to write straight on a blank paper with no guideline.

3.2 Characteristics of Dyscalculia students
- Delay in counting
- Difficulties in memorizing arithmetic facts: multiplication and addition
- Difficulty decomposing numbers (e.g. recognizing that 10 is made up of 4 and 6)
- Difficulty understanding place value
- Child would often mix up similar-looking numbers in reading, such as 6 and 9, 3 and 8 or 1 and 7
- It would be difficult for the child to recognize, and therefore use, calculation symbols such as +, –, × and ÷. And may confuse '+' with '÷' or '÷' with '–'
- Confusion in reading directions, for instance '56' would be read as '65'
- Trouble in telling the time
- Making comparisons such as more than/less than (>/<)
- Difficulty in learning mathematical tables, formulas and rules

3.3 Characteristics of Dysgraphia
- Trouble forming letter shapes
- Inconsistent spacing between letters and words
- Poor understanding of uppercase and lower case letters or mixing them
- Inability to write or draw in a line or within margins
- Excessive erasures
- Inattentiveness over detail while writing
- Having a hard time translating ideas to writing, sometimes using the wrong words altogether
- Trouble with buttons & zippers
- Doesn't learn to tie his/her shoes like other kids
- May hate to color
- Trouble connecting the dots

Remedial Measures for various Learning Disabilities

When it comes to learning disabilities, it's not always easy to know what to do and where to find help. Turning to specialists who can pinpoint and diagnose the problem is, of course, important. The use of educational therapy can be effective in the classroom as long as teachers are well informed about the child's learning disability.

Even if the symptoms seem clear, it's important to have child tested and evaluated by a qualified professional.

Read and learn about child's type of learning disability. It is necessary to find out how the disability affects the learning process and what cognitive skills are involved. It's easier to evaluate learning techniques if one understands how the learning disability affects the child.

Helping children with learning disorders develop their passions and strengths will probably help them with the areas of difficulty as well.

Some students who have been diagnosed with a learning disability can be made to work with a special teacher or tutor for a few hours a week to learn certain study skills, note-taking strategies, or organizational techniques that can help them compensate for their learning disability.

4. Conclusion : As discussed earlier, learning disabilities are problems that affect the brain's ability to receive, process, analyze, or store information.But a learning disability doesn't

have anything to do with a person's intelligence. Most people with these disabilities adapt to their learning differences and find strategies that help them accomplish their goals and dreams.After all, successful people such as Walt Disney, Alexander Graham Bell, and Winston Churchill all had learning disabilities. With

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REINFORCEMENT LEARNING TECHNIQUES FOR SPEECH DYSLEXIA

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Who is not motivated by rewards, encouragements? Who doesn't like to stand out in the crowd by their awe inspiring talks? Answer to these questions would be yes. Every one of us tries to speak as nicely as possible. But most of us have stage fears; speak up skills etc., which can be overcome by adequate amount of practices as these are related to psychological illness. But there is a very few percentage of people who can't speak what they want to as they find difficult to speak. This kind of ailment is categorised as neurological illness by the name Speech Dyslexia. Including Thomas Alva Edison: a great scientist, there are many people who were and still are diagnosed as speech dyslexic. Being speech dyslexic doesn't stop a person in achieving something that he intends to do. In fact, they are the great inventors and innovators. How could this happen!

Can speech dyslexic people overcome their difficulty in speaking? Yes, there are many treatments/methodologies devised for the same. One such most advanced method for giving solutions could be by the application of Machine Learning called Reinforcement Learning Technique. This paper describes the role of Reinforcement Learning Technique: a reward giving strategy to treat Speech Dyslexia. This technique would be used to solve the real life problems existing in speech dyslexic children.

Keywords: Speech Dyslexia, Reward, Machine Learning, Reinforcement Technique.

I. Introduction: The word 'dyslexia' is derived from the Greek 'dys-' meaning difficulty with, And '-lexia', meaning words or language. Dyslexia is a condition that occurs due to some abnormalities in the brain where a person finds difficulty in reading, writing. It's said that the way information stored and retrieved is different when compared to a normal person .There are different kinds of dyslexia namely dysphonetic, dyseidetic and dysphoneidetic.People with disphonetic dyslexia find difficulty in connecting sounds to symbols i.e. problem with phonetics, whereas 'dyseidetic' dyslexic people find difficulty in word recognition and spelling. In a condition where a child dysphoneidetic it cannot either read or spell the words correctly.

Around 15-20% [2] population is dyslexic and root cause for it is still being researched.In this paper we read more on speech dyslexia and reinforcement learning and role of Reinforcement learning.

II. Methodology: Maturity is the state of mind where a person can distinguish between right and wrong. And every person will have his/her own perspective of what is right or wrong. This difference in perspective is because of the experiences and the derivations from them vary from person to person. We learn from various interactions, consequences of our actions, rather than from being explicitly taught and we select our action towards a problem on the basis of our past experiences (exploitation) and also by new choices (exploration) .Thus we all make decisions by trial and error learning .This trial and error learning is called as Reinforcement learning.

Reinforcement learning addresses the question of how an autonomous agent that senses and acts in its environment can learn to choose optimal actions to achieve its goals. Each time an agent performs an action in its environment, a trainer may provide a reward or penalty to indicate the desirability of the resulting state.

For example when a child is encouraged for its mischievous activities it continues to repeat the same activity but when it is condemned it falls back in a course of time. From the sequence of negative and delayed reward (here in this case beating or condemning) the child chooses the sequences of action that produce the greatest cumulative reward namely setting him /her right. This algorithm is called as Q-learning that can acquire optimal control strategies from delayed rewards even when the child has no prior knowledge of the effects of its actions on the environment.

This Reinforcement learning algorithms are related to dynamic programming algorithms frequently used to solve optimization problems.

Let's explain the process of Reinforcement learning in humans. Let's consider a ball is given to a child. The set of actions that the child can take are: it can play with it, it can

kick the ball, or it can throw the ball at someone. The action that will be taken by the child depends on what was the result obtained for the action performed earlier or if it performs any of the above action. Suppose if the child is praised for the action it takes and if it's performing this activity for the first time, then it considers taking the same action next time when it is praised for the same (reward).Let us consider for the second time it sees the ball it checks for the action with maximum reward i.e. the action which doesn't land it in trouble and performs that .Suppose the same action performed the second time is not encouraged then it will look for another option. Third time it sees the action with maximum reward and performs the same .This is how the Reinforcement learning happens in human brains.

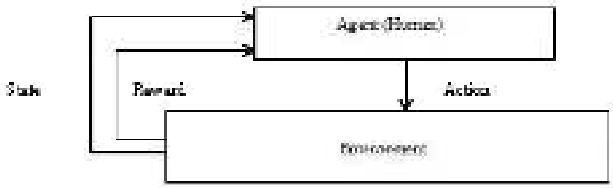

Fig 1: Reinforcement Learning Process

III. Experiment/Observations: Most of us would have watched Taare Zameen Par [1] where the child (Ishaan Awasthi) finds difficulty in speaking and writing.However he shows immense interest in painting, drawing etc. Figure 2 is one of the still from the movie.

Fig 2: IshaanAwasthi

http://www.taarezameenpar.com

One incident we would like to quote is when he was asked to read in the class he finds difficulty in reading and when the teacher threatens him he just blabbers something. When asked for the reason he tells that "letters are dancing" .This tells us that he was not able to recognize the words properly and hence found difficulty in reading. He was not able to perform well in his academics as he found difficulty in remembering and interpreting words and he used to be punished for the same. He used to get scolded by his parents, teachers which made him adamant.

Below images shows how a dyslexic child interprets the letters.In Figure 2 we can see that the letters 'I' and 'r' are interchanged in the word bird.

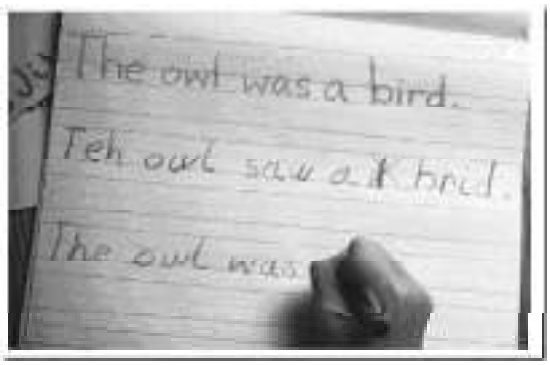

Fig 3: Interpretation of words by dyslexic children.

http://healthcare-home.blogspot.in/2012/10/dyslexia-word-blindness-homoeopathy.html

Figure 4: Interpretation of words by dyslexic children.

http://en.wikipedia.org/wiki/Dyslexia

Seeing his academic performance he will be put into a boarding school. Even there he would be punished for not performing well in his academics. This continues until a new teacher Ram Shankar Nikumbh comes.Interacting with the students he comes to know about Ishaan' s disability. He will go to his home and does lot of research by going through his notes and comes to know that he is suffering from dyslexia. Without knowing this his parents and teachers were punishing him and thus being a cause for him being adamant. There are many such children who have difficulty to read and interpret words. They are termed to be speech dyslexic. Reading problems in such children are manifested in extreme difficulties in acquiring basic reading sub skills such as word identification and phonological (letter-sound) decoding. Some of the interpretations of the words by a speech dyslexic student are: WHILE is pronounced as WHITE, SCANDAL as SANDALS and so on.

Ram Shankar Nikumbh (Ram hereafter)decides that he should help Ishaan to recover from his disability. He uses various

methods for the same. We shall list out the methods that he used and the impact on the child.

Method 1: Ram in his class quotes the examples of various personalities like Thomas Alva Edison, Abhishek Bachchan etc. and says that all of them had one common thing. It was that there were all dyslexic.

Result: This is a positive trait which in terms of Reinforcement Learning is a reward that makes Ishaan think that he is not the one who is dyslexic.

Method 2: Ram encouraged Ishaan in activities that he was interested in i.e. painting. Also he used to teach him the alphabets and made him repeat the same .When he used to commit a mistake he used to pacify him that it is normal and asked him to repeat the words.

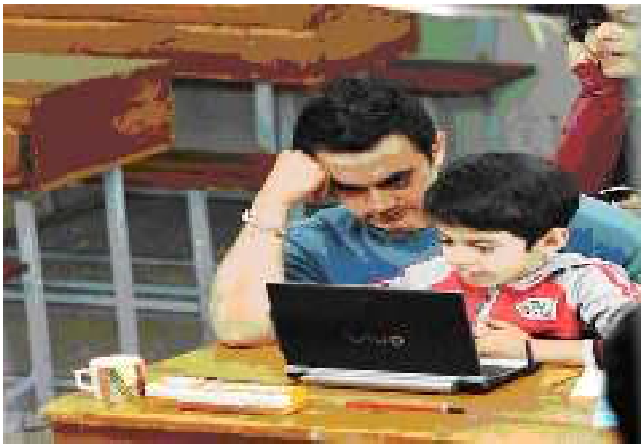

Figure 5: Ram teaching Ishaan

http://www.taarezameenpar.com

Result: Encouragements and appreciations from Ram made Ishaan overcome his disability. He gradually improved in his academics.

From the movie we can clearly see that how rewards and not punishments helps a person in overcoming his learning disability.

In this regard an experiment is also being conducted with an NGO. The experiment is being designed with the help of the teachers teaching the children with speech dyslexia. The anticipated result from the experiment designed using Reinforcement learning technique we sincerely hope that it would certainly solve the issue.

IV. Conclusion: Reinforcement learning has a wide range of applications. It addresses the problem of learning control strategies for autonomous agents. It assumes that training information is available in the form of rewards and the main aim of the agent would be to select an action with maximum reward points.

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CLIENT CENTRED REHABILITATION FOR INDIVIDUALS WITH CLEFT LIP AND PALATE

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Background and need: The cleft lip and palate is a congenital condition exhibiting speech abnormalities. Successful rehabilitation is possible by team work of the professionals (Plastic surgeon, speech language pathologist, prosthodontist, psychologist, and orthodontist). However, it is challenging to work as a multidisciplinary team in a developing country like India. Hence the present study is emphasized on the team approach for rehabilitating individuals with cleft lip and palate.

Main Objectives: The present study was aimed to document the variations in the perception of resonance characteristics of speech (hypernasality and burst duration) across the stages of prosthodontic management and compared with the controls.

Method: The study included five subjects among these two children underwent for surgical correction of the cleft lip and palate followed by prosthodontic management. Three adults with cleft lip and palate recommended for prosthodontic management by the cleft team. All the subjects were provided with the custom made prosthesis. The speech sample for recording was reading or repeat nine meaningful words embedded with pressure consonants (/p/, /t/, /k/, /b/, /d/, /g/) along with the spontaneous

speech across the stages of fabrication of the prosthesis. The variations in the perception of hypernasality in spontaneous speech was analyzed using a four point standardized rating scale. The acoustic measure (burst duration) of speech was analyzed.

Results: The findings of perceptual evaluation revealed significant reduction in perception of hypernasality in speech with sustained fistula obturation and followed by speech therapy for one subject. There was reduced or absent of burst was observed for most of the pressure consonants during pre obturation condition and with obturation the presence of burst was noticed for few stimuli. However, the same result was not consistent across the subjects and during the stages of prosthesis fabrication.

Conclusion: The team work of plastic surgeon, speech pathologist, and prosthodontist enabled to plan client centred rehabilitation program. This includes decision on type of surgical correction, type and extent of the prosthesis required for subjects based on their speech abnormalities.

INTRODUCTION : Cleft lip and palate is one of the birth abnormalities of the mouth and lip. Clefts vary in length and width depending on the degree of fusion of the individual parts. The incidence of cleft lip and palate is 1 in 700 live births. In individuals with cleft due to the opening of the roof of the mouth and the lip, muscle function is impaired, which can lead to abnormal speech. The most common speech abnormalities exhibited by individuals with cleft lip and palate are hypernasality, nasal air emission, weak pressure consonants, and compensatory articulation. The management of individuals with cleft lip and palate (CLP) presents many challenges. A multidisciplinary approach is essential to achieve optimum results. Management for the individuals born with CLP and related craniofacial anomalies occur within three broad categories: Surgical intervention, Prosthetic intervention and behavioural therapy (Speech and Language Therapy). Both the surgical and prosthetic intervention should be followed by behavioural therapy to achieve best results in overall achievement of the individual with cleft lip and palate.

The prosthodontic treatment is usually one of the final management recommended. The speech prosthesis may be the best choice in several situations, for example, when surgery may not be performed due to systemic, anatomic, or functional limitations or if the individual is not willing to undergo surgery. Sometimes, when surgery is being considered as an option to improve nasal speech, prosthesis may be used on a trial basis to determine the success of surgery. In many individuals, velopharyngeal function can be restored by surgical reconstruction.

Gonzalez and Aronson (1969) reviewed 16 individuals with short soft palate or large nasopharynx in which one appliance consisting of a combination of lift and obturator was used. They reported moderate improvement, though three individuals did not tolerate the prostheses. Prosthetics has been advocated as the initial treatment for all individuals presenting with VPD from the ages of 2-5 years, the appliances being worn for 1-10 years (Israel et al. 1993).Tachimura, Kotani, and Wada (2004) studied the effect of palatal lift prosthesis on children with repaired cleft palate exhibiting hypernasality or nasal emission of air without any compensatory articulation. After fitting the palatal lift prosthesis resulted in decrease in nasalance score for speakers with repaired cleft palate with affected velopharyngeal function.

Speech therapy is indicated in many cases followed by surgery / prosthetic management velopharyngeal dysfunction has been treated surgically or prosthetically because changing structure through surgery does not change function (i.e., learned articulation patterns). In this case the individual may need to learn appropriate articulatory placement and oral airflow. To decide, whether the individual is a surgical candidate for VPD, a trail period of speech therapy should always be considered (Hardin, 1991). The therapy should be short term no more than few months, as it does not take long to determine whether the individual will respond to therapy. If the individual continues to demonstrate hypernasality or nasal air emission, even with an improvement in articulation, then surgical intervention should be considered. When the surgical intervention is contradicted, prosthetic rehabilitation will be considered. There are dearth of studies on documenting the efficacy of multidisciplinary client centered approach. Hence the present study is focused on the customize rehabilitation plan for individuals with cleft lip and palate.

Objectives of the study

1. To investigate the acoustical parameter (burst duration) during the process of prosthodontic rehabilitation and compare with control subjects.
2. To evaluate the difference in perception of speech in terms of degree of hypernasality during the process of prosthodontic rehabilitation.

METHOD

Subjects : The study included two subjects with cleft lip and palate and ten age and gender matched control subjects. Both the subjects consulted the multidisciplinary cleft team at All India Institute of Speech and Hearing, Mysore. The demographic details of the subjects are as given below in table 1.

Table 1
Demographic details of the subjects

Sub. No	Age/ gender	Cleft type	Diagnosis
1	17years/Male	Wide palatal cleft anterior to posterior	Unrepaired cleft palate with hypernasality and misarticulation
2	35years/ Female	Submucous cleft	Unrepaired submucous cleft palate with hypernasailty

A 17 year-old male with congenital cleft lip and palate (Figure 1) and moderate mental retardation reported to cleft team with wide palatal cleft. He underwent plastic surgery for cleft lip at the age of 3 years. Since he had a wide palatal cleft, the surgery for the palate was not successful due to lack of tissue. On speech evaluation by speech language pathologist, he was diagnosed to have hypernasality with misarticulations. The cleft palate team consisting of plastic surgeon, orthodontist, prosthodontist, speech pathologist and psychologist recommended for the prosthetic management followed by speech therapy. The palatal obturator was prepared based on the shape and size of the cleft as shown in figure 2. The palatal obturator in situ was represented in figure 3.

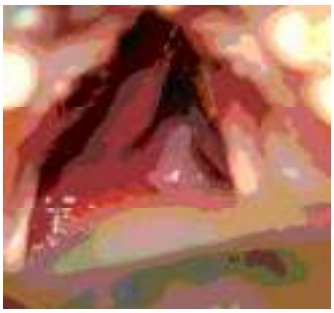

Figure 1: Wide palatal fistula

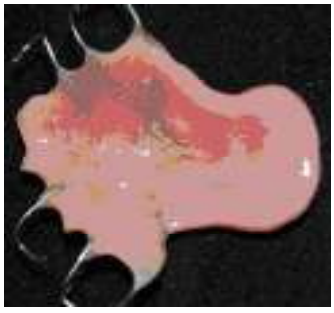

Figure 2: Final Prosthesis

Figure 3: Palatal prosthesis in situ

A female aged 35 years with unrepaired submucous cleft palate was evaluated and diagnosed as having velopharyngeal dysfunction with unrepaired submucous cleft palate (Figure 4) exhibiting hypernasality and misarticulations. The plastic surgeon recommended for the surgical management of SMCP. However, she was not motivated to undergo the surgery. Hence, she was recommended to use palatal lift prosthesis (Figure 5) by the prosthodontist followed by speech therapy.

Figure 4: Submucous cleft palate

Figure 5: Palatal lift Prosthesis

Figure 6: Palatal lift prosthesis in Situ

Procedure : The subjects were seated comfortably in a sound proof room for the recording. The speech recordings were performed before starting the prosthodontic treatment and during the various stages of the prosthodontic treatment while undergoing speech therapy. However the speech therapy is attended only by subject 1. The speech sample for the recording required to read or repeat nine meaningful words from the Kannada articulation test list along with the spontaneous speech. All the words were audio recorded using the PRAAT 5.1 software with sampling size 44000Hz. simultaneously video recording was also done using the *Sony handycam with 60X optical zoom, bearing model no. DCR-SR88.* The spontaneous speech recorded was given to three qualified speech language pathologists to judge the severity of hypernasality. The hypernasality was evaluated using a standardized four point rating scale developed by

Henningsson et al (2008) where the severity of hypernasality was rated as 0-if it is within normal limits, 1- mild , 2- moderate, 3- severe. The SLP who elicited the speech sample and helped with fabrication of the prosthesis did not participate as one of the three judges. The listeners did not have any previous contact with the experimental subjects and did not have any information about their speech treatment or condition. Before rating, the speech samples were randomized for each judge to eliminate any order effects.

For objective evaluation of speech burst duration was measured using acoustic analysis. The speech sample recorded using *PRAAT 5.1 Version* with sampling size 44000Hz was used to elicit the spectrograms. The material consisted of nine meaningful Kannada words in which unaspirated stop consonants were in the initial position and in the context of vowels /a/, / i / and /u /. The burst is considered in the speech spectrum when articulators quickly move away from each other causing explosive burst of air rushes through the opening, involving energy in most or all the audible spectrum. The duration between the onset and offset of the explosive air rush through the articulatory opeining is called as burst duration. Summary of the recommended prosthesis and the stages of preparation of the prosthesis are given below in Table 2. During each stage based on speech evaluation report by speech pathologist the width and length of extension of the prosthesis was discussed and modified by the prosthodontist.

Stage 1 (S1): Without prosthesis
Stage 2 (S2): Immediately after fitting prosthesis
Stage 3 (S3): After using prosthesis for 2 wks
Stage 4 (S4): After using obturator prosthesis/extending obturator prosthesis if lift is required for 1 month while undergoing 6 sessions of speech therapy
Stage 5 (S5): After using obturator prosthesis for 2 months while undergoing 6 sessions of speech therapy.

RESULTS AND DISCUSSION

Investigating the burst duration during the process of prosthodontic rehabilitation and comparing with control subjects.

The reduction in burst duration was observed for most of the pressure consonants included in the study. The absence or reduction of burst duration was attributed to the inability to generate adequate pressure due to the presence of nasal escape of air which is noticed for all the pressure consonants. In post obturation condition burst was noticed for some of the plosives but was shorter in duration compared to normal subject. In the present study, in experimental subject 1 exhibited increased duration of burst in immediate post obturation condition and reduced towards the final stage as shown in figure 9. This can be attributed to the improved ability to build pressure in the oral cavity immediately after obturation, however burst duration varied during speech therapy sessions and reduced by the final stage of therapy. This can be attributed to the variations in the subjects attempts to approximate the correct place of articulation. The increased burst of /k/ is observed for the subjects similar to the normals as shown in figure 7 and 8. Burst of /k/ is based on the mass of the velum resulting in multiple bursts during the production. In case of subject 2 the burst was noticed for voiced consonants (/b/, /d/, & /g/) only during post obturation stages of adaptation to the prosthesis (figure 9) indicating increase in the ability to build pressure in the oral cavity during produciton of pressure consonants. Similar findings were reported by Casal et al., (2002) and stated that the data on bursts indicate the absence of nasal escape of air during consonant production since escape of air through the nostrils creates insufficient intraoral pressure to generate a burst.

Table 2
Recommended custom made prosthesis and the stages subjects undergone during prosthodontic management

SubNo	Type of the cleft	Prosthesis Recommended	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
1	Wide palatal cleft anterior to posterior	Palatal obturator	✓	✓	✓	✓	✓
2	Submucous cleft	Palatal lift	✓	✓	✓	✓	

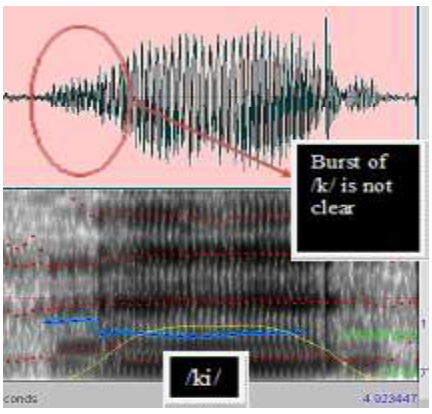

Figure 7: /kitYki/ without prosthesis

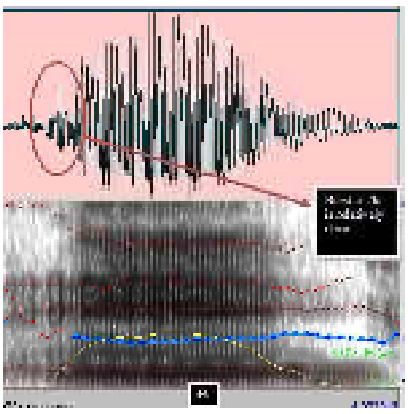

Figure 8: /kitYki/ with prosthesis

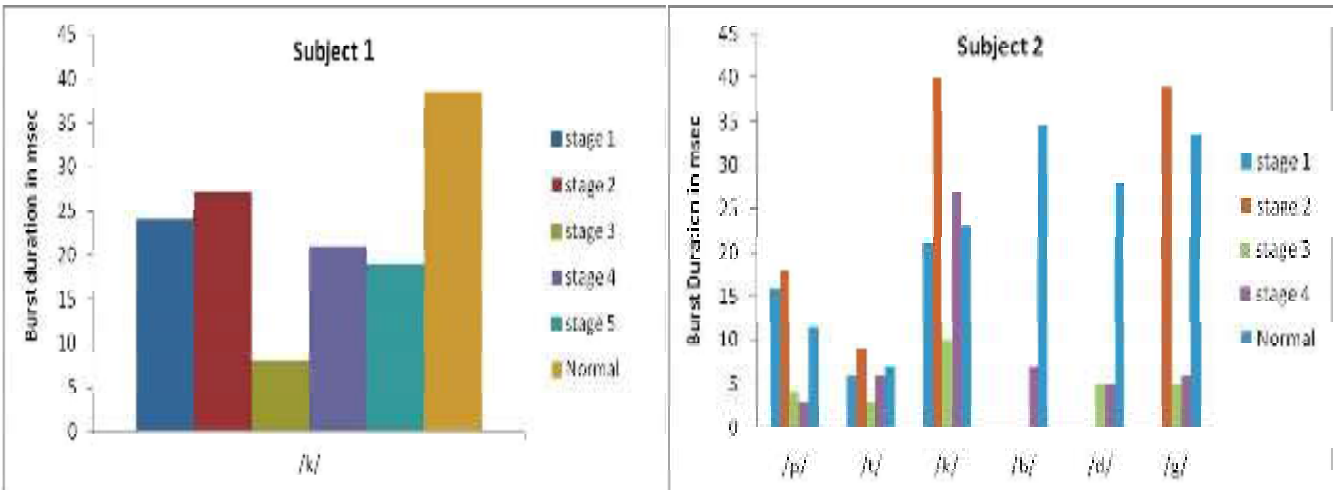

Figure 9: Burst duration across the stages

Perception of degree of hypernasality during the stages of prosthodontic management followed by speech therapy

The hypernasality was analyzed by the judges across the stages, results indicated reduction in the perception of hypernasality in speech with sustained fistula obturation and followed by speech therapy . However, increase in hypernasality between preobturation and immediate post obturation was observed in both the subjects. In the following stages of adaptation to the palatal obturator, perception of hypernasality was found to be reducing. After undergoing speech therapy (12 sessions over 2 months), significant reduction in perception of hypernasality was noticed. The increase in hypernasality in the immediate post obturation can be due to the variations in the articulatory postures and habitual patterns developed by the subject with the presence of a foreign body /internal aid speech prosthesis in the oral cavity. This finding support the results obtained by Zimmerman, et al (1997) who reported poor speech immediately post obturation and stated that improvement in speech was only after using the prosthesis continuously for 4-7weeks. Similar finding was not noticed in experimental subject two, who was fitted with palatal lift for improving velopharyngeal closure and provided time for getting adapted with palatal lift prosthesis while undergoing speech therapy (6 sessions). This could be because the experimental subject two was not motivated and uncomfortable (presence of foreign object in mouth) to use the palatal lift prosthesis continuously. She was using the palatal lift only while attending speech therapy. She was finding very difficult to get adapted to use the palatal lift on regular basis. The failure in using speech prosthesis is more common in most of the subjects selected for prosthodontic management. Sell et al. (2006) stated that failure is most likely to occur during the process of fabrication, and in subsequent stages of adaptation to the palatal prosthesis. It is usually depends on the tolerance of the individual towards the material placed against the soft palate. The clinical experience of the author suggests that factors associated with failure are usually difficult to access and continue prosthetic treatment, young age, an associated syndrome and reduced motivation for wearing an appliance. The reduced speech understand-ability and increased perception of hypernasality may be due to abnormal articulatory postures while palatal lift in place.

In the present study, eventhough the final recording of experimental subject two was done after 6weeks, the subject was not using the palatal lift on regular basis. This might be the reason for the poor speech with obturation condition while attending speech therapy than pre-obturation. However, the reduction in perception of hypernasality in experimental subject two immediately post obturation condition can be explained with individual variations in the articulatory patterns and adaptability abilities. The reduced nasality is often related to obstruction of the nasal cavity, leading to an expectation that the presence of an obturator might decrease the perception of nasalance of speech. The results of this study also supports few studies which reported immediate improvement in speech intelligibility due to reduction in the perception of hypernasality (H) followed by obturation (Henningsson and Isberg, 1987) or surgical closure of a fistula (Kanabara, 1975).

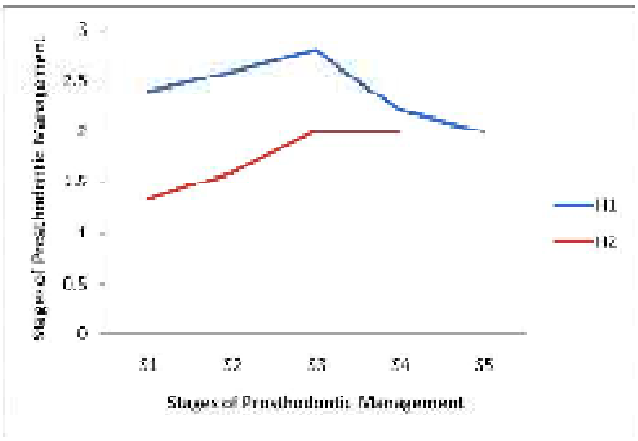

Figure 10: Hypernasality of subjects across the stages
S1-Stage 1, H1-Hypernasality of first subject

CONCLUSION : This is a preliminary study attempted to document the outcomes of prosthodontic treatement and speech thearpy in individuals with cleft lip and palate. The study shows that prosthesis can be an alternative for individuals who have no other treatment option, but can also be a useful temporary solution. This treatment requires the combined expertise of an interdisciplinary team invovling the SLP and prosthodontist. In conclusion prosthetics can be an effective treatment option for reducing hypernasality and speech therapy is essential after the prosthodontic treatment.

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EFFICACY OF ESTIMATED SUBGLOTTIC PRESSURE MEASURED THROUGH A PORTABLE DEVICE IN DIFFERENTIATING NORMAL AND PATHOLOGICAL VOICES

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Introduction: Growing number of professional voice users and increase in incidence of voice problems in this population demands for the existence of accurate tools for screening voice pathologies. Earlier studies attempted for screening voice pathologies had reported moderate accuracy values of sensitivity and specificity. Researchers reported classification accuracy of 74.1% for harmonic to noise ratio, 78.6% for normalized noise energy. Although multidimensional studies used systems such as neural networks, it is not always easy to interpret as human evaluator. Therefore it is essential to have a screening measure which is easy to perform with portable, mobile infrastructure yet provide with good discrimination accuracy.

Need for the study: The respiratory and laryngeal sub-systems must be well coordinated for voice production. Laryngeal aerodynamic analysis measures both respiratory and laryngeal functions and reflects this coordinative nature of voice production. Laryngeal aerodynamic parameters estimated subglottic pressure (ESGP) and laryngeal airway resistance (LAR) were reported to be useful tools in discriminating normal, breathy and pressed voice qualities Grillo, Perta and Smith (2009). In a recent study Zheng, Zhang, Su, Gong, Yuan, Ding, and Rao, (2012) reported that ESGP was able to differentiate normal vocal function from muscle tension dysphonia with 92.5% accuracy. Considering the efficacy of ESGP in differentiating normal and pathological voices, it was hypothesized to be a good tool in screening/discriminating individuals with pathological voices. PG-20 is a portable hand-held analog device used to obtain ESGP and hence can be an appropriate screening tool for voice pathologies, provided the ESGP measured by this instrument maintains its discriminating efficacy. Therefore considering the dearth of studies in identifying appropriate tool for screening voice disorders, it is essential to verify the discriminating efficacy of ESGP measured from PG-20.

Growing number of professional voice users and increase in incidence of voice problems in this population demands for the existence of accurate tools for screening voice pathologies. Earlier studies attempted to screen voice pathologies using tools such as questionnaires (Ghirardi, Ferreira, Giannini, & Latorre, 2012), acoustic measures (Martin, Fitch, Wolfe, 1995; Parsa, Jamesion, 2001) and aerodynamic measures (Giovanni, Heim, Demolin, Triglia,2000: Grillo, Perta & Smith 2009).

Ghirardi et al (2012) developed and validated a questionnaire which could serve as screeningindex for voice disorders in teachers,and its sensitivity was found to be 94%.Preciado JA, Fernandez S. (1998) attempted to estimate sensitivity and specificity of jitter and shimmer parameters in diagnosis of vocal pathology. The authors found sensitivity and specificity values of 73% and 41% respectively. Kasuya et al (1986) reported classification accuracy of 74.1% for harmonic

to noise ratio and 78.6% for normalized noise energy. Parsa et al (2001) evaluated the discriminative capabilities of several noise related measures suchas normalized noise energy (NNE), signal to noise ratio, zero phase harmonics to noiseratio, spectral flatness ratioand reported accuracy of 79.8, 82.5,83.3, and 98.7% respectively. Even though some of the measures like spectral noise ratio(SNR), pitch amplitude of linear prediction model showed higher accuracy in discriminating normal and pathological voices, these measures requires the use of trained professionals to carry out the testing procedure and to interpret the results.

The acoustic parameters such as jitter shimmer NNE and SNR, depends onestimation of fundamental frequency which is not feasible to calculate in pathological cases. To overcome this issue, recent studies (Michaelis, Gramaa, Strube, 1997; Ignacio, Godino-Liorente, Victor, & Osma-ruiz, 2008) focused on parameterssuch as Glottal to Noise Energywhich are independent of the prior estimation of fundamental frequency in evaluating pathological voices and to discriminate pathological from normal voices.The authors reported a screening accuracy of 89.91% for GNE.

Further, researchersalso attempted to verify whether use of combination of acoustic parameters (multidimensional parameters) canbe superior to uni-dimensional parameters in yielding better accuracy in identifying pathological voices. Hadjitodorov, Mitev, (2002); Ritchings, McGillion, Moore, (2002) attempted to determine the efficacy of multi set dimensions (jitter, shimmer, harmonics to noise ratio, normalised first harmonic energy and turbulent noise index) in identifying laryngeal pathology and reported an accuracy level of 95%.Even though multidimensional studies reported to have good screening efficacy it is not always easy to interpret.

Laryngeal aerodynamic measures include maximum phonation duration(MPD), S/Zratio, mean airflow rate(MAFR), estimated subglottic pressure(ESGP), laryngeal airway resistance(LAR), laryngeal airway conductance(LAC) etc, among these measures LAR(Grillo, Perta &Smith, 2009) and ESGP(Giovanni et al,2000) are extensively studied and were found to be useful in discriminating normal, breathy and pressed voice qualities.In a recent study Zheng, Zhang, Su, Gong, Yuan, Ding, &Rao, (2012) reported that ESGPwas able to differentiate normal vocal function from muscle tension dysphonia with 92.5% accuracy.

Considering the efficacy of ESGP in differentiating normal and pathological voices, it was hypothesized to be a good tool in screening/discriminating individuals with pathological voices. PG-20 is a portable hand-held analog device used to obtain ESGP and hence can be an appropriate tool for screening voice pathologies, provided the ESGP measured by this instrument maintains its discriminating efficacy. Therefore considering the dearth of studies in identifying appropriate tool for screening voice disorders, it is essential to verify the discriminating efficacy of ESGP measured from PG-20.

Aim of the study: To investigate the efficacy of estimated subglottic pressure measured through PG-20 subglottic pressure exploration system in differentiating normal and pathological voices.

Method : The study involved twenty one participants in the age range of 20 to 50 years with definite vocal pathology for which the diagnosis was based on perceptual assessmentusing Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V), acoustic analysis using multidimensional voice program (MDVP from KayPentax), and vocal imaging using stroboscopic evaluation by Speech Language Pathologist and Otolaryngologist experienced in voice disorders. The control group consisted of 25 age matched healthy individuals with normal voice qualitywith no complaints of upper respiratory tract infections on the day of testing.

The instrument PG-20 Subglottic pressure Exploration System(Glottal enterprises, USA) which is an analogue portable pressure sensitive instrument was used to measure ESGP.PG-20 is a hand held, battery operated, analogue device consists of a panel with measurements between 0 and 20cmH_2O. The device consists of a socket to which an intraoral tube can be connected. Digital voice recorder from Olympus was used to simultaneously record the speech sample. The recording was done from a constant mouth to microphone distance of 15 cm so as to monitor the intensity level during the production of syllables.

Procedure: Participants were made to sit comfortably in a quiet and the procedure was explained as well as demonstrated by the examiner. Before the actual recording, 1 or 2 practice trials were carried out.The participants were instructed to place the intra oral tube in between their lips and to repeat CV syllable /pa/ continuously atcomfortable pitch and loudness and the respective deflection of needle indicating pressure deviation was noted. Only those readings where the SGP cursor showed stable value across the production of CV syllable /pa/ were considered. Three such trials were obtained and their average was considered for further analysis. The recorded syllable trains of /pa/ through digital recorder were analysed using PRAAT software to obtain average intensity values. The data was subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) software version 20. Descriptive statistics mean and standard deviation were analyzed and MANOVA was performed with voice quality as the independent variable to verify the main effects of ESGP and intensity.

Results and discussion : The present study was taken up to investigate the efficacy of estimated subglottic pressure measured through PG-20 subglottic pressure exploration system in differentiating normal and pathological voices.

The results of the study indicated higher ESGP values for individuals in the clinical group compared to the control group. A mean ESGP value of 2.917 and standard deviation of 0.384 was obtained for control group while a mean of 4.576 and standard deviation of 2.041 was obtained for clinical group (figure-1).The difference in the value of ESGP is statistically significant on MANOVA [F(1,43)=34.207, *p*=0.000] (table-1).

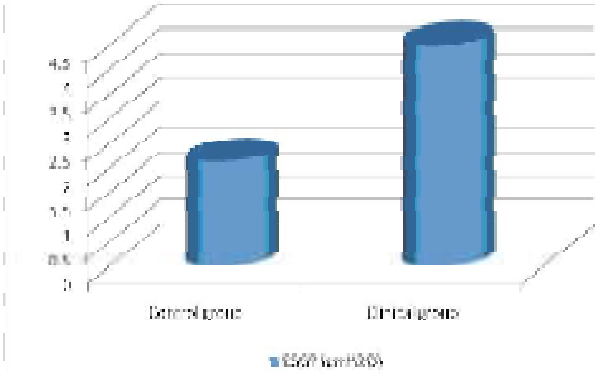

Figure1. Estimated Subglottic Pressure (cmH_2O) in clinical and control groups.

The results of the present study are in coherence with the earlier findings reported in the literature (Netsell, Lotz, and Shaughnessy, 1984; Grillo et al., 2009; Zheng et al., 2012). Netsell et al (1984) reported that the individuals with strained voices showed hyperadduction of vocal folds, increased ESGP and low MAFR. The majority of the participants in the clinical group of the present study were with mass occupying lesions and muscle tension dysphonia. Therefore, the elevated subglottic pressure in these individuals can be a possible strategy used by these individuals to compensate for inadequate glottal valving associated with the voice disorder.

Source	Dependent variable	df	F	Significance value –*p*
Group	SGP	1	34.207	0.000
	Intensity	1	1.0140	0.320
Error	SGP	43		
	Intensity	43		

Table 1. Significance values obtained on MANOVA.

Zheng et al., (2012) reported that ESGP values higher than 8.175 cmH_2O was associated with individuals with muscle tension dysphonia. Using ESGP of 8.175 cmH_2O as a cut off, authors reported a sensitivity of 76.9% and specificity of 100% in differentiating muscle tension dysphonia from healthy voices. This study used KayElemetrics Phonatory Aerodynamic System (model 6600; Kay Elemetrics, Lincoln Park, NJ). In the present study, the ESGP measured using portable instrument PG-20 subglottic pressure exploration system maintained its efficacy in differentiating normal from pathological voices with high statistical significance. Hence the results of the study support the application of ESGP measured by PG-20 as a valid parameter for screening voice disorders.

Although the individuals in the clinical group used subglottic pressures double to that of the control group, there is no statistically significant difference in the output (in terms of intensity) these individuals [F(1,43)=1.014, *p*=0.320]. This indicates that individuals with voice pathologies consist of a non-economical voice mechanism that uses higher subglottic pressure to produce the equivalent amount of output generated by individuals with normal voice.

Conclusionsand future directions : ESGP measured from PG-20 portable device reveals to be valid measure for discriminating normal from pathological voices. Considering the portability, cost-effectiveness of the device and time economy in providing valid results, this parameter can be used as screening tool for voice disorders. This would aid in screening and early identification of voice related issues in professional voice users such as teachers, singers, orators etc. The participants size chosen for the study is small in number hence the mean score obtained from the control group cannot be taken as best cut-off value in differentiating normal and pathological voices. This may be acceptable considering the preliminary status of the present study. Nevertheless future studies considering larger sample size may be conducted to confirm the screening accuracy of this parameter through sensitivity and specificity measures.

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SENTENCE REPETITION IN BILINGUAL ELDERLY

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Introduction: Bilingualism is the ability to use both the languages effectively. The pattern of speech and language use frequently changes throughout lifespan particularly in bilinguals. The two languages can be associated with different social contexts and living situations. The second language can be acquired late in life and be related with working activities or migration. The two languages can also be acquired early in life and maintained in active use throughout the whole lifetime. Diverse cognitive changes, including changes in language abilities, are observed during aging. It has been proposed that aging and general cognitive decline may have a detrimental effect on the ability to use two different languages. For instance, aging has been associated with increased interference between the two languages. Interference has been defined as the transference of elements of one language to another at various levels (phonological, grammatical, lexical and orthographical).

Aim: To correlate the effect of language proficiency and speech motor control in bilingual elderly.

Objective: To compare the duration of sentence repetition by Kannada and English bilingual younger and older individuals.

Methodology: 30 normal Kannada-English bilinguals between the age range of 20-35 years and above the age of 60 years were taken in the present study. All the subjects were screened through Mini-mental State Examination (MMSE) for their cognitive abilities. Modified Language efficiency and proficiency questionnaire (LEAP-Q) was administered to all the subjects to check for the proficiency level in both the languages. Subjects were instructed to repeat 10 Standardized sentences from Western aphasia battery (WAB) , 5 sentences each from English and Kannada in three trials and the responses were recorded by digital voice recorder and analysed in Pratt for analysing the duration.

Results: Descriptive statistical analysis has been carried out to find the difference in the performance of sentence repetition tasks in younger and elderly. Results revealed there is a difference in sentence duration between the subjects and across languages. Younger subjects performed in lesser duration on sentence repetition task compared to elderly individuals could be attributed to aging. The performance of L2 was better than L1 in younger but same pattern is not observed in elderly. Memory and language aspects will also contribute to the difference in performance in both the groups.

Conclusion: Speech motor control declines as age increases. L2 usage and exposure has a positive influence in the performance of sentence repetition in younger but not elderly.

Key words: Bilingualism, Language Proficiency, Duration.

Introduction: Older adults comprise our fastest growing segment of the population. The influence of bilingualism on speech production in elderly has received limited attention. As biological, psychological, and physiological changes occur in all adults over time, changes in speech production occur as well. Kahane (1981) stated that changes in speech production occur throughout the lifespan as a result of changes in the anatomy, physiology, sensory feedback, motor control, and central processing of speech.) Older speaker constantly changes and monitors speech production to meet environmental demandsLaine&Warre (1995. Huber (2008) found that older adult speakers exhibited greater difficulty relative to utterance length and loudness and planned in advance for these difficulties by using processes associated with pre-motor speech planning.

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working activities or migration. The two languages can also be acquired early in life and maintained in active use throughout the whole lifetime. Diverse cognitive changes, including changes in language abilities, are observed during aging and have an effect on speech production. It is interesting to know how language proficiency influences the speech production in elderly compared to younger adults. We hypothesise that L2 proficiency will have a positive effect on speech production task of sentence repetition.

Aim: The aim of the study is to find the effect of language proficiency and speech production in bilingual elderly.

Objective: To compare the duration of sentence repetition in Kannada and English bilingual younger and older individuals.

Methodology:

Criteria for selection of participants: A total of 30 participan ts which includes15 Kannada-English bilinguals in the age range of 20-35 years and15 Kannada-English bilinguals between 60 - 90 years participated in the study.Their educational qualification level ranged from minimum of 12 years of education or higher in at least one of the languages were selected for the study. All the participants were native speakers of Kannada and acquired the first language (L1-Kannada) and English as their second language both for academic and communicative purpose. All the participants were normal, with no present/past history of any neurological, psychological problem and or sensory deficits.

Procedure: A modified version of Language Efficiency and Proficiency Questionnaire (LEAP-Q) developed by RamyaMaitreyee*(2009)* was used to rate the language proficiencyof the participants. The questionnaire contained a total of 18 questions. The first question was intended to collect details about the number of languages known by each of the participant. The rest 17 questions with their subsections were to assess proficiency in language. The domains in the questionnaire were as follows.

- Language history during childhood(3 questions)
- Acquisition of language(3 questions)
- Proficiency of language (4 questions)
- Usage of language in different context(2 questions)
- Exposure to different languages (4 questions)
- Native/non-native speaker(1 question)

The participants were asked to encircle the language used with specific people and situations. In obtaining information about the language acquisition age for each of the languages (L1&L2), the participants were asked to give approximate age of acquisition and proficiency level reached for each of the languages. A 4- point rating scale (1-Zero proficiency, 2-Low proficiency, 3-Good proficiency, and 4-Perfect proficiency) was used for self-proficiency rating. A 4- point rating (1-never, 2-sometimes, 3-most of the times, 4-always) was employed to obtain information regarding the native/ non-native status and duration for exposure of each of the 14 variables (e.g.: family, friends, textbook, internet, etc).Subjects were instructed to repeat 10 Standardized sentences from Western aphasia battery (WAB), 5 sentences each from English and Kannada with equal number of syllables in 4 trials. It was recorded by digital voice recorder and analysed in Pratt to obtain the duration of sentence repetition.

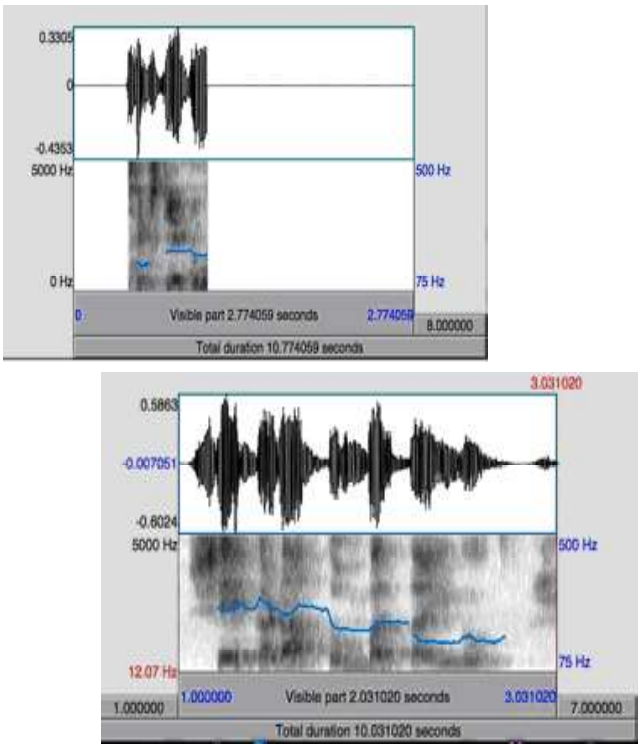

Figure1: spectrogram showing measurement ofduration using PRAAT

Statistical analysis: The statistical analysis was carried out using SPSS version 15.0. The data collected was analyzed using descriptive statistics, further two ways ANOVA was performed to know the significant difference betweenduration of sentence repetition in younger adults and older individuals.Wilcoxon test has been carried out to find the significant difference between induration of sentence repetition in both the languages.

Results: Results obtained on sub section of proficiency of language on Modified Language Efficiency and Proficiency Questionnaire (LEAP-Q) revealed that both the groups have good proficiency in understanding and speaking in Kannada and English.Rating of 3 indicates good proficiency and 4-Perfect proficiency.

Subject	Rating	L1(Kannada)		L2 (English)	
Younger		Understanding	Speaking	Understanding	Speaking
	4	100%	100%	100%	100%
	3	-	-	-	-
Older	Rating	Understanding	Speaking	Understanding	Speaking
	4	100%	100%	80%	70%
	3	-	-	20%	30%

Table 1 shows the percentage of language proficiency scores obtained for younger and elderly

Mean and standard deviation of younger and elderly are shown in table 2 which depicts that the mean values of younger is comparatively better than elderly in both the languages.

Languages	Mean Values of the Groups	
	Young	Elderly
English	1.3999	2.0343
Kannada	1.6220	1.8013

Table 2 shows the mean values of younger and elderly in both languages.

Younger performed in lesser duration than older in both the language which is in support with the findings of Celia R. Hooper (2009) who reported changes in speech production as a result of aging.

Wilcoxon test has been carried out to find the significant difference in sentence duration in English and Kannada in younger and elderly.

Subject	Z value
Younger	0.001
Older	0.570

Table 3 depicts the Z values in Wilcoxon test

The z value obtained in Wilcoxon test is< than 0.005 which shows that there is a significance difference in the performance of both the languages.

ANOVA has been carried out to see the significant difference in duration of sentence repetition in both the groups.

Language	Significant value
Kannada	0.000
English	0.000

Table 4 depicts the P values in ANOVA

The P value obtained in ANOVA is < than 0.005 which shows that there is a significance difference in duration of sentence repetition in both the groups.

Discussion: The results of the study show that the speech production of the elderly differed significantly from that of the younger adults in both Kannada and English Language. Duration of sentence repetition in English was lesser in younger probably because of early exposure to English in the home environment and exposure and duration of usage of English in academic and social environment is more compared to Kannada. Socio-economic status and usage of internet and media in younger also lead to the better performance in English than Kannada.Rosselli et al (2000) studied verbal fluency and repetition skills in healthy older Spanish- English bilinguals and found better performance in sentence repetition of L2 in Spanish- English bilingual adults whose age of acquisition of second language was before 12 years and usage of second language on daily basis was more which is in support of our findings.In older group sincethe exposure and usage of both the languages are equal and did not show a significant dominant use of English in both work and home environment,might have lead to the nosignificant difference in duration of sentence repetition in both the languages.A similar finding is noted by Chakraborty, Goffman, smith (2008) in their study of Physiological Indices of Bilingualism on Motor Co-ordination and Speech Rate in Bengali English speakers. They found that adult bilingual speakers produced equally consistent speech movement patterns in their production of L1 and L2. L2 usage and exposure has a positive influence in the performance of sentence repetition in younger but not in elder. The present study did not show language proficiency as a significant variable in speech production in elderly. Future research is warranted to find out the influence of language proficiency on speech production in elderly with increased number of participants and with varying level of language proficiency.

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SPEECH CHARACTERISTICS FOLLOWING WITH MYOTONIC DYSTROPHY-A CASE REPORT

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Introduction: Myotonic dystrophy is part of a group of inherited disorders called muscular dystrophies. (Myotonia refers to stiffness of muscles following a muscle contraction.) Muscular dystrophy are associated with degeneration of muscle fibres and proliferation of connective tissue .the effects are usually diffusew, chronic and progressive. The fascioscapulohumeral form may affect bulbar muscle , facial weakness may be prominent.

Myotonic Muscular dystrophy is an autosomal dominant inherited multisystem disease which is characterized by progressive muscular weakness, atrophy and myotonia. Facial –bulbar muscle weakness is characteristics of adult onset with myotonic dystrophy which can result in peripheral disorder of speech execution, in particular flaccid dysarthria. Percussion myotonia is a perstent myotonic contraction that follows strong percussion. It may be observed in the tongue after pressure is exerted on it, as an obvious depression that persists for several seconds (Roses , 1989) . muscle atrophy give sthe face a characteristic long, lean , and expressionless appearance , with weak voluntary and emotional facial movements. Articulation , phonation, and resonanace may be affected. Velopharngeal incompetence has been reported as a presenting symptom (Salomonson, Kawamoto , and Wilson, 1988)

Cognitive functions associated with the frontal lobe including memory, personality, ability to take the initiative, social behaviour as well as planning and organisational skills all deteriorate with age. No clear association has been established between this deterioration and the degree of the mutation or severity of the other symptoms. However, there is a correlation between the age when the disease manifests, the degree of cognitive impairment and behavioural and emotional problems. Those who become ill before the age of ten are especially likely to suffer from learning, memory and behavioural problems, reading and writing difficulties, anxiety, problems in social interaction and ADHD (Attention-Deficit/ Hyperactivity Disorder).

Myotonic dystrophy affects at least 1 in 8,000 people worldwide. The prevalence of the two types of myotonic dystrophy varies among different geographic and ethnic populations. In most populations, type 1 appears to be more common than type 2. However, recent studies suggest that type 2 may be as common as type 1 among people in Germany and Finland.

Review of literature: Swart and Van engelen (2004) studied the speech execution in patients with adult onset myotonic dystrophy. Results revealed that compared with healthy subjects, patients with adult onset myotonic dystrophy showed signs of myotonia and weakness as components of flaccid dysarthria like lower repetition rate, reduced loudness, limited duration of sound prolongation, and greater variability.

M. Steinert(1996) studied the speech characteristics in patients with myotonic dystrophy. Nine of the twenty-three patients had dysarthric symptoms. All the patients had a hypernasal resonatory problem and six had articulatory difficulties. Other dysarthria features occurred and the degree of the dysarthric symptoms varied considerably.

Need for the study: Patients with myotonic dystrophy have problems in speech execution**.** Speech problems are sometimes the first symptoms of patients with myotonic dystrophy .So it is very important for speech language pathologists to have a solid knowledge of myotonic dystrophy. Thus there is a need to understand the speech characteristics of patients with myotonic dystrophy.

Aim: The aim of the study is to specify and quantify possible defect in speech execution in individuals with myotonic dystrophy.

Method and material: A prospective single case study of a 17 year old boy who had come to our center with a complaint of unclear speech since childhood. History revealed that problem was gradual and insidious in nature. Medical history indicated that client has been diagnosed as myotonic dystrophy by neurologist. The client had been to various hospitals for re-correction of maxilla and prosthodontic counseling. He has also undergone EMG assessment for clumsiness of hand. The client was subjected to various assessment procedures in our center such as Oro-motor, Cranial nerve, Frenchay dysarthria assessment, Cognitive linguistic assessment protocol (CLAP), drooling, Quick neurological screening test (QNST) and swallowing evaluation. Diadochokinetic syllable rates were assessed. Speaking rates and speech rates were also assessed.

Results and discussion: Results of the study showed that subject exhibited the features like unintelligible speech, reduced range of movement of lips, tongue and jaw, breathy voice quality with mild hypernasality, effortful articulatory precision, fast rate of speech and reduced loudness and diagnosed as having flaccid dysarthria. Dysphagia assessment reveals mild drooling with reduced anterior posterior tongue movement and delay in chewing. Posterior saliva accumulation was present. He was reported to consume food with any texture and consistency but takes time to consume hard food consistency. Cranial nerve assessment revealed that multiple involvement of cranial nerves such as trigeminal, facial and vagus nerves. Client had difficulty during the performance of geometrical figures and lisping present as per Quick neurological screening test (QNST) evaluation. He was observed to have disturbance in his episodic memory according to Cognitive linguistic assessment protocol (CLAP).

Diadochokinetic syllable rates reveals : 1. Sequential motion rate (SMR)- 3 syllables/second. 2. Alternating motion rate (AMR): /pa/-3 syllables/second,/ta/-3.6 syllables/second, / ka/- 4 syllables/second. Speaking rate 109 words/minute. Speech rate was 2.48 syllables/second.

Conclusions: Thus as a speech language pathologist we should be aware of the speech characteristics of patients with myotonic dystrophy which helps in better rehabilitation and interaction with other professionals.

VOILENCE AGAINST WOMEN

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It is customary to classify the human community on the basis of sex, i.e. in to two groups called as 'men' and 'women' the biological fact of sex has created much difference between them.

Nowhere in the history of humanity men and women are treated alike and assigned status alike. But women in ancient India particularly during the Vedic period enjoyed a position which was a whole, much more satisfactory than in the later period women underwent almost a kind of servitude during the medieval period and their position went on improving during the British period and after Independence. Despite of removal of all barriers and announcing equal opportunities for women, the present situation women at present day is very crucial and are facing social, economic injustices.

To eradicate this serious problem, we have to make social activities like creating awareness in the society and we all have to attain the reform in social thinking. Then only there may be decrease in violence against the women. And then only India will become utopia in the real sense.

It is customary to classify the human community on the basis of sex, i.e., into two groups called as "men" and "women", the biological fact of sex has created much difference between them. The aims and objectives of desires, aspirations, duties and responsibilities, dress styles and behavioral patterns, roles and status of men and women are different. Nowhere in the history of humanity men and women are treated alike and assigned status alike, women have not been able to lead a life exactly on par with men inspite of their urge for equality. This does not mean that men and women represent two different cultures as such, they represent one way of life, one culture and one heritage. This is also true of India and Indian women.

The type of status assigned to women in any society reflects the nature of its cultural richness and the level of civilizations, standards. Hence Swamy Vivekananda said that, 'the nation which did not respect women have never become great nor will ever in future'. The status accorded to women in society symbolizes its level of progress. The spirit of civilization can be assessed by way in which women are treated by members of that civilization.

The ideal women is one who does not strive to break these bonds of controls; the salvation and happiness of a women revolve around her virtue and chastity as a daughter, a wife and a widow.

Worse still, a widow's life began to be denied from around the sixth century A.D. when the practice of sati was introduced.

Wife-beating got religious and social sanction with the Matsya Purana authorising the husband to bet his 'erring' wife with rope or a split bamboo.

Violence against woman further increased when the young girl's began to be forced to serve as the Devadasi in the temple. This also made prostitution a part of religious life.

In the medieval period, when two measure cultures-Islam and Hinduism-encountered and interacted with each other, violence against women increased manifold. It included new elements.

Even the purdah system which isolated the woman from the rest of the world was after all violence against woman. Girls began to be married off at a tender age, and in certain communities he new-born baby girls began to be killed by the parents themselves.

Polygamy took strong roots in the society, and a woman's right to the unshared love of her husband started vanishing, rapes for vengeance and forced marriages became common.

The Ramcharita manas, though in a different context mentions-DHOL GANWAR SHUDRA PASHU NARI, YE SAB TARAN KE ADHIKARI:

The drum, the uncultured the untouchables, animals and women should be beaten.

The British Government by and large remained indifferent to the violence against women. After independence violence against women has only grown in all its dimensions.

Indeed a few more forms of violence like female foeticide have developed because of the progress in science and technology.

Dowry system has been with India society for a long time. But today's growing materialism has increased its severity which results in a great number of bride-killings every year.

Today violence against women in India has assumed an alarming proportion. According to one estimate, there are about thirty specific forms of violence being committed against women from the pre-natal stage to their death.

Such forms include foeticide, infanticide, deliberate check on the supply of sufficient or/and nutritious food, medicine neglect, deprivation of educational opportunities, child marriages, sexual abuse of the girl child, forced marriages, rapes, prostitution, sexual harassment, pregnancies at small intervals, wife-battering, bride-burning, cursing the widows, witch-hunting, neglect of the old women, etc. one can see these forms of violence in his or her own surroundings. These are also reported in newspapers and other media very frequently.

Most of the violence against women is related to and grows out of their position in society. If a female foetus is destroyed it is because a girl child is unwanted as she is seen as a burden.

If a wife is beaten, at least partly it is because women are seen as property- to be treated as the husband, her owner, desires. On a broader level it is also because a woman is perceived as the "weaker" sex, dependent on man, so he can bully her.

It is a human tendency to take out one's frustrations on anyone willing to put up with it or too weak to resist it. Expected to submit to every whim of the man, the least sing of resistance on her part invites use of violence to make her comply.

If she is uneducated, unskilled and economically dependent, a woman seldom has any choice but to bear all the atrocities heaped on her. And a man, fully cognizant of this weakness, shows his power through more violence.

Domestic violence apart, women are victims of public violence more often and more humiliatingly than men. Rape is not just the act of an individual man against an individual woman, a manifestation of psychological aberration.

It is increasingly becoming an instrument a weapon, to prevent women from raising their voice against atrocities. In personal or family feuds or in wars, rape of the women folk has always been a form of humiliating the adversary, clearly signifying the position of woman as property.

Now women, in their own right are threatened with rape if they dare to speak out against injustice or crime. The activist who for instance, stopped a child marriage in Rajasthan was gang-raped by men from the child's family.

The violence continues unabated because no social actions have been forthcoming. Legislation exists, but is seldom implemented with care or readiness. Indeed those very persons in charge of protecting a woman assault her and humiliate her.

It is not just actual physical violence that is used to intimidate women. Even the threat of it is enough cause for mental agony, and that too is a form of violence.

The fear of being beaten, having to bear the pain, the humiliation and trauma of rape helps to keep women in a state of subjugation.

Furthermore, there is a peculiar attitude in society and, worse, in our judiciary that rape in the case of woman so 'loose' character is not quite so heinous a crime.

By a queer inverted logic, all raped women come to be looked upon as 'loose' women. Can there be a greater violence against a human being?

Violence against women is further complicated by other factors in society. Caste, religious, communal and class factors also play a role in the violence against women.

Caste was result in rape or molestation of women. So do communal riots. Religious fundamentalism imposes restriction first on women and they are the ones penalised for trying to break out of blatantly unfair and unrealistic codes of behaviour that have no relevance in the life of today.

Sporadically, individual women react, returning violence for violence. But on the whole they suffer in silence.

The effect of violence on women, unfortunately not getting the attention it deserves, is not confined to the women victims It affects, directly and indirectly, the immediate family in which the mother is violently treated either develops violent reactions against the father or is himself inured to violence and gets brutalised.

This quality spreads in society as a whole if it is indifferent to the violence perpetuated on women.

Violence against women is also to be seen as an aspect of the increasing violence in society, as a whole. In that context the causes of violence are rooted in the psyche of human beings-their temperament and the desire they nourish.

There are three basic factors- accumulation of wealth, egocentricity and basic animal instincts-which have caused violence either against women or any group/section of society.

As the race for owning and accumulating wealth increase violence increases. Today most of the world's wealth has been exploited but material hunger is terrible, and there has been a proportional decline in wealth.

The competition for wealth is excessive and so is the violence. Egocentricity has tempted men to dominate others, including women, on the strength of economic, political and social powers.

One of the major components of animal instincts is the use of force-without bothering about its pros and coins, advantages or disadvantages-for immediate benefits.

Hence, the remedy for violence is no very far to seek. It is within ourselves. What we have to do is to entirely leave the animal kingdom, be human and to give humans treatment to others.

This will be the greatest fight ever fought. But this fight is not between men and women, between men and men; this fights between good and evil a fight between human and inhuman. If we men or women are not ready to participate in this fight we will be doomed.

Utopia apart, however in the short and middle term has to be some practical steps to put a check on the violence against women. Law-enforcing machinery must be trained and made sensitive o the issue.

Women must organise themselves in groups and raise a collective voice against a system that turns a blind eye towards. If not actually condones, violent acts against women.

Every public minded person and the media must contribute to spreading a civilised attitude in society.

United effort can certainly create a public opinion and outcry against situations when women are humiliated by public officials or others with their connivance- this has been witnessed recently in the Saharanpur incident.

Women too have to be persuaded to become aware of their rights and stand up for them. For the more they retreat inside their shell the more ready are the predator's outsides to seal that shell and suffocate the very life out of them.

Women most help themselves and each other in the fight against violence. But it is in fact a social issue that affects many others and the system as a whole. In a democratic polity and society violence against any section cannot be condoned.

Right thinking men too have to be drawn into the movement against violence. Attitudinal change in society is required if women are to live in the world as free human beings without fear.

It is not only the making of strict laws to protect the women from all sorts of atrocities and exploitations, it is the duty of the government to bring the same into strict implementation. Only implementation is also not sufficient, there needs a social reform, thinking, behavioral changes in the society, same may be developed day-by-day by organizing social seminars, social activities like creating awareness in the society, a chapter in a school and college education, as to what are all the laws that protect the women. Hence making a separate social wing is necessary in all local bodies to protect the women from all sorts of violence's.

If we attained the reform in social thinking, then only there may be decrease of violence against the women, and we may see decrease in news in Social Media's, Televisions, Print Media etc., without violence against women and we can see safe secured women in India and also India will become an utopia in the real sense.

GENDER EDUCATION IN INDIA

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Education is a universal right of every child, the idea of education for all is still a utopian dream in India. It is the only key to bring gender equality. Education lays the foundation for a bright future. An educated woman not only helps in nourishing the family in a better way can also help in earning. Human development cannot be accelerated unless girls are given right education in right direction.

Gender inequality in education is extremely high. Girls are less likely to access school or to remain in school, hence to achieve in education. The ratio of drop outs is more than boys. The importance of educating women cannot be overlooked. Considering the fact that women power if tapped into and allowed to be fully utilised, has the potential of boosting the Nation's economy. Lack of woman education will have a negative impact on the health and well being of her family. Girl child education is still a battle yet to be won. As in most communities women are still regarded as second class citizens.

Conceptual approaches in gender education are discussed in this paper in the background of gender education in India , trends in literacy rates in India, qualities & evidence of changing patterns of gender parity & equality in education. The major Government policies for gender equality-Statistical data for primary, elementary & secondary schools, dropout rate in India are taken from 1999-2000 to 2010-11 for analysis. Along with this district – wise gender parity in enrollments in both lower & higher primary schools with in North- Karnataka are taken for analysis. The reasons for drop- outs in India are discussed in this paper.

Introduction: Gender discrimination continues to be an enormous problem within Indian society. Traditional patriarchal norms have relegated woman to secondary status within the household and work place. This drastically effect woman's health, financial status, education, and political involvement. Women are commonly married young, quickly became mother, and are then burdened by stringent domestic and financial responsibilities. They are frequently malnourished since women typically are the last to receive medical attention. Additionally, only 54% of men. Women receives little schooling, and suffers from unfair and biased in heritance and divorce laws. These laws prevent woman from accumulating substantial financial assets, making it difficult for woman to establish their own security and autonomy.

The most important things that is needed in our society is raising woman's status by giving them due respect and honor. The first step required in this direction is education. Swami Vivekananda has rightly said "educate your woman fist & leave them to themselves, then they will tell you what reforms are needed.

1. BACKGROUND TO GENDER EDUCATION IN INDIA: India accounts for 30% of the world's total illiterate population and around 70% of these illiterate of woman. As per 2001 census data , women constitute 48% of the total population in India , but around 46% of the women are still found to be illiterate problems of gender disparity and discrimination begin with access to schooling. The gender parity index (GPI) the primary and upper primary level was 0.9 and 0.8 in 2003 respectively. Once girls are able to get enrolled in school, they are rather more likely to go to school than boys to continue their education with more success (UNESCO, 2004). Access and retention problem deepen at higher level of education with the GPI at lower secondary and upper secondary levels dropping to 0.73 and 0.67 respectively (UNESCO, 2004).

Female education has been acknowledged to have strong correlations with other dimensions of human and social development. Despite strong economic and social evidence of the high returns to female education, most communities continue to under invest in female education relative to male education. Even as the thresholds of schooling completion increase, with significantly narrowing gender gaps in primary education in particular, discrimination against girl in secondary is higher education remains an issue. Economic and social privilege also effect gender patterns of success, with girls in secondary and higher education predominantly drown from higher income and social groups, endowed with higher social status.

2. Quantitative Evidence of changing patterns of gender parity & Equality in education

2.1 TRENDS IN LITERACY : In recent year, India has reputedly shown considerable improvement at each leave of education for boys as well as for girls daring on date from the national censor, many studies & reports have indicated that there has been significant improvement in literacy levels, & particularly in the reeducation of female literacy during the decade 1901-2001 . The gender gap in literacy has also harrowed during that time, although there was still a gap of 22% point between the genders according to the 2001 census in comparison to a 25&%point gap ten years earlier. The last decade has experienced the highest decadal increase literals in literacy (12.6% points) since independence, artisan increase in this period from 2.2% to 64.8% for the first time the country has experienced faster growth in female literacy, which increased faster grout in female literacy, which increased by around 15% points (from 39-54%) as compared to that of males (65.75%) Along with this huge increase in

the literate population the absolute for of litterateur also declined substantially during 1991-2001 as compared to the earlier decade of 1981-1991. The literary rate improved by 8.6% from 1981-1991 while the increase way 12.6% during the met decade,

- urban differences have also been found to be significant in accessing the resources & the facilities provided by the state . For example, children in rural areas have less access to schooling because the schools are either not available or

Table 1. Trends in Literacy rates in India (%)

Year	Source of Data	Male			Female		
		Rural	Urban	Total	Rural	Urban	Total
1981	census	49.6	76.7	56.4	21.7	56.3	29.7
1987-8	NSS (43rd)	48.4	72.3	-	25.9	55.9	-
1991	Census	57.8	81.1	64.1	30.6	64.1	39.3
1992-3	NFHS_1	62.9	84.1	68.8	34.5	97.5	43.3
1993-4	NSS (50th)	63.7	85.3	74.5	36.6	68.7	52.7
1998-99	NFHS-II	69.5	87.5	74.5	43.7	72.2	51.4
2001	Census (all ages)	71.2	75.6	86.4	46.6	73.0	54.0
2001	Census (7+& above)	-	-	75.9	-	-	54.2
2004-5	NSS (61th)	64	81	-	45	69	-
2004-5	NSS (61th) 7+& above	73	89	77	50.4	75.9	57

Table 1 indicates that in spite of the considerable improvement in general literary rates, a big gap persists between male & female literary rates, a Although the data suggests that there has been a significant in cause in male as well as well female literary levels, at present only three quarterly population is functionally literate, while out half of the female population remains illiterate.

From table 1 it is obvious that the dropout rate of girls have come down compare to boys from the year 2002-03 to 2005-06 & after that from 2007-08 to 2010-11 at primary level.

2.2 Reasons for dropouts in India

A) Facilities in Rural & Urban Areas. : In rural areas the facilities in school are not at level to the urban schools, rural physical & low socially inaccessible. Coupled with that is the integration of the children, especially girls, in the village & house hold anomy. Then fore, reality has also been recognized as a critical indicator of who can participate in education.

The hour & schools at some places is less & also at some places especially at tribal areas there are no sufficient qualified teachers who work among the tribes with total dedication. Girls 'hostel & separate toilet facilities are expected from the parents. It they find there is any difficulty in accessing these they stop schooling. The distance of the school after elementally level is also, a big issue in rural area which affects especially grills' Education.

Table 2.

Dropout Rates at Primary, Elementary and secondary School in India (1991-2000 to 2010-2011)									
Year	Primary (I V) Classes			Elementary (I VIII) Classes			Secondary (I-X) Classes		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
1991-00	38.80	41.00	40.30	53.30	57.70	55.10	64.90	69.90	67.00
2000-01	39.70	41.90	40.70	50.30	57.70	53.70	66.40	71.50	68.60
2001-02	38.40	39.90	39.00	52.90	56.90	54.60	64.20	68.60	66.00
2002-03	35.85	33.72	34.98	52.28	53.45	52.79	60.72	64.97	62.58
2003-04	33.74	28.57	31.47	51.85	52.92	52.32	60.98	64.92	62.69
2004-05	31.81	25.42	29.00	50.49	51.28	50.84	60.41	63.88	61.92
2006-06	28.71	21.77	25.67	48.67	48.98	48.80	60.10	63.56	61.62
2006-07	24.57	26.75	25.60	46344	45.22	45.90	58.61	61.50	59.88
2007-08	25.70	24.41	25.09	43.72	41.34	42.68	56.55	57.33	56.71
2008-09	26.68	22.90	24.93	44.89	38.86	42.25	55.82	55.95	55.88
2009-10	30.25	27.25	28.86	40.59	44.39	42.39	53.38	51.97	52.76
2010-11	28.70	25.10	27.00	40.30	41.00	40.60	50.40	47.90	49.30

The District – wise gender parity in Enrollments in both lower & higher primary schools is as follows:

Table 3.

District	Govt- Aided	Unaided
LOWER PRIMARY SCHOOL		
Bijapur	97	66
Yadgir	94	66
Belgaum	102	68
Raichur	100	70
Bidar	105	69
Bellary	104	72
Bangalkot	101	69
HIGHER PRIMARY SCHOOL		
Yadgir	82	63
Bijapur	95	59
Belgaum	97	65
Bagalkot	99	66
Bidar	105	69

It is found that the trend to run government schools when it comes to enrolling boys is more pronounced in the state – level figures. In lower primary government schools. There are 101 girls for every 100 boys. But in private schools, the number comes down to 79. In higher primary school there are 99 girls for every 100 boys. And in unaided schools the number is said to be 79.

After class 7, one in every five students drops out of school. Though the state marching ahead in terms of enrollment of children in primary schools, the bigger concern is for those children who are lost during their transition from one class to another

The report also points out that one of every five children who would have started going to class 7 in 2009-10 sessions has not reached the 2012-13 batch for class 10 in the state. This proves that the transition loss is about 20% across the state.

Indicator	Primary	Higher primary
Access ratio	100	100
Gross enrollment Ration	106.81	105.366
Net Enrollment Ratio (GER)	97.69	94.83
Dropout Ratio of (NER)	2.56	5.40
OUT OF SCHOOL Children Aged 7 years	51.994	
Never Enrolled	4.330	
Dropouts	47.664	

The transition loss of children moving from class 7 to class 8 in 2012-13 was a whooping 57.130. Out of these 32.642 were girls. The total number of out -of -school children stands at 51.994 . Out of these 4.330 have never been enrolled.

B) Sexual Harassment: - Sexual harassment & violence also continue to be major constraining factors preventing parents from freely sending their girls to school. Public places in India continue to be relatively hostile to the presence of women & rarely function in a way to make women feel secure & confident. Transporting girls to school & back safely especially where secondary schools & universities are for away from their homes, is a critical policy measure that has received scant attention.

C) POVERTY : The main reason for dropout at all the levels of school education irrespective of the locality is poverty. Family Problems leads the child to get into a work to become independent or to support the family Poor SC/ST parents are unable to send their children to free school because of costs other than the tuition fee & of forgone income from the children's work

D) Social Status of the Groups: Social status begins from the caste system in many communities girls are married at the very young age. This is the main reason for drip out at secondary level. "People believe that marrying many find higher in more important than studying many It they do have money They prefer sending their sons to colleges.

Based on community status or the wealth of the family irking condition of the people also differ In the castle gender segment action of the labor market women are disproportionately found in agricultural sexual labara, traditional domestic, low skilled in, low status or caste relate (sweeping- scavenging) Services in rural sectors. In urban sectors, poor women are located in alloy unskilled low status, feminized service sectors in urban informal economy.

E) Lack Of Quality Education: Some people are not interested in classes because the education provided to them is not interesting or de-motivation by school authorities by scolding them or not considering them. Behavioral problem children are given corporal punishment still in school level, Theses kindly of children lose their interest in studies & they dropout from school.

2.3 Government Policies & Programs on Gender Equality & The Indian govt. has expressed a strong commitment towards education for all several schemes have been launched by the govt. encouraging the girl's education, such as Sarva Shiksha Abhiyana for girl's, Kasturba Gandhi Balika Vidyalaya(KGBV) scheme & District primary education program me(DPEP) Kanya Saaksharahta protsahana yojna in urban & rural areas. The 33% reservation given to women in panchayats, have played positive rule in this direction. Several other policies like 30% reservation to women candidates in services, enhance subsidy to women entrepreneurs have accelerated the development process.

Conclusion:- Education enables a woman to realize her full potential to think and judge independently & to be a wise decision maker. It is rightly said that one could judge the degree of civilization of a country by the social & political status of women education is the only tools of empowering women with Knowledge, skills & self-confidence.

Dropout rate of children from primary to secondary level, Govt. policies & programmes has been discussed in this paper. From that it's observed that the number of dropout is high in all the periods at secondary level. Some of major reasons for dropout in India are discussed & it's concluded that the mindset of the society towards gender based discrimination should be changed with the help of Education, Administration & curriculum & policy makers.

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A STUDY ON ADJUSTMENT OF INSTITUTIONAL CHILDREN*

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Abstract: The present study was conducted to study the social, emotional and educational adjustment of institutionalized children during 2003-05. The sample for the study comprised 148 children in the age group of 10-16 years residing in four juvenile institutions in Belgaum division, Karnataka state. Information about adjustment of children was collected by using Sinha and Singh (1997) adjustment inventory. Results revealed that majority of the institutional children had unsatisfactory social, emotional and educational adjustment and very few of them had good adjustment. Further their age and academic performance had significant influence on adjustment of them. The adjustment of different types of abused children and their different periods of stay in the institution did not differ significantly.

Key words: Adjustment, institutional children, neglect, physical abuse, multiple abuse.

Introduction : Institutional children are considered as highly deprived class of society. These children are left helpless, abandoned, neglected due to social, economic and personal reasons by the parents/ caregivers and they are deprived of one or more necessities of life. Early separation from parents, deprivation of parental care, love, affection, warmth, security, acceptance and discipline during childhood disrupts their normal socio-emotional development So it becomes necessary to know whether institutional children who are devoid of family life with the emotional warmth grow up normally and how well they are able to cope with himself and adjust to the demands of the environment/society around them. Therefore the study with the aim to know the level of adjustment of institutional children was taken up.

Material and Methods : The population for the present study comprised children residing in Juvenile institutions of Belgaum Division, in Karnataka State. Among the 9 institutions in the division four juvenile institutions i.e., two for boys and two for girls nearer to Dharwad were selected for the study. Totally there were 255 children of which 150 children were selected fulfilling following criteria i.e., children between 10-16 years who were neglected, physically and multiple abused were selected for the detailed study. Information about social, emotional and educational adjustment of these children was collected by using Sinha and Singh (1997) adjustment inventory.

Results and Discussion : The results of the study (Table 1) showed that majority of the institutional children had unsatisfactory social, emotional and educational adjustment and very few of them had good adjustment. This clearly indicates that institutional children have more social, emotional and educational problems which made them socially more aggressive, emotionally unstable and educationally not interested in studies and these characteristics were responsible for unsatisfactory adjustment of children. Similarly, the earlier studies conducted by Biradar (1992), Hiremani *et al.* (1994), Chaudhary and Bajaj (1995) and Chaudhary and Uppal (1996) also reported that institutional children were emotionally insecure, immature and unstable.

The results of study showed that younger (10-12 years) and older (13-15 years) children differed significantly in the level of social, emotional and educational adjustments. Larger proportion of older children showed average adjustment while younger children showed unsatisfactory adjustment (Table 2). This indicated that younger children had more problems in social, emotional and educational areas compared to older children. This may be due to the fact that adjustment of children improves with advancing age. Their childhood behavior and emotions are replaced by more matured forms of behaviors and their cognitive abilities such as ability to understand, reason, remember and concentrate also improves with advancing age. The findings are in conformity with the earlier studies made by Sujatha *et al.* (1993), Hiremani *et al. (*1994) and Dutta *et al.* (1998).

The results in Table 3 showed that higher proportion of boys had average social, emotional and educational adjustment indicating better level of adjustment as compared to the girls. This clearly indicated that as compared to the girls, boys were socially more friendly with their classmates and with others, like to work with others, extrovert, outgoing, sharing, aggressive, take part in school activities, and emotionally

they were quite bold, less worried, depressed, sad, jealous about others, resentful, rationalize their mistakes. Further, educationally they were able to understand the lesson taught by the school teachers, able to take notes properly, satisfied with the method of teaching in school, pay attention to studies and make use of library facilities. All these traits were responsible for better adjustment of boys. The study similarly conducted by Jain and Negi (1998) on juvenile children also revealed that male children had better social, educational and overall adjustment than girls.

Further the results revealed no significant difference in the level of social, emotional, educational adjustments of different categories of abused children (Table 4). However, more number of neglected, physical and multiple abused children were unsatisfactory in social, emotional, educational adjustments. From the child's perspective abuse during childhood disrupts the early process of attachment with the primary caregiver i.e., parent(s) and impairs the related developmental processes in social, emotional and intellectual areas.

The findings of the present study (Table 5) also revealed that duration of stay in the institution had no association with social, emotional, educational adjustment of children. This indicates that the level of social, emotional, educational areas of children was almost same irrespective of their duration of stay in the institution. This may be attributed to the fact that institutionalization is a pathological element for the development of children. It is the parental attitude towards child's acceptance or rejection which has a greater impact on the children irrespective of its duration of stay in the institute. Similar results were reported by Hiremani (1991) who found no relation between length of institutionalization and emotional maturity among destitute adolescent girls.

The present study further indicated significant association between academic performance and social, emotional, and educational adjustment of children (Table 6). This clearly indicated that children who were fair in academic performance were average in social, emotional and educational adjustment. This is because of the fact that physical, social, emotional, and intellectual developments are interrelated. High academic performance in school generally develops better self-esteem and self-confidence in the children which leads to the development of desirable social and emotional traits such as boldness, being friendly with classmates and others, enjoy company of other children and working in group, assumes responsibilities, interest in extra curricular activities, helping nature, not become angry on others quite often, do not envy others and feel jealous about others, often do not feel sad, depressed and anxious, rationalize their mistakes and cooperative which leads to better adjustment in society. The results are in conformity with the studies made by Rai (1982) and Dutta *et al*. (1998). Agarwal (1981) found that under-achievers were less emotionally stable, less calm, less placid, prone to getting into difficulties, less able to face reality, less compulsive and had poor self concept. Bharatidevi (1982) reported that high achievers differed from low achievers in neuroticism, guilt feelings, inferiority feeling, personal warmth, and attitude towards life.

The results of the study also revealed that majority of institutional children had unsatisfactory adjustment indicating more problems in social, emotional and educational areas. These children were emotionally unstable, impatient, demanding, disobedient, less accommodating, shy, timid, sensitive, insecure, aggressive, worried, troubling, lack concentration and interest in studies, poor memory which put impediment in their adjustment in the institutional living and in effective utilization of its services. The finding has important practical implication that such traits later are likely to drag them towards anti social behavior. There are theoretical and empirical evidences regarding links between child abuse and delinquency. So child abuse is only the beginning that sparks off a series of problems that lasts for life time. From the perspective of children, it is not appropriate simply if we focus our attention on the psychological reaction of the child victims but they must be helped to overcome the adverse effects of abuse. So there is need for tertiary intervention efforts targeting towards victims to restore their optimum level of functioning and preventing them from maladjustment. Under the circumstances where the family atmosphere is unhealthy, institutional care is the best available alternative for these children. In this regard institution/protective agency has high degree of responsibility towards abused children who are experiencing great stress and safeguard children from further detrimental experiences in their immediate environment and prevent further neglect or abuse. Abused children need help to overcome pain, fear, confusion which they may not be able to voice or even show in their behaviors. Institutional children may be protected from harm if they get an opportunity to develop stable emotional relationship with at least one important and consistent person in their lives who can provide support and protection. So the mechanical type of care must be replaced with personal concern by the staffs who are in charge of the children particularly the house mothers whom they consider as a substitute parent. However a stable, reliable and understanding relationship does not depend primarily on words but on consistent response to child's feelings which gradually develops foundations of trust, confidence, and sense of security. This provides strong base from which they develop self identity, self respect, a sense of confidence and work. These tasks must be partly accomplished before the child adjusts his/her behaviors reasonably to the day's events in the institution and before they are ready to explore opportunities to learn. The Department of social welfare should pay attention to social, emotional, educational problems of children either by providing special training to in-service teachers or through guidance and counseling services in the institution by the counselor.

Table 1 Distribution of institutional children according to their level of adjustment

Area of a djustment	Level	Institutions				Total(148)	Mean score obtained
		Hubli (n=36)	Gadag (n=76)	Khanapur (n=17)	Saundatti (n=19)		
Social	Good	8(22.22)	9(11.84)	3(17.65)	4(21.05)	24(16.22)	7.67
	Average	12(33.33)	26(34.21)	6(35.29)	6(31.56)	50(33.78)	
	Unsatisfactory	10(27.78)	29(38.16)	5(29.41)	7(36.84)	51(34.45)	
	Very unsatisfactory	6(16.67)	12(15.79)	3(17.65)	2(10.53)	23(15.54)	
	Mean score obtained	7.58(3.29)	7.78(2.30)	7.26(2.70)	7.88 (2.98)		
Emotional	Good	6(16.67)	8(10.53)	1(5.88)	4(21.05)	19(12.84)	8.22
	Average	15(41.67)	20(26.32)	9(52.94)	4(21.05)	48(32.43)	
	Unsatisfactory	8(22.22)	34(44.74)	4(23.53)	9(47.37)	55(37.16)	
	Very unsatisfactory	7(19.44)	14(18.42)	3(17.65)	2(10.53)	26(17.57)	
	Mean score obtained	7.94(3.34)	8.49 (2.76)	7.82 (2.81)	8.05(2.55)		
Educational	Good	7(19.44)	8(10.53)	3(17.65)	2(10.53)	20(13.51)	8.19
	Average	14(38.88)	20 (26.32)	8(47.06)	5(26.32)	47(31.76)	
	Unsatisfactory	11(30.56)	32(42.11	3(17.65)	8(42.11)	54(36.49)	
	Very unsatisfactory	4(11.11)	16(21.05)	3(17.65)	4(21.05)	27(18.24)	
	Mean score obtained	7.50(2.94)	8.55 (2.56)	8.00 (3.12)	8.26(2.79)		
Total	Good	4(11.11)	8(10.53)	1(5.88)	3(15.78)	16(10.81)	24.18
	Average	13(36.11)	21(27.63)	8(47.05)	5(26.32)	47(31.75)	
	Unsatisfactory	13(36.11)	32(42.10)	5(29.41)	8(42.11)	58(39.19)	
	Very unsatisfactory	6(16.66)	15(19.74)	3(17.65)	3(15.79)	27(18.24)	
	Mean score obtained	23.08(8.85)	24.92 (7.34)	23.82 (8.21)	23.63 (7.18)		

Figures in parenthesis indicate percentages Lower mean indicate better adjustment

Table 2. Influence of age on adjustment of institutional children

N=148

Age group	Level of social adjustment				MeanSD	't' value
	Good	Average	Unsatisfactory	Very unsatisfactory		
Younger 10-12 yrs (n=71)	7(9.86)	20(28.17)	24(33.80)	20(28.17)	8.71 (±2.78)	4.87**
Older 13-15 yrs (n=77)	17(22.08)	30(38.96)	27(35.06)	3(3.90)	6.71(±2.17)	
Total	24	50	51	23		
x2	19.38**					
	Level of emotional adjustment					
Younger10-12 yrs (n=71)	5(7.04)	20(28.17)	22(30.99)	24(33.80)	9.45 (±3.05)	5.22**
Older13-15 yrs (n=77)	14(18.18)	28 (36.36)	33(42.86)	2(2.60)	7.18 (±2.11)	
Total	19	48	55	26		
x2	26.21**					
	Level of educational adjustment					
Younger10-12 yrs (n=71)	6(8.45)	17(23.94)	23(32.39)	25(35.21)	9.33 (±2.94)	5.18**
Older13-15 yrs (n=77)	14(18.18)	30(38.96)	31(40.26)	2(2.60)	7.14 (2.09)	
Total	20	47	54	27		
x2	27.37**					

Figures in parenthesis indicate percentages ** Significant at 0.01 per cent level

Table 3. Influence of gender on adjustment of institutional children

N=148

Age group	Level of social adjustment				Mean	't' value
	Good	Average	Unsatisfactory	Very unsatisfactory	MeanSD	
Boys(n=53)	12(20.75)	17(32.08)	15(28.30)	9(16.98)	7.68 (±3.16)	0.01NS
Girls(n=95)	12(12.63)	33(34.74)	36(37.89)	14(14.74)	7.67 (±2.37)	
Total	24	50	51	23		
x2	2.47 NS					
	Level of emotional adjustment					
Boys	7(13.21)	24(45.28)	12(22.64)	10(18.87)	7.66 (±2.98)	3.70 **
Girls	12(12.63)	24 (25.26)	43(45.26)	16(16.84)	8.49 (±2.59)	
Total	19	48	55	26		
x2	8.97 *					
	Level of educational adjustment					
Boys	10(18.87)	22(41.51)	14(26.42)	7(13.08)	7.91 (±3.15)	1.16NS
Girls	10(10.53)	25(26.32)	40(42.11)	20(21.05)	8.47 (±2.64)	
Total	20	47	54	27		
x2	7.67 NS					

Figures in parenthesis indicate percentages * Significant at 0.05 per cent level ** Significant at 0.01 per cent level

Table 4 Influence of types of abuse on adjustment of institutional children

Types of abuse	Level of social adjustment				Mean	'F' value
	Good	Average	Unsatisfactory	Very unsatisfactory		
Neglect	9(12.33)	26(35.62)	28(38.36)	10(13.70)	8.67 (±2.78)	0.54NS
Physical abuse	8(22.86)	13(37.14)	11(31.42)	3(8.57)	8.03 (±3.33)	
Multiple abuse	7(17.50)	11(27.50)	12(30.00)	10(25.00)	7.65 (±2.38)	
Total	24	50	51	23		
x2	6.28 NS					
	Level of emotional adjustment					
Neglect	13(17.81)	20(27.40)	23(31.51)	17(23.29)	7.87 (±2.52)	1.81NS
Physical abuse	3(8.57)	13(37.14)	15(42.86)	4(11.43)	7.69 (±3.33)	
Multiple abuse	3(7.5)	15(37.50)	17(42.50)	5(12.50)	7.33 (±2.32)	
Total	19	48	55	26		
x2	7.85 NS					
	Level of educational adjustment					
Neglect	9(12.33)	22(30.14)	26(35.62)	16(21.92)	8.59 (±2.81)	1.55NS
Physical abuse	7(20.00)	11(31.43)	13(37.14)	4(11.43)	7.71 (±2.92)	
Multiple abuse	4(10.00)	14(35.00)	15(37.50)	7(17.50)	7.88 (±2.43)	
Total	20	47	54	27		
x2	3.18 NS					

Figures in parenthesis indicate percentages NS- Non significant

Table 5 Influence of duration of stay in institution on adjustment of children

Duration of stay	Level of social adjustment				Mean	't' value
	Good	Average	Unsatisfactory	Very unsatisfactory		
2-5 yearsn=91	16(17.58)	35(38.46)	30(32.97)	10(10.99)	7.43 ±2.57	1.35NS
>6 yearsn=57	8(14.04)	15(26.32)	21(36.84)	13(22.81)	8.07 ±2.82	
Total	24	50	51	23		
x2	0.16 NS					
	Level of emotional adjustment					
2-5 yearsn=91	13(14.29)	32(35.16)	33(36.26)	13(14.28)	7.93 ±2.65	1.64 NS
>6 yearsn=57	6(10.53)	16(28.07)	22(38.60)	13(22.80)	8.74 ±3.07	
Total	19	48	55	26		

x2	0.48 NS					
	Level of educational adjustment					
2-5 yearsn=91	14(15.38)	32(35.16)	32(35.16)	13(14.29)	7.87 ±2.64	1.76 NS
>6 yearsn=57	6(10.53)	15(26.32)	22(38.60)	14(24.56)	8.70 ±2.87	
Total	20	47	54	27		
x2	0.31 NS					

Figures in parenthesis indicate percentages NS – Non significant

Table 6 Influence of academic performance on adjustment of institutional children

Academic performance	Level of social adjustment				Mean	'F' value
	Good	Average	Unsatisfactory	Very unsatisfactory		
Good (60-74%)n=23	13 (61.9)	3(14.3)	3(13.04)	4(17.39)	5.85 (±3.49)	5.04**
Fair (50-59%)n=50	5(10.0)	28(56.0)	12(24.0)	5(5.0)	7.38 (±2.36)	
Poor (30-49%) n=64	5(7.8)	18(28.1)	31(48.4)	10(15.6)	8.17 (±2.25)	
Very poor(< 30) n=11	1(9.1)	1(9.1)	5(45.5)	4(36.4)	9.18 (±2.75)	
Total	24	50	51	23		
x2	59.75 **					
	Level of emotional adjustment					
Good (60-74%)n=23	10(47.6)	7(33.3)	3(13.04)	3(13.04)	6.09 ±2.27	6.79**
Fair (50-59%)n=50	4(8.0)	28(56.0)	11(22.0)	7(14.0)	7.76 ±2.59	
Poor (30-49%) n=64	4(8.0)	12(18.8)	37(57.8)	11(17.2)	8.92 ±2.45	
Very poor(<30%) n=11	1(9.1)	1(9.1)	4(36.4)	5(45.5)	10.27 ±3.16	
Total	19	48	55	26		
x2	60.20**					
	Level of educational adjustment					
Good (60-74%)n=23	10(47.6)	9(39.13)	2(8.70)	2(9.5)	6.04 (±2.92)	7.02**
Fair (50-59%)n=50	4(8.0)	27(54.0)	13(26.0)	6(12.0)	7.70 (±2.44)	
Poor (30-49%) n=64	5(7.8)	10(15.6)	36(56.3)	13(20.3)	8.96 (±2.51)	
Very poor(< 30%) n=11	1(9.1)	1(9.1)	3(27.3)	6(54.3)	10.00 (±2.60)	
Total	20	47	54	27		
x2	61.37**					

Figures in parenthesis indicate percentages ** Significant at 0.01 per cent level

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MEMORISATION TECHNIQUES IN PEDAGOGY

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ABSTRACT: All our attempts in the field of education are directed to make the pupil learn properly. For an effective learning, it is essential that we should be able to preserve our past experiences and make use of them whenever needed. The process of memorization begins with learning or experiencing something and ends reproduction.
Techniques of Memory:
Principle of Association, Grouping and Rhythm, Peg Word method, Making use of SQ 4R technique, Recite and Recall, Utilizing as many sensed as possible and Mnemonic Techniques.

Ø General Guidelines to Improve Memory
Organize information: Write things down in address books and date books and on calendars, take notes on more complex material and recognize the notices into categories later. Use both words and pictures in learning information

Thus, there must be firm determination or strong will to learn, retain and reproduce for achieving the desired success in memorization and there must be interest & attention for effective memorization.

Learning occupies a very significant place in one's life. All our attempts in the field of education are directed to make the pupil learn properly. For an effective learning, it is essential that we should be able to preserve our past experience and learning, and make use of them whenever needed. In the psychological world this ability of retention and repeating is known as 'Memory'. The awareness of an object or situation as having been known to the person is – Recognition. Here the presence of the already experienced object or thing makes the task of recollection easy.

Thus the process of memorization or remembering begins with learning or experiencing something and ends with its retrieval and reproduction. Therefore, memory is said to involve the four stages i.e. learning or experiencing something / Registration, Retention, Recall and Recognition. These four stages have been given a different shape now a day named as – Encoding, Storage, and Retrieval

Encoding – a process to translate or convert the sensory information into such a coded form that can be easily stored and reproduced at the time of our need.

The process of encoding as we can visualize resembles the stage of learning described earlier for the process of memorization. During the process of learning, we try to encode the learned material or acquired experiences according to our own ability, style, experience, training or capacity. Every bit of this information can thus be transformed in the form of memory traces (engrams) and codes for the storage and its farther retrieval.

When we have proper encoding of the learned material, the result in the terms of its storage and retrieval in proportion are always better. One can opt for any form, method or technique for choosing a particular code for any type of the information to be coded in one's memory like figure, symbol, word, sentience, incidence etc.

The storage is concerned with the power of retention. What is available in the form of engrams or encoded message is kept safe by this storage so that it can be revived at the time of the need.

Retrieval is concerned with the revival or reproduction of the stored encoded messages of memory traces (engrams) into their original form. Here the coded message undergoes a process of decoding and as a result we can reproduce the things in the form they were experience or learnt by us during the process of learning or experiencing.

Retention: Since all learning implies retaining it also includes remembering. To remember is to deal with past experience, to be able to recall or to recollect the circumstances surrounding an event, an idea, or a fact. It doesn't follow, however, that if one has learned he also can remember all that he has learned. Recall depends upon many factors including the emotions for example, although you know the names of your close friends, it is possible to be in such an emotional state that, at any one moment, a mental block interferes with recall.

Importance of Retention: So experience a clear mental image at the time of sense stimulation is basic to the development of correct perception. Yet, it is equally important that, if the individual so desires, he will be able to recall clearly what he has learned? Learning can be demonstrated only through the ability to bring to the level of conscious recall what has been experienced. Recall functions more effectively when the material has been understood and completely learned. It is not correct to think that learning has taken place unless or until that which is present verbally or in written form is understood by the learner. The type of material learned usually has an effect upon an individual's degree of success in retaining it.

For example, meaningful materials usually are retained more easily than meaningless material; likewise materials which are associated with unpleasantness, dissatisfaction.

The good student discovers the value of rethinking the various topics in his lesson. He knows that recall is easier when ideas have been repeated or rethought.

Many students attempt to rely upon one reading of an assignment to fix the ideas firmly in mind. They believe recall with follow if they understand what they read. What they do not always realize is that it is one thing to understand and to retain, but another to recall.

A little over learning is good insurance for effective recall. Much information or learning is retained, but can't be recalled. Names, places, dates, or ideas that have been learned can be recognized to have been a part of our former experience, at the time they are needed.

Individuals differ greatly in the extent to which are the ways in which they remember exactly what they have learned or experienced. This fact can be illustrated by two witnesses. Each observes may have perceived different aspects of the situation. One may remembers certain details, the other may remembers the in any situation is influenced him most. What a person remembers in any situation is influenced by his personal needs at the moment, his emotional state or mood, his interest in the situations, the kinds of material he has learned and the extent of his over learning.

Forgetting : The act of remembering implies forgetting. If we can't recall or remember a name, an object, a person or an event it is because we have forgotten it. Hence the forgetting concerns itself with the loss of or the lack of retention of experiences, ideas or skills. It is affected by every factor that determines the rate, efficiency or extent of learning.

In a study of retention of college classes in zoology, psychology, and chemistry, Greene discovered that. Four months after the final examination, the percentage of retention was 42, 42 and 48 respectively. These percentage figures compared with the class average on the final examination of 76, 70 and 80 respectively. After twenty months of no learning, they fell to 32 and 24 percent for zoology and psychology; no figures were available for chemistry. Thus forgetting sets in as soon as learning ceases, material that is memorized requires much over-learning for retention over a long period of time.

Types of Memory:

* **Sensory or Immediate Memory –** Here retention time is extremely brief, generally from a fraction of a second to several seconds. Old sensory impressions disappear as they are 'erased' by new information.

(Exa: we enter the cinema hall and see the seat number given on our ticket. After occupying the seat, we forget the seat number).

* We took up a telephone number from the directory and remember it. But after making the call, we usually forget it.

* **Short Term Memory** – Up to 30 seconds, the information is stored up in this memory, even if the material is not being rehearsed. One can retain much information in one's short term memory by special processes like chunking Mathematics as mat He Mat Ics.

* **Long Term Memory –** It has quite a durable or endless retention of the sensory impressions. That is why; it is also referred to as permanent memory.

* Remembering our identifying data like our name, father's name, native place, names of studied schools, date of joining the new job is the simplest example of long term memory. With the help of our long-term memory, we can store, retain and remember at record notice most of the things of our lives.

Techniques of Memory:

1. Principle of Association: A thing should never be learnt in a complete water tight compartment. Attempts should be made to connect it with one's previous learning on one hand and with so many related things on the other. Sometimes for association of ideas special techniques are used that facilitate learning and recall

* **Initial Letter Strategy:**

* The letters VIBG YOR has proved to be effective in remembering the colours of the spectrum (Violet, Indigo, Blue, Green, Yellow, Orange and Red)

* KUAASIA for remembering the specific objectives of writing a lesson plan (Knowledge, Understanding, Application, Attitude, Skill, Interest, Appreciation)

* BODMAS – Bracket of Division Multiplication Addition Subtraction.

* SPCF – Sensory motor period, Pre- operational period, concrete operational period, Formal operations period in the cognitive developmental theory of Piaget

* My very early mother just shown us Nine planets Mercury Venus Earth mars Jupiter Saturn Uranus Neptune Pluto.

2. Grouping and Rhythm: Grouping and rhythm also facilitate learning and help in remembering.

Exa: Telephone No: 08352223290 can be easily memories and recalled if we try to group 08352-223290

Mathematics as mat he mat ics

International as Inter nation al

Thermodynamics as Thermo dynamo ics

Apperception as Apper cept ion

Environment as viron ment

Thurstone as Thurst one

Rhythm also proves as an aid in learning and memorizing. Children learn effectively the multiplication tables in the sing-sang fashion.

The arrangement of the material in the form of a verse with rhythm and rhyme is found very useful in the direction.

Exa: Thirty days has September, April, June & November All the rest have thirty one accepting February alone To which they twenty eight assign. Till a leap year gives it twenty nine.

3. Peg Word method: The peg words numbering 1-10 may be memorized with the help of a rhyme.

One is Gun	Six is sticks
Two is Shoe	Seven is Heaven

Three is Tree	Eight is Gate
Four is Door	Nine is Wine
Five is Knives	Ten is Hen

4. Making use of SQ 4R technique: Thomas and Robinson developed this strategy for effective learning and memorization. In this technique the learners are taught to adopt a systematic approach to learning the desired material involving sequential stops that is Survey, Question, Road, Reflect, Recite and Review (SQ4R)

i) Survey: The material to be remembered is surveyed quickly to get an idea of what is going to be remembered.

ii) Question: The learner asks himself questions like why, what, when, where and who connecting the material surveyed in the first step.

iii) Read: The material is then read for mental comprehension and to learn answers to the questions raised in the second step.

iv) Reflect: The information given in the required material is organized and meaningful by

- Linking it with the previous knowledge
- Comparing and contrasting the facts.
- Correlating the information with other similar facts, concepts and principles.

5. Recite and Recall: The information provided in the material is remembered through recitation and recall both orally and in writing.

Memory Test
4 8 2 7
2 6 8 9 5
6 3 8 5 4 8
6 9 3 5 2 7 4
8 3 5 6 2 4 1 7
4 2 8 1 5 3 6 9 7
3 8 7 4 6 8 1 4 2 5

6. Utilizing as many sensed as possible: Senses are said to be the gateways of knowledge and is has also been found that the things are better learned and remembered when presented through more than one senses. So attempts should be made to take the help of audio – visual aid and receive impressions through as many senses as possible.

Ex: microphone be remembered as mike
Rose as Rosie
Use positive and pleasant images.

7. Mnemonic Techniques:

a) The Long Method: It is one of the easiest mnemonic techniques available. You use it by making simple associations between items in a list, linking them with a vivid image containing the items. Taking the first image, create a connection between it and the next item – Then move on through the list linking each item with the next.

You may want to remember the list of countries in the south of England: Avon, Dorset, Somerset, Cornwall, Wiltshire, Devon, Gloucestershire, Hampshire and Surry.

You could do this with link method.

This could rely on a series of images coding information.

· An AVON (Avon) Lady Knowing on a heavy oak Door (Dorset).
· The Door opening to show a beautiful SuMmer R landscape with a SET ting sun (Somerset).
· The setting sun shines down onto a field of CORN (Cornwall)
· The CORN is so day it is beginning to WILT (Wiltshire)
· The WILTing stalks slowly droop onto the tail of the sleeping DEVil's horn a woman has impaled a GLOssy (Gloucestershire) HAM (Hampshire) when she hit him over the head with it.
· Now the Devil feels SoRRY (Surrey) he bothered her.

b) The Story Method: It links items together with a memorable story featuring them. The flow of the strong and the strength of the images give you the cues for retrieval.

Ex: An AVON lady is walking up a path towards a strange house. She is hot and sweating slightly in the heat of high SUMMER (Somerset). Beside the path some one has planted giant CORN in a WALL (CORNWALL), but it's beginning to WILT (Wiktsgure) in the heat. She knocks on the DOOE (Dorset), which is opened by the DECil (Devon).

In the back ground she can see a kitchen in which a servant is smearing honey on a HAM (Hampshire), making it GLOSSY (Gloucestershire) and gleam in bright sunlight streaming in through a window. Panicked by seeing the Devil, the Avon lady screams 'SoRRY' (Surrey) and dashes back down the path.

This method helps to keep events in a logical order.

c) The Journey Method: The Journey Method is a powerful, flexible and effective mnemonic based around the idea o remembering landmarks on a well known journey. It combines the narrative flow of the link method and the structure and the order of the peg-systems into one very powerful system.

To use this technique most effectively, it is often best to prepare the journey before hand. In this way the land marks are clear in your mind before you try to commit information to them. One of the ways of doing this is to write down all the landmarks that you can recall in order a piece of paper.

Exa: Shopping list

Coffee, salad, vegetables, bread, kitchen paper, fish, chicken, Pork chops, soup, fruit, bath tub cleaner.

Mnemonic images could be as –

1. Front door : Split coffee grains on the doormat
2. Rose bush in front garden: growing lettuce leaves and tomatoes around the roses.
3. Car: with potatoes, onions and cauliflower on the driver's seat
4. End of the Road: an arch of French bread over the road.
5. Past Garage: with its sign wrapped in kitchen roll
6. Under railway bridge: from which haddock and cod are dangling by their tails

7. Traffic lights: chickens squawking and flapping on top of lights.
8. Past Church: in front of which a pig is doing karate, breaking boards.
9. Under office block: with a soup slick underneath: my car tires send up ets of tomato soup as I drive through it.
10. Post car park: with apples and oranges tumbling from the top level.
11. Supermarket car park: a filthy bath tab is parked in the space next to my car.

Ø General Guidelines to Improve Memory

1. Organize information: Write things down in address books and date books and on calendars, take notes on more complex material and recognize the notices into categories later. Use both words and pictures in learning information.
2. Understand and be able to interpret complex Material: For more complex material, focus on understanding basic ideas. Be able to explain it to some one else in your own words.
3. Be motivated keep a positive attitude: Tell yourself that you want to teach what you reed to remember, and that you car learn and remember it. Positive mental feed back sets up an expectation of success.

Thus, there must be firm determination or strong will to learn, retain and reproduce or achieving the desired success in memorization and there must be interest & attention for effective memorization.

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ರಾಯಚೂರು ಜಿಲ್ಲೆಯ ಆಧುನಿಕ ಮಹಿಳಾ ಕಾವ್ಯ

ಶ್ರೀ ಮತಿ ಮಹಾದೇವಮ್ಮ
ಕನ್ನಡ ಅಸೋಸಿಯಟ್ ಪ್ರೋಫೆಸರ್. ಬಿ.ಆರ್.ಬಿ. ವಾಣಿಜ್ಯ ಮಹಾವಿದ್ಯಾಲಯ, ರಾಯಚೂರು.

ಹೈದರಾಬಾದ್ ಕರ್ನಾಟಕ ಹಿಂದುಳಿದ ಪ್ರದೇಶ ಎನ್ನುವ ಹಣೆ ಪಟ್ಟ ಹೊಂದಿದ್ದು ವಿಶೇಷವಾಗಿ ಶೈಕ್ಷಣಿಕವಾಗಿ ಹಿಂದುಳಿದ ಪ್ರದೇಶ ಎನ್ನುವ ಮಾತು ಕೇಳಿ ಬರುತ್ತಿರುವುದು ಸಹಜವಾದದ್ದೆ. ಅದರಲ್ಲಿ ರಾಯಚೂರು ಜಿಲ್ಲೆಯು ಹೊಂದಾಗಿದೆ. ಆದರೆ ಇದಕ್ಕೆ ಅಪವಾದವಾಗಿ ಹೈದರಾಬಾದ್ ಕರ್ನಾಟಕ ಪ್ರಗತಿ ಪಥದ ಹಾದಿಯಲ್ಲಿದೆ. ಪ್ರತಿಯೊಂದು ರಂಗದಲ್ಲಿಯು ತನ್ನ ಕ್ರಿಯಾ ಶೀಲತೆಯನ್ನು ಎತ್ತಿ ತೋರಿಸತ್ತಾ ಇದೆ.

ಅದರಂತೆ ಇಲ್ಲಿಯು ಸಾಹಿತ್ಯ ರಂಗವೂ ಕೂದ ಅಭಿವೃದ್ದಿ ಪಡೆದಿದೆ. ವಿಶೇಷವಾಗಿ ರಾಯಚೂರು ಜಿಲ್ಲೆಯ ಕಾವ್ಯಕ್ಕೆ ದೊಡ್ಡ ಇತಹಾಸ ಪರಂಪರೆ ಇದೆ. ಈ ನೆಲದ ಸಾಂಸ್ಕೃತಿಕವಾದ ವಾಂತವರಣವನ್ನು ನಿರ್ಮಿಸಲು ಕಾವ್ಯವನ್ನು ಬಳಸಿಕೊಳ್ಳಲಾಗಿದೆ. ಇಲ್ಲಿಯ ಕವಂಯತ್ರಿಯರು ಕುರಿತೋದೆಯು ಕಾವ್ಯ ಪ್ರಯೋಗದಲ್ಲಿ ಪರಿಣಿತಿಯನ್ನು ಹೋಂದಿದ್ದಾರೆಂಬ ಮಾತುಗಳ ಅಕ್ಷರಶ ಸತ್ಯ ಕಾವ್ಯ ಕೇವಲ ಕಾಲ್ಪನಿಕತೆಯಿಂದ ಕೂಡಿದರೆ ಸಾಲದು ಅದು ತನ್ನದೆ ಆದ ಸಾಂಸ್ಕೃತಿಕ ಜವಾಬ್ದಾರಿಯನ್ನು ಹೊತ್ತುಕೊಂಡು ನಂತು ಸ್ಪಂದಿಸುವ ಕೆಲಸ ಮಾಡುತ್ತಿರಬೇಕು ಇಂತಹ ಕೆಲಸವನ್ನು ಈ ಜಿಲ್ಲೆಯ ಕಾವ್ಯ ಒಳಗೊಂಡಿದೆ.

ರಾಯಚೂರು ಅಲ್ಲಿಯ ಕನ್ನಡ ಕಾವ್ಯದಲ್ಲಿ ಕವಿಯತ್ರಿಯರ ಕೋಡುಗೆಗಳು ವಿಶಿಷ್ಠವಾಗಿದೆ. ಇಂತಹ ಕವಿಯತ್ರಿರ ಕೊಡುಗೆಗಳನ್ನು ಕುರಿತು ಈ ವಿಚಾರಸಂಕೀರ್ಣದಲ್ಲಿ ವಿಚಾರಗಳನ್ನು ಮಂಡಿಸಲಾಗಿದೆ.

ರಾಯಚೂರು ಜಿಲ್ಲೆಯ ಕಾವ್ಯಕ್ಕೆ ದೊಡ್ಡ ಇತಿಹಾಸ ಪರಂಪರೆಯಿದೆ. ಈ ನೆಲದ ಸಾಂಸ್ಕೃತಿಕವಾದ ವಾತಾವರಣವನ್ನು ನಿರ್ಮಿಸಲು ಕಾವ್ಯವನ್ನು ಬಳಸಿಕೊಳ್ಳಲಾಗಿದೆ. ಇಲ್ಲಿಯ ಕವಿಗಳು 'ಕುರಿತೋದದೆಯೂ ಕಾವ್ಯ ಪ್ರಯೋಗದಲ್ಲಿ ಪರಿಣಿತಿ'ಯನ್ನು ಹೊಂದಿದ್ದಾರೆಂಬ ಮಾತುಗಳು ಅಕ್ಷರಶ್ ಸತ್ಯ. ಕಾವ್ಯ ಕೇವಲ ಕಾಲ್ಪನಿಕದಿಂದ ಕೂಡಿದರೆ ಸಾಲದು, ಅದು ತನ್ನದೇ ಆದ ಸಾಂಸ್ಕೃತಿಕ ಜವಾಬ್ದಾರಿಯನ್ನು ಹೊತ್ತುಕೊಂಡು ನಿಂತು ಸ್ಪಂಧಿಸುವ ಕೆಲಸ ಮಾಡುತ್ತಿರಬೇಕು. ಅಂತಹ ಕೆಲಸವನ್ನು ಜಿಲ್ಲೆಯ ಕಾವ್ಯ ಒಳಗೊಂಡಿದೆ. ಹೀಗಾಗಿ ಕಾವ್ಯವೇ ಆ ಕಾಲದ ಸನ್ನಿವೇಶಕ್ಕೆ ಉತ್ತರವನ್ನು, ಜವಾಬ್ದಾರಿಯನ್ನು, ಜಿಲ್ಲೆಯ ಸಮಗ್ರತೆಯನ್ನು ಕಟ್ಟಿಕೊಡಲು ಸಾಧ್ಯವಾಗುತ್ತದೆ. ಆ ಹಿನ್ನಲೆಯಲ್ಲಿ ಕಾವ್ಯವನ್ನು ನೋಡಿದರೆ ಕಾವ್ಯ ಜೀವಂತವಾಗಿ ನೆಲೆಗೊಂಡಿದೆ.

ಪ್ರಾಚೀನವಾದ ಜನಪದ ಸಾಹಿತ್ಯ ನಮ್ಮ ಮುಂದಿನ ಶಿಷ್ಟ ಸಾಹಿತ್ಯಕ್ಕೆ ಬೇರುಗಳಾಗಿ ಕಂಡುಬರುತ್ತದೆ. ಹಗಲಿರುಳು ಜನಪದರು ತಾವು ದುಡಿದು ಬಂದು ಆಸರಿಕೆ–ಬೆಸರಿಕೆಗಳನ್ನು ಕಳೆಯಲು, ಸಂತೋಷವಾಗಿರಲು ತಮ್ಮ ಬದುಕಿನಲ್ಲಿ ಅಡಗಿದ ವಿಷಯಗಳಲ್ಲಿ 'ಜಾನಪದ'ದ ವಿವಿಧ ಪ್ರಕಾರಗಳ ಮೂಲಕ ಹೇಳುವುದರಿಂದ ಹುಟ್ಟಿದ ಮೌಖಿಕ ಕಾವ್ಯ–ಸಾಹಿತ್ಯ ಜನಪದ ಸಾಹಿತ್ಯವಾಯಿತು. ಈ ಜನಪದ ಹಾಡುಗಬ್ಬಗಳು ಆಧುನಿಕ ಕವಿಯತ್ರಿಯ ಮೇಲೆ ತೀವ್ರವಾದ ಪರಿಣಾಮವನ್ನು ಭೀರಿವೆ. ಜಾನಪದ ಸಾಹಿತ್ಯದ ಸಾಂಸ್ಕೃತಿಕವಾದ ಅನನ್ಯತೆಯನ್ನು ಬೆಳಗಲು ಮುಖ್ಯ ಧಾರೆಗಳಾಗಿರುವುದು ಕಂಡುಬರುತ್ತದೆ.

ಜಿಲ್ಲೆಯಲ್ಲಿ ಮಹಿಳಾ ಸಾಹಿತಿಗಳಾಯಿತು, ಕವಯತ್ರಿಯರಾಯಿತು ಹೆಚ್ಚು ಗಮನವನ್ನು ಸೆಳೆಯುತ್ತಿಲ್ಲ. ಕಾರಣವಿಷ್ಟೇ ಅಧ್ಯಯನದ ಕೊರತೆ ಮತ್ತು ವಿಮರ್ಶೆ ಆಯಾ ಕಾಲಕ್ಕೆ ನಡೆಯಲಿಲ್ಲ. ಹೀಗಾಗಿ ಆಯಾ ಕಾಲದ ಪರಮಾರ್ಶೆಯ ಕಾಲದ ಮೂಲಕ ಮಹಿಳಾ ಕಾವ್ಯರಚನೆಗೆ ಯಾರು ಮುಂದೆ ಬರಲಿಲ್ಲ. ರಾಯಚೂರು ಲೇಖಕರಿಗೆ ಸಾಕಷ್ಟು ಹದವನ್ನು ಹೊಂದಿದ ಜಿಲ್ಲೆಯಾಗಿದೆ. ಲೇಖಕಿಯರಿಗೆ ಹೆಚ್ಚಿನ ಗುಣಮಟ್ಟದಲ್ಲಿ ನಿಲ್ಲುವ ಹಾಗೆ ಸಾಹಿತ್ಯ ಸೃಷ್ಟಿ ಆಗಲಿಲ್ಲ. ಅದಕ್ಕೆಲ್ಲ

ಹಲವು ಕಾರಣಗಳಿರಬೇಕೇನಿಸುತ್ತದೆ.

ಮಹಿಳೆಯರು ಮುಕ್ತವಾಗಿ ಹೊರಬರದೇ ಇರುವುದರಿಂದ ಸಾಹಿತ್ಯ ರಚನೆ ಕುಂಠಿತಗೊಂಡಿರಬೇಕು. ಇಲ್ಲವೇ, ಅವರಿಗೆ ಸರಿಯಾದ ರೀತಿಯ ಶಿಕ್ಷಣ ದೊರೆಯದೇ ಇರಬೇಕು. ಮನೆ, ಸಂಸಾರ ತಾಪತ್ರಯದ ನಡುವೆ ಸಾಹಿತ್ಯ ರಚನೆ ಮಾಡಲು ಸಾಧ್ಯವಾಗಲಿಲ್ಲ. ನಿಜಾಮನ ಆಡಳಿತದಿಂದ ಉರ್ದು ಭಾಷೆ ಇಲ್ಲಿ ನೆಲೆಗೊಂಡಿದ್ದರಿಂದ ಮಹಿಳೆಯರು ಯಾರು ಕಲಿಯಲು ಮುಂದೆ ಬರಲಿಲ್ಲ. ಇಂತಹ ಹೊತ್ತಿನಲ್ಲಿ ಕಲಿಯದೇ ಇರುವಾಗ ಸಾಹಿತ್ಯ ರಚನೆ ಮಾಡಲಾಗಲಿಲ್ಲ. ಕಾವ್ಯಕ್ಕೆ ಅಲ್ಲಲ್ಲಿ ಮಹಿಳೆಯರು ಪ್ರವೇಶ ಪಡೆದರು. ಆದರೆ ಪ್ರವೇಶ ಹೊಂದಿದವರೆಲ್ಲರೂ ಯಶಸ್ವಿಯಾಗಲಿಲ್ಲ. ಮೇಲಾಗಿ ಕಾವ್ಯಕ್ಷೇತ್ರಕ್ಕೆ ಗಟ್ಟಿಯಾದ ನೆಲೆಯನ್ನು ಒದಗಿಸಲಿಲ್ಲ ಎಂಬ ಕೂಗು ಕೇಳಿಬರುತ್ತಿದೆ. ಇದೆಲ್ಲಾ ಅರೆ– ಕೊರೆಗಳ ನಡುವೆ ಮಹಿಳಾ ಸಾಹಿತಿಗಳು ಕಾವ್ಯ ಕ್ಷೇತ್ರದಲ್ಲಿ ಹೆಚ್ಚು ತಲ್ಲೀನರಾಗಿರುವುದನ್ನು ಕಾಣಬಹುದಾಗಿದೆ.

ರಾಯಚೂರು ಜಿಲ್ಲೆಯ ಕನ್ನಡ ಕಾವ್ಯದಲ್ಲಿ ಕವಿಯತ್ರಿಯರ ಕೊಡುಗೆಗಳು ವಿಶಿಷ್ಟವಾಗದೆ. ಶತ–ಶತಮಾನಗಳಿಂದಲೂ ಪುರುಷ ಪ್ರಧಾನ ಸಮಾಜದಲ್ಲಿ ಬದುಕಿದ ಮಹಿಳೆಯರು ತಮ್ಮ ಸ್ವಂತಿಕೆಯನ್ನು ಗುರುತಿಸಿಕೊಳ್ಳವಲ್ಲಿ, ಸಮಾನತೆಯನ್ನು ಸಾಧಿಸಿಕೊಳ್ಳವಲ್ಲಿ ಕಾವ್ಯ ಮಾರ್ಗದ ಮುಖೇನ ಪ್ರಯತ್ನಿಸುತ್ತಿರುವುದು ಮಹತ್ತರ ಕಾರ್ಯವಾಗಿದೆ. ಇಂತಹ ಮಹತ್ವದ ಕಾರ್ಯ ಸಾಧನೆಯಲ್ಲಿ ಈ ಜಿಲ್ಲೆಯ ಕವಿಯತ್ರಿಯರ ಕೊಡುಗೆ ಮಹತ್ವದ್ದಾಗಿದೆ.

ಸ್ತ್ರೀ ಸಂವೇದನೆಯ ನಿಲುವುಗಳೊಡನೆ, ಮಹಿಳೆಯರು ಅಂತರಂಗದ ತುಡಿತಗಳನ್ನು, ಅವಳ ವೈಚಾರಿಕ ನಿಲುವುಗಳನ್ನು ಪರಂಪರಾಗತವಾಗಿ ಬಂದ ಸಾಂಪ್ರದಾಯಿಕ ಚೌಕಟ್ಟಿನಲ್ಲಿಯೇ ಇದ್ದುಕೊಂಡು ಕಾವ್ಯರಚನೆಗೆ ತೊಡಗಿದ ಗಟ್ಟಿ ಧ್ವನಿಗಳು ಈ ಜಿಲ್ಲೆಯಲ್ಲಿವೆ. ಅವರಲ್ಲಿ ಡಾ॥ ಶೈಲಜಾ ಉಡಚಣ, ಹೆಚ್.ಎಸ್.ಮುಕ್ತಾಯಕ್ಕ, ಲಲಿತಾನಾಯಕ, ಲಕ್ಷ್ಮೀದೇವಿ ಶಾಸ್ತ್ರೀ, ಭಾರತಿ ಮೋಹನ್ ಹೋಟೆ, ಬಸ್ಸಮ್ಮ ಹಿರೇಮಠ ಮುಂತಾದವರನ್ನು ಹೆಸರಿಸಬಹುದು.

ಜಿಲ್ಲೆಯ ಹಿರಿಯ ಮತ್ತು ಪ್ರಸಿದ್ಧ ಕವಿಯತ್ರಿಯನ್ನಾಗಿ ಡಾ॥ ಶೈಲಜಾ ಉಡಚಣ ಅವರನ್ನು ಹೆಸರಿಸಬಹುದು. ಪುರುಷ ಪ್ರಧಾನ ಸಾಂಸ್ಕೃತಿಕ ನಡುವೆ ಮಹಿಳೆಯರು ಬರೆಯುವುದು, ಓದುವುದು, ದುಸ್ಸಾಹಸವಾಗಿದ್ದ ಕಾಲದಲ್ಲಿ ಮತ್ತು ಕನ್ನಡ ಸಾಹಿತ್ಯದಲ್ಲಿ ಮಹಿಳೆಯರು ಕತೆ, ಕಾದಂಬರಿಗಳನ್ನೇ ಹೆಚ್ಚಾಗಿ ಬರೆಯುತ್ತಿದ್ದ ಕಾಲದಲ್ಲಿ ಶ್ರೀಮತಿ ಡಾ॥ ಶೈಲಜಾ ಉಡಚಣ ಅವರು ಜನರ ಅಶೋತ್ತರಗಳಿಗೆ, ಸ್ತ್ರೀ ಸಂವೇದನೆಗಳಿಗೆ, ಜನಪರನಿಲುವುಗಳಿಗೆ ಸ್ಪಂಧಿಸುತ್ತಾ ಗಂಭೀರ ಕಾವ್ಯ ರಚನೆಗೆ ತೊಡಗಿದ್ದು ಮಹತ್ವದ ಕಾರ್ಯವಾಗಿದೆ.

'ಕಾಳಿ ಕಾಮಾರಿಯರ ರೂಪ ನಿನ್ನದೇ ಅಲ್ಲವೇ
ಶ್ಯಾಮಲೆ ಸುಭಗೆ ನೀನೇ ಅಲ್ಲವೆ?
ಹಿಂತಿರುಗಿ ನೋಡು
ಸಿಂಹವಾಹಿನಿಯಾಗಿ
ಗರ್ಜಿಸು, ನಿದ್ದೆಕಳೆ, ಎದ್ದು ನಡೆ'
(ವಿಚಿತ್ರ ನೆನಪು)

ಎಂದು ಎಚ್ಚರಿಸುತ್ತಾ, ಸಮಕಾಲೀನ ಪ್ರಜ್ಞೆಯೊಂದಿಗೆ ಭಾವ–ಭಾಷೆಗಳಲ್ಲಿ ತಮ್ಮ ವೈಚಾರಿಕತೆಗಳನ್ನು ತುಂಬಿಕೊಟ್ಟಿದ್ದಾರೆ. ಈ ಜಿಲ್ಲೆಯ ಹಿರಿಯ ಕವಿಯಿತ್ರಿಯಾದ ಇವರು "ಬಂಧುಗಳಿಗೆ" ಕವನ ಸಂಕಲನ ಹೊರತರುವ ಮೂಲಕ ಪ್ರಾರಂಭಿಸಿದ ಸೃಜನಕ್ರಿಯೆ ಕಾವ್ಯಕ್ಷೇತ್ರಕ್ಕೆ ಹೆಚ್ಚಾಗಿ ಸಂದಿದೆ. ಇವರು ಇದುವರೆಗೆ 'ಕಾದುನೋಡು' 'ಸ್ವಗತ', 'ಕಪ್ಪುನೆಲ ಸೊಕ್ಕಿದ ಸೂರ್ಯ', 'ತುಂತುರು ಹನಿಗಳು', 'ನನ್ನಂಥವರು' ಎನ್ನುವ ಕವನ ಸಂಕಲನಗಳನ್ನು ಕನ್ನಡ ಕಾವ್ಯಕ್ಕೆ ಕೊಡುಗೆಯಾಗಿ ನೀಡಿದ್ದಾರೆ ಇವರ ಈ ಸಮೃಜನ ಕಾರ್ಯ ಇಡೀ ಕನ್ನಡ ಸಾಹಿತ್ಯದಲ್ಲಿ ಮಹತ್ವದ ಸ್ಥಾನವನ್ನು ಪಡೆಯುತ್ತದೆ.

ಈ ಜಿಲ್ಲೆಯ ಕವಿಯತ್ರಿಯರಲ್ಲಿ ಮತ್ತೊಂದು ಪ್ರಮುಖ ಧ್ವನಿಯೆಂದರೆ ಹೆಚ್.ಎಸ್.ಮುಕ್ತಾಯಕ್ಕನವರದು. 'ನಾನು ಮತ್ತು ಅವನು' ಸಂಕಲನದ ಮೂಲಕ ಕನ್ನಡ ಕಾವ್ಯ ಕ್ಷೇತ್ರಕ್ಕೆ ಪ್ರವೇಶಿಸಿದ ಇವರು ಪುರುಷ ಪ್ರಧಾನವಾದ ಈ ಸಮಾಜದಲ್ಲಿ ಹೆಣ್ಣನ್ನು ತನ್ನ ಹಿತಕ್ಕಾಗಿ ಬಳಸಿಕೊಳ್ಳುವ ಪುರುಷ ಸಮಾಜವನ್ನು

'ನಿಮ್ಮ ಕಾಮಾಗ್ನಿ ಕುಂಡಕ್ಕೆ
ನಮ್ಮ ಶೀಲವನ್ನು ಬಲಿಗೊಟ್ಟು
ನಿಮ್ಮ ಮಾನಾಪ ಮಾನವನು
ಕಾಪಾಡಲು ನಿಮ್ಮಿಂದಲೇ
ಪತಿವ್ರತೆಯರ ಪಟ್ಟಕ್ಕೇರಿ
ಪ್ರಾತ:ಕಾಲದ ಸ್ಮರಣೆಯಲ್ಲಿ
ಇಂದಿಗೂ ಉಳಿದು ನರಳುತ್ತಿರುವವರು ನಾವು
ನಾವು ಪತಿವ್ರತೆಯರಲ್ಲ'
(ನಾವು ಪತ್ರಿವ್ರತೆಯರಲ್ಲ)

ಎಂದು ಸ್ಫೋಟಿಸುವ ಹೆಚ್.ಎಸ್.ಮುಕ್ತಾಯಕ್ಕನವರು ಮನುವಿತ ತತ್ವವನ್ನು ಸಂಸ್ಕೃತಿಯ ಡಾಂಬೀಕತನವನ್ನು ಇಷ್ಟು ನೇರವಾಗಿ ವಿಡಂಬಿಸಿದ್ದು, ಕನ್ನಡ ಕಾವ್ಯದಲ್ಲಿ ಇದೇ ಮೊದಲೆನಿಸಬಹುದಾಗಿದೆ. ನೀವು ಕಾಣಿರಿ, ಕಾಣಿರಿ'ಕಬೀ ಕಬೀ' ಮತ್ತು 40 ಗಜಲ್‌ಗಳು ಎನ್ನುವ ಸಂಕಲನಗಳನ್ನು ಪ್ರಕಟಿಸಿದ್ದಾರೆ.

ತಮ್ಮ ಅಂತರಂಗದ ನೋವುಗಳಿಗೆ, ನೆನಪುಗಳಿಗೆ, ಭಾವನೆಗಳಿಗೆ ಭಾಷೆಯಲ್ಲಿ ರೂಪು ಕೊಟ್ಟಿದ್ದಾರೆ. ಸ್ತ್ರೀ ಸಂವೇದನೆಗಳೊಡನೆ ಮೈದಳೆಯುವ ಮುಕ್ತ ಅಭಿವ್ಯಕ್ತಿ ಇವರ ಕವಿತೆಗಳಲ್ಲಿ ಎದ್ದು ಕಾಣುತ್ತದೆ.

ಇವರ 'ನಲವತ್ತು ಗಜಲ್‌ಗಳು ಸಂಕಲನ ಕನ್ನಡ ಕಾವ್ಯದಲ್ಲಿಯೇ ಒಂದು ಹೊಸ ಪ್ರಯೋಗವಾಗಿದೆ. ಉರ್ದು ಭಾಷೆಯ 'ಗಜಲ್'ನ ಮೂಲದ ಲಯ–ಲಾಲಿತ್ಯದೊಡನೆ ಉರ್ದು ಕಾವ್ಯಮಟ್ಟವನ್ನು ಮೈಗೂಡಿಸಿಕೊಂಡು ಕನ್ನಡದಲ್ಲಿ 'ಗಜಲ್'ಗಳನ್ನು ರಚಿಸಿರುವ ಸಾಹಸ ಮಾಡಿದ್ದನ್ನು 'ಕನ್ನಡ ಮಹಿಳಾ ಕಾವ್ಯಕ್ಕೆ ಇದೊಂದು ನೂತನ ಪ್ರಕಾರದ ಸೇರ್ಪಡೆ' ಎಂದು ಶಶಿಕಲಾ ವೀರಯ್ಯಸ್ವಾಮಿಯವರು ಮುನ್ನುಡಿಯಲ್ಲಿ ಹೇಳಿದ್ದು ಸೂಕ್ತವಾಗಿಯೇ ಇದೆ.

ದಲಿತ ಬಂಡಾಯ ಕಾವ್ಯದಲ್ಲಿ ಮಹತ್ವದ ಕವಿಯಾಗಿ ಪರಿಚಿತರಾದ ಬಿ.ಟಿ.ಲಲಿತಾ ನಾಯಕರವರು 'ನಂರೂಪ್ಲಿ' 'ಇದೇ ಕೂಗೂ ಮತ್ತೆ–ಮತ್ತೆ' ಎನ್ನುವ ಸಂಗ್ರಹಗಳನ್ನು ಹೊರತಂದಿದ್ದಾರೆ. ಸ್ವತ: ದಲಿತ ಜನಾಂಗದಿಂದ ಬಂದ ಇವರ ಕವನಗಳಲ್ಲಿ ದಲಿತ ವರ್ಗದ ನೋವುಗಳು ಶೋಷಿತರ ವಿರುದ್ಧ ಪ್ರತಿಭಟನೆಗಳು, ವ್ಯವಸ್ಥೆಯ ವಿರುದ್ಧ ಆಕ್ರೋಶಗಳು ಸ್ತ್ರೀಪರ ನಿಲುಗಳು ಮೂಡಿಬಂದಿವೆ.

ಧನವ ತರುವ ಸೊಸೆಯು ನಾವೇ

ಕ್ರೌರ್ಯದಿಂದ ಕಾಡಿ ಪಡೆದ ಅತ್ತೆ ನಾವೇ,
ಅತ್ತೆ ಸೊಸೆಯನ್ನರಿತ ಮೇಲೆ
ಮತ್ತೆ ಮಾವ ಕಾಡಲುಂಟೆ.
ಇದುವೆ ಸತ್ಯ ಅರಿತು ನಡೆಯೆ
ಕುತ್ತು ಬಾರದಿನ್ನು ನಮಗೆ ॥ಕೇಳಿ॥
(ಕೇಳಿ ಮಾನಿನಿಯರೇ)

ಎಂದು ಸ್ತ್ರೀಯರಲ್ಲಿ ಒಗ್ಗೂಡುವ ವೈಚಾರಿಕತೆಯನ್ನು ಭಿತ್ತುತ್ತ ಮಹಿಳೆ ತನ್ನ ಬಂಧನವನ್ನು ತಾನೇ ಬಿಡಿಸಿಕೊಳ್ಳಬೇಕಾಗಿರುವುದನ್ನು ಹೇಳುತ್ತಾರೆ. ಹಾಗೆಯೇ ಜಿಲ್ಲೆಯ ಮತ್ತೊಬ್ಬ ಕವಿಯತ್ರಿ ಲಕ್ಷ್ಮೀದೇವಿಶಾಸ್ತ್ರೀಯವರು 'ನಾಲ್ಕುಸಾಲು', 'ಮರಿಚೀಕೆ', 'ಮೌನ ಮಿಡಿದಾಗ', ಸಂಕಲನಗಳನ್ನು ಪ್ರಕಟಿಸಿದ್ದಾರೆ. ಇವರ ಕವಿತೆಗಳಲ್ಲಿ ಪ್ರೀತಿ, ವಿರಹ, ಪ್ರಕೃತಿ, ಸಾಮಾಜಿಕ ಕಾಳಜಿಗಳು, ಸ್ತ್ರೀ–ಪರ ನಿಲುವುಗಳು ಮುಖ್ಯ ಆಶಯವಾಗಿ ಮೂಡಿಬಂದಿವೆ.

ಹೀಗೆ ಜಿಲ್ಲೆಯ ಹೊಸಗನ್ನಡ ಕಾವ್ಯದಲ್ಲಿ ಹೆಮ್ಮರವಾಗಿ ಬೆಳೆದ ಕವಿಯತ್ರಿಯರ ಜೊತೆಗೆ ಬಿ.ಟಿ.ಕುಮದಾ ನಾಯಕ್‌ರವರು 'ಧಾರೆ' ಬಸಲಿಂಗಮ್ಮ ಹಿರೇಮಠರವರು 'ಅಮೃತಸಾರ' ಪದ್ಮಾಬಸವರಾಜರವರು 'ಭಾವನಾ' ಮತ್ತು ಸಮುಂಗಲ ಡಿ. ಬಾದರ್ಲಿರವರು 'ನಾನು ಮತ್ತು ಭಾವನೆಗಳು', ಎನ್ನುವ ಸಂಕಲನಗಳನ್ನು ಹೊರತಂದು ಜಿಲ್ಲೆಯ ಭರವಸೆಯ ಕವಿಯತ್ರಿಯಾಗಿದ್ದರೆ.

ಇವರ ಜೊತೆ–ಜೊತೆಗೆ ಕಾವ್ಯ ಕೃಷಿಯಲ್ಲಿ ತೊಡಗಿಕೊಂಡು ಹಲವಾರು ಸಂಪಾದಿಕ ಸಂಕಲನಗಳಲ್ಲಿ ಹಾಗೂ ಪತ್ರಿಕಾ ಪ್ರಕಟಣೆಯಲ್ಲಿ ಪ್ರಕಟಗೊಂಡು ಯಾವುದೇ ಸ್ವಂತ ಸಂಕಲನಗಳನ್ನು ಮಾಡದೇ ತಮ್ಮ ಕವಿತಾ ಶಕ್ತಿಯಿಂದ ಹಲವಾರು ಗಟ್ಟಿ ಕವಿತೆಗಳನ್ನು ಕಟ್ಟಿಕೊಟ್ಟು ಹೆಸರು ಮಾಡಿದ ಭಾರತಿಮೋಹನ, ಕೋಟೆ ಸರಸ್ವತಿ, ಆರ್.ಕಳಸದ, ಅಪರ್ಣ ಪೆಂಡ್ಲಕರ, ಭ್ರಹ್ಮವೇಣಿ ಹಾದಿಮನಿ, ಬಾನುಬೇಗಂ, ಸಂಧ್ಯಾ ಕುಪನೇಸಿ, ರುಕ್ಮೀಣಿಮುದ್ದುರಾವ್, ಕೆ.ಲಕ್ಷ್ಮೀ, ಮಾಯದೇವಿ ಚರಂತಿಮಠ, ಅನ್ನಪೂರ್ಣ ಯಲಿಗಾರ, ಗಿರಿಜಾ ಹೂಗಾರ ಮುಂತಾದವರ ಕವಿತಾ ಶಕ್ತಿಯನ್ನು ಉಪೇಕ್ಷಿಸುವಂತಿಲ್ಲ.

ಹೀಗೆ ರಾಯಚೂರು ಜಿಲ್ಲೆಯ ಮಹಿಳಾ ಕಾವ್ಯ ಸೃಷ್ಟಿ ಕಡಿಮೆ ಯಾಗಿದ್ದರೂ ಸತ್ಯದಿಂದ ಗಮನಾರ್ಹವಾಗಿದೆ. ಈ ಭಾಷೆಯ ಒತ್ತಡ ಗಳು ಕಾಲ ಸಂದರ್ಭದ ಸಮಸ್ಯೆ ಸವಾಲುಗಳ ಮಧ್ಯದಲ್ಲೂ ಎಲ್ಲವನ್ನೂ ಅರಿತು ಕಾವ್ಯ ರಚಿಸಿದ ಮಹಿಳೆಯರು ನಿರಂತರ ಕೃಷಿ ಕೈಗೊಂಡಿದ್ದಾರೆ. ಆಯಾ ಕಾಲದ ಸಂದರ್ಭದಲ್ಲಿ ನಡೆದ ಅನೇಕ ಘಟನೆ, ಹೋರಾಟ, ಸಮಸ್ಯೆ ಹಾಗೂ ಪ್ರಚಲಿತ ವಿದ್ಯಮಾನಗಳನ್ನು ಕುರಿತು ಆಗಿಂದಾಗಲೇ ಸ್ಪಂಧಿಸುವ ಗುಣ ಇವರಲ್ಲಿ ಸೂಕ್ಷ್ಮವಾಗಿ ಕಂಡುಬರುತ್ತವೆ. ಹೀಗಾಗಿ ಇಲ್ಲಿಯ ಕವಯತ್ರಿಯರಿಗೆ ಸಾಂಸ್ಕೃತಿಕವಾದ ಪರಿಸರವಿದೆ. ಅನೇಕ ಸೌಲಭ್ಯಗಳ ಕೊರತೆಯೂ ಇದೆ. ಇವೆಲ್ಲ ಮೀರಿ ನಿಂತಾಗ ಹೊಸ ಸಮನ್ವಯ ಹಾದಿ ಹುಡುಕುತ್ತಾರೆ.

ರಾಯಚೂರು ಜಿಲ್ಲೆಯ ಕಾವ್ಯಕ್ಕೂ ಮಹಿಳಾ ಕಾವ್ಯಕ್ಕೂ ಬಹಳಷ್ಟು ಅಂತರ ದೊರೆಯುತ್ತದೆ. ಅದಿಅಂತರದೊಳಗೆ ಹೊಸ ಚಿಂತನೆಗಳನ್ನು ಕವಯತ್ರಿಯರು ಹರಿಸಿದ್ದು ಶ್ಲಾಘನೀಯವಾದುದು.

ಕನ್ನಡ ಕಾವ್ಯ ಅವಲೋಕನದ ಸಂದರ್ಭದಲ್ಲಿ ರಾಯಚೂರು ಜಿಲ್ಲೆಯ ಕಾವ್ಯ ಕುರಿತು ಚಿಂತನೆ–ಚರ್ಚೆಗಳು–ವಿಮರ್ಶೆಗಳು ಆಗಿಲ್ಲವೆಂದಾಗ ನಮ್ಮ ಮಹಿಳಾ ಕಾವ್ಯವೂ ಇನ್ನೂ ದೂರದ ಮಾತಾಗಿದೆ. ನಮ್ಮಲ್ಲಿ ಅನೇಕ ಪುರಾಣಕಾರರ ಪುರಾಣಗಳು ಜಿಲ್ಲೆಯಲ್ಲಿ ಐವತ್ತಕ್ಕೂ ಹೆಚ್ಚು ಹೊರಬಂದಿವೆ. ಹೊಸಗನ್ನಡ ಸನ್ನಿವೇಶದಲ್ಲಿ ನವೋದಯ ರಚನೆಗೊಂಡ ಕಾಲ ಶತಮಾನಗಳ ನಂತರ ಕಾವ್ಯ ಸೃಷ್ಟಿಗೊಂಡಿದೆ.

ಮಹಿಳೆಯರು ಕಾವ್ಯ ರಚನೆಗೆ ಕೈ ಹಾಕಿದ್ದು 1974 ರಿಂದ. ಅಲ್ಲಿಂದ ಹಿಡಿದು ಇಲ್ಲಿಯ ತನಕ ಜಿಲ್ಲೆಯ ಮಹಿಳಾ ಕಾವ್ಯ ಹೊರಬಂದದ್ದು. ಒಂಬತ್ತು ಕವಯತ್ರಿಯರ ಮೂವತ್ತು ಕವನ ಸಂಕಲನಗಳು ಮಾತ್ರ ದೊರೆಯುತ್ತವೆ. ಮಹಿಳಾ ಕಾವ್ಯದ ಬಗ್ಗೆ ಯಾರೂ ತಲೆಕೆಡಿಸಿಕೊಂಡಿಲ್ಲ. ಈಗಾಗಲೇ ಎರಡು ಮಹಿಳಾ ಸಮ್ಮೇಳನಗಳು ನಡೆದಿವೆ. ಹೀಗಿದ್ಯಾಗಲೂ ಕೂಡಾ ಹೊರ ಬರದೇ ಇರುವುದು ದುರಾದೃಷ್ಟಕರ ಸಂಗತಿಯಾಗಿದೆ.

MEDICAL SCIENCE IN VACHANAS

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ABSTRACT: In the history of Karnataka, 12th Century witnessed many innovations not only in the field of science and also in the spiritual area. Many saints and sharana's started new movement in the spiritual domain. Their open mind gave birth to many scientific innovations. In emphasizing the spiritual ideas of vachanas, its scientific importance is sidelined or neglected. If peerely peep into scientific aspects of spiritual demonstration. We can realize innovative part of it in my paper as attempt has been made to reveal medical aspect demonstrated by vachanakarti Akkamaha Devi and other sharanas. We are here looking at these vachanas not only from the point of view of spirituality but also on the ground of scientific base. A sincere and cautious effort should be made to demonstrate the same.

ವಚನಗಳಲ್ಲಿ ವೈದ್ಯ ವಿಜ್ಞಾನ

12ನೇ ಶತಮಾನವ್ನು ಕರ್ನಾಟಕದ ಇತಿಹಾಸದಲ್ಲಿ ಅನೇಕ ಹೊಸ ಹೊಸ ಆವಿಷ್ಕಾರಗಳಿಗೆ ಮುನ್ನುಡಿ ಬರೆಯಿತು. ಆಧ್ಯಾತ್ಮಿಕ ಕ್ಷೇತ್ರಗಳಲ್ಲಿ ಶರಣರು ತಮ್ಮದೇ ಆದ ಹೊಸ ರೀತಿಯ ಆಂದೋಲನವನ್ನು ಪ್ರಾರಂಭಿಸಿದರು. ಅವರ ಈ ಮುಕ್ತ ಮನಸ್ಸು ಅನೇಕ ರೀತಿಯ ವೈಜ್ಞಾನಿಕ ಸಂಶೋಧನೆಗಳನ್ನು ಕೈಗೊಂಡಿತು. ನಾವೆಲ್ಲ ಅವರ ಆಧ್ಯಾತ್ಮಿಕತೆಯಲ್ಲಿಯೇ ಹೊಸತನವನ್ನು ಜಗತ್ತಿಗೆ ಪರಿಚಯಿಸುವ ಭರಾಟೆಯಲ್ಲಿ ಅವರ ವೈಜ್ಞಾನಿಕ ಸಂಶೋಧನೆಯನ್ನು ಮರೆತಿದ್ದೇವೆ. ಆಧುನಿಕ ಜಗತ್ತು 19–20–21 ಶತಮಾನದಲ್ಲಿ ಸಂಶೋಧಿಸುತ್ತಿರುವ ಅನೇಕ ಅವಿಷ್ಕಾರಗಳನ್ನು 12ನೇ ಶರಮಾನದಲ್ಲಿ ನಮ್ಮ ಶರಣರು ಗುರುತಿಸಿರುವ ಬಗ್ಗೆ ತಮ್ಮ ಅನೇಕ ವಚನಗಳಲ್ಲಿ ದಾಖಲಿಸಿದ್ದಾರೆ. ಅವರ ವಚನಗಳನ್ನು ನಾವು ವೈಜ್ಞಾನಿಕ ಮನೋಭಾವದಿಂದ ನೋಡಿದಾಗ ಅವರ ಸಂಶೋಧನೆಗಳು ಪರಿಚಯವಾಗುತ್ತವೆ ಮತ್ತು ಬೆರಗು ಮೂಡಿಸುತ್ತವೆ.

ಶರಣರ ವೈಜ್ಞಾನಿಕ ಸಂಶೋಧನೆಗಳು ಆಧುನಿಕ ವಿಜ್ಞಾನದ ಅನೇಕ ವಿಭಾಗಗಳಾದ ಖಗೋಳ ವಿಜ್ಞಾನ, ಭೌತ ವಿಜ್ಞಾನ, ರಸಾಯನ ವಿಜ್ಞಾನ, ಜೀವ ವಿಜ್ಞಾನ, ಭೂಗೋಳ ವಿಜ್ಞಾನ, ವೈದ್ಯ ವಿಜ್ಞಾನ, ಮನೋವಿಜ್ಞಾನ ಮುಂತಾದ ಎಲ್ಲಾ ಕ್ಷೇತ್ರಗಳಲ್ಲಿ ಅನೇಕ ಬಗೆಯ ಸಂಶೋಧನೆಗಳನ್ನು ಕೈಗೊಂಡಿರುವುದು ಅವರ ವಚನಗಳಿಂದ ತಿಳಿಯಬಹುದಾಗಿದೆ.

ಮನುಷ್ಯನಿಗೆ ತಗಲುವ ರೋಗ–ರುಜಿನಗಳಿಗೆಲ್ಲಾ ಅಂದಿನ ಕಾಲದಲ್ಲಿ ಶೂಶ್ರುಷೆಯನ್ನು ಪಡೆಯದೆ ಮೂಢನಂಬಿಕೆಗಳಿಗೆ ಮಾರು ಹೋಗಿ ತಾಯತ, ಮಂತ್ರ, ತಂತ್ರಗಳನ್ನೆಲ್ಲ ಅನುಸರಿಸುವ ಕಾಲದಲ್ಲಿ ಶರಣರು ವೈಜ್ಞಾನಿಕ ಮನೋಭಾವನೆಯಿಂದ ಚಿಂತಿಸಿ ಅವುಗಳಿಗೆ ಮುದ್ದು ಕಂಡುಹಿಡಿದು ಜನರಲ್ಲಿರುವ ಮೂಢನಂಬಿಕೆಗಳನ್ನು ದೂರಮಾಡಲು ಪ್ರಯತ್ನಿಸಿದರು.

ಅಕ್ಕಮಹಾದೇವಿಯವರು ತಮ್ಮ ವಚನದಲ್ಲಿ ಹೀಗೆ ಹೇಳುತ್ತಾರೆ.

ಆಹಾರವ ಕಿರಿದು ಮಾಡಿರಣ್ಣ ಆಹಾರವ ಕಿರಿದು ಮಾಡಿ
ಆಹಾರದಿಂದ ವ್ಯಾಧಿಹಬ್ಬಿ ಬಲಿವುದಯ್ಯ
ಆಹಾರದಿಂದ ನಿದ್ರೆ, ನಿದ್ರೆಯಿಂದ ತಾಮಸೆ, ಅಜ್ಞಾನ,
ಮೈಮರೆವು
ಅಜ್ಞಾನದಿಂದ ಕಾಮವಿಕಾರ ಹೆಚ್ಚಿ
ಕಾಯವಿಕಾರ, ಮನೋವಿಕಾರ, ಇಂದ್ರಿಯ ವಿಕಾರ
ಭಾವ ವಿಕಾರ, ವಾಯು ವಿಕಾರವನ್ನುಂಟು ಮಾಡಿ
ಸೃಷ್ಟಿಗೆ ಸಹುದಾದ ಕಾರಣ ಕಾಯದ ಅತೀ ಪೋಷಣೆ ಬೇಡ
ಅತೀ ಪೋಷಣೆ ಮೃತ್ಯುವೆಂದುದು
ಜಪ, ತಪ, ಧ್ಯಾನ, ಧಾರಣೆ ಪೂಜೆಗೆ ಸೂಕ್ಷದಿಂ
ತನು–ಮಾತ್ರವಿದ್ದರೆ ಸಾಲದೇ?
ತನುವ ಪೋಷಿಸುವ ಆಸೆಯ ತಿತ್ವಕ್ಕೆ
ವಿಘ್ನವೆಂದುದು
ತನು ಪೋಷಣೆಯಿಂದ ತಾಮಸ ಹೆಚ್ಚಿ
ಅಜ್ಞಾನದಿಂದ
ವಿರಕ್ತಿ ಹಾನಿ,
ಅರಿವು ನಷ್ಟ ಪರವು ದೂರ ನಿರಕೆ ನಿಲವಿಲ್ಲದ
ಕಾರಣ
ಚೆನ್ನಮಲ್ಲಿಕಾರ್ಜುನನೊಲಿಸ ಬಂದ ಕಾಯವ
ಕೆಡಿಸದೆ ಉಳಿಸಿಕೊಳ್ಳಿರಯ್ಯ.

ಈ ವಚನದಲ್ಲಿ ಅಕ್ಕಾಮಹಾದೇವಿ ದೇಹಾರೋಗ್ಯದ ಮಹತ್ವ ವಿವರಿಸಿದ್ದಾರೆ. ಈ ವಚನ ನಿಜವಾಗಿ ವೈದ್ಯರು ಬರೆದುಕೊಟ್ಟ ಔಷಧ ಚೀಟಿಯಂತಿದೆ. ಅಕ್ಕಾಮಹಾದೇವಿ ಹೇಳುವಂತೆ ಈ ದೇಹವನ್ನು ಕೆಡಿಸಬಾರದು, ಕೆಡಲು ಕಾರಣವೆಂದರೆ ದೇಹದ ಅತಿ ಪೋಷಣೆ. ಇದನ್ನು ತಡೆದರೆ ಹಲವಾರು ತೊಂದರೆಗಳನ್ನು ದೂರಿಡಬಹುದು. ಅತಿ ಆಹಾರದಿಂದ ರೋಗಗಳು ಹುಟ್ಟುತ್ತವೆ. ಆ ರೋಗಗಳು ಬಲಿತು ಎಲ್ಲಾ ಅಂಗಾಂಗಗಳಿಗೆ ಹರಡುವುವು. ಅದು ಹೇಗೆಂಬುದನ್ನು ವಿವರಿಸಿದ್ದಾಳೆ. ಅತಿ ಆಹಾರದಿಂದ ನಿದ್ರೆ ಅತಿ ನಿದ್ರೆಯಿಂದ ತಾಮಸ ಪ್ರವೃತ್ತಿ ಮೈಮರೆವು ಹೆಚ್ಚಿದಂತೆ ಜ್ಞಾನ ಕಡಿಮೆಯಾಗಿ ಹಲವಾರು ಕಾಯವಿಕಾರಗಳಿಗೆ ಕಾರಣವಾಗುವುದು ಬೊಜ್ಜು ಹೆಚ್ಚಾಗಿ ಸಂಧಿವಾತ ಕಾಣುವದು, ಹೃದಯ ಸೋತಂತೆ ಪುಪ್ಪಸಗಳ ಕಾರ್ಯ ಕಡಿಮೆಯಾಗಿ ಶ್ವಾಸಕೋಶದ ತೊಂದರೆ ಕಾಣುವದು, ರಕ್ತದೊತ್ತಡ ಹೆಚ್ಚಿ ಮೂತ್ರಪಿಂಡಗಳು ಸೋತು ಮಧುಮೇಹಕ್ಕೆ ದಾರಿಯಾಗುತ್ತದೆ. ಇಂದು ವೈದ್ಯರು ಸಹ ಸ್ಥೂಲಕಾದಿಂದ ಬರುವ ರೋಗಗಳಿಗೆ ಒಜಾಬಿಛಾಯಿ ಥಿಟಿ–ಜಡಿಡಿಜ ಎಂದು ಕರೆದಿದ್ದಾರೆ. ಇವೆಲ್ಲ ನಿಯಂತ್ರಿಸಬೇಕಾದರೆ ಆಹಾರದಲ್ಲಿ ಮಿತಿ ಇರಬೇಕು. ಇವೇ ಮಾತನ್ನು ಸರ್ವಜ್ಞನ ಒಂದು ವಚನದಲ್ಲಿ ಕಾಣಬಹುದು.

“ಒಂದ್ಹೊತ್ತು ಉಂಡವನು ಯೋಗಿ
ಎರಡೊತ್ತು ಉಂಡವನು ಭೋಗಿ
ಮೂರೊತ್ತು ಉಂಡವನು ರೋಗಿ
ನಾಲ್ಕೊತ್ತು ಉಂಡವನ ಹೊತ್ಕೋಡು ಹೋಗಿ”.

ಅತಿ ಆಹಾರ ಸೇವನೆಯಿಂದ ಮನೋವಿಕಾರ ಬರುವುದು, ಇಂದ್ರೀಯಗಳು ನಿಯಂತ್ರಣ ತಪ್ಪುತ್ತವೆ. ಇಂದ್ರೀಯ ವಿಕಾರಗಳಲ್ಲಿ ಸಿಕ್ಕು ವ್ಯಕ್ತಿ ಯಾರಿಗೂ ಬೇಡದವನಾಗಿ ಹಾಳಾಗುವನು. ದೇಹದಲ್ಲಿ ವಾತ ಸೇರಿ ರೋಗಗಳಿಗೆ ಕಾರಣವಾಗುತ್ತದೆ. ಹಾಗಾಗಿ ಸಕಾಲದಲ್ಲಿ ಎಚ್ಚೆತ್ತುಕೊಂಡು ಆಹಾರವನ್ನು ಪ್ರಸಾದವೆಂದು ಸ್ವೀಕರಿಸಬೇಕು. ಸಿಗ್ಮಂಟ್ ಫ್ರಾಯ್ಡ್‌ರವರು ಹೇಳುವಂತೆ, “ನಮ್ಮೊಳಗಿನ ಆತಂಕ ನಾವು ಸೇವಿಸುವ ಆಹಾರದ ಮೇಲೆ ಪ್ರಭಾವ ಬೀರುತ್ತದೆ”. ಅಕ್ಕಾಮಹಾದೇವಿಯು ಜಪ, ತಪ, ಧ್ಯಾನ, ಧಾರಣೆಗಳಿಂದ ಸೂಕ್ಷ್ಮ ಶರೀರ ಹೊಂದಬೇಕು. ಚೆನ್ನಮಲ್ಲಿಕಾರ್ಜುನನ ಒಲಿಸಬಂದ ಈ ದೇಹವನ್ನು ಅತಿ ಪೋಷಣೆಯಿಂದ ಕೆಡಿಸದೆ ಅದನ್ನು ಚೆನ್ನಾಗಿ ಇಟ್ಟುಕೊಳ್ಳಬೇಕು.

“ಉದಯದ ಮಾಗಿಯ ಬಿಸಿಲು ಅಂಗಕ್ಕೆ ಹಿತವಾಯಿತ್ತು
ಮಧ್ಯಾಹ್ನದ ಬಿಸಿಲು ಅಂಗಕ್ಕೆ ಕಡುಕಠಿಣವಾಯಿತ್ತು”.

ಇದು ಅಕ್ಕಾಮಹಾದೇವಿ ವಚನದ ಒಂದು ತುಣುಕು ಇದರಲ್ಲಿ ಎರಡು ಪ್ರಕಾರದ ಬಿಸಿಲುಗಳನ್ನು ತಿಳಿಸುತ್ತಾಳೆ. ಮುಂಜಾನೆ ಬಿಸಿಲು ಒಂದು ಪ್ರಕಾರ ಅದನ್ನು ನಾವು ಎಳೆಬಿಸಿಲು ಎನ್ನುತ್ತೇವೆ. ಇದರಲ್ಲಿ ಕಡಿವೆ ಶಾಖ ಇದ್ದು ನಮಗೆ ಬೇಕಾದ ಪ್ರಮಾಣ ಅಲ್ಟ್ರಾವಯೋಲೆಟ್ ಕಿರಣಗಳು ಇರುತ್ತವೆ. ಈ ಕಿರಣಗಳು ತ್ವಚೆಯ ಮೇಲೆ ಪ್ರಭಾವ ಬೀರಿ ದೇಹದಲ್ಲಿ ವಿಟಮಿನ್ ‘ಡಿ’ ತಯಾರಾಗುವಂತೆ ಮಾಡುತ್ತವೆ. ಇದರಿಂದ ಕೂಸುಗಳ ಎಲುಬು ಸರಿಯಾಗಿ ಬೆಳೆಯುತ್ತವೆ. ವಿಟಮಿನ್ ‘ಡಿ’ ಕೊರತೆ ಮಕ್ಕಳಲ್ಲಿ ಕಾಣುವುದು ಇದನ್ನು ರಿಕೆಟ್ಸ್ ರೋಗವೆಂದು ಕರೆಯುತ್ತೇವೆ. ಇದರ ಲಕ್ಷಣಗಳೆಂದರೆ ತಲೆ ಬುರುಡೆ ದೊಡ್ಡದಾಗಿರುವುದು, ಎದೆಗೂಡು ಸರಿಯಾಗಿ ಬೆಳಯಲಾರದು, ಉದರಗೂಡು ದೊಡ್ಡದಾಗುವುದು, ಕಾಲುಗಳು ಸೊಟ್ಟಗಾವುವು. ಇವೆಲ್ಲಾ ವಿಟಮಿನ್ ‘ಡಿ’ ಕೊರೆತೆಯ ಲಕ್ಷಣಗಳು. ಎಳೆ ಬಿಸಿಲಲ್ಲಿ ಕೂಸು ಆಡಿದರೆ ಚೆನ್ನಾಗಿ ಬೆಳಯುವುದು ಇಂದಿನ ಜನರಿಗೆ ಗೊತ್ತು. ಇದು 12ನೇ ಶತಮಾನದ ಜನರಿಗೂ ತಿಳಿದಿತ್ತು. ವಿಟಮಿನ್ ‘ಡಿ’ ಹೆಸರು ಗೊತ್ತಿರಲಿಕ್ಕಿಲ್ಲ. ಆದರೆ ಮುಂಜಾನೆ ಮಾಗಿ ಬಿಸಿಲಿನಿಂದ ಮಕ್ಕಳಿಗೆ ಹಿತ ಎಂಬ ಸಂಗತಿ ತಿಳಿದಿತ್ತು. ಹಾಗೆಯೇ ಮಧ್ಯಾಹ್ನದ ಬಿಸಿಲು ಕಠಿಣವಾಯಿತು. ಶಾಖವುಳ್ಳ ತನ್ನ ಪ್ರಭಾವದಲ್ಲಿ ಬಂದ ಪ್ರತಿ ವಸ್ತುವನ್ನು ಸುಡುವಂತೆ ಮಾಡುವುದು ಕಠಿನ ಬಿಸಿಲು ಜೀವಿಗಳ ಚರ್ಮ ಘನಗೊಳಿಸುತ್ತದೆ. ತ್ವಚೆಯ

ಜೀವಕಣಗಳ ಮೇಲೆ ತನ್ನ ಪ್ರಭಾವ ಬೀರಿ ಈ ಜೀವಕಣಗಳು ಕ್ಯಾನ್ಸರ್ ಕೋಶಗಳನ್ನು ಪರಿವರ್ತಿಸುವವು. ಹೀಗೆ ಹಲವಾರು ತೊಂದರೆಗಳು ಕಠಿಣ ಬಿಸಿಲಿನಿಂದ ಬರುವಂತಾಗುತ್ತವೆ.

ಚೆನ್ನಬಸವಣ್ಣನರು: ಚೆನ್ನಬಸವಣ್ಣನವರು **"ಕರಣ ಹಸಿಗೆ"** ಕೃತಿ ವೈದ್ಯಕೀಯ ಕ್ಷೇತ್ರದಲ್ಲಿಯೇ ಅಮೂಲ್ಯ ಗ್ರಂಥವಾಗಿದೆ. 21ನೇ ಶತಮಾನದಲ್ಲಿ ಸಂಶೋಧಿಸ ಲಾಗುತ್ತಿರುವ ಅನೇಕ ಮಾಹಿತಿಗಳು ಲಭ್ಯವಾಗುತ್ತಿರುವು ದನ್ನು ವೈದ್ಯ ಜಗತ್ತು ಆಶ್ಚರ್ಯದಿಂದ ಈ ಕೃತಿ ಅಧ್ಯಯನ ಮಾಡುತ್ತಿದೆ.

ಅನೇಕ ವೈದ್ಯಕೀಯ ಮಹಾವಿದಾಲಯಗಳಲ್ಲಿ ಈ ಕೃತಿಯ ಕುರಿತು ಸಂಶೋಧನೆಗಳು ನಡೆಯುತ್ತಿರುವದನ್ನು ಗಮನಿಸಿದರೆ ನಮಗೆಲ್ಲ ಚೆನ್ನಬಸವಣ್ಣನವರ ವೈದ್ಯಕೀಯ ವಿಜ್ಞಾನದ ಆಳ ಪರಿಚಯವಾಗು ತ್ತದೆ. 12ನೇ ಶತಮಾದಲ್ಲಿಯೇ ಚೆನ್ನಬಸವಣ್ಣನವರು ರಕ್ತದ ನಾಲ್ಕು ಗುಂಪಿನ ಬಗ್ಗೆ ರಕ್ತ ಪರಿಚಲನೆಯ ಬಗ್ಗೆ ಮಾನವ ದೇಹದಲ್ಲಿರುವ ಮೂಳೆಯ ಬಗ್ಗೆ ವಿಸ್ತಾರವಾಗಿ ತಿಳಿಸಿದ್ದಾರೆ.

ಮನುಷ್ಯರು ತಮ್ಮ ಅಂಗುಲದಲ್ಲಿ 96 ಅಂಗುಲ ಪ್ರಮಾಣ
ಎಂಟು ಗೇಣು ಉದ್ದ, ನಾಲ್ಕು ಗೇಣು ಅಗಲ
ಮೂರು ಕೋಟಿ ರೋಮ ದ್ವಾರಗಳು
ಮೂವತ್ತೆರಡು ಮೊಳ ಹಿರಿ ಕರಳುಗಳು
ತೊಂಬತ್ತೆರಡು ಸಂದುಗಳು
ಎಪ್ಪತ್ತು ಹಿರಿಯ ಎಲುಬುಗಳು
ಎಂಭತ್ತೊಂದು ಫಲಫಾಳಗಿ
ನಾಲ್ಕು ಫಲುರುದಿರ
ಮುನ್ನೂರರವತ್ತ ಫಲಮಾಂಸ
ಪಡಿಪತ್ಯ, ಪಾವು ಶ್ಲೇಷ್ಮ, ಪಾವು ಶುಕ್ಲ
ಇವು ಇಷ್ಟರಿಂದ ಕೂಡಿದ್ದು ಈ ಶರೀರ.
ಈ ಎಲ್ಲವೂ ಜಡ ಇವಕ್ಕಿನ್ನು ಜೀವನು ಸಾಕ್ಷಿಯಾಗಿದ್ದು
ಕಾರಣ.
ಕೊರತೆ ಹುಟ್ಟಿ ಮನುಷ್ಯ ಆಕಾರವಾಯಿತು.....

ಈ ವಚನದಲ್ಲಿ ಚನ್ನಬಸವಣ್ಣನವರು ಮಾನವ ಶರೀರ ರಚನೆ (Human Physiology & Anatomy) ಬಗ್ಗೆ ತಿಳಿಸಿ ವಿವರವಾಗಿ ತಿಳಿಸಿದ ಜಗತ್ತಿನ ಮೊದಲ ವೈದ್ಯರಾಗಿದ್ದಾರೆ. ಆದರೆ ಬೆಲ್ಜಿಯಂನ ಆಂಡ್ರಿಯಸ್ ವೆಸಾಲಿಯಸ್ ಕ್ರಿ.ಶ. 1543 ರಲ್ಲಿ ಬರೆದ **"ಮಾನವ ದೇಹದ ರಚನೆ"** ಜಗತ್ತಿನ ಮೊದಲ ವೈದ್ಯ ಕೃತಿಯಾಗಿದೆ. ಈ ವಚನದಲ್ಲಿ ತಿಳಿಸಿರುವಂತೆ ಪ್ರತಿಯೊಬ್ಬರ ಎತ್ತರವು ತಮ್ಮ ಎಂಟು ಗೇಣು ಇರುತ್ತದೆ, ನಾಲ್ಕು ಗೇಣು ಎದೆಯ ಸುತ್ತಳತೆ, ಮಾನವ ದೇಹದ ಒಟ್ಟು ರೋಮ (ಕೂದಲು) ಗಳು ಮೂರು ಕೋಟಿ ರೋಮದ್ವಾರಗಳಿರುವುದಾಗಿ ತಿಳಿಸಿರುವ ಅವರ ಸೂಕ್ಷ್ಮದೃಷ್ಟಿ ವ್ಯಕ್ತವಾಗುತ್ತದೆ. ದೇಹದಲ್ಲಿ ಮೂವತ್ತೆರಡು ಮೊಳ ಹಿರಿಯ ಕರಳುಗಳಿರುವುದಾಗಿ ತಿಳಿಸಿದ್ದಾರೆ.

ಆಧುನಿಕ ವೈದ್ಯರ ಪ್ರಕಾರ 600 ಸೆ.ಮೀ. ಉದ್ದ ಸಣ್ಣ ಕರುಳು ಮತ್ತು 170 ಸೆ.ಮೀ. ದೊಡ್ಡ ಕರುಳಿರುವುದು ಹೇಳುತ್ತಾರೆ. ಮಾನವ ಶರೀರದಲ್ಲಿ ಎಪ್ಪತ್ತು ಹಿರಿಯ ಎಲುಬುಗಳಿರುವ, ವಿಷಯ ತಿಳಿಸಿದ್ದಾರೆ.

ಆಧುನಿಕ ವೈದ್ಯ ವಿಜ್ಞಾನದ ಪ್ರಕಾರ ಮಾನವನ ಅಸ್ಥಿಪಂಜರದಲ್ಲಿ ಒಟ್ಟು 206 ಮೂಳೆಗಳಿವೆ ಮತ್ತು ಎಂಬತ್ತೊಂದು ರಕ್ತನಾಳಗಳಿರುವು ದನ್ನು ತಿಳಿಸಿದ್ದಾರೆ. 15–16ನೇ ಶತಮಾನದಲ್ಲಿ ಇಂಗ್ಲೇಂಡಿನ ಸರ್. ವಿಲಿಯಂ ಹಾರ್ವೆರವರನ್ನು ರಕ್ತ ಪರಿಚಲನೆ ಪ್ರತಿಪಾದಕರೆ ಂದು ನಂಬಲಾಗಿದೆ. ಆದರೆ ಚನ್ನಬಸವಣ್ಣನವರ ಮಾತು ಇವರಿಗಿ ಂತ ಮುಂಚಿನದು. ಹಾಗೆಯೇ ರಕ್ತದ (ಫಲಾರುದಿರು) ನಾಲ್ಕು ಗುಂಪಿನ ಬಗ್ಗೆ ಅಂದೇ ವಿವರಿಸಿದ್ದಾರೆ. 1901 ರಲ್ಲಿ ಆಸ್ಟ್ರೀಯಾದ ಕಾರ್ಲ್‌ಲ್ಯಾಂಡ್ ಸ್ಟೀನರ್ ಈ ವಿಚಾರ ತಿಳಿಸಿದ್ದಕ್ಕಾಗಿ 1930 ರಲ್ಲಿ ನೋಬಲ್ ಪಾರಿತೋಷಕ ಗಳಿಸಿದರು. ಚೆನ್ನಬಸವಣ್ಣನವರ ವೈದ್ಯಕೀಯ ಜ್ಞಾನ ಅಮೋಘವಾಗಿತ್ತೆಂದು ಸ್ಪಷ್ಟವಾಗುತ್ತದೆ.

ಕಾಡ ಸಿದ್ದೇಶ್ವರರು: 1838ರಲ್ಲಿ ಜರ್ಮನಿಯ ಮಥಿಯಾಸ್ ಸ್ಲೀಡನ್ ಮತ್ತು ಫಿಯೋಡರ್ ಇವರು ನಾಯಿಯ ಅಂಡಾಂಶವನ್ನು ಮೊದಲ ಬಾರಿಗೆ ಶಸ್ತ್ರಚಿಕಿತ್ಸೆ ಮೂಲಕ ಪರೀಕ್ಷಿಸಿ ಮನುಷ್ಯ ಅಂಡಾಂಶ ಇದರಂತೆ ಇರುವುದಾಗಿ ತಿಳಿಸಿದರು. ಅಲ್ಲಿಯವರೆಗೆ ದೇಹದೊಳಗಿನ ಅಂಡಾಂಶ ಬೆಳವಣಿಗೆ ಬಗ್ಗೆ ಜಗತ್ತಿಗೆ ಯಾವ ವಿಚಾರವೂ ಗೊತ್ತಿರಲಿಲ್ಲ. ಆದರೆ 1723 ರಲ್ಲಿ ಜೀವಿಸಿದ್ದ ವಚನಕಾರ ಕಾಡಸಿದ್ದೇಶ್ವರರು ತಮ್ಮ ವಚನದಲ್ಲಿ ಗರ್ಭಾಶಯ ಮಗುವಿನ ಬೆಳವಣಿಗೆ ಬಗ್ಗೆ ತಿಳಿಸಿದ್ದಾರೆ.

ಒಂದು ಮಾಸಕ್ಕೆ ಮಾಂಸಗೊಂಡ
ಎರಡು ತಿಂಗಳಿಗೆ ಪಿಂಟಗಟ್ಟಿ ಬಯಕೆ ತೋರಿ
ಮೂರು ತಿಂಗಳಿಗೆ ಅಂಕಗಟ್ಟಿ ಹೇಸಿಗೆ ಹುಟ್ಟಿ
ನಾಲ್ಕು ತಿಂಗಳಿಗೆ ಅಂಗರೂಪು ಹುಟ್ಟಿ
ಐದು ತಿಂಗಳಿಗೆ ಅವಯವಗಳು ಹುಟ್ಟಿ
ಆರು ತಿಂಗಳಿಗೆ ಅವಯವಗಳು ಬಲಿದು
ಏಳು ತಿಂಗಳಿಗೆ ರೋಮ ಹುಟ್ಟಿ
ಇಂತಿ ಪರಿಯಲ್ಲಿ ಶಿವಕೃಪೆಯಿಂದ ಪಿಂಡವರ್ಧನ
ವಾಗಲು
ಇಂತಿಪ್ಪ ಪಿಂಡದಲ್ಲಿ ಶಿವೇಚ್ಛೆಯಿಂದ
ಆತ್ಮನು ಪ್ರವೇಶವಾದಾಕ್ಷಣ ಗರ್ಭದಲಲಿ ಶಿಶುವು
ಉಲುಕುವುಲು

ಈ ರೀತಿಯಾಗಿ ಆಧುನಿಕ ವೈದ್ಯರು ಸ್ಕ್ಯಾನಿಂಗ್ ಯಂತ್ರದ ಮೂಲಕ ಗರ್ಭದಲ್ಲಿರುವ ಮಗುವಿನ ಬೆಳವಣಿಗೆ ಬಗ್ಗೆ ತಿಳಿಯುವುದನ್ನೇ 17ನೇ ಶತಮಾನದ ವಚನಕಾರರಾದ ಕಾಡಸಿದ್ದೇಶ್ವರರು ವಿವರವಾಗಿ ವಿವರಿಸಿರುವುದನ್ನು ನೋಡಿದರೆ ಅವರ ವೈದ್ಯಕೀಯ ಜ್ಞಾನದ ಬಗ್ಗೆ ನಾವು ಸರಿಯಾಗಿ ಅರ್ಥೈಸಿಕೊಂಡಿಲ್ಲ ಎಂಬುದು ಸ್ಪಷ್ಟವಾಗುತ್ತದೆ.

ಅಲ್ಲಮಪ್ರಭುಗಳು: ಅಪ್ರತಿಮ ಅನುಭಾವಿ ಅಲ್ಲಮಪ್ರಭುಗಳು ಹೊಂದಿದ ವೈದ್ಯಕೀಯ ಜ್ಞಾನ ಅಪಾರ ಗರ್ಭಿಣಿ ಸ್ತ್ರೀಯ ಸ್ಥಿತಿಗತಿಗಳ ಬಗ್ಗೆ ತಜ್ಞ ವೈದ್ಯರ ನಿಲುವನ್ನೆ ಅಲ್ಲಮಪ್ರಭುಗಳು ತಾಳಿದ್ದಾರೆ. ಇವಕ್ಕೆಲ್ಲ ಸಾಕ್ಷಿ ಈ ವಚನ

**"ಗರ್ಭಿಣಿ ಸ್ತ್ರೀಗೆ ಉಣಲಿಕ್ಕಿದಡೆ ಆ ಗರ್ಭದೊಳಗಣ
ಶಿಶುವು ತೃಪ್ತವಹುದಲ್ಲದೆ
ಆ ಸ್ತ್ರೀಯ ಗರ್ಭದ ಮೇಲೆ ಸಲಿಲ ಪದಾರ್ಥಗಳಉಕ್ಕಿದಡೆ
ಆ ಗರ್ಭದೊಳಗಣ ಶಿಶುತೃಪ್ತನಾಗಬಲ್ಲುದೇ?"**

ಎಂಬ ಮಾತು ತಾಯಿ–ಮಗುವಿನ ಸಂಬಂಧ ತಿಳಿಸುತ್ತದೆ. ಶಿಶು ತೃಪ್ತನಾಗಲು ತಾಯಿ ಉಣಬೇಕೇ ಹೊರತು ಗರ್ಭದ ಮೇಲಿಟ್ಟರೆ ಶಿಶು ತೃಪ್ತವಾಗುವುದಿಲ್ಲ. ತಮ್ಮ ಮತ್ತೊಂದು ವಚನದಲ್ಲಿ **"ಬಸಿದೊಳಗಿನ ಕೂಸಿಂಗೆ"** ಬೇರೆ ಊಟ, ಬೇರೆ ಮೀಹ(ಜ್ಞಾನ) ಉಂಟೆ? ಎಂದು ಪ್ರಶ್ನಿಸುತ್ತಾ ತಾಯಿಯ ಸುಖ–ದುಃಖಗಳಲ್ಲಿ ಮಗುವಿಗು ಅನ್ವಯಿಸುತ್ತದೆಂಬುದು ಆಧುನಿಕ ವಿಜ್ಞಾನ ಸಂಶೋಧಿಸಿದ ಸತ್ಯವನ್ನೇ ಅಲ್ಲಮಪ್ರಭು ಅಂದೇ ತಮ್ಮ ವಚನದಲ್ಲಿ ಹೇಳಿದ್ದಾರೆ.

ಮಡಿವಾಳ ಮಾಚಿದೇವರ 370 ರೋಗಳ ಬಗ್ಗೆ ತಿಳಿದಿರುವ ಕುರಿತು ತಮ್ಮ ವಚನದಲ್ಲಿ ತಿಳಿಸುತ್ತ ಈ ರೋಗಗಳು ವಾಸಿಯಾಗ ಬೇಕಾದರೆ ಮದ್ದಿನ ಜೊತೆಗೆ ಮಾನಸಿಕ ದೃಢತೆಯು ಅವಶ್ಯಕವಾಗಿ ದೆ ಎಂದು ತಿಳಿಸಿದ್ದಾರೆ.

ತದ್ದು, ತುರಿ, ಬಾವು, ಬಗದಳ, ಶೀತ, ವಾತ, ಬಹುಜರ
ಹೊಟ್ಟೆಬೇನೆ, ಕೆಟ್ಟಹುಣ್ಣು, ಮೈಕುಷ್ಟ ಮೊದಲಾದ
ಮುನ್ನೂರ ಅರವತ್ತು ವ್ಯಾದಿಗಳ ಶಿವನು ಹರಿಯ ಬಿಟ್ಟು
ನೋಡುವ
ಇದೆಲ್ಲ ಶಿವನ ಕರುಣವಾದಲ್ಲದೆ ಹೋಗವು.

ಎಂಬ ಮಾತಿನಿಂದ ವಿವಿಧ ರೋಗಗಳ ಪರಿಚಯ ಮತ್ತು ಅವುಗಳ ಔಷಧೋಪಚಾರಗಳ ಜ್ಞಾನವಿತ್ತೆಂದು ಈ ವಚನದಿಂದ ಸ್ಪಷ್ಟವಾಗುತ್ತದೆ.

ಒಟ್ಟಾರೆ 12ನೇ ಶತಮಾನದ ಶರಣ–ಶರಣೆಯರು ಆಧ್ಯಾತ್ಮ ಜ್ಞಾನದೊಂದಿಗೆ ವೈದ್ಯಕೀಯ ಜ್ಞಾನವನ್ನು ಹೊಂದಿರುವುದು ಅವರ ವಚನಗಳಿಂದ ವ್ಯಕ್ತವಾಗುತ್ತದೆ. ನಾವೆಲ್ಲಾ ಅವರ ವಚನಗಳನ್ನು ಕೇವಲ ಆಧ್ಯಾತ್ಮ ದೃಷ್ಟಿಕೋನದಿಂದ ನೋಡದೆ ವೈಜ್ಞಾನಿಕ ದೃಷ್ಟಿಕೋನದಿಂದ ನೋಡಿದಾಗ ನಮಗೆ ಅವರ ನಿಜವಾದ ಜ್ಞಾನದ ಪರಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ. ಈ ನಿಟ್ಟಿನಲ್ಲಿ ಪ್ರಯತ್ನಗಳು ಸಾಗಲಿ ಎಂದು ಆಶಿಸುವೆ.

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4) ಶೂನ್ಯ ಸಂಪಾದನೆ

SEECH OUTCOME FOLLOWING PALATOPLASTY IN TELUGU SPEAKERS WITH CLEFT PALATE

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Background and need: Clefts of the lip and palate are among the most common of all birth defects as the incidence is 1 per 700 live births. They exhibit speech abnormalities characterized by any combination of hypernasality, nasal air emission, weak consonants, short utterance length, and compensatory articulation productions. The primary step of rehabilitation is surgical closure of the cleft. Surgical closure will aid in reduction of nasal regurgitation by separating the oral from the nasal cavity and helps in balancing the oronasal coupling. The important aspects for successful rehabilitation of the individuals with cleft lip and palate is undergoing post surgical speech therapy, however the same was not made essential. Hence the present study highlights on the efficacy of surgical correction of cleft palate for improving speech in individuals with cleft lip and palate.

Aim of the study: The aim of the present study is to compare the perception of hypernasality, presence of articulation errors and speech intelligibility between pre and post surgical (palatoplasty) correction of cleft lip and palate.

Method: The present study included four individuals age ranging from 5 to 12 years with nonsyndromic cleft palate (with or without cleft lip). All the subjects underwent palatoplasty for closure of the cleft palate. The pre and postoperative video recordings of spontaneous speech and repetition of words embedded with pressure consonants were used for the perceptual evaluation. Three qualified speech language pathologists perceptually rated for hypernasality, type of articulatory errors, and speech intelligibility on standardized four point rating scale developed by Henningsson (2007).

Results: The results indicated that, there was a reduction in hypernasality, articulatory errors, and improved speech intelligibility. However, the above findings were not consistent across the subjects.

Conclusion: The surgical correction of the cleft palate resulted in better speech intelligibility scores during post surgical recording than pre surgical condition. However, the perception of hypernasality and consistent articulatory errors were evident which may be reduced with speech therapy.

Introduction: Cleft lip (CL) and cleft palate (CP) are among the most common congenital deformities in children , resulting in hypoplasia and distorted development of all tissues of the lip and palate. The general incidence of cleft palate with or without cleft lip is 1 per 700 live births. CL occurs more commonly seen in males than females (2:1), whereas CP is more commonly seen in females than in males (2:1) **(**Friedman,Wang and Milczuk., 2005).

The cleft of soft palate lead to escape of air through the nose instead of the mouth. As result, individual with this condition have hypernasality, misarticulation leading to unintelligible speech. Primary speech characteristics of individuals with CLP include: hypernasal resonance , decreased intraoral pressures that cause weak pressure consonants, and audible nasal emissions during speech. The principal goal of cleft palate surgery is to provide adequate velopharyngeal function for typical speech development. There are several surgical methods developed to correct the palatal cleft. Although the optimal intervention technique for the treatment of cleft-palate repair remains controversial, a large variety of studies have suggested that superior speech results may be obtained with the palatoplasty .

Many studies have aimed to document the efficacy of the surgery on speech. Chapman et. al., (2003) reported, speech improvement in children with cleft palate after post surgical intervention. The study included thirty, 2- year old infants. Participants were divided into two categories: 15 infants had a cleft lip+/- palate; the remaining 15 were non cleft palate. Participants were observed, video recorded and audio recorded in their houses pre and post surgery during play and communication with their primary caregiver. The results reveal a positive relationship between percentages of true stops produced pre and post surgically. An increase of emerging consonants, size of true consonant inventory, production of true stops, and lexical development during post surgery was observed.

A study by Kirshner, et al. (2010) assessment regarding optimal surgical intervention which included a sample size of 390 children with cleft lip and palate who had undergone palatoplasty. Results indicated that, 93.4% of individuals had mild or no hypernasality 88.4% of individuals had no or inaudible nasal escape and 97.2% no articulation errors associated with velopharyngeal incompetence. The above studies concluded that, individual who had undergone the palatoplasty yielded better speech outcomes. In contrast, Pamplona, Ysunza, and Guerrero (1996) reported individuals with post surgical palatal closure exhibiting articulation errors due to velopharyngeal dysfunction. During speech production the velopharyngeal sphincter must close off the nose to properly articulate consonants such as /p/, /b/, /g/, /t/, and/d/. However, due to velopharyngeal dysfunction speech sounds will be hypernasal resulting in reduced speech intelligibility.

The literature provides spectrum of speech and language errors exhibited by individuals with CLP after palatoplasty. There speech errors can be result of velopharyngeal dysfunction or developmental mislearning of the articulatory placements. Studies have also suggested postsurgical management is effective in treating speech and language among children with repaired cleft palates. In these context, the present study investigate the efficiency of surgical correction of cleft palate speech outcome in terms of hypernasality, speech intelligibility and type of articulation errors in Telugu speaking children with cleft palate

Aim of the study: The aim of the present study is to compare the hypernasality, presence of articulation errors and speech intelligibility across pre and post surgical (palatoplasty) correction of cleft palate.

Method

Participants: Four children with nonsyndromic cleft palate were participated in the study. The children age ranged from 5 to 12 years (mean age of 8years 8 months) and included 2 boys and 2 girls. All children were native speakers of Telugu. Three of them had unilateral complete cleft lip and palate (with repaired cleft lip) and remaining one child had isolated soft palate cleft. The children did not had any associated congenital anomalies, sensorineural hearing impairment, cognitive deficits, or neurological involvement. All the subjects underwent palatoplasty for closure of the cleft palate and not attended speech therapy.

Procedure: All participants underwent speech assessment preoperatively, and one month postoperatively. The speech sample of each participant was video recorded. The speech sample consists of the repetition of words embedded with pressure consonants from Telugu test of articulation profile (TTAP) and spontaneous speech. The production of pressure consonants requires intraoral pressure for production and were therefore particularly sensitive to the effects of velopharyngeal insufficiency.

Analysis: The words embedded with pressure consonants were analyzed for place and manner of articulatory errors in terms of substitutions, omissions, distortions and additions of pressure consonants. The resonance (hypernasality) and speech intelligibility were analyzed using a standard 4 point rating scale(0= normal; 1= mild; 2 = moderate; and 3 = severe) developed by Henningsson (2008) as shown in table 1 and 2. The spontaneous speech samples recorded during pre and post operation were blind folded and rated by three graduate SLP's. Mean of perceptual rating of hypernasality and speech intelligibility was considered. Descriptive statistics was used to explain the results of the present study as the number of subjects included were only four.

Table 1
Severity rating and corresponding descriptors for Hypernasality parameter

Severity Rating	Descriptors
0= WNL	Nasality does not exceed nasality heard in regional speech There is no perceptual evidence of cleft type speech
1= Mild	Nasality exceeds regional speech nasality There is increased nasality heard on high vowels primarily
2- Moderate	Hypernasality is perceived and draws attention to itself and away from the massage There is increased hypernasality heard on high and low vowels
3- Severe	Hypernasality is perceived as pervasive and interferes with speech understand ability There is an increased nasality heard on vowels and some voiced consonants
X =Missing data	

Table 2
Severity Rating and corresponding Descriptors for speech understandability

Severity rating	Descriptor
0= WNL	Speech is always easy to understand
1= Mild	Speech is occasionally hard to under stand
2= Moderate	Speech is often hard to understand
3= severe	Speech is hard to understand most of the time
X= Missing data	

Results

Perception of hypernasality across condition: All the subjects exhibited mild to severe perception of hypernasality on four point standardized rating scale before surgical correction of cleft. There was significant reduction in the perception of hypernasality from pre to post surgical speech evaluation as shown in Figure 1. The hypernasality deceased from moderate to mild hypernasality in two individuals and moderately severe to moderate hypernasality in the remaining two individuals. The reduction in hypernasality can be attributed to surgical closure of abnormal opening between the nose and mouth led to reduction in air escape through the nose while speaking which in turn helped the individuals. The results support the findings of Sie, Tampakopoulou, Sorom, Gruss, and Eblen (2001) who reported 70.8% of 48 individual with cleft lip and palate demonstrated no or mild hypernasality after palatoplasty and Perkins, Lewis, Gruss, Eblen, and Sie (2005) reported that, 66.9% of 148 demonstrated no or mild hypernasality after palatoplasty. Some of the studies reported there was complete reduction in hypernasality after the palatal surgery. Recent study by Elassy, Elrashedy, Behairy, Elazez, Sawy and Ayman (2007) compared hypernasality in speech during pre and post operative palatoplasty in 24 individuals with cleft lip and palate of 11 males and 13 females in age range of 3 to 13 years. There results indicated that, 66.7 % of individuals were free of any degree of hypernasality.

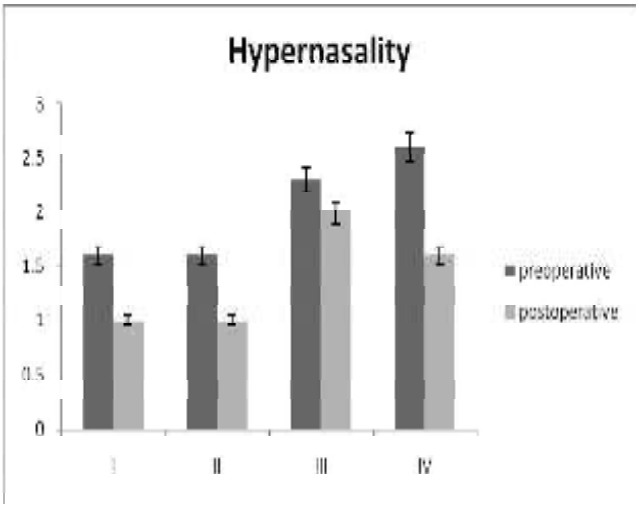

Figure 1: speech outcome- pre and post hypernasality scores

Comparing the presence of articulatory errors between pre and post surgical correction of cleft palate: As a result of cleft all the subjects were exhibiting misarticulations in speech production. Incresed articlatory errors were present on alveolars which was 40% followed by dentals (25%), palatal(15%), velars and bilabials (10%) preoperative speech evaluation. There was a decrese in the articulatory errors followed by surgical cloure of cleft palate and simlar pattern of place errors were exhibited as 30% alveolars, 20% dentals, 10% palatal, 7% velars and 5% bilabials . Production of alveolar require the contact between tongue and alvelar ridge leading to articulatory closure for building the air pressure to produce speech. however, the subjects were having palatal clefts from alveolar ridge and extendig to the posterior palate. The reduction in articulatory errors were noticed after the sugical correction of cleft as shown in Figure 2. The results are in accordance with the study by Jyotsna, Sunitha and Hussain (2009), who reported decrease in the articulatory errors when they compared the preoperative and postoperative palatal surgery in all the 192 Tamil speaking patients of age 10 years. However, the research study by Perkins, Lewis, Gruss, Eblen, and Sie (2005) reported after palatoplasty 83.1 % of 148 patients' demonstrated complete recovery in articulation contradictory to the findings of the present study. The reduction or complete recovery from articulatory errors depends on variables related to type of articulatory errors, extent of cleft, age, and type of surgical correction of the cleft. In the present study the mean age of surgical correction is 8 year 8months, where in the study by Elassy, et al., (2007) surgical correction was performed at the age of 6.5 years and results indicated that, 83.4 %of patients had no aberrant ar-

ticulation related to velopharyngeal incompetence . The less number of articulatory errors were reported to be velars in the present study as the subjects were exhibiting the palatal cleft extended from alveolar region to hard palate and soft palate is barely involved exhibiting improved velopharyngeal closure. Similar results were reported by Spauwen, Brouwe, and Schutte (1992) who conducted a study on 10 subjects with cleft lip and palate mean age 3 year 5 months results indicated that 83% of subjects exhibited no aberrant articulation errors related to velopharyngeal incompetence after the palatoplasty. The majority of errors were substitutions and omissions of stop consonants and fricative sounds due to difficulty in building up of intraoral air pressure for production of these consonants because of velopharyngeal dysfunction or developmental mislearning of the articulatory placements.

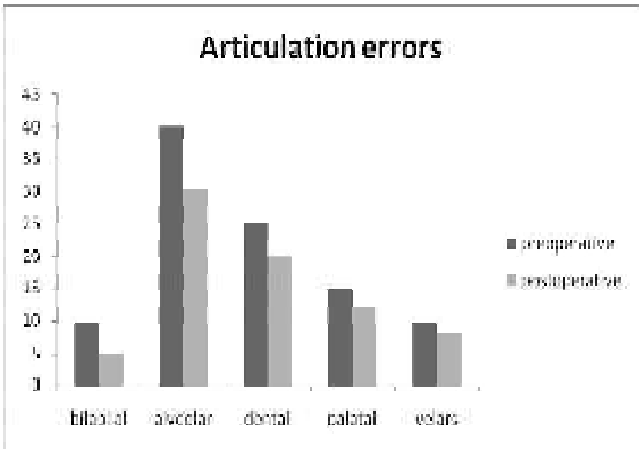

Figure 2: Speech outcome—pre and post operative articulation errors in different place of articulation

Comparing speech understandability across condition: The speech was often hard to understand for two subjects and hard for another two subjects due to the presence of the air escape through the nasal cavity along with articulatory errors as a result of cleft palate. After the surgical correction of the cleft palate significant reduction in the difficulty in understanding speech as shown in Figute 3. The increase in speech intelligibility can be attributed to significant improvement in the articulation and resonance postoperatively. Sie, Tampak opoulou, Sorom, Gruss, and Eblen, LE. (2001), reported 56.6% of the 48 individuals demonstrated improvement in intelligibility after the palatoplasty. Another study by Yu , Chen, and Chen (2001) had documented a complete improvement in 98 % of subjects after the palatal repair in speech intelligibility out of 46 subjects with cleft palate. Similarly, Deren, et al., (2005) also demonstrated 85 % of 27 patients shown improvement in speech intelligibility after palatoplasty. In addition to that Jyotsna, Sunitha, and Hussain (2009), analyzed post operative speech outcomes of primary palatal repair in 131 individuals with cleft lip and palate at the age of 10 years. They reported significant improvement in speech intelligibility across all the patients in accordance with the results of the present study.

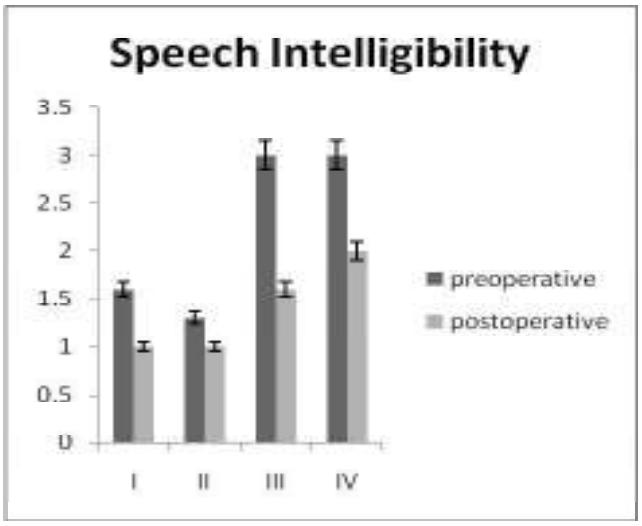

Figure 3: Speech outcome—pre and post operative speech understandability score

Conclusions: Children with cleft palate face a variety of communication challenges in their daily lives, including hypernasality in speech due to velopharyngeal insufficiency, articulation problems and language delay. As technology advances, more and more solutions are offered. One of the primary solutions offered to children with a cleft palate +/- cleft lip is surgrical correction. According to many findings, surgery closes the cleft of the palate and creates an anatomical separation between the oral and nasal cavities. This will help the child to direct the air in to the oral cavity while producing the speech. Palatoplasty is a best intervention technique due to vast amounts of successful speech outcomes, highest successful rate in velopharyngeal insufficiency. The present study also showed a positive impact of the palatoplasty where there is good improvement in overall speech of individuals with cleft palate. Shortcoming in the design of this study must be acknowledged. Shortcoming in the design of this study is size of the sample is small.

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HEARING LOSS IN THE ELDERLY

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The aged refers to one specific age grouping and to a particular stage or point in the life cycle or life course.This is the group we define as old, elderly or senior citizen, it occupies the later part of the aging process or the llife span.

Though many old people do have some health problems, the majority of those over age 65 have hearing loss. As with all sensory system in the human body, there is a progressive degeneration in the auditory system with aging which leads to hearing impairment in th affected individuals, termed as"PRESBYACUSIS".

Defined as 'the lessening of the acuteness of hearring that characterizes old age';Hearing loss affects them communicatively,socially and occupationally.Most people complain of difficulty in hearing which is worse in the presence of background noise so that they find conversations difficult to follow. Many people eventually become socially isolated and even depressed.

As there is no curative treatment for deafness associated with aging the main aim in management is to assess the degree of disability to provide a hearing aid and to improve communication ability.

With this background an attempt is made to find out and analyse the problem of the elderly who had come for hearing evaluaton and rehabilitation in the month of July, and August to the Audiology& Speech therapy section of Thedepartment ofENT,Govt. Stanley Hospital Chennai-1 .Those of 55years and above were taken into consideration.The onset of hearing loss,the interference of hearingloss in their day today life, the acceptance /rejection of their problem, the readyness to bring the elderly for evaluation andrehablitation by the family members were obtained by interview method. Of 116 registered 37 were females , 79were males .Thestudy revealed that there is a delay in recognition and acceptance of having hearing loss,the decision to come for evaluation is forced by their fear of losing the job in men ,the acceptance to wear amplification device,their family members' cooperation in case of females.CONCLUSION.Aged hearing impaired women without spouse face more problem in society than the aged men with hearing impairment.

HEARING LOSS IN THE ELDERLY: The aged refers to one specific age grouping and to a particular stage or point in the cycle or life course. This is the group we define as old, elderly or senior citizen it occupies the late part of the aging process or the life span, though many old people do have some health problems, the majority of those over age 65 have hearing loss. As with all sensory system in the human body, there is a progressive degeneration in the auditory system with aging which leads to hearing impairment in the affected individuals, termed as "PRESBYACUSIS". Defined as ' the less-

ening of the acuteness of hearing that characterizes old age' ; hearing loss affects them communicatively, socially and occupationally. Most people complain difficult in hearing which is worse in the presence of background noise so that they find conversations difficult to follow. Many people eventually become socially isolated and even depressed as there is no curative treatment for deafness associated with aging. The main aim in management is to assess the degree of disability to provide a hearing aid improve communication ability.

With this background an attempt is made to find out and analyze the problem of the elderly who had come for hearing evaluation and rehabilitation in the month of July and August to the audiology and the speech therapy section of the department of ENT, Govt. Stanley hospital Chennai-01.

Those of 55 years and above were taken in to consideration. The onset of hearing loss the interference of hearing loss in their day today life, the acceptance/rejections of their problem, the readiness to bring elderly for evaluation and rehabilitation, by the family members were obtained by interview method. Of 116 registered 37 females 78 were males and 1 was transgender. The study revealed that there is a delay in recognition and acceptance of having hearing loss their fear of expenses even to attend the government hospitals, the decision to come for evaluation is forced by their fear of losing the job in men, the family members' co-operation in case of females especially those without their spouses.

NEED AND AIM OF THE STUDY: The amount of importance given to ophthalmological, loco motor difficulties and neurological disorders is not given to hearing loss in elderly in Indian scenario.Especialy the middle , lower income groups' budgets do not give importance to hearing impairment ,make them postpone the visits to hearing health care professionals on the part of elderly. Our hospital cater to the middle, lower income and below poverty line people, being situated in north Chennai, older people brought exclusively for hearing evaluation are scarce. After the hearing loss has reached the highest level, only are they brought. This prompted to take up the study.

METHOD: The study considered 116 elderly individuals of above 55 years of age who had attended the audiology and speech therapy section of ENT department government Stanley medical college & hospital Chennai-01. Of this 116 females were 37 males were 78 and one was transgender. The inclusions criteria for the group was healthy elderly with normal intact tympanic membrane, no previous history of ear discharge, should not be diabetic or anyother prolonged illness/ treatment having taken for the same: no neurological/ psychological problems and should not be complaining of memory loss are other cognitive difficulties. The questionnaire was presented to them in their mother tongue Tamil.

QUESTIONNAIRE:

1 .Whether the identification of hearing loss was by self/ family members

2 . How many years after the onset of hearing loss patient is coming for evaluation

3 . Reason for reluctance to come for evaluation.

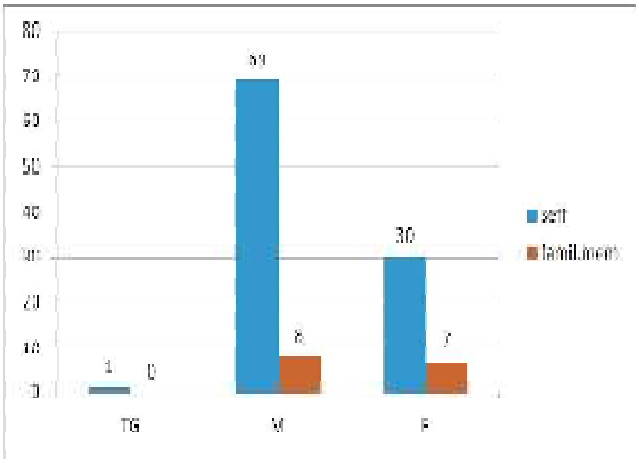
4 .Decision to come for evaluation induced by self motivations/ family members / co-workers/ employers.

5 .Recognition and acceptance of hearing loss.

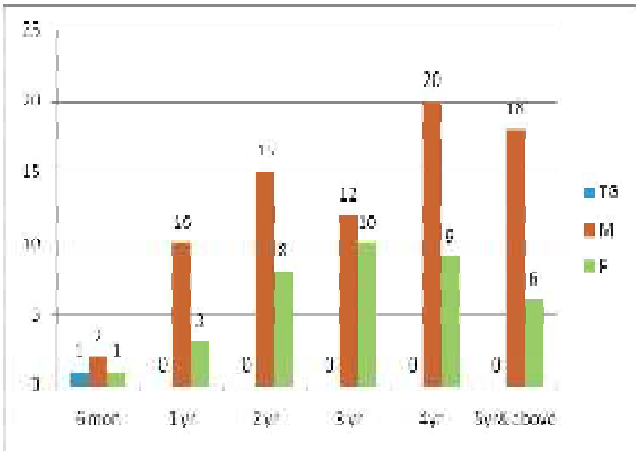
6 .Acceptance to wear hearing amplifications .

RESPONSES:

I.IEDNTIFICATION OF HEARING LOSS : 101 had identified themselves, 15 were identified by family members

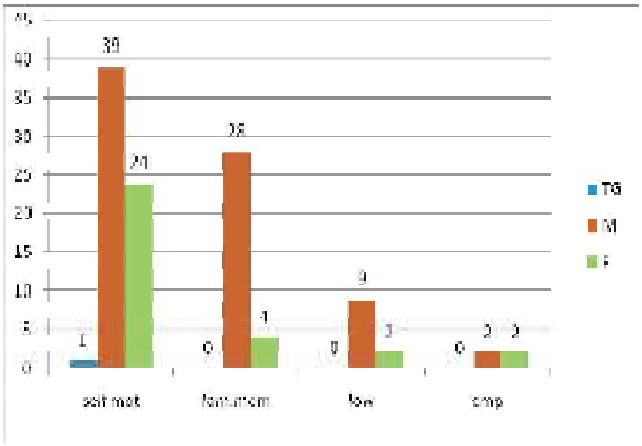


II.THE NUMBER OF YEARS AFTER THE ONSET OF HEARING LOSS EVALUATION INITITED : the trans gender individual had come evaluations 6 months after the onset:likewise 2 men and 1 woman had come. 13 individuals had come after 1 year;23 people came after 2 years:22 of them came after 3 years 29 of them had attended after 4 years: 24 of them had come after 5 years and above the onset of hearing loss



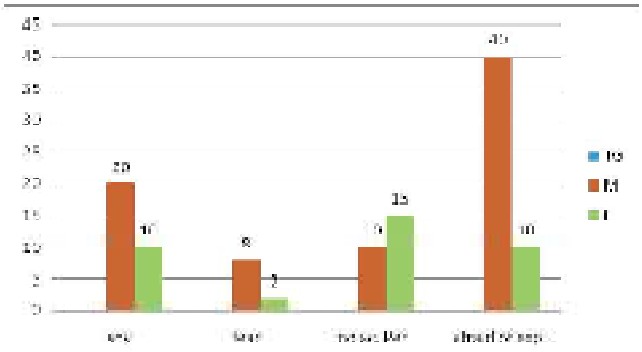
III. DECISION TO COME FOR EVALUATION INDUCED BY

69 of them had come by self motivations as the hearing loss has reached beyond their managing level, 32 were brought by relatives 11 of them had come due to the initiation of the co-workers, 4 of them had been pressurized by their employers



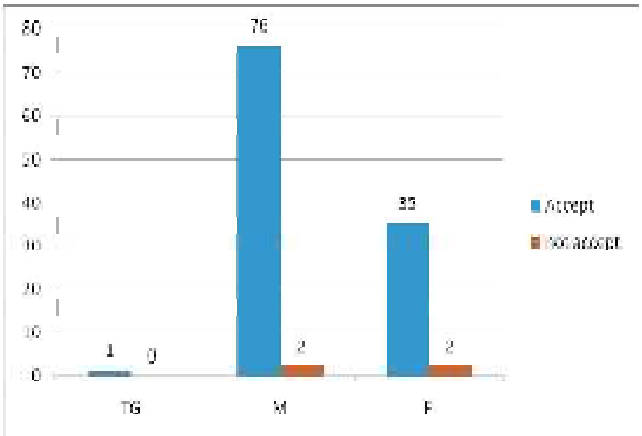
IV. REASON FOR RELUCTANCE TO COME FOREVALUATION:

51 of them were afraid of expenses, 25 of them were in want of accompanying persons,10 of them were fearing for any surgery would be suggested, 30 of them were shy of coming to seek help



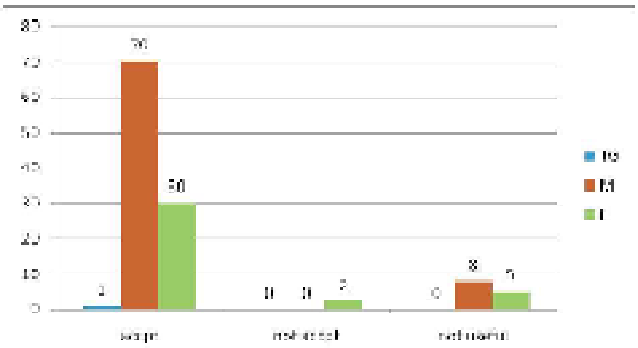
V.RECOGNATION AND ACCEPTANCE OF HEARING LOSS:

112 had recognized and accepted their hearing loss: 4 of them did not accept the hearing loss.



VI.ACCEPTANCE TO WEAR THE HEARING AMPLIFICATION

101 had accepted to use the amplification device to females did not want to wear the aid, for 13 of them the amplification was found not useful as their hearing loss had reached maximum level .



RESULTS AND DISCUSSIONS: Descriptive analysis was used to analyze, the results are discussed with respect to each question and their responses by participants. The hearing loss was identified by self in 69 of the male members 30 of the female members, by family members8 men and 7 women respondents. They come for evaluation after the loss progressed beyond their management. The reason for their postponing the visits to the hearing health care professionals is mainly afraid of the expenses of the to and fro of the journey, food and beverages for themselves and the accompanying persons. Majority of them or self motivated as the loss has progressed. Only 4 of them were not accepting their hearing loss. Only 2 of the females were not accepting to use hearing amplifications .For 8 of the males and 5 of the females the amplification was found not useful as the loss has gone beyond the amplification level.

CONCLUSION: The hearing loss in elderly individuals especially in the middle and lower income make them think so much to take the initiative to come for evaluation and rehabilitation, even if they are coming to government hospital. Aged hearing impaired women without spouse face more problems than the aged men with hearing impairment. The aging of the baby boom generation brings with it the challenges to a huge increase in the number of the older adults with hearing impairments. These individuals will need, and want to hear and understand family, friends and coworkers.They must be encouraged to seek out AUDIOLOGICAL SERVICES EARLY SO THAT HEARING LOSS DOES NOT INTERFERE WITH THE QUALITY OF THEIR PROLONGED LIVES.

It is our responsibility to empower them to identify, get evaluated and to manage the HEARING IMPAIRMENT.

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THEME:2 (PATANJALEEYAM) PSYCHOSPIRITUAL AND PHILOSOPHICAL SCIENCES

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ಡಾ॥ ವೈ.ಎಸ್. ಗಾಯತ್ರೀ
ಸಂಸ್ಕೃತೋಪನ್ಯಾಸಿಕೆ, ಶ್ರೀ ಬಾಲಾಜಿ ಪದವಿಪೂರ್ವ ಕಾಲೇಜು, ಬೆಂಗಳೂರು-560019

ಸುಮ್ಮ ಇಂಪಿಂತಾಯು ಮಿಂಬಂಲಿಯುಲ್ಲಿ ಸುಗಿಂಬಾಗಿಗೆ ಲಿಲ್ಲಿಗಿಂಬಿಲ್ಲಿ ಮಾಯಿಂತಿ ಸುಂಸ್ಕೃತಿಂಲಿಂಗಾಯಿ ಸುಗಿಂಬಾಗಿಂಲು ಚಿಲಿಂಪಿ ತಿಯಿಂಬಿಲ್ಲಿಂಗಳಲ್ಲಿ ಬಂಬಂಗಿ ಮಿಂಬ ಸಂಬಂಧವನ್ನು ಲಂಬಿಸುತ್ತಿಂಬಂತಿಂದೆ. ಇತಿಹಾಸಪುರಾಣಾಭ್ಯಾಂ ವೇದಂ ಸತ್ಕೃಪಬೃಹಯೇತ್ ಎಂಬಂದೆ.

ಭಾರತೀಯ ಪುರಾಣಗಳಲ್ಲಿಂದು ವಿಷ್ಣುಪುರಾಣವು ಮುಖ್ಯ ತೆರನಾಬಿಸಿಕೊಂಬಿದ್ದು ಎಂದು ಪುರಾಣಗಳ ಅಧ್ಯಯನಿಕಾರರು ಅಭಿಪ್ರಾಯಪಟ್ಟಿದ್ದಾರೆ. ಈ ವಿಷ್ಣು ಪುರಾಣದಲ್ಲಿ ಬಂದಿರುವಂತೆ ಶ್ರೀಮನ್ನಾರಾಯಣನ ಪ್ರೇರಣೆಯಿಂದ ಈ ಜಗತ್ತಿನ ಸೃಷ್ಟಿ, ಪಾಲನೆಯಲ್ಲದೇ ಲಯವೂ ಆಗುತ್ತಿದೆ. ಮುಖ್ಯವಾಗಿ ಅಧ್ಯಾತ್ಮವಿದ್ಯೆಯ ಬಗ್ಗೆ ಪರಾಶರರು ಮೈತ್ರೇಯರಿಗೆ ಉಪದೇಶಿಸಿದ ಸಂದರ್ಭದಲ್ಲಿ ಈ ವಿಷ್ಣುಪುರಾಣವು ಹುಟ್ಟಿಕೊಂಡಿದೆ. ಈ ಪುರಾಣದಲ್ಲಿ ಒಟ್ಟು ಆರು ಅಂಶಗಳಿವೆ. ಪ್ರತಿಯೊಂದು ಅಂಶದಲ್ಲಿಯೂ ಒಂದೊಂದು ವಿಷಯಗಳನ್ನು ಕುರಿತು ಚರ್ಚಿಸಲಾಗಿದೆ. ಪ್ರಥಮ ಅಂಶದಲ್ಲಿ ಸೃಷ್ಟಿಯ ಬಗ್ಗೆ ಹೇಳಲಾಗಿದೆ. ಎರಡನೆಯ ಅಂಶದಲ್ಲಿ ಭೂಗೋಳ ಮತ್ತು ಖಗೋಳದ ಬಗ್ಗೆ ವಿವರಣೆಯಿದೆ. ಮೂರನೆಯ ಅಂಶದಲ್ಲಿ ಮನ್ವಂತರಗಳ ಬಗ್ಗೆ ಹೇಳಲಾಗಿದೆ. ನಾಲ್ಕನೆಯ ಅಂಶದಲ್ಲಿ ಸೂರ್ಯವಂಶ ಮತ್ತು ಚಂದ್ರವಂಶದ ಬಗ್ಗೆ ವಿವರಣೆಯಿದೆ. ಐದನೆಯ ಅಂಶದಲ್ಲಿ ಶ್ರೀಕೃಷ್ಣನ ಜನನದಿಂದ ಮೊದಲ್ಗೊಂಡು ಅವನ ಜೀವನದ ಪ್ರಮುಖ ಘಟನೆಗಳ ಬಗ್ಗೆ ವಿವರಣೆಯಿದೆ. ಆರನೆಯ ಅಂಶದಲ್ಲಿ ಪ್ರಳಯದ ಬಗ್ಗೆ ಹೇಳಲಾಗಿದೆ. ಈ ಪುರಾಣದಲ್ಲಿ ಒಟ್ಟು ೨೩೪೦೦ ಶ್ಲೋಕಗಳಿವೆ.

ಕೇಶಿಧ್ವಜ ಮತ್ತು ಖಾಂಡಿಕ್ಯರ ಅಖ್ಯಾನ ಕಥೆಯಲ್ಲಿ ಅಡಗಿರುವ ಸತ್ಯವನ್ನು ಅಧ್ಯಾತ್ಮದೃಷ್ಟಿಯಿಂದ ಅರಿತುಕೊಳ್ಳುವುದು ಇಂದಿನ ಜೀವನಕ್ಕೆ ಬಹಳ ಅಗತ್ಯವಾಗಿದೆ. ಇಂದು ಜೀವನದಲ್ಲಿ ಸಂಪತ್ತಿಗೆ ಹೆಚ್ಚಿನ ಪ್ರಾಧಾನ್ಯತೆ ಕೊಡುತ್ತಿರುವುದರಿಂದ ಮನುಷ್ಯನಲ್ಲಿ ಅಸಹನೆ, ಅಸೂಯೆ, ಕ್ರೌರ್ಯ ಮುಂತಾದ ಅವಗುಣಗಳು ಹೆಚ್ಚಾಗಿ ಕಂಡುಬರುತ್ತಿವೆ. ಇಂತಹ ಸಂದರ್ಭದಲ್ಲಿ ಈ ಕಥೆಯ ಮೂಲಕ ಅಧ್ಯಾತ್ಮದ ಮಹತ್ವವನ್ನು ಸಾರುವ ಪ್ರಯತ್ನವನ್ನು ಮಾಡಲಾಗಿದೆ.

ಅಷ್ಟಾದಶ ಪುರಾಣಗಳಲ್ಲಿ ವಿಷ್ಣುಪುರಾಣವು ಪ್ರಮುಖವಾದುದು. ವಾಸುದೇವನ ಪರಬ್ರಹ್ಮತತ್ತ್ವವನ್ನು ಎತ್ತಿ ಹಿಡಿದು, ಜನರನ್ನು ನಶ್ವರವಾದ ಸಾಂಸಾರಿಕ ಜ್ಞಾನದಿಂದ ಶಾಶ್ವತವಾದ ಆನಂದದೆಡೆಗೆ ಮಾರ್ಗದರ್ಶನ ಮಾಡುವ ಪರಮ ಪವಿತ್ರಗ್ರಂಥ. ಭಗವಂತನ ನಾಮಸ್ಮರಣ ಮಾತ್ರದಿಂದಲೇ ಕಲಿಯುಗದಲ್ಲಿ ಪಾತಕಗಳೆಲ್ಲ ನಶಿಸುತ್ತವೆ ಎನ್ನುತ್ತದೆ ಮಹಾತ್ಮರ ಈ ನುಡಿ –

ಧ್ಞಾತ್ಞೇ ಕೃತೇ ಧ್ಞಜನ್ ಧ್ಞಶೈತ್ರೇತಾಯಾಂ ದ್ವಾಪರೇऽರ್ಚಧ್ಞನ್ ।
ಧ್ಞದಾಪ್ನೋತಿ ತದಾಪ್ನೋತಿ ಕಲೌ ಸಙ್ಕೀರ್ತ್ಯ ಕೇಶವಞ ।।

ಕೃತಯುಗದಲ್ಲಿ ಧ್ಯಾನಕ್ಕೆ ಹೆಚ್ಚಿನ ಪ್ರಾಧಾನ್ಯತೆ ಇರುತ್ತದೆ. ತ್ರೇತಾಯುಗದಲ್ಲಿ ಯಜ್ಞಯಾಗದಿಗಳಿಗೆ ವಿಶೇಷವಾದ ಸ್ಥಾನವಿರುತ್ತದೆ. ದ್ವಾಪರದಲ್ಲಿ ಇವೆರಡರ ಬಲವೂ ಕುಂಠಿತವಾಗಿ ಅರ್ಚನೆಯು ಸ್ಥಾನವನ್ನು ಪಡೆಯಿತು. ಆದರೆ ಕಲಿಯುಗದಲ್ಲಿ ಭಗವನ್ನಾಮ ಸಂಕೀರ್ತನೆಯಿಂದ ಮಾನವನ ಉದ್ಧಾರವಗುವುದು ವಿಚಿತ್ರವಾದರೂ ವಿಶೇಷ. ಈ ಸಂಕೀರ್ತನೆಯ ಮಹತ್ತ್ವವನ್ನು ವಿಷ್ಣುಪುರಾಣವು ಸಾರಿಕೊಂಡು ಬಂದಿರುವುದು ಮತ್ತೊಂದು ವಿಶೇಷ. ಆ ಭಗವಂತನಲ್ಲಿ ಲೀನವಾಗುವ, ಒಂದಾಗುವ ಆನಂದ ವಿಶೇಷವನ್ನು ಅನುಭವಿಸುವುದೇ ಈ ಜನನ ಮರಣಗಳ ಬಂಧನದಿಂದ ಬಿಡುಗಡೆಯ ಸೋಪಾನವೆಂದು ಸಾರುತ್ತವೆ ಪುರಾಣಗಳು.

ಈ ಪ್ರಬಂಧದಲ್ಲಿ ವಿಷ್ಣುಪುರಾಣದ ಷಷ್ಠಾಂಶದ ಒಂದು ಪ್ರಸಂಗದ ಮೂಲಕ ಅಧ್ಯಾತ್ಮ ತತ್ತ್ವವನ್ನರಿಯುವ ಪ್ರಯತ್ನವನ್ನು ಮಾಡಲಾಗಿದೆ. ಇದು ಪರಾಶರ ಮೈತ್ರೇಯರ ನಡುವಣ ಸಂಭಾಷಣೆಯಿಂದ ವಿಷ್ಣುಪುರಾಣವು ಸಕಲ ಮನುಕುಲಕ್ಕೇ ಈ ಸಂದೇಶವನ್ನು ಸಾರುತ್ತಿದೆ.

ಅಸ್ವಾಧ್ಯಾಯ ಎಂದರೆ ಪ್ರಣವಾದಿ ಜಪ ಮತ್ತು ಯೋಗದಿಂದ ಆ ಪುರುಷೋತ್ತಮನು ಗೋಚರಿಸುವನು. ಆತನ ದರ್ಶನಕ್ಕೆ ಕಾರಣವಾದ್ದರಿಂದ ಇವೆರಡು ಸಾಧನಗಳೆನ್ನು ಬ್ರಹ್ಮವೆನ್ನುವರು. ಉಪಯೋಗಗಳ ಸಂಪತ್ತಿನಿಂದ ಪರಮಾತ್ಮನ ಗೋಚರವಾಗುವುದು. ಬ್ರಹ್ಮಸ್ವರೂಪನಾಗಿರುವ ಆತನನ್ನು ಕಾಣಲು ಈ ನಮ್ಮ ಕಣ್ಣುಗಳು ಅಶಕ್ತವು. ಆದ್ದರಿಂದ ಆತನನ್ನು ನೋಡಲು ಜಪಯೋಗಗಳೇ ನೇತ್ರಗಳುಟಟ ಎಂದು ಪರಾಶರರು ಮೈತ್ರೇಯರಿಗೆ ಹೇಳಿದಾಗ ಮೈತ್ರೇಯರು ಯಾವ ಯೋಗವನ್ನು ತಿಳಿದು ಅನುಷ್ಠಾನ ಮಾಡುವುದರಿಂದ ಅಖಿಲಾಧಾರನಾದ ಆ ಪರಮೇಶ್ವರನನ್ನು ನೋಡಬಹುದೋ ಅದನ್ನು ತಿಳಿಸಬೇಕೆಂದು ಪ್ರಾರ್ಥಿಸುತ್ತಾರೆ. ಆಗ ಪರಾಶರರು ಮೈತ್ರೇಯರ ನೆಪದಿಂದ ಕೇಶಿಧ್ವಜೋಕ್ತವಾದ ಈ ಯೋಗಮಾರ್ಗವನ್ನು ಸಕಲ ಮನುಕುಲಕ್ಕೆ ಉಪದೇಶಿಸುವರು.

ಧರ್ಮಧ್ವಜನೆಂಬ ರಾಜನಿಗೆ ಅಮಿತಧ್ವಜ, ಕೃತಧ್ವಜ ಎಂಬ ಇಬ್ಬರು ಮಕ್ಕಳಿದ್ದರು. ಅವರಲ್ಲಿ ಕೃತಧ್ವಜನು ಅಧ್ಯಾತ್ಮದಲ್ಲಿ ಆಸಕ್ತನಾಗಿದ್ದನು. ಕೃತಧ್ವಜನ ಸುತನಾದ ಕೇಶಿಧ್ವಜನು ಪ್ರಖ್ಯಾತನಾದ ರಾಜನೆನಿಸಿದ್ದನು. ಅಮಿತಧ್ವಜನಿಗೆ ಖಾಂಡಿಕ್ಯಜನಕನೆಂಬ ಮಗನೊಬ್ಬನಿದ್ದನು. ಖಾಂಡಿಕ್ಯನು ಕರ್ಮಮಾರ್ಗದಿಂದ ಜೀವನದ ಸಾರ್ಥಕತೆಯನ್ನು ಕಂಡುಕೊಂಡಿದ್ದನು. ಕೇಶಿಧ್ವಜನು ಅಧ್ಯಾತ್ಮವಿದ್ಯಾವಿಶಾರದನಾಗಿದ್ದನು. ಅವರಿಬ್ಬರೂ ಕಲಹನಿಮಿತ್ತದಿಂದ ಒಬ್ಬರನ್ನೊಬ್ಬರು ಜಯಿಸಲೆತ್ನಿಸಿದರು. ಯುದ್ಧದಲ್ಲಿ ಪರಾಭವಗೊಂಡ ಖಾಂಡಿಕ್ಯನು ರಾಜ್ಯಭ್ರಷ್ಟನಾಗಿ ದುರ್ಗಮವಾದ ಅಟವಿಯನ್ನು ಸೇರಿದನು. ಕೇಶಿಧ್ವಜನು ಜ್ಞಾನನಿಷ್ಠನಾಗಿದ್ದರೂ, ಕರ್ಮಯೋಗದಿಂದ ಮೃತ್ಯುವನ್ನು ದಾಟಬೇಕೆಂಬ ಉದ್ದೇಶದಿಂದ ಬಹುವಿಧವಾದ ಯಜ್ಞ ಗಳನ್ನು ಆಚರಿಸುತ್ತಿದ್ದನು. ಒಮ್ಮೆ ಅವನ ಯಾಗಾಚರಣೆಯ ಸಮಯದಲ್ಲಿ ಪ್ರವರ್ಗ್ಯದಲ್ಲಿ ಬಳಸುವ ಹವಿಸ್ಸಿಗೆ ಹಾಲನ್ನು ನೀಡುತ್ತಿದ್ದ ಹಸುವನ್ನು ಕಾಡಿನಲ್ಲಿ ಹುಲುಯೊಂದು ಕೊಂದುಹಾಕಿತು. ಪ್ರಾಯಶಿತ್ತಕ್ಕಾಗಿ ಅವನು ಬಲ್ಲವರನ್ನು ಕೇಳಲಾಗಿ ಅವರು ಖಾಂಡಿಕ್ಯನೊಬ್ಬನಿಗೇ ಆ ಪ್ರಾಯಶ್ಚಿತ್ತವು ತಿಳಿದಿದೆಯೆಂದೂ ಅವನನ್ನೇ ಕೇಳಬೇಕೆಂದೂ ಹೇಳಿದರು.

ಅವನು ಖಾಂಡಿಕ್ಯನು ಇರುವ ಸ್ಥಳಕ್ಕೆ ಹೋಗಲಾಗಿ ಕೋಪಗೊಂಡ ಖಾಂಡಿಕ್ಯನು ಬಿಲ್ಲಿಗೆ ಹೆದೆಯೇರಿಸಿ ಯುದ್ಧಕ್ಕೆ ಸಿದ್ಧನಾಗಿ ನಿಂತನು. ಆಗ ಕೇಶಿಧ್ವಜನು ತಾನು ಧರ್ಮಶಾಸ್ತ್ರದ ಸಂದೇಹವನ್ನು ಪರಿಹರಿಸಿಕೊಳ್ಳಲು ಬಂದಿರುವುದಾಗಿ ತಿಳಿಸಿದನು. ಖಾಂಡಿಕ್ಯನ ಮಂತ್ರಿಗಳು ಕೈಗೆ ಸಿಕ್ಕಿರುವ ಶತ್ರುವನ್ನು ಕೊಲ್ಲುವುದೇ ಲೇಸೆಂದೂ, ಭೂಮಿಯು ಅವನ ಕೈವಶವಾಗುವುದೆಂದೂ ಸಲಹೆಯನ್ನು ಅವನಿಗೆ ನೀಡಿದರು. ಆಗ ಖಾಂಡಿಕ್ಯನು ನುಡಿದ ಮಾತುಗಳು –

ಪರಲೋಕಜಞಸ್ತಸ್ಞ ಪೃಥಿವೀ ಸಕಲಾ ಞಞ ।
ನ ಹನ್ಞಿ ಚೇತ್ಪಲೋಕಜಞೋ ಞಞ ತಸ್ಞ ವಸುನ್ಧರಾ ।।

ನಾಹಂ ಞಞೇ ಲೋಕಜಞಾದಧಿಕಾ ಸ್ಞಾದ್ವಸುನ್ಧರಾ ।
ಪರಲೋಕಜಞೋऽನನ್ತಸ್ತ್ವಲ್ಪಕಾಲೋ ಞಹೀಜಞಃ ।।
ತಸ್ಞಾನ್ನೈನಂ ಹನಿಷ್ಞಾಞ್ಞಿ ಞತ್ಪೃಚ್ಛತಿ ವದಾಞ್ಞಿ ತತ್ ।।

ಈಈತನನ್ನು ಕೊಂದರೆ ಸಕಲ ಭೂಮಂಡಲವು ನನ್ನ ವಶವಾಗುವುದರಲ್ಲಿ ಸಂದೇಹವಿಲ್ಲ. ಆದರೆ, ಅದರಿಂದ ಆತನಿಗೆ ಪರಲೋಕ ಲಭಿಸುವುದು, ನನಗೆ ಈ ಭೂಲೋಕವು ದೊರೆಯುವುದು. ಕೊಲ್ಲದಿದ್ದರೆ ಅವನಿಗೆ ಈ ಲೋಕವೂ, ನನಗೆ ಪರಲೋಕವೂ ದೊರೆಯುವುದು. ಆದ್ದರಿಂದ ಇವನನ್ನು ಕೊಲ್ಲದೆ ಏನು ಕೇಳುವನೋ ಅದಕ್ಕೆ ಉತ್ತರಿಸುವೆನುಟಟ ಎಂಬ ನಿರ್ಧಾರವನ್ನು ತಳೆಯುವನು.

ಭೂಲೋಕ ಜಯವು ಶಾಶ್ವತವಾದುದಲ್ಲ; ಪರಲೋಕ ಜಯವೇ ಶಾಶ್ವತ ಎಂಬ ಅವನ ನುಡಿಗಳನ್ನು ನಾವು ಇಲ್ಲಿ ಗಮನಿಸಬೇಕು.

ಖಾಂಡಿಕ್ಯನು ಕೇಶಿಧ್ವಜನಿಗೆ ಶಾಸ್ತ್ರೀಯವಾಗಿ ಮಾಡಿಕೊಳ್ಳಬೇಕಾದ ಪ್ರಾಯಶ್ಚಿತ್ತ ವಿಧಿಯೆಲ್ಲವನ್ನೂ ತಿಳಿಸಿದನು. ಅನಂತರ ಆ ಮಹಾತ್ಮನಿಂದ ಅಪ್ಪಣೆಯನ್ನು ಪಡೆದು ರಾಜ್ಯಕ್ಕೆ ಹಿಂದುರುಗಿ, ಯಾಗವನ್ನು ಪೂರ್ಣಗೊಳಿಸಿ, ಅವಭೃತ ಸ್ನಾನವನ್ನಾಚರಿಸಿ ಕೃತಕೃತ್ಯನಾದನು. ಆದರೂ ಅವನ ಮನದಲ್ಲಿ ಯಾವುದೋ ಕಾರ್ಯವು ಬಿಟ್ಟುಹೋದಂತೆ ತಳಮಳವಿದ್ದಿತು.

पूजिताश्च द्विजास्सर्वे सदस्ङ्गा ङ्कानिता ङ्कङ्गा ।
तथैवार्थिजनोऽप्यैर्ङ्गोजितोभिङ्कतैर्ङ्कङ्गा ।।

ङ्मथार्हङ्कस्ङ्म लोकस्ङ्म ङ्कङ्गा सर्वं विचेष्टितङ्क ।
अष्निक्रिङ्गं चेतः तथापि ङ्कङ्क किं ङ्मथा ।।

इत्थं सञ्चिन्तङ्मन्नेव सस्ङ्कार स ङ्कहीपतिः ।
खाण्डिङ्काङ्क न दत्तेति ङ्कङ्गा वै गुरुदक्षिणा ।।

ಋತ್ವಿಜರಾಗಿದ್ದ ಎಲ್ಲ ಬ್ರಾಹ್ಮಣರನ್ನೂ ಪೂಜಿಸಿದ್ದಾಯಿತು. ಸದಸ್ಯರಿಗೆ ಸಂಭಾವನೆಗಳನ್ನು ನೀಡಿ ಸನ್ಮಾಸಿಲಾಯಿತು. ಬೇಡಿ ಬಂದವರಿಗೆ ಅವರು ಕೇಳಿ ಕೇಳಿದ್ದನ್ನು ನೀಡಲಾಯಿತು. ಆದರೂ ಯಾವುದೋ ಒಂದು ಕಾರ್ಯವು ಬಿಟ್ಟುಹೋದಂತೆ ಮನವನ್ನು ಕೊರೆಯುತ್ತಿದೆಯಲ್ಲ ಟಟ ಎಂದು ಚಿಂತಿಸುತ್ತಿರಲಾಗಿ ತಾನು ಖಾಂಡಿಕ್ಯನಿಗೆ ಗುರುದಕ್ಷಿಣೆಯನ್ನು ಸಮರ್ಪಿಸಿಲ್ಲವೆಂಬ ಅಂಶವು ಅವನಿಗೆ ಥಟ್ಟನೆ ನೆನಪಿಗೆ ಬಂದಿತು. ತಕ್ಷಣವೇ ಆತನು ರಥವನ್ನೇರಿ ಖಾಂಡಿಕ್ಯನ ಬಳಿಸಾರಿ ತನು ಅವನಿಗೆ ಗುರುದಕ್ಷಿಣೆಯನ್ನು ಸಮರ್ಪಿಸಲು ಬಂದಿರುವನೆಂದು ನುಡಿದನು. ಖಾಂಡಿಕ್ಯನು ತನ್ನವರೊಡನೆ ಸಮಾಲೋಚನೆಯನ್ನು ನಡೆಸಲಾಗಿ, ಅಶೇಷ ರಾಜ್ಯವನ್ನು ಗುರುದಕ್ಷಿಣೆಯಾಗಿ ಕೊಡುವಂತೆ ಕೇಳಲು ತಿಳಿಸಿದರು. ಅದಕ್ಕೆ ಖಾಂಡಿಕ್ಯನು ಜೋರಾಗಿ ನಕ್ಕುಬಿಟ್ಟನು.

च्हस्ङ्क तानाह नृपस्स खाण्डिङ्को ङ्कहाङ्कतिः ।
स्वल्पकालं ङ्कहीपाल्ङ्गं ङ्कादृशैः प्रार्थ्ङ्कते कथङ्क ।।

एवङ्कैतद्वन्तोऽत्र ह्मर्थसाधनङ्कन्त्रिणः ।
छस्ङ्कार्थः कथं कोऽत्र ङ्कङ्गं नात्र विचक्षणाः ।।

ಅಲ್ಪಕಾಲವಿರುವ ರಾಜ್ಯಪದವಿಯನ್ನು ನನ್ನಂತಹವರು ಕೇಳುವುದು ಹೇಗೆ ಸಾಧ್ಯವಾದೀತು? ಲೌಕಿಕವಾದ ಅರ್ಥಸಾಧನೆಯ ವಿಷಯದಲ್ಲಿ ನೀವು ಹೀಗೆ ಹೇಳುವುದು ಸಹಜ. ಆದರೆ ಪರಮಾರ್ಥ ಯಾವುದು? ಅದನ್ನು ಪಡೆಯುವುದು ಹೇಗೆ ? ಎಂಬ ವಿಷಯದಲ್ಲಿ ನೀವು ವಿಚಕ್ಷಣರಲ್ಲಂದು ನುಡಿದು ಕೇಶಿಧ್ವಜನ ಬಳಿ ಹೋಗಿ ಸತ್ಯವಗಿಯೂ ಅವನು ಗುರುದಕ್ಷಿಣ್ಯನ್ನು ಒಪ್ಪಿಸುವನೊ ಎಂದು ಪ್ರಶ್ನಿಸಿದನು. ಕೇಶಿಧ್ವಜನು ಅದು ಸತ್ಯವೆನ್ನಲು, ಕೇಶಿಧ್ವಜನು ಪರಮಾರ್ಥವಿದ್ಯೆಯನ್ನು ಚೆನ್ನಾಗಿ ಬಲ್ಲವನಾದ ಕಾರಣ ತನಗೆ ಗುರುದಕ್ಷಿಣೆಯಾಗಿ ಸಂಸಾರ ಕ್ಲೇಶಗಳೆಲ್ಲವನ್ನೂ ಕಳೆಯುವ ಕರ್ಮವನ್ನು ಉಪದೇಶಿಸಬೇಕೆಂದು ಕೇಳಿದನು.

ತತ್ತ್ವಜ್ಞಾನವನ್ನು ಪಡೆಯಲು ಅವಶ್ಯಕವಾದ ವಿವೇಕ ವೈರಾಗ್ಯಗಳು ಖಾಂಡಿಕ್ಯನಲ್ಲಿವೆಯೆ ಎಂದು ತಿಳಿಯಲು ಕೇಶಿಧ್ವಜನು ಅವನನ್ನು ಹೀಗೆ ಪ್ರಶ್ನಿಸುತ್ತಾನೆ. ಕಾರಣ ಯಾವುದೂ ಅಪಾತ್ರದಾನವಾಗಬಾರದೆಂಬುದು ಭಾರತೀಯ ಪರಂಪರೆಯ ಒಂದು ಅಂಗ. ಅಪಾತ್ರದಾನವಾದರೆ, ಅದರ ದುರುಪಯೋಗವಾಗುವುದೇ ಅಧಿಕವೆಂಬುದನ್ನು ನಮ್ಮ ಸಮಾಜದಲ್ಲಿ ನೋಡುತ್ತಲೇ ಬರುತ್ತಿದ್ದೇವೆ.

न प्रार्थितं त्वङ्गा कस्ङ्कादस्ङ्कद्राज्ङ्गङ्ककण्टकङ्क ।
राज्ङ्गलाभाद्विना नान्ङ्गत् क्षत्रिङ्गाणाङ्कतिप्रिङ्गङ्क ।।

ನಿಷ್ಕಂಟಕವಾಗಿ ನಮ್ಮ ರಾಜ್ಯವು ದೊರೆಯಬೇಕೆಂದು ನೀನೇಕೆ ಕೇಳಲಿಲ್ಲ ? ಕ್ಷತ್ರಿಯನಾದವನಿಗೆ ರಾಜ್ಯಲಾಭಕ್ಕಿಂತ ಪ್ರಿಯವಾದುದು ಯಾವುದು ಇಲ್ಲವಷ್ಟೆ? ಅದಕ್ಕೆ ಖಾಂಡಿಕ್ಯನು ಉತ್ತರಿಸುವ ರೀತಿ –

केशिध्वज निबोध त्वं ङ्कङ्गा न प्रार्थितं ङ्कतः ।
राज्ङ्गङ्केतदशेषं ते ङ्कत्र गृध्ङ्कन्ङ्गपण्डिताः ।।

क्षत्रिङ्गाणाङ्कङ्गं धर्ङ्गो ङ्कत्प्रजापरिपालनङ्क ।
वधश्च धर्ङ्गङ्कद्धेन स्वराज्ङ्गपरिपन्थिनाङ्क ।।

तत्रासक्तस्ङ्म ङ्के दोषो नैवास्त्ङ्गर्पौ त्वङ्गा ।
बन्धाङ्गैव भवत्ङ्गेषा ह्यविद्याप्ङ्गक्रङ्कोज्झिता ।।

जन्ङ्कोपभोगलिप्सार्थङ्किङ्गं राज्ङ्गस्पृहा ङ्कङ्क ।
अन्ङ्गेषां दोषजा सैव धर्ङ्गै वै नानुरुध्ङ्गते ।।

न ङ्गाच्ङ्गा क्षत्रबन्धूनां धर्ङ्गाङ्गैतत्सतां ङ्कतङ्क ।
अतो न ङ्गाचितं राज्ङ्गङ्कविद्यान्तर्गतं तव ।।

राज्ङ्गे गृध्नन्ङ्गविद्वांसो ङ्कङ्कत्वाहृतचेतसः ।
अहंङ्कानङ्कहापानङ्कदङ्कत्ता न ङ्कादृशाः ।।

ಅವಿವೇಕಿಗಳು ರಾಜ್ಯಕ್ಕಾಗಿ ಆಸೆಪಡುತ್ತಾರೆ. ಪ್ರಜೆಗಳ ರಕ್ಷಣೆ ಹಾಗೂ ರಾಜ್ಯವಿರೋಧಿಗಳನ್ನು ಯುದ್ದದಲ್ಲಿ ಗೆಲ್ಲುವುದು ಕ್ಷತ್ರಿಯರ ಕರ್ತವ್ಯವೆಂಬುದೇನೋ ಸರಿ. ಆದರೆ, ನೀನು ನನ್ನ ರಾಜ್ಯವನ್ನು ಅಪಹರಿಸಿದ ಮೇಲೆ ನನಗೆ ರಾಜಧರ್ಮದಲ್ಲಿ ಆಸಕ್ತಿಯಿಲ್ಲದಕಾರಣ ಅದರಿಂದ ಯಾವ ದೋಷವೂ ಬಾರದು. ರಾಜ್ಯರಕ್ಷಣೆಯು ಬಂಧನಕ್ಕೆ ಕಾರಣವಾದರೂ ಅದು ರಾಜಧರ್ಮವೇ ಆಗಿರುತ್ತದೆ. ನನಗಿದ್ದ ರಾಜ್ಯದ ಆಸೆಯು ಜನ್ಮಾಂತರದ ಫಲವಾಗಿ ಬಂದಿದ್ದ ರಾಜಭೋಗದ ಪ್ರಾಪ್ತಿಯಾಗಿದ್ದಿತು. ಆದರೆ ಇತರರಿಗೆ ರಾಗಲೋಭಾದಿದೋಷದಿಂದ ರಾಜ್ಯದ ಆಸೆಯು ಹುಟ್ಟುತ್ತದೆ. ಅಲ್ಲದೆ ಕ್ಷತ್ರಿಯರು ಬೇಡುವುದು ಸಜ್ಜನರು ಒಪ್ಪದ ಸಂಗತಿ. ಆದ ಕಾರಣ ಅವಿದ್ಯೆಗೆ ಸಂಬಂಧಿಸಿದ ಈ ರಾಜ್ಯವು ಬೇಕೆಂದು ನಿನ್ನಲ್ಲಿ ನಾನು ಕೇಳಲಿಲ್ಲ. ನನ್ನದು ನನ್ನದು ಎಂಬ ಮಮಕಾರವು ಯಾರ ಮನವನ್ನು ಸೆಳೆಯುತ್ತದೆಯೋ, ಅಂತಹ ಅವಿವೇಕಿಗಳು ರಾಜ್ಯಕ್ಕಾಗಿ ಆಶಿಸುತ್ತಾರೆ. ಅವರು ಅಹಂಕಾರವೆಂಬ ಮಹಾಮದ್ಯದ ಪಾನದಿಂದ ಮತ್ತರಾಗಿರುತ್ತಾರೆ. ನನ್ನಂತಹವರಲ್ಲ.

ಇಲ್ಲಿ ಖಾಂಡಿಕ್ಯನು ಅರಿಷಡ್ವರ್ಗಗಳನ್ನು ದೂರ ಮಾಡಿ, ನಿಜವಾದ ಜ್ಞಾನವನ್ನು ಅಪೇಕ್ಷಿಸುತ್ತಿರುವನೆಂದು ಅವನ ಮಾತುಗಳಿಂದ ತಿಳಿದು ಬರುತ್ತದೆ. ಇದನ್ನು ಕಂಡ ಕೇಶಿಧ್ವಜನಿಗೆ ಮಹದಾನಂದವಾಗುತ್ತದೆ.

ಅವಿದ್ಯಾ ಕ್ಷತ್ಯಂ ತೀರ್ತ್ವಾ ವಿದ್ಯಾಕ್ಷತಕ್ಷಶ್ನುತೆ ಎಂಬ ಈಶಾವಸ್ಯೋಪನಿಷತ್ತಿನ ವಾಣಿಯನ್ನೂ, ಅನಿತ್ಯಾಶುಚಿದುಃಖಾನಾತ್ಮಸು ನಿತ್ಯಶುಚಿ ಸುಖಾತ್ಮಖ್ಯಾತಿರವಿದ್ಯಾ ಎಂಬ ಯೋಗಸೂತ್ರವನ್ನೂ ಸ್ಮರಿಸಬಹುದು.

ಕೇಶಿಧ್ವಜನು ಖಾಂಡಿಕ್ಯನನ್ನು ಕುರಿತು ಹೀಗೆ ಹೇಳುತ್ತಾನೆ–

अनात्ङ्कान्ङ्कात्ङ्कबुद्धिर्ङ्गा चास्वे स्वङ्किति ङ्गा ङ्कतिः ।
संसारतरुसम्भूतिबीजङ्केतद् द्विधा स्थितङ्क ।।

पञ्चभूतात्ङ्के देहे देही ङ्कोहतङ्कोवृतः ।
अहं ङ्कङ्कैतिदित्ङ्कचैः कुरुते कुङ्कतिर्ङ्गतिङ्क ।।

ಆಕಾಶವಾय्वग्निजलपृथिवीभ्ङ्गः पृथक् स्थिते ।
आत्ङ्न्ङ्गात्ङ्कङ्गं भावं कः करोति कलेवरे ।।

कलेवरोपभोग्ङ्गं हि गृहक्षेत्रादिकं च कः ।
अदेहे ह्यात्ङ्नि प्राज्ञो ङ्कङ्केदङ्किति ङ्कन्ङ्गते ।।

इत्थं च पुत्रपौत्रेषु तद्देहोत्पादितेषु कः ।
करोति पण्डितस्त्वाम्ङ्गङ्कनात्ङ्नि कलेवरे ।।

सर्वं देहोपभोगाङ्ग कुरुते कर्ङ्क ङ्कानवः ।
देहश्चान्ङ्गो ङ्गदा पुंसस्तदा बन्धाङ्ग तत्परङ्क ।।

ङ्कण्ङ्कङ्गं हि ङ्गथा गेहं लिप्ङ्गते वै ङ्कदम्भसा ।
छार्थिवोऽङ्गं तथा देहो ङ्कदम्बालेपनः स्थितः ।।

पञ्चभूतात्ङ्कैर्गोगैः पञ्चभूतात्ङ्कं वपुः ।
आप्ङ्गाङ्गते ङ्गदि ततः पुंसो भोगोऽत्र किं कृतः ।।

अनेकजन्ङ्कसाहस्रीं संसारपदवीं व्रजन् ।
ङ्कोहश्रङ्कं प्रङ्गातोऽसौ वासनारेणुगुण्ठितः ।।

च्क्षात्ङ्गते ङ्गदा सोऽस्ङ्ग रेणुर्ज्ञानोश्रवारिणा ।
तदा संसारपान्थस्ङ्ग ङ्गाति ङ्कोहश्रङ्कश्शङ्कङ्क ।।

ङ्कोहश्रङ्के शङ्कं ङ्गाते स्वस्थान्तःकरणः पुङ्कान् ।
अन्ङ्गातिशङ्काबाधं परं निर्वाणङ्कच्छति ।।

निर्वाणङ्कङ्ग एवाङ्गङ्कात्ङ्गा ज्ञानङ्कङ्गोऽङ्कलः ।
दुःखज्ञानङ्कङ्गा धर्ङ्गाः प्रकृतेस्तेस्तु नात्ङ्कनः ।।

जलस्ङ्ग नाग्निसंसर्गः स्थालीसङ्गात्रतापि हि ।
शब्दोद्रेकादिकान् धर्ङ्गास्तत्करोति ङ्गथा नृप ।।

तथात्ङ्गा प्रकृेस्सङ्गादहम्ङ्गानादिदऊषितः ।
भजते प्राकृतान् धर्ङ्गानन्ङ्गस्तेभ्ङ्गो हि सोऽङ्गङ्गः ।।

तदेत्कथितं बीजङ्गविद्याङ्गा ङ्कङ्गा तव ।
ेलेशानां च क्षङ्गकरं ङ्गोगादन्ङ्गन्न विद्यते ।।

ಆತ್ಮವಲ್ಲದ ದೇಹದಲ್ಲಿ ಆತ್ಮಬುದ್ಧಿ, ತನ್ನದಲ್ಲದ ಗೃಹಾದಿವಸ್ತುಗಳಲ್ಲಿ ನನ್ನದು ಎಂಬ ಬುದ್ಧಿ – ಹೀಗೆ ಅವಿದ್ಯೆಯು ಎರಡು ವಿಧವಾಗಿದೆ. ಈ ಅವಿದ್ಯೆಯೇ ಸಂಸಾರವು ಹುಟ್ಟುವುದಕ್ಕೆ ಕಾರಣವಾಗುತ್ತದೆ. ಅಜ್ಞಾನವೆಂಬ ಕತ್ತಲಿನಿಂದ ಆವೃತವಾದ ಜೀವನಿಗೆ ತಪ್ಪು ತಿಳುವಳಿಕೆಯುಂಟಾಗುತ್ತದೆ. ಪಂಚಭೂತಗಳಿಂದ ನಿರ್ಮಿತವಾದ ದೇಹದಲ್ಲಿ ನಾನು –ನನ್ನದು ಎಂಬ ಮಮಕಾರವನ್ನು ಬೆಳೆಸಿಕೊಳ್ಳುತ್ತಾನೆ. ಆಕಾಶ, ವಾಯು, ಅಗ್ನಿ, ಜಲ ಮತ್ತು ಪೃಥಿವಿ – ಈ ಪಂಚಭೂತಗಳಿಂದ ಆತ್ಮನು ಅತಿರಿಕ್ತ ಎಂದಮೇಲೆ, ಯಾವ ಬುದ್ಧಿವಂತನು ತಾನೇ ಈ ಶರೀರದಲ್ಲಿ ಆತ್ಮಬುದ್ಧಿಯನ್ನಿಡಲು ಸಾಧ್ಯ? ಆತ್ಮನು ದೇಹಕ್ಕಿಂತ ಭಿನ್ನವೆಂದ ಮೇಲೆ, ಹೊಲ, ಮನೆ ಮೊದಲಾದವುಗಳನ್ನು ತಿಳುವಳಿಕೆಯುಳ್ಳವನು ನನದು ಎನ್ನಲು ಹೇಗಾದೀತು? ಮಾನವನು ಮಾಡುವ ಕರ್ಮಗಳೆಲ್ಲವೂ ದೇಹದ ಭೋಗಕ್ಕಾಗಿಯೇ ಆಗಿವೆ. ಆತ್ಮನಿಗಿಂತ ದೇಹವು ಬೇರೆಯಾದಾಗ, ಆ ಕರ್ಮವೆಲ್ಲವೂ ಜನಮರಣರೂಪವಾದ ಬಂಧಕ್ಕೆ ಕಾರಣವಾಗುತ್ತವೆ. ಇದನ್ನು ಒಂದು ಸರಳ ಸುಂದರ ಹೋಲಿಕೆಯ ಮೂಲಕ ವಿವರಿಸುತ್ತಾನೆ. ಮಣ್ಣಿನ ಮನೆಯು ಮಣ್ಣು ನೀರುಗಳ ಲೇಪನದಿಂದ ನಿಂತಿರುವಂತೆ, ಈ ನಮ್ಮ ದೇಹವು ಅನ್ನಪಾನಗಳೆಂಬ ಮಣ್ಣುನೀರುಗಳ ಲೇಪನವನ್ನು ಅವಲಂಬಿಸಿದೆ. ಪಂಚ ಭೂತಾತ್ಮಕವಾದ ಶರೀರವು ಪಂಚಭೂತಾತ್ಮಕವಾದ ವಿಷಯ ಸುಖವನ್ನು ಅನುಭವಿಸುವಾಗ ಆತ್ಮನಿಗೆ ಯಾವುದರಿಂದ ಸುಖವು ಲಭಿಸುತ್ತದೆಯೇ? ಖಂಡಿತವಾಗಿಯೂ ಇಲ್ಲ. ವಿಷಯ ಸುಖಗಳನ್ನನುಭವಿಸುವುದು ಬುದ್ಧಿಯೇ ಹೊರತು ಆತ್ಮನಲ್ಲ. ನಾನು ನನ್ನದು ಎಂಬ ಮಿಥ್ಯಾಜ್ಞಾನದ ಧೂಳಿನಿಂದ ಆವರಿಸಲ್ಪಟ್ಟ ಆತ್ಮನು ಸಾವಿರಾರು ಜನ್ಮಗಳಿಂದ ಸಂಸಾರಚಕ್ರಕ್ಕೆ ಸಿಲುಕಿ, ಮೋಹವಶನಾಗಿ ಆಯಾಸಗೊಳ್ಳುವನು. ಹೇಗೆ ನಾವು ಶರೀರಕ್ಕೆ ಅಂಟಿದ ಧೂಳನ್ನು ಬಿಸಿನೀರಿನಿಂದ ಸ್ವಚ್ಛಗೊಳಿಸುವೆವೋ, ಅಂತೆಯೇ ತತ್ತ್ವಜ್ಞಾನ ಎಂಬ ಬಿಸಿನೀರಿನಿಂದ ಚೆನ್ನಾಗಿ ತೊಳೆಯಬೇಕು. ಆಗ ಸಂಸಾರದ ದಾರಿಹೋಕನ ಮೋಹಜನ್ಯವಾದ ಆಯಾಸವು ಶಾಂತಗೊಳ್ಳುವುದು. ಈ ಮೋಹವೆಂಬ ಆಯಾಸವು ಶಾಂತಗೊಂಡ ಬಳಿಕ ಅಂತಃಕರಣವು ತನ್ನ ಸ್ವಸ್ವರೂಪದಲ್ಲಿ ಸ್ಥಿರಗೊಳ್ಳುತ್ತದೆ. ಆಗ ನರನು ನಿರತಿಶಯವಾದ ಮೋಕ್ಷವೆಂಬ ಪರಮಸುಖವನ್ನು ಪಡೆಯುವನು.

ಮುಂದೆ ಆತ್ಮನ ಸ್ವರೂಪವನ್ನು ತಿಳಿಸಲಾಗಿದೆ. ಆತ್ಮಸ್ವರೂಪವನ್ನು ತಿಳಿಯಬೇಕಾದರೆ ಅವಿದ್ಯೆಯು ಅಳಿಯಲೇ ಬೇಕು. ಅವಿದ್ಯೆಯ ನಾಶಕ್ಕೆ ಯೋಗಮಾರ್ಗವಲ್ಲದೆ ಅನ್ಯ ದಾರಿಯೇ ಇಲ್ಲ ಎಂದು ಯೋಗ ವಿಧಾನವನ್ನು ವಿವರಿಸುವನು.

ಯೋಗಿಯಾದವನು ಬ್ರಹ್ಮದಲ್ಲಿ ಪ್ರವೇಶಿಸಲು ಮೊದಲು ಅರ್ಹತೆಯನ್ನು ಸಂಪಾದಿಸಬೇಕು. ಆ ಅರ್ಹತೆಯೇನೆಂದರೆ, ನಿಷ್ಕಾಮನಾಗಿ ಯೋಗಾಂಗಳಾದ ಯಮ, ನಿಯಮ, ಆಸನ, ಪ್ರಾಣಾಯಾಮ, ಪ್ರತ್ಯಾಹಾರ, ಧ್ಯಾನ, ಧಾರಣ, ಸಮಾಧಿಗಳನ್ನು ಪಾಲಿಸಬೇಕು.

ಅಹಿಂಸೆ, ಸತ್ಯ, ಅಸ್ತೇಯ, ಅಪರಿಗ್ರಹಗಳು ಯಮಗಳೆನಿಸುತ್ತವೆ.

ಮನವನ್ನು ನಿಗ್ರಹಿಸಿ ಸ್ವಾಧ್ಯಾಯ, ಶೌಚ, ಸಂತೋಷ, ತಪಸ್ಸು ಮತ್ತು ಪರಬ್ರಹ್ಮನಲ್ಲಿ ಮನಃಪ್ರಣವತೆಯೆಂಬ ಈಶ್ವರ ಪ್ರಣಿಧಾನವನ್ನು ಆಚರಿಸುವುದು ನಿಯಮವೆನಿಸುತ್ತದೆ.

ಯಮನಿಯಮಗಳೆಂಬ ಈ ಗುಣಗಳಿಂದ ಕೂಡಿದ ಯೋಗಿಯು ಒಂದು ಆಸನವನ್ನಾಶ್ರಯಿಸಿ ನಿಯತವಾಗಿ ಯೋಗಾಭ್ಯಾಸವನ್ನು ಮಾಡಬೇಕು.

ಪ್ರಾಣವೆಂಬ ವಾಯುವನ್ನು ವಶಪಡಿಸಿಕೊಳ್ಳುವುದೇ ಪ್ರಾಣಾಯಾಮ. ಇದರಲ್ಲಿ ಸಬೀಜ ಪ್ರಾಣಾಯಾಮ ಹಾಗೂ ಅಬೀಜ ಪ್ರಾಣಾಯಾಮವೆಂದು ಎರಡು ವಿಧ. ಪೂರಕ, ರೇಚಕ, ಕುಂಭಕ – ಇವು ಮೂರೂ ಸೇರಿ ಒಂದು ಪ್ರಾಣಾಯಾಮವ ೆನಿಸುತ್ತದೆ.

ಇಂದ್ರಿಯಗಳನ್ನು ಚಿತ್ತದಲ್ಲಿ ಲೀನವಾಗಿಸಬೇಕು. ಈ ವಿಧಾನದಿಂದ ಅತ್ಯಂತ ಚಂಚಲವಾದ ಇಂದ್ರಿಯಗಳು ಅವನಿಗೆ ವಶೀಭೂತವಾಗುತ್ತವೆ. ಇಂದ್ರಿಯಜಯವನ್ನು ಸಾಧಿಸದವನು ಏನನ್ನೂ ಸಾಧಿಸಲಾರ. ಹೀಗೆ ಪ್ರಾಣಾಯಾಮದಿಂದ ವಾಯುವನ್ನೂ, ಪ್ರತ್ಯಾಹಾರದಿಂದ ಇಂದ್ರಿಯವನ್ನೂ ನಿಗ್ರಹಿಸಿ, ಬ್ರಹ್ಮವಸ್ತುವಿನಲ್ಲಿ ಮನವನ್ನು ನೆಲೆಗೊಳಿಸಬೇಕು.

ಈ ರೀತಿಯ ಸದಾಚರಣೆಯಿಂದ ಮಾನವನ ಮೋಹವು ನಷ್ಟವಾಗಿ, ಅವನು ಜನನಮರಣಗಳ ಬಂಧನದ ಕೊಂಡಿಯನ್ನು ಕಳಚಿಕೊಳ್ಳುವನು. ಪ್ರತಿಯೊಬ್ಬ ಮಾನವನ ಅಂತಿಮ ಗುರಿಯೂ ಇದೇ ಎಂದರೆ ಆತ್ಯಂತಿಕ ಸುಖವೇ ಆಗಿರುತ್ತದೆ.

ನಾವು ಅದನ್ನು ಸರಿಯಾಗಿ ಅರಿತು ಸಾಧನೆಯ ಹಾದಿಯಲ್ಲಿ ಕೇಶಿದ್ವಜನ ವಚನದಂತೆ ಸಾಗಿದಾಗ ಖಾಂಡಿಕ್ಯನು ತನ್ನ ಜೀವನವನ್ನು ಸಫಲಗೊಳಿಸಿಕೊಂಡಂತೆ ನಾವೆಲ್ಲರೂ ಸಾರ್ಥಕತೆಯನ್ನು ಕಾಣಬಹುದಲ್ಲವೆ?

WORKING WOMEN AND MENTAL HEALTH

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ABSTRACT: The time has come, at last, when the Indian women are seeing the light of modernity and emancipation, after centuries of humiliation, torture, exploitation and confinement. The Indian women have penetrated into the numerous fields and working shoulder to shoulder with men. They are enjoying the constitutional rights and shouldering the constitutional duties admirably.

The women who are confined in the homes face the domestic problems only. But the working women face the three sets of problems like: (1) the family problems, (2) office problems and (3) the problems which arose due to their over-exposure or over-indulgence, so to say, they are misusing the freedom or liberty

Some important causes that are responsible for the domestic problems of the working women are mentioned here: joint family system and the resultant greater responsibilities, dowry problem, harassment by the in-laws, duties towards husbands and children, lack of sleep or rest, excessive expenditures etc. In addition to the domestic problems, the working women face the problems in their work places, such as: boss's pressure, peer pressure, excessive work load particularly due to the adoption of the concept of multiple worker, long time for travelling, fear of pay cut and cut in fringe benefit, transfer or deputation (this problem become still more serious if the working husbands are not transferred or deputed) and consequent division of families, teasing in the office and the public places, etc. Then the third set of problems is a consequence of the misuse of the liberty or over-indulgence. Some problems related to the over-exposure are illicit relationships, rapes, murders, wine drinking, etc.

So whenever they are, they have confronted the problems. The problems lead to some diseases, such as; depression, blood pressure, diabetes, over-weight and obesity, mental and physical stress, disturbances in menstruation, radiation effects, back pain, head ache, vision problem, and so on. Depending upon the problems and diseases, the remedies have to be wide-ranging.

Introduction: Women's health creates and impacts the entire environment where she lives and work .The health issues arise due to mental tension, stress, depression and anxiety which is found in all most all the working women at office, running business and at homes. Now-a-days, women are exposed to official jobs, along with maintaining the private life in society. It does not being married or unmarried, but everyone is going through the stress and depression throughout the world. The materialism affects the human beings in the modern society so that a women bound to step into jobs and to some business to aid the family financially and to make herself economically independent in this expensive world but to be a multi tasking women pays a lot in fact which creates problems in her health and mind which leads to short life span. Being a multi tasking women it's too tough to handle well. Always there is a chance to hear allegation and receive harassment both from the family and the work place an excess work pressure and dissatisfaction in job pushes her to the depression for which she becomes imbalanced mentally and physically and prefers to be addicted to bad things. If she is a married women she is the victim of all the responsibilities and duties both at home and office so that she goes through depression because neither her family understands her problem nor the boss at office for which she gets headache, pains in body, irritation, frustration and weakness

Stress is no doubt a psychological disease but it affects health and creates lots of physical problem. These days' women are running to doctors to get through from stress and depressions but nothing works really until self realization takes place in mind

Some working women go for Yoga and exercise with balanced diet but all these things never have been affective for all the working women in stress because of the problem of time management and self consciousness.

The so called multi tasking modern women are knowingly getting stress due to various reasons that they may be ignorant of like - lack of family support and encouragement, colleague behavior, boss temperament in office, dissatisfaction from spouse and in laws, children rough behavior etc. create havoc and tension in their mind for which they fall mentally sick and develop health in critical condition. Always stress and sickness gets erupted when disturbed and dissatisfied with the job.

Mother with job is further difficult task to maintain the children. The children's of the family should have good ideals and environment to grow up in the shadow of the mother's love which the working mother fails to provide the proper care and teachings that her children needed. As children grow up their behaviors and life style become more irresistible. Consequently a mother gets suffering and mentally depressed and all her realization goes in vain.

Therefore, self awareness is required for all the women who are in job and running independent business. To take a proper care is indeed a challenging task in the busy society but

women have to realize first before they take care for others and service. If a son becomes mentally healthy then his father gets benefited but if a girl becomes mentally healthy, entire family gets benefited.

Objective

To identify receiving harassment both in family and work place

1) To Know how best support is getting in family

2) To know dissatisfaction from spouse and in-laws

Conclusion: Employment contributes to greater health benefits for unmarried than for married women & for married women, employment has more health benefits if their husbands participate more in household labour. Some women derive greater satisfaction from employment roles then from traditional roles as wife, mother.

ತತ್ವಪದ ಸಾಹಿತ್ಯದಲ್ಲಿ ಸತಿ–ಪತಿ ಭಾವ

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ಕನ್ನಡ ಉಪನ್ಯಾಸಕರು. ಎಸ್.ಆರ್.ಪಿ.ಎಸ್.ಪಿ.ಯು. ಕಾಲೇಜ. ರಾಯಚೂರು

ಹಿಂದೂ ಧರ್ಮ ಸಂಸ್ಕೃತಿಯ ಪುನರುತ್ಥಾನಕ್ಕಾಗಿ ತಲೆ ಎತ್ತಿದ ಭಾರತದ ಮಧ್ಯಕಾಲೀನ ಭಕ್ತಿ ಸಾಹಿತ್ಯವು ವೈಶಿಷ್ಟ್ಯತೆಯಿಂದ ಕೂಡಿದ್ದಾಗಿತ್ತು. ಈ ಸಂದರ್ಭದಲ್ಲಿ ಧರ್ಮಕ್ರಾಂತಿಯು ಹೋರಾಟಗಳ ನಡುವೆ ಮುಸಲ್ಮಾನರ ಆಕ್ರಮಣ, ರಾಜಕೀಯ ದಬ್ಬಾಳಿಕೆಯ ನಡುವೆಯೂ ಬಲಿಷ್ಠತೆಯನ್ನು ಪಡೆಯತು. ಹಿಂದೂ ಧರ್ಮಕ್ಕೆ ಪ್ರತಿಸ್ಪರ್ಧಿಯಾಗಿ ಇಸ್ಲಾಂ ಧರ್ಮವು ಪ್ರಚಾರಕ್ಕೆ ಬಂದಿತು. ಸಾಮಾನ್ಯ ಜನರು ತಲ್ಲಣಿಸುವಂತಹ ಸಂದರ್ಭದಲ್ಲಿ ಅಶಾಂತಿಯ ಜೊತೆಗೆ ಮತಾಂತರ ಕ್ರಾಂತಿಯೂ ಉಂಟಾಯಿತು. ಇಂತಹ ಸಂದರ್ಭದಲ್ಲಿ ಜನರಿಗೆ ರಕ್ಷಣೆಯ ಮಾರ್ಗ ಬೇಕಾಗಿದ್ದಿತು. "ಧರ್ಮ" ಆತ್ಮರಕ್ಷಣೆಯ ಕವಚವಾಗಿ ತಲೆಯೆತ್ತಿತ್ತು. ಕವಿಗಳ ಸ್ಫೂರ್ತಿಯ ಸೆಲೆ ರಣದಿಂದ ಸ್ಮರಣದತ್ತ ಹರಿಯಿತು. ಈ ಕ್ರಾಂತಿಯು 16ನೇ ಶತಮಾನದ ವರೆಗೂ ಮುಂದುವರಿಯಿತು.

ದೇಶಾದ್ಯಂತ ಮುಸಲ್ಮಾನರು ತಮ್ಮ ದೌರ್ಜನ್ಯದಿಂದ ಹಿಂದೂ ಜನರ ಮೇಲೆ ಶೋಷಣೆ ಮಾಡುತ್ತಿದ್ದರು. ಹಿಂದುಗಳ ಗುಡಿ, ಗೋಪುರಗಳು ಭಗ್ನವಾಗುತ್ತಿದ್ದವು. ಸಂತರ ಸಾಧಕರ, ಅವಮಾನ ನಡೆಯುತ್ತಿತ್ತು. ಇಷ್ಟಾದರೂ ಹಿಂದುಗಳು ಏನನ್ನು ಮಾಡಲಾರರಾಗಿದ್ದರು. ದೇಶದ ಪೂರ್ವ ಭಾಗದಲ್ಲಿ ವಜ್ರಯಾನಿ ಸಿದ್ಧರು, ಕಾಪಾಲಿಕರು ಮತ್ತು ಪಶ್ಚಿಮ ಭಾಗದಲ್ಲಿ ನಾಥ ಪಂಥಗಳು, ಜೋಗಿಗಳು ಗುಪ್ತಗಾಮಿನಿಯಾಗಿದ್ದರು. ಕರ್ಮ ಭಕ್ತಿಗಳೇ ಈ ಪ್ರದೇಶದಲ್ಲಿ ಸಾಮಾನ್ಯರ ಸಂಪತ್ತಾಗಿತ್ತು. ಭಕ್ತಿ ಮಾರ್ಗ ಚಳುವಳಿಯಿಂದ ದೇಶದ ಎಲ್ಲಾ ಭಾಷೆಗಳ ಮೇಲೆ ಧರ್ಮ ಜಾಗೃತಿಯ ಮನ ಮನ ಜಾಗೃತಿಯ ತಾಕಲಾಟಗಳು ಪ್ರಾರಂಭವಾದವು. ದಕ್ಷಿಣದಲ್ಲಿ ಮುಸಲ್ಮಾನರು ತಳವೂರಿದ ನಂತರ ಹಿಂದೂ ಧರ್ಮವು ಬಹುಭಾಗ ನಶಿಸಿ ಹೋಗಿತ್ತು. ಜನರು ಅಲೆಮಾರಿಗಳಂತೆ ತಮಗೆ ಇಷ್ಟವಾದ ತಾಣಗಳಿಗೆ ವಲಸೆ ಹೋಗುತ್ತಿದ್ದರು. ಇಂಥಹ ಸಂದರ್ಭದಲ್ಲಿ ಭಕ್ತಿಯ ಗಂಗೆ ದಕ್ಷಿಣದಿಂದ ಉತ್ತರಕ್ಕೆ ಹರಿದಳು. ಭಕ್ತಿ ದ್ರಾವಿಡ ದೇಶದಲ್ಲಿ ಹುಟ್ಟಿತೆಂದು, ಅದನ್ನು ರಾಮಾನುಜರು ಉತ್ತರಕ್ಕೆ ಒಯ್ದರೆಂದು ಕಬೀರರೇ ತಮ್ಮ ಪದ್ಮ ಪುರಾಣದಲ್ಲಿ ಹೇಳಿದ್ದಾರೆ.

"ಭಕ್ತಿ ದ್ರಾವಿಡ ಊಪಜೀ ಲಾಯೆ ರಾಮಾನಂದ
ಪರಗಟಕೀಯೋ ಕಬೀರ ನೆ ಸಾತ್ ದ್ವೀಪ ನವಖಂಡ"

ಭಾರತದ ಭಕ್ತಿ ಆಂದೋಳನವು ದಕ್ಷಿಣ ಭಾರತದ ಮಹತ್ವಪೂರ್ಣ ಕೊಡುಗೆಯಾಗಿದೆ. ಈ ಚಳುವಳಿಯಿಂದ ಪ್ರೇರಣೆ ಪಡೆದ ದೇಶದ ಎಲ್ಲಾ ಭಾಷೆಗಳು ಗುಣ ವಿಶಿಷ್ಟತೆಯನ್ನು ಹೊಂದಿದ ಯುಗವಾಗಿ ತಮಿಳು ನಾಡು, ಕರ್ನಾಟಕ, ಮಹಾರಾಷ್ಟ್ರ, ಬಂಗಾಲ ರಾಜ್ಯಗಳಲ್ಲೆಲ್ಲಾ ಭಕ್ತಿ ಸಾಹಿತ್ಯ ತನ್ನ ಕಾಲದ ಚರಿತ್ರೆಗೆ ತೋರಿರುವ ಪ್ರತಿಕ್ರಿಯೆಗಳು ಧರ್ಮ ಪಂಥಗಳಲ್ಲಿ ಕಂಡು ಬರುವ ಸಾಮಾನ್ಯ ತತ್ವಗಳು ನಮಗೆ ಕಾಣಸಿಗುತ್ತವೆ.

ಕನ್ನಡದ ಭಕ್ತಿಯ ತತ್ವಪದಗಳಿಗೆ ಸಮಾನವಾದ ರಚನೆಗಳು ಭಾರತದ ಅನೇಕ ಭಾಷೆಗಳಲ್ಲಿ ನಮಗೆ ಕಾಣಸಿಗುತ್ತವೆ. ಉರ್ದುವಿನಲ್ಲಿ ಹಾಡುವ ಕವ್ವಾಲಿಗಳು, ಚಾರ್‌ಬೈತ್‌ಗಳು, ಕಾಶ್ಮೀರಿಯ ವತ್ಸುನ್ ರಚನೆಗಳು, ಮಲಯಾಳಂನ ವೇಲನ್ ಪಾಣನ್, ತಮಿಳಿನ ಭಕ್ತಿ ಪ್ಪಾಡಲ್, ತೆಲುಗಿನ ತತ್ವಾಲು, ಪಂಜಾಬಿಯ ಸೂಕ್ ಸಾಗರ್ ಹಾಡುಗಳು, ಬಂಗಾಲಿಯ ಬಾವುಲ್ ಗೀತೆಗಳು, ಮರಾಠಿಯಲ್ಲಿ ತುಕಾರಾಂ ಗೀತೆಗಳು, ಹಿಂದಿಯಲ್ಲಿ ಕಬೀರ್‌ದಾಸ್, ರೈದಾಸ್ ಮುಂತಾದ ಸಗುಣ ಪಂಥದವರ ಹಾಡುಗಳು, ಕನ್ನಡದ ತತ್ವಪದ ಸಾಹಿತ್ಯಕ್ಕೆ ಮುಖ್ಯ ಭೂಮಿಕೆಯನ್ನು ಒದಗಿಸಿವೆ.

ಭಕ್ತಿ ಪಂಥಗಳಲ್ಲಿ ಗುರುವನ್ನು ದೇವರನ್ನು ನಲ್ಲನೆಂದು, ಪತಿ ಎಂದು ಸ್ವೀಕರಿಸಿದ ಉದಾಹರಣೆಗಳು ಸಾಕಷ್ಟಿವೆ. ಮೀರಾಬಾಯಿ ಕೃಷ್ಣನ್ನು ಪತಿಯಾಗಿ ಸ್ವೀಕರಿಸಿ ಹಾಡಿದ ಹಾಡುಗಳು, ಅಕ್ಕಮಹಾದೇವಿ ಚೆನ್ನಮಲ್ಲಿಕಾರ್ಜುನನನ್ನು ಪತಿಯೆಂದು ಸ್ವೀಕರಿಸಿದಳು. "ಹಾದರ ಮಾಡುವೆನೆ ಹರನ ಕೂಡ ಮನವೆಂಬ ಸಖಿಯ ಪ್ರಸಾದದಿಂದ" ಎಂದು ಹೇಳಿದ್ದನ್ನು ನೋಡಿದರೆ ಆಧ್ಯಾತ್ಮದ ಅನುಭಾವ ಮನೋವಿಶ್ಲೇಷಣಾತ್ಮಕವಾಗಿ ಮುಂದುವರೆಯುತ್ತದೆ. ಇದೇ ಸತಿ–ಪತಿ ಭಾವ.

ಹೀಗಾಗಿ ಪ್ರತಿ ಮನುಷ್ಯ ಸಂಬಂಧಗಳಲ್ಲಿ ಹೆಣ್ಣು ಗಂಡಿನ ಗುಣಗಳು ಕಾರ್ಯ ನಿರ್ವಹಿಸುತ್ತಿರುತ್ತವೆ. ಹೆಣ್ಣಿನ ತುಮುಲಗಳು ಹೆಚ್ಚಾದಾಗ ಹೆಣ್ಣಿನ ಗುಣಗಳು, ಗಂಡಿನ ತುಮುಲಗಳು ಹೆಚ್ಚಾದಾಗ ಪುರುಷ ಸ್ವಭಾವಗಳು ದೇಹದಲ್ಲಿ ವಾಸ್ತವ್ಯ ಹೂಡುತ್ತವೆ.

ನಮ್ಮ ಪ್ರಾಚೀನ ಧಾರ್ಮಿಕ ಸೂತ್ರಗಳಾದ ನಾಥ, ಶೈವ, ಶಾಕ್ತ, ತಾಂತ್ರಿಕ ಪಂಥಗಳಲ್ಲಿ ಸ್ತ್ರೀಯನ್ನು ಮಾತೃ ಸ್ವರೂಪಿಣಿ ಶಕ್ತಿಯೆಂದು ಪೂಜಿಸಿದ ಉದಾಹರಣೆಗಳನ್ನು ಕೂಡ ನೋಡುತ್ತೇವೆ. "ಲೋಕದ ಪರತತ್ವವನ್ನು ಸ್ತ್ರೀ ರೂಪದಲ್ಲಿ ಭಾವಿಸಿಕೊಂಡು ಆರಾಧಿಸುವ ಧರ್ಮದಲ್ಲೊಂದು ಶಾಕ್ತ ಧರ್ಮವಾಗಿದೆ. ಪರತತ್ವಕ್ಕೆ ಸ್ತ್ರೀ ಮತ್ತು ಪುರುಷ ರೂಪಗಳೆರಡೂ ಇದ್ದರೂ ಪ್ರಾಜ್ಞಾಶಕ್ತಿ ನಿಷ್ಕ್ರಿಯವಾಗಿರುತ್ತದೆ. ಈ ಕ್ರಿಯಾ ರೂಪಿ ಬಲವಾದ ಶಕ್ತಿ ಸ್ತ್ರೀ ರೂಪದ್ದು, ಇದು ಕ್ರಿಯಾತ್ಮಕವೆಂದು ಶಾಕ್ತರು ನಂಬುತ್ತಿದ್ದು ಶಕ್ತಿಯನ್ನು ಮಾತೆಯ

ರೂಪದಲ್ಲಿ ಗ್ರಹಿಸುತ್ತಾರೆ. ದೈವಿಕ ಪರತತ್ವದಲ್ಲಿ ಸ್ತ್ರೀ ಪುರುಷ ರೂಪಗಳೆರಡೂ ಇದ್ದರೂ ಅಂತಿಮವಾಗಿ ಆತ್ಯಂತಿಕ ಸ್ವರೂಪದಲ್ಲಿ ಇದಕ್ಕೆ ಹೆಣ್ಣು ತನವಾಗಲಿ ಗಂಡುತನವಾಗಲಿ ಇರುವುದಿಲ್ಲ.

ತತ್ವಪದಕಾರರು ಸ್ತ್ರೀ ಸಂಬಂಧ ಬಗ್ಗೆ ಮಾತನಾಡುತ್ತಾ ಸತಿಯನ್ನು ಮಾಯೆ, ಪ್ರಾಣ ಸಂಗಾತಿ, ನಳಿನಾಕ್ಷಿ, ಬಾಲೆ, ಪೋರಿ ಎಂಬಂತಹ ಪದಗಳ ಮೂಲಕ ಸಂಭೋದಿಸುತ್ತಾರೆ. ಇವು ಪದೆ ಪದೆ ಹಾಡುಗಳಲ್ಲಿ ಸ್ತ್ರೀ ದೃಷ್ಟಿಕೋನದ ನಿಷ್ಪತೆಯನ್ನು ಪ್ರತಿನಿಧಿಸುತ್ತದೆ. ತಾನು ಆರಾಧಿಸುವ ಶಕ್ತಿ ದೇವತೆಯನ್ನು ಲಿಂಗಾತೀತವೆಂದು ಸ್ತುತಿಸುತ್ತಾನೆ. ತತ್ವ ಹೇಳುವಾಗ ಬಳಸುವ ತಂಗಿ, ನಾರಿ, ಅವ್ವ, ಅಕ್ಕ, ಇಂಥ ಸಂಬಂಧವಾಚಕಗಳು ಆತ್ಮಾನುಸಂಧಾನದ ಸಂಕೇತಗಳಾಗಿವೆ.

ಡಾ. ದೇವಿಪ್ರಸಾದ್ ಚಟ್ಟೋಪಾಧ್ಯಾಯರು ಹೀಗೆ ಹೇಳುತ್ತಾರೆ. "ವಾಮ ಎಂಬುದಕ್ಕೆ ಸ್ತ್ರೀ, ಕಾಮ, ಅರ್ಥಗಳು ಇರುವುದರತ್ತ ಗಮನ ಸೆಳೆದು "ವಾಮಭೂತೃಯಜೇತ್ ಪರಮ್" ಎಂದರೆ ಪರತತ್ವವನ್ನು ಆರಾಧಿಸಲು ಸಾಧಕನು ಹೆಣ್ಣಾಗಲೇ ಬೇಕೆಂಬುದೇ ವಾಮಾಚಾರದ ಮೂಲ ಸಿದ್ಧಾಂತವೆಂದು ಪ್ರತಿಪಾದಿಸುತ್ತಾರೆ. ತಾಂತ್ರಿಕರು ಆಚರಿಸುವ ಸ್ತಂಭನಾಯೋಗವೆನ್ನುವುದು ಸಾಧಕನು ತನ್ನೊಳಗಿನ ಸ್ತ್ರೀ ಸತ್ವವನ್ನು ಸಾಕ್ಷಾತ್ಕರಿಸಿಕೊಳ್ಳುವ ಸಂಗಾತಿಯೇ ಆಗಿದೆ ಎಂದು ಅವರ ಅಭಿಮತವಾಗಿದೆ. ಷಟ್‌ಚಕ್ರಗಳು, ಪದ್ಮಗಳು, ತ್ರಿಕೋನಗಳು ಸ್ತ್ರೀ ಶಕ್ತಿಯ ಸಂಕೇತಗಳಾಗಿದ್ದು ಸಾಧಕನು ಎಚ್ಚರಿಸಿಕೊಳ್ಳಬೇಕಾದ ಕುಂಡಲಿನಿ ಶಕ್ತಿಯು ತನ್ನೊಳಗಿನ ಸ್ತ್ರೀ ಶಕ್ತಿಯನ್ನು ಆಹ್ವಾನಿಸಿಕೊಳ್ಳುವ ಕ್ರಯೆಯಾಗಿರುತ್ತದೆ. ಇಂತಹ ಹಲವಾರು ವಿಚಾರಗಳನ್ನು ಸೆಮಿನಾರ್‌ನಲ್ಲಿ ವಿವರಿಸಿ, ವಿಮರ್ಶಿಸಿ ಹೇಳುತ್ತೇನೆ.

ಅಕ್ಕಮ್ಮನ ವಚನಗಳ ಪ್ರಸ್ತುತತೆ

ಡಾ. ಶೀಲಾಕುಮಾರಿ ದಾಸ
ಸಹಪ್ರಾಧ್ಯಾಪಕರು, ಕನ್ನಡ ವಿಭಾಗ, ಎಲ್.ವಿ.ಡಿ. ಮಹಾವಿದ್ಯಾಲಯ, ರಾಯಚೂರು.

ವಚನಕಾರರು ಕರ್ನಾಟಕದ ಸ್ತ್ರೀಸಮಾನತೆಯ ಹರಿಕಾರರು. ದ್ರಾವಿಡ ಸಂಸ್ಕೃತಿಯಲ್ಲಿದ್ದ ಸಮಾನತೆಯನ್ನು ಕಳೆದುಕೂಂಡು ಶೋಷಣೆಯಲ್ಲಿ ಬಳಲುತ್ತಿರುವ ಸಂದರ್ಭದಲ್ಲಿ, ವಚನಕಾರರು ಸಮಾನತೆಯನ್ನು ತಂದು ಕೊಟ್ಟರು. ಸ್ತ್ರೀ ಅಭಿವೃದ್ಧಿ ಇಲ್ಲದೆ ಸಮಾಜದ ಅಭಿವೃದ್ಧಿಸಾಧ್ಯವಿಲ್ಲಾ ಎಂದು ನಂಬಿದವರು. ಹಾಗೆಯೆ ನಡೆದುಕೊಂಡವರುಕಲಾಂತರದ ಬದಲಾವಣೆಯಲ್ಲಿ ಅವಕಾಶಗಳನ್ನು ಕಸಿದುಕೊಳ್ಳಲಾಯಿತು. ಇಂಥಾ ಸಂದರ್ಭದಲ್ಲಿ ವಚನಕಾರರು ಆತ್ಮಕ್ಕೆ ಲಿಂಗವಿಲ್ಲಾ ಸ್ತ್ರೀ ಪುರುಷರು ಸಮಾನರು. ಪುರುಷರಿಗೆ ಇರುವ ಅವಕಾಶಗಳೆಲ್ಲಾ,ಹಕ್ಕುಗಳೆಲ್ಲ ಮಹಿಳೆಯರಿಗೂ ದಕ್ಕಬೇಕು ಎಂದು ಪ್ರತಿಪಾದಿಸಿದರು, ಹೆಣ್ಣುಹೊನ್ನುಮಣ್ಣು ಮಾಯೆ ಇವುಗಳಿಂದ ದೂರ ಇರಬೆಕು. ಇವು ಸಾಧನೆಗೆ ಮಾರಕ ಎಂದು ಹೆಳುತ್ತಿರುವ ಸಂದರ್ಭದಲ್ಲಿ ಹೆಣ್ಣು ಮಾಯೆಯಲ್ಲಾ ,ಮನದಮುಂದಣ ಆಸೆಯೇ ಮಾಯೆ ಎಂದು ಪ್ರತಿಪಾದಿಸಿದರು, ಹೆಣ್ಣು ರಕ್ಕಸಿಯಲ್ಲ. ಆಕೆ ಪ್ರತ್ಯಕ್ಷ ಕಪಿಲಸಿದ್ಧಮಲ್ಲಿಕಾರ್ಜುನ ಎಂದು ಅವಳಲ್ಲಿ ದೈವತ್ವವನ್ನು ಕಂಡರು. ಆಕೆಗೊ ಧಾರ್ಮಿಕ ಆಚರಣೆಗೆ ಅವಕಾಶನೀಡಿ ಅತ್ಯೋದ್ಧೋರದ ಬಾಗಿಲತೆರೆದರು. ಹೆಣ್ಣನ್ನು ಬರೀ ಭೋಗದ ವಸ್ತುಎಂದು ಕಾಣದೆ ಆಕೆಯನ್ನು ಮಾತೃಸ್ವರೊಪದಲ್ಲಿ ಪಾರ್ವತಿ ಸ್ವರೂಪದಲ್ಲಿ ಕಾಣಲು ಹೇಳಿದರು. "ಸತಿ ಪತಿಗಳೊಂದದ ಭಕ್ತಿ ಹಿತವಪ್ಪುವದು ಶಿವಂಗೆ" ಎಂದು ಸಂಸಾರದಲ್ಲಿ ಮಹಿಳೆಯರಿಗೊ ಪ್ರಾಧಾನ್ಯತೆನೀಡಿದರು. ಇಂಥಪರಿಸರವನ್ನು ಮಹಿಳೆಯರಿಗೆ ಒದಗಿಸಿಕೊಟ್ಟರು,ಅದರ ಫಲವಾಗಿ ಅನೇಕ ಮಹಿಳೆಯರು ಅಭಿವ್ಯೆಕ್ತಿ ಸ್ವಾತಂತ್ರ್ಯವನ್ನು ಪಡೆದುಕೊಂಡರು. ವಚನಗಳ ರಚನೆಯನ್ನು ಮಾಡಿದರು. ಅವರಲ್ಲಿ ಪ್ರಮುಖಳಾದವಳು ಅಕ್ಕಮಹಾದೇವಿ. ಇವಳು ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಮೊದಲ ಕವಿಯಿತ್ರಿ, ಈಕೆಯು ಕನ್ನಡನಾಡಿನ ಹೆಮ್ಮೆಯ ವಚನಕಾರ್ತಿ ಈಕೆಯ ಸಾಧನೆ ಅನುಕರಣೀಯ, ಆರ್ದಶನೀಯ. ಈಕೆಯ ನಂತರದ ಸ್ಥಾನವೇ ಅಕ್ಕಮ್ಮನದು.

ಈಕೆಯ ಒಂದುನೂರಾ ಐವತ್ಮೂರು ವಚನಗಳನ್ನು ಕನ್ನಡ ಮತ್ತು ಸಂಸ್ಕೃತಿ ಇಲಾಖೆ ಬೆಂಗಳೂರು ವಚನಸಂಪುಟದಲ್ಲಿ ಪ್ರಕಟಿಸಿದ್ದಾರೆ. ಈಕೆಯ ವೈಯಕ್ತಿಕ ವಿಚಾರ ಹೆಚ್ಚಾಗಿ ತಿಳಿದುಬಂದಿಲ್ಲಾ. ಆದರೆ ಈಕೆಯ ವಚನಗಳು ಮೌಲಿಕವಾಗಿವೆ. ಇಂದಿಗೂ ಪ್ರಸ್ತುತವಾಗಿವೆ. ಈಕೆಯು "ಆಚಾರವೇ ಪ್ರಾಣವಾದ ರಾಮೆಶ್ವರಲಿಂಗ" ಎಂಬ ಅಂಕಿತದಿಂದ ವಚನರಚನೆ ಮಾಡಿದ್ದಾಳೆ. ಧರ್ಮಾಚರಣೆಯಲ್ಲಿ ವ್ರತ, ಆಚಾರ, ನೇಮ, ನಿಷ್ಠೆ ಬಹು ಮುಖ್ಯವಾದವು. ಅವುಗಳನ್ನು ಅನುಷ್ಠನ ಮಾಡುವ ವಿಧಾನವು ಅಷ್ಟೇ ಮುಖ್ಯ. ಆ ಕುರಿತು ಬಹಳ ವಿವರವಾಗಿ ತನ್ನ ವಚನದಲ್ಲಿ ಹೇಳಿದ್ದಾಳೆ. ವ್ರತ ಎಂದಾಗ ಅಕ್ಕಿ, ಬೇಳೆ. ಬೆಲ್ಲ ಮುಂತಾದ ವಸ್ತುಗಳನ್ನು ದಾನಮಾಡುತ್ತಾರೆ. ಆದರೆ ಅಕ್ಕಿ, ಬೇಳೆ, ಬೆಲ್ಲ ಮುಂತಾದ ದ್ರವ್ಯಕ್ಕೆ ವ್ರತವಲ್ಲ, ಚಿತ್ತಕ್ಕೆ ವ್ರತ. ಬಾಹ್ಯದಲ್ಲಿ ಮಾಡುವ ಕ್ರಿಯೆ ವ್ರತವಲ್ಲಾ. ವ್ರತವನ್ನು ಅಂತರಂಗದಲ್ಲಿ ಮಾಡಬೇಕು. "ತನ್ನ ಸ್ವಪ್ನದಲ್ಲಿ ತನ್ನದಲ್ಲದು ತಾ ಕಂಡೊಡೆ, ತಾ ಮುಟ್ಟದದು ಮುಟ್ಟದರೆ, ತಾ ಕೊಳ್ಳದು ಕೊಂಡೊಡೆ, ತನುವಿನಲಿ ಸೂಕ್ಷ್ಮತನುನಿಂದುದು ವ್ರತ" ಎಂದು ಕನಸಿನಲ್ಲೊ ಪರರವಸ್ತುವನ್ನು ಬಯಸದೆ ಇರುವುದು ವ್ರತ ಎಂದು ಹೇಳುತ್ತಾಳೆ.

ಮನದಲ್ಲಿ ವ್ರತ ಮಾಡುತ್ತಾ ಬಾಹ್ಯದಲಿ ಆಚಾರ ಶೂನ್ಯನಾಗಿದ್ದರೆ ಅದು ವ್ರತವಲ್ಲಾ. ಉಭಯ ಸಿದ್ಧಮಾಡಿದ ವ್ರತವೇ ನಿಜವಾದ ವ್ರತ ಎಂದು ಹೇಳುತ್ತಾಳೆ. ವ್ರತ ಮಾಡುವವನು ಮದ್ಯ, ಮಾಂಸ, ಪರಪಾಕ ಸೇವಿಸುವವನು ಆಗಿರಬಾರದು, ಅರಿತೂ ಅರಿಯದೆಯೋ ತಪ್ಪು ನಡೆದರೂ ಅಂಥವನು ಲಿಂಗಕ್ಕೆ ಸಲ್ಲ, ಜಂಗಮಕ್ಕೆ ಸಲ್ಲ ಎಂದು ಹೇಳುತ್ತಾಳೆ. ಅನ್ಯರಲ್ಲಿ ಹೋಗಿ ಲಿಂಗಕ್ಕೆ ಆಹಾರ ಕೊಡದೆ ಪ್ರಸಾದ ಸ್ವೀಕರಿಸಿದರೆ ಅಂಥವನು ವ್ರತಿ ಆಗಲಾರ. ಇಂಥವನನ್ನು ವ್ರತ ಭ್ರಷ್ಟ ಎಂದು ಕರೆಯುತ್ತಾಳೆ. ವ್ರತ ಮಾಡುವವನು ಪಂಚೇಂದ್ರೀಯಗಳನ್ನು ನಿಗ್ರಹಿಸಿಕೋಳ್ಳಬೇಕು. ಅನ್ಯರ ಬಗಗೆ ಮಾತಾಡಲು ನಾಲಿಗೆ ಬಂಧನ. ದುರ್ಗಂಧಕ್ಕೆ ನಾಸಿಕ ಬಂಧನ, ನಿಂದೆಗೆ ಕರ್ಣಬಂಧನ, ದೃಕ್ಕಿಗೆ ಕಾಮಬಂಧನ, ಚಿತ್ತಕ್ಕೆ ಆಶಾಬಂಧನ, ಅಂಗಕ್ಕೆ ಅಂಹಕಾರ ಬಂಧನ, ಈ ರೀತಿಯ ಷಡ್‌ಬಂಧನ ಹರಿದಲ್ಲದೆ ವ್ರತಮಾಡಲು ಆಗುವುದಿಲ್ಲಾ. ಇಂಥವರ ವ್ರತ ಕಳ್ಳರ ವ್ರತವಾಗುತ್ತದೆ. ಅರಸಿಯಾದವಳು ಆದರ್ಶವಾಗಿರಬೇಕೆಂದು ಹಾವಕಚ್ಚಿಸಿಕೊಂಡು ಸಾವತರಸಿಕೊಂಡಂತೆ. ಭಕ್ತನಾದವನಲ್ಲಿ ಈ ತೋರಿಕೆಯ ವ್ರತ ಸಲ್ಲದು. ಇವನು ಆಚಾರಕ್ಕೆ ಹೂರಗಾಗುತ್ತಾನೆ

ಅಚಾರ ತಪ್ಪಿದರೆ ಪ್ರಾಯಶ್ಚಿತ ಇದೆ ಎಂದು ಅನಾಚಾರಿಗಳ ಸಂಗಮಾಡಬಾರದು. ಬಂಗಾರವ ಕರಗಿಸಿ ಬೇರೆ ರೂಪವ ಮಾಡಬಹುದು, ಆದರೆ ಮುತ್ತು ಮುರಿದು ಬೇರೆ ರೂಪವ ಮಾಡಬಹುದೇ ಎಂದು ಪ್ರಶ್ನಿಸುತ್ತಾಳೆ. ವ್ರತ ಮಾಡುವವನು "ಗುರುಲಿಂಗ ಜಂಗಮಕ್ಕೆ ನಿಷ್ಪಾವಂತನಗಿರಬೇಕು. ಇಲ್ಲದೇ ಹೋದರೆ ಶುದ್ಧ ಆಚಾರವಲ್ಲ. ಖಂಡವ್ರತ. ಅಖಂಡವ್ರತ, ಸಂದವ್ರತ, ಸಲ್ಲದವ್ರತ ಎಂದು ತಿರುಗುವದು ವ್ರತವಲ್ಲ. ಊರವರಿಗೆಲ್ಲಾ ಯಾಕೆ ತಿಳಿಯಬೇಕು. ಹಾಗೆ ತಿಳಿವಂತೆ ಮಾಡಿದರೆ ಊರ ಮಗನನ್ನು ಬಾಗಿಲ್ಲಿ ಇರಿದು ಕೂಂದಂತೆ, ವ್ರತವಮಾಡಿ ಖ್ಯಾತಿಯ ಪಡೆಯಬೇಕೆಂದರೆ ಊರಜನ ಮುಂದೆ ಸತಿಯಳ ತೋರಿದಂತೆ ಅಪವಿತ್ರವಾಗುತ್ತದೆ. ಮಹಾವ್ರತಿಗಳು, ವ್ರತಿಗಳ ಮನೆಗೆ ಹೋದಾಗ ಕಣ್ಣಿಗೆ ಕಾಣಿಸಿದ್ದು ಬೇಡದೆ. ಬಾಯಿಗೆ ಬಂದದ್ದು ನುಡಿಯದೆ, ಕಾಮದ ದ್ರಷ್ಟಿಯಿಂದ ನೋಡದೆ. ಶಿವಲಿಂಗಪೂಜೆ, ಶಿವಧ್ಯಾನಮೂರ್ತಿ, ಶಿವಕಥಾ ಪ್ರಸಂಗ, ಶಿವಶೆರಣರ ಸಂಗ, ಕ್ರಿಯಾನುಭವದಲ್ಲಿ ಇರುವವನೆ ಮಹವ್ರತಿಯಾಗುತ್ತಾನೆ. ಮಹಾವ್ರತಿಯು "ತಾನು ಭೋಗಿಸುವಂತಹ ಸಕಲ ದ್ರವ್ಯಂಗಳೆಲ್ಲವ ನ್ನು ಜಂಗಮಕ್ಕೆ ಕೊಟ್ಟುತಾನುಕೊಳ್ಳಬೇಕು. ಇದುವೇ" ಶುದ್ಧ ಆಚಾರ ಕ್ರಮ ಎಂದಿದ್ದಾಳೆ.

ಕಾಮಿಗೆ ವ್ರತಉಂಟೆ ನಿ:ಕಾಮಿಗಲ್ಲದೆ
ಕ್ರೊಧಿಗೆ ವ್ರತಉಂಟೆ ಸಮಧಾನಿಗಲ್ಲದೆ
ಲೋಭಿಗೆ ವ್ರತ ಉಂಟೆ ಉದಾರಿಗಲ್ಲದೆ

ಇಂತೀ ಕ್ಷಮೆ. ದಮೆ, ಶಾಂತಿ, ಸಮಾಧಾನ ಸಂಪದ ಮುಂತಾಗಿ ಗುರುಲಿಂಗ ಜಂಗಮಕ್ಕೆ ತನುಮನಧನ ನಿರುತನಾಗಿ
ತನ್ನ ಪ್ರಾಣಕ್ಕೆ ಇದ್ದಂತೆ ಚಿತ್ತ ಶುದ್ಧಾತ್ಮನಾಗಿ ಇಪ್ಪ ಮಹಭಕ್ತನೇ ಕೃತ್ಯವಿಲ್ಲದಶರಣ
ಆತನಪಾದ ಎನ್ನ ಹೃದಯದಲ್ಲಿ ಅಚ್ಚೂತ್ತಿದಂತಿಪ್ಪುದು ಆಚಾರವೇ ಪ್ರಾಣವಾದ
ರಾಮೇಶ್ವರಲಿಂಗವು ಅರಿವು ಎತ್ತುಕಟ್ಟುವ ಗೂತ್ತಾಗಿಪ್ಪನು.

ಎಂದು ಕಾಮ, ಕ್ರೋಧ, ಲೋಭ ಮುಂತಾದ ಅರಿಷಡ್ವರ್ಗಗಳನ್ನು ಗೆದ್ದು, ಕ್ಷಮೆ, ದಮೆ, ಸಮಾಧಾನ, ದಂತಹ ಗುಣಗಳನ್ನು ರೂಢಿಸಿಕೂಂಡು ಚಿತ್ತಶುದ್ಧನಾದ ವ್ಯಕ್ತಿಯೇ ಶರಣ. ಆತನಪಾದ ಎನ್ನ ಹೃದಯದಲ್ಲಿ ಅಚ್ಚೊತ್ತಿರಲಿ. ಡಂಬಾಚಾರದ ಭಕ್ತಿಯು ಭಕ್ತಿಯೇ ಅಲ್ಲ.ಆತನು ಭಕ್ತನೇಅಲ್ಲ. "ಆಚೆಯ ನೀರು ಈಚೆಯಲ್ಲಿ ತೆಗೆಯುವದು ಚಿಲುಮೆಯಲ್ಲ
ಆಚೆಯಲ್ಲಿ ಕೇಳಿದ ಮಾತು ಈಚೆಯಲ್ಲಿ ನುಡಿದು
ಮತ್ತಾಚೆಯಲ್ಲಿ ಬೆರೆಸುವವ ಭಕ್ತನಲ್ಲ
ಆತನ ಇದಿರಿನಲ್ಲಿ ಆತನಸತಿಯಳ ಅವ್ವಾ ಎಂದು.
ಆತ ಸಂದಲ್ಲಿ ಸತಿ ಎಂಬ ಭಂಡರಿಗೇಕೆ ವ್ರತ, ನೇಮ, ನಿಷ್ಟೇ ಇಂತಿವರಲ್ಲಿ ಕಳೆದುಳಿಯಬೇಕು
ಆಚಾರವೇ ಪ್ರಾಣವಾದ ರಾಮೇಶ್ವರಲಿಂಗವನರಿವುದಕ್ಕೆ.

ಚಿತ್ತ ಶುಧ್ಧಿಇಲ್ಲದ ವ್ರತ, ನೇಮ, ನಿಷ್ಠೆ ಯಾವುದುಕ್ಕೂಅರ್ಥವಿಲ್ಲಾ. "ಆರಾರ ಭಾವಕ್ಕೆ ಒಳಗಾಗದ ವಸ್ತು, ಆರಾರ ಭ್ರಮೆಗೆ ಹೂರಗಾಗದ ವಸ್ತು. ಆರಾರ ಆಚಾರಕ್ಕೆ ಒಳಗಾದ ವಸ್ತು, ಆರಾರ ಅನಾಚರಕ್ಕೆ ಹೂರಗಾದವಸ್ತು ,ಆಚಾರ ಶ್ರದ್ಧೆ ಇದ್ದಲ್ಲಿ ನೀನೆಂಬೆ" ಮಾಡುವ ಕ್ರೀಯೆಶುದ್ಧವಾಗಿರಬೇಕು.

ಯಾವ ಭ್ರಮೆಗೂ ಒಳಗಾಗಿರಬಾರದು. ಇಂಥವರನ್ನು ವ್ರತಿ ಎಂದು ಕರೆಯಬಹುದು. "ಏರಿಯೋಳಗೆ ಬಿದ್ದ ನೀರು ಮತ್ತೆ ಹೇಗೆ ತಟಾಕವನ್ನು ಸೇರುವುದಿಲ್ಲವೋ ಹಾಗೆ ಅನಾಚಾರಿ ಸದ್ಭಕ್ತರನ್ನು ಸೇರಲಾರ. ಅರಿದು ಮಾಡುವ ತಪ್ಪಿಗೆ ಪ್ರಾಯಶ್ಚಿತವೇ.? ತನುವಿನಿಂದಾದ ತಪ್ಪಿಗೆ ಕ್ಷಮೆಯೆ ಹೊರತು ಮನದಿಂದ

ಆದ ತಪ್ಪಿಗೆ ಕ್ಷಮೆಇಲ್ಲ.ಇಂತಿವರ ಸೇರಿದರೆ ಗುರುವಾದರೂ ಬಿಡಬೇಕು, ಲಿಂಗವದರೂಬಿಡಬೇಕು,ಜಂಗಮವಾದರೂ ಬಿಡಬೇಕು" ಎಂದು ನಿರ್ದಾಕ್ಷಿಣ್ಯವಾಗಿ
ಹೇಳುತ್ತಾಳೆ. ಸಾಮನ್ಯ ಮನುಷ್ಯನಿಂದ ಹಿಡಿದು ಜಂಗಮದವರೆಗೂ ಕ್ಷಮೆ ಇಲ್ಲಾ. ಅಷ್ಟು ಕಠಿಣವಾದದ್ದು. ವ್ರತ ಮಾಡುವವನು ಸಜ್ಜನರ ಆಗರದಲ್ಲಿರಬೇಕು.
ಹಣವಂತನಾದವನು ಭಕ್ತರ ಪಜ್ತೆಯಲ್ಲಿ ಸಹಭೋಜನಕ್ಕೆ ಕುಳಿತರೆ, ಗುರುವೆಂದು, ಅರಸನೆಂದು, ತನ್ನವರೆಂದು ದ್ರವ್ಯವನ್ನು ನೀಡಿದರೆ ಅದನ್ನು
ಸ್ವೀಕರಿಸುವುದು ಅಪರಾಧ.ನಾಲಿಗೆಯ ಚಟಕ್ಕೆ ಮೀನು ಮಾಂಸತಿನ್ನಲು ಹೋಗಿ ಬಲಿಗೆ ಸಿಕ್ಕಿಬಿದ್ದಂತೆ ಅಂತವರ ಸಹ ಭೋಜನವ ಮಾಡಿದರೆ ಲಿಂಗಕ್ಕೆ

ದೂರವಾಗುತ್ತಾರೆ.ಆಚರಣೆಯೊಂದಿಗೆ ಸಜ್ಜನರ ಸಂಘವೂ ಬಹು ಮುಖ್ಯ ಎಂದು ಸೂಚಿಸುತ್ತಾಳೆ. ನೇಮಿಯಾದವನು ಸಂದರ್ಭಗಳನ್ನು ಬಂದತೆ ಸ್ವೀಕರಿಸಬೇಕು. ಸುಖ ದು:ಖಕ್ಕೆ ಮೈಗೊಡದೆ ಅಂದಂದೆ ಆಯುಸತ್ತಿತೆಂದು ತಿಳಿಯಬೇಕು. ಇದುವೇ ಜ್ಞಾನ. ಆ ಗುಣವೆ ಶಿವಲಿಂಗದ ಖಂಡಿತ ನೇಮ. ಶೀಲ ಎಂಬುವುದು ಬಾವಿಯಲ್ಲಿ ಸ್ನಾನ ಮಡುವದರಿಂದ ಬರುವಂಥದ್ದಲ್ಲ, ಮನೊವಿಕಾರಗಳನ್ನು ಕಳೆದುಕೊಳ್ಳುವುದು.

ಇದುವೆ ನೇಮ, ಇದುವೇ ಲಿಂಗದೊಂದಿಗೆ ಕೂಟ ಎಂದು ನುಡಿಯುತ್ತಾಳೆ. ಅದು ಬಿಟ್ಟುತನ್ನ ಸಂಸಾರದ ನಿರ್ವಹಣೆಗೆ ಭಕ್ತರ ಮನೆಗೆಹೋಗಿ ಬೇಡುವುದು, ಕಾಡುವುದು, ನೇಮವಲ್ಲಾ.
ನೇಮವಮಾಡಿಕೂಂಡು ತನ್ನಯ ಸಂಸಾರದ ಕರ್ಮ್ಯಾರ್ಥಕ್ಕಾಗಿ ಐದು ಹತ್ತು ಹದುನೈದೆಂದು ಮೀರಿ ಬಂದೂಡೆ ಕೃತ್ಯವಿಲ್ಲೆಂದು ಅವರಿಗಿಕ್ಕಿಹೆವೆಂದು ಭಕ್ತರ ಮನೆಯಲ್ಲಿ ಹೊಕ್ಕು ಹೊಕ್ಕು ಬೇಡುವದು ಭಕ್ತನ ಯುಕ್ತಿಯೆ?
ಆರೂಡೆವೆಯ ಆರಿಗೆ ಬೇಡಿ ಮಾಡಿ
ತಾನು ದಾರಿಯಾದನೆಂಬಭೋಗಿಯ ನೋಡಾ
ವೇಶಿಯ ಪುತ್ರ ಪೈತೃಕವ ಮಾಡಿದಲ್ಲಿ ಅದೇತರ ಊಟ ? ಅದೇತರ ಮಾಟ?
ಆಚಾರವೇ ಪ್ರಾಣವಾದ ರಾಮೇಶ್ವರ ಲಿಂಗಕ್ಕೆ ಸಲ್ಲದ ನೇಮ" ಎಂದು ನಿರ್ದಾಕ್ಷಿಣ್ಯವಾಗಿ ಹೇಳುತ್ತಾಳೆ.
ಶಿವಶರಣರು ಕಾಯಕದ ಕುರಿತು ವಿಶೇಷವಾಗಿ ಹೇಳಿದ್ದಾರೆ. ಕಾಯಕ ವ್ರತವಂತನ ಲಕ್ಷಣವೆಂದರೆ" ದಿನ ನಿತ್ಯದ ಕಾಯಕ ಮುಗಿಸಿಕೂಂಡು
ಒಡೆಯ ಭಕ್ತ, ಮಡದಿ, ಮಕ್ಕಳೋಂದಿಗೆ ಸೇರಿಕೊಂಡು ಎಡೆಮಾಡಿ ಭೋಜನಮಾಡಿ ಇಂದಿಗೆ, ರಾತ್ರಿಗೆ, ನಾಳಿಗೆ ಎಂದು ವಿಚಾರಮಾಡದೆ ಅಂದಂದಿಗೆ
ಎಂದು ಭಾವಿಸಿ ಇರುವ ಭಕ್ತನ ಮನೆಯಂಗಳದಲ್ಲಿ ಮಂಗಳಮಯ

ಕೈಲಾಸ ಇಪ್ಪುದು ಎಂದು ಹೇಳುತ್ತಾಳೆ. ಸಹಬೋಜನಾ, ತೃಪ್ತಿ ಸಂಗ್ರಹಮನೋಭಾವವಿಲ್ಲದ ಮನಸ್ಥಿತಿ ಭಕ್ತನಿಗೆ ಬಹುಮುಖ್ಯ. ಎಂದು, ಕಾಯಕದ ಪ್ರಾಮುಖ್ಯತೆಯನ್ನು ಸಾರುತ್ತಾಳೆ. ಕೆಲಸವನ್ನು ಕಾಯಕಯೆಂದು ಹೆಸರಿಸಿ ಶೆರಣರುಪವಿತ್ರಗೊಳಿಸಿದರು. ಆದರೆ ಇಂದುನಾವು ನಮ್ಮ ಕೆಲಸವನ್ನುಶ್ರದ್ಧೆಯಿಂದ ಮಾಡುವುದಿಲ್ಲ. ಇದು ರಾಷ್ಟ್ರದ ಅಭಿವೃದ್ಧಿಗೆ ಮಾರಕವಾಗುತ್ತದೆ. ಹಾಗಾಗಿ ವ್ರತಿಯಾದವನು ಕಟ್ಟು ನಿಟ್ಟಿನವನಾಗಿರಬೇಕು.

"ತನ್ನ ಸ್ವಕಾರ್ಯದಿಂದ ಮಾಡಿದ ಭಕ್ತನ ವ್ರತವೇ ವ್ರತ
ಆತನಾಚಾರವೇ ಸತ್ಯ, ಅತನಾಶ್ರಯದ ಶೇಷವೆ ಸಂಜೀವಪ್ರಸಾದ
ಆತನ ರೂಪೇ ಆಚಾರವೇಪ್ರಾಣವಾದ ರಾಮೆಶ್ವರಲಿಂಗರೂಪ"

ಎಂದು ಕೆಲಸ ಮಾಡುವವ ಸಾಕ್ಷತಲಿಂಗ ಸ್ವರುಪಿಯಾಗಿದ್ದನೆ ಎಂದು ಆತನ ವ್ಯಕ್ತಿತ್ವಕ್ಕೆ ಮಹತ್ವ ನೀಡಿದ್ದಾಳೆ. ಈ ಎಲ್ಲ ವಚನಗಳನ್ನು ನೋಡಿದರೆ ಮಾನವ ದೇವಮಾನವ ನಾಗಬೇಕಾದರೆ ಸ್ವಾರ್ಥಚಿಂತನೆಯನ್ನು, ಕಾಮ ಕ್ರೋದಾಧಿಗಳನ್ನು ಡಂಭಾಚಾರವನ್ನು ಬಿಡಬೇಕು. ಇಂದಿನ ಅನೇಕ ಹಗರಣಗಳನ್ನು ನೋಡಿದರೆ ಈ ಎಲ್ಲಾ ವಚನಗಳು ಔಷಧಿಯಂತಿವೆ,

"ವ್ರತವೆಂಬುದೇನು? ವಸ್ತುವನ್ನು ಕಾಂಬುದಕ್ಕೆ ನಿಚ್ಚಣಿಕೆ
ವ್ರತವಂಬುದೇನು? ಇಂದ್ರಯಗಳ ಸಂದು ಮುರಿವ ಕುಲಕುಠಾರ
ವ್ರತವೆಂಬುದೇನು? ಸಕಲ ವ್ಯಾಪಾರಕ್ಕೆ ದಾವನಲ
ವ್ರತವೆಂಬುದೇನು? ಸರ್ವದೋಷನಾಶನ
ವ್ರತವೆಂಬುದೇನು? ಚಿತ್ತಸುಯಿದಾನದಿಂದ ವಸ್ತುವ ಕಾಂಬುವದಕ್ಕೆ ಕಟ್ಟಿದ ಹುತ್ತರೆ

ವ್ರತವೆಂಬುದೇನು? ಆಚಾರವೇಪ್ರಾಣವಾದ ರಾಮೇಶ್ವರಲಿಂಗವು ಅವರಿಗೆ ತೊತ್ತಲ ಮಗನಾಗಿಪ್ಪನು" ಎಂದು ಸೂತ್ರಬದ್ಧವಾಗಿ ಹೇಳುತ್ತಾಳೆ. ಪ್ರಾಮಣಿಕವಾದವನ ಮಹತ್ವವನ್ನು ಸಾರುತ್ತಾಳೆ. ಹೇಳುವುದನ್ನು ಖಂಡಿತವಾಗಿ ಹೇಳುವ ಧಾಟಿ, ನೇರ, ನಿಷ್ಠುರದಮಾತುಗಳನ್ನು ಈಕೆಯ ವಚನದಲ್ಲಿ ಕಾಣುತ್ತೇವೆ. ಉಪಮೆ, ದೃಷ್ಟಾಂತ ರೂಪಕದಂತಹ ಅಲಂಕಾರಗಳೂ ಕಂಡು ಬರುತ್ತವೆ.ಪ್ರಾಸ, ಅನುಪ್ರಾಸಗಳು ಭಾವತೀವ್ರತೆಯನ್ನು ಹೇಳುವಲ್ಲಿ ಪೂರಕವಗಿವೆ. ವಸ್ತು ನಿಷ್ಠವಾದ ವಿಚಾರಕ್ಕೆ ಹೆಚ್ಚು ಒತ್ತು ನೀಡಿದ್ದಾಳೆ. ಪ್ರಾಣಿ, ಪಶು, ಪಕ್ಷಿ,ದವಸ ಧಾನ್ಯದ ಬಳಕೆ ಮಾಡಿಕೂಂಡು ವಿಚಾರ ತಕ್ಷಣ ಮನಕ್ಕೆ ಮುಟ್ಟುವಂತೆ ಹೇಳುತ್ತಾಳೆ.

THE IMPORTANCE, APPLICATION AND PREPARATION OF BHASM-RUDRAKSHA.

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The religion is as necessary for human beings as food is. To be free from the series of transmigrations, man must have recourse to religion that teaches him psychic culture and guides him on the road to eternal happiness, the Moksha, ever lasting peace Shaivism is one of the greatest and ancient religion of tha world. and Virashaiva sect is the one of the main branches of the Shiva tree. The practice of the Veerashaiva religion is expressed very well by the definition of the word 'uÉÏUvÉæuÉ' given in various treatises of the religion. Every religion has a set of religious exercises for its followers. So Veerashaiva religion has its own philosophy and practices. Thus the Lingayat is one who practices १. अष्टावरणः(अङ्गः) २. पञ्चाचारः (प्राणाः) ३. षट् स्थलाः (आत्मा)

गुरुलिङ्गजंगमश्च पादोदकप्रसादाः ।
भस्मरुद्राक्षमन्त्रश्च अष्टावरणेति संज्ञिता ।।

These Ashtaavaranaas are the eightfold shields or protective coverings of the Devotee. They protect Anga from the onslaughts of Maya on him.and guide himsafely to find beatitude ,after the life of theworld.Among Ashtaavaranaas vibhooti or Bhasma is the fourth avarana.every religion has asset of exercises for its followers.LikewiseBhasmadhaarana is the fourth religious exercise. The sacred Ashes of the shaivas or veerashaivas remind them of the love of the God. which reduces to ashes the impurities in them. And their six fold enemies. Holybhasma or vibhuti is essential in Lingarchana.Bhasmadhaarana and Rudraaksha Dharana have gotspiritual significance. In this paper, Importance of wearing bhasm, Application and preparation etc are discussed in detail.

Rudraksha, also rudraksh, Sanskrit: *rudriiksa* ("Rudra's eyes"), is a large evergreen broad-leaved tree whose seed is traditionally used for prayer beads in Hinduism. The seed is borne by several species of *Elaeocarpus*, with *E. ganitrus* being the principal species used in the making of a bead chain or *mala*. Rudraksha is aSanskrit compound consisting of the name Rudra ("Shiva") and *aksha(leyes").[1][2]* The' specific epithet *ganitrus* is possibly taken from ganitri, the name for this species in ·Sundanese and Malay.

• The religion is as necessary for human beings as food is. To be free from the series of transmigrations, man must have recourse to religion that teaches him psychic culture and guides him on the road to eternal happiness, the Moksha, ever lasting peace. Shaivism is one of the greatest and ancient religion of the world. and Virashaiva sect is the one of the main branches of the Shiva tree. The practice of the Veerashaiva religion is expressed very well by the definition of the word 'uEIUvEceuE[1] given in various treatises of the religion.

Every religion has a set of religious exercises for its followers, So Veerashaiva.religion has its own philosophy and practices. Thus the Lingayat is one

who practices

• **Definition and meaning of the word Rudraksha**
• The word rudraksha is derived from two words - rudra and aksha.
• A. Aksha means eye. Rudra and aksha means the one who is capable of looking at and doing everything (for example, the third eye). Aksha also means axis. Since the eye can rotate on one axis, it too is known as aksha.

• **The rudra (rudhir, rudraksha) tree**
• A. Creation of the rudraksha tree from the tears of grief shed by Shankar (or Shiva) upon seeing the unrighteous conduct of demon Tarakasur's sons, and their destruction by Shiva :
• Through their righteous conduct and devotion unto Shiva, Tarakasur's sons Tadinmali, Tarakaksh and Kamalaksh, attained divinity. After some time, seeing that they have returned to their original unrighteous conduct, Shankar was grief-stricken, and His eyes were filled with tears. A few of these tears fell onto the earth; a tree sprang up from these, which came to be known as the rudraksha tree. Later, Shiva destroyed the sons of Tarakasur. - Gurudev Dr. Kateswamiji
• B. General information on rudraksha tree : This is found at a height or depth of three thousand..meters above or below sea level. The rudraksha tree grows in a narrow opening, not on plain ground. Its leaves resemble those of tamarind or nuxvomica, but are longer. It yields one to two thousand fruits annually .. The Yatis (Ascetics) in the Himalayas survive only on these fruits. These fruits are also known as amrutphal (Fruits of nectar). They satisfy thirst

Rudraksha Benefits
Rudraksha is considered as incarnation of Bhagwan Shiva. The person who wears RUdrakshaj possess always good health, is respected by all and is capable of attracting everybody & any body.
• Rudraksha is a very important and mystical' bead of Hindu Mythology & Meditation & Rishi Cult.
• Rudraksha has a high profile in Tantrism and spiritualism specially Nara gosha & Graha dosha. Rudraksha worshipped as a source of good luck, good health, prosperity, medical values, success, financial gains and for eradication of evil forces.
• Faceless Rudraksha (Nirankara) is most powerful.

One chaturmukha (4 faces) Rudraksha and one shanmukha (6 faces) Rudraksha tied together with copper wire and wearing with red thread as a (talisman) shiva shakti locket will improve the attentiveness, memory growth, interest in studies, etc., Boon for studies and aged, pandits, astrologers, leaders, etc. For the bite of a Scorpion or other such creatures panchamukhi Rudraksha can be rubbed on a grind stone with thejuice of a lemon and the paste applied on the affected spot. Pain will subside.

Those who takes the bath by keeping 9 (nine)Rudrakshas in water will get benefits equally to Ganga Jal Bathing and energy gaining.

Rudraksha can be worn·by any person without the consideration of nation, religion, caste,' sex, with full confidence to get desired benefits in mandalam (40 days). One should wear the malas at all times except sex time, going to burial grounds and ladies should not wear during menstrual periods. It is. also helps for longevity and avoids untimely death.
• Rudraksha dharana by swamyji is a must & essential and symbol of authority to run the ashram.
• In rudraksha satyavani (dowsing)- bhavishya vani forms cosmo electro magnetic field and radiation comes out after teletherapy message. Rudraksha pendulum gets the movement. The directions of movements is helpful for prediction & disease diagnosis.
• "Beads in the shape of ardha chanrakara (cashewnet) is not at all Rudrakshas but they are bhadrakshas some businessmen, sellers, frauds persons are cheating the innocent public for huge amounts naming them as ekamukhi Rudrakshas."

Rudraksha therapy by itself and also in combination with other healing systems can cure any illness. Apart from the healing at physical, mental and emotional level, Rudraksha increases body-energy, self-confidence, money growth, intelligence, intuition and so on. It is also harmonises and balances all the body systems, glandular organs and immune central nervous system. It also balance the brain waves bringing peace and harmony clearing the mind and making medication & meditation easier.

Thus the benefits of this miraculous Rudraksha plant having been flowing to the users, wearers from the time-immemorable. Even in the latest researchers it is proved that Rudraksha got more medical effectiveness and spiritual effects and withstood to various laboratory tests and scientific experiments. It is proved installing Rudraksha & malas in the houses in particular method removes the Gruha dosha - vasthu dosha - nara gosha, etc ..

Thus by this reason the age old Rudraksha therapy is gaining more momentum all over the world in different countries and practicing benefits lakhs of patients and suffer with different problems in this computer age. Day by day acceptance of this Rudraksha's super natural & holistic medicinal system is spreading all over the universe

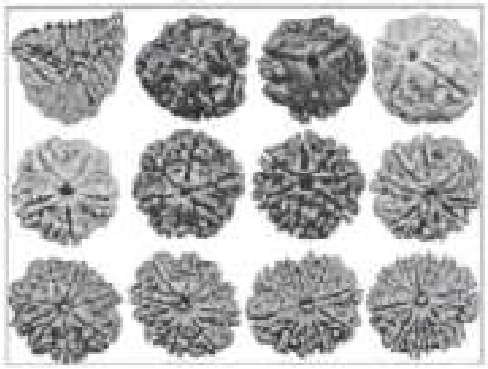
• **: Why it is so important? What is its relevance?**

• Found in Ancient.Indian Scriptures and texts: From ancient times,. the power of Holy Rudraksha beads have been scripted in various religious texts like ShivmahaPurana, Shreemaddevibhagwat, Pa~ma . Purana, ling Purana, Ashtamalikopnisbad, Nirnayasin dhoo, Mantramaharnava, Mahakaal Sanmhita, Rudrakshajabalopnishad, vrihajjabalopnishad, Shivaswarodaya and Sarvollastantra.

As per ancient Indian scriptures mentioned above Rudraksha is evolved from the eyes of Lord Shiva hence, it's called Rudraksha. **Rudra** means Shiva and **Aksha** means eyes. Aksha also means a group of alphabets in Sanskrit called **Varna).** As per details found in **Halayudh Kosha (Ancient Scripture)** letters from A to **ksha** that is 51 letters are called **Aksha .** Therefore, Rudraksha can be called as a. seed in which a group of Sanskrit letters called **Varna** reside.

• **What** i.s **Mukhi or Multifaceted Rudraksha ?**

• As per details found in the Purana there are fourteen kinds of Rudraksha, which are called Mukhi or faceted Rudraksha. Mukhi or faces of Rudraksha are deep lines found on the surface of the Rudraksha from bottom to the top hole. The number of these lines decides about the type or Mukhi Rudraksha. For example, if a Rudraksha has three such lines it is called 3 Mukhi or 3 face Rudraksha. Other handwritten Scriptures found with various saints narrate the properties of 1 to 21 Mukhi Rudraksha. It is believed that these beads were available in the ancient time from 1 to 108 Mukhi. Now they have become most rare Natural thing.



• **Its advantage for human?**

• **Perfect for Body, Mind & spiritual** gains: Rudraksha evokes power in the body, which fights against diseases hence improving overall health. As per Avurveda, Rudraksha strengthens' the body constitutions. It removes the blood impurities and strengthens the body substance. It removes the bacteria inside as well as outside the Human Body. Rudraksha removes the headache, cough, paralysis, and blood pressure, heart disease and maternity problems. Wearing of Rudraksha brings glow on the face, which results in calm and charming personality. Rudraksha rosary is used for Japa. The process of Japa increases spiritual power and self- confidence to move in multi direction of life. Therefore, Rudraksha seeds are found be useful for providing health benefits as well as helps in gaining spiritual success. Wearing Rudraksha results in the destruction of sins from previous birth that cause difficulties in the present life. The. men who are Mlechchha, chandaal (impious and inhumane) or full of all kinds of vices can get the form of Lord Rudra by wearing Rudraksha. This helps in getting rid of all the sins and. gets him to attain the supreme goal of his life.

ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

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REPRESENTING DALIT PATRIARCHY IN P. SIVAKAMI'S *THE GRIP OF CHANGE* AND BAMA'S *SANGATI.*

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The attempt has been made in the present paper to highlight the domination of patriarchal system prevails in dalit community. Therefore, the main objective of the paper is to focus on the selected novels of P. Sivakami and Bama have been taken into consideration. P. Sivakami, a well known Tamil dalit writer, has written four novels, numerous short stories and poems. She is the founder editor of a literary magazine *Pudiya Kodangi* and was the secretary ranked bureaucrat in Tamil Nadu till 2008. Sivakami, the most important dalit woman writer, has gained national as well as international fame, and writes about dalit issues in different journals. Sivakami never faced caste problem like other poor dalit women, as she is the daughter of a former Member of Legislative Assembly. She is the founding member of 'Women's Front', a political forum that campaigns for the economic and political empowerment of women. Moreover, she has worked in Indian Administrative Service, in various capacities, including as District Collector until recently. She quitted the Administrative Service and joined Bahujan Samaj Party and contested in the Lokasabha Election from Kanyakumari and lost. Original Tamil novel *Pazhaiyana Kazhithalum* (1989) is first full length novel by Sivakami, was written when the author was just twenty six years old. The second book was published ten years after the publication of *Pazhaiyana Kazhithalum* entitled *Asiriyar Kurippu*. Both these books have been translated by the author herself into English entitled *The Grip of Change* (2006).

Key Words: Patriarchal system, frustration, Discontent, female subordination and discrimination.

The novel is in the traditional narrative form in which the novelist condemns caste hierarchy and dalit patriarchy. At the end of the novel, the novelist shows how decades of neglect and exploitation has begun to boomerang. *Pazhaiyana Kazhithalum*, first dalit woman's novel in Tamil, by Sivakami, was published in 1989 when Dalit movement was at its height and it created a stir in the atmosphere by evoking a great deal of discussion because of its condemnation of caste fanatics. It is not the individual voice but the collective voice of all dalit women who are eagerly waiting for a change. The novel is autobiographical in its tone.

Kathamuthu, the protagonist of the novel, the elected president of the Panchayat, a leader of Paraya community is a perfect and true representative of dalit patriarchy. He has two wives, the first one is Kanagavalli who has two children, Gowri and Sekaran, and the second one is Nagamani, who is dominant. Kathamuthu is overbearing, but helps those who seek his help. He restricts Gowri not to wear flowers, not to apply kohl to her eyes, not even *pottu* on her brow and wear blouse that covers her back. Kathamuthu has been given little attention, or perhaps has been distorted, because of the author's rude experiences with him. By portraying Kathamuthu and his tyranny, corruption and polygamy, Sivakami proves that even patriarchy prevails powerfully in dalit community.

Nagamani could not conceal her emotions and she would be upset when she notices intimacy between Thangam and Kathamuthu. Whenever quarrel takes place between Thangam and Nagamani, Kathamuthu would be always on Thangam's side, and would hit Nagamani. Thangam's pathetic condition describes the atrocities faced by dalit women. Arrogance and domineering nature of high castes is found in the case of Thangam. Thangam is a widow of Kaipallai, is beaten up by the relatives of Paranjothi in such a way that, the skin of her thighs and knees is scored. Description of her battered body moves everyone to tears. Poor Thangam does not get any share in her husband's property. Therefore, after his death she goes out to Paranjothi's field to work. Paranjothi's molestation, her brother-in-laws' misbehaviour with her, her childlessness, her widowhood augment her agony. Thangam is subjected to a specific kind of violence because she belongs to dalit community. Moreover, she is called a whore by everybody. Even youngsters like Lalitha do not have better opinion about Thangam. But Paranjothi is neither degraded nor humiliated. The writer raises her voice against male dominance, "He is a man and he can do anything that pleases him."(Sivakami. P. p56.).

Paranjothi is stupefied when he hears that Thangam has lodged complaint against him. If the enquiry were of another issue, he would have used his power and money and would have turned the case to his advantage. His affair has been made public, and now he feels shameful that he has an affair with Parachi. Though he uses her for satiating his lust, her complaint makes him intolerable. Dalit woman should not stand up against high castes. He does not care for her injuries and ill treatment meted out to her, but cares only of his career in the next election. So he curses her. Thangam still weeps whenever she remembers her dog days in Puliyur. An event of being dragged out by her hair in the middle of the night, and beaten up like an animal, affects her mind deeply. Paranjothi takes undue advantage of Thangam's helpless condition. Despite her stubborn resistance, he subdues her. She sobs as she becomes a prey to the lust of loathsome old man. Paranjothi is ready to spend money as much as possible, if the problem is solved. Even Police authorities do not hesitate to lodge counter complaint against Thangam to save Paranjothi. According to the writer, all dalit women endure

sufferings as it is the tradition of the society, "In continuance with the tradition of the society they lived in, the lower castes had learned to tolerate the intolerable."(Ibid p.76). Thangam has been exploited by her brothers-in-law, by Paranjothi, and further by Kathamuthu. She is forced to yield to Kathamuthu's desires.

Whenever people visit to Gowri's house, she could not come out as freely as Sekaran, her younger brother. She hides behind the window, so that her father would not see her. Gowri has developed such contempt for her father that, she would rather go to college and stay in hostel than stay at home listening to her overbearing father. At the end of the novel, Gowri is thirty one years old, still unmarried, has completed her research, and she is no respect for her father. If the father forces her to marry, she retorts bluntly, "The sufferings that my mother underwent in her marriage! I don't want to be tortured like her by some man…Moreover; I need a father who can respect his son-in-law."(Ibid.p.124).

She is close only with her mother, Sekaran and Chandran, her cousin. The author feels that before the entrance of her step mother, her father has cared her, nurtured and loved her. Her step mother and her children have stolen all his time and strength. He even never hesitates to beat her or slap her, if she commits any silly mistake. Once he slapped her so hard that food went flying from her mouth and roared, "You should fear your father as much as you fear your teacher."(Ibid.p145). Kathamuttu's domineering nature has been projected in the novel at each and every step by the author. These painful incidents make her hate her father throughout her life. At the end of the novel, she has reduced him to a 'counterfeit coin' (Ibid.p145) that he is an old man reading a newspaper in an easy chair. The reminiscences of her childhood days have forced her to present male characters as betrayers. Her disgust is due to childhood traumas that forced her to remain unmarried. Father's hypocrisy, her step brother's and step mother's complaint against her in front of her father who ultimately gets wild and shouts at her and her mother – all such bitter experiences force the author to think that polygamy is the cause of all such oppression and insult. The author, her brother, and mother live in their house as strangers and she feels that peace of the family has been spoiled by her step mother and step brothers. She mocks at Kathamuthu who is mainly responsible for creating domestic conflicts and making her life unbearable. In the opinion of Meena Kandasamy, "Sivakami criticizes the dalit movement and exposes the cruel face of dalit patriarchy through feminist eyes and yet clearly veers away from becoming a caste traitor because of her engagement with the search for solutions."(Ibid.p.195).

Sivakami's skill is exhibited in her clear explanation of all incidents without hesitation. The author refuses to marry as she observes closely the victimization of her mother who has been always humiliated by her father who is of vicious nature. She desires to get away from such intolerable circumstances. Monogamy and disciplined behaviour are the qualities for which the writer yearns.

Dalit patriarchy is the central theme of the novel. The writer concentrates on domestic violence, abuse of dalit woman, at home and sexual harassment outside the home by upper caste men. It is ironical to note that while Kathamuthu weds a caste Hindu widow, i.e. Nagamani, she earns authentic place in his house. On the other hand, when Paranjothi enters the life of Thangam, he literally brings bitter days and horrifying environment for her. Both Thangam and Kanagavalli are the victims of the situation. Kanagavalli remains a mute sufferer till the end of the novel. One of the most unfortunate aspects of the community is that a man can marry as many women as possible, whether he is a widower or a married man with his wife being alive, marry for a second time, third or can even fourth time. An insecure life, restrictions, frustrations have their own adverse effects on the psyche of dalit women who suffer mutely rather than resist the situation. Kathamuthu, who has been intoxicated with power, and sensual pleasure, ignores his own family. The author craves for education of dalit women, new reforms and change in the society.

Tamil dalit writing had emerged two decades after the Marathi Dalit literature and has been enriched by the noted writers and feminist thinkers like Bama. P. Shivakami, Sukirtharani who have occupied significant place in Dalit literature for their unique contribution to the literature. Bama Faustina Mary is one of the most forceful and innovative dalit feminist novelists. She worked as a school teacher and later joined the convent to become a nun. After seven years, she gave up nunnery when she came to know that even in Christianity dalits are discriminated. Now she is working as a teacher in school in a small village near Kancheepuram. She writes in a simple language, breaking all barriers of decency. Bama is the first distinguished Tamil dalit woman writer whose works have been translated into English, French and other Indian languages. Dalit community and its problems are the main concern of her writings.

Dalit woman has been segregated at the very early stage of her life. Parents welcome differently a baby boy and a baby girl. Their ways of treatment are also different while bringing up the children. Boys are encouraged in all respects whereas girls are not. This environment contributes lot to her further frustration. There are various reasons which block the ways of woman's development. Society permits male dominance and female subordination and discrimination. Some actions have been considered normal in the case of men whereas they amount to debauchery in the case of women. Thus, double standards always prevail in the society. Ignorance and illiteracy are obstacles to her development. Women are always dissatisfied and discontented. The author's true feminist voice is clearly heard while describing the discrimination of elders in their treatment of boys and girls. In dalit community aversion towards girl child is commonly found. In spite

of doing all the household chores, girls are neglected and, at the same time, boys are treated well and given full freedom. *Sangati* (1994) is the representation of different faces of dalit women, who suffer in all spares of life because of patriarchal society. The novel is a collection of episodes of acute sorrows of Paraya women. In the course of the novel, the novelist refers to dalit women's problems like marriage, negligence of husbands and in laws, their insecurity, discrimination between boys and girls, man and woman.

Perimma, the narrator's aunt, who is married off in a young age and has given birth to eight babies, finally breathed her last, having been treated worst by her husband. As he was crazy with lust, he assaulted her sexually, and if she refused his demand, because of tiredness, he would break her into pieces. Mariyamma is a scapegoat and throughout her life she has been crushed to pieces. She is a symbol of all dalit girls who confront sexual assault and abuses in day-to-day life. Mariyamma is not only humiliated in front of the villagers but is also forced to pay a fine of two hundred rupees, whereas Manikkam is penalized only one hundred rupees. Manikkam is given concession as he is a male. Mariyamma feels frustrated and thinks to hang herself, when she has been humiliated in front of the entire village, and when, further, people start making insinuating remarks. Mariyamma's adversity does not stop there itself. She is married off to Manikkam who is a drunkard, a sluggard, a gambler, and she receives everyday beatings, blows, kicks, from him. This makes her life no less than a hell.

Dalit women become slaves from the very day of their marriage and they could not escape from the shackles of slavery. The author gives example of Thaayi's life. Thaayi is most beautiful, but an unfortunate dalit lady, who has been dragged along the street and has been flogged like an animal. Thaayi's husband beats her often with the belt from his waist. Everywhere, the strap fell on her soft skin, there were bright red weal. If somebody comes for her rescue, he would become even more furious. Once, he cuts off her long hair and hangs on the doorpost of the threshold. Apart from all these humiliations he would always call her with derogatory words like 'whore', etc. In another incident, Paakkiaraj, who is a drunkard, violent, quarrels everyday with Raakkamma, his wife, drags her by her hair, pushes her down and kicks her lower belly.

If a man earns money, he spends it according to his wish. But woman has to run her family and manage her children. Moreover, he snatches money from his wife whenever he needs for his addiction. But if she asks money for the family expenses, he would kick her, beat her and would abuse her. Once, the author perceives a pregnant woman being chased and beaten up by her husband with firewood. He drags her along by the hair. Her whole stomach is dragged on the earth as he pulls her along, flings her inside, locks her in the house and beats her horrifically. The only reason for his fury is, she has asked some money for family expenses. Although both men and women work in fields in dalit community throughout the day, men straightway go out to market or chavadi, but women have to strive hard by doing household chores. Kaaliamma strives hard throughout the day in fields and at home. On the contrary, Chinnappan just takes bath when he is back from the field and goes out and returns only when meal is ready. As dalit men could not show their strength in front of their landlords, they exhibit their authority and suppressed anger by beating their wives. Poor dalit women have to suffer both inside and outside the family. They have to bear the torment of upper caste men in the fields and of husband at home. Dalit women could not get support either from their parents or from their in-laws, and eventually they succumb to death. Maikkanni's case is different from all. While earlier characters suffer because of the irresponsibility of their husband, Maikkanni suffers because of the irresponsibility of her father. Maikkanni is only an eleven year old girl who has taken the responsibility of her family because of poverty and her father's illicit alliance with another woman. She gets beatings from her father when she purchases an ice-cream just for one rupee. Further she gets beatings from boys in the bus and then from Mestri in the factory. Poor Maikkanni endures bitter experiences in her young age, and it might be the initial step for further tolerance in her future life. Once a Paraya girl is beaten up by her father and brother as she is in love with Palla boy. Her brother catches her by hair and drags her to home and beats her horrifically. This is how patriarchy prevails in the society and poor dalit girls undergo tormenting experiences.

Women power alone can rise and redeem itself from bondage, oppression, humiliation and subjection. The novel is an authentic representation of the predicament of dalit women in patriarchal society. It deals with three generations; one is the narrator's grandmothers' generation, her own generation and the generation coming after the narrator. The characters are left independent and the novel does not really end where it should end and the end is left open. The novel has no central plot as such. Sangati means events, narrated by numerous protagonists in the first person with comments by grandmother, mother and by narrator herself. The novel throws light on how dalit women suffer from patriarchy, economic inequality and wage disparity. Though, dalit women work in different fields with men, their earning is less than that of men. Moreover, she has to run her family whereas men spend money as they please. Both the authors throw light on how patriarchy dominates in dalit society and how dalit women are constantly subjected to sexual harassment and abuse in the work places and within the community and how they are treated violently by their fathers, brothers brothers-in law and their husband.

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ಗರ್ಭ ಸಂಸ್ಕಾರಗಳು– ಸಾಮಾಜಿಕ, ಸಾಂಸ್ಕೃತಿಕ, ಮಾನಸಿಕ ಪ್ರಭಾವ

ಡಾ॥ ಕೆ. ಎಸ್. ರಮಾ
ಬೆಂಗಳೂರು

ಲೋಕಾರೂಢಿಯಲ್ಲಿ ನಾವು ಸಂಸ್ಕಾರ ಎನ್ನುವ ಪದವನ್ನು ಅನೇಕ ಸಂಧರ್ಭಗಳಲ್ಲಿ ಉಪಯೋಗಿಸುತ್ತೇವೆ. "ಮನುಷ್ಯನಿಗೆ ಒಳ್ಳೆಯ ಸಂಸ್ಕಾರವಿರಬೇಕು". "ಅವನಿಗೆ ಸಂಸ್ಕಾರವೇ ಇಲ್ಲ". "ಎಂಥ ಕೆಟ್ಟ ಸಂಸ್ಕಾರ ಉಳ್ಳವನು". ಅವನೊಬ್ಬ ಅಸಂಸ್ಕೃತ" ಇತ್ಯಾದಿ ಮಾತುಗಳು. ಒಬ್ಬ ವ್ಯಕ್ತಿಯ ಜೀವನದ ರೀತಿ ಅವನಿಗೆ ದೊರೆತಿರುವ ಸಂಸ್ಕಾರದಿಂದ ಬರುತ್ತದೆ ಎನ್ನುವುದು ವೇದ್ಯವಾಗುತ್ತದೆ.

"ಸಮ್ಯಕ್ ಕ್ರೀಯತೆ ಇತಿ ಸಂಸ್ಕಾರಃ" ಸಂಸ್ಕಾರವು ಒಂದು ಕ್ರಿಯಾ ವಿಶೇಷ. ಯಾರು ಈ ಸಂಸ್ಕಾರವನ್ನು ಪಡೆಯುತ್ತಾರೋ ಅವರ ಜೀವನ ಶೈಲಿಯೇ ವಿಶೇಷ ರೀತಿಯಲ್ಲಿ ರೂಪುಗೊಳ್ಳುತ್ತದೆ. "ಆತ್ಮ ಶರೀರಾನ್ಯತರನಿಷ್ಠೋವಿಹಿತಕ್ರಿಯಾಜನ್ಯೋತಿಶಯ ವಿಶೇಷಃ ಸಂಸ್ಕಾರಃ" ವಿಹಿತವಾದ ಕ್ರಿಯೆಗಳಿಂದ ಆತ್ಮ ಶರೀರಗಳನ್ನು ವಿಶೇಷವಾದದ್ದಾಗಿ ಮಾಡುವುದೇ ಸಂಸ್ಕಾರ. ಸಂಸ್ಕಾರವು ಒಬ್ಬ ಮನುಷ್ಯನನ್ನು ಒಂದು ನಿರ್ದಿಷ್ಠವಾದ ಉದ್ದೇಶಕ್ಕಾಗಿ ಸಿದ್ದಪಡಿಸುವ ಕ್ರಿಯೆ ಎನ್ನಬಹುದು. "ಸಂಸ್ಕಾರ" ಎನ್ನುವ ಪದದ ಅರ್ಥವನ್ನು 'ಪ್ರತಿಯತ್ನ' ಅಂದರೆ ತನ್ನನ್ನು ತಾನು ಉದ್ಧಾರ ಮಾಡಿಕೊಳ್ಳುವ ಕ್ರಿಯೆ, 'ಅನುಭವ' ಆತ್ಮವನ್ನು ಉದ್ಧರಿಸುವ ಒಂದು ಅನುಭವ. 'ಮಾನಸಕರ್ಮ ಅಂದರೆ ಇಂದ್ರಿಯಗಳ ಅನುಭವಕ್ಕಿಂತ ಹೆಚ್ಚಿನ ವ್ಯಾಪ್ತಿವುಳ್ಳದ್ದು– ಎಂದು ಸಂಸ್ಕೃತದ ಮೇಧಿನೀ ಕೋಶವು ವಿವರಿಸುತ್ತದೆ.

ಶರೀರಕ್ಕೆ ಜನ್ಮದಿಂದ ಅಂಟಿರುವ ಕಲ್ಮಶ ಮತ್ತು ಪಾಪಗಳನ್ನು ತೊಳೆಯುವುದು ಸಂಸ್ಕಾರಗಳ ಉದ್ದೇಶವೆಂದು ಸ್ಮೃತಿಗಳು ತಿಳಿಸುತ್ತವೆ. ಸಾಮಾನ್ಯವಾಗಿ ಮನುಷ್ಯನಾಗಿ ಹುಟ್ಟುವ ವ್ಯಕ್ತಿತ್ವನ್ನು ಪಡೆಯುತ್ತಾನೆ. "ಜನ್ಮಾನಾ ಜಾಯತೇ ಶೂದ್ರಃ ಸಂಸ್ಕಾರತ್ ದ್ವಿಜ ಉಚ್ಯತೇ" ಹೀಗೆ ಸಂಸ್ಕಾರಗಳನ್ನು ಮನುಷ್ಯನ ಜೀವನದಲ್ಲಿ ಮಹತ್ತರವಾದ ಪಾತ್ರವನ್ನು ವಹಿಸುತ್ತವೆ. ಸ್ಮೃತಿಗಳಲ್ಲಿ ವಿವರಿಸಿರುವ ಸಂಸ್ಕಾರಗಳ ಪಟ್ಟಿಯನ್ನು ನೋಡಿದರೆ ಸಂಸ್ಕಾರಗಳಿಗೆ ಅನೇಕ ಉದ್ದೇಶಗಳಿವೆ ಎಂದು ತಿಳಿಯುತ್ತದೆ.

ಮನುಷ್ಯನು ಜನ್ಮ ತಾಳುತ್ತಿರುವಂತೆಯೇ ಈ ಸಂಸ್ಕಾರಗಳು ವ್ಯಕ್ತಿಯ ಜೀವನದಲ್ಲಿ ಪ್ರಾರಂಭವಾಗುತ್ತದೆ. ಬಾಲ್ಯದಿಂದ ವೃದ್ಧತ್ವವನ್ನು ಹೊಂದಿ, ಅವನು ಮರಣ ಹೊಂದುವವರೆಗೂ ಸಂಸ್ಕಾರಗಳು ಮಾನವನ ಜೀವನವನ್ನು ನಿರ್ದಿಷ್ಟವಾಗಿ ರೂಪಿಸುತ್ತಾ ಹೋಗುತ್ತವೆ. ಸಂಸ್ಕಾರಗಳು ಸಾಮಾನ್ಯ ನಂಬಿಕೆ, ದುಷ್ಟಶಕ್ತಿಗಳಿಂದ ಮಗುವಿನ ರಕ್ಷಣೆ ಹಾಗೂ ಮಗಿವಿಗೆ ಉತ್ತಮ ಭವಿಷ್ಯವನ್ನು ರೂಪಿಸುವ ಪ್ರಯತ್ನಗಳಾಗಿ ಪಾತ್ರವಹಿಸುತ್ತವೆ. ಬಾಲ್ಯದ ಸಂಸ್ಕಾರಗಳು ಒಂದು ಸಂಸಾರದಲ್ಲಿ ಮಗಿವಿನ ಹುಟ್ಟಿನಿಂದ ಉಂಟಾದ ಸಂತೋಷವನ್ನು ಎಲ್ಲರೊಂದಿಗೆ ಹಂಚಿಕೊಳ್ಳುವ ಉದ್ದೇಶವನ್ನು ಹೊಂದಿರುತ್ತವೆ. ಜೀವನದ ಸುಖದುಃಖಗಳನ್ನು ಬೇಕಾದ ಸಂಬಂಧಿಕರು, ಸ್ನೇಹಿತರೊಡನೆ ಹಂಚಿಕೊಳ್ಳುವ ಅಭಿವ್ಯಕ್ತ ಸಂಸ್ಕಾರಗಳಲ್ಲದೆ. ಒಬ್ಬ ವ್ಯಕ್ತಿ ಬ್ರಾಹ್ಮಣನಾಗಿ ಜನಿಸಿದರೂ ಅವನನ್ನು ದ್ವಿಜನಾಗಿ, ಶ್ರೋತ್ರೀಯನಾಗಿ ಮಾಡುವುದು ಸಂಸ್ಕಾರಗಳು.

ಇಂದು ಈ ಸಂಸ್ಕಾರಗಳು ಮಹತ್ವವನ್ನು ಕಳೆದುಕೊಂಡು ತೋರಿಕೆಯ, ಆಡಂಬರದ ನೆಪವಾಗಿ ಉಳಿದೆವೆ. ಅಂತಃಸ್ಸತ್ವವಿಲ್ಲದ ಬಾಹ್ಯ ವೈಭವವು ಮಾತ್ರ ಇಂದು ಕಾಣುತ್ತಿದೆ. ಆದ್ದರಿಂದ ಇಂದು ಸಂಸ್ಕಾರಗಳ ಪ್ರಾಮುಕ್ಯತೆಯ ಬಗ್ಗೆ ಜೀವನವನ್ನು ರೂಪಿಸುವಲ್ಲಿ ವಹಿಸುವ ಪಾತ್ರದ ಬಗ್ಗೆ ಚಿಂತನೆ ನಡೆಸಬೇಕಾಗಿದೆ. ಸಂಸ್ಕಾರಗಳ ಬಗ್ಗೆ ಅಂತಹ ಒಂದು ಪ್ರಯತ್ನವನ್ನು ಈ ಲೇಖನದಲ್ಲಿ ಮಾಡಲಾಗಿದೆ.

ಮುಖ್ಯವಾದ ಸಂಸ್ಕಾರಗಳು ಹದಿನಾರು ಅವುಗಳು:–

1. ಗರ್ಭಾದಾನ	2 ಪುಂಸವನ
3 ಸೀಮಂತೋನ್ನಯನ	4 ಜಾತಕರ್ಮ
5 ನಾಮಕರಣ	6 ನಿಷ್ಕ್ರಮ್ಮಣ
7 ಅನ್ನಪ್ರಾಶನ	8 ಕರ್ಣಛೆಧನ
9. ಚೂಡಾಕರ್ಮ	10. ಉಪನಯನ
11. ವೇದಾರಂಭ	12. ಸಮಾವರ್ತನ
13. ವಿವಾಹ	14. ವಾನಪ್ರಸ್ಥಾಶ್ರಮ ಗ್ರಹಣ
15. ಸಂನ್ಯಾಸಾಶ್ರಮಗ್ರಹಣ	16. ಅಂತ್ಯೇಷ್ಟಿ.

ಗರ್ಭಾದಾನ:– ಸಂಸ್ಕಾರಗಳ ವ್ಯಾಪ್ತಿಯನ್ನು ಎರಡು ವಿಧದಲ್ಲಿ ವಿಂಗಡಿಸಬಹುದು. ಸಂಸ್ಕಾರಗಳ ಸಾಂಪ್ರದಾಯಿಕ ಆಚರಣೆ ಹಾಗೂ ಸಂಸ್ಕಾರಗಳ ಸಾಮಾಜಿಕ ಮೌಲ್ಯಗಳು.

ಯಾವ್ಯದೇ ಸಂಸ್ಕಾರಗಳನ್ನು ಸಾಂಪ್ರದಾಯಿಕವಾಗಿ ಆಚರಿಸುವಾಗ ಮಂತ್ರಾಗ್ನಿಯ ಸಾಮೀಪ್ಯ ಪ್ರಮುಖವಾದದು. ಅಗ್ನಿಯನ್ನು ಭೂವಿಯ ಮೇಲಿನ ಪ್ರತ್ಯಕ್ಷ ದೇವತೆಯಾಗಿ, ದೇವತೆಗಳೆಲ್ಲರ ಪ್ರತಿನಿಧಿಯಾಗಿ ಕಾಣುವುದು ವೇದಗಳ ಕಾಲದಿಂದಲೂ ರೂಢಿಯಲ್ಲಿ ಬಂದಿದೆ. ಸರ್ವದೇವತಾಂ ಸ್ವರೂಪ ಈ ಅಗ್ನಿ "ಅಗ್ನಿಸ್ಸರ್ವದೇವತಾಃ" ಎಲ್ಲ ದೇವತೆಗಳನ್ನೂ ಅಗ್ನಿಯು ಸುತ್ತುವರೆದಿದ್ದಾನೆ. ಚಕ್ರದ ನೇಮಿಯಂತೆ, "ಅಗ್ನಿನೇಮಿ ರರಾಜ್ಞ ಇವ ದೇವಾಂಸ್ತ್ವಂಪರಿಭೂರಸಿ" ಆದ್ದರಿಂದ ಅಗ್ನಿಯನ್ನು ಸಾಕ್ಷಿಯಾಗಿಟ್ಟುಕೊಂಡೇ ಶುಭ, ಅಶುಭ ಎರಡೂ ಕಾರ್ಯಗಳನ್ನು ಮಾಡುವ್ಯದು ರೂಢಿಯಲ್ಲಿದೆ. ನಮ್ಮ ನಿತ್ಯ ಜೀವನದಲ್ಲೂ ಅಗ್ನಿಯ, ಬೆಳಕಿನ ಶಕ್ತಿಯ ಅವಶ್ಯಕತೆ ಪರಮೋಚ್ಚವಾಗಿದೆ.

ಒಂದೊಂದು ಸಂಸ್ಸಾರವನ್ನು ನೆರವೇರಿಸುವಾಗಲೂ ಅಗ್ನಿಗೆ ಒಂದೊಂದು ವಿಶೇಷವಾದ ನಾಮವನ್ನು ಕೊಟ್ಟಿದೆ.

ಸಂಸ್ಕಾರಗಳಲ್ಲಿ ಮೊದಲನೆಯ ಸಂಸ್ಸಾರವೇ ಗರ್ಭಾದಾನ. ಅಲ್ಲಿ ಅರ್ಚಿಸುವ ಅಗ್ನಿಗೆ ಮಾರುತ ಎಂದು ಹೆಸರು. ಮಾರುತ ಎನ್ನುವ ಪದ ಮಾನಸಿಕ ಸ್ವಾಸ್ಥ್ಯ ಅಥವಾ ಭಾವನೆಗೆ ಸಂಬಂಧಪಟ್ಟಿದೆ. ಗರ್ಭಾದಾನ ಸಂಸ್ಕಾರವು ವಂಶಾಭಿವೃದ್ಧಿಗಾಗಿ ಪತಿ ಪತ್ನಿಯ ಸಮಾಗಮ ಕೇವಲ ಕಾಮತೃಪ್ತಿಗಾಗಿ ಅಲ್ಲ. ಈ ಸಂಸ್ಸಾರದ ಸಮಯದಲ್ಲಿ ಪತಿ ಪತ್ನಿಯರ ಮಾನಸಿಕ ಆರೋಗ್ಯ ಅತಿ ಮುಖ್ಯ. ಶಾಂತಚಿತ್ತರಾಗಿ ಪರಸ್ಪರ ಸಮ್ಮತಿ, ಪ್ರೀತಿ ವಿಶ್ವಾಸದಿಂದ ನಡೆಯುವ ಈ ಕ್ರಿಯೆಯಿಂದ ವಂಶದ ಚಿಗುರು. ಆದ್ದರಿಂದ ಇದೊಂದು ಸಂಸ್ಸಾರ, ನಿರ್ದಿಷ್ಟವಾದ ದಿನಗಳು ಮತ್ತು ಕಾಲವನ್ನು ಸ್ಮೃತಿಗಳು ತಿಳಸ್ಮತ್ತವೆ. ವರ್ಷದಲ್ಲಿ ಯಾವ ತಿಂಗಳುಗಳನ್ನು ವರ್ಜಿಸಬೇಕು., ಯಾವ ತಿಂಗಳಿನಲ್ಲಿ ಗರ್ಭಾದಾನ ಮಾಡಬೇಕು, ಶುಭಕರವಾದ ದಿನಗಳು, ನಕ್ಷತ್ರಗಳಾವುವು. ಇತ್ಯಾದಿ ವಿಷಯಗಳನ್ನು ಸೂಕ್ಷ್ಮವಾಗಿ ಪರಿಶೀಲಿಸಬೇಕಾಗುತ್ತದೆ. ಈ ವಿಷಯಗಳನ್ನು ಸಂಸ್ಕಾರಗಳ ಪ್ರಯೋಗ ಗ್ರಂಥಗಳಲ್ಲಿ ವಿವರವಾಗಿ ತಿಳಸ್ಮತ್ತಾರೆ. ಸ್ಮೃತಿ ಗ್ರಂಥಗಳೂ ಈ ವಿಷಯದಲ್ಲಿ ತಿಳವಳಿಕೆಯನ್ನು ನೀಡುತ್ತವೆ. ಛೆದ ಮೂಲವಾದ ಮಂತ್ರ ಪುರಸ್ಸರವಾದ ಗರ್ಭಾದಾನ ಮುಂತಾದ ಸಂಸ್ಕಾರಗಳು ಛೆದಾಧ್ಯಯನ ಮುಂತಾದ ಇಂತಹದಲ್ಲಿ ಶ್ರೇಷ್ಠವಾದ ಕರ್ಮಗಳಗೂ ಹೋಮಗಳನ್ನು ಮಾಡುವುದರಿಂದ ಪರಲೋಕಕ್ಕೂ ಒಳತನ್ನು ಮಾಡುತ್ತದೆ.

ಗರ್ಭಾದಾನವು ಗರ್ಭವನ್ನು ಶುದ್ಧಿ ಮಾಡುತ್ತದೆ. ಋತುಕಾಲದಲ್ಲಿ (ರಜೋದರ್ಶನದಿಂದ ಹದಿನಾರು ದಿನಗಳವರೆಗೆ ಋತು) ಪತಿಪತ್ನಿಯರು ಮಂಗಳಸ್ನಾನ ಮಾಡಿ, ಒಳ್ಳೆಯ ಮನಸ್ಸಿನಿಂದ ಪ್ಯತ್ರಕಾಮರಾಗಿ ಸೇರಿದರೆ ಆ ದಾಂಪತ್ಯದಿಂದ ಸರ್ವವಿಧದಲ್ಲೂ ಶ್ರೇಷ್ಠವಾದ ಸಂತಾನೋತ್ಪತ್ತಿಯಾಗುವ್ಯದು, ಸಮದಿನಗಳಲ್ಲಿ ಸಂಸ್ಸಾರವು ನಡೆದರೆ (ಪುತ್ರನೂ) ಬೆಸದಿನಗಳಲ್ಲಿ ನಡೆದರೆ ಕನ್ಯೆಯು ಜನಿಸುವುದೆಂದು ಗರ್ಭಾದಾನ ಪ್ರಯೋಗಗಳಲ್ಲಿ ತಿಳಿಸಿದೆ. ಸಂಸ್ಕಾರವು ನಡೆಯುವ ದಿನದಲ್ಲಿ ದಂಪತಿಗಳಿಬ್ಬರೂ ಶುಚಿಯಾದ, ಮೃಧುರವಾದ ಆಹಾರವನ್ನು ಸೇವಿಸಿ, ಪುಷ್ಪಮಾಲೆ ಅನುಲೇಪನಗಳಿಂದ ಅಲಂಕೃತರಾಗಿರಬೇಕು. ಈ ಎಲ್ಲಾ ಬಾಹ್ಯ ಅಲಂಕಾರ ಬರಿ ರಂಜನೆಯಲ್ಲ, ಮಾನಸಿಕ ಸಮತೋಲವನ್ನು ಕಾಯ್ದುಕೊಳ್ಳಲು ಅನುಕೂಲ.

ಸಂಯಮ ಎನ್ನುವ ಪದವೇ ಇಂದು ಸಮಾಜದಲ್ಲಿ ಕಾಣುತ್ತಿಲ್ಲ. ವ್ಯಕ್ತಿಗಳು ಮಾನಸಿಕ ಜಂಜಾಟದಿಂದ ನವೆಯುತ್ತಿದ್ದಾರೆ, ಪ್ರತಿಯೊಬ್ಬ ವ್ಯಕ್ತಿಯಲ್ಲೂ ಅಶಾಂತಿ, ಕುಬ್ಬುದ್ದಿಗಲು ಹೆಚ್ಚಾಗುತ್ತಿವೆ. ನಿಷಿದ್ಧ ಕಾಲದಲ್ಲಿ ಅಥವಾ ಬಲಾತ್ಕಾರವಾಗಿ ನಡೆಯುವ ಕ್ರಿಯೆಯಿಂದ ನಿಷಿದ್ಧವಾದ ಸಂತಾನ ಉತ್ಪತ್ತಿಯಾಗುವುದೆಂದು ಪ್ಯರಾಣಗಳು ತಿಳಸುತ್ತವೆ. ಪ್ಯರಾಣಗಳು ಕಥೆಗಳ ಮೂಲಕ ಜನಸಾಮಾನ್ಯರಲ್ಲಿ ಸಾಮಾಜಿಕ ಪ್ರಜ್ಞೆಯನ್ನು ಬೀರುವ ಗ್ರಂಥಗಳಾಗಿವೆ. ಕಂಸನ ಹುಟ್ಟು ದೈತ್ಯರ ಜನನ ಇವುಗಳಿಗೆ ನಿಷಿದ್ಧ ಸಮಯದಲ್ಲಿ ನಡೆದ ಸಮಾಗಮವೇ ಕಾರಣವೆಂದು ಪ್ಯರಾಣಗಳು ತಿಳಸ್ಮತ್ತವೆ. ಆದ್ದರಿಂದ ಗರ್ಭಾದಾನ ಸಂಸ್ಕಾರವು ಸಮಾಗಮಕ್ಕೆ ಪೂರಕವಾದ ಮಾನಸಿಕ ಸಿದ್ಧತೆಯನ್ನು ತಂದುಕೊಡುತ್ತದೆ. ಉತ್ತಮ ಸಚಿತತಿಯನ್ನು ಪಡೆದು ಸಮಾಜನದ ಸ್ವಾಸ್ಥ್ಯವನ್ನು ಕಾಪಾಡಲು ಸಹಾಯಕವಾಗುತ್ತದೆ.

ಪುಂಸವನ:– ಪುಂಸವನ ಸಂಸ್ಕಾರವು ಗರ್ಭಧಾರಣೆಯಾದ ಮೇಲೆ ಗರ್ಭಿಣಿ ಸ್ತ್ರೀಯರಿಗೆ (ಕ್ಷೇತ್ರಕ್ಕೆ) ನೆರವೇರಿಸುವ ಸಂಸ್ಕಾಖುವಾಗಿದೆ. ಸ್ತ್ರೀಯನ್ನು ಕ್ಷೇತ್ರವೆಂದು, ಪುರುಷನನ್ನು ಬೀಜವೆಂದು ಗುರುತಿಸುವುದು ಸಾಮಾನ್ಯವಾಗಿದೆ. ಪುಂಸವನದ ಉದ್ದೇಶ ಗರ್ಭವು ಯಾವ ತೊಂದರೆಗಳನ್ನನುಭವಿಸದೆ ವೃದ್ಧಿಯಾಗಲೀ, ಗರ್ಭಪಾತವಾಗದಿರಲಿ ಎನ್ನುವುದಾಗಿದೆ. ಈ ಸಂಸ್ಕಾರವು ಗರ್ಭಿಣಿ ಸ್ತ್ರೀಯರಿಗೆ ಅವರ ಊಟ ಉಪಚಾರಗಳಲ್ಲಿ, ಆಹಾರ ವಿಹಾರಗಳಲ್ಲಿ ಒಂದು ಸಂಯಮವನ್ನು ತರುವ ಉದ್ದೇಶವನ್ನು ಹೊಂದಿದೆ. ಇದೊಂದು ವ್ರತವೆಂದು ಸ್ವೀಕರಿಸಿ ತನ್ನ ಗರ್ಭದ ರಕ್ಷಣೆಗೆ ಬೇಕಾದ ಎಲ್ಲಾ ಎಚ್ಚರಿಕೆಯ ಕ್ರಮವನ್ನು ಗರ್ಭಿಣಿಯು ತೆಗೆದುಕೊಳ್ಳಬೇಕು.

ಗರ್ಭಾದಾನವಾದ ನಚಿತರ ದ್ವಿತೀಯ ಅಥವಾ ತೃತೀಯ ತಿಂಗಳಿನಲ್ಲಿ ಈ ಸಂಸ್ಕಾರವನ್ನು ನಡೆಸಬೇಕು. ಪುಂ–ಸವನ, ಪುಂ (ಅರೆಯುವುದು, ತೇಯುವುದು, to crush, grind) ಸವನ ವ್ರತ. ಈ ಸಂಸ್ಕಾರದಲ್ಲಿ ಪತಿಯು ಗರ್ಭಿಣಿ ಪತ್ನಿಗೆ ಪ್ರಶಸ್ತವಾದ ವಾರ, ತಿಥಿ, ನಕ್ಷತ್ರಗಳುಳ್ಳ ಶುಭ ದಿನದಲ್ಲಿ ಪೂಜಾಕಾರ್ಯಗಳನ್ನು ನೆರವೇರಿಸಿದ ನಂತರ, ಹಿಂದಿನ ರಾತ್ರಿ ನೆನಪಿಟ್ಟು ಮೃದುವಾದ ಆಲದ (ನ್ಯಗ್ರೋಧದ) ಬಿಳಲನ್ನು ಜಜ್ಜಿ ಅದರ ರಸವನ್ನು ಗರ್ಭಿಣಿಯ ಬಲಮೂಗಿನಿಂದ, ಶರೀರದೊಳಕ್ಕೆ ಇಳಯುವಚಿತೆ ಮಾಡುತಾನೆ. ಗರ್ಭವು ಶಕ್ತವಾಗಲು ಇದೊಂದು ಔಷಧಿ.

ಪುಂಸವನದಲ್ಲಿ ಪತಿಯು ಪತ್ನಿಯನ್ನು ಕೇಳುತ್ತಾನೆ, 'ಕಿಂ. ಪಿಬಸಿ'? ಏನನ್ನು ಕುಡಿಯುತ್ತೀಯಾ? ಎಂದು ಪತ್ನಿಯು ಉತ್ತರಿಸುತ್ತಾಳೆ. 'ಪುಂಸವನಂ' ಎನ್ನುತ್ತಾಳೆ. ಪತಿಯು ಪತ್ನಿಯ ಹಸ್ತಕ್ಕೆ ಮೊಸರು, ಯವೆ (ಗೋಧಿ), ಕಾಳು (ಹುರಿಳಿಕಾಳು) ಗಳನ್ನು ಹಾಕಿ ಅದನ್ನು ತೆಗೆದುಕೊಳ್ಳಲು ತಿಳಸುತ್ತಾನೆ. ಪತ್ನಿಯು ಅದನ್ನು ಕುಡಿಯುತ್ತಾಳೆ. ಅಂದರೆ ಗರ್ಭಕ್ಕೆ ಬೇಕಾದ ಪೋಷಕಾಂಶಗಳಾದ ವಿಟಮಿನ್ನುಗಳು (ಮೊಸರು) ಕಾರ್ಬೋಹೈಡ್ರೆಟ್ (ಯವೆ) ಹಾಗೂ ಪ್ರೋಟೀನ್‌ಗಳು

(ಕಾಳು) ಇವುಗಳನ್ನು ಆಹಾರವಾಗಿ ತೆಗೆದುಕೊಳ್ಳಲು ನಿಯಮವನ್ನು ರೂಪಿಸುವ ಕ್ರಿಯೆಯಾಗಿದೆ ಪುಂಸವನ.

ಗರ್ಭಧಾರಣೆಯಾದ ನಂತರ ಗರ್ಭದನ್ನು ಬಲಗೊಳಿಸಲು ಇಂದು ಅನೇಕ ಔಷಧಗಳು, ಚುಚ್ಚುಮದ್ದುಗಳು ಇರುವುದರಿಂದ, ಎಲ್ಲಾ ಆಹಾರ, ವಿಹಾರಗಳಲ್ಲಿ ಮಾರ್ಗದರ್ಶನ, ಸಲಹೆಗಳನ್ನು ನೀಡುವ ವೈದ್ಯರು ಇರುವುದರಿಂದ ಈ ಪುಂಸವನ ಸಂಸ್ಕಾರವು ಮಹತ್ವದ್ದಲ್ಲ ಎನ್ನುವ ಭಾವನೆ ಉಂಟಾಗಬಹುದು. ಆದರೆ ಯಾವುದೇ ಸಂಸ್ಕಾರವಿದ್ದರೂ ಸಂಸ್ಕಾರವನ್ನು ನೆರವೆರಿಸುವುದಕ್ಕೆ ಮುಂಚೆ ದೇವತಾ ಪೂಜೆ, ಹೋಮ ಮುಂತಾದವನ್ನು ನಡೆಸುವುದರಿಂದ ಗರ್ಭಿಣಿಯಲ್ಲಿ ಕಂಡುಬರುವ ಆತಂಕ ಕಡಿಮೆಯಾಗಿ ಆತ್ಮವಿಶ್ವಾಸವು ಮೂಡುತ್ತದೆ. ಮಾನಸಿಕ ಸ್ಥೈರ್ಯವು ಔಷಧಗಳ ಜೊತೆಜೊತೆಯಾಗಿ ಸಹಾಯಕವಾಗಿ ಗರ್ಭದ ಆರೋಗ್ಯವನ್ನು ಕಾಪಾಡುತ್ತದೆ. ಇಂದಿಗೂ ಅನೇಕ ಮನೆಗಳಲ್ಲಿ, ವೈದ್ಯರಿಂದ ಸಲಹೆ ಸಹಕಾರಗಳನ್ನು ಪಡೆದರೂ ೩, ೫, ಹಾಗೂ 7ನೇ ತಿಂಗಳುಗಳಲ್ಲಿ ಪಥ್ಯದ ಔಷಧಿಗಳನ್ನು ಹಿರಿಯರು ಮನೆಯಲ್ಲಿ ಮಾಡಿ ಗರ್ಭಿಣಿಯರಿಗೆ ಕೊಡುವ ಪರಿಪಾಠವಿದೆ.

ಈ ಸಂಸ್ಕಾರದಲ್ಲಿ ಪೂಜಿಸುವ ಅಗ್ನಿಗೆ ಪವಮಾನ ಎಂದು ಹೆಸರು. ಪದ ಎಂದರೆ ಪವಿತ್ರ ಮಾಡುವುದು. ಇಲ್ಲಿ ಗರ್ಭವನ್ನು ಪವಿತ್ರಗೊಳಿಸುವ ಕ್ರಿಯೆ ಇದೆ. ಸ್ಮೃತಿಗಳು ಪುಂಸವನ, ಸೀಮಂತೋನ್ನಯನ, ಜಾತಕರ್ಮ ಮುಂತಾದ ಸಂಸ್ಕಾರಗಳು ಕ್ಷೇತ್ರದ (ಹೆಣ್ಣು) ಬೀಜದ (ಗಂಡು) ಕಲ್ಮಷಗಳನ್ನು ದೂರ ಮಾಡುತ್ತವೆ ಎಂದು ತಿಳಿಸುತ್ತವೆ. ಅಂದರೆ ಅನುವಂಶಿಕ ಖಾಯಿಲೆಗಳನ್ನು ತೆಡೆಯುತ್ತವೆ. ಪುಂಸವನವು ಗಂಡು ಮಗುವನ್ನು ಪಡೆಯಲು ಮಾಡುವ ಸಂಸ್ಕಾರ ಎಂದು ನಂಬಿಕೆ ಇದೆ. ಶಾಸ್ತ್ರಗಳೂ ಹೇಳುತ್ತವೆ. ಆದರೆ ಪ್ರಸಿದ್ಧವಾದ ಮನುಸ್ಮೃತಿಯಲ್ಲಿ ಪುಂಸವನದ ಸಂಸ್ಕಾರದ ಹೆಸರೇ ಇಲ್ಲ. ಅಭಿಪ್ರಾಯಗಳು ಏನೆ ಇರಲಿ, ಈ ಸಂಸ್ಕಾರವು ಔಷಧೋಪಚಾರದಿಂದ ಗರ್ಭವನ್ನು ಬಲಗೊಳಿಸುವ ಸಂಸ್ಕಾರ ಎಂದು ಹೇಳಿದರೆ ತಪ್ಪಿಲ್ಲ.

ಸೀಮಂತೋನ್ನಯನ: ಷೋಡಶ ಸಂಸ್ಕಾರಗಳಲ್ಲಿ 'ಪುಂಸವನ'ದ ನಂತರ ಮಾಡುವ ಸಂಸ್ಕಾರ ಸೀಮಂತೋನ್ನಯನ. ಇದು ಗರ್ಭಕ್ಕೆ ಮಾಡುವ ಸಂಸ್ಕಾರ. ಪುಂಸವನ ಸಂಸ್ಕಾರವನ್ನು ಗರ್ಭದ ಚಲನೆ ಪ್ರಾರಂಭವಾಗುವ ಮುಂಚೆ ಮಾಡಬೇಕು. ಸೀಮಂತೋನ್ನಯನ ಸಂಸ್ಕಾರವು ಗರ್ಭಧರಿಸಿದ ೬ ಅಥವಾ ೮ ನೇ ತಿಂಗಳನಲ್ಲಿ ಶುಕ್ಲಪಕ್ಷದಲ್ಲಿ ಮಾಡಬೇಕು.

ಸೀಮಂತೋನ್ನಯನವು ಮೊದಲ ಸಲ ಗರ್ಭಧರಿಸಿದ ಗರ್ಭಿಣಿಯು ಸಾಮಾನ್ಯವಾಗಿ ಹೊಂದುವ ಆತಂಕ ಮತ್ತು ಭಯವನ್ನು ನಿವಾರಿಸಿ ಸಂತೋಷದಿಂದಿರುವಂತೆ ಮಾಡಲು ನೆರವೇರಿಸುವ ಒಂದು ಸಂಸ್ಕಾರ

ಸೀಮಂತವೆಂದರೆ ಗರ್ಭವು ಸ್ಥಿರವಾಗಿ ನಿಂತಿದೆ ಎನುವುದನ್ನು ಪ್ರಚುರಪಡಿಸುವುದು. ಗರ್ಭಿಣಿಯು ಆಹಾರ, ವಿಹಾರಗಳ ವಿಷಯದಲ್ಲಿ ಕ್ರಮಬದ್ಧವಾಗಿ ನಡೆದುಕೊಳ್ಳಲು, ಮಾನಸಿಕ ಸ್ಥಿತಿಯು ಸಮತೋಲನವನ್ನು ಕಾಪಾಡಿಕೊಳ್ಳಲು, ಸಂತೋಷವಾದ ಮನಸ್ಥಿತಿಯನ್ನು ಹೊಂದಲು ಈ ಸಂಸ್ಕಾರವು ಸಹಾಯಕವಾಗುತ್ತದೆ.

ಸೀಮಂತವೆಂದರೆ ಬೈತಲೆ, ತಲೆಯ ಕೂದಲನ್ನು ಎರಡು ಭಾಗ ಮಾಡಿ, ತಲೆಯ ಮಧ್ಯದಲ್ಲಿ ಒಚಿದು ಗೆರೆ ಉಳಯುವಂತೆ ಮಾಡುವ್ಯದು.

ಈ ಸಂಸ್ಕಾರಕ್ಕೆ ಸ್ಥಾಪಿಸುವ ಅಗ್ನಿಯ ಹೆಸರು ಮಂಗಲ. ಮುಂದಿನ ಮಂಗಲ ದಿನಕ್ಕೆ ಎದುರು ನೋಡುತ್ತಾ, ಈ ಸಂಸ್ಕಾರವು ಮಂಗಲಾಗ್ನಿಯಲ್ಲಿಯೇ ಹೋಮಕ್ರಿಯೆ ನಡೆಯುತ್ತದೆ. ಶುಭ ಸಂಕಲ್ಪವನ್ನು ಮಾಡಿದ ನಂತರ ಪತಿಯು ಪತ್ನಿಯನ್ನು ಮೃದುವಾದ ಪೀಠದಲ್ಲಿ ಕೂರಿಸಿ, " ಈ ಔದುಂಬರ ವೃಕ್ಷವು ಬೆಳೆಯುವಂತೆ ಗರ್ಭವು ಬೆಳೆಯಲಿ ಎಂದು ಹೇಳುತ್ತಾ ಮೂರು ಮೂರು ಬಾತಿ ಪತ್ನಿಯ ಸೀಮಂತವನ್ನು ಊರ್ಧ್ವಮುಖವಾಗಿ ಬಿಡಿಸುತ್ತಾನೆ. ಅಂದರೆ ಅಡ್ಡಲಾಗಿರುವ ಕೂದಲುಗಳನ್ನು ಸರಿಸಿ ಬೈತಲೆಯ ಗೆರೆಯನ್ನು ಎಳೆಯುತ್ತಾನೆ. ಆನಂತರ ಗರ್ಭಿಣಿಯ ಸಂತೋಷಕ್ಕಾಗಿ ವೀಣಾವಾದನವು ನಡೆಯುತ್ತದೆ. ವೀಣಾವಾದನ ಮುಖ್ಯ ಉದ್ದೇಶವು ಸಂತೋಷ, ಸಂಭ್ರಮವನ್ನುಂಟುಮಾಡುವುದಲ್ಲದೇ. ಗರ್ಭದಲ್ಲಿರುವ ಮಗುವು ಶುಭಕರವಾದ ನಾದವನ್ನು ಕೇಳುತ್ತಾ, ಉತ್ತಮವಾದ ಗರ್ಭಸ್ಥ ಶಿಶುವು ಗರ್ಭದಲ್ಲಿದ್ದಾಗಲೇ ಸಂವೇದನೆಯುಳ್ಳದ್ದಾಗಿರುತ್ತದೆ. ತಾಯಿಯ ಪ್ರತಿಯೊಂದು ಕ್ರಿಯೆಯೂ, ತಾಯಿಯ ನೋವು, ನಲಿವುಗಳು ಗರ್ಭದ ಮೇಲೆ ಪ್ರಭಾವವನ್ನು ಬೀರುತ್ತದೆ ಎನ್ನುವುದಕ್ಕೆ ನಮ್ಮ ಪ್ಯರಾಣಗಳು ಅನೇಕ ಆಧಾರವನ್ನು ಒದಗಿಸುತ್ತವೆ. ಉದಾಹರಣೆಗಾಗಿ ಹೇಳುವುದಾದರೆ, ಮಹಾಭಾರತದಲ್ಲಿ ಅರ್ಜುನ, ಸುಭದ್ರೆಯರ ಮಗ ಅಭಿಮನ್ಯುವಿನ ಕಥೆ ಎಲ್ಲರಿಗೂ ತಿಳಿದೇ ಇದೆ. ಸುಭದ್ರೆಯು ಗರ್ಭಿಣಿಯಾಗಿದ್ದಾಗ, ಗರ್ಭಸ್ಥ ಶಿಶುವು ವೀರಯೋಧ ನಾಗಬೇಕೆಂದು ಸುಭದ್ರೆಯು ಯುದ್ಧ, ವ್ಯೂಹ ರಚನೆ ಮುಂತಾದ ವಿಷಯಗಳನ್ನು ಕೇಳಲು ಇಚ್ಚಿಸುತ್ತಾಳೆ, ಸುಭದ್ರೆಯ ಅಣ್ಣ ಶ್ರೀ ಕೃಷ್ಣನು ಯುದ್ಧದಲ್ಲಿ ರಚಿಸುವ ವ್ಯೂಹಗಳ ಬಗ್ಗೆ ವಿವರಿಸುತ್ತಿದ್ದನು. ಚಕ್ರವ್ಯೂಹದ ವ್ಯೂಹ ರಚನೆಯ ಬಗ್ಗೆ ಕೃಷ್ಣನು ವಿವರಿಸುತ್ತಿದ್ದಾಗ ಅರ್ಧದಲ್ಲಿಯೇ ಗರ್ಭಿಣಿಯಾದ ಸುಭದ್ರೆ ನಿದ್ದೆ ಹೋದಳು, ಅವಳ ಹೊತೆಯಲ್ಲಿಯೇ ಎಲ್ಲಾ ವಿಷಯಗಳನ್ನೂ ಕೇಳಿಸಿಕೊಳ್ಳುತ್ತಿದ್ದ ಗರ್ಭಸ್ಥ ಶಿಶುವೂ ನಿದ್ರೆ ಮಾಡಿತು. ಇದರ ಪರಿಣಾಮ, ಮಹಾಭಾರತ ಯುದ್ಧದಲ್ಲಿ ದ್ರೋಣರು ರಚಿಸಿದ ಚಕ್ರವ್ಯೂಹವನ್ನು ಭೇದಿಸಿ ಒಳನುಗ್ಗಿದ ಅಭಿಮನ್ಯು ಅದನ್ನು ಭೇದಿಸಿ ಹೊರಗೆ ಹೇಗೆ ಬರಬೇಕೆಂದು ತಿಳಿಯದೆ ಯುದ್ಧದಲ್ಲಿ ಹೋರಾಡಿ ವೀರಸ್ವರ್ಗವನ್ನು ಪಡೆಯುತ್ತಾನೆ.

ಸಂಗೀತ ವಿದ್ವಾಂಸರ ಮನೆಯಲಿ ಹುಟ್ಟಿದ ಮಕ್ಕಳು ಅದೇ ವಾತಾವರಣದಲ್ಲಿ ಬೆಳೆದು ಸಂಗೀತ ವಿದ್ವಾಂಸರಾಗುತ್ತಾರೆ. ಇದು ಸಾಮಾನ್ಯ. ಗರ್ಭಸ್ಥ ಸಂಸ್ಕಾರವಾದ ಈ ಸೀಮಂತೋನ್ನಯನವು, ಶಿಶುವು ಸುಸಂಸ್ಕೃತವಾಗಲು ಒಂದು ಅವಕಾಶ ಕಲ್ಪಿಸುತ್ತದೆ. ಸ್ತ್ರೀಯರಿಗೆ ಸಂತೋಷವನ್ನು, ನೆಮ್ಮದಿಯನ್ನು ಕೊಟ್ಟು ಗರ್ಭದ ಬಗ್ಗೆ ಆತಂಕ, ಭಯವನ್ನು ಹೋಗಲಾಡಿಸುವ ಈ ಸಂಸ್ಕಾರ ಇಂದಿಗೂ ಎಂದೆಂದಿಗೂ ಪ್ರಸ್ತುತವೇ ಸರಿ.

ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

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EMPOWERMENT OF WOMEN THROUGH EDUCATION A REALITY CHECK

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"The future must not belong to those who bully women. It must be shaped by girls who go to school and those who stand for a world where our daughters can live their dreams just like our sons."— President Barack Obama at the UN General Assembly 2012.

Keywords; Women, Education, Empowerment,

Scholars believe that in ancient India, women enjoyed equal status with men in all aspects of life. However, some have contrary views. Works by ancient Indian grammarians such as Patanjali and Katyayana suggest that women were educated in the early Vedic period. The status of women in India has been subject to many great changes over the past few millennia From equal status with men in ancient times through the low points of the medieval period to the promotion of equal rights by many reformers, the history of women in India has been eventful. In modern India, women have held high offices including that of the President, since 1947 the Indian government has tried to provide incentives for girls' school attendance through programmes for midday meals, free books, and uniforms. This welfare thrust raised primary enrollment between 1951 and 1981. In 1986 the National Policy on Education decided to restructure education in tune with the social framework of each state, and with larger national goals. It emphasized that education was necessary for democracy, and central to the improvement of women's condition.

Education is one of the most important means of empowering women with the knowledge, skills and self-confidence necessary to participate fully in the development process." But before coming on the role of education in women empowerment, we must think about the place of women in society. **Education:** "The act or process of imparting or acquiring general knowledge, developing the powers of reasoning and judgment, and generally of preparing oneself or others intellectually for mature life." **Woman:** "The female human being (distinguished from man)." **Empowerment:** "The giving or delegation of power or authority. In other words, it refers to increasing the spiritual, political, social, racial, educational, gender or economic strength of individuals and communities. It often involves the empowered developing confidence in their own capacities."After having the knowledge about education, woman and empowerment, we can say that **women empowerment** means **"delegation of authority to the female human beings"**, In other words, the same phrase **„women empowerment** may be defined as **"to empower a female person in her own capacities"**. The main aim the paper is after the tremendous reformation in women education compared with past whether the women empowered in reality.

"There is no chance for the welfare of the world unless the condition of women is improved. It is not possible for a bird to fly on one wing"

- Swami Vivekananda

"The future must not belong to those who bully women. It must be shaped by girls who go to school and those who stand for a world where our daughters can live their dreams just like our sons."—President Barack Obama at the UN General Assembly, 2012.

INTRODUCTION: The status of women in India has been subject to many great changes over the past few Millennia the history of women in India has been eventful.[1] During the ancient India, women enjoyed equivalent status & rights like their males counterparts. In addition they were properly educated in the early Vedic period. These references are available from the works of Grammarians such as Katyayana and Patanjali. Women also had the freedom to see their husbands. This system was known as 'Swayamvar.' In fact during this time, women had superior position than the males.[2] Indian women's position in society further deteriorated during the medieval period,[3]

HE STATUS OF WOMEN IN INDIA: When Gandhiji assumed India's leadership the average life span of an Indian woman was only twenty seven years. Babies and the pregnant women ran a high risk of dying young. Child marriage was very common. Only 2% of the women had any kind of education and women did not have an identity of their own. It is in this context that we have to recognize the miracle of Gandhi's work. Gandhiji claimed that a woman is completely equal to a man and practiced it in strict sense. Thousands and millions of women, y participated in the India's freedom movement because his influence. For Gandhiji, the freedom fight was not political alone; it was also an economic and social reform of a national proportion. Gandhiji always advocated a complete reform which he called "*Sarvodaya*" meaning comprehensive progress. He believed that the difference between men and women was only physical and has expressed several times in his writings that in many matters especially those of tolerance, patience, and sacrifice the Indian woman is superior to the male. "Womanhood is not restricted to the kitchen", he opined and felt that "Only when the woman is liberated from the slavery of the kitchen, that her true spirit

may be discovered". He wanted women to outgrow the traditional responsibilities and participate in the affairs of nation. He criticized Indian's passion for male progeny. He said that as long as we don't consider girls as natural as our boys our nation will be in a dark eclipse.

PROGRESS OF WOMEN'S EDUCATION IN INDIA: The education of women in India plays a significant role in improving livings standards in the country. A higher women literacy rate improves the quality of life both at home and outside home, by encouraging and promoting education of children, especially female children, and in reducing the infant mortality rate. Since 1947 the Indian government has tried to provide incentives for girls' school attendance through programmes for midday meals, free books, and uniforms. This welfare thrust raised primary enrollment between 1951 and 1981. In 1986 the National Policy on Education decided to restructure education in tune with the social framework of each state and with larger national goals. It emphasized that education was necessary for democracy, and central to the improvement of women's condition. The new policy aimed at social change through revised texts, curricula, increased funding for schools, expansion in the numbers of schools, and policy improvements. Following independence, India viewed education as an effective tool for bringing social change through community development.[4] The administrative control was effectively initiated in the 1950s, when, in 1952, the government grouped villages under a Community Development Block—an authority under national programme which could control education in up to 100 villages.

The government continued to view rural education as an agenda that could be relatively free from bureaucratic backlog and general stagnation. However, in some cases lack of financing balanced the gains made by rural education institutes of India. Some ideas failed to find acceptability among India's poor and investments made by the government sometimes yielded little results. Today, government rural schools remain poorly funded and understaffed.

WOMEN'S EMPOWERMENT AND WHAT IT MEANS IN INDIAN CONTEXT: Empowerment means, the giving or delegation of power or authority. In other words, it refers to increasing the spiritual, political, social, racial, educational, gender or economic strength of individuals and communities. It often involves the empowered developing confidence in their own capacities. In modern India, women have held high offices including that of the President. Women in India now participate fully in areas such as education, sports, politics, media, art and culture, service sectors, science and technology, etc. The Constitution of India guarantees to all Indian women equality Article 14, no discrimination by the State Article 15(1), equality of opportunity Article 16, and equal pay for equal work Article 39(d)). In addition, it allows special provisions to be made by the State in favour of women and children Article 15(3), renounces practices derogatory to the dignity of women Article 51(A) (e), and also allows for provisions to be made by the State for securing just and humane conditions of work and for maternity relief Article 42.[5]

With the introduction of the National Policy for Empowerment of Women, the Government of India had declared year 2001 as Women's Empowerment Year. It was said, "Our vision in the new century of a nation where women are equal partners with men". Many new projects were launched like Swashakti and Stree Shakti for women's empowerment; Swayam Sidha to benefit 100,000 women through micro-credit programs, Balika Samrudhi Yojana for the girl child and many more.

IS WOMEN EMPOWERED IN REALITY: The social condition of women is a matter of great concern. Where, at the one hand, they are considered in the Indian religious scriptures as respectable and worthy of worship, on the other hand they are, in practice, exploited, tortured and humiliated. Gender discrimination and injustice is widely practiced in the society whereas Law prohibits such acts.[6] Women in India can broadly be categorized under the urban and the rural. While women's empowerment may mean a lot to the urban women of India, it may not even strike a chord for the countless women folk of rural India who by far outnumber women living in urban India. Another major drawback and difference between both the categories of women is that majority of women in rural India presently, in the age bracket of 35 – 65 years have been kept away from any form of formal education. The scene is changing rapidly for the better for the present younger generation where a large number of young girls from villages are seen to be attending schools and even colleges, but this was not so earlier.

Thus lack of basic education has indeed prevented the girls in rural India in comprehending what their basic civil liberties are. Their real empowerment is thus confined within the four walls of their homes, and there too they are a shadow of their own self and have to follow the wish of their men folk. Even among the urban women we have a divide; the rich and novae rich and the poor and the middle class. The rich and super rich class of women in India get the maximum advantage of women rights, civil liberties, the programmes beneficial to women and are generally in command of their situation both at home and at their workplace. This is generally the situation of urban women belonging to the upper strata in India across bigger metros as well as smaller cities. Women are from the poor stratum and fed up of the life of squalor and misery in their villages, take flight to the cities of urban India in the hope of getting a far more satisfactory lifestyle. In fact they are attracted by the alluring lifestyle and glamour promised sometimes by the touts and pimps of the city who are constantly roaming around villages scouting for their prey. Invariably they succeed in luring away to the city a large number of women who either end up as sex slaves in a sick brothel or get some menial jobs as maid servants in the big-

ger cities of India where household chores are generally looked down upon and frowned by the upper stratum of women.

When we talk about women's empowerment or movements like 'one billion rising' we have to keep in mind the status of women prevalent in all these above categories of both urban and rural India mentioned above. If we feign ignorance about majority of the womenfolk in the villages of India, as well as those belonging to the poor and middle class working women in urban India, as and when we talk about women's empowerment, we could end up doing a great disservice to these women. It is in fact these women who remain mostly ignorant of their basic human rights, who need to be awakened from their stupor. It is in fact this class and stratum of society of women who need to unshackle themselves from the ignorance of backwardness and get acquainted with the promised life unfolding before them. These women both in the urban and rural sector, in fact account for at least 70% of the total women force who are denied their basic rights available to them. It is this stratum of women in India who need to be really awakened, and made aware of what can unfold for them. These women if made to come up to their real potential can really redefine the meaning of women's empowerment in a developing Country like India. A Country where women are cherished and worshiped in the form of Goddesses' like Sita, Durga and Lakshmi is really struggling to make its women aware of their simple basic human rights.[7]

A woman in most parts is looked upon more as an object of glamour or a mere sex object rather than somebody who can share and shoulder the equal and sometimes dominant responsibilities of decision making in the home and at work place. Although things are slowly changing for most women in India, but the change is so slow and subtle that it is hardly noticeable. The core areas concerning women are still in the process of being discovered and opened up for them. Till that happens it's an uphill task for majority of the women in both rural and urban India. Women in India continue to face discrimination and other social challenges and are often victims of abuse and violent crimes and, according to a global poll India is the "fourth most dangerous country" in the world for women, and the worst country for women among the G20 countries. Women bear almost all responsibility for meeting basic needs of the family, yet are systematically denied the resources, information and freedom of action they need to fulfill this responsibility. The vast majority of the world's poor are women. Two-thirds of the world's illiterates are female. Of the millions of school age children not in school, the majority are girls. And today, HIV/AIDS is rapidly becoming a woman's disease. Indian societies have received notoriety for being unsafe for women. If you think a lot has been done for woman empowerment, think again

Ø Cases of female-infanticides are still on rise (both reported and un-reported)
Ø Certain section of the society does not send girls to schools once she attains puberty.
Ø Some are not sent to schools ever.
Ø Numbers of pre-age marriages are also significant
Ø Dowry related harassment and deaths are still in news now and then.
Ø Harassment at work place, sexual or otherwise, though mainly unreported, is significant.
Ø The legislative strength of women is still less.
Ø The crimes against women are on the rise.
Ø The gender disparity is at all time high.

We call ourselves India is the next super-power country comparing us with some other nations. But, can we be acknowledged as a super-power or as a matter of fact, a developed nation, when there is such discrimination in the society? A lot is still to be done, miles to go….

OUR VISION IN THE NEW EAR: SOME SUGGETIONS

Ø Gender equality and women's empowerment are human rights. We need to augment our efforts for empowering women and enhance their progress.
Ø It is our moral, social and constitutional responsibility to ensure their progress by providing them with equal rights and opportunities.
Ø Women's active participation in economic policy in the public sector and in reaching upper-management and decision-making positions.
Ø Women's equal rights and influence in the key decisions that shape their lives and those of children must be enhanced in two distinct arenas: the household, the workplace.
Ø Women shall educate about the social benefits including awareness about the existing social problems in the society.
Ø Women are also allowed to participate in political and public life.
Ø Let women be equal partners and this aspect can be achieved through education and bringing about a change in the mind set of the people.
Ø Empowering women on one hand involves making them self-dependent and financially independent to the extent where they can demand and extract their rights; and on the other hand it involves motivating men to support the women in their lives to get empowered.
Ø In fact it becomes the pious and solemn duty of those women who have understood the power of complete women's empowerment, to come forward and willingly educate and embolden the fortune of the less fortunate and under privileged section of Indian women
Ø The University Education Commission was created to recommend suggestions to improve the quality of education. However, their report spoke against female education, referring to it as: "Women's present education is entirely irrelevant to the life they have to lead. It is not only a waste but often a definite disability."[8]

CONCLUSION: In this contemporary world, women need to gain the same amount of power that men have. Now, it is time to forget that men are the only holders of power. Indian women are slowly getting empowerment in the sectors like education, politics, the work force and even more power within their own households. The worth of civilization can be arbitrated by the place given to women in the society.[9] Time has come to break this chain, and free the women from their shackles and bondage from which society has constantly sought to bind them. How best we can protect the women from all these social challenges and are violent crimes; the only way in which we can give the solution for all the problem is by [10] reforming soul of every individual it is possible only by imparting ethical education and State as to follow the pillars of the good governance while protecting the women's interest these are as follows;

— PARTICIPATION
— RESPONSIBLE
— TRANSPARANCY
— ACCOUNTABALITY
— RESPONSIVE

"Cheers for the awakening of all women"

[1] http;//en.wikipedia.org visited on 10/10/11
[2] http;//www.womenempowermentinindia.com visited on 11/10/13
[3] http://www.cqvip.com/qk/83891A/200203/6479902.html
[4] "Plan Overseas - Education Girl-friendly schools see enrollment rates soar in Burkina Faso"
[5]http://books.google.com/books?id=w8FMjgPTWBUC
[6] https;//sites,google.com visited on 11/10/13
[7] http;//vikram140.blogspot.in visited on 14/10/13
[8] Daniel Murphy, *Comenius: A Critical Reassessment of his Life and Works* (1995), Chapter IV, *The Comenian Vision of Universal Education*
[9] http; //www.ifp.co.in visited on 14/10/13

THE SEXUAL HARASSMENT OF WOMEN AT WORK PLACE (PREVENTION, PROHIBITION AND REDRESSAL) BILL 2012 -A CRITICAL ANALISIS

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After 16 years of Visakha's case, the protection of women at work place Bill was passed by Lok Sabha on 3.09.2012 and Rajya Sabha on 25.02.2013 and now been sent for Presidential Assent. This aims at prevention of harassment of women at work place and establishment of complaint registration mechanism in the case of such harassment.

Sexual harassment was defined comprehensively by section 2(n) and section 2(o) of the bill defines work place to include each and every place of work including hospitals or nursing homes, stadium etc wherever there is a possibility of women employment. But an insertion of an explanation is sought to include the 'unorganized sector' i.e. the agricultural labours in which 60% of the work force contains female workers and the armed forces, domestic household servants in which sexual harassment is wide spread. Such insertion is necessary to include every single female member of the national workforce under this section.

Section 4 of the bill provides for establishment of Internal complaints committees, member of which shall be appointed/ nominated by the employers. It is often fond that the employers themselves are culprit and hence such committee would be haplessly hopeless and futile. Hence bill shall provide for establishment of such committees in concurrence with employees association as well. Section 6 provides for establishment of Local Complaints committers and Additional Local complaints committers by district Officers whose jurisdiction was unclear. Clarification as to powers and function of these committees are essential.

Section 10(1) provides for "Conciliation" on receipt of complaint of sexual harassment. But unlike disputes in contracts, conciliator further undermines the dignity and integrity of women in case of sexual harassment.

Section 10(3) confers powers of civil court as the Internal complaints committees which is undesirable as they are only domestic in nature. The time frame of 90 days for inquiry shall be extended in fit cases.

As per section 13 once the happening of sexual harassment was proved by inquiry committees, again the same will be brought before the disciplinary committees and enquiry will be done under central service Rules and it would be duplicate of work, perhaps resulting in mitigation of process and witness which would dilute the process. More over private employees have their own service rules and bill is unclear as to second enquiry thereof.

Section 14 of the bill provides for action as malicious complaint. A Complaint not proved can not be said that it did not happen. The internal/Local complaints committee is not competent to measure whether the complaint is malicious. More over in case where the employer himself is the culprit every possibility is there to prove that the complaint as malicious and no justice is available for the victim.

Section 26 (2)(ii) provides for cancellation of license of employers who do not comply with the provision of the act there by adversely effecting the employees as well.

As a whole the bill is highly unsatisfactory and does not reflect the dictum of Supreme Court in Visakha's case. It fails comprehensively in prevention the fall of imperceptible influence of any gender biases as female workforce either in performance of their duties or in their career progression. It is worth noting that the state women's commission was not involved in making this bill.

The responsibility and the burden of enforcement of the bill lies in the Government, employers and establishment. But it is the attitude that has to change and so that to pave way for establishment of safe and healthy work environment.

"You can tell the condition of a nation by looking at the status of its women".

- Jawaharlal Nehru

There was a time women were restricted to certain fields of work by virtue of their sex, cultural factors, social factors, traditional barriers and societal perceptions about their ability, but in today's world women are working at equal pace with men. Their choice of work is not longer defined by their gender. Women have made great progress by breaking the cultural barriers and taking up wide range of jobs, which were earlier restricted only for men. There has been a paradigm shift in the nature of employment that women take up from being supplementary income generators. They have become centre stage and providing themselves as dynamic leaders and significant income earners within their families[1]. Though now they are at par with the men, still the 'work place' is yet to adapt to the needs of women. Because sexual harassment in a workplace has become a serious and wide spread problem. Sexual harassment an invisible problem until quite recently, has now become a major Social problem with the widespread entry of women into labour force. Today almost all working women are vulnerable to sexual harassment, irrespective of their status, personal characteristics and types of their employment. Such conduct interferes with their job performance, their working relationship; it threatens their dignity, safety and health[2].

Sexual harassment of women at work place obviously results in violation of fundamental rights guaranteed by Articles 14[3],15[4],21[5], & Article 19 (1) (g)[6] of Constitution. Further the state also has failed in providing for just and humane conditions of work under Article 42 of part IV of the Constitution. It is also one of the Fundamental duty of every citizen to renounce practices derogatory to the dignity of women[7].

The protection against sexual harassment and the right to work with dignity are human rights universally recognized by International Conventions and instruments such as *Convention on the Elimination of all forms of Discrimination Against Women*, which has been ratified on the 25th June, 1993 by the Government of India[8].

The aim of the present article is to assess the historical background of the Act and critically evaluate the *Sexual Harassment of women at work place (Prevention, Prohibition and Redressal) Act, 2013*.

In India development of law of sexual harassment is of very recent origin. And there is no specific law relating to sexual harassment. In the absence of specific legislation the courts in India specifically depended on two sections of Indian Penal Code that are section 354 and 509[9].

These sections attract only when the intention of the harasser was to outrage or insult the modesty of a woman employee, but to gain sexual access through the promise or reward of job related benefits or to sexual favors through the threat of job related punishment are not attracted. So provisions do not protect working women either from *quid pro quo*[10] type of harassment or from hostile type of harassment[11]. So the jurisprudence of law for prevention of sexual harassment has been drawn by the Apex court in the light that the provisions of Indian Penal Code do not specifically provide a shield for sexual harassment.

A land mark case of judicial law making to fill the vacuum of legal norms against sexual harassment in work place is *Vishaka v/s State of Rajasthan*[12]. The case arose out of an incident of brutal gang rape of a social worker. The petitioners sought before the Apex court, writ of mandamus and appropriate legal scheme to ensure dignity of woman and prevent sexual harassment at workplace. The court conceded that the primary responsibility for ensuring safety and dignity of woman was upon the legislature and the executive. "when, however, instances of sexual harassment resulting in violation of fundamental rights of women under Articles 14, 19 and 21 are brought before us for redress under Art 32, an effective redress requires that some guidelines should be laid down for the protection of these rights to fill the legislative vacuum[13].

The Supreme Court of India, in 1997, delivered its landmark judgement in the case of *Vishaka and Ors. V. State of Rajasthan*[14]*;* it observed that, "Gender equality includes protection from sexual harassment and right to work with dignity, which is a universally recognized basic human right. The common minimum requirement of this right has received global acceptance. The international conventions and norms are, therefore, are of great significance in the formulation of the guidelines to achieve this purpose. "Further, the Supreme Court in this case laid down guidelines dealing exhaustively with the definition of 'sexual harassment'. The preventive measures required to be taken by an employer and the internal Redressal mechanisms required to be put in place. The

Supreme Court guidelines in *Vishaka* case were intended to be applicable to all employers until a statute was enacted for the same. But these guidelines are not implemented satisfactorily. It is stated that the attitude of neglect in establishing effective and comprehensive mechanism in letter and spirit of the *Vishaka* guidelines by the States as well as the employers in private and public sector has defeated the very objective and purpose of the guidelines.

The Complaints Committee as envisaged by the Supreme Court in its judgement in *Vishaka case* will be deemed to be an inquiry authority for the purpose of *Central Civil Services (Conduct)Rules, 1964,* and the report of the Complaint Committee shall be deemed to the an inquiry report under the Central Civil Services Rules. Thereafter the disciplinary authority will act on the report in accordance with the rules. The Supreme Court gave directions to comply with *Vishaka's* guidelines again in 2006.

In *Seema Lepcha*[15], the Apex Court gave directions to government to give comprehensive publicity to the notifications and orders issued by it in compliance of the guidelines framed in *Vishaka case* .in *Medha Kotwal Lele v. Union of India*[16] case, the affidavit filed by the State Governments and Union Territories show that most of the states have not carried out amendment to *Civil Services Conduct Rules* and *Standing orders*. Some of the States have not formed the Complaints Committee as envisaged in the *Vishaka* guidelines. Some states have constituted only one complaints committee for the entire State. For better implementation of *Vishaka* guidelines again in this case the Supreme Court, gave directions to State Governments and Union Territories to carry out adequate and appropriate amendments in their respective *Civil Services Conduct Rules* and *Industrial Employment (Standing orders) Rules,* within two months from date of the order, and that every State and Union Territories must constitute adequate complaints Committees so as to ensure proper implementation of the guidelines and State functionaries and private and public sector undertaking /organizations/bodies/ institutions, etc., should put in place sufficient mechanism to ensure full implementation of the *Vishaka* guidelines[17].

After 15 years of *Vishaka* case, the parliament passed the *The sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal)Act, 2013* with the objective to protect women from sexual harassment at the workplace. It also aims to setup mechanisms through which women can register complaints of harassment and seek compensation.
Sec .2 (n) defines sexual harassment as under:
"Sexual harassment" includes any one or more of the following unwelcome acts or behhavious (whether directly or by Implication) namely:
(i) Physical contact and advances; or
(ii) A demand or request for sexual favours; or
(iii) Making sexually coloured remarks; or
(iv) Showing pornography; or
(v) Any other unwelcome physical, verbal or non-verbal conduct of sexual nature.

Since each and every act of sexual harassment at the workplace is a form of sex discrimination which in effect denies a woman her fundamental rights guaranteed under the Constitutions, it is proposed that any legislation dealing with the said issue should have the widest possible application so as to take within its scope every female member of the national workforce.

Section 2(o) of the Act defines the "work place" as under
"Workplace" includes…….
(i) Any department, organization, undertaking, establishment, enterprise, institution, office, ranch or unit which is established, owned, controlled or wholly or substantially financed by funds provided directly or indirectly by the appropriate Government or the local authority or a Government company or a corporation or a co-operative society;
(ii) Any private sector organization or a private venture, undertaking, enterprises, institutions, establishment, society, trust, non-governmental organization, until or service provider carrying on commercial, professional, vocational, educational, entertainmental, industrial, health services or financial activities including production, supply, sale, distribution or service;
(iii) Hospitals or nursing homes;
(iv) Any sports institute stadium, sports complex or competition or games venue, whether residential or not used for training, sports or other activities relating thereto;
(v) Any place visited by the employee arising out of or during the course of employment including transportation provided by the employer for undertaking such journey;
(vi) A dwelling place or a house;

The present definition of "workplace" contained in section 2(o) is of wide amplitude and in that sense is acceptable. However, it bears mentioning that a clarification may be inserted in the said definition that the "unorganized sector" is not exempt from the ambit of the legislation. To this end, the legislation must cover agricultural workers and women in the armed forces. The agricultural workers, it was a gross injustice to who are the single largest female component of work force(68%) in the country if excluded; it amounts to injustice. Women in the armed forces must also be covered as there is a high rate of sexual harassment in the armed forces, judging from complaints that have come to Court in the last decade. It must also be remembered that the armed forces are, in any event, heavily male dominated and the chain of command is strong and entrenched. Enquiries are held behind closed doors putting women in the armed forces at a disadvantage to begin with. There is no need to exclude such women from the preview of the Act as no strategic or other interests are affected by protecting them against sexual harassment at the work place. It is necessary to cover every single female member of the national workforce under this section.

Section 4 of the Act makes provision for an Internal Complaints Committee (ICC), wherein all members including one senior Presiding Officer, two employees and a third-party Non –Government Organization (NGO) /Association are to be nominated by the employer. Given the stranglehold that the principles of chain of command have on relations in the workplace,, anti-sexual harassment committees must dispense justice in direct opposition to these workplace hierarchies. In instances where senior employees, or even employers, commit the human rights violation of sexual harassment, a nominated handpicked committee is easily susceptible to manipulation. The Act's faith in the employer's willingness to appoint a responsible and responsive committee and its non-compliance creates problem and is the same that beset the Supreme Court in *Vishaka*, and has been the single greatest hurdle in the redressal of complaints.

Therefore, while the Act must make employers liable for the institution of Internal Complaints Committee, no single employer should be allowed to pick and choose the entire committee. The process of appointment of the committee must involve concurrence by the Employees Association or any other such body. In the Jawahar Lal Nehru University (JNU), Delhi, the committee comprises of elected representatives from all sections of the university community –teachers, students, officers and karamcharis – so that the composition of the committee is independent and free from pressure from senior levels[18].

Instead of recognizing that sexual harassment is a violation that is predicated upon the exercise of institutional power, the present Act institutionalizes workplace –based hierarchies as the principle by which an Internal Complaints Committee may function, by mandating inquiry by an officer sufficiently senior to the person against whom a complaint has been made. It is essential that enquiry committees include representatives of 'junior' levels to mitigate the effects of hierarchy. Moreover, as the Internal Complaints Committee is itself not the disciplinary authority that action must be taken by the employer, this provision is simply unnecessary. Therefore, the authority and independence of the committee must be derived from law, and not the workplace position of the committee members.

Under section 4(2) (a) of the Act, if the senior level women employees are not available in that unit/work place, the Presiding Officer shall be nominated from other officers or administrative units of the work places. There is no provision for fee or allowances to a deputed officer for holding the proceedings; however it may mean that the Presiding Officer may not work efficiently as he has no remuneration.

As far as Section 6 of the Act, is concerned, it contains ambiguous guidelines for constitution of the Local Complaints Committee; the Act provides that every District Officer shall constitute a Local Complaints committee in the district. It also prescribes that an additional Local Complaints Committee shall be constituted at the block level to address complaints in certain cases. However, the jurisdiction and functions of these commissions are unclear. This needs to be clarified.

Section 10(1) of the Act, stipulates that on receipt of a complaint of sexual harassment, 'conciliation' must be attempted between the complainant and respondent. This is in violation of the mandate prescribed by the Supreme Court in *Vishaka case*, which was a direction to the state 'to ensure a safe workplace / educational institution for women'. In this context, attempts, to ensure justice cannot be muscled by attempts at conciliation. There are certain areas, such as contractual matters where there could be conciliation, but in matters of harassment and humiliation to women, an attempt to compromise the same is indeed yet another way in which the dignity of women is undermined. Objections have been raised by many women's organizations that the said provision actually shows very little regard for the dignity of women. Then once a settlement has been reached, the Act requires that 'no further enquiry shall be conducted by the Committee'. Settlement through 'conciliation' and crisis-mediation' are two entirely different concepts, but unfortunately the Act replaces one for the other. Can a mere complaint be a basis of reconciliation? Surely the basis and terms of any settlement can only be determined by first establishing that an act of sexual harassment took place, and the extent of its nature and severity. The provision has greater peril for aggrieved women, as it can be used to 'disappear' complaints of sexual harassment as soon as they are filed. Given that Internal Complaints Committee in the Act are handpicked by employers from 'senior' levels, it is quite likely that aggrieved women will feel compelled to accept the conciliation option. So section 10 (1) of the Act, in so far as it proposes conciliation as a first step, must be deleted.

As far as section 11(3) is concerned, which has enabled the Internal Complaints Committee to be given powers of a Civil Court for summoning, and production of documents is concerned, this amounts to colorable legislation because powers of courts cannot be simply conferred upon domestic committees, particularly when the composition of the Internal Complaints Committee does not have any legal background. Even the Act does not specify any training to the committee for fulfilling these duties. This is in distinction to the composition of the Local Complaints Committee in which at least one member has to preferably have a background in law or legal knowledge. As far as section 11(4), is concerned inquiry shall be completed within a period of 90 days; this provision must be given extension of period in certain or special cases. Section 13 of the Act visualizes a two stage enquiry process. Even after the inquiry committee has found that sexual harassment has taken place, it is required to send the report to the disciplinary committee for action under the Service Rules. This means that the employer/District Officers will start an-

other enquiry on the same complaint once again in accordance with law. Public servants will then have to face an enquiry under Central discipline rules. The women will have to lead evidence again and subject herself to cross examination again as per the *Central Civil Services Rules* and there will be a fresh report and the report will then have to go to the disciplinary authority for deciding the punishment. The application of the services rules that require cross examination of witness etc., do not provide the adequate safeguards to the complainant as is required in a case of sexual harassment at workplace. There is no justification in a complainant deposing twice; at times witnesses may or may not be willing to depose twice; private sector employers also have rules which require enquiries to be held according to their rules and it is not clear if they too will conduct a second enquiry. The value of the Internal complaints committee is being completely undermined by sec 13(3) (i). In contrast to this, the

Supreme Court of India in the *Medha Kotwal*[19] case has clarified that the report of the complaints committee is final and that the disciplinary authority can only deal with the punishment but not start a second stage enquiry:

"Complaint Committee as envisaged by the Supreme Court in its judgement in *Vishaka* case will be deemed to be an inquiry authority for the purpose of Central Civil Services (Conduct) Rules, 1964 and the report of the Complaint Committee shall be deemed to be an inquiry report under the Central Civil Services Rules[20]. Thereafter the disciplinary authority will act on the report in accordance with the rules".

This means that enquiry is not required to be conducted again but that the disciplinary authority will only decide the punishment after giving to the employee an opportunity to make a representation against the report; punishment, in this section must be appropriately modified.

Section 14 of the Act calling for action against the complainant in case the "Internal Committee or the Local Committee as the case may be, arrives at a conclusion that the allegation against the respondent is malicious or the aggrieved women or any other person making the complaint has made the complaint knowing it to be false…" The danger in this is that the entire purpose of *Vishaka* and this law is defeated. Complaint 'not proved' does not mean that the complaint is false. There are remedies under the ordinary law (e .g defamation) to resort to if complaint is found to be 'false'. Second, how is malice to be determined? Such provision will have a chilling effect and a woman will hardly if ever make a complaint when sexually harassed. Are members of complaints committee competent to measure if complaints are made maliciously? The answer is a clear 'No'.

Then the present section 14 of the Act appears to be a provision which is liable to misuse. Where an aggrieved woman makes a complaint it is possible that she will be faced with opposition from the employer as well. In such cases it is often possible that evidence may be manipulated by the employer or those acting in concert with the employer so as to ostensibly falsify the allegations of the aggrieved women. Therefore the fear is that such a provision may be used to counter the complaint of the aggrieved women and would promote a culture among employers with means to render false the genuine complaint of aggrieved women. Sexual harassment is the most under-reported crime, such provision will deter women to come forward and complain. This provision may further discourage even genuine complaints and is intended to nullify the objective of the law. So such provision needs to be removed from the Act.

Section 26(2) (ii) of the Act, which says that, if the employer fails to comply the provisions which are mentioned in the Act, his license may be cancelled, withdrawn or not approved? It not only affects the respective employer but also to other employees who are working in same unit / establishment.

Read, as a whole, *The Sexual Harassment of Women at Work Place (Prevention, Prohibition and Redressal) Act 2013* is unsatisfactory. While the Act purports to be in effectuation of the Hon'ble Supreme Court's dictum in *Vishaka*, it is clear from a reading of the said Act that the spirit of the judgement in *Vishaka* is not adequately reflected. The applicable law, relating to sexual harassment at the work place, ought to ensure that not even an imperceptible influence of any gender bias is felt against the female workforce either in the performance of their duties or in their career progression. It is also important to note that in entire Act there is no involvement of the State Women Commission.

The responsibility and onus to implement this Act is on the Central Government, State Government, employers and establishments. Prevention of work place sexual harassment is all about a collective aspiration of both men and women to have workplaces free of discriminatory practices. It is necessary that our workplaces take responsibility for promoting a safe and healthy work environment.

Law alone is not enough to root out this social evil society has to change its attitude so that women can come out and participate in public life without feeling threatened. What needs to be inculcated is a sense of mutual respect between men and women. There is a divinity in each of us. The recognition of this divinity will automatically bring both mutual self-respect and that alone will be source of liberation and empowerment of women.

End notes

1. Report on "WORKING CONDITIONS OF WOMEN IN CALL CENTRES : ISSUES AND REMEDIES"
2007 BY NATIONAL COMMISSION FOR WOMEN, P.1
2. Lohit .D. Naikar 2004, The Law relating to Human Rights P 539 &540, Puliani & puliani publications, Bangalore.
3. Article 14 which says equality before law.
4. Article 15 prohibition of discrimination on grounds of reli-

gion, race, caste, sex, place of birth.
5. Article 21, Right to life and personal liberty
6. Article 19(1) (g) Right to practice any profession or to carry on any occupation or business.
7. Article 51 (e) to promote harmony and the spirit of common brotherhood among all the people of India transcending religious, linguistic and regional or sectional diversities, to renounce the practices derogatory to the dignity of women.
8. Article 11, the convention on elimination of all forms of discrimination against women.
9. Subhash Chandra, "Sexual Harassment of women in the Workplace : Need for a comprehensive legislation", Criminal Law Journal, 1998 P.3
10. Quid pro quo Harassment involves sexual threats or bribery that are made a condition of employment or used as the basis for employment decisions.
11. Hostile environment harassment captures those behaviours such as sexual jokes, comments and touching that interfere with individual ability to do his/her job or that create an intimidating hostile or offensive working environment.
12. AIR 1997 SC 3011
13. Dr. J.N. Pandey, Constitutional Law of India, P.101Central Law Agencies Allahabad.
14. Supra at 12
15. Seem A Lepcha V State of Sikkim &Ors. SLA (CIVIL) No. 34153/2010 decided on 03.02.2012
16. AIR 2013 SC 93
17. Ibid
18. Ayesha Kidwai, Mourya Anubhuti, 'Sexual Harassment at work place : Extending the Debate' WWW. Indiareal .Com visited on 03.02.2013
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ROLE OF WOMEN IN AGRICULTURAL DEVELOPMENT

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Agriculture is the predominant sector of Indian economy that meets the basic requirements, food, clothing and shelter of the people, which became a way of life for millions of farm families. Both men and women play critical roles in Agriculture throughout the world, producing, processing and providing the food we eat. For most women in developing countries labour is their key asset. Agriculture is of particular importance as a source of self- and wage employment, especially for women (and men) who lack training or resources for employment in other sectors. Their contribution is invisible though they influence men, guide the family and convince the people to accept the changes in development. Women comprise, 43% of the agricultural work force in developing countries and only 11% women have access to land holding. Rural women in particular are responsible for half of the world's food production and produce between 60 -80 percent of the food in most developing countries. Yes, despite their contribution to global food security, women farmers are frequently underestimated and overlooked in development strategies. Women's unequal access to assets and resources such as land limits their options for self-employment. Easier access to firewood, water and markets relaxes women's time constraints and can make an appreciable difference in their ability to participate in employment and self-employment. Women need to be involved in investment planning right from the beginning. Gender concerns need to be mainstreamed in the agricultural extension process. There is a necessity to target women is to ensure that they receive information relevant to their work, particularly with reference to crops and livestock. The National Sample Survey Organization (NSSO) data reveals that Female Participation Rate (FPR) is increasing and there is a scope for feminization of agriculture, this situation warrants generation and dissemination of women friendly technologies and need-based capacity building of farm women.

Introduction : Agriculture is the predominant sector of Indian economy that meets the basic requirements, food, clothing and shelter of the people, which became a way of life for millions of farm families. For most in developing countries labour is their key asset. Agriculture is of particular importance as a source of self and wage employment, especially for women (and men) who lack training or resources for employment in other sectors.

Men and women are both equal and both play vital role in the creation and development of their families in particular and society in general. Both men and women play critical roles in Agriculture throughout the world, producing, processing and providing the food we eat. Women farmers generally face more barriers than men in operating effectively in factor markets. As a result, they incur higher effective costs for information, technology, inputs, and credit and their productivity is lowered. Women also lack incentives to increase productivity: food crop prices are low, their access to markets is poor, and husbands often control the income from the products of women's labor.

Half of the world's population is females. They are doing two-third of work of the total work in the world but received only one-tenth of the world's total income. Nearly two-third of the women is illiterates and they have possessed only one percent of the total world's assets. In the world only one-fourth of the families are headed by female. Women comprise

43 percent of the agricultural labour force in developing countries. India is a male dominant society and gender discrimination is customized habitually.

Importance of Women in Development: Females are nearly 50 per cent of the total population but their representation in public life is very low. In democracy "of the people, by the people and for the people" cannot be optimally accomplished if the female population remains out of political empowerment. The sex ratio of the employed persons in India reveals that, 259 females are employed per 1000 employed males at the overall level. In the rural and urban areas, the sex ratio of the employed persons is estimated at 278 and 204 respectively (Hazra 2011). Women are, of course, an integral part of farming households. They produce over half the food in many developing countries, bear most responsibility for household food security, and contribute to household well-being through their income-generating activities. Yet, women usually have more limited access to resources and opportunities and *their productivity remains low relative to their potential.* Women need to be involved in investment planning right from the beginning. Gender concerns need to be mainstreamed in the developmental process.

Women in Agricultural Land: Ownership of land is concentrated mostly in male hands in our patriarchal society. It has been estimated that in India, landownership in favour of women is not more than 2 percent (Agarwal 1995). Lack of entitlement to land (and other assets such as house, livestock, and so on) is a severe impediment to efficiency in agriculture for women cultivators because in the absence of title women cannot get credit or be entitled to irrigation and other inputs, especially technology. Thus in every state the policy of abolishing all intermediary interests and giving ownership to the actual operator on land was adopted soon after independence. Time is ripe now to do so for women farmers too. Women's importance in agricultural production both as workers and as farm managers has been growing in the last two decades, as more men move to non-farm jobs leading to an increased feminization of agriculture. Today 48 percent of all male workers are in agriculture as against 75 percent of all female workers, and this gap is rising. Further, an estimated 20 percent of rural households are de facto female headed, due to widowhood, desertion, or male out-migration. These women are often managing land and livestock and providing subsistence to their family with little male assistance. Hence agricultural productivity is increasingly dependent on the ability of women to function effectively as farmers.

• *Women farmers are as efficient as men farmers, once other characteristics and input levels are controlled for*. Increasing women's physical and human resource capital to the level of men's would bring significant gains in agricultural production. Limited access to inputs combined with cultural constraints on women's farm work tend to reduce women's labor productivity and their participation in high productivity agricultural work.

• *Women farmers underperform* in agricultural production because they lack access to information, credit, extension, inputs, and markets and by household and child care tasks limit the time they have available. This underperformance occurs despite the longer hours they work than men in traditional farming systems.

• The gradual *feminization of agriculture* in many countries makes attention to women farmers necessary in implementing agricultural policy and programs. As men move out of agriculture into other sectors, women remain on the farm, gradually feminizing the agricultural labor force.

• *Attention to gender facilitates economic and social development.* As improving women's access to resources, control over income, and education, while reducing their time burden generates both efficiency and welfare gains.

Why land is important for women (Saxena, 2011**)**

· Land access can reduce a household's risk of poverty, but for persistent gender inequalities land solely in men's hands need not guarantee female welfare.

· Direct land transfers to women are likely to benefit not just women but also children. Evidence both from India and from many other parts of the world shows that women, especially in poor households, spend most of the earnings they control on basic household needs, while men spend a significant part of theirs on personal consumption, such as alcohol, tobacco, etc.

· Women with assets such as land have greater bargaining power, which can lead to more gender-equal allocations of benefits even from male incomes.

· Women without independent resources are highly vulnerable to poverty and destitution in case of desertion, divorce, or widowhood. In parts of western and northwestern India, not uncommonly, rural women even from rich families, deprived of their property shares when widowed, can be found working as agricultural labourers on the farms of their well-off brothers or brothers-in-law. The fate of deserted and divorced women is worse.

· Tenure security, and especially titles can empower women to assert themselves better with agencies that provide inputs and extension services.

• Women are often better informed than men about traditional seed varieties and the attributes of trees and grasses. If they had greater control over land and farming, this knowledge could be put to better use.

Role extension services (The State of Food and Agriculture 2010–11)

Extension services are important for diffusing technology and good practices, but reaching female farmers requires careful consideration. In some contexts, but not all, it is culturally more acceptable for female farmers to interact with female extension agents. Whether they are male or female, extension agents must be sensitive to the needs and constraints faced

by their female clients. Extension services for women must consider all the roles of women; women's needs as farmers are often neglected in favour of programmes aimed at household responsibilities. Hiring female extension agents can be an effective means of reaching female farmers. Preferences and problems are not universal, however, so in many cases properly trained male extension agents may be able to provide equally effective services. Male extension agents must be sensitized to the realities of rural women and the quality of information provided to women improved. This requires careful and location specific analysis of their situation. Cultural barriers could be overcome by organizing women in groups and possibly providing separate training for male and female farmers. Extension systems will also have to be more innovative and flexible to account for time and mobility constraints. Indeed, women farmers tend to be less mobile than their male counterparts owing to time constraints, restricted access to transportation and potential social and cultural obstacles that keep them from travelling outside their village boundaries. Women also often have seasonal workloads that can conflict with the timing of extension training programmes.

Conclusion: Yes, despite their contribution to global food security, women farmers are frequently underestimated and overlooked in development strategies. Their contribution is invisible though they influence men, guide the family and convince the people to accept the changes in development. Women's unequal access to assets and resources such as land limits their options for self-employment. Easier access to firewood, water and markets relaxes women's time constraints and can make an appreciable difference in their ability to participate in employment and self-employment. Women need to be involved in investment planning right from the beginning. Gender concerns need to be mainstreamed in the agricultural extension process. There is a necessity to target women is to ensure that they receive information relevant to their work, particularly with reference to crops and livestock. The National Sample Survey Organization (NSSO) data reveals that Female Participation Rate (FPR) is increasing and there is a scope for feminization of agriculture, this situation warrants generation and dissemination of women friendly technologies and need-based capacity building of farm women.

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WOMEN'S RESERVATION: A COMPARISON OF ITS EFFICACY UNDER FIRST PAST THE POST AND LIST SYSTEMS

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The Indian model of democracy eschews majoritarianism in favour of inclusive governance through affirmative action. Article 15(3) of the Indian Constitution identifies women as a group that merits such affirmative action. Consequently, the Government of India has introduced several policies aimed at the empowerment, upliftment and development of women. However, although these policies identify women as the policy beneficiaries, they are in no manner gynocentric. These policies are made for women by men. The reason for this anomaly may perhaps be attributed to the lack of adequate representation of women in the policy formulation and enactment process. The fifteenth Lok Sabha comprises only sixty-three women members i.e. a mere 11% of the total strength of the House.

Affirmative action exclusive of Parliamentary representation effectively creates a system that denies women a substantial role in determining the nature and content of policies aimed at securing their interests; this negates the principle of inclusive democracy. To rectify this flaw in democratic representation in India, the government has tabled the Women's Reservation Bill in 2010, which seeks to reserve thirty-three percent of seats in the Lok Sabha and State Legislative Assemblies for women.

In this context, this paper seeks to undertake a comparative study of the efficacy of such reservation for women under the First Past the Post and the List forms of electoral winner-determination. In this, the researcher shall identify the methods, values and limitations of women's reservation under each stated system. Thereby, the paper shall indicate the electoral system under which the objectives of guaranteed legislative representation for women can be best achieved. As such, the paper is a qualitative fundamental inquiry into Electoral Systems that enable the maximization of Women's Inclusion in policy-formulation both procedurally and substantively.

The following discussion limits itself to the context of representation in the Lok Sabha only. It does not engage with women's representation in the Vidhan Sabhas, local self-government institutions, or any other representative body.

The National Policy for the Empowerment of Women, 2001 states "equal access to participation and decision making of

women in social, political and economic life of the nation" as one of its specific objectives. To this end, "affirmative action such as reservations/quotas, including in higher legislative bodies, (would) be considered whenever necessary on a time bound basis." This policy itself was based on other serious deliberations on the issue including "Towards Equality: Report of the Committee on the Status of Women in India", 1974[1] , the National Perspective Plan for Women (1988-2000), the ShramShakti Report, 1988, and the Platform for Action Report.[2]

Following this, the National Common Minimum Programme of the Government of India, 2004 stated that "to fully empower women politically, educationally, economically and legally" would be one of the "six basic principles for governance" adopted by the United Progressive Alliance (UPA) government and the Left parties that support it.[3] To this end, it would "introduce legislation for one-third reservations (sic) for women in Vidhan Sabhas and in the Lok Sabha." To effectuate this, the Constitution (One Hundred and Eighth Amendment) Bill, 2008 was introduced in the Rajya Sabha, which referred it to a Standing Committee[4] before passing it in March 2010[5] .

The Constitution (One Hundred and Eighth Amendment) Bill, 2008, which has commonly come to be known as the Women's Reservation Bill, seeks to reserve one-third of all seats in the popularly elected Houses of Parliament and State Legislatures for women. One-third of the seats reserved for Scheduled Castes and Scheduled Tribes (SC/STs) shall be reserved for women of these groups. Reserved seats shall "be allotted by rotation" amongst the Territorial Constituencies.[6] Reservation shall "cease to have effect" after a period of fifteen years.

Several studies have debated the efficacy of these provisions towards realizing the objective of the "political empowerment of women" contained in the Bill's Statement of Objects and Reasons. Criticisms begin with the very principle of Women's Reservation: "Quota is not an answer to women's problems and quota results in discrimination on the basis of sex, violation of the democratic right of people to choose their representatives and violation of the democratic right of people to contest elections."[7] The provisions have been criticized on the grounds of (a) under proportionate representation of women[8] ; (b) inadequate representation of SC/STs and Other Backward Classes (OBCs)[9] ; (c) requirement of specific quota for Muslim women[10] ; (d) requirement of specific quota for physically challenged women[11] ; (e) requirement of extending reservation to Rajya Sabha[12] and Vidhan Parishads; and (f) limiting the reservation to fifteen years.

When examining the above-stated provisions of the Women's Reservation Bill and the criticisms thereof, it is imperative that we place them in the context of the existing electoral System and its principles and structures. The efficacy of the Bill's provisions can only be understood by considering how their implementation will pan out given our current electoral practices, and whether the Bill's objectives can be better realized under an alternate electoral system.

The Indian Electoral System functions on the basis of First Past the Post (FPP), also referred to as Simple Plurality. Under the FPP system, a candidate contesting an election is required to secure only the maximum number of votes polled (as opposed to the majority of votes polled) in order to be declared the winner. Hence, the winning candidate should have gained more votes than any other candidate, and not necessarily more votes than all the other candidates put together. In this discussion, we shall refer to FPP in India as the Single Member Plurality (SMP) system, since the latter nomenclature is better suited to the purpose of our discussion here than the former is.

SMP in India operates through Territorial Constituencies. The use of Territorial Constituencies for the purpose of Democratic Representation implies the geographic delimitation of the state into a number of territories of roughly equal population. SMP with Territorial Constituencies implies an electoral system that permits the election of one democratic representative for each Territorial Constituency determined by plurality rather than majoritarianism.

What are the implications of SMP with Territorial Constituencies for the provisions of the Women's Reservation Bill? Specifically, can the Bill's provisions effectively realize its objectives under such an electoral system?

Certainly, the SMP system is the most convenient to effectuate. The principle of "one voter – one vote – one representative" is easy for the electorate to comprehend and execute. The fact that the system is already in practice to elect members to unreserved seats makes it easy to adopt an identical system to elect women representatives to reserved seats. Hence, it would appear at a superficial glance that the Bill is being logical in extending this existing system to encompass Women's Reservation.

However, deeper analyses uncovers fundamental flaws in an approach such as this, which, instead of creating new avenues of Parliamentary Representation for Women, simply allocates them a predetermined percentage of existing seats. The over-simplicity of this approach is problematic in several ways.

One, an ideal system of affirmative action is arguably expected to provide representation to a community in proportion to its population. In this context, the figure of thirty-three percent seats may be considered to be a disproportionate under-representation of the sex. Hence, although this figure enables a marginal empowerment of women, it does not

level the political field by providing equal representation to the sexes in public policy.

This concern has been partially addressed in the Thirty-sixth Report on The Constitution (One Hundred and Eighth Amendment) Bill, 2008 by the Department Related Parliamentary Standing Committee on Personnel, Public Grievances, Law and Justice, 2009. In a summary of a memoranda that compiles public inputs on the issue, the Report says: "Reservation for women should be same as nearly as may be, that of percentage of women out of the total population of India or States according to the census of 2001, of the seats of the present strength of the House of People and the Legislative Assembly of every State."

Two, although the above statement reiterates the view that Women's Representation should not be under-proportionate, the solution that it offers – that equality of representation should be reflected in the total composition of the Lok Sabha – is an incomplete one. For the purpose of argument, let us assume that women comprise fifty percent of India's total population. The Report's statement (given above) would suggest that fifty per cent of the Lok Sabha's seats should be reserved for Women. The SMP system permits one Parliamentary seat to represent each Territorial Constituency. Consequently, only fifty per cent of Parliamentary constituencies in India would have a Woman Representative in Parliament. The women domiciled in the other fifty per cent Parliamentary constituencies would have to remain unrepresented. The consequence would be a questionably skewed system of Women's Representation wherein only fifty per cent of the sex would be included in the policy process at any given time, even if representation is on a Rotation basis.

Hence, Representation can be complete only if the system enables every woman in every constituency to be represented in Parliament at all given times. Else, we are likely to be faced with the alarming outcome of the exclusion of sixty-seven per cent of women from policy-participation for up to a decade at a time, considering the Bill's recommendation of a fifteen-year Rotation period. The Bill itself cannot avoid Rotation, as a better alternative system to provide Reservation under SMP is difficult to suggest.

Three, the Rotation basis for Women's Reservation itself poses challenges. The Bill suggests a fifteen-year Rotation period, which implies that no Women Representative can hold office in the same Territorial Constituency beyond her five-year tenure. This is worrisome because in the general course of things, a political representative's will to work for the Territorial Constituency is directly linked to the possibility of re-election. Consequently, the Women Representative may find little political motive to strive to secure the Constituency's interests.

Moreover, in the absence of the possibility of re-election from that Constituency, political parties are unlikely to field established women politicians from a reserved constituency. It would appear that this would prove advantageous to women as the numbers of women securing unreserved seats would carry the number of women Parliamentarians beyond thirty-three percent. However, this may well turn out to be an advantage in quantity only without a corresponding increase in quality of women legislators. Political Parties, which would naturally seek to maximize their seats in Parliament, are likely to continue to field their strong women contenders from the constituencies that they have been traditionally contesting from, while fielding weaker women candidates who are unlikely to win against a male candidate from the women's reserved constituency. Consequently, only the quantity of women legislators increases, while the quality stagnates.

Here, it may be argued that the assured numbers in Lok Sabha at least provide Women Representatives with the chance to initiate bills on the floor of the House. This argument may, however be countered by the observation that such bills, although initiated, cannot be granted assured passage as women form only thirty-three percent of the House and hence remain a minority. Even if we assume that the existing women legislators continue to contest and win unreserved seats, and add their eleven per cent[13] to the thirty-three percent, women make a total of only fourty-four per cent, which is still a minority figure.

If the Bills introduced by women Parliamentarians are subject to a Whip Vote, then even women representatives from the Opposition would be required to tow the party line and vote against the Bill, thereby further reducing actual support on the floor of the House. Also, during the times when the constituency of a senior male party member is reserved for Women's Representation, the party may decide to have him swap constituencies with a lady member who holds an unreserved seat and has developed her constituency into a strong party bastion that is "safe" for the former to contest from. A perhaps unfortunate casualty of the mere minority presence of women representatives in the Lok Sabha would be the Uniform Civil Code (UCC)[14] . Political observers who hoped that Women Representatives would initiate and carry through a UCC that enables gender parity for members of all communities may perhaps be disappointed to note that Women Representatives do not possess the numbers to successfully push the UCC legislation.

Four, the above conditions may result in tokenism in women's representation, as the preceding discussion indicates that the woman representative may be unable to gain any real ground or acquire a political foothold at the constituency level. Consequently, she never has the chance to be a serious threat to or a contender for the political power and policy control enjoyed by her male counterpart. The latter are likely to view the former as mere temporary inconvenient interludes

to their electoral clout. This view would be reinforced if it is found that the political career of Women Representatives ends with a singular tenure.

Five, given the prevalent patriarchal political culture in India (whose existence is borne out by the existence of the Bill), it may be reasonably assumed that Women's Reservation would be met with passive-aggressive hostility from male Members of Parliament (MPs). Consequently, the onus for initiating and carrying through women's development policies may be placed entirely on the women legislators by their male counterparts. In which case, there exists the possibility that there would be a marked fall in the initiation of schemes exclusively for women in the sixty-seven per cent unreserved Parliamentary constituencies. This phenomenon may intensify in the five-year tenure immediately preceding the reserved tenure, as the male MP representing the constituency at the time is aware that he cannot run for office and attempt re-election in the polls that immediately follow. (In fact, the neglect of women's interests during this tenure may even be extended to include a neglect of all interests by the incumbent MP, as he cannot run for office there for another half-decade.)

Six, the coming and going of constituency representatives of either sex, and their possibly differing policy focus, may adversely affect policy continuity. Pro-women policies initiated by the Women Representative during her tenure may be undone or neglected when her tenure ends and the male legislator reassumes power. The Woman Representative's five-year tenure itself is too brief and inadequate to successfully bear returns in so short a time. Schemes that seek to empower women may require decades to be internalized and followed by society (a case in point is the anti-dowry law[15]).

The suitability of the system of Territorial Constituencies to effectuating Women's Reservation is as questionable as that of the SMP system. The juxtaposition of Women's Constituency and Territorial Constituency renders the Women Representative in the uncomfortable situation of having to serve two constituencies. This may cause for the representative, a fundamental conflict of interest, wherein she may be required to choose between contradicting interests of the women's constituency and Territorial Constituency. (This is not difficult to foresee considering that in several parts of India popular opinion is against women's empowerment. One indicator of the same is the spate of recent pronunciations[16] by Khap Panchayats.)

In the event that such a conflict arises in the discharge of her duties, whom will she prioritise? If this question is answered from the perspective of electoral gain (which arguably is the perspective most likely to be adopted by a Lok Sabha candidate), it is clear that she is likely to prioritise the popular stand in her Territorial Constituency over women's interests. The reason for this is not far to seek: The fifteen-year rotation with single-term representation that the Bill provides implies that the woman member cannot be elected again as a Women Representative from that Territorial Constituency. If she wishes to contest the next election, she has to gain the support of the entire constituency in the face of competition from male candidates. Hence, she may consider prioritizing general opinion over women's interests to be a more rewarding choice electorally. This renders the Women Representative barely different from her male counterpart, and the Bill fails its purpose.

Here, it is possible that at the end of her tenure as a Women Representative from a particular Territorial Constituency, her party decides to support her candidature from another reserved constituency, and then another, for all the three General Elections in the fifteen-year rotation period. In this case it may appear that the Women Representative would choose to prioritise women's empowerment over popular sentiment in her constituency, as her party brief is to use her fifteen years to garner the support of women voters across three Territorial Constituencies for her party. Although this situation serves the purpose of women's empowerment, it is alternatively dangerous, as it eliminates accountability of the representative to the Territorial Constituency. It may be presumed that the Bill intends to make electoral representation more democratic and inclusive and not less so, as in this situation. Nevertheless, the question to be answered in the above situation is not whether the Women Representative will prioritise the Women's Constituency over the Territorial Constituency or vice versa, but rather the more fundamental one of why such a conflict of interests should be permitted by the system in the first place.

The above discussion indicates that a system that follows SMP under Territorial Constituencies is poorly suited to achieve the objectives of Women's Reservation. Implementing the Bill in its present form and under the present electoral system may result in a dilution of its provisions. It is imperative that we design a system that leaves no space for such occurrences.

Here, we may consider the alternative electoral system recommended by The Law Commission of India (LCI), in its One Hundred Seventieth Report on Reform of the Electoral Laws[17] . In the Report, the Law Commission of India has argued in favour of the adoption of the List System in addition to the existing SMP System.[18] The List system in its basic form requires that "each party draw up a list of candidates in each constituency. The size of the lists is based on the number of seats to be filled. In its most basic form, voters vote for parties instead of candidates."[19]

Consequently, the Lok Sabha and Vidhan Sabhas would be comprised of two types of Members of Parliament (MPs): some elected under SMP and others under the List system.

Alongside filing nominations for candidates contesting elections under SMP, political parties would also be required to submit to the Election Commission a List of candidates contesting for the non-SMP seats.

The LCI's suggestions on the form that the List system in India should take have been analyzed by the author in the paper "Mixed Member Representation in India: An Examination of the Law Commission of India's Recommendations"[20]. The paper suggestions measures by which the flaws in the List system recommended in the LCI can be overcome. One such suggestion, which is relevant to our discussion on the Women's Reservation Bill, is that the List members should represent the National Constituency, and not Territorial Constituencies as recommended by the LCI. A percentage of the List seats may be reserved for women. Such a system would have the following advantages over representation under SMP and Territorial Constituencies.

One, since Women Representatives elected to List seats represent the National Constituency, they will be unencumbered by responsibilities towards Territorial Constituencies. The issue of conflict between interests of women and that of the general constituency will not arise. Consequently, the representatives will be able to focus all their attention on securing the interests of women. Similarly, the representatives of the Territorial Constituencies elected under the regular SMP will be able to focus entirely on securing the general interest. In this manner, both women's interests and general interest is represented in the policy process, and the dilution of attention to either of them is prevented.

Two, under the List system, all Women Representatives will work for the welfare of all women across India. Here, a woman MP is not tied to her Territorial Constituency alone. Consequently, the number of women who are represented in Parliament at any given time will not be restricted to a mere thirty three percent. The remainder sixty-seven per cent women will also simultaneously find representation in the Lok Sabha, thereby allowing for hundred per cent of India's women to have a representative voice in Parliament at all times.

Three, under the List system, the need for representation by Rotation is eliminated, as the representatives do not represent Territorial Constituencies.

Four, since the Rotation system is eliminated, Women Representatives can hope to be re-elected to the List seat in every successive poll. This provides them with a motive to excel in their work for the welfare of women.

Five, by eliminating the Rotation system and the consequent constant upheavals in representation at the constituency level, the List system enables greater policy-continuity and sustainability.

Six, under the List system, the issue of disproportionate representation can be resolved by marking a larger percentage of seats for women than the thirty-three percent offered under SMP.

Seven, when the number of Women Representatives in the Lok Sabha is increased, the pro-women Bills enjoy a relatively better chance of being passed, than under the SMP system.

Seven, since the List representatives can be re-elected unlike Women Representatives under SMP, political parties are likely to field strong women candidates to the reserved seats, rather than weak ones (as in the case of SMP). This will positively impact both the quantity and quality of Women's Representation.

Eight, the LCI recommends that new seats be added to the Lok Sabha to accommodate List members, so that List seats are not carved out of the existing SMP seats. Hence, in a List system, reservation for seats for women does not result in depriving men of access to thirty-three per cent of existing seats as in SMP. This may go a long way towards reducing the hostility with which men perceive the principle of Women's Reservation[21], and facilitate a quicker acceptance of gynocentric policies by non-feminist society.

Nine, the author had suggested in the abovementioned analyses of the list system[22], "…the issuance of the party whip on List members should be restricted to no-confidence motions. The party stand on a policy is likely to be determined on the basis of vote-bank considerations. If the whip requires List members to also assume this position on policy matters, then the National Interest perspective that they bring to legislation will be nullified." Moreover, if the Whip Vote is curtailed, then the Women Representatives would be able to choose women's interests over towing the party line. The increased exercise of the Conscience Vote may result in the initiation and passage of hitherto difficult legislations such as the Uniform Civil Code, whose largest stakeholders are women.
Ten, the principle of Women's Reservation may perhaps gain wider acceptance if it is expanded to also encompass affirmative action for the other minority sex i.e. the neuter gender. The focus principle of the Bill should be 'Representation for Marginalized and Minority Sexes'. To provide political protection to a larger marginalized minority and not extend the same to a smaller marginalized minority may be perceived by detractors as being uncomfortably akin to vote-bank politics, and may be rejected on this ground. The Rajya Sabha Standing Committee on the Bill, in its report, agrees with this view: "The Committee's attention was also drawn to the need for equal rights and representation in policy making, for individuals who are transgender/neuter gender. It was submitted that their grievances are generally ignored by MPs/MLAs and that since they are marginalized groups, their representative should be nominated as Member of Lok Sabha and State

Assemblies."[23] However, attempting to provide reservation for the neuter gender under SMP and Territorial Constituencies would only make things more complicated, and the process more questionable than it already is. On the other hand, providing them reservation under the List system appears to be more feasible – perhaps as feasible as providing Women's Reservation under the system, for the reasons discussed above.

Concluding Observations : The preceding analyses appear to indicate that the objectives of the Women's Reservation Bill may be more successfully realized under the List system (with National Constituency as a provisio) than under the First Past the Post system and Territorial Constituencies. This is not to say that the Women's Reservation Bill should not be implemented until such time that the List system is incorporated into our structures and procedures of democratic representation. Rather, it is to emphasise that due caution should be exercised in the framing of reservation policies that are to be implemented in an FPP system. Hence, it would perhaps be prudent to rework the provisions of the Women's Reservation Bill with a view to incorporating adequate safeguards against its flaws, lest the progressive policy degenerates into mere tokenism.

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SUSTAINABILITY OF RURAL LIVELIHOODS

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Livelihoods can be derived from a range of on-farm and off-farm activities, which together provide a variety of procurement strategies for food and cash. The livelihoods approach puts households of the poor as its central focus. It takes holistic consideration of things that the poor might be vulnerable to assets and resources that help them thrive and survive policies and institutions that impact their livelihoods, how the poor respond to threats and opportunities and what sort of outcomes the poor aspire to. A "livelihood" is how people survive, cope with stresses and shocks, and, maintain, and improve their well-being … now and in the future. "A livelihood is sustainable, when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities & assets, both now and in future, while not undermining the natural resource base" **(Department for International Development – DFID).**

Factors Influencing change in rural livelihoods: a) Changing Trends in Agriculture b)Household Level Food Security c)Trends in Rural Non-Farm Sectors d)Globalization and Vulnerability e)Disasters and f)Migration

In recent years the Indian government has made huge investments in development of rural areas. Initial poverty eradication efforts in India were often 'production' orientated. Later, the approach changed towards 'capacity-building' in sector organisations to equip people and organisations with the skills and resources to do a better job. The Ministry of Rural Development has transformed the Swarna Jayanti Swarozgar Yojna (SGSY) into the National Rural Livelihood Mission (NRLM). **Salient features/approaches under NRLM**: a)Universal social mobilization through formation of SHGs under NRLM b)Setting-up of federations of SHGs c)Capacity building and training d)Rural Self Employment Training Institutes (RSETIs) e)Provision of revolving fund and capital subsidy at enhanced rates f) Flexibility to the states to formulate their own poverty alleviation action plans.

The benefits of globalisation process have largely accrued to the urban sector growth the rural sector has been left behind. Slowdown in agricultural growth and productivity, increase in distress migration, changing consumption patterns, government policies favouring industrial houses, among others have seriously undermined the food and livelihood security of the poorer households. An integrated, multidimensional and holistic approach to poverty eradication efforts is crucial to preserve and enhance the livelihoods of the poor.

Factors Influencing change in rural livelihoods

*** Changing Trends in Agriculture:** The agricultural sector is facing the new challenges of diminishing land resources, factor productivity decline, threatened loss of bio-diversity, natural resource degradation, widening economic inequality, etc that have serious implications on the livelihoods of the poor.

*** Household Level Food Security:** *Food security is a subjective concept defined as an individual farmer's own perception as to whether he/she has been able to support the family's food and fodder requirements adequately round the year using all resources under his control* (Hiremath, et. al. 2004). Food security is only one (although extremely important) element of livelihood security. There are evidences to suggest that many of the household decisions (e.g. sending children to school, participation in community organisations, etc.) are directly related to whether the households are below or above the food security threshold.

*** Trends in Rural Non-Farm Sectors:** The rural non-farm economy is the backbone of numerous towns scattered throughout India as well as the primary source of income and employment for many of India's poor. The RNFS is closely linked to agriculture. A large share of rural manufacturing involves agro-processing and the production and supply of farm inputs. Agricultural performance therefore tends to influence growth in the non-farm economy.

*** Globalization and Vulnerability:** Rural livelihoods are affected by the process of Globalization. Special Economic Zones (SEZ) are created across India to promote exports. The estimated land to be acquired by SEZ is around 150,000 hectares which is predominantly agricultural and typically multi-cropped. If it continues they will endanger the country's food security. Such developments by the MNCs and Corpo-

rate Sector are playing with the emotional, economical and cultural interests of farmers, fisherfolk, salt-pan workers and agriculturalists in the area. Correspondingly, the entry of corporate retail into India is nothing but a hijack of India's vibrant, well organized retail service economy. Corporate retail will not create two million jobs; but it will destroy 38 million livelihoods of people involved in running small shops and street markets. The growth being projected as a new contribution to the economy hides the destruction of the contribution of the 40 million people involved in small retail to the Indian economy.

*** Disasters:** Disasters can be grouped in to two types, namely; natural and human made. Natural disasters are floods, droughts, tidal waves and earth tremors. Human-made disasters are chemical or industrial accidents, environmental pollution, transport and fire accidents and political unrest. Natural disasters may leads to personal disasters i.e., Farmers suicide, Migration, Alternative Livelihood.

*** Migration:** In the absence of food security off-farm income from migration becomes a stabilising component in the overall livelihood security. These distress migrants often lock their homes, take a few meager belongings and move across long distances. Being away from their village, they do not belong to the places where they go and increasingly lose acceptance in their own villages. They are disconnected from their community, culture and traditions, thus losing their sense of identity. Distress migrants find themselves with hardly any skills, assets or education. Earnings from migration are survival level and not enough to build assets.

Current Scenario of Rural Employment in India (Hazra 2011)

- In india, the worker population ratio is estimated at 325 persons per 1000 population at the overall level. in the working age population (i.e. 15-59 years of age), the worker population ratio is 465. In the rural areas, the worker population ratio is estimated at 329 persons per 1000 population.
- The labour force participation rate is estimated to be 359 persons out of 1000 persons in the labour force at the overall level. in the rural and urban sectors, it is 365 and 340 respectively.
- The unemployment rate is estimated at 94 persons out of 1000 persons in the labour force, which implies that 9.4 per cent of the labour force is unemployed at the overall level as per the usual principal status.
- In the rural sector, the unemployment rate is estimated at 101 persons out of 1000 persons in the labour force. similarly in the urban areas, the unemployment rate is 73 persons out of 1000 persons in the labour force.
- In rural areas, the proportion unemployed is estimated at 37 persons per 1000 population in these areas. similarly, in urban areas, the proportion unemployed is 25 persons per 1000 population in these areas.
- In the rural sector, 457 persons and 435 persons out of 1000 persons are in the categories of self employed and casual labour respectively. rest 108 employed persons belong to regular wage/salaried class in the rural areas.
- In the rural sector, 576 persons out of 1000 persons employed are engaged in the agriculture, forestry & fisheries group, followed by 72 persons in the construction group and 67 persons in the manufacturing group of industries.

New government's focus on rural livelihoods

In recent years the Indian government has made huge investments in development of rural areas. Initial poverty eradication efforts in India concentrated on supply of agricultural technologies, inputs and services that were often 'production' orientated. Later, the approach changed towards 'capacity-building' in sector organisations to equip people and organisations with the skills and resources to do a better job. The Ministry of Rural Development has transformed the Swarna Jayanti Swarozgar Yojna (SGSY) into the National Rural Livelihood Mission (NRLM). The National Rural Livelihood Mission (NRLM) promises to address the needs of 6.5 crore poor rural households and proposes to bring substantial changes in the lives of the rural poor. As the Mission document says, its focus is on people-led and people centric organizations. It provides for a demand driven approach for release of funds on receipt of state level action plans (Somkuwar 2011).

Salient features/approaches under NRLM

- Universal social mobilization through formation of SHGs under NRLM
- Setting-up of federations of SHGs
- Capacity building and training
- Rural Self Employment Training Institutes (RSETIs)
- Provision of revolving fund and capital subsidy at enhanced rates
- Flexibility to the states to formulate their own poverty alleviation action plans

Output and Outcome Targets for the NRLM : 2016-17

In Lakh

S. No.	Output/ Outcome Indicator	Target for remaining period of 11th Plan	Tentative target for 12th Plan	Total target by 2016-17	Number of BPL families
I.	Outputs[9]				
1.	Total number of new BPL SHGs to be formed	12.25	15.75[10]	28	280
2.	No. of SHGs to be provided Revolving Fund support	12.25	15.75	28	280
3.	No. of SHGs to be provided Capital Subsidy	5.25	10.75	16	160
4.	No. of SHGs to be provided Interest Subsidy	10	12	22	220
5.	No. of rural BPL youth to be provided Skill Development Training	15	60	75	75
II.	Outcomes[11]				
1.	No of SHGs to be entering at Micro enterprise level	5.25	10.75	16	160
2.	No. of rural BPL youth to be provided placement support	15	60	75	75

Conclusion : The rapid changes at the macro level that India witnessed since the early nineties has contributed to the instability of the livelihood systems of the poorer section of both rural and urban households. While the benefits of globalisation process have largely accrued to the urban sector growth the rural sector has been left behind. Slowdown in agricultural growth and productivity, increase in distress migration, changing consumption patterns, government policies favouring industrial houses, among others have seriously undermined the food and livelihood security of the poorer households. An integrated, multidimensional and holistic approach to poverty eradication efforts is crucial to preserve and enhance the livelihoods of the poor.

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THE MINOR MILLETS: NEW VENTURE FOR SMALL FARMERS

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Abstract: The minor millets includes Finger millet (ragi*, Eliusine coracana),* Foxtail millet (navane, *Setaria italica*,), Little millet (Savi, *Panicum miliare*), Barnyard millet (Oodahe, *Echinocloa frumanyacea*), Proso millet (Baragu, *Panivum miliacium*) *and* Khodo millet (Haraka, *Paspalum scrobiculatum*). Millets are recognized as important substitute for major cereal crops to cope up with worldwide food storage and to meet the demands of increasing population of both the developing and developed countries. They can be well exploited as special purpose food in view of their better nutritional and functional qualities by using appropriate processing technologies. Millets occupy an important place in the world food and nutrition economy. They are dependable cash crops for small and marginal farmers. Moreover millets are full of micronutrients like Mg, Ca, Mn, tryptophan, phosphorous, fibre, B vitamins and also act as antioxidants which are essential to our body. Majority of diabetic, cardio vascular and obesity patients are accepting millets as healthy food in the management of these diseases. Millet snacks, healthy foods, bakery products have potential for cottage industry at local and national markets. Value added products of millets are eco- friendly and viable for income generation to rural community. The production, marketing and promotion of value added millet products may play a pro active role in creating awareness among consumers and to combat non communicable diseases and also help in protecting a global resource.

Introduction: Millets are recognized as important substitute for major cereal crops to cope up with worldwide food storage and to meet the demands of increasing population of both the developing and developed countries. They can be well exploited as special purpose food in view of their better nutritional and functional qualities by using appropriate processing technologies.

Millets occupy an important place in the world food and nutrition economy. They are dependable cash crops for small conditions. Millets are staple diet increasing demand in their better utilization through processing. Millets have unique traits like they are fast maturing and therefore fit into intensive cropping system. They store well for long periods and assure the nutritive value of millets is well compared fat and mineral content. Millets are recognized as important worldwide food storage and to meet the demands of developing and developed countries. Poor quality and their flours such as dark, dull colour, coarse and grit high fibre content, larger cooking time they can be well exploited as special purpose food in view of their better nutritional and functional qualities by using the acceptability of these grains can be improved by adopting technologies which would result in value addition and increased utilization.

Some of the key reasons why millet should be a part of our healthy ecological diet because it

- ❖ Acts as a pre-biotic
- ❖ Provides serotonin to calm and soothe your mood.
- ❖ Helps hydrate colon and vegetable bowl movement
- ❖ Digest easily.

Moreover millets are full of micronutrients like Mg, Ca, Mn, tryptophan, phosphorous, fibre, B vitamins and also acts as antioxidants are essential to our body. Nutrifacts of millets are

- ❖ Magnesium in millet helps to reduce the affects of migraines attack.
- ❖ Niacin in millet helps lower cholesterol.
- ❖ Phosphorus in millet helps with fat metabolism, body tissue repair.
- ❖ Millet can help lower risk of diabetes and because of high fibre content reduces risk of breast cancer.

Minor millets are used as food sources mainly in arid and semiarid regions of the world thanks to their low water requirements and capacity to grow in marginal lands. They can often be used in recipes instead of rice. The protein content in these species is very close to that of wheat, but in addition they are also rich in B vitamins, especially niacin, B6and folacin calcium, iron, potassium, magnesium, and zinc. Minor millets contain no gluten, so they cannot be used in raised bread making. For the same reason, they are appropriate foods

for those with coeliac disease or other forms of allergies/wheat intolerance. Millet sprays are often recommended as healthy treats to finicky pet birds, as they are easily eaten and easily broken.

The minor millets includes

- Finger millet (ragi, *Eliusine coracana),*
- Foxtail millet (navane, *Setaria italica*,),
- Little millet (Savi, *Panicum miliare*),
- Barnyard millet (Oodahe, *Echinocloa frumanyacea*),
- Proso millet (Baragu, *Panivum miliacium*)
- Khodo millet (Haraka, *Paspalum scrobiculatum*).

Finger Millet – Ragi (*Eleusine coracana*) : Finger millet is the major staple food millet popularly known as ragi in the rural population in Karnataka. Finger millet is one of the important minor cereals cultivated in many South Asian and African countries. It is one of the oldest food crops and referred to as " Artta- Kandaka" in the ancient Sanskrit literature, which means " Dancing Grain". It is a rich source of diatery fibre and calcium.

Folk Medicine: The leaf juice has been given to women in childbirth, and the plant is reported to be diaphoretic, diuretic, and vermifuge. Ragi is a folk remedy for leprosy, liver disease, measles, pleurisy, pneumonia, and small pox. Ragi has the highest Calcium content and good fiber content. This is a very good source of calcium for growing children and aged people who need calcium supplement.

Utilization of ragi is in the daily diet at present is restricted to the rural areas. Traditionally a stiff porridge (mudde) is prepared from ragi this provides them them the satiety to work in field for long hours, can withstand dehydration and tolerate thirst and hence has been the most preferred food item. Another popular traditional food now gaining popularity even in urban areas is an infant food- ' ragi malt'. Usage of finger millet has to be popularized in urban areas owing to its high nutritional and therapeutic benifits . Ragi requires diversification of products in terms of infant foods, health foods, ready to eat foods, ready to prepare fermented foods, bakery products and confectionary, pasta products, snack foods, preserved foods, food adjuncts like papads and wafers, ready mixes and beverages.

- Tumkur stands Ist in area (1,96,385 ha), production (2,66,416 tons) and productivity (1,428t/ ha)

Traditional Value added products of Ragi: Ragi Idli, Ragi Balls and Ragi Dosa

Bakery products of Ragi: Ragi coconut biscuits, Ragi Pappad, Ragi Ambli etc

Foxtail millet *(Setaria italuica)* : Foxtail millet (*Setaria italica*) one among the six small millets is known as navane, kangni, tenai, korra and rala in many regional names in different parts of the country. Foxtail millet is comparable to that of super cereals like rice and wheat due to its capacity to withstand drought, adaptable to poor environment and input management.

The cultivation of foxtail millet is more in Madhya Pradesh, Tamil Nadu, Karnataka and Orissa. In Karnataka it is mainly grown in Bellary, Koppal, Chitradurga and Belgaum districts. These are used mainly for home consumption. Foxtail millet is used in indigenous medicine and it is mainly is used in snake poisoning. Indigenous products of millets viz, mudde, ambali, rice, halva and fried products posses unique nutritional processing qualities. Celiac patients can replace certain cereal grains in their diets by consuming millets in various forms including breakfast cereals.

Foxtail millet has higher quantities of protein (0.7-13.7%), fat (3-5%) and fiber (4.5- 6%) compared to other major cereals, minerals like calcium and iron are similar to other cereals. The amino acid profile is balanced and the dietary fiber content is very high compared to other cereals. The higher quantity of dietary fiber is helpful in the management of diabetes. Traditionally, a person when diagnosed as diabetic is advised to consume foxtail millet rice in North Karnataka. The higher dietary fiber content is also beneficial in bowel movement, reducing cholesterol, scavenging toxic components. Consumption is foxtail millet is found to help in the management of cardio- vascular disease, obesity and constipation.

Foxtail millet has a tight husk which is comparatively difficult to dehusk. But with advent of modern technology, dehusking of foxtail millet is no more a cumbersome and painstaking process. The rice can be used instead of rice in the preparation of all the traditional products like bisibele bath, chakkali, pongal, dosa, idli, laddus, etc.

Value added products of foxtail millet are: Foxtail millet biscuits, Foxtail millet Cake, Foxtail millet Muffins, Foxtail millet bread etc.

Little Millet

- Scientific name: *Panicum miliare*
- It is known as Savi in Kannada, Kutaki in Hindi, and Chama in Malayalam.
- It is a rich source of Carbohydrate (75.7 g) and Fat (5.3 g)
- It will improve metabolic control of glucose.
- It is a good source of micro nutrients and vitamin B.
- Haveri stands Ist in area (4818 ha), production (3387 tons) and productivity (740 t/ha)

Value added products of little millet are little millet Idli, Little millet Dosa, Little millet Fried rice and Little millet Upma.

Kodo millet

- *Paspalum scrobiculatum*
- In Kannada it is called as Haraka.
- Still a traditional food plant in Africa, this little-known grain has potential to improve nutrition, boost food security, foster rural development and support sustainable landcare.
- Tumkur stands Ist in area (4 ha), production (2 tons) and

productivity (462 t/ ha)

Proso millet

- *Panicum miliaceum*
- Commonly called as White millet, Hog millet and Common millet.
- In Kannada it is called as Baragu.
- Proso is mainly grown for birdseed and livestock feed.
- It is sold as health food and due to its lack of gluten it can be included in the diets of people who cannot tolerate wheat.
- It is still extensively cultivated in India, Russia.

Barnyard millet

- *Echinochloa frmentacea*
- Commonly called as Sawa millet and in kannada it is known as Oodahe .
- The grains are cooked in water, like rice, or boiled with milk and sugar. Sometimes it is fermented to make beer.

Costs and returns in foxtail millet cultivation : Table 1 indicates that the total cost of cultivation of foxtail millet worked out to be Rs.11607.21 per hectare, of which the fixed cost accounted for the meager proportion (23.72 per cent) as this was grown almost on marginal lands and doesn't require much investment cost. The variable cost (76.28 per cent) accounted large proportion of total cost. However, of the variable cost, major proportion was accounted for the human labour due to various labour intensive operations like weeding, interculturing, harvesting and post harvesting operations. Material inputs included were farm yard manure, fertilizer (17.66 per cent) and seeds, among this cost of fertilizer were highest. Lower amount of material cost was due to usage of farm grown seeds and lower quantity of farm yard manure and also very less quantity of fertilizer application. The fertilizer application was not according to recommended dosages. This is because of lack of awareness among farmers regarding recommendations. There is much scope for realizing yield potential of foxtail millet by adopting recommended fertilizer use. None of the farmers used plant protection measures due to its hardy nature and resistance to pests and diseases. However, the benefit- cost ratio of 1.48 indicating its feasibility of cultivation in the rainfed marginal areas. With these results we can conclude that the cultivation of foxtail millet brings better returns to farmers in rainfed areas.

Value addition in foxtail millet: Foxtail millet papad and foxtail millet tambittu : Foxtail millet can be used for value added products such as papad and tambittu. In the preparation of foxtail millet papad, variable cost accounted a major share of 100 per cent of the total cost, while fixed cost zero. Variable costs included two components *viz*., raw material and labour. The share of raw materials was found to be highest in the variable cost as the cost of foxtail millet was more compared to other raw materials followed by packaging materials, electricity and fuel charge. On the other hand, labour cost accounted for the lion share in the total cost of production (42.86 per cent). Labour cost included procurement of raw materials, preparation of foxtail millet papad and packaging till the product is ready for market.

In this preparation of papad, if 100 kg of foxtail millet was used around 88 kg of papad was obtained. The total cost of production of 88 worked out to be Rs.7000. The gross returns and net returns were Rs.11880 were Rs.4880. Papad production yielded Rs.1.70 per rupee investment. From this we can conclude that preparation of foxtail millet papad found to be economically feasible. The producers sold papad at Rs.135 per kg. Here retailers get better price of Rs.145 when compared to producers. Hence, it is advisable for the producers to sell their produce directly to the consumers.

Tambittu is another product prepared out of this millet. In the preparation of tambittu, variable cost accounted a lion share of 100 per cent of the total cost while, fixed cost zero. Variable costs included two components *viz*., raw material input and labour cost. The share of raw materials was found to be highest in the variable cost as foxtail millet, jagerry and ghee were cost items required for tambittu followed by packaging materials, electricity and fuel charge. Labour included procurement of raw materials, preparation of tambittu and packaging till the product is ready for market.

In this preparation of tambittu, about 100 kg of foxtail millet was required for 95 kg of tambittu. The total cost of production worked out to be Rs.8290. The gross returns realized were Rs.14250.00 and net returns were Rs.5960 with return of Rs.1.72 per rupee spent on foxtail millet tambittu production.

Hence, we can conclude that preparation of foxtail millet tambittu found to be economically feasible. It was advisable for the producers to sell their produce directly to consumers as producers sold tambittu at Rs.150 per kg. It was observed in the study area that the retail price of Rs.160 per kg was charged. The BC ratios of value added products were more as compared to raw foxtail millet. Hence it is advisable to sell value added products rather than selling foxtail millet in raw form.

Comparison of costs and returns of grains and value added products of foxtail millet : From Table 4 it is clear that variable cost was more or less equal in production of both grains and value added products. Fixed cost was found to be higher in production of grains when compared to value added products because rental value costs more in production of grains but in value added products it was zero. Gross returns and net returns were found to be higher in value added products this was because of less cost of production. Returns per rupee of investment were more in value added products when compared to raw grains. Hence, the foxtail millets growers are advised to involve in production of value added products than selling only raw grains.

Conclusion: 'Value added products of millets are eco- friendly

and viable for income generation to rural community. The production, marketing and promotion of value added millet products may play a pro active role in creating awareness among consumers and to combat non communicable diseases and also help in protecting a global resource. Demand needs to be created for these value added products by standardizing products in qualitative aspects. For this technical guidance should be provided by the State Agriculture Departments and Agriculture Universities for the producers. Production and value addition of millets bring better returns for the farmers especially the small and marginal farmers.

Table 1: Cost and returns in Foxtail millet cultivation (Rs./ha)

Sl.No	Particulars	Value (Rs.)	Per cent
I	**Variable cost**		
	Seed	110.50	0.95
	FYM	900.00	7.75
	Chemical fertilizer	2050.00	17.66
	Human labour	3256.26	28.05
	Bullock labour	1680.25	14.48
	Machine labour	350.00	3.02
	Interest on working capital	507.45	4.37
	Total variable cost	**8854.46**	**76.28**
II	**Fixed cost**		
	Land revenue	25.00	0.22
	Depreciation	145.00	1.25
	Rental value of land	2570.00	22.14
	Interest on fixed capital	12.75	0.11
	Total fixed cost	**2752.75**	**23.72**
III	**Total cost of cultivation**	**11607.21**	**100.00**
IV	**Returns**		
	Main product (qtl)	12.00	
	By product (qtl)	4.50	
	Main product (qtl) * Price(Rs)	14940.00	
	By product (qtl)* Price (Rs)	2250.00	
	Gross returns	**17190.00**	
	Net returns	**5582.79**	
V	**Returns per rupee of expenditure**	**1.48**	

Table 2: Cost and returns in foxtail millet papad preparation (per 100 kg)

Sl. No	Particulars	Quantity (kg)	Rs./ kg	Value	Percent
I	**Variable cost**				
A	**Materials**				
1	Foxtail millet	100	30	3000.00	42.86
2	Salt	2.5	8	20.00	0.29
3	Electricity (Sealing + grinding)			210.00	3.00
4	Fuel	1 cylinder	370/ cylinder	370.00	5.29
5	Packaging material	5	80	400.00	5.71
	Total (A)			**4000.00**	**57.14**
B	**Labour cost**				
	Labour cost (30 days)	2	50	3000.00	
	Total (B)			**3000.00**	**42.86**
II	**Total cost of production (A+B)**			**7000.00**	
III	**Returns**				
1	Returns (Price per kg)			135.00	
2	Gross returns			11880.00	
3	Net returns			4880.00	
IV	**B C Ratio**			**1.70**	

Table 3: Cost and returns in foxtail millet tambittu preparation (per 100 kg)

Sl no	Particulars	Quantity (kg)	Rate/ kg	Value	Per cent
I	**Variable cost**				
A	**Materials**				
1	Foxtail millet	100	30	3000.00	36.19
2	Jaggery	25	30	750.00	9.05
3	Ghee	2	280	560.00	6.76
8	Electricity (Sealing + grinding)			210.00	2.53
9	Fuel	1 cylinder	370/cylinder	370.00	4.46
10	Packaging material	5	80	400.00	4.83
	Total (A)			**5290.00**	**63.81**
B	**Labour cost**				
	Labour cost (30 days)	2	50	3000.00	
	Total (B)			**3000.00**	**36.19**
II	**Total cost of production (A+B)**			**8290.00**	**100**
III	**Returns**				
1	Returns (Price per kg)			150.00	
2	Gross returns			14250.00	
3	Net returns			5960.00	
IV	**B C Ratio**			**1.72**	

Table 4: Comparison of costs and returns from grains and value added products of foxtail millet

Sl. No	Particulars	Foxtail milletgrain	Foxtail millet papad	Foxtail millet tambittu
1.	Total variable cost	8854.46	7000.00	8290.00
2.	Total fixed cost	2752.75	0.00	0.00
3.	Total Cost of production	11607.21	7000.00	8290.00
4.	Gross Returns	17190.00	11880.00	14250.00
5.	Net Returns	5582.79	4880.00	5960.00
6.	BC Ratio	1.48	1.70	1.73

ಮಹಿಳಾ ಕೃಷಿ ಕಾರ್ಮಿಕರ ಸ್ಥಿತಿಗತಿ

ಡಾ॥ ಶ್ರೀಮತಿ ಜಾಗೃತಿ ಬಿ. ದೇಶಮಾನ್ಯ
ಉಪ-ನಿರ್ದೇಶಕರು ವಿದ್ಯಾರ್ಥಿ ಕಲ್ಯಾಣ ಕೃಷಿ ವಿಶ್ವ ವಿದ್ಯಾಲಯ ರಾಯಚೂರು

ಭಾರತ ದೇಶವು ಹಳ್ಳಿಗಳಿಂದ ಕೂಡಿದ ಶ್ರೀಮಂತ ರಾಷ್ಟ್ರವಾಗಿದೆ. ಕೃಷಿ ದೇಶದ ಮೂಲ ಉದ್ಯೋಗವಾಗಿದೆ. ದೇಶ ಸ್ವಾತಂತ್ರ್ಯವಾಗಿ ೬೮ ವರ್ಷಗಳಾದರೂ ಸುಮಾರು ೬೮ % ಜನಸಂಖ್ಯೆಯು ಪರೋಕ್ಷವಾಗಿ ಮತ್ತು ಅಪರೋಕ್ಷವಾಗಿ ಕೃಷಿಯ ಮೇಲೆ ಅವಲಂಬಿತರಾಗಿದ್ದಾರೆ. ಭಾರತದ ಅಭಿವೃದ್ಧಿಯಲ್ಲಿ ಕೃಷಿಗೆ ಅತಿ ಮಹತ್ವದ ಸ್ಥಾನವಿದೆ. ಇದು ದೇಶದ ಆರ್ಥಿಕ ಅಭಿವೃದ್ಧಿಯ ಬೆನ್ನುಲುಬುಯಾಗಿದೆ. **ಮಹಿಳಾ ಕೃಷಿ ಕಾರ್ಮಿಕರು ಎಂದರೆ** : ತಮ್ಮ ಹೆಸರಿಗೆ ಯಾವುದೇ ಸ್ಥಿರ ಸ್ವತ್ತು ಅಥವಾ ಸ್ಥಿರಾಸ್ತಿ ಇಲ್ಲದೆ ಹೊಲಗದ್ದೆಗಳಲ್ಲಿ ಜೀವನವೆಲ್ಲ ಕೂಲಿಗಾಗಿ ದುಡಿಯುವ ಕಾರ್ಮಿಕರಿಗೆ ಕೃಷಿ ಕಾರ್ಮಿಕರೆಂದು ಕರೆಯುತ್ತಾರೆ. ಭಾರತದಲ್ಲಿ ಇವರ ಸಂಖ್ಯೆ ಅಧಿಕವಾಗಿದೆ.

ಪ್ರಸಿದ್ಧ ಕೃಷಿ ತಜ್ಞರಾದ ಡಾ. ಸ್ವಾಮಿನಾಥನ್ ಅವರ ಪ್ರಕಾರ "ಕೃಷಿಯನ್ನು ಮೊಟ್ಟ ಮೊದಲಬಾರಿಗೆ ಪ್ರಾರಂಭಿಸಿದವರು ಮಹಿಳೆಯರು ಪುರುಷರು ಆಹಾರವನ್ನು ಹುಡುಕುತ್ತಾ ಬೇಟೆಗೆ ಹೋಗುತ್ತಿದ್ದರು. ಮಹಿಳೆ ಮನೆಯ ಅಕ್ಕ ಪಕ್ಕದಲ್ಲಿಯೇ ಸಿಗುವ ಬೀಜಗಳನ್ನು ಸಂಗ್ರಹಿಸಿ ಚಿತ್ತಿ ಬೆಳೆಗಳನ್ನು ಬೆಳೆಯುತ್ತಿದ್ದಳು." ಗ್ರಾಮೀಣ ಭಾಗದಲ್ಲಿ 87% ರಷ್ಟು ಮಹಿಳೆಯರು ಕೃಷಿ ಚಟುವಟಿಕೆಯಲ್ಲಿ ತೊಡಗಿಸಿಕೊಂಡಿದ್ದಾರೆ. ಯಾವುದೇ ಒಂದು ಕುಟುಂಬ, ಸಮಾಜ, ಸಮೂದಾಯ, ಗ್ರಾಮ, ರಾಜ್ಯ, ದೇಶ ಮುಂದುವರೆಯಬೇಕಾದರೆ, ಅಲ್ಲಿಯ ಮಹಿಳಾ ಶಕ್ತಿಯ ಉಪಯೋಗ ಎಷ್ಟು ಆಗುತ್ತಿದೆ ಎಂಬುದನ್ನು ನಾವು ನೋಡಬೇಕು. ಮಹಿಳೆಯರನ್ನು ಗ್ರಾಮೀಣ ಅಭಿವೃದ್ಧಿಯ ಬೆನ್ನುಲುಬು ಎಂದು ಕರೆಯುತ್ತಾರೆ. ಅವಳು ಇಂದು ಮನೆಯ ನಾಲ್ಕುಗೋಡೆಗಳ ಮಧ್ಯೆ ಇರದೆ ತನ್ನ ಕಾರ್ಯಚಟುವಟಿಕೆಯನ್ನು ವಿಸ್ತರಿಸಿ ಕೃಷಿಗೆ ಹೆಚ್ಚಿನ ಮಹತ್ವವನ್ನು ಕೊಡುತ್ತಿದ್ದಾಳೆ. ಪ್ರಪಂಚದ ಸುಮಾರು ೫೦ % ಆಹಾರ ಧಾನ್ಯವನ್ನು ಉತ್ಪಾದಿಸುವಳು ಮಹಿಳೆ ಜೊತೆಗೆ ಹಣ್ಣು ತರಕಾರಿ, ಹೂವು ಇತರ ಬೆಳೆಗಳನ್ನು ಬೆಳೆಸಲು ಆಸಕ್ತಿಯನ್ನು ವಹಿಸುತ್ತಾಳೆ.

ಇಂದು ಮಹಿಳೆಯರು ದ್ವಿಪಾತ್ರದಲ್ಲಿ ತಮ್ಮ ಕಾರ್ಯವನ್ನು ಮಾಡುತ್ತಿದ್ದಾರೆ. ಮನೆಯ ಒಳಗೆ ತಾಯಿ, ಅಕ್ಕ, ತಂಗಿ ಅತ್ತಿಗೆ, ಸೊಸೆ, ಮಗಳು ಮತ್ತು ಹೊರಗೆ ಕೃಷಿ ಕಾರ್ಮಿಕಳಾಗಿ ಚಿತ್ತುವುದು, ಕಸಕೀಳುವುದು, ಭೂಮಿ ಸ್ವಚ್ಛ ಮಾಡುವುದು, ರಾಶಿ ಮಾಡುವುದು ಬೆಳೆದ ಪದಾರ್ಥಗಳನ್ನು ತೆಗೆದುಕೊಂಡು ಮಾರುಕಟ್ಟೆಗೆ ಒಯ್ಯುವುದು ಮತ್ತು ಆಕಳು, ಎಮ್ಮೆ, ಎತ್ತು ಕುರಿ, ಕೋಳಿ, ಜೇನು ಹುಳು ರೇಷ್ಮೆಹುಳು ಸಾಕಾಣಿಕೆ ಹೀಗೆ ಹತ್ತಾರು ಕೆಲಸಗಳಲ್ಲಿ ಅವಳು ಬೆಳಗಿನ ಜಾವ ೫ ಗಂಟೆಗೆ ದಿನಚರಿ ಆರಂಭಿಸಿ ರಾತ್ರಿ ೧೧ ಗಂಟೆಯವರೆಗೆ ಬಿಡುವಿಲ್ಲದೆ ಗಾಣದ ಎತ್ತಿನ ಹಾಗೆ ಅವಳ ದುಡಿಮೆ,

ಹಳ್ಳಿಯಲ್ಲಿ ವಾಸಮಾಡುವ ಮಹಿಳೆಯಾಗಲಿ ಅಥವಾ ಪಟ್ಟಣದಲ್ಲಿ ವಾಸಮಾಡುವ ಮಹಿಳೆಯಾಗಲಿ ತಮಗಾಗಿ ಕೆಲಸ ಮಾಡದೆ ತನ್ನವರಿಗಾಗಿ ಕೆಲಸ ಮಾಡುತ್ತಾಳೆ. ಅವಳು ಮದುವೆ ಮುಂಚೆ ತವರು ಮನೆಯ ಉದ್ಧಾರಕ್ಕಾಗಿ ದುಡಿಯುತ್ತಾಳೆ ಮದುವೆಯಾದ ಮೇಲೆ ಗಂಡ, ಮಕ್ಕಳಿಗಾಗಿ ದುಡಿಯುತ್ತಾಳೆ, ಅವಳಿಗಾಗಿ ದುಡಿಯುವ ದಿನಗಳು ತುಂಬಾ ಕಡಿಮೆ, ಆದರೂ ನಾಡಿನಲ್ಲಿ ಮನೆ ಕಾಡಿನಲ್ಲಿ ಹೊಲ ಅವಳ ಹೆಸರಿಗೆ ಏನು ಇಲ್ಲ ಆದರೂ ಅದು ಯಾವುದೇ ನೆಲ, ಆಸ್ತಿ, ಅಂತಸ್ತಿಗೆ, ಬಂಗಾರಕ್ಕೆ ಆಸೆ ಪಡೆದ ಅವಳು ಶ್ರಮವಹಿಸುತ್ತಾಳೆ. ಅದಕ್ಕಾಗಿಯೇ ಹೇಳುತ್ತಾರೆ. ಭಾರತ ದೇಶದ ಕೃಷಿಯು 70 % ಮಾನಸೂನ್ ಮೇಲೆ ಅವಲಂಬಿತವಾಗಿದೆ. ಅದು ಯಾವತ್ತು ಅವರ ಜೀವನದ ಜೊತೆ ಜೂಜಾಟ ಆಡುತ್ತದೆ. ಒಂದು ವರ್ಷ ತುಂಬಾ ಚನ್ನಾಗಿ ಮಳೆ ಬರುತ್ತದೆ. ಬೆಳೆಗಳು ಉತ್ತಮವಾಗಿ ಬಂದರೆ ಕೃಷಿ ಬಡ ಕಾರ್ಮಿಕರಿಗೆ ಉದ್ಯೋಗ ಸಿಕ್ಕೆ ಅವರಿಗೆ ಗಂಜಿ ಸಿಗುತ್ತದೆ. ಒಂದು ಸಲ ಸರಿಯಾಗಿ ಮಳೆ ಬರದೆ ಇದ್ದರೆ ಆವರ್ಷ ಬೆಳೆಯೂ ಇಲ್ಲ ಗಂಜಿಯೂ ಇಲ್ಲ ಅವರ ಜೀವನ ನೀರಿಗೂ ಗತಿ ಇಲ್ಲದಂತೆ ಆಗುತ್ತದೆ. ಆದಕ್ಕಾಗಿಯೇ ಹೇಳುತ್ತಾರೆ.

"ಬಡ ರೈತರು ಸಾಲದಲ್ಲೇ ಹುಟ್ಟಿ
ಸಾಲದಲ್ಲಿಯೇ ಜೀವನ
ಸಾಲದಲ್ಲಿಯೇ ಸಾಯುತ್ತಾರೆ."

ಸಾಲವೇ ರೈತ ಮಹಿಳೆ, ರೈತ ಮಹಿಳೆಯೇ ಸಾಲ ಎನ್ನುವಂತೆ ಅವರ ಜೀವನ,

ಇದರಿಂದ ಮುಕ್ತಿಹೊಂದಲು ಅವರು ತಮ್ಮ ಹುಟ್ಟೂರೂ ಬಿಟ್ಟು ಎಂದು ನೋಡದ ನಾಡಿಗೆ ತಮ್ಮ ಗಂಡದಿರು ಮತ್ತು ಹರಿಯದ ಮಕ್ಕಳೊಂದಿಗೆ ಜೀವನದ ಹಂಗು ತೊರೆದು ಹಸಿವು ನೀಗಿಸಿಕೊಳ್ಳಲು ಅವರು ಪಟ್ಟಣಕ್ಕೆ ವಲಸೆ ಹೋಗುತ್ತಾರೆ. ಬಡತನ ನಿರುದ್ಯೋಗ, ದೌರ್ಜನ್ಯ, ಹಸಿವು ಅನಕ್ಷರತೆ, ಮೌಢ್ಯತೆ, ಮುಗ್ಧತೆ, ಅವಲಂಬನೆ ಇವು ಭಾರತ ಕೃಷಿ ಮಹಿಳಾ ಕಾರ್ಮಿಕಳ ಜೀವನದ ಉಸಿರಾಗಿವೆ.

ಅವಳು ವರ್ಷದ 220 ದಿನಗಳೂ ಮಾತ್ರ ಕೆಲಸಕ್ಕೆ ಹೋಗುತ್ತಾಳೆ. ಉಳಿದ 145 ದಿನ ಅವರ ಸಮಯ ವ್ಯರ್ಥವಾಗಿ ಅವಳಿಗೆ ಏನು ಕೆಲಸವಿಲ್ಲದೆ, ಇರುತ್ತಾಳೆ. ಅವಳು ಒಂದು ದಿನದ ಕೂಲಿ ಎಂದರೆ ದಿನಕ್ಕೆ 85 ರಿಂದ 125 ರೂಪಾಯಿಯವರೆಗೆ ಅದು ಊರಿನ ಭೂ ಮಾಲಿಕ , ಭೂ ಒಡೆಯರು, ಕುಲಕರ್ಣಿಯವರು ದಿನಾಲೂ ಕೂಲಿ ಕೊಡುವುದಿಲ್ಲ ಅವರು ದಿನವೆಲ್ಲಾ ಕೆಲಸ ಮಾಡಿ ಸಂಜೆಗೆ ಬಿಸಿಲಿಗೆ ಬಣ್ಣ ಕರಿಯಾಗಿ ಒಣಗಿದ ಮುಖ, ಹಸಿದ ಹೊಟ್ಟೆಯೊಂದಿಗೆ ಬಾಗಿಲು ಇಲ್ಲದ ತನ್ನ ಗುಡಿಸಲಿಗೆ ಬರುತ್ತಾಳೆ. ಅಲ್ಲಿ ಕುಡಿದು ಚೀರಾಡುವ ಗಂಡ ಕಂಗಾಲಾಗಿ ಹಸಿವೆಯಿಂದ ಅಳುವ ಮಕ್ಕಳನ್ನು ಬಿಟ್ಟರೆ ಅವಳಿಗೆ ಏನು ಗತಿಯಿಲ್ಲಾ ಇದೆಲ್ಲಾವನ್ನು ತಾಳಲಾರದೆ ಅವಳು ಇಂದು ಪಟ್ಟಣಕ್ಕೆ ಒಡೆದ ಪ್ಲಾಸ್ಟಿಕ್ ಕೊಡ, ಹರಿದ ಚಾಪೆ ಸೋಸೈಟಿಯಲ್ಲಿ ಹಸಿರು ಕಾರ್ಡಿನಲ್ಲಿ ನೀಡಿದ ದಪ್ಪ ಅಕ್ಕಿಮೂಟೆ, ತೂತುಬಿದ್ದ ಬೋಗಣಿಗಳೊಂದಿಗೆ ಅವರು ಜೀವಕ್ಕೆ ಯಾವುದೇ ಆಶ್ರಯ, ಸುರಕ್ಷಿತವಿಲ್ಲದ ಪಟ್ಟಣಗಳಿಗೆ ಹೋಗುತ್ತಿದ್ದಾರೆ. ಹಳ್ಳಿಯ ಜೀವನಕ್ಕೆ ಬೇಸತ್ತು ಬಡ ಕೃಷಿ ಮಹಿಳೆ ಭೂಮಿ ಇಲ್ಲದೆ ನೂರರಲ್ಲಿ ಸುಮಾರು 80 % ಕೃಷಿ ಕಾರ್ಮಿಕರು ಪಜಾ/ಪ.ಪಂ ಕ್ಕೆ ಸೇರಿದವರು ಇರುತ್ತಾರೆ. 15 % ಹಿಂದುಳಿದವರು, 5 % ಮುಸ್ಲಿರು ಇರುತ್ತಾರೆ.

ಮಹಿಳಾ ಕೃಷಿ ಕಾರ್ಮಿಕರನ್ನೂ ನಾಲ್ಕು ವಿಧವಾಗಿ ನಾವು ನೋಡಬಹುದು.

1. ಭೂಹೀನ ಕಾರ್ಮಿಕರು ಇವರು ಗೌಡ ಮತ್ತು ಕುಲಕರ್ಣಿ ಅವರ ಮನೆಯಲ್ಲಿ ಕೆಲಸ ಮಾಡುತ್ತಾರೆ. ಇವರನ್ನು ಜೀತದಾಳು ಎಂದು ಕರೆಯುತ್ತಾರೆ.
2. ಭೂಮಿ ಇಲ್ಲದೆ ಸ್ವತಂತ್ರ್ಯವಾಗಿ ಇನ್ನೊಬ್ಬರ ಹೊಲದಲ್ಲಿ ದಿನಗೂಲಿ ಕೆಲಸ ಮಾಡುತ್ತಾರೆ.
3. ಸ್ವಲ್ಪ ಭೂಮಿಯಲ್ಲಿ ಬೀಜ ಬಿತ್ತಿದರೂ ಬೆಳೆ ಬರದೆ ಹೆಸರಿಗೆ ಮಾತ್ರ ಹೊಲ ಅದು ಕಲ್ಲುಮುಳ್ಳುಗಳಿಂದ ಕೂಡಿದ್ದು ಅದಕ್ಕಾಗಿ ಇವರು ಬಹಳ ಸಮಯ ಇನ್ನೋಬ್ಬರ ಹೊಲದಲ್ಲಿಯೇ ಕೆಲಸ ಮಾಡುತ್ತಾರೆ.
4. ಸ್ವಲ್ಪ ಸಣ್ಣ ಭೂಮಿ ಮನೆಯಲ್ಲಿ ತುಂಬಾ ಜನರು ಆ ಭೂಮಿಯನ್ನೇ ಅವರು ಅವಲಂಬಿತರಾಗಿರುತ್ತಾರೆ, ಅವರ ಹೊಟ್ಟೆ ಬಟ್ಟೆಗೆ ಯಾವಗಲೂ ಬರವಿರುತ್ತದೆ. ಅದನ್ನು ನಿಯಂತ್ರಿಸಲು ಅವರು ಇನ್ನೋಬ್ಬರ ಹೊಲದಲ್ಲಿ ಕೆಲಸಕ್ಕೆ ಹೋಗುತ್ತಾರೆ. ಹೀಗೆ ನಾಲ್ಕು ಪ್ರಕಾರವಾಗಿ ಇವರನ್ನೂ ನಾವು ವಿಂಗಡಿಸಬಹುದು. ಇದರ ಜೊತೆಗೆ ಈ ಕೃಷಿ ಮಹಿಳೆಯರು ಅನೇಕ ಆರ್ಥಿಕ, ಸಾಮಾಜಿಕ, ಶೈಕ್ಷಣಿಕ, ರಾಜಕೀಯ ಸಮಸ್ಯೆಗಳನ್ನು ಸಮಾಜದಲ್ಲಿ ಎದುರಿಸುತ್ತಿದ್ದಾರೆ.

• **ಆರ್ಥಿಕ ಸಮಸ್ಯೆಗಳು :–** ಇವರ ಹೆಸರಿಗೆ ಆಸ್ತಿ ಇಲ್ಲಾ, ಕಡಿಮೆ ಆದಾಯ, ಕಡಿಮೆ ವೇತನ, ಮೂಲಭೂತ ಸೌಕರ್ಯದಿಂದ ವಂಚಿತರಾದವರು ಸುರಕ್ಷಿತವಿಲ್ಲ, ಬ್ಯಾಂಕ್ ಸಾಲ ಕೊಡುವುದಿಲ್ಲಾ, ಕಡಿಮೆ ಬೇಡಿಕೆ, ಹೆಚ್ಚಿನ ಪೂರೈಕೆ, ಸಾಲಗಾರರು.

• **ಸಮಾಜಿಕ ಸಮಸ್ಯೆಗಳು :–**ಬಡವರು, ಮುಗ್ದರು, ಪರಿಶಿಷ್ಟ ಜಾತಿ / ಪರಿಶಿಷ್ಟ ಪಂಗಡಕ್ಕೆ ಸೇರಿದವರು ನೈಪುಣ್ಯತೆ ಇಲ್ಲದವರು ವೈಜ್ಞಾನಿಕ ಜ್ಞಾನವಿಲ್ಲದವರು, ನಿರುದ್ಯೋಗ, ಅನಕ್ಷರತೆ. ಸಮಾಜದಿಂದ ತಿರಸ್ಕರಿಸಲ್ಪಟ್ಟವರು ಮುಂತಾದವುಗಳು.

ರಾಜಕೀಯ ಸಮಸ್ಯೆಗಳು :– ಬಡತನ, ನಿರುದ್ಯೋಗ ಅನಕ್ಷರತೆ ಕಾರಣದಿಂದ ಇವರು ರಾಜಕೀಯದಿಂದ ತುಂಬಾ ದೂರವಿದ್ದಾರೆ,. ಯಾವ ಸರ್ಕಾರ ಆಡಳಿತ ನಡೆಸುತ್ತಿದೆ ಮತ್ತು ಯಾರು ಮುಖ್ಯಮಂತ್ರಿ, ಯಾರು ಪ್ರಧಾನ ಮಂತ್ರಿ ಇವರಿಗೆ ಗೊತ್ತಿಲ್ಲ, ಇತ್ತೀಚೆಗೆ ಸಂವಿಧಾನವು ಮಹಿಳೆಯರಿಗೆ 33% ಮೀಸಲಾತಿ ನೀಡಿದ ನಂತರ ಇವರಿಗೆ ಗ್ರಾಮ, ಪಂಚಾಯತಿಯಲ್ಲಿ ಸ್ವಲ್ಪ ಮಾರ್ಯದೆ ಸಿಕ್ಕಿದೆ. ಇಂದಿರಾ ಗಾಂಧಿಯ ಕೈ ಬಿಟ್ಟರೆ ಇವರಿಗೆ ಬೇರೆ ಯಾರುಗೊತ್ತಿಲ್ಲ, ಮತದಾನದ ಮಹತ್ವದ ಅರಿವು ಇಲ್ಲ. .

ಈ ಬಡ ಅವಿದ್ಯಾವಂತ ಹೆಣ್ಣು ಮಕ್ಕಳು ಇಂದು ಅವರು ಅನೇಕ ಗ್ರಾಮ ಪಂಚಾಯತ್ ತಾಲೂಕು ಪಂಚಾಯತ್ ಜಿಲ್ಲಾ ಪಂಚಾಯತ್ ಚುನಾವಣೆಯಲ್ಲಿ ಸಕ್ರೀಯವಾಗಿ ಭಾಗವಹಿಸಿ ನಿರ್ಣಾಯಕ ಪಾತ್ರವನ್ನು ವಹಿಸುತ್ತಿದ್ದಾರೆ. ಕೆಲವರು ಸದಸ್ಯರಾಗಿ, ಕಾರ್ಯದರ್ಶಿಯಾಗಿ, ಉಪಾಧ್ಯಕ್ಷರಾಗಿ, ಅಧ್ಯಕ್ಷರಾಗಿ ಸಮಾಜದಲ್ಲಿ ಮುಂಚೂಣಿಯ ಸ್ಥಾನದಲ್ಲಿ ಈ ಹೆಣ್ಣು ಮಕ್ಕಳು ಪಾಲ್ಗೋಳುತ್ತಿದ್ದಾರೆ. ಇದೆಲ್ಲಾವನ್ನು ಇವರು ಸ್ವಸಹಾಯ ಗುಂಪುಗಳಿಂದ ತಮ್ಮಲ್ಲಿ ಹುದುಗಿದ ಶಕ್ತಿಯನ್ನು

ಹೊರಹೊಮಿಸಿ ಸಮಾಜದ ಅಭಿವೃದ್ಧಿಯಲ್ಲಿ ಆಗ್ರ ಸ್ಥಾನದಲ್ಲಿದ್ದಾರೆ. ಇದಕ್ಕೆ ಸಮಾಜದ ಎಲ್ಲರೂ ಈ ಬಡ, ಅವಿದ್ಯಾವಂತ ಹೆಣ್ಣುಮಕ್ಕಳಿಗೆ ಸಮಾನ ಅವಕಾಶವನ್ನು ಕೊಡಬೇಕು.

• **ಶೈಕ್ಷಣಿಕ ಸಮಸ್ಯೆಗಳು :–**ಅನರಕ್ಷರತೆ 100 %, ಆಧುನಿಕ ತಂತ್ರಜ್ಞಾನದ ಸಲಕರಣೆಗಳಿಂದ ತುಂಬಾ ದೂರ, ನೈಪುಣ್ಯತೆ ಇಲ್ಲಾ, ವಿಶ್ವಸಂಸ್ಥೆಯ ಘೋಷಣೆಯನ್ನು ಇವರಿಗೆ ಗೋತ್ತಿಲ್ಲ ಶಿಕ್ಷಣ ಪಡೆಯುವುದು ವಿಶ್ವದ ಎಲ್ಲ ಮಾನವನ ಮೂಲಭೂತ ಹಕ್ಕು ಎಂದು ಆದರೂ ಇದು ಇವರ ಜೀವನದಲ್ಲಿ ಇಲ್ಲವೆ ಇಲ್ಲ,

ಭಾರತ ಸಂವಿಧಾನದ ಪ್ರಕಾರ ಯಾವುದೇ ಜಾತಿ, ಮತ ಪಂಥ ವರ್ಣ, ಮೇಲು, ಕೀಳು ಎನ್ನದೆ ರಾಜ್ಯ ಮತು ರಾಷ್ಟ್ರದ ಸರ್ಕಾರದ ಕರ್ತವ್ಯವೇನೆಂದರೆ 14 ವರ್ಷದವರೆಗೆ ಎಲ್ಲ ನಾಗರಿಕರಿಗೆ ಮುಕ್ತ ವಿಧ್ಯೆವನ್ನು ಕೂಡುವುದು (1964–65) ರ ಶಿಕ್ಷಣ ಕಮೀಟಿಯ ವರದಿ ಪ್ರಕಾರ ಶಿಕ್ಷಣ ಒಂದೇ ಒಂದು ಅಸಮಾನತೆಯನ್ನು ಅಳಿಸುವ ಅಸ್ತ್ರವಿದೆ ಅದನ್ನು ಎಲ್ಲರೂ ಪಡೆಯಬೇಕು ಇದರಿಂದ ನಾವು ಸಮಾಜದಲ್ಲಿ ಪರಿವರ್ತನೆಯನ್ನು ತರಬಹುದು ಮತ್ತು ಅವರ ಜೀವನದಲ್ಲಿ ಬದಲಾವಣೆ ಕಾಣಬಹುದು. ಅಜ್ಞಾನ, ಮುಗ್ಧತೆಯ ಫಲವಾಗಿ ಇವರು ಸಂಘಟಿತರಾಗಿಲ್ಲಾ ಇದರಿಂದ ಅವರಿಗೆ ಶ್ರಮಕ್ಕೆ ತಕ್ಕ ಕೂಲಿ ಸಿಗುತ್ತಿಲ್ಲ, ಇವರ ಸಂಘಟನೆಗೆ ನಾಯಕರು ಇಲ್ಲ, ಒಗ್ಗಟ್ಟಿನ ಶಕ್ತಿ ಅರಿವು ಇಲ್ಲ, ಅದಕ್ಕಾಗಿ ಎಲ್ಲಾರು ಇವರನ್ನು ಪ್ರಾಣಿಗಳಿಗಿಂತ ಕಡೆಯಾಗಿ ಕಾಣುತ್ತಾರೆ.

• **ಇತರ ಸಮಸ್ಯೆಗಳು :** ಇವರಿಗೆ ಹಳ್ಳಿಯಲ್ಲಿ ವಾಸಮಾಡಲು ಮನೆಯಿಲ್ಲ, ಬಡತನದ ಕಾರಣದಿಂದ ಮೈಯನ್ನು ಮುಚ್ಚಿಕೊಳ್ಳಲು ಬಟ್ಟೆ ಇಲ್ಲಾ, ಒಳ್ಳೆಯ ಪೌಷ್ಟಿಕ ಆಹಾರವಿಲ್ಲಾ, ನೀರು ಇಲ್ಲ ಜೀವನಕ್ಕೆ ಯಾವುದೇ ಸುರಕ್ಷಿತೆಯಿಲ್ಲ ವೈದ್ಯಕೀಯ ಸೌಲಭ್ಯಗಳು ತುಂಬಾ ವಿರಳ ಸುಖ ಸಂತೋಷ ಉಲ್ಲಾಸ, ಆಸ್ತಿ, ಸಂಪತ್ತು ಇವುಗಳು ಗಗನ ಕುಸುಮವಾಗಿದೆ. ಇವರ ಜೀವನದ ಎಲ್ಲಾ ಸಮಸ್ಯೆಗಳಿಗೆ ಪರಿಹಾರವನ್ನು ಕೊಡಲು ಸರ್ಕಾರ ಅನೇಕ ಯೋಜನೆಗಳನ್ನು ಜಾರಿಗೆಗೊಳಿಸಲಾಗಿದೆ.

ಅವುಗಳಲ್ಲಿ ಮುಖ್ಯವಾದವು ಸ್ವಸಹಾಯ ಗುಂಪುಗಳು ಸ್ತ್ರೀ ಶಕ್ತಿ ಗುಂಪುಗಳು, ಗ್ರಾಮೀಣ ಬ್ಯಾಂಕ್‌ಗಳು, ಕಡಿಮೆ ದರದಲ್ಲಿ ಸಾಲವನ್ನು ಕೊಡಲು ದೇಶದಲ್ಲಿ ಸುಮಾರು 30 ಮಿಲಿಯನ್ ಹೆಣ್ಣು ಮಕ್ಕಳು ಗ್ರಾಮೀಣ ಭಾಗದಲ್ಲಿ ಸ್ವಸಹಾಯ ಸಂಘಗಳಲ್ಲಿ ತಮ್ಮನ್ನು ತೊಡಗಿಸಿಕೊಂಡಿದ್ದಾರೆ. ಇದರಲ್ಲಿ 20 ಮಿಲಿಯನ್ ಕೃಷಿ ಕಾರ್ಮಿಕರೂ ಹಾಗೂ 10 ಮಿಲಿಯನ್ ಮಹಿಳೆಯರು ಪಶುಸಂಗೋಪನೆ ಹಾಗೂ ಇತರ ಸಣ್ಣ ಗುಡಿ ಕೈಗಾರಿಕೆಯಲ್ಲಿದ್ದಾರೆ. 2008–09 ರಲ್ಲಿ 62,12,620 ಸ್ವಸಹಾಯ ಸಂಘಗಳು ಭಾರತದಲ್ಲಿವೆ ಕರ್ನಾಟಕದಲ್ಲಿ 2010 ರಲ್ಲಿ 5,34,588 ಸ್ತ್ರೀ ಶಕ್ತಿ ಗುಂಪುಗಳಿವೆ ಅದರ ಜೊತೆ MGNEGS ಯೋಜನೆ, ಭೂಸುಧಾರಣೆ ಕಾಯ್ದೆ, ಕನಿಷ್ಠ ವೇತನ ಕಾಯ್ದೆ, ಜೀತದಾಳು ಪದ್ಧತಿ ನಿರ್ಮೂಲನೆ ಮತ್ತು ಬಡತನ ನಿವಾರಣೆಗಾಗಿ ಅನೇಕ ಯೋಜನೆಗಳನ್ನು ರಾಜ್ಯ ಮತ್ತು ರಾಷ್ಟ್ರ ಮಟ್ಟದಲ್ಲಿ ಸರ್ಕಾರ ಜಾರಿಗೆ ತಂದಿವೆ. IRDP, NREP, RLEGP, TRYSEM, DWACRA, IMY, MSY, RWDEP, NRHM, JRY, SGSY, AWAKE , Etc..

ಈ ಎಲ್ಲಾ ಯೋಜನೆಗಳು ಕೃಷಿ ಕಾರ್ಮಿಕರ ಬಾಳಿನಲ್ಲಿ ಆಶಾಕಿರಣ ಮೂಡಿಸುವುದಕ್ಕೆ ಜಾರಿಗೊಳಿಸಿದರು. ಆದರೆ ಅವುಗಳ ಅನುಷ್ಠಾನ ಸರಿಯಾಗಿ ಆಗಲಿಲ್ಲ ಮತ್ತು ಅವಶ್ಯವಿರುವ ಬಡ ಜನರಿಗೆ ತಲುಪಲಿಲ್ಲ ಇದಕ್ಕೆ ಮುಖ್ಯ ಕಾರಣ ಆಳಿಸಿಕೊಳ್ಳುವ ವರ್ಗಗಳು.

ಕೃಷಿ ಮಹಿಳೆಯರ ಸ್ಥಿತಿಗತಿಯನ್ನು ಸುಧಾರಿಸಲು ಈ ಕೆಳಗಿನ ಕ್ರಮಗಳನ್ನು ಜಾರಿಗೊಳಿಸಬೇಕು.

ಗ್ರಾಮೀಣದಲ್ಲಿಯೇ ಸಿಗುವ ಕಚ್ಚಾವಸ್ತುವನ್ನು ಉಪಯೋಗಿಸಿ ಗ್ರಾಮೀಣ ಜನರ ಆಸೆಗಳನ್ನು ಪೂರೈಸಲು ಇವರಿಗೆ ಮಹಿಳಾ ಮತ್ತು ಮಕ್ಕಳ ಕಲ್ಯಾಣ ಇಲಾಖೆ, ಕೃಷಿ ಇಲಾಖೆ, ಅನೇಕ ಸರ್ಕಾರೇತರ ಸಂಸ್ಥೆಗಳು, ಹಾಗೂ ಜಿಲ್ಲಾ ಪಂಚಾಯತ್ ಕೃಷಿ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಪೌರ ಆಡಳಿತ ಸಂಸ್ಥೆಗಳು ಸ್ತ್ರೀ ಶಕ್ತಿ ಗುಂಪುಗಳು, ಸ್ವಸಹಾಯ ಗುಂಪುಗಳ ಮುಖಾಂತರ ಹೆಣ್ಣು ಮಕ್ಕಳಿಗೆ ಅನೇಕ ಜೀವನ ಉಪಯೋಗಕ್ಕೆ ಬರುವ ಕೃಷಿ ಆಧಾರಿತ ಗುಡಿಕೈಗಾರಿಕೆಗಳಾದ ಎರೆಹುಳು ಸಾಕಾಣಿಕೆ, ತರಕಾರಿ ಬೆಳೆಸುವುದು, ಕುರಿ ಕೋಳಿ ಸಾಕಾಣಿಕೆ, ಹೈನುಗಾರಿಕೆ, ಜೇನುಹುಳು ಸಾಕಾಣಿಕೆ ರೆಷ್ಮೆಹುಳು ಸಾಕಾಣಿಕೆ ತರಬೇತಿಯನ್ನು ಕೊಡಬೇಕು. ಅದು ಅಲ್ಲದೆ ಇತರ ಹೋಟೆಲ್, ಸಣ್ಣ ಅಂಗಡಿ ವ್ಯಾಪಾರ, ಮದುವೆಯಲ್ಲಿ ಶಾಮಿಯಾನ ಸಾಗಿಸುವುದು, ಸಣ್ಣ ಬಟ್ಟೆ ವ್ಯಾಪಾರ ಬಟ್ಟೆ ಹೊಲಿಯುವುದು, ಕಸೂತಿ ಮಾಡುವುದು, ಮೇಣದ ಬತ್ತಿ, ಅಗರ ಬತ್ತಿ, ಹಾಗೂ ಇತರ ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ತಯಾರಿಸುವ ತರಬೇತಿ ನೀಡಬೇಕು. ಉದಾ: ಬಜ್ಜಿ, ಬಂಡಿ, ಸೇಂಗಾ, ಗುರೇಳು, ಅಗಸಿ ಹಿಂಡಿ, ಪುಟಾಣಿ ಅಥವಾ ಪುಡಿ ವಿವಿಧಗಳು, ಮಾವಿನಕಾಯಿ, ಹುಣಿಸೆಕಾಯಿ, ಪುಂಡಿಪಲ್ಯ ಟಮೋಟೋ ಮುಂತಾದ ಚಟ್ನಿಗಳು ಪಾಪಡ್ ಸೆಂಡಿಗೆ ಸಾವಿಗೆ, ರೋಟ್ಟಿ ಹಾಗೂ ಇತರೆ ದಿನನಿತ್ಯಕ್ಕೆ ಬೇಕಾಗಿರುವ ಸಿಹಿ ತಿಂಡಿಗಳ ಮಾಡುವ ವಿಧಾನದ ಬಗ್ಗೆ ತರಬೇತಿಯನ್ನು ಕೊಟ್ಟು ಅವರನ್ನು ಆರ್ಥಿಕವಾಗಿ ಸಬಲರನ್ನಾಗಿ ಮಾಡುವಲ್ಲಿ ಈ ಚಟುವಟಿಕೆಗಳು ಪ್ರಮುಖ ಪಾತ್ರವನ್ನು ವಹಿಸುತ್ತವೆ.

ಬಡ ಮಹಿಳಾ ಕೃಷಿ ಕಾರ್ಮಿಕರ ಸಮಸ್ಯೆಗಳನ್ನು ಪರಿಹಾರಿಸುವುದ್ದಕ್ಕಾಗಿ ಅವರನ್ನು ಸಂಘಟಿತರನ್ನಾಗಿ ಮಾಡಿ ಒಗ್ಗಟಿನ ಶಕ್ತಿಯ ಅರಿವು ಮೂಡಿಸಬೇಕು. ಇಷ್ಟೆಲ್ಲಾ ಕಷ್ಟಗಳ ಸರಮಾಲೆ ಜೊತೆಗೆ ಅವರು ಯಾವತ್ತು ಎದೆಗುಂದದೆ ಧೈರ್ಯದಿಂದ ಬಂದಂತಹ ಸಮಸ್ಯೆಗಳನ್ನು ಸ್ವೀಕರೀಸಿ ಸಾಲ, ಬಡತನ, ನಿರುದ್ಯೋಗ ಯಾವುದಕ್ಕೂ ಅಂಜಿ ಆತ್ಮಹತ್ಯೆ ಮಾಡಿಕೊಳ್ಳದೆ, ಹೇಡಿ ಅನ್ನಿಸಿಕೊಳ್ಳದೆ ಎದೆಗುಂದದೆ ಗಂಡ ಹಾಗೂ ಇತರರು ಸಹಕಾರ ಕೊಡದಿದ್ದರೂ, ತನ್ನ ಮನೆ, ಮಕ್ಕಳನ್ನು ನೋಡಿಕೊಂಡು ಬಂದಂತಹ ಕೂಲಿಯಲ್ಲಿ ಸಾಯದೇ ಹುಸಿನಗೆ ಬೀರಿ ಬದುಕುತ್ತಿದ್ದಾಳೆ. ನಮ್ಮ ಬಡ ಕೃಷಿ ಕಾರ್ಮಿಕಳು ಈ ಶ್ರೀಮಂತ ಹಳ್ಳಿಗಳ ರಾಷ್ಟ್ರವಾದ ಭವ್ಯ ಭಾರತದಲ್ಲಿ

"ನಾವು ಈಗಿರುವ ಸ್ಥಿತಿಯೇ ಅಂತಿಮವಲ್ಲ
ಸದ್ಯದ ಪರಿಸ್ಥಿತಿ ಬಗ್ಗೆ ಹೊಂದುವುದು ಸರಿಯೂ ಅಲ್ಲ.
ಮುಂದೆ ಸಾಗಬೇಕಿರುವ ಹಾದಿ ಬಹು ದೂರವಿದೆ.
ಎಂದು ತಿಳಿಯಬೇಕು. ಆಗ ಮತ್ತಷ್ಟು ಉತ್ತಮ
ದಿನಗಳು ಬಂದರೂ ಬರಬಹುದು."

KAUTILYEEYAM: ARTHASASTRA DEALING WITH THE CONCEPT OF ARTHAKRANTI, A PROPOSAL FOR WITHDRAWING THE ENTIRE TAX SYSTEM IN INDIA

Sahana
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The urban "haves" are certainly getting richer in the liberalized, global Economy. However, there is a sharp ***economic disparity,*** where all this "Isolated" growth leaves the masses - in cities and in rural areas - even worse off than before. The "have-nots", for the ***sake of survival*** are forced into illegal activities. The desperation serves as an ideal fuel for the fires of *terrorism, naxalism* and all kinds of socially divisive activities. This in turn leads to an increasingly difficult law and order situation.

There is a ***thriving parallel economy*** fuelled by black money. There is a related issue of ***rampant corruption.*** There is a ***fiscal deficit*** at the Centre and in all States. No matter how many new taxes are added, the Governments at all levels are forever short of revenue. As a consequence, there are little or no funds to run any real development programs or to address even the subsistence needs of the "have-nots".

The urban "haves" are certainly getting richer in the liberalized, global Economy. However, there is a sharp economic disparity, where all this "Isolated" growth leaves the masses – in cities and in rural areas – even worse off than before. The "have-nots", for the sake of survival are forced into illegal activities. The desperation serves as an ideal fuel for the fires of terrorism, naxalism and all kinds of socially divisive activities. This in turn leads to an increasingly difficult law and order situation.

There is a thriving parallel economy fuelled by black money. There is a related issue of rampant corruption. There is a fiscal deficit at the Centre and in all States. No matter how many new taxes are added, the Governments at all levels are forever short of revenue.

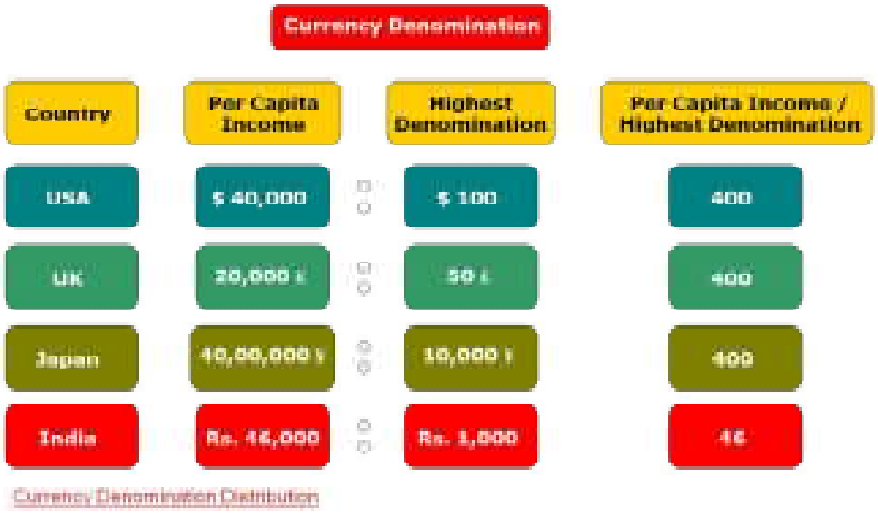
As a consequence, there are little or no funds to run any real development programs or to address even the subsistence needs of the "have-nots".

The Political System, due to lack of Government Funding, is at the mercy of the Parallel Economy and Black Money. This inevitably leads to increased criminalization of the politics. Government seems to be locked into a single point program to generate capital – "Attract Foreign Direct Investment". Thus the policies tend to favour these investments and end up making the local industry even more un-competitive.

In the Indian economy, cash transactions far outweigh transactions through the banking system – as much of 80 % of the economy is cash based leading to an Unhealthy Development of the Banking System, the backbone of any modern day economy. Natural effect is inadequacy, rather, scarcity of Credit Supply for one and all. Alarmingly enough with every passing year this percentage is growing rather than shrinking!

Due to the minimal use of the banking system, there is inadequate capital supply and capital formation. The "have-nots" remain outside the banking system and never get a chance to establish their credibility. This keeps them at the mercy of the "cash / parallel economy".

India also faces the problem of currency denomination which is a main leading factor to the parallel economy and also the reason for flawed taxation system.



The answer to this is **Chanukya's Arthasastra** which gives a solution to the flawed taxation system in the country and to completely remove the parallel economy to the extent it is existing in India i.e. **ARTHAKRANTI**.

He has given the vision like **"Vasudhaiva Kutumbakam"** which describes the capital formation of one economy for effective governance.

Solution in the form of the **ArthaKranti Proposal**

• **Withdrawal of existing Taxation System completely including,** *all Central, State and Local Government Taxes – Direct as well as Indirect* **(except Customs/Import Duties)**

• **Every Transaction routed through a bank will attract a certain deduction in appropriate percentage (say 2 %) as a Bank Transaction Tax [BTT]** [A Single Point Tax Deducted at Source]

* This deduction is to be effected on receiving/credit account only

* This deducted amount will be credited to different Government levels like Central, State and Local (as say, 0.7 %, 0.6 % and 0.35 % respectively)

* Transacting Bank will also have a share (say 0.35 %) in the deducted amount as the bank has a key role to perform

• **Cash Transactions will not attract any tax.**

• **Withdrawal of High Denomination Currency** (**say above Rs. 50)**

• **Government should make legal provisions to restrict Cash Transactions up to a certain limit (say Rs. 2,000)** This means, Cash Transactions above this limit will not enjoy any legal protection.

Productivity of the ArthaKranti Proposal

For the Year **2010-11** as per Budget Estimates,

Central (Gross) Total Tax Revenue = Rs. 7, 46,651 Crores

States - Total Tax Revenues [Excluding States' Share in Central Taxes] = Rs. 4, 14,590 Crores

So, Combined Total Tax Revenue of the Central and All the State Governments = Rs. 11,61,241 Crores

Considering the Total Tax Revenue of all the Local Governments like Municipal Corporations as ~ Rs. 85,000 Crores, the Combined Total Tax Revenue of the Central, State and Local Governments = **Rs. 11,61,241 Crores + Rs. 85,000 Crores = ~ Rs. 12,50,000 Crores**

On a typical day, RTGS alone handles Transactions worth ~ Rs. 2,000 billion, that is, ~ Rs. 2,00,000 Crores.

Considering per day RTGS Transactions of Rs. 2,00,000 Crores and only for 300 days in a year, the Total Bank Transaction Tax [BTT] Collected (at 2 %) as per the ArthaKranti Proposal will be: 2,00,000 * (2/100) = Rs. 4,000 Crores per day and **4,000 * 300 = Rs. 12,00,000 Crores per Year**

Thus, with BTT Rate of 2 %, Tax Collection as per the ArthaKranti Proposal almost equals the Current Combined Total Tax Collection of All Governments (Central, State and Local) considering today's RTGS Transactions alone.

Considering other types of bank transactions, currency denomination compression and a limit set for the Cash Transactions to enjoy legal protection, BTT Rate is expected to be less than 1%.

Effects of the ArthaKranti Proposal

There would be **Adequate Revenue** with Governments at All Levels to spend on developmental activities [Please see previous page]

Adequate funds for execution of projects of national, global importance will be available. Schemes for social security like **Social Security Allowance** can be successfully implemented to ensure Social Security for one and all.

Generation of Black Money is ***technically impossible***

Merger of the existing Black Money into White Money [thanks to withdrawal of Higher Denominations]

Government, Administration, Law and Order Maintaining Systems Freed from the Influence of the Parallel Economy

Opportunities for Corruption in the taxation system eliminated plus an automatic check applied on Corruption thanks to: currency denomination compression and inherently traceable Bank Transactions

Budgetary [White Money] Provisions for the Political System, freeing it from its dependence on the Parallel Economy

Tax incidence shifted to Bank Transactions/the Flow of Money replacing all other incidences of taxation. Entire Tax Collection System functioning will be Automatic, Producing Daily Collection of Revenues at each Government Level, thus helping realize Decentralized Governance.

No Filing of Returns, Challans etc

Industry Focus can Shift from Manipulation to Innovation. Same true of resources engaged in Tax Compliance in the present system.

Effective control over Terrorism possible by way of withdrawal of High Denomination Currency, thereby, reigning - their - currently uncontrolled, untraceable transactions and activities. Also the root causes of terrorism, namely, insecurity, poverty, disparity will be acted upon via provision of Social Security Allowance and Empowered Governance.

Enhancing the Capital Formation Process. Capital will be available easily and at cheaper rates.

The prices of goods as well as services will be freed from Current Heavy Burden of both - the **Costly Capital and the Heavy Taxes**. Along with this, due to the availability of Cheaper Capital at Ease post ArthaKranti Implemen-

tation, the Effective Purchasing Power of the Individuals and therefore the Society will increase.

A Principled, Prosperous and a Peaceful Living for Every Individual Enabled

SURROGACY – BOON OR BANE – IN THE LIGHT OF ASSISTED REPRODUCTION TECHNOLOGY BILL AND RULES – 2008

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I)Pushpalatha G practiced as an advocate in the High Court of Karnataka at Bangalore. From 2002-03 joined as Lecturers at SCAB Law COLLEGE Raichur. Presented paper at seminars and workshops Delivered lecturers on public premises act –at NLSIU at Bangalore, The training programme organized for estate officers of LIC.

The present topic is chosen as India has become centre for outsourcing of the children. The inter country adoption laws have not yet been streamlined. It is in this situation that India is much sought after place for adoption and surrogacy. The law on both the issues have not been considered by the parliamentarians. It is an Earnest effort to contribute the framework of law to the betterment of the humanity.

The desire for the offspring is an innate desire of a every living creature in this world. It is being said that “Mother gives birth to the child biologically, where as child givers birth to parentage socially” The desire to be a parent is social and psychological need of the human beings.

Hindu scriptures have always desired to have natural born son right from Vedic age, in the absence of it adoption was the alternative. But now technology has provided option to have biological child. This needs to be protected, to prevent commercial exploitation of women.

Problem when it comes to surrogacy.

Reproduction is the basic right of a human being.

Surrogacy is a process of carrying and delivering a child for another person .surrogacy is neither legal nor illegal in India still it is carried on.

In baby manj case

The intervention of Supreme Court settled matter

The claim for surrogacy vests with number of people.

The legal queries needs Introspection as to,

i} it its moral?

Ii} The whole procedure involves commercialization –

At different levels

Iii} The contract that is entered among the facilitator beneficiary parents and surrogate mother.

Does the contract satisfies requirements under the Indian contract act

Iv} When it comes taking womb on rent – does human body can be given on rent –is there is any provision – v} Fundamental Right, Right to life –does it mean –Right to put the body for use.

· The draft Assisted Reproductive Technology (Regulation) Bill and Rules- 2008

· The agreement is not covered on all aspects.

1) Citizenship of child born to foreign couple

2) Financial protection to surrogate mother and child.

288th Law Commission Report on Insurance

When woman undergoes pregnancy her body undergoes sea change. Life is Risk. Insurance coverage needs to be determined.

The desire for the offspring is an innate desire of a every living creature in this world. It is being said that" mother gives birth to the child biologically, where as child givers birth to parentage socially" The desire to be a parent is social and psychological need of the human beings.

Need for Legislation to regulate Assisted Reproductive Technology Clinics as well as Rights and Obligations of Parties to a surrogacy.

The Worlds Second and India's First IVF (In Vitro Fertilization) baby, Kanupriya alias Durga was in Kolkata on October 3 1978 about two months after the world's First boy, Louise Joy brown in Great Britain on July 25, 1978. Since then the Field of assisted reproductive technology (ART) has developed rapidly.

The growth in the ART methods is recognition of the fact that infertility as a medical condition is huge impediment in the overall well being of couples and cannot be over looked especially in a patriarchal society like India. A woman is respected as a wife only if she is mother of a child, so that her Husband's masculinity and sexual potency is proved and the lineage continues. Some authors put it as follows: *The parents construct the child biologically, while the child constructs the parents socially.* The Problem however arises when the parents are unable to construct the child through the conventional biological means. Infertility is seen as a major problem as kinship and family ties are dependent on progeny. Herein surrogacy comes as a supreme saviour.

The legal issues related with surrogacy are very complex and need to be addressed by a comprehensive legislation. Surrogacy involves conflict of various interests and his inscrutable impact on the primary unit of society viz. Family, Non-intervention of law in this knotty issue will not be proper at a time when law is to act as ardent defender of human liberty and an instrument of distribution of positive entitlements. At the same time, prohibition on vague moral grounds without proper assessment of social ends and purposes which surrogacy can serve would be irrational. Active legislative intervention is required to facilitate correct uses of the new technology i.e. ART and relinquish the cocooned approach to legalization of surrogacy adopted hitherto. The need of the hour is to adopt a pragmatic approach by legalization altruistic surrogacy arrangements and prohibited commercial ones.

Surrogacy Meaning:- The word "Surrogate" has its origin in Latin '*Surrogatus'* past participle of '*Surrogare',* meaning a substitute, that is, a person appointed to act in the place of another. Thus a surrogate mother is a woman who bears a child on behalf of another woman, either from her own egg or from the implantation in her womb of a fertilised egg from other woman. According to the Black's Law Dictionary, surrogacy means the process of carrying and delivering a child for another person. The new Encyclopaedia Britannica defines *"Surrogate motherhood"* as the practice in which a woman bears a child for a couple unable to produce children in the usual way. The report of the Committee of Inquiry in to Human Fertilization and Embryology or the Warnock report (1984) defines surrogacy as the practice whereby one woman carries a child for another with the intention that the child should be handed over after birth.

The Black' Law Dictionary categorizes surrogacy into two classes: 'Gestational surrogacy' and 'Traditional surrogacy'. They are defined as follows:

Gestational surrogacy:- A pregnancy in which one woman (The Genetic Mother) provides the egg, which is fertilised, and another woman (The Surrogate Mother) carries the fetus and gives birth to the child.

Traditional surrogacy:- A pregnancy in which one woman provides her own egg, which is fertilised, by artificial insemination, and carries the fetus and gives birth to a child for another person.

'Gestational surrogacy' is total in the sense that an embryo created by the process of IVF is implanted in to the surrogate mother. 'Traditional surrogacy' may be called partial or genetically contracted motherhood because the surrogate mother is impregnated with the sperm of the intended father making her both the genetic and the gestational mother, the child shares make-up of the commissioning father and the surrogate mother. Surrogacy is commercial or altruistic depending on whether the surrogate receives financial reward for her pregnancy or the relinquishment of the child, or not.

INDIA-A-REPRODUCTIVE TOURISM DESTINATION.

In Commercial surrogacy agreements, the surrogate mother enters into an agreement with the commissioning couple or a single parent to bear the burden of pregnancy. In return of her agreeing to carry the term of the pregnancy, she is paid by the commissioning agent for that. The usual fee is around $ 30,000/- in India which is around 1/3rd of that in developed countries like the USA. This has made India a favourable destination for foreign couples who look for a cost-effective treatment for infertility and a whole branch of medical tourism has flourished on the surrogate practice. ART industry is now a 25,000/- crore rupee pot of gold. Anand, a small town in

Gujarat, has acquired a distinct reputation as a place for outsourcing commercial surrogacy. It seems that wombs in India are on rent which translates into babies for foreigners and dollars for Indian surrogate mother.

LEGAL AND MORAL ISSUES: The Moral issues associated with surrogacy are pretty obvious, yet of an eye-opening nature. This includes the criticism that surrogacy leads to commoditization of the child, breaks the bond between the mother and the child, interferes with nature and leads to exploitation of poor women in underdeveloped countries who sell their bodies for money. Some times, psychological considerations may come in the way of a successful surrogacy arrangements.

As far as the legality of the concept of surrogacy is concerned it would be worthwhile to mention that Article 16.1 of the *Universal Declaration of Human Rights 1948 Says, Inter alia,* that "men and women of full age without any limitation due to race, nationality or religion have the right to marry and found a family". The judiciary in India too has recognized the reproductive right of humans as a basic right. For instance, in *B.K. Parthasarathi V. Government of Andhra Pradesh* [1], the Andhra Pradesh High Court upheld "the right of reproductive Autonomy" of an individual as a facet of his "right to privacy" and agreed with the decision of the US Supreme Court in *Jack T. Skinner V. State of Oklahama,*[2] which characterised the right to reproduce as "one of the basic civil rights of man" Even in *Javed V. State of Haryana*[3], through the Supreme Court upheld the two living children norm to debar a person from contesting a *Panchayath Raj* Election it refrained from stating that the right to procreation is not a basic human right.

Now, if reproductive right gets constitutional protection, surrogacy which allows an infertile couple to exercise that right also gets the same constitutional protection. However, jurisdictions in various countries have held different views regarding the legalisation of surrogacy, In England, surrogacy arrangements are legal and the Surrogacy Arrangements Act, 1985 prohibits advertising and other aspects of commercial surrogacy. In the US also, commercial surrogacy seems prohibited in many states. In the famous *Baby M Case* [4], the New Jersey Supreme Court, through allowed custody to commissioning parents in the "best interest of the child", came to the conclusion that surrogacy contract is against public policy. It must be noted that in the US, Surrogacy laws are different in different states.

1 AIR 2000 A.P. 156

2 316 US 535

3 (2003) 8 SCC 369

4 537 A.2d 1227.

If the 1988 *Baby M Case* in the US forced many to put on legal thinking caps, then that year also saw Australia battling with societal eruptions over the *Kirkman Sisters'* case in Victoria. Linda Kirkman agreed to gestate the genetic child of her older sister Maggie. The baby girl, called Alice, was handed over to Maggie and her husband at birth. This sparked much Community and legal debate and soon Australian states attempted to settle the legal complications is surrogacy. Now in Australia, commercial surrogacy is illegal, contracts in relation to surrogacy arrangement unenforceable and any payment for soliciting a surrogacy

Mother Hood – an Enigma: How surrogacy can lead to an array of legal complexities regarding motherhood was shown by Jaycee B.V. Superior Court[5]. A child was born to a surrogate mother using sperm and eggs from anonymous donors because the infertile couple was unable to create their own embryo using the in vitro fertilization techniques. The couple chose to use anonymous donors rather than asking the surrogate to use her own eggs because of the Baby M case in New Jersey in which the surrogate had eventually refused to hand over the baby saying that she was its biological mother and her right to raise the child pre-empted the commissioning parents'. The child thus had five people who could lay claim to parenthood-a genetic mother, a commissioning mother, a surrogate mother, a genetic father and a commissioning father one month prior to the birth of the baby Jaycee the intended parents John and Luanne separated and john sough to rescind his obligations under the surrogacy contract so as to avoid having to pay child support for Jaycee. Luanne sought both custody and support from her ex husband. The court battle continued and for three years Jaycee did not have a legal parent. A California court granted temporary custody of the baby Jaycee to Luanne and ordered John to pay for child-support.

In India, according to the National Guidelines for Accreditation, Supervision and Regulation of ART Clinics, evolved in 2005 by the Indian Council of Medical Research (ICMR) and the National Academy of Medical Sciences (NAMS), the surrogate mother is not considered to be the legal mother. The birth certificate is made in the name of the genetic parents. The US position as per the Gestational surrogacy Act, 2004 is pretty similar to that of India.

1 42 Cal.App.4Th 718 (1996)

The Bill neither creates, nor designates or authorizes any court or quasi – judicial forum for adjudication of disputes arising out of surrogacy, ART and surrogacy agreements. Disputes may, *Inter alia,* relate to parentage, nationality, issuance of passport, grant of visa. There is already a conflict on adoption and guardianship as Non-Hindus cannot adopt in India. Such disputes need

to be resolved before a child is removed from India to foreign country.

The legal and moral issues involved in Surrogacy are.

i. What would be the remedy available to biological parents to obtain exclusive legal custody of surrogate children.
ii. How can the rights of the surrogate mother be waived completely.
iii. How can the rights of the ovum or sperm donor be restricted.
iv. How can the genetic constitution of the surrogate baby be established and recorded with authenticity.
v. Whether a single or a gay parent can be considered to be the custodial parent of a surrogate child.

India is emerging as a leader in international surrogacy ever since commercial surrogacy has been legalized by Supreme Court in the Japanese case of baby Manji Yamada in the year 2008. Indian surrogates have been increasingly popular with fertile couples in industrialized nations because of relatively low cost. Indian clinics are at the same time becoming more competitive, not just in the pricing but, in the hiring and retention of Indian females as surrogates. Clinics charge patients between $10000 to $ 28000 for complete package including fertilization, the surrogate's fee and the delivery of baby at a hospital.

Surrogacy in India is much more simpler and less costlier than any other country in the world. The main reasons for this are low cost treatment and ready availability of poor Indian surrogates, illiteracy, lack of power possessed by Indian women, lack of regulation of ART clinics and better flexible laws. The Judgment delivered by Supreme Court in 2008 in baby Manji's case has again increased the International confidence in going for surrogacy in India and making it a very effective destination for surrogacy.

International View of Surrogacy.

The Position of surrogacy in different countries can be best summarized as follows:-

· **Canada-** Surrogate Mothers are not allowed to accept the payments.
· **Japan:-** It is the woman who delivers the baby, and not the woman who provides the eggs, is considered the baby's mother in a surrogate birth.
· **Australia:**- Not all states have laws on surrogacy but ones that do are.
· **Queensland: -** Where surrogacy is illegal.
· **Tasmania: -** Where it is an offence to make and receive payment for surrogacy and such are not illegally binding.
· **In South Australia and Victoria**:- where surrogacy contracts are illegal.
· **South Africa**:- Paying surrogate mother is illegal.
· **United Kingdom**:- Such contracts or agreements are not illegally binding.
· **U.S.A**:- Compensated surrogacy arrangements are illegal in many states. Also four states in USA have held that such contracts, while not illegal, are unenforceable.
· **New Zealand**:- Commercial surrogacy is illegal but 'altruistic surrogacy' is allowed.
· **France**:- Any kind of surrogacy, commercial or otherwise is illegal.

While western countries focus on the pain of giving up a baby which the mother has carried for 9 months and there are many court battles fought on the issue, but unfortunately in India this is not the issue at all.

Indian women are vulnerable. A poor country like India badly needs a law on surrogacy and it badly needs to make payments to a surrogate mother illegal. The new law is intended to protect all the parties- the genetic parents, surrogate mother and the child. It must also deal with regulations relating to preventing the ART (Assisted Reproductive Technology) Clinics from hiring surrogates for money.

CRITICAL ANALYSIS OF SURROGACY: Surrogacy is a very knotty issue in India due to non intervention of law. Law is to act as an ardent defender of human liberty and an instrument of distribution of positive entitlements. At present surrogate motherhood in India involves a business of $ 4455 billion, faces sever pressures from different social concerns. Even the law in its favour is criticized. Should law let the business or save the society from onslaught of capitalism.

It's very important question to be considered that why India has become a much favoured destination. Today fertility market in India has gone above as 20000 crore as mentioned above. The past few years have seem more than 150 % rise in surrogacy cases in India. The Anand town in Gujarat State is a hub of surrogate mothers. Not only this, Indore city in Madhya Pradesh, Pune, Mumbai in Maharashtra state, Delhi, Kolkata and Thiruvanantapuram are also emerging as a surrogacy centre as many childless NRI's from all over the world are flocking here due to much lower cost, less restrictive law, lack of regulation of ART clinics and easy availability of poor Indian surrogate mothers. Generally surrogacy arrangements are drawn up in a random fashion and can be exploitative especially since surrogates are mostly from socio-economic weaker sections. It is imperative that the practice be illegally regulated to prevent victimization of both the surrogate and the intended parents.

The law commission of India in its 228th report submitted by Dr. Justice AR Lakshmanan, Chairman of Law Com-

mission of India on 5th Aug 2009 has recommended that the need of the hour is to adopt a pragmatic approach by legalization altruistic surrogacy arrangements and prohibited commercial ones. It has also pointed out that prohibition of surrogacy totally on vague moral grounds without proper assessment of social ends and purposes which surrogacy can serve would be irrational. Active legislative intervention is required to facilitate correct uses of new technology that is ART and relinquish cocooned approach to legalization of surrogacy.

Conclusion: India is in heavy need of laws which can regulate and can have a check on this activity as it is apparent that surrogacy is increasing as an industry and here many clinics are providing these services to foreign couples who do not want to compromise their career and they find it more easy to give their eggs and sperms and hire a womb on rent.

It is a matter of great concern that if this practice keeps growing the way it is, it could change from medical necessity for infertile women to a convenience for a rich with specially the wealthy couples of West choosing a commercial surrogacy over a natural child birth because of the pain and stress of natural child birth causing the whole industry to be framed out.

It's a high time for the Indian parliament to study in detail the international prospective on surrogacy in general and the position prevailed in India in particular to understand it the best and provide good deal of rules and regulations to our own country after carefully considering societal feelings and acceptance to this practice of surrogacy. The focus needs to be given on legalizing altruistic surrogacy. It is advisable to protect the society from onslaught of capitalism over Asian poverty and stop the exploitation poor women being used as machines.

GENDER BIAS IN HIGHER EDUCATION AMONG THE HOUSEHOLDS IN AN URBAN FAMILY SETUP

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Abstract: Gender inequality is an acute and persistent problem especially in developing countries**.** This inequality takes a form of discrimination in terms of social, family, education, political and so forth. Many social practices seen as normal from a religious or cultural point of view leave women out of mainstream. These social practices may have profound consequences because they do not allow to take advantage of the talent inherent in women. In India girls have significantly worse education, lifestyle health and nutrition than boys. One possible explanation of this discrepancy in child outcomes is gender discrimination in the intra-house allocation of resources. Parents are willing to spend more on boys than on girls, both in monetary and in terms of time allocated to each child. Empirical as well as anecdotal evidence suggests that gender bias is considerable in some developing countries.

Thus, the study makes an attempt to understand the attitude and practice of gender discrimination in an urban family setup. Though females form a major junk of the population yet it is a threatening fact to know that they are hardly represented anywhere. This is due to our age-old customs, beliefs and practices which needs a lot of re-orientaion for the women to come to the main task. This can be achieved only when women overcomes the shackles, change her attitude and come to the fore-front. Thus this paper elicits the response from urban House managers about their attitude and practice of gender discrimination

Keywords: Gender discrimination**,** urbanization, Preference, Attitudes

Introduction: In India, discriminatory attitude male and female have existed for centuries and generations which has been affecting the lives of both genders. Although the constitution of India has granted men and women equal rights, gender disparity still remains as our Indian society has come from traditional to modern society where in women has always been recognized as second citizen. At one side women is honored as Goddess and at the other side she is harassed in many facets of her life. Indian women are primarily conceived of as sisters, wives, mothers and homemakers, and their responsibilities within this realm define the notion of 'women's. According to Hindu Mythology the six criteria for a women are Karyeshu Dasi, Karaneshu Manthri;Bhojeshu Mata, Shayaneshu Rambha;Roopeshu lakshmi,Kshamayeshu Dharitri; Satkarma Nari, Kuladharma Patni, which means women should work like a servant, advise like a minister, feed like a mother, makes love like a nymph, is as beautiful as Lakshmi, and forgiving like the earth. Thus from the beginning women are trained from her childhood about being submissive, acquiescent, docile and compliant to everything. She had no right to question about any form of discrimination that which was existing in her family ambiences. Gender bias exists in family, marriage, children, education, health and lifestyle, preferences towards life partners, moving out and career development. Education plays a vital role in getting better employment and thereby better standard of life but there are obstacles to women to access higher education as hardly few females are sent for higher education that too

Post Degree level. Given that with limited income to a family and they have both male and female child, the male child is allowed to go for professional course like engineering, medical and management courses while females are sent to basis courses only.

Meaning of Gender Bias and Gender discrimination: The definition of gender bias is simply unfair treatment of men or women because of their gender. It is basically the belief or attitude that one sex is of higher power than the other sex.

Gender bias is a preference or prejudice toward one gender over the other. This bias can be conscious or unconscious, and may manifest in many ways, both subtle and obvious.

The word discrimination means to treat differently and gender discrimination means relatively different treatment to the persons (bys society) on the basis of gender. Females in our society meet inferior treatment and this discrimination is widely prevalent in all areas including health care and in both rural and urban areas. It reflects through many direct and indirect parameters.

Gender describes the socially constructed roles, activities, attributes and qualities, personality characteristics and responsibilities expected or assigned to male and female in a given culture, location or time which is associated with a person's biological sex in a given culture may be used as biology, may be learned or may represent a combination of biological and cultural determinant.

World Health Organisation assert that "Son preference affects all aspects of women's life including child care, health education, employment because she is discriminated since the moment she is born and sometimes even before if sex selection procedures are available".

Thus Gender is a belief or a notion while gender discrimination is the practice of treating both the sexes unequally

In many countries, eliminating such preferences is the basis of many laws, including those that govern workplaces, family courts, and even the voting booth. Despite these efforts, many legal and political scholars argue that total gender parity remains a far off goal, one which many regions are not remotely close to reaching.

Prevalence of gender discrimination in India: In Indian civilization the child is believed to be a gift of the God to be nurtured with love, care and affection not only within the family but also within the society as a whole. Son preference or the privileging of sons over daughters in accordance to a patriarchal system, is a growing phenomenon in India. In the era of UN Millennium Development Goals where one of the objectives is to "increase gender equality and empower women", the issue of son preference is even more widely debated.

This process in both rural and urban households arises due to a "Son preference" wherein sons are lauded as blessing, boon, carrier of family lineage, earns income and an insurance to the family, care taker of parents during oldage and a person who can give mukthi to them after death i.e the son lights the funeral pyre when the parents die. A family without a son is incomplete and a social embarrassment. Contrary to this women are pinpointed as curse, burden, and raising the daughter is waste of time and money, expenditure to the family, and useless in terms of family lineage development as she has to get married elsewhere and whatever the name she earns goes to the family she is married to. Although prohibited by law, dowry is still widely practiced which shows that social belief is larger than the regulation. Thus, the incidence of neglect, abuse, and deprivation particularly in the case of girl child has gradually increased. In fact it is the gender that determines the position of a girl child in an Indian society. Whatever the class or caste girl child are discriminated and prevented from realizing their full potential. The girl child faces the neglect of the family in the form of a failure to provide her the basic necessities of life in terms of food, clothing, love shelter, supervision education and medical expenses. This neglect may be deliberate or unintentional but the effect is clearly evidenced.

A rise in welfare has led to the decline in fertility levels in India today. Successful campaigns with popular slogans "Small family-happy family" have made family planning more important. For families with strong patriarchal values, the small family preference makes it even more important to have a son and the pressure increases if the families decide to have only one child, and it should be male only.(Suresh Sharma)

There is also a wide variation in the degree of son preference, with a stronger son preference found in northern India than in the south.

In millions of homes in South Asia the very birth of a girl is considered a bad omen. Female infanticide has been with us for centuries. Various research shows that the female babies are fed for shorter periods, given less food and less medical attention compared to male babies.

Thus girl child is a part of the society, which idolizes sons and where female feticide and infanticide prevails, along with a whole range of determinatory practices. From the very beginning, girls are made to accept the norms of patriarchal and male dominated society and they grow up accepting themselves to be inferior to boys. Although the girl child has a natural biological advantage over the boy, yet in India the social disadvantage outweighs the genetic advantage of girls. Demographic trends indicate the deep-rooted gender discrimination.

Review of literature: Sapru R K opines that powerlessness is due to a complex interplay of factors such as historical, social, political, economic, legal and cultural. Both men and women are conditioned from birth to conform to certain ste-

reotypes and roles and thus views themselves and other sex in these terms. A woman has a great capacity to work but lacks proper avenues either due to lack of confidence or proper encouragement.

Kalyani Menon Sen and Shivakumar(2001) found that girls in India are discriminated against in several ways – fewer months of breast feeding, less of nurturing and play, less care of medical treatment, denial of special foods on special; occasions like festivals or religious performance. As a result, girls are far more susceptible than boys to disease and infections, leading to poor health in shorter life span.

Rashmi Sharma and Mukherjee S (2011) in their empirical study on " A comparative study of selected parameters of gender discrimination in rural versus urban population of Ahmedabad, Gujarath found that the preference of male child by both partners an indicator of gender discrimination was found in both rural and urban areas but manifested differently. While urban areas showed more adverse sex ratio coupled with awareness and use of ultrasonography (USG) for sex determination and poor employment status, rural areas exhibited (along with adverse sex ratio) poor literacy and employment of females and poor contraceptive use. The study reveals that despite the ban on sex determination the practice still continues in northern India through private clinics. The reason for son syndrome are the social responsibilities perceived to be undertaken by males such as propogation of family name, support in the old age, perform cremation etc. This study explores that Gender discrimination as prevalent in both areas and is evident by alarmingly low sex ratio among urban under fives, high Ultra Sonography rates in urban especially in educated ones. Low education and high dropouts (female), poor quality / quantity jobs, low contraceptive uses reveal gender discrimination in rural areas. The study found that men were reluctant to use any sort of contraceptives in both rural and urban areas. The study recommends that women empowerment through better education, training, employment oppurtunities, reservation at various places, monitoring sex ratio, strict implementation of PNDT Campaign about adverse sex ratio can slow down the gender discrimination.

Government of India Planning Commission (2008) indicated that discrimination against women and girls impinges upon their right to health and manifest itself in the form of worsening health and nutrition indices. Thus India continues to grapple with unacceptably high MMR,IMB and increasing rate of anemia, malnutrition, HIV/AIDS, among women

Suruchi Tewari (2005) asserts that gender bias continues to manifest itself in Indian Society in spite of the right to equality enshrined in the constitution and various laws. The study analysed the gender bias prevalent in the slum areas of Allahabad city of Uttar Pradesh. The main objective of the study was to find the gender gap through Gender Disparity Index. The results indicated that the existence of strong gender bias in both the higher castes and the lower caste slum dwellers regarding the fulfillment of the demands of the children, the work assigned to them and mode of punishment.

Statement of the problem: The study is an attempt to understand the perception and prevalence of Gender bias in higher education in urban families, so for this purpose the data was collected form 100 married house managers aged 45 and above. In order to provide justice for the study those who had both married male and female children were selected for the study using convenience sampling method in Bangalore city. The data was collected through a structured interview schedule. After a pre-test with slight modification the study was conducted.

Data Interpretation

I) Socio-demographical characteristics

a) Age : As according to the age wise distribution it was found that 59 per cent of respondents belonged to 45-50 age group, while 11 per cent were in the age group of 51-55 years, 12 per cent in 56-60 age category and 18 per cent were above 61 years.

b) Education: 83 Per cent of the respondents were literates while the rest had no such formal schooling and it was found among the literates they were educated upto XII standard (68 per cent)

c) Occupation: 43 Per cent of the respondents agreed that they had no income while the remaining 57 per cent engaged themselves in flower tying, beedi rolling, preparing rotis etc. The amount they earned ranged from Rs. 1000 to 2000 per month though this was a meager income but the respondents agreed that this amount they used to take some personal belongings and also supported their husband during their hardships

d) Type of Family: 72 per cent of the respondents were from Nuclear family and 28 per cent were from Joint family.

e) Marital Status: 73 per cent were married and remaining 26 per cent were single i.e. either widows or divorcees and separated.

f) Age at Marriage: 44 per cent of the respondents were married before the age of 20 years while 40 per cent

Married at the age of 21-25 years and 16 per cent of the respondents got married after the age of 26 years. None got married after 30 years

g) Age at birth of first child: Majority of the respondents had their first child at the age of before the age of 25 years (60 per cent) while 40 per cent had when they were between 25 to 30 years

Attitude towards higher education: The socialization of gender within our families and schools assures that girls are made aware that they are unequal to boys. Every time students are seated or lined up by gender, teachers are affirming that girls and boys should be treated differently. When an administrator ignores an act of sexual harassment, he or she is allowing the degradation of girls.the family head also teaches a girl

child to be care taker, submissive, obedient etc while a male child is pompous, ostentatious and demand driven. While males are given higher education fo their choice as they are care takers while females are given any basic degree as if she gets higher education she may become intolerant, arrogant and difficult to find a suitable guy. Thus in this paper an attempt has been to understand the mentality of our Indian women in providing higher education within their male and female kids

Women should be accessed towards higher education for the development of a nation as a common aphorism goes "i*f you educate a man you educate an individual, but if you educate a woman you educate a family (nation)" comes true.*

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Table No-1 Attitude towards higher education

Sl.No	Criteria	Male	Female	Equal	Per cent
1	Spending higher amount for higher education especially professional courses	59	1	40	100
2	To pursue higher education in foreign countries before their marriage	70	2	28	100
3	Giving pocket money	43	5	52	100
4	During quarrel between children which side you support	10	2	88	100
5	Helping in all sorts of household chores	2	65	33	100
6	Permitting to go for parties late evenings	45	0	55	100
7	Whose salary you would prefer to take when they go for work	35	10	55	100
8	To carry over the family property	67	1	32	100

The above table shows the discriminative attitude towards male and female child. While majority of the mothers agreed to send their male children for higher education, while females were restricted to basic degree the reason given for this was that it is difficult to find a suitable groom if the daughter are highly educated and further they feared that she may give deaf ears if she is given higher education. A son's education in contrast, maybe valued as an investment that will bring his parents higher income in the future and will ensure them a more secure old age. Even boys were sought at the highest compared to females for pursuing higher education at foreign countries. Women were reluctant to use females earned amount but accepted it wholeheartedly from their male kids. But still we find that there have been changes in the mentality of Indian women where they gave equal status to both male and female child.

Conclusion: Men are always placed in a more advantageous position than women in India. The education differences between females and males are among the most significant indicators of gender inequality, as it is one of the most important sources of opportunity in any society. Parents are more willing to let a daughter than son drop out of school, because they see less value in daughter's education and further investment in sons education has more returns when compared to females education. Women are discriminated in sending to colleges especially after completion of Pre-University level.

WOMEN MANAGERS IN INDIA: CHALLENGES AND OPPORTUNITIES

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Abstract: The very fact of women being adequately represented in the work-force, but hardly present in the managerial positions got labeled "the glass ceiling", "a barrier so subtle that it is transparent, yet so strong that it prevents

women and minorities from moving up in the management hierarchy". Women have attained remarkable success in what was once considered the "male domain", of the working world. Working women have constantly battled against not only horizontal segregation, but also, the separation of women and men into gender specific jobs. Women are graduating and entering management positions, yet there is a bottleneck at middle management levels. While entry is easier, progression slows down after the middle level and in most situations, regardless of their technical and professional qualifications or achievements. In India, research and surveys reveal that men out-number women in terms of attaining top managerial positions. Along with their increasing level of education in various streams there has been sizeable increase in their workforce participation. The success stories of few women making it to the top are "feel good factor" providing an impression that position and status of women is changing in Indian management sector. But in the true sense how many of these breakthroughs are really happening? Barring a handful like ICICI Bank, HSBC and Biocon, an overwhelming majority of Indian boardrooms are still "no-go" areas for women. The reasons for this are many, ranging from individual constrains, mindsets, stereotypes and organizational and structural impediments. It is necessary to identify the barriers that women mangers face and recommend strategies to overcome and to create a platform as to what should the employer and society do to break the glass ceiling.

"The very fact of women being adequately represented in the work-force, but hardly present in the managerial positions got labeled "the glass ceiling", a barrier so subtle that it is transparent, yet so strong that it prevents women from moving up in the management hierarchy".

"LADIES UP THE LADDER": Women Managers swim against the tide in a male- dominated workplace. But now a new wave of initiatives is helping them forge a head. They are the "THE THIRD BILLIONS WOMEN" across the globe and considered as the better half of the society are mostly from emerging markets that will join the global economy as Managers.

The global evidence buttress that women have been performing exceedingly well in different spheres of activities like academics, politics, administration, social work and so on. They are also poised to transform their local economies. The Network today boasts of over 1200 members, who run businesses in area ranging from "herbal beauty products to IT services".

Along with their increasing level of education in various streams there has been sizeable increase in their workforce participation. With growing awareness about business among women over the period, women have started shifting from 3Ps viz., Pickle, Powder and Pappad to 3 Modern Es Engineering, Electronics and Energy. In certain Business, Women Managers account for about 10% of total business in the country.

The fact remains that the Citadels of excellence in academic. Politics, administration business and industries are no longer the prerogatives of men in India. Globally, many organizations are trying to help women excel. Three dynamic ladies and friends - Sarika Bhattacharya, Priyanka Awasthy and Ranjana Deopa each with 15 years of experience in leading banks like ICICI bank, and financial institutions started Altavis a talented management firm.

There is help closer home as well Design Entrepreneur Ruche Mittal started her entrepreneurial Network (HEN). India in 2011 for women to collaborate on projects, help each other with contacts and share knowledge and inputs. Mentoring is being extended not only to women managers but also to corporate women. Companies are leveraging networks for high potential women executive managers as well as in house programmes to nurture women within the organization for leadership positions.

The initiatives are paying off. The managing directors of the Indian wing of Diageo, the world's largest spirits company, are women, and a large percentage of its India executive team are women. The team is looking to expand the scope of its global women's networking group, the Spirited Women's Net-work.

Cadbury India recently introduced the 'MY MENTOR' programme to encourage women to aspire to senior leadership roles.

Women Managers looking after the administration of manufacturing Solar Cookers in Gujarat, small foundries in Maharashtra and T.v. capacitors in Orissa have proved beyond doubt that given the opportunities, they can excel their male counterparts. Smt.SumatiMorarji, (Shipping Corporation), Smt.Yamutai Kirloskar (Mahila Udyog Limited), Smt.Neena Malhotra (Export) and Smt.Shahnaz Hussain (Beauty Clinic) are some exemplary name of successful and accomplished men managers in our country.

Working women have constantly battled against not only horizontal segregation, but also, the separation of women and men into gender specific jobs. Women are graduating and entering management position, yet there is bottleneck at middle management levels. The reasons for this are many, ranging from individual constrains, mindsets, stereotypes and organizational and structural impediments. Women managers encounter two sets of problems, viz., general problems and problems specific to women managers.

PROBLEM OF FINANACE: Finance is regarded as "life-blood" for any managers. Women feel shortage of finance because they do not have property on their own names to use them as collateral for obtaining funds from external sources. Banks also consider women less credit-worthy and discourage women borrowers.

MALE-DOMMINATED SOCIETY: Male chauvinism is still the order of the day in India. The Constitution of India speaks of equality between sexes. But, in practice, women are looked upon as abla, i.e. weak in all respects. Women suffer from male reservations about a woman's role, ability and capacity and are treated accordingly. In nutshell, in the male-dominated Indian society, women are not treated equal to men. This, in turn, serves as barriers to women entry into business. Family ties, lack of need achievement, education and risk-bearing abilities are the examples of problems specific to women managers. An overwhelming majority of Indian board-rooms are still "no-go" areas for women.

Efforts are on at the Government and voluntary administration levels to tap the hitherto unrecognized and unaccounted for strength of women to integrate them in the process of educational development, more especially, at manager's development in the country.

Factors hindering growth of women in Management:
The following are some of the major factors that hinder growth of women in Management.

The stereotypes & pre-conceptions towards women, that they are fragile & lacking in the qualities are considered useful to be effective managers. Top posts are generally characterized by masculine aggressive values and suitability for them is decided mostly according to male criteria and by male.

The position which an individual hold within the organization shapes the traits and the behavior they develop or posses. Women often secure positions that have titles with little real power or supervisory authority.

Women are primarily placed in non-strategic sectors rather than in the positions that involve financial decision-making or revenue-generating responsibilities, like sales and production positions that are critical for advancement to the top.

Mentoring plays an important role in the advancement of women into management positions. However, mentoring is often limited for women, which in turn results in a lack of access and training and career development activities.

Lack of information and knowledge regarding training and attainment of skills related to job area and leadership qualities impact advancement in career.

Women workers still bear more of the main burden of family responsibilities than men and so have less time for the "extracurricular" formal and informal networking essential for advancement in enterprises.

Woman's career paths tend to be more circuitous and interrupted than those of men which are typically linear, and this impedes women progress to top positions. Women often have to deal with the complexities of the dual role as working women and mother and sometimes have to make compromises, which slow down their careers.

Women managers with children are often looked at as less favorable than those without children and they are viewed as being less committed. This is, however. not same in the case of men who have children.

Inability to stay late at work and a disinclination for jobs involving travel and transfers have been identified as another major factors for women in not achieving top positions.

Women managers also have their own inner battles, which need to be fought and overcome. Many women do not aspire for higher management posts which will automatically bring in loads of responsibilities including late hours and travel as that would disrupt family life.

Women manager lack effective career planning. Unlike men they generally do not have fixed career goals and they lack determination to overcome the obstacles that exist to keep them from accomplishing their goals.

Recommendations: Women intake ratio is less than men in almost all the companiesl organizations. Companies should orient their recruitment policies to recruit equal number of male and female in the entry level in order to bring in gender diversity and inclusiveness.

It was observed that policies of companies in the four sectors are not adequate to ensure growth and leadership development of women employees. Companies should be more sensitive to women situations and need as women generally have to look after family and work.

Companies should be transparent about their polices relating to employment, promotion, training .Organizations should go in for gender audits.

Need of male colleagues who are more sympathetic and understanding. Managers should be made more accountable for gender focused results and everyone should go through a gender sensitization process.

More transparency among the staff and the HR department is needed. More employee- friendly HR. sensitive to women concerns and situation is needed.

Lack of laws in the private sector, therefore there should

be proper laws regarding pregnancies, maternity leaves etc. the Laws should prescribed, so that no one manipulates it.

Clear cut sexual harassment policy should be laid down by the companies. Proper grievance cells need to be formed for women to report about their grievances.

Promotion should not be linked to transfer as has been the case in public sector banks. Transfer should be need based. Women who are willing to take transfer should be given transfers if the companies have a branch in the location where one wants to be transferred.

Both family and work are fulfilling experiences in it. Good support system at family and work place would enable women to fulfill both without being pressurized to prioritize one above the other. Companies should adopt best practices such as options to work in flexi-timings, work from home and transport facilities.

Difficulty with child care arrangements was a major workplace issue. Companies should provide facilities like creches to enable women to give their best in their profession.

Companies should encourage its women employees to participate in programs that would hone personality development of women. Woman should have clear cut aims and ambitions in life. Goals should be well defined in the start so that women do not lose focus in the midst of their career.

lack of mentoring is found to be one of the factors responsible for women slow development. Companies should create programs for mentoring entry and middle level mangers. Mentoring not only inspires a sense of responsibility across levels but also and a sense of intergenerational connection and reciprocity.

Companies should establish leadership training explicitly for newly recruited women managers in the recognition that promotion to middle- level and senior -level often entails appointment to leadership positions.

Conclusions are: Women representation at the top level of management is proportionately very low compared to men. There is a solid glass ceiling that is existing and that 1S resisting women movement in their upward ladder of career growth. This suggests that there needs to be systemic changes, if companies are serious about bringing in greater diversity in their management and encouraging competent women to overcome the hurdles that society places in their career path.

SOCIAL NETWORKING SITES & ITS EFFECTS

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Abstract: The growing popularity of social networking sites (SNS) among the internet users demands an introspection of personal & social behavior of human beings. Today more than 1.5 billion people across the world have their profiles in social networking sites viz., Facebook, Twitter, hi5, MySpace etc. No doubt these social networking sites provide employments, marketing, personal growth & corporate growth too. In the view of positive approach these social networking site have greater effect on personal life to connect the world by professional, to improve English for business commutation & make new friends and on the corporate growth to build brand image in the world of business. To succeed in the connected world, marketers must create. Connected brands; brands that continuously engage with people when they want, where they want and how they want – especially through social media. But in the negative point of view it's a time consuming, neglecting the health effect on continuous users means of addicted to these social networking. So in this paper we have focused on the positive as well as negative effect of this S.N.S

Keywords: Youth of India, corporate, employs, personnel life.

INTRODUCTION: Social networking phenomenon has emerged over the past ten years ,in that time social networking sites have grown from a niche to a mass online activity, in which millions of internet users are engaged both in their free time and at work time .No matter male, female well educated peoples, children's elders or any others they are using and talking about social media because they enjoy the advantages of free services of communication, content sharing , meeting new peoples, making friends through the social media services. The most of social media sites nowadays like facebook, youtube, twitter, MySpace, LinkedIn, orkut, etc., are free of charge to registration. In this paper I focused on the effect of these social networking sites on the marketing, employees, corporate, in both positive as well as negative phase. The purpose of this paper is to review the rising use of social networks by people as a marketing tool, as a communication to between management and employees to ensure that employees are productive.

CLASSIFICATION OF SOCIAL NETWORKING : Social media has different forms of production. According to Constantinides and Fountain social media could be divided into five main categorizations based on their application types: *Blogs and podcasts, social networks, communities, content*

aggregators, virtual worlds.

Table 1 Five categories of social media and their related tools

CATEGORY	TOOL	FOCUS	EXAMPLES
1. BLOGS AND PODCASTS	Traditional blogs, vlogs, podcasts, videocasts	Informing of current events and novelties	Blogs by Dell, podcasts from interviews
2. SOCIAL NETWORKS	Social networks	Content sharing, maintaining relationships, networking	MySpace, Facebook, IRC-Gallery, LinkedIn, ITToolbox
3. COMMUNITIES	Online communities		
	Member-initiated	Members' mutual interests and reciprocal interaction	Communities formed around similar interests e.g. Aukea.net (photography)
	Organization-sponsored	Business transactions, brand building, interaction among organization and customers, co-creation of products	Communities by Mozilla, Fiscars, Dell and Salesforce.com
	Third-party established	Enable communication and transactions between buyers and sellers	eBay
	Content communities		
	Content sharing sites, wikis	Content sharing	YouTube, Flickr, Picasa, Pikeo, dotPhoto, GoogleVideo, Wikipedia
	Forums/bulletin boards	Discussion of mutual interests	B2Bexchanges, Alibaba, Zentrada, Go4worldbusiness
4. CONTENT AGGREGATORS	RSS, widgets, bookmarks, tagging services etc.	Categorizing and customization of web content	Delicious, Yahoo! Widgets
5. VIRTUAL WORLDS	Virtual worlds	Substitute for the real world	Second Life, World of Warcraft, Kaneva, Universe, Habbo

Use of social networking : Social media tools are used for various purposes. You may need social networking sites for building and maintaining the peer relationships, instant messengers for communication, online forum for expressing your opinions the usage of social media into three types: *individuals, government, and business*.

For individual users, first of all, social media creates a new way of communication beyond the traditional way of email, phone call, and text messaging. Secondly, with the UCCs made in social media sites, it provides a new source of collective knowledge, and user can seek answers to specific questions from those one-on-one or one-to-many dialogs within his network. Users also have opportunities to join online communities or different groups based on any interest or hobby to interact with others, keep up with the world, and seek advice between each other. On the other hand, more and more people view the social media as a new entertainment. They use it for entertainment purpose and enjoying the life, spend the idle time, and recharge themselves after the work. Furthermore, it shows that a large number of users have a

strong desire for self expression and self-satisfaction. They may post UCCs or update status, reply others, post photos and record their daily lives and thoughts to derive a sense of self-assurance and belonging from such self-expression. In addition, with the huge 3 Online. database since each site has gathered millions of members' information, it can be used as online world wide directories of people.

For government, they could easily reach a large number of people to disseminate information and receive feedback for governance purpose. Law enforcement agencies also use social websites, and they may search the profiles, updates and UCCs to collect required incriminating evidence of suspects. They can also post surveillance photos and related information for seeking help from other users. Moreover, there are more and more election campaigns utilize social media as their campaign strategies.

For business purpose, social media provides rich features for online networking and UCCs, which is essential for a company intranet. They could conduct everyday operations on the site. Meanwhile, business can also benefit from external networks their employees maintain on the open social webs. For example, they can use external social web for recruitment and information gathering. And the most significant utilization is in marketing. There are increasingly businesses now post their product release announcement, photos to such social media sites like YouTube, Facebook, Flicker for products promotion. They also monitor the comments replied by potential customers about their products.

Social networking sites:

Social networking sites are structures consisting of members that share one or more specific types of special interests, such as values, visions, ideas, financial, exchange, friends, kinship, dislike, conflict, trade, web links, and so forth. Online social networks are built on the concept of tradition networks, but without relying on the face-to-face initial. Boyd and Ellison clearly define social network sites as web based services that allow people: *firstly, construct a public or semi-public profile within a bounded system; secondly, articulate a list of other users with whom they share a connection; and thirdly, view and traverse their list of connections and those made by others within the system*.

Most social network sites provide a mechanism for users to leave messages on friends' pages. This feature typically involves leaving "comments", although sites may name different labels for this feature. Meanwhile, social network sites vary greatly in their features and user base. Some social network sites target people from specific geographical regions or linguistic groups, some others are designed with specific ethnic, religious, sexual orientation, political, or other identity-driven categories in mind. Bellow Table compares the characteristics of four popular social networks.

The purpose of social network sites vary as well, it may help to connect to classmates, establish friendship, find business partners, look for same interest buddies, or romantic relationships. For example, Classmates.com is a typical social network site designed for keeping contact with friends and acquaintances, LinkedIn is more business oriented which used to seek professional or business associates, Myspace is focusing on music service, and Facebook is much more used in peer-relationship and welcomed among college students. However not all websites started as a social network site, some may focus on instant messaging service (for example, Tencent), forum discussion or others, and implement social network features gradually

Social Networking as a Marketing Tool*:* Report on social media trends indicate increased use rate amount the population there are many studies suggest people have already adopted online social network as an integral part of their life.

Shift in consumer attitudes: Social media is actually becoming a new source of consumer creativity, influence and empowerment. Study the consequences of social networking on the marketing practice, and it brings a visible shift in consumer attitudes:

- There are growing needs for online service, customer interaction with both marketers and peer communities.
- The value perceptions are based on the feeling of achievement through personal gratification instead of traditional customer value approach.
- Consumer behavior is increasingly influenced by peer opinions.

In result, the customer decision making process regarding to

	Main audience	End User Feature	General Features
MySpace	Teens, young people	Blog, video, photo, address book, bulletin calendar, email	Browse profiles, search, and invite new people, film/comedy/music forum, favorites, videos, classifieds, and events.
Orkut	Teens, young	peoplePhoto, video, bookmarks,scrap book, profile, testimonials	Friends (rank, best, good, acquaintances), search, communities, Orkut media, news
LinkedIn	Business professionals	Connections, network data, email list, recommendations	People search, jobs,hiring, categorized service Providers recommendations, ask a question from professionals
Facebook	Students	Profile, friend finder, photos, My Shares, notes, events, inbox	Browse profiles, search, invite new people

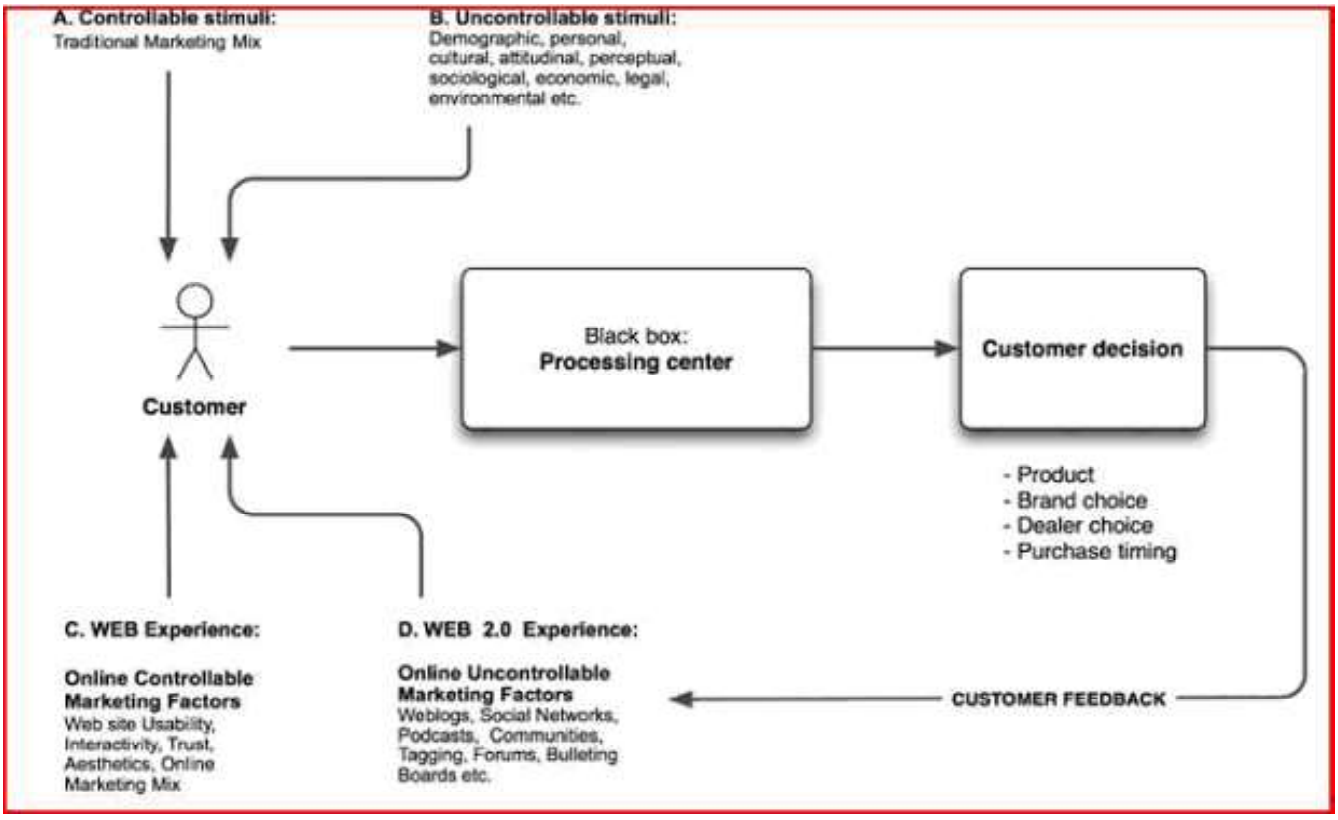
their new buying attitudes has also turn into more complex one (Figure 1). Besides the traditional marketing Mix (A) and uncontrollable personal factors (B), two more influencers have to be considered in digital marketing environment: one is online controllable experiences given by websites (C), such as sites' usability, interactivity and so on, and another is online uncontrollable marketing factors (D), including weblogs writing, podcasts, forums, which created by customers themselves, are not controlled by marketers. As the emerging of Web 2.0 technology becomes mature, the influencing consumer behavior by means of traditional marketing media and practices becomes less effective. Consumer preferences and experiences about products are increasingly based on inputs provided by element C and D. consumers do not trust traditional marketers as they used to, there are 70% people tune out ads much more and show a negative attitude to marketing than years ago. Consumers nowadays prefer to read peers online generated reviews which they consider more reliable before they decide which product to choose, and 80% of those consumers admit those reviews affect their buying decisions. After using the product, they can post the feedback and experience reviews online in the form of Weblogs, social networks, podcasts, forums (D), which influences more new consumers. And this will lead to customer advocacy which is the ways to enhance user experience and meet their informational needs, and it will be the key element to success for marketers.

Following is the list of Top 10 Social Networking Sites By Number Of Users

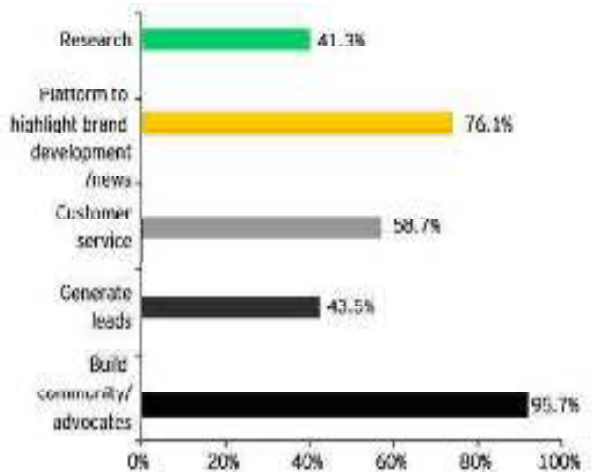
S.No.	Social Networking Sites	No. of Users
1	www.Facebook.com	300 million
2	www.Myspace.com	264 million
3	Windows Live Spaces	120 million
4	www.Habbo.com	118 million
5	www.Friendster.com	90 million
6	www.hi5.com	80 million
7	www.Tagged.com	70 million
8	www.Orkut.com	67 million
9	www.Flixter.com	60 million
10	www.Netlog.com	54 million

According to media reports, Indian organizations use social media much more than the global average and their counterparts in emerging economies. Our study of social media marketing practices among various social media-savvy organizations in India has thrown up some good insights.

Factors Influencing Customer Buying Process



Why social media:



95.7% of the surveyed social media-savvy organizations in India use the medium to build communities and advocate usage while 76.1% use social media as a platform to highlight brand news. Around 16% of organizations, which use social media for both the above reasons, also use it for customer service, lead generation, and research indicating high social maturity and moving toward getting business meanings out of engagements.

Which social media platform:

• Facebook most important platform for marketers in India for engaging customers, followed by Twitter, YouTube and blogging

• Almost half of the social media-savvy organizations are already using emerging platforms such as Pinterest, Google Plus, and Foursquare. More than half of the social media-savvy organizations surveyed regularly engage with bloggers or online influencers who have authority and strong following.

Active Facebook users in India: 88,000,000
Position in the top list : 02
Population: 1,205,074,000
Penetration; 7.30%

India - Users by cities

Major Cities	Total Users
Delhi	6200000
Agra	320000
Jaipur	26000
Patna	540000
Calcutta	2800000
Nagpur	640000
Mumbai	6400000
Hyderabad	3600000
Bangalore	4200000
Chennai	3400000
Madurai	240000

India - Gender distribution

Female: 24 %
Male: 76 %

There are **76% male** users and **24% female users in India**, compared to 46% and 54% in United States and 47% and 53% in Brazil

Age Distribution:

Age	M	F
13-18	13600000	4600000
18-25	30000000	10600000
25-35	15800000	4600000
35-45	4200000	1260000
45-55	1440000	480000
55-65	940000	280000
65+	400000	—-

Age	Percentage of Users
13-15	4%
16-17	9%
18-24	49%
25-34	27%
35-44	7%
45-54	2%
55-64	1%
65-100	1%

India Facebook demographics is other social media statistics we monitor. The largest age group is currently **18-24**, followed by the users in the age of **25-34**.

Relationship Statuses:

	18-25	25-35	35-45	45-55	55+
Single	18000000	3800000	154000	—	—
In relation	2200000	500000	—	—	—
Engaged	440000	220000	—	—	—
Married	1020000	4200000	1700000	640000	260000
No data	18940000	11680000	3544200	1241240	1352200

Education:

	Users	Percentage
College Graduate	34000000	38.6
In college	4600000	5.2
No data	49316000	56.2

Positive effect of social networking:

1. Social networking websites provide an opportunity for management to have faster contact with their subordinates, if there is an issue that needs immediate attention, a manager can send a message through social networking websites and the internet to their employees to get the information they need to make a decision.

2. Social networking is bringing a broad new range of technology innovations to communication multimedia, presence, interactivity, etc,. now, customers are not only looking for the value of the producats, but for corporate values that make sense. Being visible and personalizing communication are

the silver bullets, even for B2B business, as well as the need to let go of some of their image control.

3. Employee Mobility will increase as employees increase their visibility and make their expertise available to communities, inside or outside their organizations, they will be more frequently solicited this will also happen as they grow the number of online contacts they maintain as along as these links are meaningful.

4. Social networking may allow increased revenue as a result of the changes in communication and innovation

Negative Effect of Social Network:

1. It effect on relationship, any body can access the personal information by social networking sites, it results in damage the relationships and make life miserable.

2. After drags and alcohol addiction if the world is facing any new type of addiction disorder then that is social networking addiction.

3. Its effects productivity, people spent hours chatting with their friends and browsing profits on social networking sites, it becomes a compulsive habit to visit own profile several times in a day for checking friends updates changing status and commenting on other photos and videos finally it diverts employees attention from the office work.

ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

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HOMEOPATHY FOR INDIAN POPULATION

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Homoeopathy is a therapeutic system of medicine based on the Law of Similars that is Similia Similibus Curentur. Indeed, the word itself is from the Greek-Homoion meaning 'Similar', and Pathos meaning 'Disease'. The Law of Similars means that a remedy which creates symptoms and conditions in a healthy person will cure a sick person manifesting similar symptoms.

Homeopathy is founded by German physician Dr. Samuel Hahnemann in1976, as part of its global strategy 'Health for All' in the 21st Century, WHO (World Health Organization) has supported the integration of conventional and alternative medicines to improve the quality of health care. The Government of India developed the homeopathic system of medicine by setting up a homeopathic enquiry committee way back in 1948, and today it is accepted as one of the National Systems of Medicine.

There are over 3,00,000 qualified homeopath practitioners, 7,500 government clinics, 307 hospitals, and 180 Teaching Institutes affiliated to Universities existing in India specific to Homeopathy.

Now according to WHO, Homeopathy is the 2nd largest system of medicine with a growth rate of 20-25% every year. The growing popularity of Homeopathy and its legal acceptance has been seen in 66 countries. Homoeopathy came to India in early 1810, with travelers, missionaries and military personals from the West. Homeopathic education is regulated by central Council of Homoeopathy (CCH); a statutory body under the Ministry of Health & Family Welfare, formed in 1973 through Act of Parliament is one of Professional Councils of University Grants Commission (UGC), which monitors all higher education across India. In India, over 100 million people use homeopathy as their only form of medical care. According to an A.C. Nielsen survey in India, 62% of current homeopathy users have never tried conventional medicines and 82% of users would not switch to conventional treatments. Around 10% of India's population—more than 100 million people—depend solely on homoeopathy for their health care, according to the Indian government.

Homoeopathic medicines have treated varied number of infectious, Allergic, metabolic, malignant, and acute as well as chronic diseases from pediatrics to geriatric population. Homeopathic medicines are easy to administer, they are sweet medicines, taken orally. Homoeopathy cures the disease from its root cause; it increases resistance and immunity of the patient. Homoeopathy treats patient's disturbances on physical, mental and emotional level in an integrated manner. Homoeopathy is a non evasive treatment which treats many ailments only by oral administration of medicines, thus avoiding surgery in cases such as excessive bleeding from uterus, sinusitis, tonsillitis, kidney stones, piles, fissures etc. Long before antibiotics and improved hygiene started to change the impact of epidemics in the western world, homeopathy was used with great success in several epidemics like cholera and the Spanish flu. In Recent epidemics of chikengunia, swine flu, brain fever homeo medicines have been used in India effectively as both curative and preventive remedies. Homeopathy is an integral part of the healthcare system and deeply respected by the people of India.

Friends, since twenty three years I am practicing classical homoeopathy in Raichur. I have tried to spread importance and efficacy of homoeopathy in and around Raichur district. In this congress I take an opportunity to present to you all brief introduction, spread and usefulness of homoeopathy for Indian population. As it is organized by swadeshi vijnyana andolana, I have given evidence of presence of main principle of homoeopathy in ancient Indian literature.

Homoeopathy is a therapeutic system of medicine based on the Law of Similars that is Similia Similibus Curentur. Indeed, the word itself is from the Greek-Homoion meaning 'Similar', and Pathos meaning 'Disease'. The Law of Similars means that a remedy which creates symptoms and disease conditions in a healthy person will cure a sick person manifesting similar symptoms. In incurable disease states, the same medicine will act as the best palliative. In the course of time this system is evolved where exact observation, correct interpretation and rational application of knowledge of medicine helps in long lasting cure. This system of therapeutics was founded by German physician Dr. Samuel Hahnemann in year 1796. Theory of Potentisation , minimum dose and individualization make this science a unique in the field of medicine.

Potentisation is the method of preparation of medicine in which dynamic energy of crude drug is aroused by recurrent succusions and triturations. Potentisation reduces the quantitative amount of crude drug substance and increases its medicinal or therapeutic properties. Inert substances in their crude form exhibit different medicinal properties when they are potentised. Eg. Natrum mur is a medicine prepared from common salt. This sodium chloride after potentisation pro-

duces vast medicinal properties. We have cured asthma, infertility, chronic infections, migraines and varied no. of diseases with this potentised common salt.

Homoeopathy believes in the concept of vital force, the force which in its equilibrium state maintains health of individual. Same vital force when is deviated from its state of equilibrium produces disease symptoms. As the vital force is dynamic in nature, carefully selected single potentised medicine of homoeopathy stimulates the vital force with its minimum dose just to arouse a reaction and get it freed from the disease symptoms.

Individualization is another unique characteristic of this science. Every individual is unique in his or her genetic, mental, physical make up and their reaction towards environmental changes. Therefore selections of homoeopathic remedies differ according to individual signs and symptoms.

Roots of similia similibus curenter,[let like be cured by likes], principle on which homoeopathy is based are found in ancient literature of Indian puranas

According to srimad bhagvat, written by Maharishi vyasa in skand 1, chapter 5, in verse 33, Narad muni says to maharishi vyasa, Aamayoyaschbhutanamjayate yen suvrat Tadev hyamayamd ravyam napunatechikitsetam

Translation- Oh Suvrat, don't you know that the thing which can cause the disease in the living being, it can treat also the same condition when given as a medicine.

This shows that origin of homoeopathy is found in our ancient literature .Dr. Hahnemann has bought this system of medicine in the most scientific and complete manner before the modern world.

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There are over 3,00,000 qualified homeopath practitioners, 7,500 government clinics, 307 hospitals, and 180 Teaching Institutes affiliated to Universities existing in India specific to Homeopathy.

Mahatma Gandhi said," Homoeopathy cures a large percentage of cases than any other method of treatment and is beyond doubt safer and more economical and most complete science". Homoeopathic medicines have treated varied number of infectious, Allergic, metabolic, malignant, psychosomatic, musculoskeletal and acute as well as chronic diseases from pediatrics to geriatric population. Homeopathic medicines are easy to administer, they are sweet medicines, taken orally. Because of their easy administration children love this treatment. As sensitivity at younger age group is high, kids require only two or three doses of the medicine. Single drug with minimum dose is the essence of homoeopathic treatment. Homoeopathic treatment increases immunity of children, they start eating and sleeping well, in short parents are happy to watch healthy development of their children.

Homoeopathy cures the disease from its root cause; it increases resistance and immunity of the patient. Homoeopathy treats patient's disturbances on physical, mental and emotional level in an integrated manner. Homoeopathy is a non evasive treatment which treats many ailments only by oral administration of medicines, thus avoiding surgery in cases such as excessive bleeding from uterus, sinusitis, tonsillitis, kidney stones, piles, fissures etc.

Long before antibiotics and improved hygiene started to change the impact of epidemics in the western world, homeopathy was used with great success in several epidemics like cholera and the Spanish flu. In Recent epidemics of chikengunia, swine flu, brain fever homeo medicines have been used in India effectively as both curative and preventive remedies. Homeopathy is an integral part of the healthcare system and deeply respected by the people of India.

Twenty first century has brought many challenges for healthcare system in India. There are many changes in the life style of people due to urbanization, liberalization, pollution, increase in nuclear families etc. there are changes in food habits of people, lack of exercise, increased work pressure, increase stress in minds of people because of natural and manmade calamities. These all factors have changed the disease expressions in Indian population. There is decrease in no. of infective diseases and increase in no. of psychosomatic, metabolic, allergic, malignant diseases in urban as well

as rural population. Homoeopathy with its integrated approach towards mind and body of patient has much to offer in the health care sector of India in this twenty first century.

Thus homoeopathy with its ever increasing popularity amongst Indian population will always be an integral part of Indian health care system.
Long live homoeopathy.

MEDICINAL AROMA THERAPY

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Medicinal Aromatherapy: utilizes therapeutic grade essential oils to treat physical, emotional, and mental disorders. Essential oils are the pure natural elements derived from plant life. Essential oils can be used to bring the body into balance so that it can heal more quickly - often without the side effects of pharmaceuticals. While essential oils are effective on their own, they can also work in collaboration with conventional medicine.

With the guidance of a certified Medicinal Aromatherapist, you can use essential oils to help build your immune system, think more clearly, breathe more deeply, improve digestion, heart and general health ailments. Essential oils can be used to treat specific conditions whiling improving your mood and calming your mind.

In India the records indicates, that herbs have been in use for treating disease since ancient times reference to the curatives properties of some herbs in the Rigveda between 3500 and 1800 BC.

Aromatherapy has an ancient history going back 3,500 years. Parallel development of distillation methods in Egypt, Mesopotamia, India, and China saw the use of essential oils in the medical systems of each culture. Aromatherapy is the art and science of using aroma and scent to rejuvenate, revitalize, and heal the body. Distillation of plant materials produces essential oils, which are the active principle or life force of the plant. Completely different in nature from vegetable oils

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In the eastern cultures of India and China, however, the tradition remained unbroken. Vaidyas, ayurvedic physicians, treated Indian royalty with dried and fresh herbs, floral waters and aromatherapy oil massage..

TRIYANKPATHANA YANTRA ALEMBIC DISTILLATION
In 1975 ,arceological survey of Indus Valley (which runs the length of modern Pakistan), Dr. Paolo Rovesti found an unusual terra-cotta apparatus, displayed along with terra-cotta perfume containers, in a Taxila museum*

In India the records indicates, that herbs have been in use for treating disease since ancient times reference to the curatives properties of some herbs in the Rigveda between 3500 and 1800 BC. Aromatherapy has an ancient history going back 3,500 years. Parallel development of distillation methods in Egypt, Mesopotamia, India, and China saw the use of essential oils in the medical systems of each culture. Aromatherapy is the art and science of using aroma and scent to rejuvenate, revitalize, and heal the body. Distillation of plant materials produces essential oils, which are the active principle or life force of the plant. Completely different in nature from vegetable oils.

ARKA Definition
* Arka is a liquid preparation obtained by distillation of certain liquids or drugs soaked in water using the Arkayantra or any convenient modern distillation apparatus.

Method of preparation of ARKA
* The drugs are cleaned and coarsely powdered. Some quantity of water is added to the drugs for soaking and kept overnight.
* This makes the drugs soft and when boiled releases the

essential volatile principles easily.
* The following morning it is poured into the Arka yantra and the remaining water is added and boiled.

Method of preparation of ARKA
* The vapour is condensed and collected in a receiver.
* In the beginning, the vapour consists of only steam and may not contain the essential principles of the drugs.
* It should therefore be discarded. The last portion also may not contain therapeutically essential substance and should be discarded.
* The aliquots collected in between contain the active ingredients and may be mixed together to ensure uniformity of the arka. Characteristics of ARKA
* Arka is a suspension of the distillate in water having slight turbidity and colour according to the nature of the drugs used and smell of the predominant drug.

Essential oils have been produced in India for thousands of years but usually were only available to the royal classes and their physicians. Thus, Ayurveda's strong tradition in the use of medicated oils (Bhrami, Neem, Maha-Nayaran, Dashmool, etc.) and limited traditional use of essential oils.

Essential oil are volatile, natural substance that are the actual immune system of the plants from which they are extracted. Traditional ayurvedic practices include fumigation by burning neem leaves, use of holy basil or rose petals in water while bathing, and burning incense sticks during meditation. has survived in almost all cultures.

In the eastern cultures of India and China, however, the tradition remained unbroken. Vaidyas, ayurvedic physicians, treated Indian royalty with dried and fresh herbs, floral waters and aromatherapy oil massage..

Dr. Valnet had two students who did their internship with him who were responsible for expanding his work. Dr. Paul Belaiche and Dr. Jean Claude Lapraz. They discovered that essential oils contain antiviral, antibacterial, antifungal and antiseptic properties as well as being powerful oxygenators with the ability to act as carrying agents in the delivery of nutrients INTO the cells of the body.

Essential oils are volatile, natural substance that are the actual immune system of the plants from which they are extracted. Essential oils has antiseptic, antibiotic, antiviral, anti-inflammatoryTHE EXTRACTION OF VOLATILE OILS :
* These are extracted from stems and flower and are the life force of the respective plants. There are two ways of extracting the oil.

(1) Steam distillation
(2) Expression
Distillation in an effective method of extracting essential oils from plants. Sometime the plant material has to be crushed or broken up or chopped in order to make the oil cell more accessible to the Steam and (help in escape or release the oil from oil glands) Steam is directed to the grid and is forced through the tightly packed plant material. Thus liberating the volatile molecules. The steam and the essential oil cells thus liberating the volatile molecules. The steam and plant vapour rice and travel via pipe into a cooling chamber. As the 2 vapours are cooled down inside the pipe they condense and reform into the water separate quickly essential oils are less dense than water and will float making the separation easy.

* Expression : is a mild process used only for extracting the essential oils from citrus fruits and is simply the Squeezing or pressing of the peel of Citrus fruit, which release the oils.

* The Glandular tissues is made of glands which are special structure containing some secretary products. Glands may consists of single isolated cells are small groups of cells with or without a central cavity 2 type of gland internal or external.

* Internal oil glands secreating essential oils as in the fruit and leaves of orange, lemon, pumelo, etc.,

* External glands are commonly short having tipped by glands where the gummy substance are secreted.

CHEMICALLY :
* The essential oils are mixture of unsaturated hydrocarbons, alcohol, aldehydes, ketones. The empherical compositions of terpenoids is given by the formula (C5H8)a of (C5H8)nO. The other common essential oil with their chief constituent are

Oil of Cardamon
Terpineol
Oil of Cajeput
Oil of Caraway
Limonene
Oil of lemon grass
Citral
Oil of Camphor
Camphor
Oil of roses, geranium
Linalool
Lavender
Oil of peppermint
Menthol
Oil of Eucalyptus
cineal
* The essential oils are responsible for the odours and flavours associated with the plants. There fragrant smelling substance final application in Medicine food flavouring and perfumery . olto wallach in 1887 Suggested that the Skeletal Structure of all naturally occurring terpenoids are built of isoprene units.
* Terpenes are classified according to the no. of unit isoprene Monoterpenes, Sesuquiterpenes Diterpenes triterpenes Subdivided into acyclic or Cyclic. To get one drop of oil, you may require distilling 100 gm of plant material This is the most perfect way to improve our home environment, either to help

us relax, relieve tension and headaches, dispel odors, or just create an atmosphere of peace and harmony. If you have children, or suffer from Emphysema, Sinusitis, Asthma, and allergies, diffusing essential oils into your home will make an essential difference for you and your family's health

GENERAL PROPERTIES OF ESSENTIALS

1. The terpenes are camphors are colourless pleasant smelling and highly refractive liquid.
2. They are volatile in stream they are unsaturated crystalline compounds.
3. Detoxified removes waste material from our blood steam oxygenate as oxygen is added it has an effect of stimulating the tissue.
4. Regulates and balance body functions. Improves circulation by regulating the action of capillaries.
5. Restores vitality they evaporate quickly. Regulates and balance body functions.
6. Helps balance the nervous system and has the power of healing rapidly.

BLENDING

* Essentials oils are highly concentrated and must be diluted in vegetables oils for 3-4 drop of essential oil, 5 ml of carrier oil to be mixed.
* Some benefits of medicinal aromatherapy:
* helps relieve pain from chronic illnesses
* dries up cold sores and shingles sores fast
* heals wounds, burns and bruises quickly
* relieves PMS and menopausal symptoms
* relieves pain from endometriosis
* soothes muscle aches and pains
* clears yeast infections, ringworm and athletes foot
* assists digestive disorders
* eases depression and anxiety
* calms nerves and promotes sleep
* reduces headache/ migraine pain

MEDICINAL AROMATHERAPY FOR WOMEN:

* Women in today's modern world face challenges that create emotional stress that has a direct effect on their physiology. Stress may cause delays and irregularities in the menstrual cycle, block feelings of sensuality, and interfere with conception. It is only in recent years that women's delicate and complex physiology has been given the attention it deserves by the conventional medicine establishment. Unfortunately, conventional medicine often resorts to drastic and radical measures that do not harmonize with today's woman's needs. The new millennium woman is seeking the gentler healing practices that respect the intricacy of the female rhythms, focus on prevention, and enhance her sense of well being. Although various forms of alternative healing practices offer solutions to many women's health issues, MEDICINAL AROMATHERAPY offers unique advantages for women.

* Aromatherapy is a form of healing that uses volatile aromatic oils "essential oils" (not to be confused with "flower essences") distilled from a variety of fragrant plants and plant parts, for example, flowers (Rose), fruits (Orange), whole plants (Lavender), medicinal herbs (Chamomile), spices (Vanilla) or resins (Frankincense). Unlike other modes of healing, Aromatherapy offers a sensory journey to health that involves the delight in the fragrant treatment (e.g. aromatic bath or massage) and gently helps the body to rebalance and heal itself. Part of the healing comes from literally taking the time to smell the roses... something that women, with their keen sense of smell, can greatly appreciate. Many essential oils are antiseptic and act as natural antibiotics effective against viruses, fungi, as well as bacteria. Their complexity prevents the development of resistance, a major concern with prescription antibiotics. As you will see below, Aromatherapy is a very valuable form of alternative medicine that is both practical and enjoyable. Aromatherapy can be practiced alone or complementary to other alternative forms of healing. In Europe conventional medicine is very successful in its integration of Aromatherapy into the mainstream.

Feminine Health conditions

* Aromatherapy is wonderful for treating common feminine complaints such as yeast infections, Cellulite, Menopause, PMS and irregular periods. Some essential oils contain phytoestrogen precursors that can be used to balance the reproductive hormones that tend to fluctuate during perimenopause and menopause. These hormone-balancing essences enhance the body's own ability to balance irregular or heavy periods. Other essential oils can be applied to prevent stretch marks during pregnancy or to promote/reduce the flow of milk during nursing. Since the sense of smell is estrogen dependent, it is often greatly diminished after menopause, causing the woman great distress. Specific essential oil administration can be of significant benefit to restore smell loss in general.

Mood, Energy and Fitness

* Essential oils have many uses, however the fact that our sense of smell is linked to the deep emotion and memory centers in the brain, makes Aromatherapy a very powerful instrument for emotional healing and stress reduction. Clinical depression afflicts millions of women and certain essential oils (e.g. Neroli) are known for their calming effects, while others, such as Rosemary, will restore energy, and enhance mental alertness. Some oils have a balancing effect on mood, and they will stimulate or relax as needed. For the spiritual woman, Aromatherapy is a wonderful tool to create her indoor fragrant sanctuary. The Athletic woman can successfully use Aromatherapy to invigorate and enhance fitness, treat muscular aches and pains, and cure athlete's foot.

Personal Care and Sensuality

* It is natural for women to surround themselves with fragrance to enhance their attractivity and sensuality.

Aromatherapy is widely used for beauty care and rejuvenation, since many of the oils have skin regeneration effects. Aromas, such as in a pampering with application , will sharpen the senses and enhance all of life's pleasures, including libido. This is more than pure indulgence; Hippocrates, the Father of Medicine, stated already in 500BC that "the best way to health is a fragrant bath .Scientific studies have demonstrated that indeed, pleasant aromas promote the release of the body's natural "feel good" molecules and simultaneously stimulate the body's immune system, thus promoting a healthy physiology.

* An aromatherapy consultation consists of going over your medical history, setting goals for your desired outcome, choosing and testing appropriate oils that may be helpful, and receiving customized essential oil tinctures for home use. working together to customize the right formula for client/patien

METHODS ESSENTIAL OILS ARE USED

* Historically, there have been three models for using essential oils: the French, the German, and the English.
* The English traditionally dilute a small amount of essential oil in vegetable oil and massage the body to relax and relieve stress.
* The French prefer to ingest (swallow) therapeutic-grade essential oils. Many French practitioners have found that taking the oils internally is highly effective.
* The Germans recommend inhalation of the essential oils.

METHOD OF USING THE OILS

* Vapourisation : Using in diffuser, good method to destroy bacteria.
* Steam inhalation : Take some streaming water in bowl or use a steamer. Add 3 drop of essential oil and inhale, good for congestion
* Cotton plug : 2 drops of essential oil in cotton plug and sniff.

mud pack : The Mud pack is supposed to calm down the senses and rejuvenate the body and mind. It also acts as secret for youthful skin with no wrinkles. The mud retains the moisture of the body intact, open the pores of the skin to let it breathe, relives internal congestion and pain and promotes elimination of morbid This thermal mud even lends itself to vegetal values, to oils and essences that amplify the therapeutic effect other than the attested potency in the osteo-articulatory field; for instance in cases of venous insufficiency, stress, exhaustion or debility. can be sure effective solutions for: various nutritive problems, sleep disturbances, stress, nervousness, and exhaustion, which most of the time are not easy to treat on a pharmaceutical level, due to high social costs.

"AN INTEGRATIVE MANAGEMENT OF GUILLIAIN BARRE SYNDROME- A CASE STUDY"

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Abstract: A known case of GuilliainBarre syndrome approached with a difficulty of using bilateral upper limbs and lower limbs. A 42yr old male presented with a history of acute onset of pain in both Upper limbs and Lower Limbs associated with tingling sensations of both hands since 6months. He was admitted and taken early treatment for 15 days in local hospital. After 6 months when patient approached, he was having hypotonia in bilateral upper and lower limbs and diagnosed as GuillainBarre Syndrome (GB Syndrome) with difficulty in sitting and standing independently. Treatment planned was SarvangaMruduabhyanga (Dhanwantaratаila) followed by SarvangaPareesheka for 3days. Next 7 days SarvangaMruduAhyanga followed by ShashtikaShaliPindasweda, MustadiRajyapanaBasti in 3 parts (7days) as Snehana, Swedana and Basti helps in controlling and pacifying Vatadosha and Physiotherapy helps in strengthening the muscles and facilitation of tone. At the time of discharge patient was able to sit independently for 15 to 20 mins and stand with support for 10mins. Marked improvement was seen in the trunk muscles where as the lower limb muscles were still hypotonic.

KEY WORDS: GB Syndrome, Physiotherapy, MustadiRajayapanaBasti

Introduction: Guillain–Barré syndrome, is an acute polyneuropathy, a disorder affecting the peripheral nervous system and diagnosis is usually made by nerve conduction studies and with studies of the cerebrospinal fluidand a prevalence of one to two cases per 100,000 people annually. Treatment by intravenous immunoglobulins or plasmapheresis, together with supportive care, the majority will recover completely[1]. Ayurvedic parlance it can consider undermajjagatava talaxanas[2] and bahya-abhyantarasneha line(oleation therapy) of treatment will give better results to overcome disease from root level[3].

Case Report: A 42-year-old male, has approached OPD presented with difficulty in using bilateral upper and lower limbs since 6 months. History revealed that patient was apparently healthy 6 months back later he suffered with pain in both upper and lower limbs. Suddenly developed difficulty in using the four limbs for this patient has approached to local hospital and undergone for the investigations. Nerve conduction test suggested axonal motor neuropathy and other serological reports were within the normal limits except ESR it was 22mm/1st hr with this he diagnosed as Gullianbarre syndrome (GBS)and treated with plasmapherosisfor 5 months.

Aspatient not got much relief he decided to take ayurveda treatment expecting better results and approached to our hospital.

A diagnosed GB case on CNS Examination showed diminished reflexes in Bilateral upperand lower limbs,muscle was hypotonic,biceps-quadriceps muscle wasting was present and Manual Muscle Testing (MMT) scored as follows
1) Neck: 5/5
2) Upper limb: Shoulder Girdle 2/5, Distal 1/5
3) Lower limb: Pelvic girdle 2/5, Distal 3/5.
Ayurvedic view there is a karmakshya(difficulty in using body parts) of the shakhas(limbs), with no specific nidana(cause) and mamsakshaya in the upper and lower limbs suggestive of predominant vatadosa involvement in majjadhatu and considering it as majjagatavata a treatment was planned as follows.
1. Vidaryadigruta 25ml BD WithShuntikashaya 50mlB/F.
2. Sarvangamruduabhyanga with Dhanwantaratailа followed by Sarvangapareesheka(Guduchiksheerapaka) for 3 days.
3. Sarvangamruduabhyanga with Balashwagandhaditaila +Mahatiktakaghrita followed by Shashtikashalipindasweda for next 7days.
4. MustadiRajyapanabasti: (7days In 3stages)
Madhu-100ml, Saindhava- 5gms, Sneha-Balshwagandha ditaila (100ml)+ Murchitatilataila(100ml), Kalka: Musta+ Ashwagandh +Yastimadhu+ Pippali 20gms, Kashaya-musthadi ksheerapaka-600ml.
— Pathya: Ashwagandhaksheerapaka 100ml+Pipali Ch 2gms & Rice - OD
ShuntiKashaya- 50ml OD.
5. Physiotherapy :
1. To increase the muscle tone
2. To strengthen the muscle
— Facilitatory Techniques:
1. Quick joint compressions
2. Quick Stroking with different textures from soft to hard
3. Quick ice stroking
— Functional electrical stimulations
— Resisted isometric exercises
— Transitions
After the treatment again MMT was done and results are as follows:
1. Neck: 5/5
2. Upper limb: Shoulder Girdle 3/5, Distal 2/5
3. Lower limb: Pelvic Girdle 3/5, Distal 4/5

Discussion: Guillain-Barre´ syndrome (GBS) is an uncommon disorder of the peripheral nerves that classically causes ascending limb paralysis and, in severe cases, respiratory failure and death[4].Subsequent treatment consists of attempting to reduce the body's attack on the nervous system, either by plasmapheresis, filtering antibodies out of the blood stream, or by administering intravenous immunoglobulins (IVIg), to neutralize harmful antibodies and inflammation causing disease[5]. Approximately 90% of patients will recover completely within 3 to 8 weeks; 5% will die and 5% will be left with residual paralysis [6].

In Ayurveda different modalities are explained to treat kevalavatavyadhiwhere snehana(oleation therapy) stands first line of management[7]. As here nidana was not appreciated after the detail history so considering garavisha as the nidana the line of treatment was planned. Aim of the treatment was towards shodhana as well as brimhana:

1.Vidaryadi grita[8] 25ml BD with 50ml shuntikashayaas anupanagiven Before food in the form of vicharanasneha as it contains jeevaniya and balyadravyas and also for the doshavishyandanartha(loosening of adhered dosha in channels).
2. Sarvangamruduabhyanga with dhanwantaratailа followed by pareesheka with guduchiksheerawas selected for swedana (fomentation) 3 days , as the prakruti was vata pitta where pareesheka gives better results and helps for vilayana (liqufication)of doshas from the channels.
3. Sarvangamruduabhyanga with balashwagandhatailaand Mahatiktakagrita followed by shashtikashalipindasweda was selected for 7 days for brimhanartha(nourishment).
4. Raja yapanabasti[9] is selected to achieve sadyobalajanana (quick nourishment), rasayana(reguvinate) and shodhanarth (elimination of doshas from body).
5. Shuntikashaya 50ml OD given to maintain the jhataragni.
6. Physiotherapy techniques are given to increase the muscle tone and to strengthen the muscle.

Manual Muscle Testing (MMT) Grading's are done before and after the treatment for assessment as follows:
0- No contraction
1- Fliccur of contraction
2- Limited Range of Motion within gravity
3- Complete Range of Motion against gravity
4- With minimum resistance
5- With Maximum resistance

Conclusion: Though there is a low eitiopathology of disease, the observations such as post infectious phase and myelin depletion indicate the probability of teekshnanidana (penetrative cause) which need observation of more cases through Auyrvedic parlance.

One of the possible probabilitycan be done to Garavisha so that toxins released by the organisms will diminish the myelin depletion, if the disease addressed in early phase then there are more better prognosis of disease in Ayurveda.

Take home message: A challenging diseases like GB syndrome, Hemiplegia etc can manage better in early stages with Ayurvedic treatments.

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MEDICINAL PLANTS USE IN TRADITIONAL HEALTH CARE SYSTEM

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Abstract: The present research works was carried out in and around the Raichur district of Karnataka to study the applications of plants at home scale level in treating various kinds of ailments. The information was documented using questionnaire and PRA techniques with the help of village elders, key informants and local healers. The present study deals with traditional usage of 19 plants which were prevalent in the study area along with the botanical name, family, vernacular name, plants parts used and mode of use. The emphasis has been laid on scientific validation of medicinal properties of the plants used in traditional medication system, and also to recognize & reward the traditional wisdom of the local communities. It is most important's to record this knowledge for future generations otherwise it will be lost forever,

Key words: Raichur, Medicinal Plants, Traditional Health Care System, Vernacular name.

Introduction: Medicinal plants, some times immemorial, have been used in virtually all culture as a source of medicine use of plants for medicine in an ancient as the human civilization. The demand for the medicinal plants is increasing due to recognition of natural products being non narcotic, with no side effects easy availability cost effeteness and some times being the only source of healthcare for the poor in India approximately two million traditional health practitioners use over 7500 medicinal plants species. The traditional health care system is of tremendous relevance because it can ensure health security to a large number of people.

Raichur district is situated north eastern part of karnataka falls within the northern median region. It lies between 15'09' and 16'34' worth attitude and 75'46' and 77'35 east longitude. The Raichur forests division is having 32514.55 hectares of forest land out of which 18624.7 hectares reserve of forest 4176.62 hectares protected forest 9717.15 hectares un classed forest. But the knowledge regarding the proper use of medicinal plants in confined only to a small number of people and they usually do not real their knowledge to any one for the fear of being misused. As a result, much the valuable knowledge of the parcpioners in lost with the death of such persons.

An attempt has been made to document indigenous knowledge related to use of medicinal plants for various disease/ ailments at home scale level by farm families to study dependence of the respondents on herbal and allopathic treatment for using some of the curing some of the ailments and to verify scientific rational of documented indigenous knowledge.

METHODOLOGY :- The present study was carried out in four randomly selected villages of the Raichur district that is, Jagarikal, Machnoor, Maliyabad and Raichur.

The farm families used the questionnaires based survey along with in formal discussion to gather in formation regarding the use of medicinal plants for various disease/ailments at home scale level. The questionnaire data were supplementary by field observations during the season when the species referred to by their local names could be identified. Plant species used for different health problems, together, form and the mode of utilization were recorded and compiled. This was done with the help of key information, village elders and local healers, village elders are the major key players in the traditional health care systems. They have always played a critical role in maintaining the health of the indigenous people. They are living libraries and respositories of the oral traditional for ceremonies, songs to sing for gathering the plants and medicines to use that will cure their people.

RESULTS :- In the present investigation, 19 plants species found to be used by the local people in traditional health care

system have arranged alphabetically according to their scientific names, families, local names path used, method of use along with dosage.

1. Albizia lebbeck
Common Name :- Sirish
Family :- Mimosaceae
Uses :-
Paste of leaf after boiled in mustard oil for 10 min- is applied regularity on skin before one hour of bath in case of white patches on skin or leucoderma.

2. Aloevera (l) burm
Common Name :- Indian Aloe, GwarPatha
Family :- Lilliaceae
Uses :-
❖ Give 3-6 gm of Aloe juice with butter milk it cures spleen & liver enlargement.

3. Annona squamosa (l)
Common name :- Chitapal
Family :- Annonaeae
❖ Dried root powder (20 gm with honey is given once daily for abortion.
❖ Leaf paste in applied on the scalp to remove lice from hairs.

4. Asparagus recemosas wild
Common Name : Shatawari
Family :- Liliaceae

Uses :
❖ Mix 1 gm peepal powder in Asparagus decoction to give this to the patient thrice a day.

5. Caesalpina bondue (l) roxb,
Common name :- kanta Karai
Family :- Caesalpiniaceae
❖ Seed powder together with paste of black paper in prescribed twice daily in maleria ever
❖ seed paste with mustard oil (2:1) is applied during scabies.

6. Calotropis gigantean (l) r
Common Name :- Par Kha
Family :- Asclepidiaceae

7. Calotropis procera (aiti) r br,
Common Name :- Swallow Wort
Family :- Asclepiadaceae
❖ Take 3gm turmanic powder, mix it well with 5-7 drop calotropis milk and a few drops of rose water, apply this paste on the patch marks on the face. Take care the paste does not come in contact with eye.

8. Clerodondrum viscosum vent
Common Name :- Ghetu
Family :- Verbenaceae
❖ Old root crushed with black paper (6:1) made into small piles are given with cold water thrice a day for 2 weeks to cure blood dysentery.

9. Crotalaria aibida
Common Name :- Zhun Zhuni
Family :- Papilionaceae
❖ One cup root decoction mixed with 2-3 spoonful ginger extract is taken regularly in empty stomach in care of swelling of body.

10. Curcuma longa L
❖ Mix 6 gm turmeric in a glass of butter milk and give to the patient twice a day within 4-5 days it cures jundices.

11. Cyanodon dactylon
Common name :- Doob Grass
Family :- Poaceae

Uses :-
❖ 9 grams of Doob Grass leaves crushed with calcium carbonate make a paste, applied at the forehead for **Headache**.
❖ 3 tea spoon fuel extract of fresh leaves and mixed in a glass of water is taken internally in early morning empty stomach once in a day to care **Acidity**.

12. Dalbergia sisso
Common name :- Shishan
Family : Fabaceae

Uses :-
❖ During white discharge, one glass full leaf (10-15) decoction is taken one a day in empty stomach for one week.
❖ For wounds or ring warms leaf paste in applied on the affected part thrice a day for 3-4 days.

13. **Euphorbia hirta (l)**
Common Name :- Doodhi
Family :- Euphor biaceae

14. Gloriosa superba (l)
Common Name :- Glory Lilly
Family :- Liliaceae
❖ Tuber paste is applied on body in small fox, leprosy and the juice is applied to kill lice.

15. Paperver somniferum l
Common name :- poppy, Opium
Family :- Papavera care
❖ Grind 1gm poppy with 2 cloves and apply on the forehead. It care headache due to acidity, gastric disorders or due to chill cold.

16. Tamarindus indica (l)
Common Name :- Imli
Family :- Caesalpiniaceae
❖ Fruit infusion with cow milk (3:2) is given as an antidote to poison caused by opium and fruit of theveha peruviana & Datura metel.

17. Terminalia arjuna
Common Name : Arjuna
Family :- Combretaceae
Uses :-
❖ Cook 6-10 gm powder of its bark with jaggery and milk, strain the milk and give this to the patient and for heart weakness and swelling.

18. Tinospara cordifolia (L.) Wild
Common Name :- Amruth Belli
Family :- Menispermaceae

19. Withania somnifera (l) dunal
Common Name :- Ashwagandha, winter Cherry
Family :- Solanaceae
Uses :-
❖ Give 2 gm powder of Ashwagantha roof mixed with 1 gm peepal powder, 5 gm ghee & 10 gm Honey. It help to cure tuberculosis.

Discussion :- This study revealed a considerable medicinal plants devirsity of Raichur district. Data were compared with available literature in different regions of Indian on medicinal plants and was found that many of the usage listed are not recorded earlier In Karnataka, ethnobotanical studies on medicinal plants were conducted in kodagu, Tumkur and Utter Kannada districts. However, in Raichur district, no detailed studies on ethnomedicine have been conducted. The formulation and standardization of these effective phytomedicine should be encouraged for their sustainable uses. The plants are used either singly or in combination with others. Same information pertaining to a particular remedy from different localities or groups of informants reflects the accuracy and authenticity of the medicines. Further, scientific assessment of the medicines on phytochemistry, biological activity and clinical studies are, however, necessary this may provided a lead in the development drugs to be used in modern system of medicine.

Conclusion :-
• People are making maximum uses of plant species for meeting their day-to-day house hold demands.
• The indigenous traditional knowledge about use of plants against diseases is still practiced in majority of house hold.
• Scientific validation through biochemical clinical and pharmacological screening are required for verification of the folklore and bring out newer and potential source of medicament for the welfare of the society

THEME:6 (PARASHAREEYAM) AGRICULTURAL, HORTICULTURAL AND ANIMAL SCIENCES, FISHERIES, FORESTRY

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SWADESHI VIJNANA ANDOLANA-KARNATAKA
ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

EFFECTS OF WEED MANAGEMENT PRACTICES ON YIELD ATTRIBUTES AND YIELD OF SRI METHOD OF RICE CULTIVATION

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Abstract: The present investigation was conducted to evaluate weed management practices for System of Rice Intensification (SRI). The experiment comprises of nine treatments and was replicated thrice. The treatments are recommended weed management practice *i.e.* 4 times conoweeding from 10 DAT at 10 days interval and conoweeding 3 times at 20, 30 and 40 DAT. These two treatments in single and in combination with three different herbicides *viz.*, almix @ 20 g a.i. ha^{-1}, butachlor @ 1 kg a.i. ha^{-1} and pretilachlor @ 0.75 kg a.i. ha^{-1} were tested along with unweeded control treatment. The weed flora of the experimental field were *Echinochloa crus-galli* (L.), *Echinochloa colona* (L.), *Cyperus difformis* (L.), *Cyperus iria* (L.), *Eclipta alba* (L.) and *Ammania baccifera* (L.). Application of pretilachlor as PE @ 0.75 kg a.i. ha^{-1} + 4 times conoweeding from 10 DAT at 10 days interval (T_5) recorded highest number of filled panicles $hill^{-1}$ (17.4), panicle length (21.27 cm), number of filled grains per panicle (249.3) and test weight of 19.38 g. The treatment consisting application of butachlor @ 1 kg a.i. ha^{-1} as pre-emergence + 4 times conoweeding from 10 DAT at 10 days interval (T_4) was on par with T_5.

Application of pretilachlor as pre-emergence at 0.75 kg a.i. ha^{-1} + 4 times conoweeding from 10 DAT at 10 days interval registered significantly highest grain yield of 5863 kg ha^{-1} and straw yield of 9772 kg ha^{-1}. Comparable grain and straw yield was observed among the treatments like application of butachlor as pre-emergence at 1 kg a.i. ha^{-1} + 4 times conoweeding from 10 DAT at 10 days interval and application of almix as post-emergence at 20 g a.i. ha^{-1} + 4 times conoweeding from 10 DAT at 10 days interval.

Introduction: Rice (*Oryza sativa* L.) is one of the most important cereal crop as it is a staple food for more than 70 per cent of the world population. The System of Rice Intensification (SRI) developed in Madagascar follows a more comprehensive approach addressing various management practices at the same time with promising results (Stoop *et al.*, 2002). The SRI practices have been found to save inputs substantially and increase returns. Greater yield losses can occur at times when weed competition coincides with the critical periods of growth of crops (Carbonell and Moody, 1982). During early establishment, weeds make 20 to 30 per cent of their growth while crop makes only two to three per cent of its growth. Continuous use of these herbicides in transplanted rice resulted in the increased trend of non-grassy weeds. Use of alternative herbicides that provide wide-spectrum weed control would be desirable for effective weed control.

Materials and Methods: Field experiment was conducted during *Kharif,* 2009 at wetland farm of Tamil Nadu Agricultural University, Coimbatore to see the effect of different weed management practices on growth components in System of Rice Intensification (SRI). Nine treatments were T_1: Recommended weed management practice *i.e.* 4 times conoweeding in both the directions from 10 DAT at 10 days interval with hand removal of left out weeds, T_2: Conoweeding 3 times at 20, 30 and 40 DAT in both the directions, T_3: Almix™ @ 20 g *a. i.* ha^{-1} as POE herbicide + T_1, T_4: Butachlor 50 EC @ 1 kg *a.i.* ha^{-1} as PE herbicide + T_1, T_5: Pretilachlor 50 EC @ 0.75 kg *a.i.* ha^{-1} as PE herbicide + T_1, T_6: Almix™ @ 20 g *a.i.* ha^{-1} as POE herbicide + T_2, T_7: Butachlor 50 EC @ 1 kg *a.i.* ha^{-1} as PE herbicide + T_2, T_8: Pretilachlor 50 EC at 0.75 kg *a.i.* ha^{-1} as PE herbicide + T_2 and T_9: Unweeded control in randomized block design with three replication.

As per treatment schedule, pre-emergence herbicide butachlor @1 kg a. i. ha^{-1} was applied on 3rd DAT (T_4 and T_7). The other pre-emergence herbicide pretilachlor was also applied @ 0.75 kg *a.i.* ha^{-1} on 3rd DAT (T_5 and T_8). The post-emergence herbicide almix @ 20 g *a.i.* ha^{-1} was applied on 15th DAT (T_3 and T_6). A thin film of water was maintained at the time of herbicide application. The unweeded check (T_9) was kept undisturbed for the entire cropping period.

Results and Discussion

Yield attributes: Adoption of different weed management practices significantly influenced the yield attributes of SRI rice. Application of pretilachlor as pre-emergence at 0.75 kg a.i. ha^{-1} + 4 times conoweeding from 10 DAT at 10 days interval (T_5) recorded higher yield attributes *viz.*, number of panicles $hill^{-1}$ (17.40), panicle length (21.27 cm) and number of filled grains $panicle^{-1}$ (249.3). It was comparable with the treatments like application of butachlor as pre-emergence at 1 kg a.i. ha^{-1} + 4 times conoweeding from 10 DAT at 10 days interval (T_4) and application of almix as post-emergence at 20 g a.i. ha^{-1} + 4 times conoweeding from 10 DAT at 10 days interval (T_3) with regard to the yield attributes (Table 1). Decreased weed competition and minimum nutrient removal by weeds provided a competition free environment for rice. This might have increased the capacity of N, P and K uptake and enhanced source (LAI) and sink sizes which in turn increased the entire yield attributes *viz.*, the panicle number $hill^{-1}$, panicle length and number of filled grains $panicle^{-1}$.

Comparatively weed free condition at critical crop growth stage with these treatments enhanced all the yield components. This was confirmed by Mukherjee and Bhattacharya (1999). Unweeded control (T_9) recorded lowest number of

panicle hill^{-1}, panicle length and number of filled grains panicle^{-1}. This was due to severe competition exerted by weeds for space, light and nutrients throughout the crop growth period reported by Choudhary and Thakuria (1998).

Grain and straw yield : Adoption of different weed management practices increased the grain yield from 1808 kg ha^{-1} to 5863 kg ha^{-1}. The increase ranged from 56.42 to 69.15 % over unweeded control. With respect to straw yield the increase was from 3094 kg ha^{-1} to 9772 kg ha^{-1} which ranged from 62.54 to 68.33% over unweeded control.

Among the different weed control treatments, the treatment consisting of application of pretilachlor as pre-emergence at 0.75 kg a.i. ha^{-1} + 4 times conoweeding from 10 DAT at 10 days interval (T_5) registered higher grain yield of 5863 kg ha^{-1} and straw yield of 9772 kg ha^{-1}. This treatment was comparable with application of butachlor as pre-emergence at 1 kg a.i. ha^{-1} + 4 times conoweeding from 10 DAT at 10 days interval (T_4) and application of almix as post-emergence at 20 g a.i. ha^{-1} + 4 times conoweeding from 10 DAT at 10 days interval (T_3). This might be due to weed free environment created from the early stage up to harvest, leading to the production of effective tillers, longer panicles and more number of grains panicle^{-1} compared to all other treatments (Table 2).

However, unweeded control (T_9) recorded 69.15 per cent lesser yield due to higher weed competition and lower availability of nutrients to the crops resulted in lower grain and straw yield in control plot and this was conformity with the findings of Vinod Kumar *et al.* (1998) and Narayanan *et al.* (2001).

The increased grain and straw yields in the above said treatments clearly indicated the influence of weed free environment on grain production. Because of weed free conditions in rice eco-system, the competition for moisture, light, space and nutrients was reduced resulting in better availability and uptake of the required nutrients by the crop. The cumulative effect of all these enhanced the performance of the crop under the favorable weed free condition leading to higher grain and straw yields. This was in conformity with the findings of Narayanan *et al.* (1999).

Harvest index of the crop depends on the economic (Grain yield) and biological (grain and straw yield) yields. Weed control treatments did not cause a conspicuous difference in harvest index in both the crops. Lowest harvest index (0.33) was recorded in unweeded control (T_9).

Table 1. Effect of weed management practices on number of panicles hill^{-1}, panicle length (cm), number of filled grains panicle^{-1} and 1000 grain weight in SRI rice

Treatments	No. of panicleshill^{-1}	Panicle length (cm)	No. of filled grains panicle^{-1}	1000grain weight (g)
T_1 - Recommended weed management practice i. e. 4 times conoweeding from 10 DAT at 10 days interval	16.35	20.71	240.00	19.23
T_2 - Conoweeding 3 times at 20, 30 and 40 DAT	14.80	19.26	218.67	19.00
T_3 - Almix™ at 20 g a. i. ha^{-1} as POE + T_1	16.67	21.03	240.39	19.26
T_4 - Butachlor 50 EC at 1 kg a. i. ha^{-1} as PE + T_1	16.87	21.25	244.83	19.30
T_5 - Pretilachlor 50 EC at 0.75 kg a. i. ha^{-1} as PE + T_1	17.40	21.27	249.33	19.38
T_6 - Almix™ at 20 g a. i. ha^{-1} as POE + T_2	15.67	19.96	210.85	19.01
T_7 - Butachlor 50 EC at 1 kg a. i. ha^{-1} as PE + T_2	15.41	20.13	214.87	19.00
T_8 - Pretilachlor 50 EC at 0.75 kg a. i. ha^{-1} as PE + T_2	15.96	20.42	220.47	19.03
T_9 - Unweeded control.	10.47	17.08	103.91	18.97
SEd	0.76	0.52	9.93	0.21
CD (P=0.05)	1.62	1.12	21.31	NS

Table 2. Effect of weed management practices on grain yield (kg ha^{-1}), straw yield (kg ha^{-1}) and harvest index in SRI rice

Treatments	Grain yield(kg ha^{-1})	Straw yield (kg ha^{-1})	Harvest index
T_1 - Recommended weed management practice i.e. 4 times conoweeding from 10 DAT at 10 days interval	5161	9011	0.36
T_2 - Conoweeding 3 times at 20, 30 and 40 DAT	4150	8261	0.33
T_3 - Almix™ at 20 g a. i. ha^{-1} as POE + T_1	5411	9217	0.37
T_4 - Butachlor 50 EC at 1 kg a. i. ha^{-1} as PE + T_1	5606	9500	0.37
T_5 - Pretilachlor 50 EC at 0.75 kg a. i. ha^{-1} as PE + T_1	5863	9772	0.38
T_6 - Almix™ at 20 g a. i. ha^{-1} as POE + T_2	4589	8461	0.35
T_7 - Butachlor 50 EC at 1 kg a. i. ha^{-1} as PE + T_2	4656	8522	0.35
T_8 - Pretilachlor 50 EC at 0.75 kg a. i. ha^{-1} as PE + T_2	4819	8717	0.36
T_9 - Unweeded control.	1808	3094	0.33
SEd	297.51	291.39	0.02
CD (P=0.05)	638.17	625.03	NS

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"VISION AND VISUAL NAVIGATION IN NOCTURNAL INSECTS"

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Abstract: Insect compound eye consisting of repetitive visual units called ommatidia and are classified into apposition (photopic), neural superposition (Mesopic) and refracting superposition (scotopic) eyes. To see reliably, eye must capture sufficient light (photons). For a diurnal insect (apposition eye), adopted for vision in bright sunlight, this basic requirement is achieved. However, at night or at tremendous depth in the sea, where light levels are 11 orders of lower magnitude, reliable vision cannot be guaranteed. In such cases, they compensate lower light limits by withdrawing the pigment sleeve and imposing the clear zone between lens and retina, thus allowing the light to collect from many ommatidia and focus into single rhabdom.The spectral sensitivity of insect varies from <380-630 nm. Based on the spectral sensitivity insects are of two types, bichromatic (ants, cockroaches) with two photoreceptors absorbing green-yellow light (550 nm); blue-ultraviolet light (<480 nm) and trichromatic (Honeybees, bumblebees) with three receptors and absorption maxima at 360 nm (ultraviolet), 440 nm (blue-violet), and 588 nm (yellow). Bichromatic insects have only limited color vision (equivalent to color blindness in humans) but trichromates with true color vision able to discriminate between single colors and mixtures of colors. Hence, Color vision is the ability to discriminate two stimuli of different spectral composition, regardless of their relative intensity.Among several nocturnal insects, nectar feeding hawk moth, *Deilephila elpenor* with superposition eye was the first insect studied for nocturnal color vision. This hawk moth finds and recognises flowers by chromatic cues rather than the achromatic (intensity-related) cue and even change in color illumination will not affect its visual capability indicating color constancy and it is known to possess three spectral classes of photoreceptors, centered in the UV, blue and green parts of the spectrum. To navigate and orient animals use the sun's polarization pattern, but the dung beetle, *Scarabaeus zambesianus* is one such insect which relay on polarization pattern of moonlit sky.

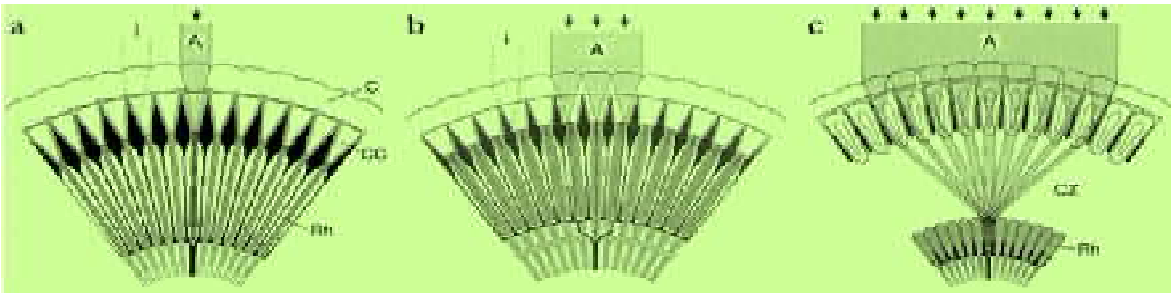
The major limitation for nocturnal vision is visual noise, which can be of three kinds within the photoreceptor: photon shot noise, dark noise and transducer noise. Photon shot noise is the degree of un-certainty (±"N photons) associated with photoreceptor absorbing a number of N photons (the signal). In nutshell, lower light intensity has led to the evolution of various specific adaptations in the visual systems of insects eyes. Sensitivity can be enhanced via optically collecting more photons with parameters like facet size and number, changes of focal length, dimensional changes of the rhabdom, and pigment migrations within the retina, or by neurally summing signals in space or time.

To see reliably, an eye must capture sufficient light. For a diurnal (day-active) animal, adapted for vision in bright sunlight, this basic requirement is easily achieved. However, at night, or at tremendous depths in the sea, where light levels may be many orders of magnitude lower, reliable vision cannot be guaranteed. Indeed, many nocturnal and deep-sea animals have simply ceased to rely on vision as their primary sense, depending instead on olfaction, hearing, electroreception and mechano-reception to interpret their environments. This, however, is by no means the rule: many others have invested heavily in vision, evolving remarkable adaptations to see well in dim light.

The visual system of an insect is designed by compound eye with repetitive units called ommatidia. Each ommatidium consists of light capturing and light gathering apparatus, the corneal lens is transparent cuticle with two cells called corneagen cells which later mature to form primary pigment cell and another is secondary pigment cell, below the corneal lens crystalline cone.

What can nocturnal insects see? From the outset it is important to point out that the nocturnal visual world is essentially identical to the diurnal visual world. The contrast of objects is identical and so are their colors. The night environment is as colorful as the day, but the only difference is the intensity of light which is 11 orders of magnitude less than the day. So, the greater challenge to the nocturnal insect is to absorb sufficient photons of light to reliably discriminate it from other objects (Warrant *et al.,* 2004).

In order to achieve this insect compound eye has modified in to three types a) Apposition (photopic), b) Neural superposition (mesopic), c) Refracting superposition (scotopic)



AppoAposition eye **Neural superposition** **Superposition**

Fig 1: Schematic longitudinal sections of the three major compound eye designs. C – cornea, CC – crystalline cone, CZ – clear zone, Rh – rhabdom

In superposition eyes, unlike the other eye types, a wide pigment free 'clear zone' spatially separates the optics and the light absorbing rhabdom layer (Fig. 1c). The rhabdoms are usually wider and shorter compared to those of apposition eyes and the optical isolation provided by screening pigments is absent (at least during dark adaptation).Through specialized optics, commonly via refractive index gradients in the crystalline cones (refracting superposition, Fig. 1c), parallel light rays from a large number of facets can be focused or 'superimposed' across this clear zone onto a single rhabdom. Hence, each rhabdom receives light through wide superposition apertures comprising typically several hundreds or even thousands of facets, which greatly improves photon catch and thus sensitivity. The gain in sensitivity is approximately equivalent to the number of superimposed facets and due to this enhanced photon capture, superposition eyes are typically found in nocturnal insects (Nilsson, 1989).

Nocturnal color vision" The world is as equally colorful at night as during the day, and the usefulness of color for object discrimination (e.g., flower identification) does not decrease with falling light intensities. The nocturnal nectar-feeding hawk moth *Deilephila elpenor* has superposition eyes with three different spectral classes of photoreceptors, centered in the UV, the violet, and the green parts of the spectrum(Hoglund *et al.,*1973). This moth can not only trained to associate a sugar reward with a blue disc at starlight levels of illumination (Kelber *et al.,*2003),but it can also discriminate this blue disk from others discs in various shades of gray with a choice equally visible and important for both nocturnal and diurnal insects.

Nocturnal navigation and orientation: To navigate back to the safety of a nest after a long and tortuous foraging trip, or to optimally orient themselves in order to efficiently escape from rivals or predators, insects require reliable detection of both terrestrial and celestial visual cues (Whener and Srinivasan,2003), and this is equally true at night as it is during the day. Most insects rely on hierarchies of both kinds of cues.

Navigation and orientation using celestial cues : At night, the brightest and most easily discernable cue in the sky in undoubtedly the moon. Because of its variable rise time and prominence, the moon is a much more complicated orientation cue than the sun, but nevertheless its bright disk is used for orientation and navigation in a number of different nocturnal insects, including ants, earwigs, moths and beetles (Klotz and Reid, 1993).

A much dimmer and subtle cue associated with the moon is its pattern of polarized light. This circular pattern, centered around the moon, arises because of the atmospheric scattering of moonlight as it travels towards earth. Light is most polarized around the celestial locus 90^0 from the moon, and the circular pattern of polarized light moves with the moon. In many day active insects, the sun is used as a compass cue when returning to the nest and allows constant bearing during their straight-line returns. A similar use of the moons'

polarization pattern, which during a full moon is a million times dimmer, should only be limited by the sensitivity of nocturnal eyes.

After the sun sets over the savannah, the nocturnal dung beetles**,** *Scarabaeus zambesianus*, emerges from the its temporary nest in the soil and takes flight in search of the fresh dung. Once found, it rapidly makes a dung ball and rolls it away on foot, aiming toward a location well away from the ferocious competition of the dung pile, where the beetle can manipulate it ball safe from interference. The safest and most efficient way to escape is to move away from the dung pile along straight line any direction. To hold this course in a straight line, beetles rely on compass information from the dim moonlight polarization pattern. If a large linearly polarizing filter is placed above the ball-rolling beetle as it moves along such a straight path, the insect realigns itself as it passes underneath, in accordance with the dominant polarization axis of the filter. When it roll backs out under the natural sky, it again realigns itself to the natural skylight polarization pattern. Thus, nocturnal dung beetles have sufficient visual sensitivity to detect dim polarized moonlight and to use it as compass cue for orientation. This ability is likely shared by other nocturnal insects, including crickets, tenebrionid beetles and bees

Navigation and orientation using terrestrial cues : Just as for diurnal insects, many nocturnal insects rely on terrestrial features and landmark orienatation, for flight control, or for homing in on the exact location of a small nest entrance in the dark. The ability of an animal to use terrestrial cues for orientation at night at much more dependent on whether the cues have a sufficient contrast against the background than on their own particular luminase.

Homing behaviour of sub-social shield bug,*Parastrachia japonensis* using path integration ,Foraging, the homing path, and orientation directions. A female first started to search for a drupe after the nymphs hatched. The bug usually failed to find a drupe on its initial trip; sometimes it took a few days to encounter a ripe drupe. Fig. 2A shows a typical round-trip provisioning excursion of an experienced bug. After the first successful trip, the experienced bug left the entrance of its burrow daily to search actively around the host-tree area. When it finally found a suitable drupe, it started to return directly along a straight path, dragging the ripe drupe to its burrow. When the bug reached the vicinity of its burrow, it stopped the straight run, made a quick turn, and then started searching behavior. The foraging directions of individuals were measured using initial and experienced bugs. At the initial foraging, the orientation directions from the burrow were randomly distributed (Fig. 2B; V test: u=1.502, N=11, P>0.05); in many cases, the female returned to the burrow after failing to find a host drupe. Only a portion of the initial bugs discovered a drupe on their first trip out; these bugs showed a straight run even at the initial homing. After females first successfully acquired a drupe, subsequent foraging directions showed a marked tendency toward the place where they had last encountered a drupe. The foraging directions of experienced bugs were significantly clustered toward the host tree (Fig. 2 C; V test: u=3.443, N=10, P<0.0001)

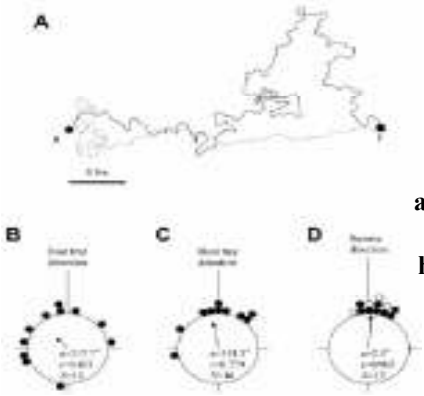


Fig. 2: A diurnal provisioning path and the distribution of foraging and homing directions.

A. A typical example of a diurnal provisioning excursion of *P. japonensis under natural conditions. B (?),* burrow; F (|), location where the bug discovered the drupe.
B. Initial foraging directions;
C. Foraging directions of experienced bugs homing directions of initial and experienced bugs. Orientation angle for each bug is shown as a small circle. The open circles in (D) indicate the initial homing bugs. Arrow indicates mean vector. a, mean angle of orientation; r, length of the mean resultant vector; n, number of animals tested.

Tropical Halictid Bee leaves her nest and quickly returns to face the nest entrance. Flying in short arcs, she investigates the nest entrance and a neighboring landmark to learn their spatial arrangement before departing on her foraging trip. Each "ball-and-stick" represents the position of the head (ball) and body (stick) at 40 ms intervals(Fig 3 A). Bees leaving for a foraging trip learn the position of their nest relative to others (Fig 3 B) or learn the presence of a white square card attached to their nest (Fig 3C). Upon return, bees enter the nest marked by the landmarks they have previously learned, not their actual nests (which are marked by stars). The rear side of the square card was attached to a Perspex cylinder that slipped neatly over the end of the nest stick to hold the card in place over the nest entrance (Warrant *et al.,*2004).

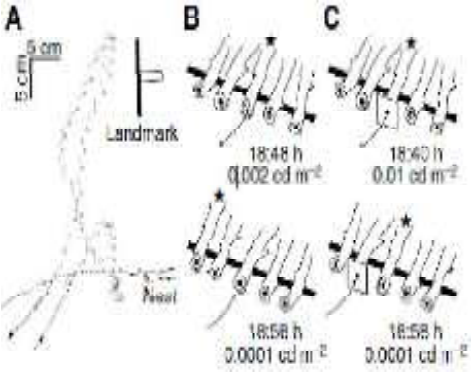


Figure 3: Nocturnal Landmark Orientation in *Megalopta* sps.

(A) A typical nocturnal orientation flight, (B and C) Landmark learning. Bees leaving for a foraging trip learn the position of their nest relative to others (B) or learn the presence of a white square card attached to their nest (C).

Limitations to vision at low light intensities : The random arrival of photons on an array of photoreceptors demonstrates the unreliability of the visual system at low light intensities. The black square in the centre can only be distinguished with certainty at light levels 3 log units brighter than threshold level.

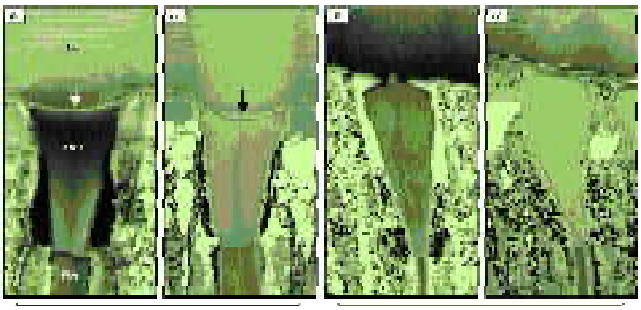
A. Visual noise : Three kinds within the photo receptor are Photon shot noise, Dark noise and Transducer noise.Photon shot noise is the degree of un-certainty (±vN photons) associated with photoreceptor absorbing a number of N photons (the signal) **(Warrant and McIntyre, 1993).S**ignal to noise ratio (N/ vN= vN) increases with increase in noise and degrades the ability of two photoreceptors to discriminate contrast. Whereas, Eye sensitivity increase at cost of losses in spatial/ or temporal resolution

Adaptation for vision in dim light

Optical adaptation : Facet size – ocelli larger, optical sensitivity increases, facets no. More; The dioptric apparatus Changes of focal length ;Dimensional changes of the rhabdom and; Pigment migrations within the retina **(Nilsson,1989)**

Neural adaptation : Spatial summation**,** Temporal summation and Organization of the lamina and spatial summation

The dioptric apparatus and focal length : Dioptric apparatus of the c. eye, consisting of the corneal lens and the crystalline cone, focuses incoming light onto the distal rhabdom tip.



Nocturnal Diurnal

Fig4. The dioptric apparatus in the apposition eyes of (a) *M. genalis, (b) A. pallens, (c) Apis mellifera and (d) P. occidentalis, showing the proximal cornea (C), crystalline cone (CC) and rhabdom* (Rh) directly beneath. Note the strongly convex inner corneal curvature, its tight apposition to the CC and the extremely wide rhabdoms in the nocturnal bee (a) and wasp (b), which are not present in their diurnal relatives (c, d). Scale for (a-d) in (d) 10 µm, Greiner, 2005.
Equation : $F = f/D$ *(f- short focal length, D- Aperture diameter* . If, F is < 2.8 light remains the photons remain trapped within their rhabdoms)

Pigment migrations within the retina : most insect eyes also need to function over a wide range of light intensities. This is mediated by migrations of screening pigments

a. Radial pigment migration : In apposition eyes mediated by retinula or primary pigment cells. This Mechanism is not only present in day active but also in night active insect like cockroaches and nocturnal bees. In light adopted condition, Pigments absorb the light propagating outside the microvilli and sharpens spatial acuity by decresing the sensitivity. Whereas, in dark adopted condition sensitivity increases

b. Longitudinal pigment migration : In superposition eyes secondary pigments migrate into the clear zone to optically isolate the ommatidia in the light-adapted state (Nilsson, 1989), and movement of retinula cell pigments along the rhabdomeres adds to the effect of the primary pigment in LA. Eg: nocturnal bug *Triatoma infestans* and the common European earwig *Forficula auricularia* . Similarly, during DA movement improve the sensitivity of an apposition eye with blurred images as light crosses between the ommatidia.

Changes of rhabdom size and shape: The nearly hemispherical lenses of crepuscular and nocturnal mosquitoes focus a 65° wide cone of light onto the rhabdom during DA. In order to capture this wide cone, a unique rhabdomeric shape, consisting of a wide fused apex and proximal hollow cone, has evolved in these species (Fig. 5 a) Only with such a conical rhabdom, is all the light effectively trapped within the rhabdom. As diurnal species have open rhabdomeres with a narrow cylindrical shape, conical rhabdoms represent a purely nocturnal adaptation (Fig. 5 b). However, the overall cost of widening the visual field to such extents is the almost complete loss of mspatial resolution.

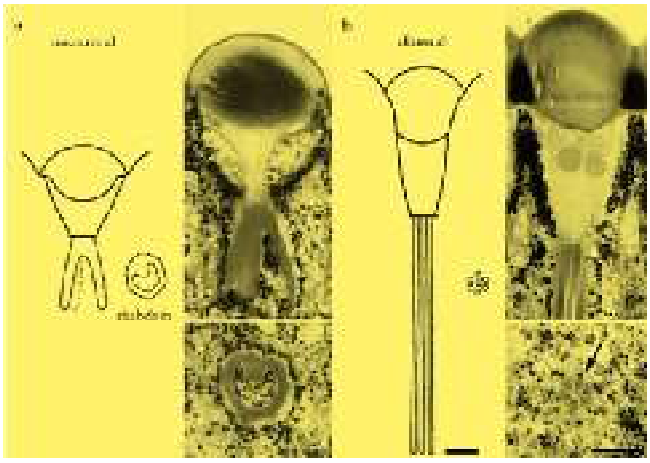


Fig 5 : The ommatidial structure of (a) nocturnal and (b) diurnal mosquitoes, shown as a schematic drawing and as histological sections. (a) The rhabdom of nocturnal mosquitoes has a unique hollow cone shape with a blunt apex and traps all the light reaching the eye through the large, almost hemispherical lenses. (b) In contrast, diurnal mosquitoes have narrow, open rhabdomeres and much smaller apertures.

Circadian rhythm change in rhabdom diameter widens the receptive field of the photoreceptors to enhance sensitivity at night and subsequent narrowing optimises spatial resolution during the day

- Small facet apertures- less optical sensitivity are particularly limited in apposition eyes.
- Increase in the response gain of the photoreceptors with decreasing light intensity can further enhance sensitivity but does not improve photon capture itself

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INTEGRATED FARMING SYSTEMS A VIABLE APPROACH FOR SUSTAINABLE AGRICULTURE

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Abstract: Integrated farming system conceptually is a set of elements or components which are interrelated and interact among themselves. It takes into account the components of soil, water, crop, livestock and other sources with the farm family at the centre and managing agriculture and related activities and even on-farm activities. In true sense, integrated farming system is an appropriate combination of farm enterprises such as crops, livestock, fishery, forestry, poultry, sericulture, mushroom, apiculture etc. and the means available to the farmers to raise them for profitability. It interact adequately with the environment without dislocating the ecological and socio-economic balance on one hand and attempt to meet the national goals on the other when practiced in non exploitive mode.

The integrated farming system irrespective of combination/ location/ management/socio-economic conditions has resulted in the profit in all the case studies, so far. It has been realized that integration generates addition income varying from Rs 20,000/ - to 25,000/ha under irrigated and Rs 8,000/- to 12,000/- under rainfed eco-systems. The income enhancement due to integration of processing and on-farm value addition may range between 25-50%, yield improvement on account of improved soil health by 0.5 to 1.0 t/ha, cost reduction by Rs 500 - 1000/ha (as a result of resource recycling) and employment generation by 50-75 man days/ household. Therefore, this approach very successfully can take care of the livelihood security of the farm crop diversification and providing year-round employment to the farmers. Integrated farming systems, therefore, assume greater importance for sound management of farm resources to enhance farm productivity, which will reduce environment degradation and improve the quality of life of resource poor farmers and to maintain agricultural sustainability.

The average holding of land in India has been declining and over 80 million out of 105 million operational holdings are below the size of one hectare (Mahapatra and Bapat, 1992). Because of ever-increasing population and decline in per capita availability of land in India (at present 0.15 hectare per capita), there is hardly any scope for horizontal expansion of land for food feed and fibre production. Vertical expansion by integrating appropriate farming components requiring lesser space and time, and ensuring higher total productivity of the system is the only alternate option left out. Hence, sustainable farming systems, both economically viable and ecologically compatible, encompassed with higher total productivity to meet the present and future needs without jeopardizing the potential, are to be optimized for specific agricultural domain. This could be possible through optimal crop and component link in accordance with the farm resources available in the farming system (Jayanthi et al., 1997). Therefore this review depicts the significance of an integrated farming system (lFS) and its advantages over a conventional cropping system (CCS).

INTEGRATED FARMING SYSTEM : Farming includes crop, livestock, poultry, fishery, tree culture etc. An integrated farming system is defined as an integration of different cropping and farming systems in accordance with needs and resource base of farmers The integration of the cropping enterprise with other enterprises should be done in such a manner that it ensures recycling of crop residues, optimum resource use, higher employment generation and minimum of risks and uncertainties (Chellamuthu and Balusamy, 1999). They also

envisaged that to mitigate the risks and uncertainties of income from conventional cropping and to reduce the time lag between investment and returns, it is essential to use integrated farming system approach in production programme that yields regular and evenly distributed income throughout the year and is not subjected adversely to vagaries of nature. Integrated Farming System (IFS) can be defined as a combination of several primary, complementary farming systems and value addition enterprises, aimed at maximization of farm family income through sustained, optimal and complementary utilization of farm resources, farm products and by-products.

Farming systems research is considered a powerful tool for natural and human resource management in developing countries such as India. This is a multidisciplinary whole-farm approach and very effective in solving the problems of small and marginal farmers. The approach aims at increasing income and employment from small-holdings by integrating various farm enterprises and recycling crop residues and by-products within the farm itself (Behera and Mahapatra, 1999).

INTEGRATED FARMING SYSTEM UNDER IRRIGATED CONDITION : The biggest edge such farming systems have on other types of farming system is the abundance of water available for crop growth. This makes it possible for the cultivators to expect a decent harvest, thus earning a reasonable income from cropping enterprise. But if other enterprises were taken along with crop husbandry in properly selected combinations, it would increase the productivity of the farm many folds and thus would virtually change the economic scenario of the place. Higher contribution of rice-based cropping component in low land IFS in Cauvery Delta region of Tamil Nadu was recorded by Govindan *et aI.* (1990) and in Western Zone by Rangaswamy *et aI. (1992)* and Rangaswamy *et aI.* (1995). By virtue of inclusion of high yielding and nutrient responsive varieties in the study by replacing the local varieties popular among the farmers, and the use of composted and recycled organic manures from allied enterprises linked would have helped in the productivity of crops in the integrated farming system (Jayanthi *et aI.,* 1997). Integrating cropping with fishery and poultry enterprises realised an additional net income over the conventional system. Out of the income obtained from the IFS, 70% was from cropping, 9.4% from poultry and 20.6% from fishery. Also additional employment generated in the IFS was 275 man-days/ha/year. The reduction in feed cost of poultry and the fish by way of effective recycling of the waste products of each enterprise reduced the cost of production and increased the net income (Rangaswamy *et aI.,* 1992). By incorporating mushroom production as an enterprise, Rangaswamy *et aI.* (1995), in the IFS comprising cropping, poultry and fishery, proved that the IFS generated more net income (Rs. 12,025) than conventional cropping (Rs. 6,334), improved the standard of living, helped in effective utilization of family labourers round the year and also minimized the risks associated with mere crop production. The efficiency of component linkage was evaluated predominantly on the basis of productivity of each component in the system. The advantage of poultry droppings as fish-feed provided wider scope for inclusion of poultry/pigeon as a component in low-land farming along with fish and mushroom associated with cropping. Similar increase in the total productivity of the IFS was reported by Devasenapathy (1995) by integrating cropping with dairy, fish, poultry and rabbit as compared to conventional cropping alone. Jayanthi *et aI.* (1997) undertook an investigation of an integrated farming system with components like cropping, fishery, poultry, pigeon and mushroom production. Pigeon droppings with comparable composition as that of poultry droppings, not being tried earlier, was also included to identify the feasibility to linkage in the low-land farming systems. They found that integration of cropping with poultry, fish and mushroom; with pigeon, fish and mushroom; and with fish and mushroom resulted in 168%, 188% and 129% higher productivity respectively as compared to cropping alone. In low land rice areas there is considerable scope for growing of fish along with rice (Sivakumar and Balasubramaniam, 2000). They observed that inoculation of azalea with rice + fish farming system enhanced the income and the nutrient uptake of low-land rice. Azolla as a component in the rice and rice + fish farming system helped to record higher grain yield by improving its manorial value and by smothering the aquatic weeds.

INTEGRATED FARMING SYSTEM FOR DRY LANDS AND RAINFED AREAS : In India nearly 100 million hectares of land is under rainfed cultivation, and rainfed cultivation shall continue to play an important role in Indian economy. The human population has already crossed the one billion mark. In view of this, there is a need to give more emphasis on boosting the productivity of rainfed agriculture in the coming years. Risk in dry land farming due to uncertain rainfall leads to adoption of diverse activities, otherwise called farming system approach. A judicious mix of anyone or more with cropping complements cropping enterprise through effective recyc1ing of residue/waste (Venkataraman *et al.* (1983*).* Similar statements have been issued by Sivasankaran *et al.* (1995) found that an additional net income of Rs. 3760 ha^{-1} $year^{-1}$ could be obtained by integrating crop husbandry with goat rearing over conventional cropping system. The Farming System Research (FSR) Unit also generated an additional employment of 113 man-days ha^{-1} year-lover the CCS. Thus it was evident that by integrating farming with cropping and goat rearing under dry lands, income of small and marginal farmers would be greatly enhanced.

INTEGRATED FARMING SYSTEM FOR PRODUCTION SUSTAINABILITY : The contribution of crops towards the system productivity ranged from 33 to 52 per cent, while poultry and mushroom contributed 28 to 39 per cent and 20 to 28 per cent, respectively. The highest system productivity of

21,487 kg/ha/year of rice grain equivalent yield was recorded with rice-brinjal system integrated with mushroom and poultry production. This was followed by rice-cowpea (18,027 kg/ha/year) and rice- groundnut system (16922 kg/ha/year) integrated with mushroom and poultry production. Rice-brinjal with mushroom and poultry system recorded nearly 400 per cent more productivity, of which 240 per cent was contributed by allied enterprises *viz*. mushroom (100%) and poultry (140%). Similarly, rice-cowpea sequence cropping integrated with mushroom and poultry recorded 318 per cent more productivity over rice alone (Manjunath and Itnal, 2003). Poultry and mushroom production when maintained with recycled by-products of rice production system such as paddy straw, rice bran and broken rice, the dependence and cost incurred on externally purchased inputs was greatly reduced. Thus, integration of poultry and mushroom production with recycling of by-products obtained from rice system enhanced the productivity of marginal rice lands substantially. The required resources – feed for poultry, fish and pigeon; substrate for mushroom production; and organic manure for field crops – can be secured at minimal cost through proper integration in the farming system. Among different integration Crop + Goat + Fish integration was tried by allocating 0.32 ha, 0.04 ha and 0.04 ha for crop, fodder and fishpond, respectively. Inclusion of one unit of goat (20 females + 1 male) could enhance the system productivity 35,000 kg/ha per year and productivity of Rs 98 per day. The goat unit would provide 11 tonnes of valuable manure apart from supplementing the feed requirement of fish (400 fingerlings). Jayanthi *et al*. (2009). Among different IFS models tried in Tungabhadra command area Rice+fish(Ri)-Rice+Fish (poultry)-poultry has given highest system productivity 11,133 kg/ha/year and higher sustainability index of 90.16 % which may be attributed to better recycling of resources reduced the cost of production and increased the system productivity due to integration of different components and thus gave higher sustainability (Channabasavanna *et al*., 2002). Kumar *et al*. (2012) reported that the contribution of crops towards the system productivity ranged from 57.1 to 81.1%, while fish ranged from 8.5 to11.8%; for goat 26.6 to 28.7%; for poultry 24.2%; for duck 7.4 to 10.1%; for cattle 34.4% and for mushroom 7.2%**.** Results on different combinations for three years revealed that integration of crop + fish + duck + goat resulted in highest system productivity in terms of rice-grain equivalent yield. Crop + fish + duck + goat and crop + fish + cattle model recorded 130% more productivity over cropping alone. Similarly crop + fish + goat model gave 113% higher productivity than growing crops alone. Besides inorganic fertilizer application of recycled pond silt, poultry manure, duck manure, goat manure and cowdung as FYM, composted residues (cereal residues) and vermicompost under different IFS module provide congenial situation to increase the yield. Channabasavanna and Biradar (2007) reported that the system productivity varied widely between the models. The model involving Rice-fish (pit at the center of the field) – poultry (reared separately) recorded the highest system yield and productivity mean over years (17,502 kg/ha/year). This was closely followed by Rice-fish (pit at one side of the field) – poultry (shed on fish pit). This may be attributed to the better growth, development and survival rate of fish in these treatments thus resulting in higher additional income. Over all mean indicated that IFS recorded the higher productivity of 15,555 kg/ha/year over conventional system of rice-rice (6,667 kg/ha/year).

INTEGRATED FARMING SYSTEM FOR INCOME SUSTAINABILITY : The highest average net returns of Rs. 1,59,479/year was obtained from an area of 1.0 ha with an average annual expenditure of Rs. 94,915/year by integrating crop + fish + duck + goat combination in the system followed by crop + fish + goat (Rs. 1,51,479/year) and crop + fish + poultry (Rs. 1,39,460/year) combinations. Sustainability index was also found higher in both the combinations (80 and 75.1%) respectively. Crop + fish + duck + goat model emerged as highest profitable enterprise for irrigated lowlands with an average net return of Rs. 471/day during the period of experimentation. This was due to the fact that system as a whole provided opportunity to make use of byproduct or waste materials, of one component as input on another. Hence, there is possibility for reduction in the cost of production of different enterprises and finally production cost of the system. Results on these combinations for three years revealed that integration of crop +fish +duck + goat also showed higher average sustainability index (80%). All other combinations tested here also resulted in higher av. Net returns/year, while their sustainability index varied from 51.5–75.1% over cropping alone. Cropping alone has resulted in lower sustainability index value of 19.3% only. Sustainability Index itself clarifies the benefits from different combinations/unit area. Higher the sustainability index, higher will be the net returns Kumar *et al*. (2012). The mean cost of cultivation for the coconut was worked out to be Rs. 12,150/ha during the experimental period similarly, for intercropping forage and legume an additional cost of Rs. 28,995/ha overall for the coconut based IFS Rs. 62.535 was incurred. the higher cost with dairy integration was due to the establishment costs including feed and labour.net returns from the coconut alone is very less Rs.6225/ha where as from IFS it was Rs. 32,335/ha. Higher yielding nature of hybrid Napiers used for intercropping coupled with on-farm generation of inputs in terms of feed for cattle and manure for the crop resulted in higher net returns Korikanthimath and Manjunath (2009). Shinde *et al*. (2010) reported that the integration of crop + dairy + poultry + fishery gave maximum net returns, sustainability index over rest of the IFS models under study. Integration of all the components has shown slightly lower sustainability index might be due to horticulture. This may be due to integration of crop production and animal components recorded year round income, employment and efficient utilization of natural resources. Among the cropping sequences, rice-rice system

yielded the maximum net returns of Rs. 7387. Higher gross returns due to high procurement price of rice resulted in higher returns. Cropping (0.73 ha) in IFS led to maximum net returns of Rs. 14600 followed by animal components (Rs. 8286). Contributions from cropping, goat, fish and poultry were 63.8, 30.9, 4.0 and 1.3 per cent, respectively**.** Net returns obtained from all the components were Rs. 22,887 with an increase of 32.3 per cent higher than conventional rice-rice system. The benefit cost ratio was also higher (1.97) in IFS than conventional system (1.64). Among the various components, goat recorded the highest benefit cost ratio (2.75) followed by fish (2.23) due to low cost of cultivation. This was followed by vegetables (2.00). Poultry showed the lowest benefit cost ratio (1.13) as a result of high cost of maintenance Barik *et al*. (2010) reported that IFS approach was found superior to crop alone providing maximum net income with benefit: Cost ratio of 1.78 and sustainability index of 54.58%. The additional income due to integrated farming approach was 179% higher than the farmer's practice. Singh (1994) reported that on 1.0 hectare of irrigated land, the net return for mixed farming with three crossbred cows ranged between US $ 466-1090 per year in different years, compared to a range between US $ -50 to 656 in mixed farming with three buffaloes. Three buffaloes units gave negative return during one year only in 7 years. The farmer's practice gave a minimum net return of US $ 153. The comparative average return as indicated by cost: return reveals that in most cases it was highest in arable farming followed by mixed farming with crossbred cows. Though cost: return was higher in arable farming, mixed farming had other advantages like production of more commodities, higher total net return, availability of more number of employment days uniformly distributed throughout the year and better use of by-products and wastes and supply of manures to the crop component of the system. Negative return from the buffalo unit could be attributed to longer calving interval, drier period and lesser milk productivity per animal. Throughout the study period, the average milk production per calving was about 9.0 liters per day per cow and 6.5 liters per day per buffalo.

CONCLUSION : An integrated farming system fulfills the multiple objectives of making farmers self-sufficient by ensuring the family members a balanced diet, improving the standard of living through maximizing the total net returns and providing more employment, recycling of crop residues, optimizing resource use, minimizing risks and uncertainties and keeping harmony with the environment by comprising' a combination of careful1y selected components/ enterprises under a given set of agro-climatic conditions.

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ANTIFUNGAL ACTIVITY OF CULTURE FILTRATES OF *TRICHODERMA* SPP. AGAINST *ALTERNARIA LINI* RESPONSIBLE FOR BUD BLIGHT OF LINSEED

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Abstract: Linseed blight caused by *Alternaria lini* is an economically important and major fungal disease of linseed. Disease is observed on linseed crop in different cultivated areas of India. For the current study, ten isolates of *A. lini* having different morphological and cultural characteristics were collected from genetically different lines of linseed. The effect of culture filtrates of four species of *Trichoderma* i.e. *T. viride*, *T. hamatum*, *T. harzianum* and *T. virens* were tested *in Vitro* on mycelial

growth of *A. lini* by poisoned food technique. The maximum inhibition of mycelial growth was observed with culture filtrate of *T. harzianum* when used as 10% concentration that inhibited redial mycelial growth upto 53.36%

In pot culture study, spray application of culture filtrate of *T. harzianum* at 10% concentration with three time schedules i.e. 30 hrs before inoculation, 30 hrs after inoculation and 60 hrs after inoculation were evaluated. Through this study spraying of 10% culture filtrates of *T. harzianum* after 30 hrs of inoculation of pathogen was found the most effective with 55.87% reduction of disease followed by spraying after 60hrs of inoculation of pathogen which was having 55.04% reduction of disease.

Key words: Biological control, Alternaria blight, linseed, Trichoderma

Linseed (*Linum usitatissimum* L.) is a winter season annual herb with erect, slender stem and is 60-80 cm tall. Linseed belongs to the family Linaceae and the genus *Linum* which has 100 species. It has been grown from ancient times for fiber (Flax) and for its seed which is rich in oil. Linseed has a great importance among oilseeds as all parts of the plant have extensive and varied uses. In India, linseed is mainly grown for extracting oil. The oil content of the seed generally varies from 33 to 45 per cent. Linseed oil is used for making linoleum, oil cloth, printers ink, soap, patent leather and other products (Kolte and Fitt, 1997). The oil cake remaining after oil extraction contains about 30 to 35 per cent protein. It is very rich proteinaceous feed for the livestock particularly quick growing animals. It is also used as organic manure. Fibers obtained from the stem are spun into linen yarns which are used for making variety of products (Singh *et al*, 2005).

Linseed blight caused by *Alternaria lini* is an economically important and major fungal disease of linseed. Disease is observed on linseed crop in different linseed growing areas of India. Due to environmental hazards caused by chemical fungicides (McEwen and Stephenson, 1979) now-a-days more emphasis is given on eco-friendly management strategies. Biological control is one of the most preferred eco-friendly management practices. Among the various bio-control agents reported to contain plant diseases *Trichoderma* spp is the most effective antifungal antagonist. For the current study, ten isolates of *A. lini* having different morphological and cultural characteristics were collected from genetically different lines of Linseed. The effect of culture filtrates of four species of *Trichoderma* were tested *in Vitro* on mycelial growth of *A. lini* by poisoned food technique. In pot culture study, spray application of culture filtrate of *T. harzianum* at 10% concentration with three time schedules i.e. 30 hrs before inoculation, 30 hrs after inoculation and 60 hrs after inoculation of *A. lini* were evaluated.

Material and Methods

Collection of pathogen and antagonist : Fresh naturally affected diseased plant parts and seeds of genetically different lines of linseed were collected from the disease screening nursery of AICRP (Linseed), Nagpur during Rabi season in the year 2007, to isolate the pathogen *A. lini*. The pathogen was isolated aseptically on PDA media at 28±2°C. Species was confirmed by observing the germ tube characteristics under microscope.

Four species of the known antagonist *Trichoderma* i.e. *T. viride*, *T. hamatum*, *T. harzianum* and *T. virens* were collected from the Department of Plant Pathology, Dr.PDKV, Akola (MS).

Evaluation of pathogenicity : Five linseed plants each were grown in sterilized soil composite (1 Sand: 2 Soil: 1 FYM) in 12" diameter earthen pots. When the plants started producing buds, small cotton swab dipped in 10^4 spore suspension of individual isolate were wrapped around the neck portion of the buds. Five buds were inoculated with every isolate. Inoculated plants were covered with polythene bags for 30 hrs and inside them 80-90% relative humidity (RH) was maintained by making light spray of double distilled sterilized water (DDSW) before sealing the bags. After 30 hrs the bags were opened and plants were sprayed with sterilized distilled water during morning and evening hours till the expression of symptoms. Observations were recorded for bud blight symptom on 7th day after inoculation and pathogenicity of isolates were confirmed by presence of blightening (Dey, 1933).

Preparation of culture filtrates : For preparation of culture filtrates antagonists were grown in 150 ml potato dextrose broth (PDB) in 250 ml conical flask for 20 days. After 20 days broth containing mycelium and spores were filtered through Whatman filter paper no. 4 then these filtrates were centrifuged at 5000 rpm for 10 min. to collect cell free supernatant and considered 100% concentration that was later used in poisoned food technique as 5% and 10% concentrations (Mane and Pal, 2008).

Effect of culture filtrates on mycelial growth of *A. lini* : Ten isolates of the *A. lini* were used for studying the antifungal activity of culture filtrates by poisoned food technique *in Vitro*. After pouring, solidification and cooling of two concentrations i.e. 5% and 10% of culture filtrates amended PDA medium, plates were inoculated by placing 6 mm disc of individual *A. lini* isolate (taken from 10 days old fungal lawn maintained on PDA) at the centre. For each concentration with each isolate three replicates were taken along with the check. Inoculated plates were incubated at 28±2°C and on 7th day diameter of fungal growth was measured. The per cent inhibition was calculated with the help of mean colony diameter by using following formula given by Vincent (1927).

$$I = \frac{C-T}{C} \times 100$$

Here, I = Per cent growth inhibition
C = Growth of fungus in control

T = Growth of fungus in treatment

Effect of culture filtrate under pot culture condition : The effect of most efficient treatment selected through in Vitro study was further tested against the disease under study on highly susceptible variety 'Kiran' in pot culture condition.

The spraying of spore suspension (an equi-proportional mixture of ten *A. lini* isolates) was done at evening time for disease development. Spore load of the inoculum was 10^4 spores/ml. Pots were covered with polythene bags for next 30 hrs.

Ten per cent solution of culture filtrate of *T. harzianum* was prepared before one day of application and was sprayed on two months old linseed plants grown in earthen pots at pre flowering stage. Spraying was done at three intervals i.e. pre inoculation (before 30 hrs of inoculation) and post inoculation (after 30 hrs and 60 hrs of inoculation).

The observations were taken on 10^{th} day of inoculation. To assess the effect of treatments 0-5 scale given by AICRP (Linseed), Nagpur was used for scoring the disease (AICRP, 2007). As per this scale –

0 = no infection
1 = 01 to 10 % leaf area/plant infected with disease
2 = 11 to 25 % leaf area/plant infected with disease
3 = 26 to 50 % leaf area/plant infected with disease
4 = 51 to 70 % leaf area/plant infected with disease
5 = 71 to 100 % leaf area/plant infected with disease

The per cent disease intensity (PDI) was calculated by following formula given by McKinney (1973).

$$PDI = \frac{\text{Sum of all numerical rating}}{\text{No. of leaves examined per plant X Maximum rating}} \times 100$$

Statistical analysis : Statistical analysis was done by applying completely randomized design (CRD) (Gomez and Gomez, 1983).

Results and Discussion

Effect of culture filtrate on mycelial growth of *A. lini* : All the four species of Trichoderma tested in this study had shown antifungal properties against *A. lini* (Table-1). This finding indicate that *Trichoderma* spp. possess broad spectrum antifungal property against Alternaria. The species of Trichoderma were varying in their performance to inhibit the mycelial growth (Table-2). Among the four species T. harzianum @ 10% was found the most effective (Table-1 & Table-2) that resulted into 24.55-53.36 % reduction of mycelial growth over the ten pathogenic isolates. Similar results were reported by Gulhane *et al.* (2005) on mycelial growth of *Pythium* spp. that causes damping off disease of tomato. Zade *et al.* (2005) has also reported the similar results on mycelial growth of *Puccinia arachidis* that causes rust disease of groundnut.

Effect of culture filtrate of *T. harzianum* on Alternaria blight of linseed in pot culture : Ten per cent concentration of *T. harzianum* culture filtrate found the most effective among all the treatments *in Vitro* was further tested under pot culture and results are summarized in Table-3. The data reveal that all the applications had shown reduction in disease intensity. The treatment was found to be the most effective (55.87% reduction of disease) when applied after 30 hrs of inoculation followed by spraying after 60hrs of inoculation of pathogen which was having 55.04% reduction of disease. The results are in accordance with the studies conducted by Gulhane *et al.* (2005) against damping off disease of tomato caused by *Pythium* spp. and Zade *et al.* (2005) against groundnut rust pathogen *Puccinia arachidis*.

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SWADESHI VIJNANA ANDOLANA-KARNATAKA
ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

Table 1: Effect of *Trichoderma* spp. on the radial mycelial growth of *Alternaria lini* isolates *in Vitro*

Treatments		Radial mycelial growth (mm)																			
		ALP-1		ALP-2		ALP-3		ALP-4		ALP-5		ALP-6		ALP-7		ALP-8		ALP-9		ALP-10	
		5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%
T-1	*Trichoderma koningii*	55.67	48.83	58.50	54.67	35.50	28.83	46.50	44.83	47.50	46.33	47.83	45.17	48.83	45.33	53.00	47.83	46.50	30.83	65.33	58.00
T-2	*T. harzianum*	60.50	50.83	59.67	55.83	34.00	25.00	48.33	40.67	55.50	49.33	53.50	43.00	52.83	45.83	45.83	35.17	42.17	39.17	62.83	56.17
T-3	*T. viride*	64.83	56.17	65.17	58.00	38.33	30.33	46.83	47.33	58.67	51.83	54.83	49.00	55.17	48.17	57.33	47.17	57.17	45.17	69.83	58.00
T-4	*T. viride*	70.83	69.17	71.67	68.50	48.00	41.17	57.17	50.00	67.00	61.17	64.17	50.83	62.83	57.50	60.17	56.17	63.83	60.83	68.50	64.83
T-5	Control	75.83	75.83	74.00	74.00	53.60	53.60	75.00	75.00	74.17	74.17	76.50	76.50	67.20	67.20	74.43	74.43	71.23	71.23	75.83	75.83
F-test		Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m) ±		0.40	0.40	0.74	0.74	3.26	3.26	0.56	0.56	0.68	0.68	0.47	0.47	0.54	0.54	0.42	0.42	0.66	0.66	0.47	0.47
CD (P=0.01)		1.64	1.64	3.05	3.05	13.50	13.50	2.28	2.28	2.76	2.76	1.91	1.91	2.22	2.22	1.72	1.72	2.71	2.71	1.91	1.91

Table 2: Per cent inhibition of radial mycelial growth of *Alternaria lini* isolates *in Vitro* due to culture filtrate of *Trichoderma* spp.

Treatments		Per cent Inhibition of Radial mycelial growth																			
		ALP-1		ALP-2		ALP-3		ALP-4		ALP-5		ALP-6		ALP-7		ALP-8		ALP-9		ALP-10	
		5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%
T-1	*Trichoderma koningii*	25.27	34.29	18.59	26.13	33.77	46.21	38.00	40.89	35.08	36.67	37.47	40.96	25.84	32.54	28.80	35.74	34.72	44.08	13.85	30.11
T-2	*T. harzianum*	20.72	32.97	19.31	24.55	36.57	53.36	34.22	45.78	24.11	32.57	31.07	43.79	21.38	31.80	38.47	52.75	40.80	45.02	17.14	28.93
T-3	*T. viride*	14.51	25.93	11.94	21.62	28.48	43.41	37.56	43.56	19.82	29.16	28.32	35.95	17.91	35.76	22.97	36.63	26.77	36.59	15.82	30.11
T-4	*T. viride*	6.59	8.79	3.15	7.43	10.45	22.06	23.78	33.33	8.43	16.40	15.12	33.55	6.50	14.43	10.17	24.54	10.39	14.60	9.63	14.51
T-5	Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 3: Effect of *Trichoderma harzianum* on Alternaria blight of linseed in pot culture condition

Treatments		Formulation	Dose	% Disease Intensity	% Disease Control
T-1	*Trichoderma harzianum* before 30 hrs of inoculation	Culture filtrate	10%	57.42	22.83
T-2	*T. harzianum* after 30 hrs of inoculation	Culture filtrate	10%	39.58	**55.87**
T-3	*T. harzianum* after 60 hrs of inoculation	Culture filtrate	10%	40.22	55.04
T-4	Control	Spray inoculation	10^4 spore suspension	73.57	0.00
F test -		-	Sig.	-	
SE (m)		-	-	0.47	-
CD (P=0.01)		-	-	1.81	-

SCENARIO OF FOLIAR FUNGAL DISEASES OF GREENGRAM AND THEIR INTEGRATED MANAGEMENT

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The greengram (also known as mungbean or golden gram) is the seed of *Vigna radiata,* an ancient and well known leguminous crop of Asia, native to the Indian subcontinent, Greengram is grown mainly as a *kharif* season crop. However, its cultivation in *rabi* season is restricted to the eastern and southern parts of the country and mainly cultivated in India, China, Thailand, Philippines, Indonesia, Burma, Bangladesh, Vietnam, Laos and Cambodia, but also in hot and dry regions of Southern Europe and the Southern United States. The major greengram growing states are Orissa, Maharashtra, Andhra Pradesh, Rajasthan, Karnataka and Gujarat. It is an important pulse crop of India. It ranks third among all pulses grown in India after chickpea and pigeonpea. The Hyderabad Karnataka area particularly Bidar and Gulbarga districts have an extensive cultivated area of greengram, pigeonpea and bengalgram. Hence, these regions are called "Pulse bowl" of Karnataka. Greengram is a rich source of protein (23 - 24%), carbohydrate (54 - 56%), minerals and vitamines. It has high digestibility due to which it is fed to babies, convalescents and elders. Unlike other pulses it is free from flatulent effects in stomach. It is consumed in many forms including boiled dhal, sprouts, bean cakes, noodles and pudding.

Greengram suffers from many diseases caused by fungi, bacteria, viruses, nematodes and also abiotic stresses. Among the fungal diseases, *Cercospora* leaf spot (CLS) caused by *Cercospora canescens* and powdery mildew (PM) caused by *Erysiphe polygoni* are important diseases. The diseases have been reported as a threat to greengram production In India. The damage caused to photosynthetic area could be considerable. It has become a chief contributing factor in the production of greengram yields. Symptoms of CLS on leaf produced are small, numerous in number with pale brown centre and reddish brown margin. Where as PM symptoms appear as white powdery patches on leaves which later become dull coloured. These patches gradually increase in size and become circular covering the lower surface also. Under favourable environmental conditions, severe leaf spotting and powdery mildew results in drying and premature defoliation.

Roving survey was conducted during *Kharif* 2011 to know the severity of CLS and PM diseases of greengram in the farmer's fields in Dharwad, Belgum, Baglkot and Gulbarga districts. CLS disease was observed in Dharwad and Belgum districts where as disease was absent in Baglkot and Gulbarga districts. PM disease was observed in all the four districts. The maximum disease severity leaf spot and powdery mildew was noticed in Dharwad district (78.52%) followed by Belgaum district (71.35%).

Fiftyfour greengram genotypes were screened against CLS and PM under field condition. Results revealed that, three genotypes *viz.,* PS-16, R-86, IC283869 were found resistant to CLS. For PM, five genotypes *viz.,* TARM-1, CO-GG-912, RM-8-6, WGG-37 and IC283869 were found resistant. IC283869 genotype was resistant to both CLS and PM diseases.

The efficacy of three systemic fungicides, one non-systemic fungicides,one combi product and a botanical was evaluated against CLS and PM under field condition. The results revealed that spraying with 0.1% hexaconazole and difenconazole helped to manage the CLS and PM successfully and recorded highest yield (7.52q/ha).

Introduction : The greengram (also known as mungbean or golden gram) is the seed of *Vigna radiata,* an ancient and well known leguminous crop of Asia, native to the Indian subcontinent, Greengram is grown mainly as a *kharif* season crop. However, its cultivation in *rabi* season is restricted to the eastern and southern parts of the country and mainly

cultivated in India, China, Thailand, Philippines, Indonesia, Burma, Bangladesh, Vietnam, Laos and Cambodia (Masood Ali and Shivkumar,2000) but also in hot and dry regions of Southern Europe and the Southern United States. The major greengram growing states are Orissa, Maharashtra, Andhra Pradesh, Rajasthan, Karnataka and Gujarat. It is an important pulse crop of India. It ranks third among all pulses grown in India after chickpea and pigeonpea (Rajendra Prasad, 2006). The Hyderabad Karnataka area particularly Bidar and Gulbarga districts have an extensive cultivated area of greengram, pigeonpea and bengalgram. Hence, these regions are called "Pulse bowl" of Karnataka. Greengram is a rich source of protein (23 - 24%), carbohydrate (54 - 56%), minerals and vitamins. It has high digestibility due to which it is fed to babies, convalescents and elders. Unlike other pulses it is free from flatulent effects in stomach. It is consumed in many forms including boiled dhal, sprouts, bean cakes, noodles and pudding.

Greengram suffers from many diseases caused by fungi, bacteria, viruses, nematodes and also abiotic stresses. Among the fungal diseases, Cercospora leaf spot (CLS) caused by *Cercospora canescens* and powdery mildew (PM) caused by *Erysiphe polygoni* are important diseases. The diseases have been reported as a threat to greengram production In India. The damage caused to photosynthetic area could be considerable. It has become a chief contributing factor in the production of greengram yields. Symptoms of CLS on leaf produced are small, numerous in number with pale brown centre and reddish brown margin. PM symptoms appear as white powdery patches on leaves which later become dull coloured. These patches gradually increase in size and become circular covering the lower surface also. Under favourable environmental conditions, severe leaf spotting and powdery mildew results in drying and premature defoliation.

MATERIALS AND METHODS

Survey : A roving survey was conducted during *Kharif* ,2011 to know the severity of leaf spot and powdery disease of greengram in farmer's fields in Dharwad, Belgum, Baglkot and Gulbarga districts. In each district five villages were selected and in each village one to three fields were surveyed. In each field, plants were selected in random and the severity of leaf spot disease was recorded by 0 to 9 scale (Mayee and Datar, 1986).

0 to 9 scale for leaf spot and Powdery mildew disease

Grade	Disease reaction	Description
0	Immune	No symptoms on leaf
1	Resistant	Up to 1% of leaf area cov ered by lesions
3	Moderately resistant	1-10% of leaf area covered by lesions
5	Moderately susceptible	11-25% of leaf area cov ered by lesions
7	Susceptible	26-50% of leaf area cov ered by lesions
9	Highly susceptible	More than 50% of leaf area covered by lesions

In each field five plants were selected randomly and scored for the disease severity. Per cent disease index (PDI) was calculated by using formula (Wheeler, 1969).

$$\text{Per cent disease index (PDI)} = \frac{\text{Sum of the individual disease ratings}}{\text{Number of leaves observed} \times \text{Maximum disease grade}} \times 100$$

Management : A field experiment was laid out at the Main Agricultural Research Station (MARS), Dharawad, University of Agricultural Sciences, Dharwad during *Kharif* 2011. The efficacy of three systemic fungicides, one non-systemic fungicides,one combi product and a botanical was evaluated against leaf spot. The experiment was conducted in randomized block design with seven treatments and three replications with cultivar shining mung. Treatment details are as followes.

Treatment no.	Treatment details
1	Carbendazim @ 0.1%
2	Mancozeb @0.2%
3	Difenconazole @ 0.1%
4	Achook @ 0.2%
5	Hexaconazole @ 0.1%
6	Carbendazim-12% + Mancozeb-63% @ 0.2%
7	Untreated

Plot size of 3 x 3.5 m^2 was maintained per treatment. The sowing was taken up on 29.06.2011. Fertilizers were applied as per package of practices. Spraying was taken up immediately after disease appearance. The observations on per cent disease index was recorded by using scale of 0-9 (Mayee and Datar, 1986). Per cent disease index (PDI) was calculated by using the formula given by Wheeler (1969) formula. The yield per plot, pod length, seeds per pod, hundred seeds weight and five plant seeds weight were recorded at harvest.

Screening of genotypes : Fiftyfour greengram genotypes were screened against leaf spot and powdery mildew under field condition at Main Agriculture Research Station (MARS) Dharwad, University of Agricultural Sciences, Dharwad during *Kharif* 2011. Genotypes were collected from All India Coordinated Research Project on MULLaRP and were screened against leaf spot and powdery mildew under field condition. Observations were recorded by using 0 to 9 scale by selecting five plants in each genotype. Based on their reaction genotypes were categorized into immune, resistant, moderately resiatant, moderately susceptible, susceptible and highly susceptible varieties.

RESULT AND DISCUSSION

Survey : The survey revealed that the leaf spot and pow-

dery mildew diseases were severe in the two districts surveyed. Leaf spot disease severity ranged from 62.25 to 86.18 per cent and powdery mildew severity ranged from 22.70 to 78.08 per cent.

Dharawad district recorded maximum leaf spot severity (78.52%) and maximum powdery mildew severity (75.32). Less severity of leaf spot disease (62.25%) was recorded at Belavadi village of Belgaum district. Least severity of powdery mildew disease (22.70) was recorded at sannur village of Gulbarga district.Leaf spot and powdery mildew diseases was completely absent in Bagalkot District and very less severity (27.39 %) of powdery mildew was recorded in Gulbarga district.

Maximum severity of leaf spot (86.18%) and powdery mildew (78.08%) diseases was noticed in Narendra Hence , Narendra villege of Dharwad district can be considered as hot spot for leaf spot and powdery mildew of greengram.

Among the districts surveyed maximum disease severity was recorded in Dharwad, which may be due to favourable environmental conditions viz., optimum temperature and relative humidity, moisture conditions that must have favoured the build up of inoculum (Aust and Jurgren, 1986) and subsequently showing increase in disease severity. Whereas in Bagalkot district the powdery mildew disease was completely absent. This may be due to unfavourable environmental condition which reduced the build up of inoculum and development of disease.

Management

Per cent disease index : All the chemicals and neem product have reduced the disease incidence significantly compared to untreated control. Among various chemicals tested, hexaconazole has given the good results with least per cent disease index and was on par with difenconozole. These two treatments were significantly superior to all other treatments. Highest per cent disease index was found in achook and was followed by carbendazim. However they were significantly superior over the control. Results are presented in table 2 and plate 1

Yield parameters : All treatments increased hundred seeds weight (5.70g), pod length (9.01cm), seeds per pod (14.60) and yield (7.52q/ha) significantly compared to untreated control.

Among the different chemicals and botanical tested, chemicals have given good results. They were significantly superior to all other treatments tested. Hexaconozole was very effective and reduced the disease with maximum yield (7.52q/ha) followed by Difenconozole. Minimum disease severity was observed in untreated plot followed by achook with minimum yield and these two are on par with each other. These results are comparable with findings of Khunti *et al.* (2002) and Divyajyoti (2012) who reported that hexaconozole effectively reduced the disease severity under *in vivo* condition.

Maximum pod length, seeds per pod, hundred seed weight and five plant seeds weight were also recorded in hexaconazole treatment. Minimum length, seeds per pod, hundred seeds weight and five plant seed weight were observed in achook.

Screening of genotypes : Screening of genotypes revealed that, none of the genotype was found immune for both the diseases. three cultivars *viz.*, IC 283869, R-86 and RM-8-6 were found resistant to leaf spot, 5 genotypes showed moderately resistant reaction. while 7 genotypes were moderately susceptible, 34 were susceptible and 5 were highly susceptible to leaf spot disease. IC 283869 was found resistant to powdery mildew, 4 genotypes showed moderately resistant reaction. While 47 genotypes were susceptible and 2 were highly susceptible to powdery mildew disease. Results are presented in table 3 , 4 and plate 2

The present study has revealed that the cultivars IC 283869, R-86, RM-8-6, LGG-460, PGG-04, DGS-52, LGG-460, PGG-04, PDM-84178 and PS-16 for leaf spot disease and cultivars IC283869, TARM-1,CO-GG-912, RM-8-6, WGG-37 for powdery mildew have shown resistant to moderately resistant reaction which can be used by breeders in resistance breeding. IC283869 has shown resistant reaction to both the diseases.

Conclusion : Higher severity of powdery mildew and leaf spot diseases was observed in Dharwad district. Spraying with 0.1% hexaconazole helped to manage the fungal diseases successfully and recorded highest yield and yield parameters. The cultivar IC 283869 was showing multiple disease resistant reaction to fungal foliar diseases.

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Table 1: Survey for the leaf spot and powdery mildew of green gram during *Kharif*, 2011

Districts	Taluk	Villages	Variety	Stage of the crop	Leaf spot PDI (%)	Powdery mildew PDI (%)
Belgaum	Saundatti	Munavalli	Shining mung	Pod formation	70.09	65.50
		Sogal	Shining mung	Pod formation	74.02	69.60
		Jeevapura	Local	Flowering	74.50	32.60
		Harlekatti	Shining mung	Pod formation	73.62	73.40
	Bailhongal	Chikkoppa	Shining mung	Maturity	82.16	73.40
		Hosur	Shining mung	Pod formation	62.26	72.90
		Belavadi	Shining mung	Flowering	62.25	71.60
		Inchal	Shining mung	Pod formation	71.90	69.00
District mean					**71.35**	**66.00**
Dharwad	Dharwad	UAS, Dharwad	Shining mung	Maturity	79.06	74.80
		Aminabhavi	Shining mung	Pod formation	80.79	71.60
		Amargola	Local	Pod formation	78.28	72.00
		Narendra	Shining mung	Maturity	86.18	78.08
	Hubli	Hubli	Shining mung	Flowering	74.37	77.90
		Unkal	Shining mung	Pod formation	76.68	74.80
		Sattur	Shining mung	Pod formation	74.33	77.06
		Gabbur	Shining mung	Pod formation	78.53	76.33
District mean					**78.52**	**75.32**
Bagalkot	Bagalkot	Shirur	Shining mung	Maturity	0.00	0.00
		Kamatagi	Local	Maturity	0.00	0.00
		Gaddankeri	Local	Maturity	0.00	0.00
		Kajjidoni	Local	Maturity	0.00	0.00
	Hungund	Amingad	Local	Maturity	0.00	0.00
		Ilkal	Shining mung	Maturity	0.00	0.00
		Hirekodagali	Local	Maturity	0.00	0.00
		Nandwadgi	Local	Maturity	0.00	0.00
District mean					**0.00**	**0.00**
Gulbarga	Jevargi	Harival	Shining mung	Flowering	0.00	24.85
		Nelogi	Shining mung	Pod formation	0.00	32.00
		Malar	Shining mung	Pod formation	0.00	29.60
		Yedrami	Shining mung	Pod formation	0.00	25.40
	Gulbarga	Farhatabad	Shining mung	Flowering	0.00	28.60
		Ferojabad	Shining mung	Flowering	0.00	29.60
		Mahagaon	Local	Pod formation	0.00	26.40
		Sannur	Shining mung	Pod formation	0.00	22.70
District mean					**0.00**	**27.39**

Table2:*In vivo* evaluationof fungicides and neem product on disease severity and yield parameters

Treatments	PDI		100 seeds weight (g)	Pod length (cm)	Seeds per pod	Yield (Q/ha)
	leaf spot	powdery mildew				
1.Carbendazim	44.29 (41.70)*	34.4 (35.88)*	3.75	8.99	14.06	6.61
2.Mancozeb	33.77 (35.51)	31.5 (34.06)	3.63	8.29	12.53	6.20
3.Difenconazole	13.18 (21.27)	21.6 (27.62)	3.78	9.00	14.60	7.31
4.Achook	53.32 (46.88)	36.0 (36.84)	3.59	7.70	12.60	5.25
5.Hexaconazole	13.03 (21.13)	16.8 (24.15)	5.70	9.01	14.06	7.52
6.Carbendazim+ Mancozeb	26.83 (31.17)	25.6 (30.36)	4.73	8.89	13.60	6.96
Untreated control	67.70 (55.35)	59.20 (50.31)	2.27	7.62	11.86	4.89
S. Em. ±	0.74	0.34	0.40	0.09	0.43	0.35
CD at 5%	2.28	1.89	1.24	0.29	1.32	1.09
CV%	3.54	4.34	17.79	1.88	5.55	9.50

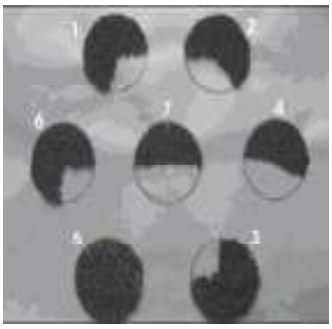
*Arcsine transformed values for which statistical analysis is done

Table 3 : Screening of greengram genotypes against leaf spot under natural condition

Grade	Disease reaction	Name of the genotypes
0	Immune	Nil
1	Resistant	**IC 283869**, R-86 , RM-8-6 **(3)**
3	Moderately resistant	LGG-460, PGG-04, DGS-52, PDM-84178, PS-16 **(5)**
5	Moderately susceptible	MLTGG-10-2, TMB-99-37, TM-98-50, WGG-37, WGG-37 **(5)**
7	Susceptible	Shining mung, Selection-4, Pusabaisaki, SML-668, IC 546502, IC 546475, IC 430580, IC 436531, IC 436611, IC 546499, IC 413318, IC 519769, IC 436526, IC 519564, IC 436555, IC 261260, IC 426772, IC 426771, IC 382784, IC 436629, MLT GG-10-8, MLT GG-10-7, MLT GG-10-16, MLT GG-10-13, MLT GG-10-15, MLT GG-10-11, TARM-1, C0-GG-912, DLGG-16, GGS-02, KGS-1-5, DGGS-02, KGS-83,TM-96-1 **(34)**
9	Highly susceptible	IC 546496, IC 436625, IC 436661, IC 413320, IC 369638 **(5)**

Table 4 : Screening of greengram genotypes against powdery mildew under natural condition

Grade	Disease reaction	Name of the genotypes
0	Immune	Nil **(0)**
1	Resistant	**IC283869 (1)**
3	Moderately resistant	TARM-1,CO-GG-912, RM-8-6, WGG-37 **(4)**
5	Moderately susceptible	TM-96-1, IC546475, IC 546502, PS-16, R-86, LGG-460, PGG-04, DGS-52, TMB-99-37, DGGS-02, KGS-83, TM-96-1, TM-98-58, SML-668, DLGG-16, GGS-02, KGS-1-5, PDM-84178, MLT GG-10-2, IC 413318, IC 519769, IC 436526, IC 519564, IC 436555, IC 261260, IC 546502, , IC546475, IC 430580, IC 436531, IC 436611, IC 546499, IC 426772,**(32)**
7	Susceptible	MLT GG –10-8, MLT GG-10-7, MLT GG-10-16, MLT GG-10-13, MLT GG-10-15, MLT GG-10-11,IC 426771, IC 382784, IC 436629, IC 546496, IC 436625, IC 436661, IC 413320, IC 369638,Selection-4 **(15)**
9	Highly susceptible	Shining Mung and Pusa baisaki **(2)**



Experimental view **100 seeds of each treatment** **Hexaconazole (0.1%)** **Untreated control**

Plate 1 : Field evaluation of fungicides on leaf spot and powdery mildew diseases

Experimental view **IC 283869 (Multiple disease resistant)** **Shining mung (susceptible)**

Plate 2 : Field evaluation of genotypes against leaf spot and powdery mildew diseases

EMU FARMING: A BUSINESS VENTURE

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Abstract: Emu the second largest flightless bird under the group ratites. Emu is scientifically classified as *Dromius Noveahollandiae*. Emus are raised throughout the world and have adapted to a variety of conditions ranging from the cold winters to the extreme heat. Emu farming in India is in developing stage. An NRI of West Godavari district in Andhra Pradesh started Emu farming for the first time during 1998. It can be grow and bred everywhere from Kashmir to Kanyakumari. It provide part time employment or to utilize family labour to earn some livelihood. It provides employment to educated unemployed youths of rural area. It increases export potential by producing more Emus for meat, oil & skin production in future and alternately to export the produce. Emu farming offers great scope and potential because of it's "supplementary income, additional employment and simplicity in operation" says the NABARD 'Model Bankable Project on Emu Farming. Efficient emu development can be Achieved by promotion of small units in villages through a gamut of functions like Dissemination of information & technology, making various inputs & organizing training Sessions for farmers on this subject. Emu farming is economically and finanacially feasible for the farmers.

Emu the second largest flightless bird under the group ratites. Emu is scientifically classified as *Dromius Noveahollandiae* along with other members of the group ostrich, kiwi and rhea, other flightless birds. Emu is native to Australia. Aborigines in Australia utilized these birds for their basic needs like food, clothing and for treatment. Presently, Emu Framing is spread all over the world with significant population in U.S.A, China, and Australia including Asian countries. Emu is becoming popular for having 98% fat free red meat and other utilities obtained by products namely; Emu oil, skin, feathers and ornamental eggs and toes.

Emu farming in India is in developing stage. An NRI of West Godavari district in Andhra Pradesh started Emu farming for the first time during 1998. Later breeding flocks spread over entire country for commercial purpose. Presently, emu farming is being carried out in large scale in States of Andhra Pradesh, Tamil Nadu, Maharashtra, Karnataka and parts of Kerala.

Since 2000, Department of Poultry Science, Veterinary College, Venkateshwara University, Andhra Pradesh is doing pioneer work in the areas of research on Emu. Central Poultry Development organization & Training Institute, Govt. of India, established an organized Emu unit during 2007, with a foundation stock of 30 pair breeding stock for expansion and to act as National Centre for Emu.

Basic information about emu

Characters	Emu
life span	40 years
chick weight at hatch	400 - 450 gm
adult body weight	40 - 50 kg
Height	5 - 6 feet
age at sexual maturity	18 - 24 months
slaughter age	14 - 16 months
sex ratio	1:1
egg weight	500 - 800 gm
no. of toes	3
incubation period	52 days
no. of egg produced / year	40 - 50 eggs
dressing meat yield	30 - 40 %
leather produced / bird	8 - 10 Sq. ft. /bird
feather yield/ bird	400 - 600 gm
Hatchability	60 - 90 %
oil production/bird	5 - 6 liters
laying pattern	lays an egg every 3 rd day
Laying time	Late evening and early morning
Running speed	60 Km/hr
Slaughter age	14 – 16 months

Emu farming: A business

Emu farming can be in the business of raising, emu birds for two main purposes.

I. The first purpose is Breeding Birds - to increase the emu population, because of the high profits that can be made by selling adult emus as breeding birds.

II. The second purpose is slaughter birds - to get the bi-products like emu meat, emu oil, emu bone, emu feathers, emu skin, emu nail. The emu ranch's secondary market will be the slaughter market, whose main products consist of prime cuts of emu meat, ready for sale to restaurants, residential orders, worldwide markets and in the future, shipment to supermarkets.

Business measures:

(a) One can Start Emu farm with maximum 1 acre of agricul-

tural land.
(b) Purchase Minimum 30 to 50 number of genetic 3-month-old Emu chicks from good Emu farm organizers.
(c) Emu Birds are grown by group concept only (16 birds' group need 56 x 56 feet space with 6 Feet height fence).
(d) Farm maintenance should be very important with good organic feed, purified drinking water.
(e) Emu bird 1st yields only in winter season and after completion of 21 months (in India November to December months)
(f) Further yield period is every year in winter season from October to March.
(g) Average of 10 to 15 eggs can be obtained from the 1st yield and subsequently average of 20 to 25 eggs can be obtained from next yields every year.
(h) Chick sale is a best profitable compared to egg sale.

Advantages of Emu Farming:
* The Emu Farming Advantage Emu is a relatively simple animal to farm and easy to manage.
* Emu adapts to almost any climatic condition. Emu has a very low susceptibility to disease.
* Emu integrates well with other farming operations, i.e. horses, cattle, sheep, fruit orchards, etc.
* Emu require very little ground space when compared to other livestock, (15 acres easily accommodates up to 600 birds).
* Emu efficiently convert feed to meat yielding 18 - 25 lbs. of premium meat at a processing age of one year, which allows a quick turn over of stock for the breeder.
* Emu consume negligible amount in feed (approx. 700 Rs per year) resulting in a high proportion of product revenue to low maintenance cost.
* Emu is **"the totally usable bird"**; oil, meat, leather, feathers, toenail and eggshells.

Products of Emu:
Emu Oil: Research and development of Emu oil using in cosmetics and pharmaceuticals is rapidly expanding. Emu oil has been documented to exhibit the following properties and/or has been used for the following purposes.
o Anti - Inflammatory Activity
o Moisturizing
o Cholesterol Reducer
o Bacteriostatic
o Penetration Enhancer
o Significant epidermal proliferative activity
o Non – Comedogenic
o Significant wound healing agent
o Significantly reduces recent keloid scarring
o Appears to promote faster healing of burns with less pain and scarring
o Anti - Arthritic Activity.
o Excellent Emulsifier.

Emu Egg:
· A single bird gives minimum twenty and maximum forty eggs every year
· These eggs have dark-green color
· Each egg weighs 400 to 600 gms

Egg shells and claws: Can be carved into jewelry and decorative items Key chains, pendants in necklaces
Emu leather: Emu leather is thin, very durable, supple and breathable. It perfectly fit for designer apparels, handbags, boots and other accessories. Has the ability to accept and enhance any color dye leather are also used to make beautiful belts, wallets, purse, bags and watch bands. The thinness and softness make it suitable for lightweight clothing and accessories. The leg skin is highly suitable for making watch straps and belts. Features of wallets due to its attractive scale pattern.
Emu Feathers: The feathers of the Emu bird are double quelled, attractive and velvety to the touch. They are soft, light and non-allergic, which makes them the ideal material for a host of applications. They are in demand both in the fashion and in art and craft industries. They are used as feather duster, feather pad, fans, boas, and masks, finishing metals prior to painting, weather-proof apparels, and pillows, blazers, sweaters, jeweler, and craft items.

Emu Feathers Feature
✓ Emu feather is long and beautiful.
✓ They are used to clean computers, audio, video, electronic equipments, automobiles, glass products.
✓ The feathers are used for earrings, pencil buddies, hair picks and doll hats.
✓ The feathers on the emu are unique in the fact that there are two feathers to a single quill.
✓ Feathers used in crafts; clothing accents, jewelry, and even pillows these feathers have a variety of uses.

Emu chick:
• Emu chick weighs approximately 70% of emu egg weight
• Emu chick breeds naturally or by using incubator
• Artificial incubation is often conducted at a temperature of approximately 97.5 degree Fahrenheit
• A relative humidity that varies according to the climate.
• Average incubation time ranges from 48 to 52 days.
• Born chick colors are coffee brown with white line marks.
• Color will change after 3 months
• Nutrition food and purified water is must up to 3 months

Emu meat: Low on cholesterol, high on protein," in what sounds like a well the benefits of consuming emu meat. 300 in Maharashtra-up and running in the country today. While 1,000 may seem like a big Number, it's a drop in the ocean in comparison with the poultry farms that dot the country. Likewise in production, there are estimate of about 33,000 tones of emu meat produced in India now, which is a fraction of the 1.9 million tones of chicken meat produced in the country every year. Each and every part of emu's body is commercially valuable. The most important is of course, its meat which is 97 to 98% fats free. Emu meat is rich in proteins; it contains

plenty of iron, vitamin B-12, hence as the modern research shows 'emu meat is an excellent diet for people suffering from heart–ailments. Emu meat has less fat content, it is easily digestible, very tasty and hence it serves as a very good alternative for mutton and chicken. Therefore, there is a great demand for it in international market. Each bird can yield about 25 kg of meat.

Economic importance of emu farming

Whole bird: The price of a pair of 3 - 5 months old birds having live body weight each 10-12 Kg Is about Rs. 20,000/- to Rs 21,000/- and the birds are used for farming purpose.

Oil: About 4-6 liters of oil is available from a bird which is devoid of any color, taste and odor. The price of one liter refined emu oil is about Rs.3000. The raw fat/crude oil of emu fetches about Rs. 1000 per Kg.

Skin: Price of good quality skin is reported to be about Rs. 1000/- per Sq.ft and 8-12 sq ft. of skin is available from a well matured bird.

Eggs: Hatcheries purchase @ Rs 750/- per egg (15 days) or on the basis of chick born @ Rs. 1000 to 1200 per chick as per buy back agreement for supply of Emus & purchase of eggs.

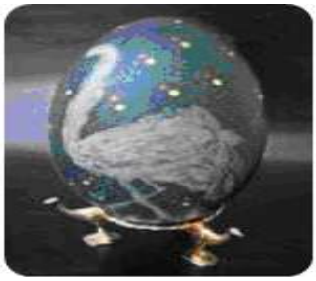
Feathers: About 400 to 600 gm of feathers would be available from a bird and each bird would fetch about Rs. 200/- at present

Egg shells and nails: The egg shells are used for painting and as decorative items owing to their deep blue color. Nails are strong having decorative uses in artificial ornaments and craft goods.

EMU OIL

EMU LEATHER

EMU FEATHER



EMU EGG

Financial assistance:

Loan from banks with refinance facility from NABARD is available for establishing Emu farm. For obtaining bank loan, the farmer should apply to the nearest branch of a Commercial or Cooperative or Regional Rural Banks in their area in the prescribed forms which is available in the branches of financing banks. For Emu farming schemes with very large outlays, detailed reports will have to be prepared. The technical officers attached to or the Branch Manager of the bank can help/ give guidance to the farmers in preparing the project report to obtain bank loan. A scheme can also be prepared by the beneficiary after consulting local technical experts or private commercial Emu hatcheries. Consultancy Services of NABARD would also be available for large commercial projects.

SWOT ANALYSIS

STRENGTHS:

- It has a extremely large application
- For greater return than any other agriculture pursuit.
- The products health oriented contribution.
- Varied climate adoption of the bird.
- Resistant to most of the disease
- Wide variety of products
- Lack of potential competitors at present
- Can create employment
- Long term business

WEAKNESS:

- Lack of information
- Care while transportation
- Sex ratio has to be maintained (1:1)

OPPORTUNITIES:

- Huge demand in global market
- The strong current in India so huge market
- Can be diversified into various projects.
- Recession of poultry industry due to bird flu.

THREATS:

- Higher investment
- For returns have to wait for 2 years

Conclusion:

Emu farming offers great scope & potential because of its supplementary income additional employment & simplicity in operation .Efficient emu development can be achieved by promotion of small units in villages through a gamut of functions like Dissemination of information & technology, making various inputs & organizing training Sessions for farmers on this subject. After knowing the products of Emu and their economic importance we can conclude that Emu farming can be carried out as a business which is financially feasible for the farmers.

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ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

INFLUENE OF SEED PELLETING ON FIELD PERFORMANCE AND STORABILITY OF TOMATO (LYCOPERSICUM ESCULENTUM MILL.)

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ABSTRACT: The field and laboratory experiment was to study the influene of seed pelleting on field performance and storability of tomato cv. PKM-1 at the Department Of Seed Science and Technology, University of Agricultural Sciences, Dharwad. The experiment consisted of six seed pelleting treatments viz., T1 (carbendazim @ 2 g/kg), T2 (Neem leaf powder @ 10 g/kg), T3 (CaOCl2 @ 3 g/kg), T4 (ZnSO4 @300 mg/kg) and T5 (Trichoderma viridae @ 4 g/kg) and T6 (unpelleted seeds as a control) and two containers viz., Cloth bag (C1) and Polyethylene bag (C2). The required quantity of tomato seeds were pelleted as per the treatment using binder polyvinyl acetate (60 ml/kg) and filler saw dust (10g/kg).Then Pelleted seeds were packed in cloth bag and polyethylene bag (700 gauge) and stored under ambient condition for ten months. The pelleted seeds significantly influenced on the field performance of the tomato crop. Among the seed pelleting treatments the seeds pelleted with ZnSO4 (300 mg/kg) recorded higher field emergence (91%), plant height (84 cm at 90 DAS), number of leaves (75 at 90 DAS), less days to initiation and 50 per cent flowering (58, 64 respectively), number of fruits per plant (31), fruit yield per plant (1432), number seeds per fruit (236), seed yield per plant (23.49 g), seed yield per hectare (564 kg) and 1000 seed weight (3.17 g) compared to unpelleted seeds. The pelleted seeds also performed better throughout the storage period over unpelleted seeds. Among the seed pelleting treatment seeds pelleted with carbendazim (2 g/kg) and CaOCl2 (3 g/kg) recorded significantly higher germination (73.63% and 70.63%), seedling length (23.63 and 20.35 cm), vigour index (1736 and 1443), dry matter production (28.75 and 26.83 mg), speed of germination (19.60 and 18.37) and dehydrogenase activity (0.254 and 0.209 OD value) and lower moisture content (7.02 and 7.04%), electrical conductivity of seed leachate (0.487 and 0.499 dS m-1) and seed infection (0.00 and 9.25%) while, all the seed quality parameters were significantly lower in the unpelleted seeds (58.63%, 8.09 cm, 7.54 cm,15.63 cm, 935, 16.48 mg, 13.52, 0.118 OD value respectively) at the end of storage period. Between the containers seeds stored in polyethylene bag maintained satisfactory seed quality parameters compared to seeds stored in cloth bag throughout the storage period. Among the interactions seeds pelleted with carbendazim and stored in polyethylene bag recorded higher seed quality throughout the storage period followed by the CaOCl2 compared to unpelleted seeds stored in cloth bag.

INTRODUCTION : Tomato (*Lycopersicon esculentum* Mill.) a self pollinated crop is one of the important solanaceous vegetable crops grown widely all over the world because of its special nutritive value and also its wide spread production. It is the world's largest vegetable crops next to potato and sweet potato, but it tops the list of commercial vegetables.Health wise tomatoes are one of the "Highest perch" because they contain an antioxidant "lycopene" and for its ability to reduce the risk of prostrate cancer in men. Tomato fruit is an excellent source of Vitamin C (160-240 mg) and edible protein (100 g). It also contain important minerals such as copper (0.01-0.09 mg), manganese (0.09-0.13 mg) and zinc (0.1-0.17 mg/kg) (Charanjeet Kaur *et al*., 2004). The successful establishment of the crop mainly depends upon good quality seed. To provide better quality seed, many seed companies have developed new technologies called Seed Enhancement Techniques. These technologies are the key inter-phase between the two highly specialized industries namely Crop Protection and Seed Industry.

Presently the main thrust in agricultural and horticultural crops is to optimize the application of seed treatment products by improving the technical quality of seed. In order to reach this target Seed Pelleting technique has been developed.Seed Pelleting is the process of enclosing a seed with small quantity of inert material just large enough to produce globular unit of standard size to facilitate precision planting. The inherent material creates natural water holding media and provides small amount of nutrients to young seedlings (Roos, 1979, Scott, 1989 and Krishnasamy, 2003). Pelleting of the seed with suitable adhesive, filler and bioactive chemicals focuses on the performance of seeds with respect to achievement of desired population, high probability of successful establishment of each seed planted and possibilities of precision planting, which is the key basis for successful crop/ seed production. The most essential phase of precision planting is the singling of seeds for exact placement at a pre-determined depth and spacing in the soil with a uniform coverage and at a reasonable planting speed. Singling is difficult for seeds which are low in density and irregular in shape. To overcome these difficulties seed pelleting is advocated (Bharathi *et al.,* 2003). Improvements in pelleting technology over the last decade includes; increased oxygen penetration/ availability, wider pellet density range, pellet loading, better field visibility, material buildup around rough, flat, irregular seed to produce round, smoothen and whole uniformly sized seeds, protection from birds and rodents and supply of growth regulators, macro and micro nutrients and selective herbicide or herbicide antidotes (Bilie and Edwards, 1980). Keeping in view the importance of pelleting, the present experiment was carried out to evaluate the effect of pelleting on field performance and also storage potential of tomato seeds.

MATERIAL AND METHODS: The present study was conducted to ascertain the influence of pelleting on field performance and storability of tomato seeds.

Treatment details
The experiment consisted of six treatments as detailed below.
T1 : Carbendazim @ 2 g per kg of seed
T2 : Neem leaf powder @ 10 g per kg of seed
T3 : CaOCl2 @ 3 g per kg of seed
T4 : ZnSO4 @ 300 mg per kg of seed
T5 : *Trichoderma viridae* @ 4 g per kg
T6 : Control (unpelleted seeds) The experiment was laid out in a Randomized Complete Block Design with four replications.
Gross plot : 5.0 x 5.5 m
Net plot : 4.5 x 5.0 m

Procedure of seed pelleting: Before imposing seed treatment, the seeds were manually cleaned and subjected for grading using 4.00 (R) m top screen and 2.10 (R) mm bottom screen sieves. Moisture content of seeds was brought to 6.10 per cent before pelleting. The filler material saw dust was obtained locally and sieved through 1.0 mm wire mesh sieve.The required quantity of carbendazim (2 g), neem leaf powder (10 g), CaOCl2 (3 g), ZnSO4 (300 mg) and t*richoderma viridae* at 4 g per kg of seeds were treated to seeds and pelleting was done by using polyvinyl acetate (60 ml/kg of seed) as binding material. The pelleted seeds were dried under the shade for four days before sowing. pelleted seeds are shown in Plate 2. The pelleted seeds as per treatments were sown directly into the main field where plots were made with a length of 4.5 m and a width of 5.0 m. The seeds were sown with spacing of 60 cm in each row. Thus, net plot size was 22.5 m2. The control plots were sown with un pelleted seeds. The experimental plot was kept free of weeds by regular hand weeding. Depending upon soil and climatic conditions, protective irrigation was given during the cropping period and need based plant protection measures were taken as and when required. The fruits were harvested when they were fully matured and turned red in colour starting from 100 DAS.

Pelleting material used :
Adhesive material : Polyvinyl acetate (60 ml/kg)
Filler material : Saw dust (10 g/kg)

Seed extraction : The fruits were harvested separately according to the treatment and the harvested fruits were kept for fermentation up to 4 days and fruits were crushed without causing damage to the seed. The seeds were separated manually by repeated hand washing of the pulp. Then, the seeds collected on the sieve were separated and dried in the shade. When the seeds reached 7 per cent moisture content, the weight of seeds from each treatment was recorded using electronic balance. In each treatment ten plants were randomly selected and tagged for recording various biometric observations such as, field emergence (%),Plant height (cm), Number of leaves per plant, Days to first flowering, Days to 50 % flowering, Number of fruits per plant, Fruit yield (g/plant), Number of seeds per fruit, Seed yield per plant (g), Seed yield per plot (g), Seed yield per ha (kg), 1000 Seed weight (g), Germination (%), Seedling vigour index, Dry weight of seedling (mg) Electrical conductivity (dsm-1).
The storage experiment consisting of totally 12 treatment combinations involving six seeddressing chemicals and two containers. The details of the treatments are furnished below.
Factor – I: Seed dressing chemicals (T)
T1 : Carbendazim @ 2 g per kg of seed
T2 : Neem leaf powder @ 10 g per kg of seed
T3 : CaOCl2 @ 3 g per kg of seed
T4 : ZnSO4 @ 300 mg per kg of seed
T5 : *Trichoderma viridae* @ 4 g per kg of seed
T6 : control (unpelleted seeds)
Factor – II: Containers (C)
C1 : Cloth bag
C2 : Polythene bag
Treatment combinations
1. T1C1 7. T1C2
2. T2C1 8. T2C2
3. T3C1 9. T3C2
4. T4C1 10. T4C2
5. T5C1 11. T5C2
6. T6C1 12. T6C2

The treated seeds were packed in polyethylene bag (700 gauge) and cloth bag and stored under ambient condition in the laboratory of Department of Seed Science and Technology, Dharwad for ten months. Initial seed quality parameters of tomato seeds before storing were recorded and every month required quantity of seeds were drawn from each bag for taking observations on seed quality parameters such as Seed health test: Pathogen infection by Blotter method (ISTA, 1999) Storage fungi present on seeds were detected using blotter method as prescribed in ISTA. Twenty five seeds were placed equidistantly on three layered moistened blotter taken in sterilized petriplate. Each treatment was replicated four times. They were incubated at 200C for seven days with alternate cycle of 12 hr near ultra violet (NUV) range and for remaining 12 hr in dark. On eighth day, the plates were examined under stereo binocular microscope for the presence of seed borne fungi. The number of infected seeds were counted and expressed in percentage besides, the kind of fungi present were also identified and documented with the help of pathologist.

Dehydrogenase activity : Representative seeds (25) from each treatment were taken and preconditioned by soaking in water for overnight at room temperature. Seeds were taken at random and the embryos were excised. The embryos were steeped in 0.25 per cent solution of 2, 3, 5-triphenyl tetrazolium chloride solution and kept in dark for two hours at 400C for staining. The stained seeds were thoroughly washed with water and then soaked in 5 ml of 2 methoxy ethanol (methyl cellosolve) and kept overnight for extracting the red colour formation. The intensity of red colour was measured using ELICO UV-VIS spectrophotometer (model SC- 159) using blue filter (470 nm) and methyl cellulose as the blank. The OD

value obtained was reported as dehydrogenase activity.

RESULTS AND DISCUSSION : Seed is an important basic and crucial input in agriculture. The two most important aspects in the seed programme are maintaining the continuous supply of high quality seed inorder to producers to produce genetically pure seed and also to preserve the quality of seed from harvest to next sowing. High quality seed that provides adequate plant stand is the basis for profitable production and expansion of a crop. This depends largely on the germination and vigour potential of seed used for the sowing and which can be improved through

Seed Enhancement Techniques. : In the present study fresh seeds of tomato cv. L-15 were first coated with carbendazim (2 g/kg), Neem leaf power (10 g/kg), CaOCl2 (3 g/kg), ZnSO4 (300 mg/kg), *Trichoderma viridae* (4g/kg) and then seeds were pelleted with a filler material (saw dust@ 10 g/kg) and polyvinyl acetate (60 ml/kg) as binding material. The pelleted seeds were evaluated for field performance and the results generated are discussed here under.The pelleted seeds significantly influenced the growth parameters such as field emergence, plant height, number of leaves, days to first flowering and days to 50 per cent flowering at different growth stages. Among the pelleting treatments ZnSO4 (300 mg/kg) recorded significantly higher field emergence (91%), plant height (84 cm at 90 DAS),number of leaves (75 at 90 DAS), less days to initiation of flowering (58) and less days to 50 per cent flowering (64). While unpelleted seeds recorded lowest field emergence (81%), plant height (64.25 cm at 90 DAS), number of leaves (50 at 90 DAS). The seeds pelleted with ZnSO4 at 300 mg per kg of seed performed better compared to other treatments with respect to field emergence and seedling growth. Dhamalingam *et al*, (1988) opined that the improvement in field emergence due to seed enhancement techniques could be ascribed to activation of cells, which resulted in the mitochondrial activity enhancement leading to the formation of more high energy compounds, an important biomolecule which are made available during the early phase of germination. In this study seeds pelleted with ZnSO4 (300 mg/kg) was found to be effective compared to unpelleted control seeds. This might be due to easy availability of ZnSO4 to the plant which leads to early vigorous growth of plant there by advanced reproduction phase and enhanced metabolic activity of seedlings as reported by Kanstantinov (1982); Sathymoorthy and Vivekanandan (1990); Anon (1999); Srimathi *et al,* (2000) in tomato and Ahamed Raza (1997) in onion and Ramesh (1996) in carrot. Yield Parameters were also significantly influenced by seed pelleting treatments. Seed pelleted with ZnSO4 (T4) recorded significantly higher number of fruits per plant (31), fruit yield per plant (1432), number seeds per plant (236), seed yield per plant (23.49 g), seed yield per plot (1269 g), seed yield per hectare (564 kg) and 1000 seed weight (3.17 g). While control (unpelleted seeds (T6) recorded lower number of fruits per plant (22), fruit yield per plant (1022 g), number seeds per plant (164), seed yield per plant (7.58 g), seed yield per plot (409 g), seed yield per hectare (182 kg) and 1000 seed weight (2.12 g). Zinc is regarded as component of a variety of enzymes which helps in protein synthesis and in the utilization of phosphorous and nitrogen and also known to enhance plant growth on account of its major role in increased auxin metabolism which has a pivotal role in metabolic activity of plant as well as seed formation which is also evident in the present study. The increased in yield parameters noticed with ZnSO4 pelleted seeds may be due to the better crop stand and activation of metabolic activities of the plant. Nutrients are the constituents of several dehydrogenase enzymes and also an activator of other enzymes, nutrients are also necessary for the biosynthesis of IAA, which is essential for normal enhancement of cells.The present investigation revealed that seeds pelleted with ZnSO4 (300 mg/kg), *T. vridae* (4 g/kg), arbendazim (2 g/kg), CaOCl2 (3 g/kg) and Neem leaf powder (10 g/kg) showed superiority in terms of growth and yield parameters of tomato. However, the maximum per cent increase in growth and yield parameters over the unpelleted control was noticed in the seeds pelleted with ZnSO4 (300 g/kg) to the extent of 9.88 per cent field emergence, 32.81 per cent in plant height at 90 DAS, 49.25 per cent in number of leaves per plant, 43.84 per cent in number of fruits per plant, 209.89 per cent in seed yield per plant and 49.53 per cent in 1000 seed weight. In general, all the pelleting treatments improved the growth of plant during early stage of crop with vigorous and stronger root system enabling plants to derive the available soil moisture and nutrients which might have resulted in enhanced growth and yield. After the harvest of the crop, the resultant seeds were analyzed for various seed quality parameters. All the pelleting treatments showed beneficial significant influence on seed quality parameter over control. The seeds harvested from the plots which were sown with the seeds pelleted with ZnSO4 (300 mg/kg) recorded higher germination (94%), seedling vigour index (2618), dry weight of seedling (28 mg) and lower EC value of seed leachate (0.040 dS m-1).While, unpelleted control (T6) seeds recorded lower germination (87.00), seedling vigour index (1570), dry weight of seedlings (18 mg) and higher EC value of seed leachates (0.082 dS m-1), indicating the formation of better quality of seeds due to nutrient enrirchment in the seeds. Zinc element involved in auxin metabolism plays a vital role in seed set, seed size and quality. Higher seed quality parameters noticed in the present study may be due to well developed seeds with higher test weight, lower electrical conductivity and higher dehydrogenase enzyme activity. Hence, additional supply of nutrients and direct availability of micronutrients to the mother plant which leads to the production of good quality seed. These results are in conformity with the findings of Rathinavel *et al*, (2000) in cotton In the present study fresh seeds of tomato cv. PKM-1 were first coated with carbendazim (2 g/kg), Neem leaf power (10 g/kg), CaOCl2 (3 g/kg), ZnSO4 (300 mg/kg), *Trichoderma viride* (4g/kg) and

then were pelleted with a filler material (saw dust 10 g/kg) and polyvinyl acetate (60 ml/kg) as binding material.The pelleted seeds were stored in polyethylene bag (700 gauge) and cloth bag for 10 months under ambient storage condition of Dharwad from July 2007 to may 2008. Observations on different seed quality parameters were recorded and the results obtained are discussed here under by enlighting the available literature. Seed is the nucleus of life and is subjected to continuous ageing once it has reached maturity. This phenomenon results in an irreversible change in seed quality ultimatelyaffecting viability. The quantitative deterioration during storage is mainly attributed to period of storage (Delouche and Baskin, 1973) and seed treatment (Basu and Rudrapal,1980) besides, other factors like seed moisture content, temperature, relative humidity and storage containers. During storage, viability and vigour are lost due to many biotic factors like micro flora. The storage fungi cause considerable damage and are responsible for deterioration and reduction in storage potential of seed. Seed deterioration is irreversible, inevitable, irrepairable, but the rate of deterioration can be showed by certain seed enhancement techniques like seed treatment, coating, or pelleting with suitable chemicals, botanicals, micronutrients and biocontrol agents which reduce the quantitative and qualitative loss besides maintaining quality of the seed for longer storage. In the present study seed pelleted with fungicide, chemicals, botanicals and biocontrol agents had a significant effect on germination. Seeds pelleted with carbendazim gave significantly higher germination throughout the storage period followed by the seeds pelleted with CaOCl2, Neem leaf powder, *Trichoderma viridae*, ZnSO4 over control. The germination percentage at the end of storage period was significantly higher in seeds pelleted with carbendazim (73.63%), CaOCl2 (70.63%), Neem leaf powder (65.63%), *Trichoderma viridae* (61.75%), ZnSO4 (60.25%). Seeds pelleted with carbendazim and CaOCl2 maintained above the Minimum Seed Certification Standards of 70 per cent till the end of storage period. Whereas, Neem leaf powder pelleted seeds maintained germination up to 8 months, *Trichoderma viridae* and ZnSO4 retained up to 7 months compared to control which retained 70 per cent germination up to six months only. The probable reason for differences in storability of seeds pelleted with various chemicals and biocontrol agent might be due to variations in their effectiveness in combating the seed borne pathogen and also might be due to the persistence of these chemicals on seed surface during storage for longer time.Seed pelleting with carbendazim was found to preserve the quality of seed by its antifungal effect. Carbendazim also protects the seed from fungal and insect attack finally contributing to seed quality parameters (Taylor and Eckenrode, 1993). Similar findings were also reported by Jayaraj *et al*, (1988) in capsicum, Gupta and Dharamsingh (1990) in vegetable mung and cowpea seeds for bavistin and thiram, Anuja Guptha and Dharm singh (1993) in chilli for thiram and bavistin, Raju and Sivaprakasam (1994) in cabbage, and Sathishkumar, (2005) in brinjal. Further, the presence of fungicide might also have increased the germination by decreasing the abnormal seedlings (Robani, 1994).The root length (12.55 cm), shoot length (11.08 cm), seedling length (23.63 cm), vigour index (1736), dry matter production (28.75 mg), dehydrogenase activity (0.254 OD value), speed of germination (19.60) were significantly higher with lower moisture content (7.02), EC value (0.487 dS m-1) and zero percent seed infection were observed in seeds pelleted with carbendazim than pelleting with other treatments. Whereas, all these parameters were lowest in unpelleted seeds (8.09 cm, 7.54 cm, 15.63 cm, 935, 16.48 mg, 0.118 OD value and 13.52 respectively) with higher moisture content (7.14%), EC value (0.615 dS m-1) and higher seed infection (35.50%) at the end of the storage period. This might be due to the control of physiological deterioration of seeds by their antifungal and antimicrobial effect, increased enzymatic activity, and efficient translocation of heterotrophic seedlings. Similar findings were also reported by Vijayakumar *et al*, (1991) in onion and Sharanamma, (2002) in chilli. The seed pelleting treatment had significant effect on vigour during all the months of storage period. The seeds treated with carbendazim gave higher vigour followed by CaOCl2. This might be due to maintenance of cell membrane integrity leading to less susceptibility to peroxidative and free radical reactions, as these chemicals possess antimicrobial agents hence the deterioration level in these treated seeds was less which is evident with lower EC values and seed infection with higher activity of dehyrogenase enzyme. Similar findings were also reported by Ravi Hunje (2007) in chilli seed treated with potassium iodide and CaOCl2. With respect to the storage period, the germination, vigour index, dry matter production decreased as the storage period increased. This may be ascribed to the damage caused to membranal enzyme, protein and nucleic acid and such degenerative changes resulted in the complete disintegration of membrane and cell organelles (Roberts, 1972).

The present study revealed that the seeds stored in polyethylene bag maintained higher germination (67.88%), vigour index (1381) and dehydrogenase activity (0.225 OD value) with lower moisture content (6.63%),EC value of seed leachate (0.534 dSm-1) and seed infection (16.04%) compared to cloth bag (62.29%, 9.10 cm, 8.61 cm, 17.71 cm, 1123, 18.28 mg, 14.85, 0.121 OD value, 7.51%, 0.545 dSm-1, and 18.67% respectively) at the end of storage period. Irrespective of the pelleting treatments seeds stored in polyethylene bag maintained satisfactory germination of 70 per cent up to 9 months compared to seeds stored in cloth bag which lost viability below 70 per cent after 7 months of storage period. Significant and lower seed quality parameters observed in cloth bag during entire storage period may be due to its permeable nature which might have favored the longer fluctuation in moisture content leading to faster metabolic activity and respiratory activity of the seeds compared to polyethylene bag, wherein seed quality parameters were comparatively superior with reduced

EC value with slow rate of increase in moisture content due to impervious nature and also evidenced with high dehdrogenase activity. Berjack and Villiers (1972) also reported that seed deterioration alter the semi permeability properties of the membrane and increase in electrical conductivity is a good indicator of loss of membrane integrity, which attributes to the seed viability (Mathews and Bradnock, 1968). Aged seeds leachout higher amount of leachates on accont of lesser membrane integrity and hence EC values of aged seeds will be always high. The current study also revealed that the electrical conductivity values were inversely proportional to the germination percentage of seeds. Increased leaching of electrolytes were noticed in unpelleted (control) seeds as against pelleted seeds. Higher electrical conductivity of seed steep water might be due to its faster exudates that may be found in steep solution indicating faster deterioration. The weakening of cell membrane might have caused increased leaching of metabolites and electrolyte through the semi permeable membrane into the inhibiting medium (Chachalis and Smith, 2001). The present study revealed that the total dissolved solids were found to be higher in the seed leachates when stored in cloth bag. This is positively correlated to the electrical conductivity of the seeds. This might be the reason for maximum deterioration in unpelleted control seeds compared to the pelleted seeds. The dehydrogenase enzyme activity in the embryo is taken as a good indicator of degree of aliveness in viable seeds (Moore, 1972) and it enables quick and reliable estimate of vigour (Kittock and Low, 1968). Irrespective of treatments dehydrogenase activity was found to decrease with the increase in storage period in both the containers, but decreased activity of dehydrogenase enzyme was observed at a faster rate in unpelleted seeds. Several structural changes in the enzymes and macromolecular structural change may contributeto their lowered effectiveness (Walter, 1963). The decline in dehydrogenase activity leading to lower energy (ATP) and supply to the germinating seed. Seeds pelleted with carbendazim and stored in polyethylene bag (T1C2) maintained higher germination (75.75%), root length (13.13 cm), shoot length (11.70 cm), seedling length (24.83 cm), vigour index (1862), dry matter production (34.20 mg), dehydrogenase activity (0.303 OD value), speed of germination (21.07), EC value of seed leachate (0.481 dS m-1), seed infection by pathogen (0.00%) at the end of 10 months of storage. The pelleted tomato seeds carrying carbendazim and CaOCl2 maintained satisfactory germination (70%) up to 10 months of storage compared to Neem leaf powder and *Trichoderma viridae* which maintained up to 8 months, while seeds pelleted with ZnSO4 maintained germination up to 7 months only. The unpelleted control seeds maintained the germination upto six months only. In the present study seed quality parameters were high in all the months of storage when seeds were pelleted with carbendazim and stored in polyethylene bag. This might be due to antifungal effect of carbendazim and impervious nature of polyethylene bag which caused less oxygen supply and death of pathogen. These results are in conformity with the findings of Jaoqualine and Selvaraj, (1988) in brinjal, Jayaraj *et al*, (1988) in tomato and Sharanamma (2002) in chilli, Veena M.Gouda (2007) in onion. A close analysis of the present study indicated that the tomato seeds pelleted with carbendazim (2 g/kg) and CaOCl2 (3 g/kg) and packed in polyethylene bag maintained satisfactory germination for 10 months under ambient condition with reduced loss in physiological and biochemical parameters.

CONCLUSION : Seed comprises of an essential component of agricultural strategy and quality seed would act as catalyst for realizing the potential of all other inputs. Seed quality is influenced by several biotic and abiotic factors. Seed pelleting provides an opportunity to encapsulation of materials such as organic, inorganic nutrients, water absorbents, fungicide and pesticides to enhance germination, increase the uniformity in seedling emergence and storability of seed. Among the seed pelleting treatments the seeds pelleted with ZnSO4 at 300 mg per kg of seed recorded higher field emergence (91%) which was on par with *Trichoderma viridae* (89%) and Carbendazim (87%). The per cent increase in field emergence was 12.35, 9.88 and 7.41 respectively over control. The control (T6) recorded lowest field emergence of 81 per cent. The tomato seeds pelleted with carbendazim recorded higher germination (73.63%), root length (12.55 cm), shoot length (11.08 cm), seedling length (23.63 cm), vigour index (1736), dry matter production (28.75 mg), speed of germination (19.60) and dehydrogenase activity (0.254 OD value) at the end of storage period followed by the seeds pelleted with CaOCl2 (70.63%, 10.50 cm, 9.85 cm, 20.35 cm, 1443, 26.83 mg, 18.37 and 0.209 OD value, respectively) while, all the seed quality parameters were significantly lower in the unpelleted seeds (58.63%, 8.09 cm, 7.54 cm,15.63 cm, 935, 16.48 mg, 13.52, 0.118 OD value, respectively) at the end of storage period.The seeds pelleted with carbendazim and stored in polyethylene bag maintained satisfactory seed quality throughout storage period, with higher germination (75.75%), root length (13.13 cm),shoot length (11.70 cm), seedling length (24.83 cm), vigour index (1862), dry matter production (34.20mg), speed of germination (21.07) and dehydrogenase activity (0.303 OD value), lower moisture content (6.56%), electrical conductivity of seed lechate (0.418 dSm-1) and seed infection (0.00%). The seeds pelleted with carbendazim and CaOCl2 and stored in polyethylene bag maintained above prescribed germination of 70 per cent up to 10 months of storage.

Seeds pelleted with carbendazim and stored in polyethylene bag recorded higher seed quality throughout the storage period followed by the CaOCl2 treatment. The unpelleted seeds stored in polyethylene bag maintained germination up to 7 months in polyethylene bag and in cloth bag up to 6 months.

Table.1 Effect of seed pelleting on Field emergence (%),Plant height (cm), Number of leaves per plant, Days to first flowering, Days to 50 % flowering, Number of fruits per plant, Fruit yield (g/plant), Number of seeds per fruit in tomato Cv. L-15.

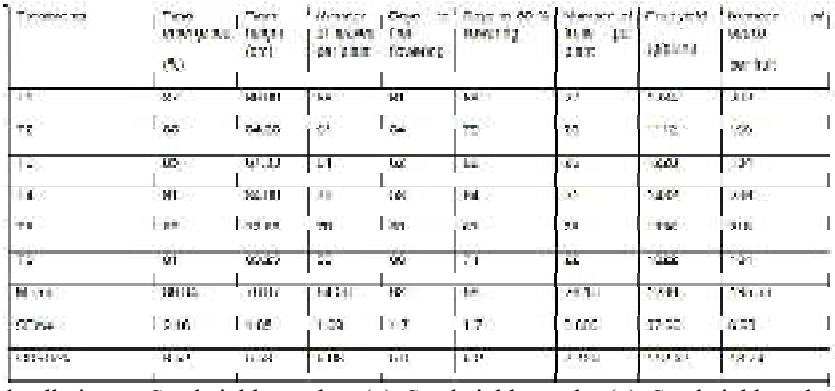

Table 2. Effect of seed pelleting on Seed yield per plant (g), Seed yield per plot (g), Seed yield per ha (kg), 1000 Seed weight (g), Germination (%),Seedling vigour index, Dry weight of seedling (mg), Electrical conductivity (dsm-1) in tomato Cv. L-15

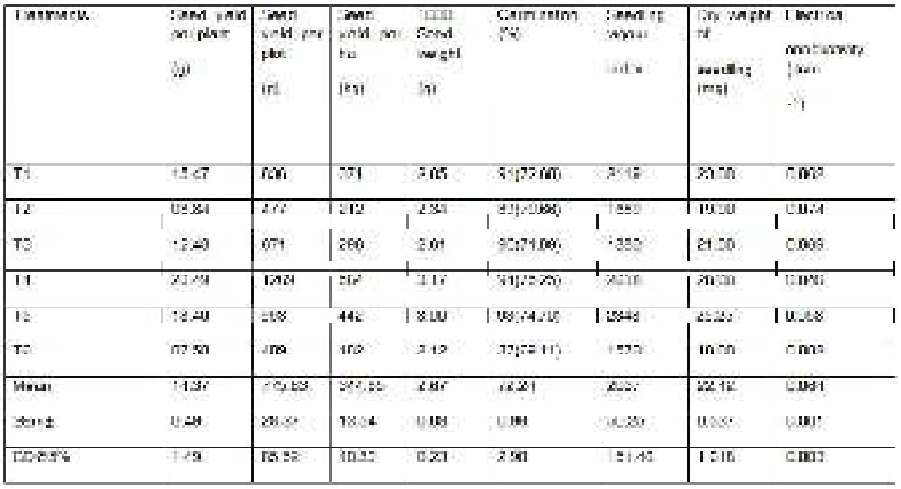

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Table 3 Influence of seed dressing chemicals, containers and their interactions on Moisture content, Germination (%) , Seedling vigour index of pelleted tomato seeds during storage.

Treatments	Moisture content			Germination (%)			Seedling vigour index		
	Months of storage			Months of storage			Months of storage		
	2	6	10	2	6	10	2	6	10
Seed dressing chemicals									
T1	6.25	6.54	7.02	88.00 (69.72)	81.38 (64.44)	73.63 (59.10)	2362	2048	1736
T2	6.28	6.58	7.05	85.75 (67.16)	77.00 (61.35)	65.63 (54.10)	1978	1635	1178
T3	6.27	6.55	7.04	87.38 (69.06)	79.50 (63.10)	70.63 (57.17)	2148	1824	1443
T4	6.30	6.62	7.10	84.00 (66.31)	74.63 (59.76)	60.25 (50.91)	1750	1427	1051
T5	6.33	6.60	7.08	85.00 (67.10)	76.13 (60.76)	61.75 (51.79)	1841	1488	1169
T6	6.35	6.67	7.14	83.13 (65.72)	73.75 (59.17)	58.63 (49.96)	1646	1345	935
SEm±	0.003	0.010	0.005	0.08	0.14	0.20	13.40	11.64	9.37
CD@5%	0.010	0.029	0.015	0.24	0.39	0.58	38.43	33.39	26.87
Containers									
C1	6.38	6.84	7.51	84.71 (66.77)	74.71 (59.82)	62.29 (52.16)	1862	1503	1123
C2	6.21	6.34	6.63	86.32 (68.25)	79.42 (63.04)	67.88 (55.52)	2046	1753	1381
SEm±	0.002	0.006	0.003	0.15	0.08	0.12	7.74	6.72	5.41
CD@5%	0.006	0.017	0.008	0.42	0.23	0.33	22.19	19.28	15.52
Interaction TxC									
T1xC1	6.33	6.78	7.48	87.00 (68.84)	79.50 (63.05)	71.50 (57.71)	2255	1902	1610
T1xC2	6.17	6.30	6.56	89.00 (70.60)	83.25 (65.82)	75.75 (60.48)	2468	2194	1862
T2xC1	6.36	6.83	7.50	85.00 (65.89)	74.50 (59.65)	63.00 (52.51)	1867	1496	1049
T2xC2	6.20	6.33	6.59	86.50 (68.42)	79.50 (63.05)	68.25 (55.68)	2089	1775	1306
T3xC1	6.37	6.80	7.47	86.75 (68.63)	76.75 (61.15)	68.75 (55.99)	2095	1687	1282
T3xC2	6.18	6.30	6.62	88.00 (69.49)	82.25 (65.06)	72.50 (58.35)	2200	1962	1604
T4xC1	6.39	6.91	7.55	83.00 (65.63)	72.00 (58.03)	56.25 (48.57)	1671	1332	947
T4xC2	6.21	6.33	6.64	85.00 (66.99)	77.25 (61.49	64.25 (53.26)	1828	1522	1155
T5xC1	6.41	6.85	7.53	84.00 (66.40)	73.75 (59.16)	58.50 (49.88)	1733	1374	1050
T5xC2	6.24	6.35	6.62	86.00 (67.80)	78.50 (62.35)	65.00 (53.71)	1949	1602	1288
T6xC1	6.43	6.89	7.56	82.50 (65.25)	71.75 (57.87)	55.75 (48.28)	1549	1225	801
T6xC2	6.26	6.45	6.73	83.75 (66.20)	75.75 (60.48)	61.50 (51.6)	1742	1465	1069
Mean	6.30	6.59	7.07	85.54	77.06	65.08	1954	1628	1252
SEm±	0.005	0.015	0.007	0.21	0.19	0.29	18.95	16.47	13.25
CD@5%	0.014	0.042	0.021	0.59	0.55	0.82	54.35	47.23	38.00

Table 4 Influence of seed dressing chemicals, containers and their interactions on Electrical conductivity (dsm-1), Dehydrogenase activity and Seed health (%) of pelleted tomato seeds during storage.

Treatments	Electrical conductivity (dsm-1)			Dehydrogenase activity			Seed health (%)		
	Months of storage			Months of storage			Months of storage		
	2	6	10	2	6	10	2	6	10
Seed dressing chemicals									
T1	0.393	0.429	0.487	0.721	0.523	0.254	0.00(0.00)	0.00 (0.00)	0.00 (0.00)
T2	0.423	0.455	0.514	0.658	0.345	0.168	9.63 (18.06)	16.63 (24.04)	27.00 (31.28)
T3	0.405	0.447	0.499	0.695	0.488	0.209	0.00 (0.00)	4.88 (12.47)	9.25 (17.47)
T4	0.483	0.524	0.582	0.632	0.348	0.135	13.50 (21.53)	21.00(27.26)	29.50 (32.88)
T5	0.453	0.490	0.544	0.640	0.369	0.155	0.00 (0.00)	0.63 (3.17)	2.88 (9.54)
T6	0.507	0.542	0.615	0.615	0.308	0.118	15.25 (22.96)	23.88 (29.22)	35.50 (36.55)
SEm±	0.002	0.003	0.003	0.002	0.004	0.002	0.09	0.15	0.29
CD@5%	0.006	0.008	0.009	0.007	0.012	0.006	0.26	0.43	0.83
Containers									
C1	0.453	0.488	0.545	0.646	0.361	0.121	6.92 (10.86)	12.25 (17.45)	18.67 (22.46)
C2	0.435	0.474	0.534	0.674	0.432	0.225	5.88 (9.98)	10.08 (14.60)	16.04 (20.11)
SEm±	0.001	0.002	0.002	0.001	0.002	0.001	0.05	0.09	0.17
CD@5%	0.003	0.005	0.005	0.004	0.007	0.003	0.15	0.25	0.48
Interaction TxC									
T1xC1	0.400	0.434	0.492	0.713	0.470	0.206	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
T1xC2	0.386	0.424	0.481	0.730	0.576	0.303	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
T2xC1	0.428	0.457	0.505	0.645	0.303	0.101	9.00 (17.45)	17.50 (24.72)	29.00 (32.56)
T2xC2	0.418	0.452	0.523	0.670	0.386	0.235	7.00 (15.34)	15.75 (23.37)	25.00 (29.99)
T3xC1	0.412	0.456	0.501	0.675	0.458	0.143	0.00 (0.00)	6.75 (15.05)	12.25 (20.48)
T3xC2	0.398	0.437	0.497	0.715	0.518	0.275	0.00 (0.00)	3.00 (9.90)	6.25 (14.46)
T4xC1	0.494	0.530	0.582	0.620	0.320	0.099	14.75 (22.57)	22.00 (27.96)	30.00 (33.20)
T4xC2	0.473	0.518	0.581	0.643	0.375	0.171	12.25 (20.48)	20.00 (26.55)	29.00 (32.57)
T5xC1	0.472	0.507	0.560	0.627	0.356	0.101	0.00 (0.00)	1.25 (6.33)	3.75 (11.10)
T5xC2	0.434	0.473	0.528	0.653	0.382	0.208	0.00 (0.00)	0.00 (0.00)	2.00 (7.99)
T6xC1	0.510	0.546	0.630	0.597	0.258	0.075	16.50 (23.95)	26.00 (30.64)	37.00 (37.45)
T6xC2	0.400	0.539	0.600	0.633	0.358	0.161	14.00 (21.96)	21.75 (27.79)	34.00 (35.65)
Mean	0.44	0.481	0.539	0.660	0.397	0.173	6.40	11.17	17.35
SEm±	0.003	0.004	0.004	0.004	0.006	0.003	0.13	0.21	0.41
CD@5%	0.008	0.012	0.012	0.010	0.018	0.009	0.36	0.60	1.18

SWADESHI VIJNANA ANDOLANA-KARNATAKA
ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

INFLUENCE OF POLLEN STORAGE CONDITION AND FILLER MIXTURE PROPORTION ON FRUIT SET, SEED YIELD AND QUALITY UNDER *IN VITRO* AND *IN VIVO* CONDITIONS IN CHILLI (CAPSICUM ANNUUM L)

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Hybrid seed production of chilli varies from varietal seed production by involving hand emasculation and pollination. Pollens are most essential and precious genetic material transmitting male gamete in sexual reproduction. Further in hybrid seed production early or late flowering (non synchrony of parental lines) of restorer line and inadequacy of pollens on account of biotic or abiotic factors is very much felt leading to poor seed set. Hence, there is a need to acquire knowledge of pollen viability, its storage method at farmer's level and its further application in hybrid seed production to obtain higher seed yield. It is also observed that lot of pollens will be wasted in regular hand collection and further pollination. Hence, to improve the pollen use efficiency during hand pollination through judicious quantity of pollen application can be also achieved by mixing of inert material of filler mixture (flour) along with essential trace element like boron with fresh pollens.The field performance of pollen grains was observed by the application of pollens stored at different proportion of filler mixture (1 g borax + 99 g rice flour) on female parent VN-2 during hybrid seed production of HCH-9646. *In vivo* pollen viability studies revealed that there was significant difference in filler mixture for number of crossed fruits retained per plant and fruit set (%) and the values were higher in cent per cent pollen. Irrespective of filler mixture proportion fresh pollens recorded higher number of crossed fruits retained per plant and fruit set followed by pollens stored in refrigerator for one day over other storage methods.

Hence success of any hybrid seed production depends upon seed setting percentage on female parent which will be decided by pollen viability, its fertilizing capacity through development of an effective tube growth. It is also learnt from literature that pollen viability varies significantly from species to species. Laboratory experiment was conducted to know the viability of pollen grains of Arka lohit. In vitro studies on pollen viability indicated that pollens were very susceptible to storage under ambient conditions when compared to pollen stored in refrigerator or moist earthen pot. The interaction revealed that 75 per cent pollen and 25 per cent filler mixture stored in refrigerator was equally better to fresh pollen combinations and there was a very slight reduction in pollen germinability over a period of one day, this was followed by pollen stored in earthen pot.

INTRODUCTION : Pollens are most essential and precious genetic material which transmit the male gametic material in sexual reproduction of all higher plants. Unlike varietal seed production, hybrid seed production involves an effective crossing of sterile female parent with a selected fertile restorer. So, only desired and viable pollens play a vital role in deciding the success of hybrid seed set on its parent. Further in hybrid seed production early or late flowering (non synchrony of parental lines) of restorer line and inadequacy of pollens on account of biotic or biotic factors is very much felt leading to poor seed set. Hence, there is a need to acquire knowledge of pollen viability, its storage method at farmers level and its further application in hybrid seed production to obtain higher seed yield. It is also observed that lot of pollens will be wasted in regular hand collection and further pollination. Hence, to improve the pollen use efficiency during hand pollination through judicious quantity of pollen application can be also achieved by mixing of inert material of filler mixture (flour) along with essential trace element like boron with fresh pollens. It is well documented that boron level in pollen can be increased by externally added sources (Visser,1955). Boron stimulates enzymatic activity and nitrogen metabolism which may be linked with improvements in pollen fertility and growth. Hence success of any hybrid seed production depending upon seed setting percentage on female parent which will be decided by pollen viability, its fertilizing capacity through development of an effective tube growth. It is also learnt from literature that pollen viability varies significantly from species to species. Keeping in view the importance of pollen use efficiency the present experiment was carried out to know the effect of pollen storage, filler mixture proportion in both *in vivo* and *in vitro* conditions.

MATERIAL AND METHODS: *In vitro* pollen viability and storage studies were conducted in the Agricultural Research Station, Bailhongal. Further, *in vivo* pollen viability studies were made in the field .

A: Viability of pollens as influenced by storage condition and filler mixture under *in vitro* condition

The treatment details were as follows

Factor I : Storage of pollens (S)

S_O – Fresh pollens
S_1 – One day stored pollens at ambient condition
S_2 – Two days stored pollens at ambient condition
S_3 – One day stored pollens at refrigerator
S_4 – Two days stored pollens at refrigerator
S_5 – One day stored pollens at earthen pot kept in moist sand.
S_6 – Two days stored pollens at earthen pot kept in moist sand.

Factor II : Different proportion of pollen and filler mixture (M)

M_O – 100 per cent pollen
M_1 – 75 per cent pollen + 25 per cent filter mixture
M_2 – 50 per cent pollen + 50 per cent filter mixture.

Treatment combinations : 7 x 3 = 21

S_0M_0	S_1M_0	S_2M_0	S_3M_0	S_4M_0	S_5M_0	S_6M_0
S_0M_1	S_1M_1	S_2M_1	S_3M_1	S_4M_1	S_5M_0	S_6M_1
S_0M_2	S_1M_2	S_2M_2	S_3M_2	S_4M_2	S_5M_2	S_6M_2

Design : CRD

Experimental procedure

Acetocarmine stain preparation for pollen viability study

Acetocarmine stain was prepared by mixing 55 ml of distilled water and 45 ml of acetic acid and 2 grams of carmine powder. This mixture was boiled gently for 5 minutes and shaken well. After cooling it was filtered through Whatman No. 71 filter paper.

Filler material (pollen mixture): The filler mixture constituted 99 grams of rice flour and 1 g of borax powder. These two were mixed thoroughly, which constituted 1.0 per cent mixture. This is used as filler material during storage to blend the pollens in different proportions.

***In vitro* studies on pollen viability :** Pollen grains were collected early in the morning from male parent Arka Lohit plants to know the pollen viability. The pollens were placed on a cavity slide containing 2-3 drops of acetocarmine stain (2%). These were mixed using a clean needle and left for 2-3 minutes for proper staining. The cover slip was then placed on a cavity slide and examined under microscope for staining pattern. The pollens were classified based on the intensity of staining into three categories viz., dark stained, light stained and unstained. The pollen grains which took stain of acetocarmine were considered as viable and unstained as non-viable. Pollen grains were observed randomly from average of five microscopic fields and number of viable and non-viable pollens were recorded. The same procedure was used for different proportion of pollen grains and filler mixture i.e., 100 per cent pollen, 75 per cent pollen + 25 per cent filler mixture and 50 per cent pollen + 50 per cent filler mixture.

Basal pollen germination media : The media was prepared as per the procedure given by Keshavamurthy *et al.* (1995). The composition of this media is as follows :

Boric acid	: 200 mg/litre
Potassium nitrate	: 200 mg/litre
Magnesium sulphate	: 200 mg/litre
Calcium nitrate	: 200 mg/litre
Polyethylene glycol	: 223.66 g/litre
Sucrose	: 15%
Stigma extract	: One stigma extract

Stock solution was prepared by dissolving boric acid 200 mg in 10 ml distilled water, KNO_3 200 mg in 10 ml distilled water, $MgSO_4$ 200 mg in 10 ml distilled water $CaNO_3$ 200 mg in 10 ml distilled water, PEG 22.3 g in 20 ml distilled water, sucrose 10 g in 20 ml distilled water each separately. The working solution was prepared for 5 ml by mixing boric acid 0.05 ml, KNO_3 0.05 ml, $MgSO_4$ 0.05 ml, $CaNO_3$ 0.05 ml, PEG 1 ml and 1.5 ml of sucrose taken from each of the stock solution and the final volume was made up to 5 ml by adding 2-3 ml of distilled water. The resultant 5 ml media was used for pollen germination study.

***In vitro* germination of pollen grains :** Hanging drop technique was used to study the pollen germination was followed in the present study and procedure is as follows.

Hanging drop method for pollen germination : The hanging drop technique (Van Tiegham, 1964) consisted of a drop of basal pollen germination medium containing pollen grains, suspended in a sealed chamber. The edges of clean coverslip glass was smeared with petroleum jelly. A single tiny drop of pollen germination medium was placed on the cover slip and small amount of pollen grains with the help of a sterilized needle was smeared in the drop of pollen germination media solution. For uniform distribution, the pollen germination medium along with the pollen was gently stirred with clean needle, later cover slip was inverted carefully with the pollen suspension over the cavity such that pollen culture drop was suspended in the centre of the cavity, pollen grains moved to lower meniscus of the hanging drop and were exposed to the atmosphere of the cavity. The cover slip was then sealed by applying gentle pressure, such that it prevented evaporation of the medium.

The cavity slides were placed in petriplates large enough to hold a number of cavity slides and were incubated at 100 per cent relative humidity at 25°C ± 2°C temperature for 30 minutes.

Duration of incubation

The duration of incubation for pollen germination was thirty minutes, the slides were examined under the microscope to ascertain pollen germination. The observation was recorded by taking five microscopic fields so as to represent whole population. In each slide the following observations were made.

1. Total number of pollen grains
2. Number of germinated pollen grains (considered as viable).
3. Number of ungerminated pollen grains (considered as non-viable).

Pollen germination percentage

It is calculated, as the ratio of number of pollen grains germinated to the total number of pollen grains observed (germinated + ungerminated) and multiplied by 100.

$$\text{Pollen germination (\%)} = \frac{\text{No. of pollen grains germinated}}{\text{Total no. of pollen grains observed (Germinated + Ungerminated)}} \times 100$$

Pollen tube growth : After pollen germination, pollen tube length was measured on the screen of the projection microscope. Tube length of 10 randomly selected pollens from

each slide was measured, then average of such three slides was taken into account. Pollen tube growth was expressed in µm.

The pollen viability study was also conducted for different storage conditions and periods viz., pollen stored at room temperature (Ambient condition : 25 ± 2°C), at refrigerator (5°C and 50% RH) and stored in earthen pot (earthen pot was placed in a plastic tray and bottom of the pot was covered with moist sand and pollen grains were kept inside the pot in petri plates).

B: Effect of pollen storage and filler mixture on pollen viability in *in vivo* condition

***In vivo* condition**

For this study pollen grains were collected in petriplates at 7.00 am from the plants of Arka Lohit with the help of hair brush. Then the pollens were subjected to different storage conditions along with different proportion of pollen grains and filler mixture as mentioned below.

Five plants of VN-2 were pollinated with the pollens from these treatments. At the time of harvest, these five plants under each treatment were harvested separately.

The treatment details were as follows

Factor I : Storage of pollens (S)

S_O – Fresh pollens
S_1 – One day stored pollens at ambient condition
S_2 – Two days stored pollens at ambient condition
S_3 – One day stored pollens at refrigerator
S_4 – Two days stored pollens at refrigerator
S_5 – One day stored pollens at earthen pot kept in moist sand.
S_6 – Two days stored pollens at earthen pot kept in moist sand.

Factor II : Different proportion of pollen and filler mixture (M)

M_O – 100 per cent pollen
M_1 – 75 per cent pollen + 25 per cent filter mixture
M_2 – 50 per cent pollen + 50 per cent filter mixture.

Treatment combinations : 7 x 3 = 21

S_0M_0	S_1M_0	S_2M_0	S_3M_0	S_4M_0	S_5M_0	S_6M_0
S_0M_1	S_1M_1	S_2M_1	S_3M_1	S_4M_1	S_5M_1	S_6M_1
S_0M_2	S_1M_2	S_2M_2	S_3M_2	S_4M_2	S_5M_2	S_6M_2

Replications : Three
Design : RBD (Factorial)
Season : Late *kharif* and *kharif*
Spacing (female and male) : 60 cm x 60 cm
Plot size : Gross plot size : 4.2 m x 3.6 m
Net plot size : 3.0 m x 3.0 m
Parents : Female : VN-2
Male : Arka Lohit

RESULTS AND DISCUSSION

Though the number of flowers crossed per plant showed non-significant difference, number of crossed fruits retained per plant (23.16) and fruit set (33.06%) were significantly higher in fresh pollens. It was statistically on par with pollens stored in refrigerator for one day. Similarly filler mixture proportion *viz.,* cent per cent pollen (M_0), 75 per cent pollen + 25 per cent filler mixture and 50 per cent pollen + 50 per cent filler mixture did not differ significant for number of crossed fruits retained per plant and fruit set (%). In interaction (S x M) cent per cent fresh pollens recorded significantly higher number of crossed fruits retained per plant (23.95) and fruit set (34.44%). But pollen stored in ambient conditions for two days either as cent per cent or with filler mixture (75 + 25% and 50+50 per cent) showed poor fruit set of 23.52 and 23.34 per cent, respectively, which revealed the deleterious effect of pollen stored in ambient condition on viability, germination and further fertilization capacity.

These results are in accordance with findings of Rajashekhar (2000) and Kantharaju (2003) in sunflower. Higher fruit set and 100 seed weight in above treatments also exhibited higher hybrid seed yield. The better performance of 75 per cent pollen and 25 per cent filler mixture" is attributed to the role of boron which increased the fertility of pollen grains and increased the seed set, number of seeds in sunflower. The poor fruit set and yield in 50 per cent pollen and 50 per cent filler mixture was attributed due to deleterious effect of increased quantity of filler material and boron (Rajashekhar, 2000) and Kantharaju,2003) as the higher concentration of boron was also found inhibitory (Garg *et al.,* 1979).

The lower seed yield per plant was recorded in the treatment where the plant was pollinated with stored pollens under ambient conditions for two days (S_2M_2). Hence, from this study it is concluded that in case of non availability of abundant fresh pollens, the pollen grains stored in refrigerator either as pollen alone (cent per cent) or with filler mixture (75% pollen + 25% filler mixture) can be safely used for supplementary hand pollination during chilli hybrid seed production if facilities are available. Otherwise next alternative is earthen pot storage. As far as possible storage of pollen grain under ambient conditions should be discouraged.

Seed quality attributes of F_1 hybrid seeds (HCH-9646) as influenced by application of stored pollens either as pollen alone or with filler mixture at different proportions differed significantly. Seeds obtained through application of fresh pollens (S_0) recorded significantly higher seed germination, seedling length, seedling vigour index, seedling dry weight and lower EC. But this treatment (S_0) was on par with one day stored pollens at refrigerator (S_3) for all quality parameters. The quality of seeds obtained through pollen stored in earthen pot for one day also comparable with S_0 treatment and S_3. Application of 100 per cent pollens showed significantly highest results in all seed quality parameters.

The next best treatment was seeds obtained through 75 per cent pollen + 25 per cent filler mixture which recorded better quality but declined values as compared to M_0. The quality of seeds obtained through 50:50 proportion of pollen and filler mixture was lowest. Interaction (S x M) showed non-significant difference in all the quality parameters except seedling vigour index (SVI) and electrical conductivity (EC) SVI

significantly higher in S_0M_0 followed by S_3M_0. EC was significantly lowest in S_0M_0 followed by S_0M_1, S_3M_0, S_3M_1 and S_4M_0.The higher germination percentage and higher vigour index is attributed to better number of seeds with abundant stored food which might have exhibited better seedling vigour and seedling dry weight.

Fresh pollens recorded significantly maximum number of dark stained pollens per microscopic field (12.29), pollen germination percentage (87.60%) and pollen tube length (1034.26µm) and significantly minimum in pollen stored at ambient condition for two days. Irrespective of pollen mixtures, storage methods differed significantly for maintaining pollen viability as revealed through light stained pollen grains. Pollens stored in refrigerator for one day recorded significantly maximum viability (S3: 41.16) followed by fresh pollen (S0: 40.54).

None of the storage conditions maintained the viability better than fresh pollen as revealed in pollen germination test. Though the pollen stored in refrigerator for one day was found to be superior to fresh pollen on the basis of acetocarmine staining by recording maximum dark and light stained pollens. Pollen germination study revealed that pollen stored in refrigerator for one day was significantly inferior by exhibiting numerically declined germination per cent and shorter pollen tube growth compared to fresh pollens irrespective of pollens and filler mixture proportions. These results can be accepted since the results under *in vitro* pollen germination study are accurate and valid.

Still we can prefer the storage of pollens in refrigerator as the need extends to for one more day because the experimental results encouraged the storage of pollens in refrigerator upto two days because there is only 1.29 and 4.53 per cent reduction in pollen viability was observed when compared to fresh pollens after one and two days, respectively. Refrigerator pollen storage recorded increased pollen viability of 14.92 and 43.84 per cent respectively when compared to one and two days ambient conditions of pollen storage.

Pollen storage in refrigerator was also found superior by Sharma and Malik (1980) in *Amryllis vittata* and Vaknin and Deisikowitch (2000) in pistachio. Pollen storage in earthen pot also found better for poor to medium class farmers for hybrid seed production since the pollen viability based on pollen germination was significantly superior over pollen storage at ambient conditions. While, compared to ambient condition earthen pot storage recorded 8.93 and 26.46 per cent increased pollen germination after one and two days respectively. Superiority of pollen storage in refrigerator and earthen pot storage was also confirmed by Rajashekhar (2000) and Kantharaju (2003), Sharma and Malik (1980) also reported the adverse effect of ambient environment on low pollen germination during storage of *Amryllis vittata*.

Significantly highest viability (11.89) was expressed by100 percent pollen without any filler material. Economy of pollen during supplementary pollination can be done through many ways. It may differ either through application of pollen on alternate day supplementary hand pollination to female or by blending of pollens with filler material and essential trace element "boron" (Rajashekhar, 2000). In the present investigation also cent per cent utilization of pollen was achieved through blending fresh pollens with inert material with boron in different proportions and storing them in varied storage conditions for further use in supplementary hand pollination. The treatment having 75 per cent pollen mixed with 25 per cent filler material exhibited equally well as that of cent per cent pollens in different storage conditions. Though the staining values are found less (49.28), the pollen germination (79.88%) and tube length growth (984.50mm) were more when compared to 100 per cent pollen irrespective of storage conditions. The role of boron in pollen germination and pollen tube growth has well documented by Garg *et al.* (1979) also found increased pollen viability and fertilizing capacity through addition of boron. But increased proportion of filler material (50 per cent) decreased the pollen viability, germination and tube growth under *in vitro* condition. This may be due to deleterious effect of more inert material and increased quantity of boron, which was found quite as inhibitory as stated by Garg *et al.* (1979).

Interaction of storage method and pollen mixture revealed that significantly higher pollen viability (15.25), pollen germination (89.80%) and pollen tube length (1219.52mm) in fresh pollens without any filler material.

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Table.1 Influence of storage conditions and filler mixtures on pollen viability of Arka Lohit under *in vitro* condition based on number of dark stained pollens, light stained pollens and unstained pollens.

Treatments	Dark stained pollen				Light stained pollen				Unstained pollen			
	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean
S_0	15.25	12.62	11.15	12.98	44.37	40.00	37.25	40.54	5.02	6.25	6.12	5.79
S_1	11.37	10.51	7.37	9.75	37.62	37.50	35.37	36.83	10.00	11.75	11.08	11.14
S_2	10.66	9.26	7.15	8.93	35.25	34.25	33.25	34.64	12.37	15.62	13.37	13.78
S_3	11.37	10.12	8.15	9.88	42.25	41.37	39.87	41.16	8.25	7.50	11.00	8.92
S_4	10.13	11.50	8.37	10.00	38.87	38.62	36.75	37.99	12.75	11.75	14.75	13.08
S_5	11.12	10.37	8.25	11.91	39.62	38.87	36.62	38.37	10.25	11.87	13.62	11.91
S_6	10.62	9.99	7.62	9.03	36.62	35.87	34.62	35.70	12.75	14.25	15.75	14.25
Mean	11.89	12.98	8.52	10.48	39.76	38.55	36.25	37.85	10.01	11.21	12.11	11.44
	SE m±		CD at 5%		SE m±		CD at 1%		SE m±		CD at 1%	
S	0.11		0.31		0.24		1.27		0.22		1.50	
M	0.09		0.27		0.22		0.92		0.21		0.78	
S x M	0.18		0.27		0.60		2.25		0.20		2.30	

S_0 – Fresh pollens
S_1 – 1 day stored pollens at ambient condition
S_2 – 2 days stored pollens at ambient condition
S_3 – 1 days stored pollens at refrigerator
S_4 – 2 days stored pollens at refrigerator
S_5 – 1 day stored pollens at earthen pot
S_6 – 2 days stored pollens at earthen pot
NS – Non-significant
M_0 - 100% pollenM_1 - 75% pollen + 25% filler mixture M_3 - 50% pollen + 50% filler mixture

Table2 : Pollen germination (%) and pollen tube length of Arka Lohit as influenced by storage conditions and filler mixtures under *in vitro* condition .

Treatments	Pollen germination (%)				Pollen tube length (um)			
	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean
S_0	89.41 (69.21)	89.80 (71.37)	83.39 (66.03)	87.60 (69.38)	1021.7	1219.5	861.4	1034.2
S_1	76.11 (60.73)	77.20 (61.48)	72.07 (58.05)	75.16 (60.07)	830.4	1012.2	651.9	831.5
S_2	39.14 (50.24)	39.74 (50.90)	53.49 (46.95)	37.46 (49.36)	520.8	751.5	480.8	584.4
S_3	87.47 (69.21)	87.86 (69.56)	84.07 (66.42)	80.47 (68.36)	948.5	1102.4	838.3	963.1
S_4	83.56 (66.09)	85.15 (67.29)	80.44 (63.72)	83.05 (65.65)	886.0	1052.2	751.0	896.4
S_5	82.27 (65.05)	84.41 (66.74)	77.80 (61.89)	81.49 (64.45)	863.0	950.5	786.3	886.6
S_6	76.94 (61.27)	74.89 (59.87)	70.55 (57.10)	74.13 (59.41)	790.4	802.9	650.4	727.9
Mean	79.27 (62.87)	79.88 (63.29)	74.57 (59.67)	77.91 (61.96)	828.7	984.5	717.2	843.4
	SE m±		CD at %		SE m±		CD at %	
S	0.32		1.20		2.1		7.9	
M	0.20		0.75		1.3		5.1	
S x M	0.55		2.06		3.6		13.7	

S_0 – Fresh pollens
S_1 – 1 day stored pollens at ambient condition
S_2 – 2 days stored pollens at ambient condition
S_3 – 1 days stored pollens at refrigerator
S_4 – 2 days stored pollens at refrigerator
S_5 – 1 day stored pollens at earthen pot
S_6 – 2 days stored pollens at earthen pot
NS – Non-significant
M_0 - 100% pollenM_1 - 75% pollen + 25% filler mixture M_3 - 50% pollen + 50% filler mixture

Table.3 Influence of storage conditions and filler mixtures on number of crossed flowers/plant, Number of crossed fruits retained/plant, Fruit set (%) and Seed yield/plant (g)of chilli hybrid (HCH-9646).

(Pooled analysis data).

reatments	Number of crossed flowers/plant				Number of crossed fruits retained/plant				Fruit set (%)				Seed yield/plant (g)			
	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean
S_0	69.48	70.82	70.59	70.30	23.95	22.14	22.60	23.16	34.44	32.68	32.04	33.08	6.95	6.95	6.95	6.95
S_1	70.83	71.23	69.53	70.53	20.61	20.68	20.39	20.56	29.14	29.05	30.31	29.50	6.11	6.05	6.05	6.07
S_2	70.16	71.00	70.22	70.46	17.37	16.68	16.39	16.81	24.86	23.52	23.34	23.91	5.84	5.30	5.14	5.43
S_3	69.35	69.70	69.85	69.63	23.63	23.26	21.9	22.95	34.26	33.37	31.42	33.02	6.95	6.94	6.93	6.94
S_4	70.47	70.38	71.11	70.65	21.32	20.98	21.05	21.11	30.28	29.89	29.62	29.93	6.64	6.63	6.62	6.63
S_5	969.13	70.18	69.85	69.92	21.28	20.95	20.33	20.85	30.39	29.85	29.16	29.80	6.23	6.12	6.12	6.16
S_6	69.70	69.90	70.32	69.97	17.71	17.09	16.68	17.16	25.40	24.42	23.76	24.52	5.99	5.97	5.95	5.97
Mean	69.99	70.46	0.18	70.21	20.84	20.37	19.91	20.37	29.82	28.97	28.52	29.10	6.39	6.28	6.25	6.31
	SE m±		CD at 5%		SE m±		CD at 5%		SE m±		CD at 5%		SE m±		CD at5 %	
S	0.35		NS		0.66		1.88		0.96		2.73		0.01		0.02	
M	0.23		NS		0.30		0.90		0.24		0.72		0.01		0.02	
S x M	0.61		NS		1.15		3.27		1.67		4.75		0.03		0.08	

S_0 – Fresh pollens
S_1 – 1 day stored pollens at ambient condition
S_2 – 2 days stored pollens at ambient condition
S_3 – 1 days stored pollens at refrigerator
S_4 – 2 days stored pollens at refrigerator
S_5 – 1 day stored pollens at earthen pot
S_6 – 2 days stored pollens at earthen pot
NS – Non-significant
M_0 - 100% pollenM_1 - 75% pollen + 25% filler mixture M_3 - 50% pollen + 50% filler mixture

Table 4 : Influence of storage conditions and filler mixtures on 100 seed weight (g), Seed germination (%),Root length (cm) and Shoot length of chilli hybrid (HCH-9646).

reatments	100 seed weight (g)				Seed germination (%)				Root length (cm)				Shoot length (cm)			
	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean
S_0	0.58	0.56	0.56	0.56	88.36 (70.00)	87.70 (69.47)	86.18 (68.11)	87.41 (69.21)	8.30	8.21	8.08	8.20	8.50	8.45	8.30	8.41
S_1	0.50	0.49	0.49	0.49	82.66 (65.35)	82.61 (65.35)	81.13 (64.23)	82.13 (64.97)	8.01	8.00	7.91	7.97	8.05	8.06	7.98	8.03
S_2	0.47	0.46	0.44	0.46	80.53 (63.79)	81.33 (64.38)	78.53 (62.37)	80.13 (63.51)	8.01	8.06	7.80	7.96	7.88	7.83	7.68	7.80
S_3	0.57	0.56	0.55	0.56	87.73 (69.47)	86.16 (68.11)	84.63 (66.89)	86.17 (68.11)	8.28	8.16	8.03	8.16	8.48	8.41	8.25	8.38
S_4	0.55	0.55	0.55	0.55	81.25 (64.30)	80.83 (64.01)	80.20 (63.58)	80.76 (63.94)	8.01	8.01	7.95	7.99	8.06	8.05	8.00	8.03
S_5	0.49	0.49	0.49	0.49	83.30 (65.88)	83.28 (65.80)	81.46 (64.48)	82.68 (65.35)	8.15	8.08	8.01	8.08	8.08	8.16	8.05	8.10
S_6	0.48	0.48	0.48	0.48	81.31 (64.38)	81.03 (64.16)	80.40 (63.72)	80.91 (64.08)	8.00	8.01	7.93	7.98	8.00	8.00	7.90	7.96
Mean	0.52	0.51	0.50	0.51	83.59 (66.03)	83.28 (65.80)	81.79 (64.67)	82.69 (65.39)	8.11	8.08	7.96	8.05	8.15	8.14	8.02	8.10
	SE m±		CD at 5%		SE m±		CD at 5%		SE m±		CD at 5%		SE m±		CD at5 %	
S	0.004		0.01		0.22		0.83		0.01		0.03		0.02		0.07	
M	0.001		0.003		0.14		0.53		0.01		0.03		0.01		0.03	
S x M	0.008		0.02		0.69		2.07		0.03		0.09		0.03		0.09	

S_0 – Fresh pollens
S_1 – 1 day stored pollens at ambient condition
S_2 – 2 days stored pollens at ambient condition
S_3 – 1 days stored pollens at refrigerator
S_4 – 2 days stored pollens at refrigerator
S_5 – 1 day stored pollens at earthen pot
S_6 – 2 days stored pollens at earthen pot
NS – Non-significant
M_0 - 100% pollenM_1 - 75% pollen + 25% filler mixture M_3 - 50% pollen + 50% filler mixture

Table 5: Influence of storage conditions and filler mixtures on seedling vigour index, Seedling dry weight (g/10 seedlings) and Electrical conductivity of seed leachate (dS/m) of chilli hybrid (HCH-9646).

Treatments	Seedling vigour index				Seedling dry weight (g/10 seedlings)				Electrical conductivity of seed leachate (dS/m)			
	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean
S_0	1484	1438	1412	1451	0.29	0.29	0.28	0.29	0.80	0.81	0.82	0.81
S_1	1328	1327	1290	1315	0.26	0.26	0.24	0.25	0.84	0.84	0.85	0.85
S_2	1277	1280	1221	1259	0.23	0.23	0.20	0.22	0.84	0.85	0.88	0.86
S_3	1471	1429	1378	1426	0.29	0.28	0.28	0.28	0.81	0.81	0.82	0.81
S_4	1306	1298	1279	1294	0.26	0.24	0.23	0.24	0.81	0.82	0.82	0.82
S_5	1353	1353	1308	1338	0.27	0.26	0.25	0.26	0.84	0.84	0.83	0.84
S_6	1301	1297	1279	1290	0.25	0.24	0.23	0.24	0.84	0.84	0.85	0.84
Mean	1360	1349	1308	1339	0.26	0.26	0.25	0.26	0.83	0.83	0.84	0.83
	SE m±		CD at 5%		SE m±		CD at 5%		SE m±		CD at 5%	
S	3.73		14.21		0.002		0.007		0.002		0.007	
M	2.44		9.29		0.001		0.003		0.001		0.003	
S x M	6.47		24.65		0.004		NS		0.003		0.01	

S_0 – Fresh pollens
S_1 – 1 day stored pollens at ambient condition
S_2 – 2 days stored pollens at ambient condition
S_3 – 1 days stored pollens at refrigerator
S_4 – 2 days stored pollens at refrigerator
S_5 – 1 day stored pollens at earthen pot
S_6 – 2 days stored pollens at earthen pot
NS – Non-significant
M_0 - 100% pollenM_1 - 75% pollen + 25% filler mixture M_3 - 50% pollen + 50% filler mixture

Table.ɤ Influence of storage conditions and filler mixtures on pollen viability of Arka Lohit under *in vitro* condition based on number of dark stained pollens, light stained pollens and unstained pollens

Treatments	Dark stained pollen				Light stained pollen				Unstained pollen			
	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean
S_0	15.25	12.62	11.12	12.29	44.37	40.00	37.25	40.54	5.00	6.25	6.12	5.79
S_1	11.27	10.31	7.37	9.65	37.62	37.50	35.37	36.83	10.00	11.75	11.68	11.14
S_2	10.00	9.56	7.12	8.89	35.62	34.25	32.25	34.04	15.37	15.62	19.37	16.79
S_3	13.37	12.12	9.12	11.54	42.25	41.37	39.87	41.16	6.37	7.00	11.00	8.12
S_4	10.12	11.50	8.37	10.00	38.87	38.62	36.37	37.95	10.25	11.75	14.25	12.08
S_5	13.12	11.75	8.75	11.91	39.62	38.87	36.62	38.37	10.25	11.87	13.62	11.91
S_6	10.12	9.00	7.62	8.91	36.62	37.50	34.62	36.25	12.75	14.25	15.75	14.25
Mean	11.89	10.98	8.50	10.45	39.28	38.30	36.05	37.88	10.00	11.21	13.11	11.44
	SE m±		CD at %		SE m±		CD at 1%		SE m±		CD at 1%	
S	0.11		0.31		0.34		1.27		0.32		1.20	
M	0.20		0.37		0.22		0.82		0.21		0.78	
S x M	0.13		0.37		0.60		2.25		0.56		2.10	

S_0 – Fresh pollens
S_1 – 1 day stored pollens at ambient condition
S_2 – 2 days stored pollens at ambient condition
S_3 – 1 days stored pollens at refrigerator
S_4 – 2 days stored pollens at refrigerator
S_5 – 1 day stored pollens at earthen pot
S_6 – 2 days stored pollens at earthen pot
NS – Non-significant
M_0 - 100% pollenM_1 - 75% pollen + 25% filler mixture M_3 - 50% pollen + 50% filler mixture

Table 5 : Pollen germination (%) and pollen tube length of Arka Lohit as influenced by storage conditions and filler mixtures under *in vitro* condition .

Treatments	Pollen germination (%)				Pollen tube length (µm)			
	M_0	M_1	M_2	Mean	M_0	M_1	M_2	Mean
S_0	89.41 (69.21)	89.80 (71.37)	83.59 (66.03)	87.60 (69.38)	1021.7	1219.5	861.4	1034.2
S_1	76.11 (60.73)	77.29 (61.48)	72.07 (58.05)	75.16 (60.07)	830.4	1012.2	651.9	831.5
S_2	59.14 (50.24)	59.74 (50.59)	53.49 (46.95)	57.46 (49.26)	520.8	751.5	480.8	584.4
S_3	87.47 (69.21)	87.86 (69.56)	84.07 (66.42)	86.47 (68.36)	948.5	1102.4	838.3	963.1
S_4	83.56 (66.03)	85.15 (67.29)	80.44 (63.72)	83.05 (65.65)	886.0	1052.2	751.0	896.4
S_5	82.27 (65.05)	84.41 (66.74)	77.80 (61.89)	81.49 (64.45)	863.0	950.5	786.3	886.6
S_6	76.94 (61.27)	74.89 (59.87)	70.55 (57.10)	74.13 (59.41)	730.4	802.9	650.4	727.9
Mean	79.27 (62.87)	79.88 (63.29)	74.57 (59.67)	77.91 (61.96)	828.7	984.5	717.2	843.4
	SE m±		CD at %		SE m±		CD at %	
S	0.32		1.20		2.1		7.9	
M	0.20		0.75		1.3		5.1	
S x M	0.55		2.06		3.6		13.7	

S_0 – Fresh pollens
S_1 – 1 day stored pollens at ambient condition
S_2 – 2 days stored pollens at ambient condition
S_3 – 1 days stored pollens at refrigerator
S_4 – 2 days stored pollens at refrigerator
S_5 – 1 day stored pollens at earthen pot
S_6 – 2 days stored pollens at earthen pot
NS – Non-significant
M_0 - 100% pollenM_1 - 75% pollen + 25% filler mixture M_3 - 50% pollen + 50% filler mixture

SWADESHI VIJNANA ANDOLANA-KARNATAKA
ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

"SURVEY AND MANAGEMENT OF PESTS OF CAPSICUM UNDER PROTECTED CULTIVATION"

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Capsicum is one of the most commercially cultivated vegetable crop under protected condition but this crop is more prone to lot of sucking pest viz., Mite, Thrips, Whitefly, leaf miners, Aphids and Gall midge. Hence, during 2010 a thorough research work were carried out at the Hi-Tech Horticulture project, MARS, Saidapur in UAS, Dharwad where the Surveillance studies indicated that mite, *Polyphagotarsonemus latus* (Banks) and thrips, *Scirtothrips dorsalis* (Hood) incidence commenced on crop around 20-25 days after planting and attained peak during the period of September and November. However, *Spodoptera litura* (Fab) incidence noticed peak during August month. Thus use of Yellow sticky traps indicated that sucking pest occurrence was more during the cropping period of July to September with varied densities. This study was correlated with weather parameter and noticed that there was positive correlation between mites and thrips population in relation to temperature and with reference to Relative humidity negative correlation with mite and positive correlation with thrips. With respect to *Spodoptera litura* there was non significant and negative correlation with temperature and positive and non significant correlation with Relative humidity.

Among the newer molecules evaluated against mite, abamectin (1.3 mites/5 leaves & 30.6% leaf curl) was found to be effective followed by Econeem. For thrips, thiamethoxam (0.65& 27.7%) and difenthiuron (0.7 & 32.7%) were found to be significantly superior compared to others. With respect to S.litura, acephate was found to be the best treatment followed by Clothianidin. The untreated capsicum crop recorded significantly highest pest densities and damage.

Among IPM modules studied, chemical intensive module proved effective in reducing the pest population and crop damage with maximum net returns (Rs 19, 77,452 /ha), B:C ratio (4.8) and fruit yield (2304 g/pl) followed by IIHR module.

INTRODUCTION : Bell pepper, (Capsicum annuum L) is one of the most popular and highly remunerative vegetable crops intensively grown in Karnataka, Maharashtra, Tamil Nadu, Himachal Pradesh and hilly areas of Uttar Pradesh. India contributes one fourth of world production of capsicum with an average annual production of 0.9 million tons from an area of 0.885 million hectare with a productivity of 1266 kg per hectare. But various biotic (pest and diseases), abiotic (RH, temperature, rainfall, light intensity) and physiological factors are the main constraints encountered by the farmers in getting higher productivity and good quality produce. It is one of the most commercially cultivated vegetable crop under protected condition but this crop is more prone to lot of sucking pest viz., Mite, Thrips, Whitefly, leaf miners, Aphids and Gall midge. They multiply in large numbers under controlled temperature and RH as well as pesticide use there by leading to significant crop loss. Under these circumstances, insect pests of capsicum, which reduce the fruit quality, are economically very important.

MATERIAL AND METHODS

a) On and off campus surveillance study: To know the Pest spectrum and extent of damage in relation to age of the crop from seedling to fruiting stage the fixed plot survey was made during *kharif* 2009-10 on capsicum pests under protected condition at fortnightly intervals and at two locations i.e. Hi-Tech Horticulture project Main Agricultural Research Station, University of Agricultural Sciences, Dharwad and farmer's field at Garag village.

In Hi-Tech Horticulture project MARS, Dharwad bavistin treated hybrid bomby 35 days old, vigorous and uniform size seedlings were transplanted to 11 nursery beds (24 x 1x ½ m^3) with a spacing of 60x30cm at a depth of 2-2.5cm. FYM and required manures were also applied as per recommended package of practices. Simultaneously Survey was made in Garag village on hybrid capsicum Orobelle (Yellow colour) which was raised under shade house condition with a bed size of 30m length, one meter width and half meter path.

Observation on pest population of thrips, *S. dorsalis* and mite, *Polyphagotarsonemus latus* were recorded by destructive sampling by taking count on number of insects /5 leaves from 5 randomly selected plants and *S. litura* was recorded by taking count on 10 randomly selected plants and the damage was recorded based on visual score (Table-1) and the percent damage was calculated.

Table-1: Scoring procedure for sucking pests (mites and thrips) and fruit borer (*Spodoptera litura*) damage

Number	Score	Symptoms
1	0	No symptoms
2	1	1 to 25% leaves per plant showing curling or damage
3	2	26 to 50% leaves per plant showing curling – moderately damaged
4	3	51 to 75% leaves per plant showing curling, heavily damaged, malformation of growing points, and reduction in plant height.
5	4	>75% leaves per plant showing curling, severe and complete destruction of growing points, drastic reduction in plant height, defoliation and severe malformation

b) Evaluation of biorationals and newer pesticides against capsicum pests:

In order to evaluate biorationals and newer pesticides against capsicum pests 11 treatments like (T1- Econeem 10,000 ppm @ 3.0ml/lit, T2- *Verticillium lecanii* @ 2.0g/lit, T3- Abamectin 1.8 EC @ 0.5ml/lit,T4- Clothianidin 50WP@0.2g/lit, T5- Difenthiuron 25WP@1.0g/lit, T6- Omite 57 EC@2ml/lit, T7- Thiamethoxam 25WG@ 0.2 g/lit, T8- Acephate 75SP@1.0 g/lit, T9- DDVP 100EC@1ml/lit,T10- Dimethoate 30EC@1.7ml/lit, T11-Control) Selected which were replicated thrice. All the treatment sprays were taken up starting from initial notice of the pest population and its damage during the experimentation period. Ten rounds of sprays were taken at ten days interval.

Pre count and post count at 3 and 7 days after spray (DAS) were taken by recording insect number / 5leaves and percent leaf damage based on grades for both mites and thrips but for thrips five leaves on the top canopy were considered. For counting of *Spodoptera litura*, ten plants were selected randomly in each replication and number of caterpillars per four branch from each selected plant recorded and scored for pin holes and defoliation Visually following the scoring procedure mentioned in (Table 1). Scoring was done thrice, first at 21st (after 1st and 2nd spray), second at 43rd (3rd and 4th spray) and third at 60th (5th and 6th spray) days after transplanting. The data were statistically analysed using RCBD and the effective treatments were selected to develop IPM modules against capsicum pests.

c) Evaluation of IPM strategies for pest Management : To develop IPM strategies for management of capsicum pests, investigation was carried out at Hi-Tech Horticulture project, MARS, Saidapur under shade house condition during Rabi season 2009-10. The experiment comprised 3 IPM modules replicated eight times. Each module consisted of four beds. The details of modules tested are given below.

Module- I → IIHR Based module — profenophos 50EC @ 2 ml/l, NSKE 5%, abamectin 1.8EC @ 0.5 ml/l, *Verticillium lecanii* @ 2g/l and fenazaquin 10 EC @ 2 ml/l.

Module- II → Chemical Intensive Module — imidacloprid @ 0.5 ml/l, dimethoate 30EC @ 1.7 ml/l , abamectin 1.8EC @ 0.5 ml/lit , fenazaquin 10 EC @ 2 ml/l , dicofol 18.5EC @ 2.0 ml/l, acephate 75 SP @ 1.0 g/l.

Module-III → Biorational Module — Spraying with imidacloprid / thiamethoxam, Spraying with either fungal pathogen/ botanicals, spraying with insecticide, spraying with Acaricide, Fungal pathogen /botanicals

The treatments were imposed at an interval of ten days and eight sprays were taken up starting from initial notice of pest population and its damage. The observations were taken for mites and thrips population as precount, and post count at 3 and 7 days after spray (DAS) and its leaf curl damage was recorded at 21, 43 and 60 day after transplanting visually by following the 0-4 scale (Niles, 1980). For yield data five plants were selected and tagged in each replication of a module and fruits from these plants were allowed to mature fully then fruits were harvested from each module respectively. The data were subjected to statistical analysis using RCBD and was converted to hectare basis and then economics were calculated. Based on the yield data, the gross returns and net returns were calculated for each module. The benefit cost ratio (B: C) was determined by dividing the net returns with the total cost including cost of treatment imposing in the respective modules on hectare bases.

RESULT AND DISCUSSION : Surveillance made on mite population in Capsicum at Garag village revealed that mite and thrips population increases with age of the crop and time (Table-2) the data indicated that peak activity of mite and thrips population was noticed during II fortnight of September (22.32 mites/5 leaves & 6.69 thrips/5leaves). where as in case of *S.litura* the population decreased with age of the crop. peak density (1.36 larva / branch) was recorded during I fortnight of August. with reference to Hi-Tech Horticulture project MARS, Saidapur peak activity (14.85 mites/5leaves & 7.50 thrips/5 leaves) of mites and thrips noticed during I fortnight of September. where as in case of *S.litura* peak activity (1.73 larva/ branch) was noticed during II fortnight of August.

Table-2: Surveillance for incidence of Mite (Polyphagotarsonemus latus), thrip (Scirtothrips dorsalis) and fruit borer (*Spodoptera litura*) on capsicum

A: (Location: Farmers fields at Garag village, Tq: DWD)						
Insects	**I FN of July**	**II FN ofJuly**	**I FN of Aug**	**II FN of Aug**	**I FN of Sept**	**II FN of Sept**
Mean number of mites / 5leaves/12 beds	0.71 ± 0.27	1 ± 0.24	1 ± 0.24	13.95±3.94	20.9±5.49	22.32 ±3.72
Mean number of thrips / 5 leaves/12 beds	0.73±0.23	1.05±0.37	2.55±0.37	3.75±0.37	4.26±0.97	6.69±1.77
Mean number of larvae / branch/12 beds	0.51±0.35	0.90±0.40	1.36±0.25	1.20±0.19	0.92±0.19	0.72±0.19

B: (Location: Hi -Tech Horti culture project, UAS, Dharwad)						
Insects	**I FN of July**	**II FN ofJuly**	**I FN ofAug**	**II FN ofAug**	**I FN ofSept**	**II FN ofSept**
Mean number of mites / 5leaves/12 beds	0.85±0.25	1.02±0.24	3.02±0.24	10.45±3.81	14.85±4.50	9.50±2.3
Mean number of thrips / 5 leaves/12 beds	0.80±0.26	4.15±1.10	4.80±1.50	4.95±1.33	7.50±1.70	5.70±1.60
Mean number of larvae / branch/12 beds	0.74±0.43	1.03±0.28	1.22± 0.26	1.73±0.4	1.33±0.47	0.74±0.29

With reference to leaf curl due to mite and thrips significantly lowest leaf curl damage was noticed on 21st day (24.25% and 18.0%) at Garag and (21.5 % and 19.4%) at saidapur when the crop was at early stage and highest damage was recorded on 60th day at Garag (33.0% and 24.0%) and at saidapur (30.0% and 32.4%). As the crop advances in age, it gives time for the pests to multiply in numbers besides allowing itself to put up more foliage and food and therefore present finding confirms this phenomenon. Alatawi *et al.* (2007) reported that older plants exhibited greater damage than younger plants. In case of S. *litura* lowest percent defoliation was noticed in 21st (14.5%) followed by 60th day in garag village where as in Saidapur lowest percent damage was recorded in 60thday (11.75%) followed by 21stday (25.3%) (Table-3). No published information is day available on S. *litura* population, its fluctuation and its damage on capsicum.

Table-3: Surveillance for damage of capsicum pests at Garag village and Hi -Tech Horticulture project, UAS, Dharwad

Damage	**Mean % leaf curl due to mites/leaf/ 12 beds**			**% leaf curl due to thrips / leaf / 12 beds**			**% Defoliation/12 beds**		
	21st day	**43rd day**	**60th day**	**21st day**	**43rd day**	**60th day**	**21st day**	**43rd day**	**60th day**
Garage village	24.25±12.1	27.4±14.6	33.0±10.8	18.0±12.4	22.9±16.1	24.0±20.5	14.5±12.7	25.8±9.7	14.5±12.7
Hi -Tech Horticulture project, UAS, Dharwad	21.5±10.7	25.2±12.4	30.0±10.0	19.4±10.1	23.0±5	32.4±4.9	25.3±13.9	33.7±15.0	11.75±10.7

The efficacy of different treatments tested against mite, (*Polyphagotarsonemus latus*) population and leaf curl damage result indicated that abamectin was found to be significantly superior recording (1.3 mites / 5 leaves & 30.6%) followed by Econeem (2.7 mites / 5 leaves) & 35 %). Untreated capsicum recorded significantly highest population (13.5 mites/5leaves) and damage (82.9%). Present findings are in line with Sheeba *et al.* (2008) Mani *et al.* (2003), Madelaine Venzon *et al.* (2008), Anon (2002) and Tatagar (2004a) who reported abamectin as effective against mite on different crops.. Anon (2001) reported that application of sulphur or any acaricide @ 0.05% was found effective for controlling broad mite in chilli ecosystem.

In case of thrips population data revealed that thiamethoxam and difenthiuron were found to be significantly superior (0.65 and 0.7 thrips / 5 leaves) followed by *V. lecanii* (1.1 Thrips/5 leaves) With respect to crop damage lowest was noticed in thiamethoxam (27.7%) followed by difenthiuron (32.7%). Untreated capsicum recorded highest population and leaf curl damage. present findings are in agreement with Sunitha *et al.* (2008), reported that Thiamethoxam 25% EC was found effective against thrips in grape ecosystem. Gupta and Roshanlal (1998) reported that thiamethoxam 25% WG was effective against thrips population in cotton. Amalendes Ghosh et *al.,* (2009) reported that thiamethoxam, Acetamiprid, clothianidin showed superior performance against thrips in chilli. Nagaraj *et al.,* (2007) reported that the mean thrips population and leaf curl index recorded were minimum in thiomethoxam 25WG which was followed by imidacloprid, thiocloprid 21.7 SC and clothianidin 50WG in chilli ecosystem. With respect to *Spodoptera litura* and % leaf damage, acephate (0.1 larva / branch & 33.4%)) was found to be best treatment followed by clothianidin (0.35 larva /branch & 35.7%) Untreated crop recorded significantly highest population (1.4 larva /branch) and damage (55.3%). In case of fruit damage, less damage was noticed in acephate (24.5%) followed by difenthiuron and dimethoate (32.3% and 32.8%, respectively). The untreated *capsicum* recorded significantly highest fruit damage (85.3%) (Table-4). There is no information available in the literature on efficacy of insecticides, bioagents and botanicals against *S. litura* on bell pepper.

Among the three modules evaluated against mite, *P. latus* and thrips, *S. dorsalis* on sweet pepper, revealed that M-II (Chemical intensive module) was found significantly effective in controlling pest population and crop damage (3.95 mites/5leaves, 27.5% and 0.45 thrips/5 leaves and 25%) followed by M-I (5.25 mites/leaves, 47.2% and 1.0 thrips/5 leaves, 47.9%) and M-III (9.95 mites/5leaves, 52.5% and 1.2

thrips /5 leaves, 47.9%, respectively) (Table-5). Present findings are in line with findings of Honnamma Rani, (2001) who reported that dicofol (0.05%), abamectin (0.0007%), ethion (0.1%) and wettable sulphur (0.2%) in sequence were more effective against *P. latus* on chilli and potato. Eswara Reddy and Krishna Kumar (2006b) also observed that application of module I (spray of abamectin followed by ethion and abamectin) or module II (spray of abamectin followed by profenofos and abamectin) were significantly effective (3.91-6.58 mites / leaf) than module III (spray of dicofol followed by pongamia oil and neem seed kernel extract (5.79-6.95 mites/ leaf). Khalid Ahmed *et al.,* (2000) Honnamma Rani (2001) and Mallik *et al.,* (2002) reported that dicofol, ethion, profenophos and fenazaquin are effective acaricides for the management of *P. latus* on number of crops. Raj and Parihar (2003) reported that imidacloprid followed by dicofol was best treatment against mite and enhanced yield. These reports lend support to the present finding that combination of different molecules in an integrated manner would manage the pest

Table-4: Effect of biorationals and newer pesticides against mite, thrips , fruit borer and crop damage (*Kharif* 2009-10)

Treatment	Dosage	Mean number of mites /5 leaves (Days after spray)	% Leaf curl (Days after spray)	Mean number of thrips /5 leaves (Days after spray)	% leaf curl (Days after spray)	Mean number of larvae /branch (Days after spray)	% Defoliation (Days after spray)	% Fruit Damage
		Mean	Mean	Mean	Mean	Mean	Mean	Mean
Econeem 10,000 ppm	3 ml/l	2.7 (1.9)	35.0	1.45 (1.5)	41.1	0.4 (1.2)	54.0	34.4 (35.9)
Verticillium lecanii	2 g/l	3.0 (1.95)	38.9	1.1 (1.45)	35.0	0.45 (1.2)	47.4	47.5 (43.4)
Abamectin 1.8EC	0.5 ml / l	2.3 (1.5)	30.6	4.45 (2.3)	52.2	0.7 (1.3)	43.7	34.9 (36.1)
Clothianidin 50 WP	0.2 g / l	6.4 (2.65)	50.4	2.45 (1.8)	50.0	0.85 (1.15)	35.7	44.1 (41.6)
Diflenthiuron 25WP	1 g / l	7.25 (2.75)	52.8	0.7 (1.3)	32.7	0.7 (1.3)	49.7	32.9 (34.6)
Ovale 5.4EC	2.5 ml / l	4.25 (2.3)	45.6	2.15 (1.7)	38.8	0.65 (1.3)	48.2	57.7 (50.0)
Thiamethoxam 25WG	0.2 g / l	10.5 (3.4)	63.9	0.65 (1.25)	27.7	0.75 (1.3)	42.6	67.0 (55.1)
Acephate 75SP	1 g / l	8.0 (2.95)	50.0	5.45 (2.55)	56.1	0.1 (1.0)	33.4	24.5 (29.6)
DDVP 100EC	1 ml /l	6.4 (2.6)	52.8	2.65 (1.85)	36.1	0.45 (1.2)	51.8	35.0 (36.0)
Dimethoate 30 EC	1.7ml /l	3.4 (2.05)	47.2	1.25 (1.5)	41.9	0.55 (1.25)	38.9	32.8 (34.9)
Control (water spray)	----	15.5 (3.8)	82.9	5.5 (2.5)	58.3	1.4 (1.55)	55.3	85.3 (68.0)
Mean								
CD@ 5%		CD (5%)	CD (5%)					
		0.34	20.4	CD (5%)	CD (5%)	CD (5%)	CD (5%)	CD (5%)
		0.18	10.6	0.27	18.36	0.06	11.88	6.27
		1.96	35.4	0.14	9.59	0.03	5.94	3.27
				0.47	31.9	0.10	19.7	10.86

DAS- Days after spray, Figures in parenthesis are square root transformation, NS-Non significant, * Significant at 5% Means followed by same letter in a column do not differ significantly by DMRT (p=0.05)

Table-5: Mite, (*Polyphagotarsonemus latus*) and thrips (*Scirtothrips dorsalis*) population and its damage as influenced by different IPM modules (Rabi 2009-10)

Modules	Mean number of mites / 5 leaves (Days after spray)	% leaf curl (Days after spray)	Mean number of thrips / 5 leaves (Days after spray)	% leaf curl (Days after spray)
	Mean	Mean	Mean	Mean
Module- I	5.25 (2.5)	47.2	1.0(1.4)	47.9
Module- II	3.95 (2.2)	27.5	0.45(1.25)	25.0
Module- III	9.95 (3.3)	52.5	1.2 (1.5)	47.9
Mean				
Anova				
CD (5%)	CD (5%)	CD (5%)	CD (5%)	CD (5%)
			0.3	14.5
	0.2	12.77	0.2	8.9
	0.1	7.82	0.3	15.4
	0.2	13.54		

DAS – Days after spray, Figures in parenthesis are Square root transformation, NS – Non significant, * Significant at 5% Means followed by same letter in a column do not differ significantly by DMRT (p=0.05)

Module- I : profenophos – abamectin - NSKE 5% - *Verticillium lecanii*- Fenazaquin - profenophos - abamectin and NSKE 5%.

Module-II : Imidacloprid - abamectin + Rogor – acephate - Dicofol + imidacloprid- Rogor + imidacloprid - imidacloprid + abamectin - Dicofol+ Fenazaquin and abamectin.

Module-III: Imidacloprid- *Verticillium lecanii* - Dimethoate + Dicofol - Dicofol - Neem – abamectin - thiamethoxam and *Verticillium lecanii*

With respect to yield and cost economics significantly higher fruit yield was recorded in M – II (2304 g/pl) which resulted maximum net returns (Rs 19,77,452 /ha) and B: C ratio (4.8) (Table-6). The effectiveness of modules in managing pests was of the order – M-II > M-I > M-III. M-II was an effective IPM module because of reduced incidence of pests which might be due to the effectiveness of components of IPM, mainly chemicals that exhibited good residual toxicity. Gupta and Rai (2006) revealed dimethoate alone or in combination with neem kernel extract enhanced the yield and increased C: B ratio.

Table 6: Economics of IPM modules evaluated in Capsicum

Modules	Yield* (g/plant)	Yield (t/ha)	Gross returns @ £ 35,000/t	Total cost (£/ha)	Net returns (£/ha)	Benefit cost ratio
Module – I	1868[b]	55.30	19,35,500	4,03,304	15,32,196	3.8
Module – II	2304[a]	68.20	23,87,138	409686	19,77,452	4.8
Module – III	1428[c]	42.27	14,79,456	397320	10,82,136	2.7

DAS – Days after spray, Figures in parenthesis are Square root transformation, NS – Non significant, * Significant at 5% Means followed by same letter in a column do not differ significantly by DMRT (p=0.05)

Module- I : profenophos – abamectin - NSKE 5% - *Verticillium lecanii*- Fenazaquin - profenophos - abamectin and NSKE 5%.

Module-II : Imidacloprid - abamectin + Rogor – acephate - Dicofol + imidacloprid- Rogor + imidacloprid - imidacloprid + abamectin - Dicofol+ Fenazaquin and abamectin.

Module-III : Imidacloprid- *Verticillium lecanii* - Dimethoate + Dicofol - Dicofol - Neem – abamectin - thiamethoxam and *Verticillium lecanii*

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BIRD PESTS AND THEIR MANAGEMENT

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A variety of crops such as :cereals, millets, pulses, oilseeds, fruits and vegetable crops are depredated by birds during their vulnerable stages of growth mainly at dough and maturity stages . Even though, only 2% of the available bird species are depredatory in nature, the magnitude of damage caused by them is significant and needs immediate attention. In India, a total of 63 species of birds belonging to 19 families have been identified damaging several crops. The important bird pests included common pea fowl ,Sarus crane, Blue rock pigeon, Ring dove, Rose ringed parakeet, house sparrow, and Baya weaver. Studies on the assessment of crop losses due to bird pests have given a varied picture because of different methods of damage estimates. Cereals damaged were paddy (0.6-22.9%), wheat(0.5-37 %),maize (6-39%),pearl millet(0.5-26%) and sorghum(0.5-44 %). Oilseeds were affected seriously *viz* 0.5-40 % in sunflower. Fruits depredated significantly were mango, pomegranate, grape ,apple and banana. Effective management strategies evaluated and recommended are wrapping maize cob with leaves, reflective ribbon, bioacoustics, screen crops ,botanicals, habitat manipulation, netting and IBPM(Integrated Bird Pest Management) which are farmer friendly.

Introduction : A variety of crops such as cereals, millets, pulses, oilseeds, fruit and vegetable crops are depredated by birds during their vulnerable stages. In India, a total of 63 species of birds belonging to 19 families have been identified damaging several crops.Even though only 2% of the available bird species are depredatory in nature, the magnitude of damage caused by them is significant and needs immediate attention. Realizing this fact the government of India under ICAR launched AICRP on Agricultural Ornithology in different states of our country. Agricultural ornithology may be defined as the science of birds in relation to agriculture(Manjiti *et al* 1994). Alternatively, it may be taken as ecology and management of birds in agro-ecosystems. Birds constitute an important component of agro-ecosystems. Ali (1971) mentioned house sparrow,baya,,parakeet, peafowl, etc. as serious bird pests. The dual role of birds in agriculture is very well known. Agriculture provides a concentrated and highly predictable source of food to birds(table 1). This food in general is of three kinds:

(i) Grain, seeds and fruits,

(ii) Green vegetation of the crop plants and grasses

(iii) Insects, other arthropods, rodents, etc., found in the soil, crops and other plants in Agricultural landscapes.

Results and Discussion

Important depredatory birds of Agricultural crops

Peafowl, *Pavo cristatus*

Male has blue neck and tailing bronze, green upper tail feathers ending in blue green.

Found throughout the India up to 1800 ft in Himalaya.

Habitat: Common in cultivated land, light wooded habitat and gardens.

Food: Grains, vegetables shoots, insects, lizards and snakes. Recently high mortality was observed due to indiscriminate use of insecticide and pesticide

Parrot , *Psittacula cyanocephalus*

Normally frugivorous. It attacks ripening cereal crops and food grains, cuts and feeds on maize, jowar, bajra, wheat, barley grains and fruits such as guava, fig, mango, pomegranate etc., (Both semi ripened and ripened fruits are cut and eaten leading to fruit drop).

House sparrow, *Passer domesticus*

Mainly grainivorous, damages the ear heads of jowar, maize, bajra and soft and fleshy fruits such as mulberry and fig. It also feeds on green leafy vegetables.

Blue rock pigeon, *Columba livia*

Mainly grainivorous, eat food grains of maize, pulses and groundnut.

Yellow throated sparrow

Causes heavy damage to wheat and barley.

Mynah, *Acridotheres tristis*

It often damages food grains in fields, fruits and vegetables.

Rosy pastor, *Sturnus roseus*

Feeds on cereals and nectar of flame of forest.

Baya or Weaver bird, *Ploceus philippinus*

It is a pest of grain crops and feeds on paddy grains.

Crow, *Corvus* spp.

It is omnivorous. Damages wheat, cobs of maize, jowar, groundnut, ripe fruits of fig, mulberry and chillies.

Type of damage by birds:

Crop damage occurs at various stages of crop production due to birds i.e. seeds may be removed after sowing, seedlings may be pulled out and grains in milky stage or at the ripening stage may be fed upon under uprooted conditions. The pigeons and crows inflict the damage at the germination and seedling stages.

The birds pick up the seed from the field after the post sowing irrigation and feed on the soaked seeds which were in the process of germination. They also pluck out on the developing young seedlings.

At the flowering stage, the rose ringed parakeets infest the male inflorescence of maize (Tassel) and feed on the anthers and pollen grains. At the tender maize cob stage, the parakeets damage the cobs with the silky style and green husk. At milky stage of the maize cob when they split away the covering bracts there by exposing the grain for easy feeding and further damage. In sunflower when the seeds are soft the parrots cause extensive damage by feeding on the seed thus reducing the yield.

Grainivorous birds describe a diet that consists primarily, though not exclusively, of seeds and grain. This is the primary diet for many types of birds, especially game birds, sparrows and finches. Granivorous birds can also eat other things and many species will consume insects as a source of protein for growing chicks during the nesting season. Damage by these species to important crops and fruits has been estimated in different parts of India (Table 2 and 3).

Table:1Bird composition on different crops in relation to their feeding guild

	No. of spp.	Carnivorous	Insectivorous	Frugivorous	Nectarivorous	Granivorous	Omnivorous
Paddy	72	5	37	1	4	14	11
Wheat	36	2	14	1	3	8	8
Maize	48	3	23	1	3	9	9
Pearlmillet	39	2	20	1	2	9	5
Sorghum	54	3	22	1	3	11	13
Pulses	29	1	10	1	2	7	8
Oilseeds	22	1	12	4	2	-	6
Fruit crops	32	2	13	5	4	-	8

(Sridhara,2006)

Table 2. Bird damage to crops

Crop	Stage of damage	Bird	Extent of loss (%)
Groundnut	Ripening	Crows	**24**
Maize	Sprouting	Crows, Doves, Babblers	**20**
Mustard	Ripening	Parakeets, Crows	**63**
Pearl millets	Ripening	Sparrows, Parakeets, Weaverbirds	**10-100**
Peas	Ripening	Pigeons	**54**
Pulses	Sprouting	Doves, Pigeons, Parakeets, Sparrows	**66**
Rice	Sprouting	Weaverbirds, Sparrows	**41**
	Ripening	Sparrows, Weaverbirds, Mynah, Parakeets, Sarus cranes	**26**
Sorghum	Ripening	Pigeons, Doves	**12-85**
Sunflower	Sprouting	Crows	**65**
	Ripening	Crows , parakeets	**22**
Wheat	Sprouting	Crows	**17-20**

Table :3 Bird damage pattern in Fruit crops

Crop	Stage of crop	Extent of Damage (%)	No. of Depredatory birds
Mango	Ripening	3 – 10	2
Guava	Ripening	3 – 5	8
Pomegranate	Ripening	2 – 20	4
Grape	Ripening	2 – 27	9
Date palm	Ripening	0.1 – 1	6
Apple	Ripening	5 – 13	14
Banana	Ripening	19.4	5
Kinnow	Ripening	3 – 16	7
Pecan nut	Ripening	6 – 50	2
Papaya	Ripening	5 - 15	7

The birds like crows, doves, babblers, parakeets, pigeons, weaverbirds, sparrows, sarus cranes etc are damaging to field and horticultural crops. Rose-ringed parakeet is probably the only species that seems to be exclusively harmful to agriculture, having no compensatory value. House crow and blue rock pigeon have also been considered to be harmful. House sparrow, ring dove and baya weaverbird have a neutral status in relation to agriculture while a large majority of the species in the agricultural bird communities are useful.

Bird congregation at grain stores and rice-shelling yards in Punjab are a real problem. A flock of 1000 pigeons can consume 18 kg/day of sprouting maize, 15 kg/day of sprouting pulses, 18 kg/day of maturing lentil, 41 kg/day of maturing pea or 01 kg/day of maturing gram.

Conservation of useful species: Agricultural areas in India probably experience the most heavy and indiscriminate use of pesticides leading to direct and indirect mortality of predatory and frugivorous birds. The population of sarus crane is dwindling in some parts of India due to agricultural aspects on birds of agricultural habitats. Fast moving vehicles have been found to constitute a new factor of bird mortality on roads in agricultural habitats.

Eco friendly management of grainivorous birds: Lethal and non-lethal methods of control can be used against different birds. In certain situations, farmers need to kill a few birds to scare others. Shooting involves a lot of labour, and mist nets are very costly and not easily available. Certain traps can be easily constructed for catching crows and other birds. Fumigation of nest holes and nest destruction for population reduction is also very labour intensive. Some chemicals have been found to be efficient poison baits against pest birds. Lethal control of birds does not always solve the problems. The killing of most of the bird species is illegal in India. Non-lethal control measures call for special attention and research on them should be intensified.

Chemical and physical bird repellents, camouflaging cobs etc. Various devices to scare or repel birds. Traditional methods like erection of scare crows, noise making device like crackers and carbide guns tying polythene bags.

Reflective ribbon or bird scaring ribbon is found to be more effective and easily adaptable by the farmers in the field for scaring the birds. It is polypropylene metallic shining ribbon with red/yellow on one side and silver white on the other side is prepared by cutting into strips of 10 to 15 meters length and 15 mm (1.5 cm) width. About 25-30 strips are fixed in an acre with the help of bamboo poles keeping just one foot above the crop level in north and south directions and slightly twisted to reflect the sunlight throughout the day. The inter distance between the two ribbons should be about 4 to 8 meters (depending upon the crop size and pest population). During sun shine, the brightness and humming noise produced by the wind scares the bird from the field.(Vasudeva and Dubey,2006)

Pruning of perching and breeding places, in addition to the manual destruction of nests closing the entrance of the nests will reduce their population.

Planting of flowering/fruit bearing trees or shade trees could reduce losses on nearby crops once the parakeets become accustomed to being able to feed on these trees without being disturbed.

Large acreage cultivation of sunflower crop reduces the bird damage.

Spraying of neem kernel powder solution (10 g per litre of water) after seed setting stage repels the birds.

Pre-recorded distress calls of parakeets (Bio- acoustic method) are amplified with the help of speaker will drive away the parrots from the field.

Combination of two or three methods for effective pest management so that the crop is completely protected during its vulnerable stages.

Netting is the best technique to reduce bird damage in small fruit plantings. It is relatively expensive compared to other methods and probably the most labour intensive. It is also the most durable. Biodegradable spray-on net is being developed. It was useful with insects, may be with birds, but is slow and may be expensive.

Visual repellents: predator kite/helium balloon, Scarecrows (a device that is used to discourage birds such as crows from disturbing crops), Balloons, owl or hawk models, animated owl model, crow model, field windmill, eagle eye bird scarer, flashing lights, hanging CDs on string etc.

Spray of methyl anthranilate and sugar (Many bird species cannot digest disaccharides).

Fogging is a fine aerosol mist that irritates birds' eyes and mucous membranes without harming them and has an unpleasant taste when attempting to preen their feathers. Fogging should be done early in the morning or late in the evening when the population counts are high. Sound scaring devices *viz.,* horns, clanging, aluminium pie plates, shiny flashing metal objects, firecrackers and Mylar humming.

Conclusion : As about 55 per cent of the total land is cultivated, the agro ecosystem plays a vital role in the conservation of the avian biodiversity. Effective management of depredatory birds should be taken up by keeping in view the conservation aspects of birds while managing birds problem in agriculture.

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SPORE INHIBITION PROPERTY OF CULTURE FILTRATES OF *TRICHODERMA* SPP. AGAINST *ALTERNARIA LINI,* THE INCITANT OF BUD BLIGHT OF LINSEED

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Abstract: Bud blight caused by *Alternaria lini* is known as an economically important fungal disease of linseed. This Alternaria blight is prevalent in all the linseed growing areas of India. Ten isolates of *A. lini* having different morphological and cultural characteristics were collected from different genetic backgrounds of linseed for conducting this trial. The effect of culture filtrates of four species of *Trichoderma* i.e. *T. viride*, *T. hamatum*, *T. harzianum* and *T. virens* were tested *in Vitro* on sporulation behaviour of all the ten isolates of *A. lini* by poisoned food technique. The maximum 84.40% inhibition of sporulation intensity was recorded when *T. viride* was used against ALP-10 at 10% concentration.

Key words: Biological control, Alternaria blight, linseed, Trichoderma

Linseed (*Linum usitatissimum* L.) is an annual herb with erect, 60-80 cm tall, slender stem that is grown in Rabi season. Belonging to the Linaceae family the genus of Linseed *Linum* has 100 species. From ancient times it is mainly grown for fiber (Flax) and for its seed which is rich in oil. All parts of the plant have extensive and varied uses thus making it an important oilseed crop. In India, linseed is mainly grown for extracting oil. The oil content of the seed generally varies from 33 to 45 per cent. Linoleum, oil cloth, printers ink, soap, patent leather etc. are prepared by using linseed oil (Kolte and Fitt, 1997). The oil cake remained after oil extraction is found to have about 30 to 35 per cent protein. It is very rich proteinaceous feed for the livestock particularly quick growing animals. It is also used as organic manure. Fibers obtained from the stem are spun into linen yarns which are used for making variety of products (Singh *et al*, 2005).

Bud blight caused by *Alternaria lini* is an economically important and major fungal disease of linseed. Disease is observed on linseed crop in different linseed growing areas of India. Chemical fungicides are known to cause environmental hazards (McEwen and Stephenson, 1979) therefore now-a-days more emphasis is given on eco-friendly management strategies. Biological control is one of the most preferred eco-friendly management practices. Among the various bio-control agents reported to suppress plant pathogens *Trichoderma* spp is known as the most effective antifungal antagonist. For conducting this trial ten isolates of *A. lini* having different morphological and cultural characteristics were collected from different genetic backgrounds of linseed. The effect of culture filtrates of four species of *Trichoderma* were tested *in Vitro* on sporulation behaviour of all the ten isolates of *A. lini* by poisoned food technique.

Material and Methods

Collection of pathogen and antagonist

Fresh naturally affected diseased plant parts and seeds of genetically different lines of linseed were collected from the disease screening nursery of AICRP (Linseed), Nagpur during Rabi season in the year 2007, to isolate the pathogen *A. lini*. The pathogen was isolated aseptically on PDA media at 28±2°C. Species was confirmed by observing the germ tube characteristics under microscope.

Four species of the known antagonist *Trichoderma* i.e. *T. viride*, *T. hamatum*, *T. harzianum* and *T. virens* were collected from the Department of Plant Pathology, Dr.PDKV, Akola (MS).

Evaluation of pathogenicity: Five linseed plants each were grown in sterilized soil composite (1 Sand: 2 Soil: 1 FYM) in 12" diameter earthen pots. When the plants started producing buds, small cotton swab dipped in 10^4 spore suspension of individual isolates were wrapped around the neck portion of the buds. Five buds were inoculated with every isolate. Inoculated plants were covered with polythene bags for 30 hrs and inside them 80-90% relative humidity (RH) was maintained by making light spray of double distilled sterilized water (DDSW) before sealing the bags. After 30 hrs the bags were opened and plants were sprayed with sterilized distilled water during morning and evening hours till the expression of symptoms. Observations were recorded for bud blight symptom on 7th day after inoculation and pathogenicity of isolates were confirmed by presence of blightening.

Study of cultural and morphological characters : The fungal lawn of *A. lini* was grown for 9 days aseptically on PDA media at 28±2°C under BOD incubator. Observations of fresh cultures grown under BOD were recorded for colony colour, nature of growth, colony diameter, conidial measurements for spore length, spore width, beak length, number of transverse septa and number of longitudinal septa and sporulation intensity. Conidial characteristics like spore length, spore width and beak length were recorded by using ocular and stage micrometers under 40X magnification of microscope (Arya and Prasad, 1952). For this a 6 mm disc of nine days old

fresh culture was suspended in 9 ml distilled water and one drop of the suspension was taken on the slide to record the observations.

Sporulation intensity was recorded using Haemocytometer. For this 6 mm discs from centre, middle and periphery of the fungal lawn were separately taken into 10 ml distilled water and spores were counted under microscope (40X) in medium square of Haemocytometer. Number of spores per cm^2 was calculated by following formula. Average of above mentioned three observations was taken as the sporulation intensity of the pathogenic isolate.

$$\text{Spore per cm}^2 = \frac{\text{Average no. of spores X 25 X } 10^5}{\pi r^2}$$

Here, r = radius of the disc in millimetre.

Preparation of culture filtrates : For preparation of culture filtrates antagonists were grown in 150 ml potato dextrose broth (PDB) in 250 ml conical flask for 20 days. After 20 days broth containing mycelium and spores were filtered through Whatman filter paper no. 4 then these filtrates were centrifuged at 5000 rpm for 10 min. to collect cell free supernatant and considered 100% concentration that was later used in poisoned food technique as 5% and 10% concentrations (Mane and Pal, 2008).

Effect of culture filtrates on sporulation behaviour of *A. lini*
After recording sporulation intensity in treatment and control, per cent inhibition of sporulation was calculated by using following formula given by Vincent (1927).

$$I = \frac{C-T}{C} \times 100$$

Here, I = Per cent spore inhibition
C = Sporulation in control
T = Sporulation in treatment

Statistical analysis : Statistical analysis was done by applying completely randomized design (CRD) (Gomez and Gomez, 1983).

Results and Discussion

Morphological and cultural variations in *A. lini* isolates

The morphological and cultural characters of the pathogenic isolates grown on PDA are summarized in Table-1. These observations indicate that among the ten isolates ALP-9 was slow growing and had sparse sporulation whereas ALP-10 was growing profusely and had abundant sporulation. Among the 10 isolates 5 were having submerged colonies with darker colour (i.e. olivaceous to black), 4 isolates had effused colonies with lighter colour (i.e. light grey to brown) and one isolate had dark grey cottony colony on PDA.

The mycelium of all the isolates was hyaline and septate. Conidiophores were olive brown and more closely septate. Conidia were 3-7 celled with 1-3 longitudinal and 1-4 transverse septation. Micrometrical observations with respect to the dimensions of conidia indicate length (including beak) and breadth of conidia among ten isolates ranged from 14.9-44.5 x 7.0-15.3 µm with beak length ranging between 2.3-15.6 µm. Conidia were born on conidiophores singally or in chains of 5-6 spores. These characteristics were matching with the characteristics of *A. lini* described by Dey (1933) as well as Arya and Prasad (1952).

Effect of culture filtrates on sporulation behaviour of *A. lini*

In the sporulation study inhibition of spores with culture filtrates of bioagents is recorded against *A. lini* (Table-2 & Table-3) that indicates *T. viride* has most efficiently reduced the sporulation in all the isolates of pathogen with the least sporulation intensity of $1x10^5/cm^2$. Per cent spore inhibition obtained by *T. viride* culture filtrate in pathogenic isolates ranged from 66.67 to 84.40%. Similar results on spore inhibitory properties of culture filtrates of bio-control agents has also been reported by Kelemin and Badal (1994) when they had tested the culture filtrates of *Bacillus subtilis* against some genera of pathogenic fungi such as *Colletotrichum gloeosporioides*. Hijwegen (1989) had also obtained the inhibitory effect on sporulation when he had tested the effect of culture filtrates of seventeen different antagonistic fungal species like *Calcarisporium arbuscula* on sporulation of *Sphaerotheca fuliginea* that causes of powdery mildew of cucurbits.

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Table 1: Morphological and cultural characteristics of pathogenic isolates of *Alternaria brii* on PDA at 28±2°C

Isolate No.	Radial mycelial growth (mm)	Colony colour	Nature of growth	Sporulation intensity ($\times 10^5$/cm^2)	Length (µm)	Breadth (µm)	Beak length (µm)	No. of transverse septa	No. of longitudinal septa	Constriction at the septa
ALP-1	85.66	Olivaceous	Submerged	5.97	17.6-31.8	9.6-12.8	2.3-6.5	1-4	1-3	+
ALP-2	81.88	Light Grey	Effused	5.64	22.8-41.8	10.1-12.7	3.7-12.9	1-4	1-3	+
ALP-3	74.99	Light Grey	Effused	5.73	19.3-26.0	7.1-9.2	4.4-9.9	2-3	1-2	+
ALP-4	65.77	Grey	Submerged	5.92	26.0-33.0	7.5-10.1	5.0-7.6	2-4	1-2	-
ALP-5	83.77	Dark Black	Submerged	5.45	23.7-42.2	9.7-14.8	4.1-13.9	2-4	1-3	-
ALP-6	83.10	Brown	Effused	4.85	31.3-44.5	7.8-11.2	7.2-10.5	1-3	1-2	-
ALP-7	86.33	Dark brown	Submerged	4.33	14.9-29.9	7.0-10.3	3.1-13.6	1-4	1-2	+
ALP-8	81.44	Black	Submerged	5.60	27.3-38.0	10.2-15.3	5.1-13.2	2-4	1-3	-
ALP-9	74.99	Brown	Effused	3.83	27.8-44.4	8.6-12.2	5.2-13.1	2-4	1-2	+
ALP-10	83.22	Dark Grey	Convoy	6.25	19.3-40.0	9.2-14.3	3.8-11.1	1-4	1-2	+

Table 2: Effect of *Trichoderma* spp. on the sporulation intensity of *Alternaria brii* isolates in Vitro

Treatments		Sporulation intensity ($\times 10^5$ /cm^2)																			
		ALP 1		ALP 2		ALP 3		ALP 4		ALP 5		ALP 6		ALP 7		ALP 8		ALP 9		ALP 10	
		5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%
T1	Treatment with respective pathogen	1.44	1.33	1.30	1.06	2.23	1.41	1.24	1.06	2.12	1.44	1.38	1.19	2.18	1.30	1.94	1.47	1.62	1.36	2.21	1.59
T2	*T. harzianum*	2.03	1.41	1.50	1.12	1.50	1.15	1.47	1.36	1.62	1.53	1.18	1.06	1.50	1.12	2.00	1.44	1.18	1.06	2.05	1.33
T3	*T. viride*	1.84	1.24	1.42	1.24	1.36	1.21	1.63	1.38	2.36	1.71	1.63	1.24	1.68	1.03	1.47	1.21	1.12	1.09	1.86	1.62
T4	*T. koningii*	1.36	1.21	1.41	1.03	1.41	1.21	1.15	1.03	1.97	1.18	1.69	1.15	1.80	1.18	2.58	1.00	1.22	1.09	1.58	1.00
T5	Control	5.37	5.57	5.10	5.10	5.51	5.54	5.55	5.69	6.13	6.13	5.07	5.07	4.53	4.63	5.57	5.57	3.27	3.27	6.12	6.42
F test		Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE.(m) ±		0.16	0.16	0.11	0.11	0.08	0.08	0.09	0.09	0.10	0.10	0.12	0.12	0.11	0.11	0.18	0.18	0.29	0.29	0.16	0.16
CD (P=0.01)		0.66	0.66	0.48	0.48	0.32	0.32	0.37	0.37	0.44	0.44	0.49	0.49	0.45	0.45	0.73	0.73	1.19	1.19	0.66	0.66

Table 3: Per cent inhibition of sporulation intensity of *Alternaria limi* isolates *in Vitro* due to culture filtrate of *Trichodermaa* spp.

Treatments		Per cent inhibition of sporulation intensity																			
		ALP-1		ALP-2		ALP-3		ALP-4		ALP-5		ALP-6		ALP-7		ALP-8		ALP-9		ALP-10	
		5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%
T-1	*Trichodermaa harzianum*	74.07	76.19	74.57	79.19	80.11	74.47	78.24	81.35	66.38	75.44	72.67	76.74	72.87	75.97	73.54	70.45	68.46	61.86	75.33	
T-2	*T. harzianum*	63.49	74.60	70.52	78.03	72.87	79.26	74.09	76.17	73.56	73.00	76.74	79.07	67.52	75.80	64.02	74.07	63.96	67.57	67.89	79.36
T-3	*T. viregens*	67.20	77.78	71.10	75.72	75.53	78.19	71.50	75.65	61.54	72.12	68.02	75.50	63.69	77.71	73.54	79.31	65.77	66.67	71.10	74.77
T-4	*T. viride*	75.66	78.31	72.25	79.77	74.47	78.19	79.27	81.87	67.79	80.77	66.86	77.33	71.97	74.52	51.85	82.01	41.44	66.67	71.10	84.40
T-5	Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SWADESHI VIJNANA ANDOLANA-KARNATAKA
ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

FERTIGATION IN HIGH VALUETUBER CROPS

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Tropical tuber crops play a significant role in the food and nutritional security to the human being.Tuber crops are classified as the third most important food crops for man after cereals and grain legumes. The majortropical tuber crops include cassava, elephant foot yam, sweet potato, yams and aroids. Sound watermanagement has the potential to improve fertilizer/nutrient use efficiency. The introduction of well-tested,efficient fertilizer application through irrigation water or "fertigation" techniques could help to bring vast areasof arid and semi-arid land in many parts of the world into farmland, as well as preventing water from beingwasted in conventional irrigation systems. Drip irrigation has the greatest potential for the efficient use ofwater and fertilizers. The limited area of wetting under trickleirrigation reduces the active root zone and thus limiting the foraging area of plants to draw water and nutrients from the soil. For minimizing the cost of irrigation andfertilizers, adoption of drip irrigation with fertigation is essential which will maximize the nutrient uptake, while using minimum amount of water and fertilizer. Thus,fertigation becomes important for increasing the yield of most of the crops under drip irrigation.In thispaper, the literatures pertaining to the different aspects of fertigation on tuber crops are reviewed.Successful cropping of elephant foot yamwas obtained with drip irrigation using fertigationon a highly calcareous desert soil where controlof nutrient level was more difficult than sand dunes. A linear relationship existed between total N uptake by elephant foot yam and fertigationof N up to 200 kg/ha. When NPK were applied throughdrip irrigation, higher elephant foot yam yield wasobtained with 75 % of the recommended dose. fertigation 1/2 N and K and black polymulch was found to be good with respect to yieldand growth parameters like yield of 63.3 t/ha,Fruit weight (64.5 g), number of fruits/plant (62), yield/plant (4 kg), number of branches/plant (7.7) and number of clusters/plant (12.3).The fruit dry matter content (41.2 %) was highestin the treatment 1/2 N and K fertigation throughmulti K + black ploy mulch. There is little information about fertigationmanagement in tuber crops. So, it is quite clearfrom the foregoing literature that,fertigationhad many advantages like higher water use efficiency (WUE),fertilizer use efficiency (FUE),minimum losses of Nand optimization of thenutrient balance by supplying nutrients directly toroot zone, control of nutrient concentration in soilsolution and saves application cost. It increasesthe yield and economics of most of the high valuetuber crops under drip irrigation. High initialinvestment and comparatively low technical skillof average Indian farmers are some of the majorconstraints limiting the large scale adoption as dripfertigation technology in the country. However, increasing water scarcity and escalating fertilizerprices may lead to adopt this technology for bringing greater use efficiency of the twomost critical inputs in crop adoption especially for high and quality production.

Introduction : Irrigation is an important input in crop production. In North Gujarat, potato crop is irrigated by underground water, and day by day the water table is depleting. Hence, economization of water is need of the hour. Drip fertigation provides higher tuber yield with 40% saving in nitrogen over furrow irrigation and soil application of nitrogen (3). Another study (5) revealed that 75% of recommended dose of NPK through drip fertigation resulted in significantly higher tuber yield along with 40% saving of water as compared with conventional furrow method of irrigation. The present investigation was undertaken to study the efficacy of nutrients and water supply to potato through drip irrigation.

Materials and Methods : The study was carried out on light textured (sandy) soil. The potato cv. Kufri Badshah was planted at 50 x 20 cm spacing during 3rd week of November every year. The experiment was conducted in randomized complete block design with six replications and five treatments viz., 100, 80, 60 and 40% of recommended dose of N and K_2O through drip fertigation designated as T1, T2, T3 and T4, respectively, along with control (100% of recommended dose of NPK T5 (220-110-220 NPK kg/ha) applied through soil application).

Half dose of N and K2O and full dose of P_2O_5 were applied in drip irrigation, whereas, for surface irrigation, half dose of N and full dose of P_2O5 and K_2O were applied as basal dose at the time of planting. Remaining half dose of N was applied at 30-35 days after planting in the surface irrigation treatment, while in case of the drip irrigation, the remaining half doses of N and K2O were given through 'venturi' in the form of urea and muriate of potash solution, respectively in four equal splits at 30, 40, 50 and 60 days after planting.

In the drip irrigated crop, lateral lines were laid out 50 cm apart in the middle of two rows. The distance between two drippers was 60 cm and the drippers had on average discharge rate of 4 liter per hour. Two irrigations at the time of planting were given in all treatments to ensure uniform emergence and plant stand. Drip system was operated every alternate day and furrow irrigation was done on the basis of 0.8 pan evaporation (PE) fraction and a total of 14 irrigations of 50 mm depth were given at weekly intervals. The harvest index (economical yield/biological yield x 100) was recorded.

Results and discussion: The results (Table 1) showed that tuber yield was significantly higher under fertigation through drip (T1 to T4) as compared with furrow irrigation. The treatment receiving 100% recommended doses of N and K_2O through drip fertigation produced significantly higher tuber

yield (431 q/ha) but was at par with the treatment receiving 80% recommended dose of N and K2O. The higher tuber yield in treatments with 100 and 80% recommended doses of fertilizers through drip in four splits may be attributed to improvement in growth and yield contributing parameters as reported earlier (2, 6). It is evident from the data (Table 1) that harvest index was maximum under drip fertigation with 100% recommended dose of N and K_2O, whereas the lowest harvest index of 62.7% was recorded in the treatment receiving 40% of recommended dose of N and K_2O fertigation.

The results on water use efficiency (WUE) were influenced by furrow irrigation and N and K fertigation (Table 2) and revealed that fertigation with splits resulted in higher WUE (T1 to T4) over soil application (T5). The results are in conformity with those reported earlier by Keshavaiah and Kumaraswami and Patel and Patel. They also found higher WUE with split nitrogen fertigation. Sood and Singh also reported that under drip irrigation, WUE increased compared with conventional irrigation method. Potato being a shallow rooted crop, rapidly and efficiently utilizes N and there is less scope for its leaching. Therefore, most of N applied through fertigation is utilized by potato for its growth, development and yield.

Drip fertigation with 40% dose of N and K_2O (T4) resulted in 40% saving of water and 17.4% increase in yield over furrow irrigation. Water savings in fertigation might be due to application of water directly to the root zone. Similar results were also reported by Singh and Sood. It is concluded that compared with conventional (furrow) method of irrigation, application of 80% of recommended dose of N and K_2O through drip fertigation would result in significantly higher yield and 20% saving of N and K_2O and 40% saving of water, besides, saving in labour and electricity.

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Table 1. Effect of fertigation on tuber yield and harvest index of potato

Treatment	Tuber yield (q/ha)	Harvest index (%)
T1 : 100% recommended doses of N and K through drip in four splits	431	68.0
T2 : 80% recommended doses of N and K through drip in four splits	420	66.2
T3 : 60% recommended doses of N and K through drip in four splits	380	65.0
T4 : 40% recommended doses of N and K through drip in four splits	365	62.7
T5 : 100% recommended doses of N and K through surface application	311	64.5
CD (P = 0.05)	26	

EVALUATION OF GROUNDNUT (*ARACHISHYPOGAEA* L.) SEED QUALITY PARAMETERS AS INFLUENCED BY FE AND ZN NUTRITION

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Groundnut (*Arachishypogaea* L.) is one of the principal oilseed crops cultivated in India. India is the second largest producer of groundnut. From an area of 6.88 m ha,our country produces 6.41m tonnes ofgroundnut. In Karnataka, nearly 1.11 m ha comes under groundnut cultivation with a production and productivity of 0.72 mtons and 715 kg ha^{-1}, respectively. The low productivity in Karnataka and the country is attributed to many constraints among which depleting soil nutrient level especially that of micronutrients level is important.In certain places of Karnataka iron deficiency is not uncommon especially in groundnut on acidic red soils, as the groundnut is an iron sensitive crop. Iron is the only micronutrient taken up by groundnut in larger quantity when compared with other micronutrients. Though acidic soils are rich in total iron content, available iron is most important rather than total iron from the view point of crop nutrition. Many of the red soils in Karnataka are poor in organic matter, light textured, acidic in reaction and excessively drained. Hence they may be expected to be low in available zinc and other micronutrients. The deficiencies of zinc and iron in soils have become serious constraints for crop production in recent

years, mainly because of continuous use of micronutrients free fertilizers. An optimum supply of these elements to the plants is very much essential for better productivity and seed quality of crop. In the light of the above facts, a field experiment was conducted in order to study the effect of iron and zinc nutrition on groundnut (*Arachishypogaea* L.) in light textured acid soils.A field investigation was undertaken during *Kharif* 2009 at ZARS, Navile, Shimoga to study the effect of Fe and Zn nutrition on growth and yield of groundnut in light textured acid soils. Highest productivity level of pod yield was obtained when $FeSO_4$ + $ZnSO_4$ were applied to soil @ 10 kg ha^{-1} each along with FYM as compared to control. Germination percentage of groundnut seeds improved significantly due to application of Zn and Fe to the crop. Highest value was recorded when $FeSO_4$ + $ZnSO_4$ were applied to soil @ 10 kg ha^{-1} each along with FYM. The seedling vigour index also increased and highest value was observed when $FeSO_4$ + $ZnSO_4$ were applied to soil @ 10 kg ha^{-1} each along with FYM. The increase in seed quality parameters like germination percentage and seedling vigour index of groundnut seems to be the beneficial effect of increased Fen& Zn content in groundnut pods. Hence,farmers can get better yield and quality by application of Fe and Zn in light textured acid soils situation.

Introduction : In certain places of Karnataka iron deficiency is not uncommon especially in groundnut on acidic red soils, as the groundnut is an iron sensitive crop. Iron is the only micronutrient taken up by groundnut in larger quantity when compared with other micronutrients. Though acidic soils are rich in total iron content, available iron is most important rather than total iron from the view point of crop nutrition. Zinc is a constituent of enzymes such as carbonic anhydrase associated with photosynthesis and superoxide dismutase (SOD), which detoxifies the superoxide radicals and protects the lipid and proteins of the membrane against oxidation. Further, it is involved in the synthesis of IAA, metabolism of gibberellic acid and synthesis of RNA, proteins and carbohydrate metabolism. Similarly, Iron is closely associated with chlorophyll formation. Though not a constituent of the chlorophyll, its role is that of a catalyst. It is an essential component of many enzymes and carriers such as peroxidase, cytochrome ferrodoxin and is involved in nucleic acid metabolism.

When the supply of zinc and iron to plant is inadequate, one or more of the many important physiological functions and the growth of plant are adversely affected. Therefore, an optimum supply of these elements to the plants is very much essential for better productivity and seed quality of crop. Supply of zinc or iron to the groundnut crop when soils are deficient in these nutrients can be made either by soil application or through foliar means. Zinc sulphate, because of its solubility and mobility, is used as a common carrier of zinc to meet the zinc demand of crop plants. Similarly iron sulphate is the chief source of iron widely used to control iron chlorosis and thereby increase the growth and yield of groundnut. Iron when applied as both soil and foliar not only increased its availability in soil but also increased the productivity of groundnut crop.

Many of the red soils in Karnataka are poor in organic matter, light textured, acidic in reaction and excessively drained. Hence they may be expected to be low in available zinc and other micronutrients. The deficiencies of zinc and iron in soils have become serious constraints for crop production in recent years, mainly because of continuous use of micronutrients free fertilizers. An optimum supply of these elements to the plants is very much essential for better productivity and seed quality of crop. In the light of the above facts, a field experiment was conducted in order to study the effect of iron and zinc nutrition on groundnut (*Arachishypogaea* L.) in light textured acid soils.

Material and methods : A field experiment was carried out on a red sandy loam soil classified under Alfisols at Zonal Agricultural Research Station, Navile, Shivamogga during *Kharif*, 2009. There were nine treatments involving application of $FeSO_4$ and $ZnSO_4$ to soil as well as through foliar means compared with application of only NPK. The treatments were replicated thrice in a randomized complete block design.

Table 1: Initial soil properties of the experimental site

Soil pH	5.10	Available K_2O (kg ha^{-1})	148.00
EC (dSm^{-1} at 25^0C)	0.07	Exchangeable Ca [cmol (p^+)kg^{-1}]	4.10
Organic carbon (g kg^{-1})	3.20	Exchangeable Mg [cmol ((p^+)kg^{-1}]	1.40
CEC [cmol (p^+)kg^{-1}]	10.23	DTPA-Zn (mg kg^{-1})	0.52
Available nitrogen (kg ha^{-1})	150.50	DTPA-Fe (mg kg^{-1})	9.50
Available P_2O_5 (kg ha^{-1})	58.70		

Results and discussion : Highest productivity level of 1685 kg ha^{-1} (Table 2) of pod yield was obtained when $FeSO_4$ + $ZnSO_4$ were applied to soil @ 10 kg ha^{-1} each along with FYM as compared to 1140 kg ha^{-1} recorded at control. Foliar application of $FeSO_4$ + $ZnSO_4$ @ 1 per cent each recorded pod yield of 1612 kg ha^{-1}. The haulm yield increased significantly from 1119 kg ha^{-1} at control to 1444 kg ha^{-1} when $FeSO_4$ + $ZnSO_4$ were applied to soil @10kg ha^{-1} along with FYM. Zn is reported to be an activator of tryptopan synthetase, a precursor of IAA (Takaki and Kushizater, 1977) and Fe has an obvious role in maintenance of chlorophyll in plants, photosynthesis and N fixation (Evans and George, 1966). Thus, significant increase in pod and haulm yield can be attributed to the aforesaid role of Zn and Fe.

The increase in pod yield was highest when micronutrients

were used along with FYM. This could be due to chelation of metal cations of Fe and Zn with organic ligands which make them available to plants slowly over the crop growth period. Although, soils of experimental site are acidic, the soil reaction is not the only factor which determines the Fe availability to the crop. Light texture of the soil which encourages leaching of Fe and K, poor organic matter and high available P responsible for precipitation of Fe all might have come in the way of Fe nutrition of groundnut.

Table 2: Pod yield and seed quality of groundnut as influenced by Fe and Zn nutrition

Treatments	Pod yield (kg ha^{-1})	Haulm yield (kg ha^{-1})	Seed Germination (%)	Seedling vigour index
T_1 Control –I (Rec. NPK + FYM)	1212	1258	79	895
T_2 Control –II (Only Rec. NPK)	1140	1119	77	824
T_3 T_2+ $FeSO_4$ soil appl. 10 kg ha^{-1}	1204	1204	89	1097
T_4 T_2+ $ZnSO_4$ soil appl. 10 kg ha^{-1}	1310	1207	89	1138
T_5 T_2+ $ZnSO_4$ + $FeSO_4$ soil appl. 10 kg ha^{-1} each	1533	1361	89	1205
T_6 T_2+ $ZnSO_4$ + $FeSO_4$ soil appl. 10 kg ha^{-1} each + FYM	1685	1444	92	1278
T_7 T_2+ $FeSO_4$ foliar spray 1%	1273	1258	88	1089
T_8 T_2+ $ZnSO_4$ foliar spray 1%	1398	1269	86	1082
T_9 T_2+ $FeSO_4$ and $ZnSO_4$ foliar spray 1% each	1612	1431	89	1185
S.Em.±	72	97	2.5	93
C.D. @ 5%	215	291	7.5	278

Germination percentage of groundnut seeds was improved significantly due to application of Zn and Fe to the crop (Table 2). Highest value of 92 per cent was recorded when $FeSO_4$ + $ZnSO_4$ were applied to soil @ 10 kg ha^{-1} each along with FYM. The seedling vigour index also increased and highest value was observed when $FeSO_4$ + $ZnSO_4$ were applied to soil @ 10 kg ha^{-1} each along with FYM. The increase in seed quality parameters like germination percentage and seedling vigour index of groundnut seems to be the beneficial effect of increased Fe& Zn content in groundnut pods.

Table 5: Shelling percentage and oil content of groundnut as influenced by Fe and Zn nutrition

Treatments	Shelling percentage(%)	Oil content (%)
T_1 Control –I (Rec. NPK + FYM)	67.7	42.7
T_2 Control –II (Only Rec. NPK)	66.3	42.8
T_3 T_2+ $FeSO_4$ soil appl. 10 kg ha^{-1}	67.5	42.9
T_4 T_2+ $ZnSO_4$ soil appl.10 kg ha^{-1}	68.7	42.7
T_5 T_2+ $ZnSO_4$ + $FeSO_4$ soil appl. 10 kg ha^{-1} each	69.3	43.7
T_6 T_2+ $ZnSO_4$ + $FeSO_4$ soil appl. 10 kg ha^{-1} each + FYM	72.0	42.9
T_7 T_2+ $FeSO_4$ foliar spray 1%	70.6	42.8
T_8 T_2+ $ZnSO_4$ foliar spray 1%	70.2	42.8
T_9 T_2+ $FeSO_4$ and $ZnSO_4$ foliar spray 1% each	70.0	42.4
SEm±	1.1	0.16
CD (0.05)	3.2	0.48

There was a significant increase in the shelling percentage of groundnut also from 66.3 per cent at control to 72.0 per cent when $FeSO_4$ + $ZnSO_4$ were applied to soil @ 10 kg ha^{-1} each along with FYM. Similarly Application of $FeSO_4$ + $ZnSO_4$ to soil @ 10 kg ha^{-1} each recorded significantly higher level of oil content (43.7 %) compared to control - II (42.7 %).

Table 3: Micronutrients content in groundnut as influenced by Fe and Zn application

Treatments	In plant (mg/kg^{-1})			
	Fe		Zn	
	Haulm	Pod	Haulm	Pod
T_1 Control –I (Rec. NPK + FYM)	411.00	65.3	40.5	27.7
T_2 Control –II (Only Rec. NPK)	391.7	60.7	39.6	25.3
T_3 T_2+ $FeSO_4$ soil appl. 10 kg ha^{-1}	430.7	79.0	41.7	28.0
T_4 T_2+ $ZnSO_4$ soil appl. 10 kg ha^{-1}	420.0	70.7	44.7	38.0
T_5 T_2+ $ZnSO_4$ + $FeSO_4$ soil appl. 10 kg ha^{-1} each	443.3	85.3	48.2	38.7
T_6 T_2+ $ZnSO_4$ + $FeSO_4$ soil appl. 10 kg ha^{-1} each + FYM	450.0	94.3	48.3	40.9
T_7 T_2+ $FeSO_4$ foliar spray 1%	442.7	85.0	42.2	32.0
T_8 T_2+ $ZnSO_4$ foliar spray 1%	420.7	73.3	46.2	39.7
T_9 T_2+ $FeSO_4$ and $ZnSO_4$ foliar spray 1% each	450.0	86.3	47.7	39.0
S.Em.±	6.69	2.41	1.2	1.0
C.D. @ 5%	20.1	7.22	3.5	3.0

Application of Fe and Zn significantly enhanced the micronutrient content in pod and haulm of groundnut (Table 3). The Fe content in pod (60.7 mg kg^{-1}) and haulm (391.7 mg kg^{-1}) at control increased to 94.3 mg kg^{-1} and 450 mg kg^{-1}, respectively when $FeSO_4$ + $ZnSO_4$ were applied to soil @ 10 kg ha^{-1} each along with FYM. The Zn content also followed a similar trend; the Zn content levels observed were 40.9 mg/ kg^{-1} and 48.3 mg kg^{-1} in pod and haulm, respectively when $FeSO_4$ + $ZnSO_4$ were applied to soil @ 10 kg ha^{-1} each along with FYM. Control-II recorded lowest levels of Zn content.

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"SUITABILITY OF FERTIGATION TECHNIQUE FOR TOMATO PRODUCTION"

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Tomato (*Lycopersicon esculentum* Mill.) is one of the most important vegetable crop in the world. The tomato is consumed in diverse ways, including raw, as an ingredient in many dishes, sauces, salads, and drinks. While it is botanically a fruit, it is considered a vegetable for culinary purposes. The fruit is rich in lycopene which may have beneficial health effects.Fertigation refers to injecting fertilizer into an irrigation system. This is accomplished in drip (trickle) by using some type of injector to meter the concentrated fertilizer solution into the irrigation water.Continuous Change of fertilizer program during the growing season in order to adjust for fruit, flower, and root development. A theory behind why fertigation has become the state of the art in vegetable nutrition is that nutrients can be applied to plants in the correct dosage and at the right time for each specific stage of plant growth. When plants receive conventional preplant fertilizer and then two (or more) sidedressings, they get more fertilizer than they need at the time it is applied. Between applications there may be a deficiency of fertilizer. With fertigation, plants can receive small amounts of fertilizer early in the crop's season when plants are vegetative. The dosage is increased as fruit load and nutrient demands grow and then decreased as plants approach the end of the crop's cycle. This gives plants the needed amounts of fertilizer throughout the growth cycle, rather than just a few large doses. Marketable yield of tomato was higher when 50 % N was fertigated than fertigation of N at 75 to 100 % level. Application of N through fertigation performed better than soil application alone. When N was fetigated N saving to the tune of 20 % was observed compared to soil application alone in tomato. Efficiency of fertigation depends on the various factors like timing, rates, fertilizer choices (Typically, nitrogen (N) and/or potassium,(K) are injected), use of equipment, application technique, fertilizer metering devices (Injectors). By considering all the above mentioned factors efficiency of fertilizer application can be improved through fertigation for getting higher yield and good quality of tomato crop under field conditions.

Tomato is one of the most popular and widely grown vegetable crops in the world. It responds well to the application of fertilizers and is reported to be a heavy feeder of NPK. Efficient use of fertilizer and water is highly critical to sustained agricultural production. Fertilizers applied under traditional methods are generally not utilized efficiently by the crop. In fertigation ,nutrients are applied through emitters directly into the zone of maximum root activity and consequently fertilizer-use efficiency can be improved over conventional method of fertilizer application. Efficient use of water in any irrigation system is becoming important particularly in arid and semiarid region where water is a scarce commodity .In furrow and border irrigation systems, loss of applied irrigation water from reservoir to the field under unlined irrigation system is 71% Such huge amount of water loss causes abundant nutrient loss through seepage/percolation

Among major plant nutrients, nitrogen is usually limited in crop growth because of leaching loss, ammonia volatalization and denitrification. With the result of these major pathways of N loss, its utilization efficiency decreases considerably. Worldwide, nitrogen use efficiency (NUE) for cereal production is approximately 33% and the unaccounted 67% is due to various pathways of nitrogen loss which represents a $15.9 billion annual loss of nitrogen fertilizer. Similar to frequent application of water, optimum split applications of fertilizer improves quality and quantity of crop yield than the conventional practice and it has been observed that higher tomato yield through fertigation than banded and furrow irrigation or banded and then trickle irrigated. Similarly, seven fertilizer application splits at weekly intervals produced higher yield as compared to the fertilizer applied just before planting (Locascio and Smajstrala,1995). With regards to water use efficiency, Italy reported higher water use efficiency under controlled environmental condition in drip irrigation over fur-

row irrigation at 20 k Pa soil water potential with no significant difference in crop yield. however under controlled environmental condition, the water use efficiency was higher than in crops grown under natural environmental condition (INCID,1994). Drip irrigation in USA increased yield of tomato and water use efficiency by 19%.The amount of fetrigation water applied in the furrow system was higher by than the drip method.The amount of irrigation water applied plus the effective rainfall were considered as total water used by the plant. On the basis of total water use and tomato yield at different nitrogen levels under both drip and furrow fertigation . In drip irrigation, water content at source point remained high over furrow irrigation in all soil depth It was found that the plant canopy temperature in drip irrigation was lower than in furrow irrigation. since irrigation water applied with the drip method on every second day was equal to crop ET for that period and there was constant supply of water through transpiration pool, however, in furrow irrigation, adequate cooling occurred immediately after irrigation, thereafter the resistance of water flow through the soil_ plant_ continuum particularly at the point of stomata cavities reduced transpiration cooling and the plant leaves emitted higher temperature. Economic yield is a part of the total biological yield of the crop and hence the dry matter production is an important determinant of the economic yield. The total dry matter accumulation per plant at final harvest was significantly higher in drip irrigation over furrow irrigation control .Further, significantly higher dry weight per plant was observed with WSF fertigation over drip irrigation. Leaf area index is the measure of source size and significantly higher leaf area index was recorded with WSF fertigation over furrow-irrigated control. Drip irrigation with soil application of fertilizer registered significantly higher yield over furrow irrigation with soil application of fertilizer which amounted to 19.9% yield increase over control This yield increase can be attributed to significantly higher number

of flowers and fruits per plant and fruit yield per plant in drip irrigation over furrow irrigation. The better performance under drip was attributed to maintenance of favorable soil water status in the root zone, which in turn helped the plants to utilize moisture as well as nutrients more efficiently from the limited wetted area Fertigation with normal fertilizers gave significantly lower yield compared to fertigation with water-soluble fertilizers. This was attributed to complete solubility and availability of the WSF as compared to normal fertilizers. Water-soluble fertilizer fertigation had higher concentration of available plant nutrients in top layer over normal fertilizer .thus increasing the marketable fruit yield of tomato. In fertigation, use of 100% water-soluble fertilizer is recognized to safe guard the drip system in a long run. The normal fertilizer generally tends to clog the emitters and cause uneven distribution of fertilizers.Nutrients such as N and K are commonly applied through drip system, while P is more difficult to apply and to obtain proper distribution in soil. Because of the tendency of P to form insoluble precipitate with Ca and Mg commonly found in irrigation water, the use of traditional P fertilizer in drip irrigation is not very common. the fruit yield of tomato in NK fertigation did not differ significantly from WSF fertigation. This suggests lesser response to P fertigation compared to NK fertigation. Since the requirements of tomato crop for N and K also is very high, fertigation of N and K produced similar yields as that of NPK fertigation.

The higher yield in subsurface drip fertigation overdrip and furrow irrigation was due to the supply of nutrients and soil moisture at the center of active root development. This was due to better availability of moisture and nutrients throughout the growth stages in drip and fertigation system leading to better uptake of nutrients and production of tomato fruits. Optimum root growth and distribution is needed for proper shoot anchorage, water and nutrient uptake and crop yield. Majority of the roots were between 0 and 25 cm, and below this depth, only a few roots were observed. This is the major cause for variation in yieldamong the treatments. Further, we have also observed a hard soil layer at 35–45 cm depth, which could be the reason for poor root proliferation at deeper layer. Although tomato is deep-rooted crop and can stretch up to 120 cm depth, as observed in literature, this was not observed in the present study. Therefore the amount of nutrient present in top 30 cm soil layer influenced the yield in different treatments. Frequentsupplementation of nutrients with irrigation water increased the availability of N, P and K in the crop root zone and which in turn influenced the root growth.This is also evidenced by the significantly higher number of primary roots (13.8–15.3), fibrous roots arising from stem base (30.3–34.0), maximum root length (82.8–91.2 cm) and average length of primary roots (44.2–50.3 cm) in fertigation treatments. The some study revealed significant difference in titrable acidity and ascorbic acid concentration while other quality parameters remained equal with each other in other convential method. Ascorbic acid concentration was significantly higher in WSF fertigation

Conclusion : The several study has shown that fertigation with 100% water-soluble fertilizer increased the fruit yield of tomato significantly over furrow irrigation and drip irrigation. This accounted for increase in fruit yield. Subsurface drip fertigation,NK fertigation and 1/2 soil–1/2 fertigation was also found equally promising to WSF fertigation. Higher fruit yield in fertigation was brought about by the higher leaf area index, total dry matter production, number of fruits per plant and higher fertilizer-use efficiency. Fertigation resulted in lesser leaching of NO3-N and K to deeper layer of soil. Subsurface drip fertigation caused significantly higher assimilable P at deeper depths.. Root growth and NPK uptake was higher with WSF fertigation. Even availability of nutrients with WSF fertigation resulted in the improvement of ascorbic acid concentration and titrable acidity.

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EVALUATION OF SUNFLOWER(*HELIANTHUS ANNUUS*) GENOTYPES FOR TEMPERATURE TOLERANCE THROUGH TEMPERATURE INDUCTION RESPONSE (TIR)

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Sunflower is one of the important oil seed crops of India and it has contributed to rapid growth in oilseed production. Sunflower oil contains 70-80% poly unsaturated (PUFA) *viz*..Linoleic acid, oleic acid and vitamin E. Sunflower is also a crop of choice for farmers due to its wider adaptability, high yield potential, shorter duration and profitability. On the aspect of global warming, temperature is increasing at very rapid rate. High-temperature stress affects all growth stages of the sunflower crop and ultimatelyyields.High temperature predominantly reduces the leaf expansion and duration of reproductive growth, since the seed filling period is very sensitive. Management options for high temperature stress are few. Hence developing intrinsically tolerant plants is essential to combat the situation,the intrinsic tolerance at high temperature is crucial, so that screening of tolerant genotypes are needed a conceptual novel technique called temperature induction response(TIS),principal behind the technique is prior exposure of seedlings to lethal at high temperatures.The relevance of temperature induction (acclimation) response (TIR), where two days old seedlings were exposed to gradual incremental temperature from 35° to 55°C for a specific time and finally subjected tothe lethal temperature. The genotypes showing maximum survivability at 55°C and growth were considered to be temperature tolerant. Those genotypes which showed less or no survivability and recovery growth were considered to be temperature susceptible. This is based on the concept that stress-responsive genes are expressed only during initial stages of stress (acclimation stress) and bring about requisite changes in cell metabolism for adaptation.By this we can conclude that high temperature tolerant lines can be evaluated through TIR and tolerant genotypes can be advocated to the farmers under high temperature conditions.

Sunflower is one of the important crops in India's oil seed production that has contributed to rapid growth in oilseed production. Sunflower is the oil of preference among the consumers' world over due to its health appeal and in India too, sunflower oil is the largest selling oil in the branded oil segment. Sunflower is also a crop of choice for farmers due to its wider adaptability, high yield potential, shorter duration and profitability. Commercially available sunflower varieties contain from 39 to 49% oil in the seed.. Sunflower accounts for about 14% of the world production of seed oils. The oil accounts for 80% of the value of the sunflower crop, as contrasted with soybean which derives most of its value from the meal. Sunflower oil is generally considered a premium oil because of its light color, high level of unsaturated fatty acids and lack of linolenic acid, bland flavor and high smoke points. The primary fatty acids in the oil are oleic and linoleic

(typically 90% unsaturated fatty acids), with the remainder consisting of palmitic and stearic saturated fatty acids. The primary use is as a salad and cooking oil or in margarine.

Global surface temperature has increased by approximately 0.6°C since the late 19th century and is projected to increase anywhere from 1.4 to 5.8°C by the end of the current century with a decrease in the diurnal temperature range (Dai et el.,2001). Temperature affects a broad spectrum of cellular components and metabolism and temperature extremes impose stresses of variable severity that depend on the rate of temperature change, intensity, and duration. Plants overcome high temperature stress by adopting several physiological and biochemical mechanisms such as excess heat dissipation through evaporative cooling, maintenance of membrane integrity, and synthesis of heat-shock proteins (HSPs). The first mechanism is an avoidance mechanism, whereas the other two are tolerance mechanisms. Plants adapt to high temperature stress by inherent basal level tolerance as well as acquired tolerance to severe temperature stress. Acquired thermo tolerance is quite rapid and has been shown to be induced during cell acclimation to moderately high temperature periods (Hikosaka et al., 2006; Larkindale et al., 2005; Massie et al., 2003).Many earlier studies have demonstrated that genetic variability for high temperature tolerance is noticed only upon induction treatment prior to severe stress (Burke, 2001; Krishnan et al., 1989; Kumar et al., 1999; Srikanth babu et al., 2002). It is opined that the stress-signaling pathway is triggered during induction stress and induces the expression of an array of stress-responsive genes. The resulting gene products alter several physiological and biochemical processes leading to stress tolerance. (Jayaprakash et al., 1998; Kumar et al., 1999; Uma et al., 1995)

Apart from effects on the duration of growth stages, especially the grain-filling period, high temperature has a deleterious effect on several physiological processes (Stone and Nicolas, 1984). Heat stress causes substantial membrane damage and leaf senescence (Liu and Huang, 2000). It has been believed that, in addition to the avoidance mechanisms such as excess heat dissipation through evaporative cooling, intrinsic tolerance mechanisms are more relevant for a greater adaptation to high temperature.

To cope up with the changing environmental conditions, plants synthesize a set of specific stress-responsive proteins and they are involved in altering specific biochemical processes necessary for adaptation (Neumann Deak 1999). One of the most widely studied aspects of thermotolerance is the enhanced expression of HSPs. Synthesis and localization of a few HSPs have been shown to trigger several physiological and biochemical processes .such as the maintenance of membrane integrity and chaperoning proteins. The expression of HSPs is primarily regulated by the heat-dependent activation of the heat shock transcription factors (HSFs) Further, the functional relevance of HSPs has been convincingly demonstrated by their over-expression in transgenic plants studies. Correlative studies such as the induction response and genetic variability studies indirectly explain the role of HSPs in thermotolerance.

Genetic variability in the stress response has been suggested to be mainly due to the differential expression of stress-responsive genes. There is convincing evidence to show that the stress-responsive genes are predominantly expressed during the sub-lethal induction stress that would bring the required changes in the plant metabolism necessary for withstanding the subsequent severe stress have clearly shown that genetic variability for the stress response could only be seen upon exposure to an induction stress. Therefore, to assess stress tolerance, it is necessary to expose the plants to an induction stress before exposing them to the severe stress. Based on preliminary studies, an efficient screening technique referred to as the temperature induction response (TIR) technique has been developed to identify thermo tolerant lines. According to this technique, the seedlings are exposed to an optimum induction temperature before being exposed to a severe challenging temperature and subsequently allowed to recover at room temperature. The surviving seedlings at the end of the recovery period are selected as thermo tolerant lines. Many studies clearly show that TIR is an effective technique for screening for high temperature tolerance It is hypothesized that induction stress, which is a prerequisite for the optimum expression of stress-responsive genes, brings about intrinsic differences in stress tolerance amongst the different lines within a population, which is otherwise uniform for several agronomic traits.. The F_1 hybrid developed from selected thermo tolerant variants of male and female parental inbred lines showed a higher degree of temperature tolerance. Further, this thermo tolerant hybrid showed enhanced expression of HSPs and also heat shock transcription factors like HSFA.

Materials and methods: **sunflower genotypes soaked for 4 hrs ,two days old seedlings are used for studies. seedlings were exposed for induction and lethal temperature**

Hybrids, A and B Lines	R LINES	R LINES
KBSH-41	EC-734871	EC-734871
KBSH-41	EC-734872	EC-734888
KBSH-41	EC-734873	95-C-1
KBSH-41	EC-734874	
17A	EC-734875	
335A	EC-734876	
17B	EC-734877	
335B	EC-734878	
	EC-734825	
	EC-734826	

Determination of Challenging temperature for seedlings
Seedlings of sunflower genotypes were subjected to different temperatures (51,52 and 53 °C) for 1, 2 ,2-15 ,2-30 and 3 h

without prior induction and these seedlings were immediately allowed to recover at 30 °C for 72 h in an incubator. At the end of the recovery period the temperature treatment at which 90% mortality of the seedlings occurred was taken as the challenging temperature in order to assess the genetic variability for seedling survival. The temperature treatment at which 50% reduction in seedling growth occurred was considered as the challenging temperature to assess differences in recovery growth.

Determination of optimum induction treatments for seedlings

Seedlings of sunflower (2-d-old) were subjected to different induction temperature treatments following which they were transferred to a defined challenging temperature. seedlings were maintained at 35 °C for 1 h, 40 °C for 1 h and 45 °C for 2 h and immediately transferred to the challenging temperature.

Recovery growth

After subjecting the seedlings to challenging temperature, seedlings were allowed to recover at 30 °C for 72 h. At the end of recovery, the percentage survival and root and shoot growth of the surviving seedlings were recorded. The root and shoot length (cm) was measured to arrive at total seedling growth. In all the experiments two replications were maintained per treatment, and each replication had 15 seedlings.The seedlings which are maintained at 30 °C (normal temperature) throughout the experimental period were taken as absolute controls.The percentage reduction in growth was calculated by dividing the difference of the growth of the control and the treatment by the growth of the control Based on the root and shoot growth, seedlings were considered as resistant and susceptible genotypes

Result and discussion: Among the sunflower genotypes 95-C-1 and 335-A showed tolerance to temperature ,EC-734822 showed susceptible to temperature stress. so that resistant A and R lines can be used in the development of temperature tolerant progenies in the future breeding programme to combat the high temperature situation.

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SWADESHI VIJNANA ANDOLANA-KARNATAKA
ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

INDIGENOUS METHOD OF SEED CONSERVATION AND PROTECTION

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In India, traditional agriculture is the mere way to meet the subsistence needs of the local farming communities. In traditional system of agriculture local seed materials of traditional crop varieties plays an important role for seed production. The Cereals, pulses, oilseeds etc. are very important products for storage. A safe storage place must be provided for the seed produced until it is needed for consumption and multiplication purposes. In such a situation, the protection of seed materials and its conservation for future needs is also very important. In order to protect seed materials and food grains, local practices by using indigenous methods like earthen pots of burnt clay, mud jar, gunnysacks and corn ears tied and hanged on sticks or ropes are used for the storage in traditional agricultural practices. Storing seeds in a cool dry environment keeps them viable for longer period. Generally the seeds are to be stored are smeared with neem / castor oil which checks the pest attack. These containers are coated with a paste of neem leaf or dry neem cake powder which are eco-friendly and sustainable. Hence the indigenous method of seed conservation is cost effective and eco-friendly method for poor farming communities.

Importance of Storage : The Cereals, pulses, oilseeds etc. are very important products for storage. A safe storage place must be provided for the seed produced until it is needed for consumption and multiplication purposes. Since seed production is seasonal, and consumption is continuous, safe storage must maintain seed quality. There is a tremendous loss of produce after harvesting. This loss is more prevalent in India. These losses should be reduced to make use of maximum produce. Post harvest losses are huge at farmer level, so preventive measures also needed at farmer level. Most of the postharvest losses are occurring while threshing, transportation and storage. 10% of total postharvest losses are due to rodents, birds, fungus and moisture. Added to these mixing of pebbles and dust also reduce quality of seeds.

Traditional grain storage structures : Grain storage plays an important role in preventing losses which are caused mainly due to weevils, beetles, moths and rodents (Kartikeyan et al, 2009). It is estimated that 60-70% of food grain produced in the country is stored at home level in indigenous storage structures. The percentage of overall food crop production retained at the farm-level and the period of storage is largely a function of farm-size and yield per acre, family-size, consumption pattern, marketing pattern, form of labour payment, credit availability and future crop expectations (Greeley, 1978). The storage methods range from mud structures to modern bins. The containers are made from a variety of locally available materials differing in design, shape, size and functions. The materials used include paddy straw, wheat straw, wood, bamboo, reeds, mud, bricks, cow dung etc. Grains can be stored indoors, outdoor or at underground level (Channal et al, 2004). Indoor storage involves grain containment in structures like *Kanaja*, *Kothi*, *Sanduka* and earthern pots.

Kanaja: Kanaja is a grain storage container made out of bamboo. The base is usually round and has a wide opening at the top. The height varies. The *Kanaja* is plastered with mud and cow dung mixture to prevent spillage and pilferage of grains. The top is also plastered with mud and cow dung mixture or covered with paddy straw or gunny bags.

Sanduka: Sanduka are Wooden boxes, also called as Sanduka, are used for storing pulses, seeds and smaller quantities of grains. These boxes have a storage capacity of 3-12 quintals. In some cases, partition is also made inside the box to store two to three types of grains. A big lid on the top with a small opening enables taking out the grains. To protect the grains from moisture, the box is kept 12 inches above the ground level with the help of stands/legs. The box has to be regularly polished for its maintenance.

Sanduka (Wooden bin)

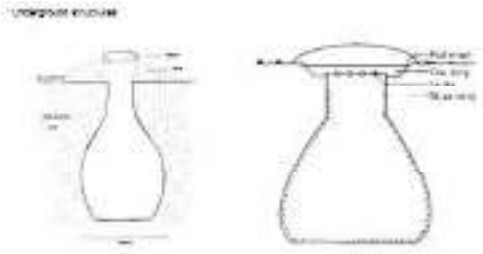
Door of Sanduka

Earthen pots: Earthen pots are indoor storage containers for storing small quantity of grains. These are made locally using burnt clay and are of different shapes and sizes. The earthen pots are placed at the floor level. They are arranged one above the other and known as dokal (Channal et al, 2004)

Outdoor storage of grains is done in structures made of bamboo or straw mixed with mud. Bamboo structures are used for storing unthreshed and threshed paddy. *Gummi* is an outdoor structure used for storing grains. This structure is made with bamboo strips or locally available reeds. It is usually circular or hexagonal in shape and plastered with mud. The base on which the structure is constructed is also made up of reeds or in some cases with stone slabs. The roof of the structure is usually made from loose straw. The structure is placed on a raised platform. Bamboo structures made on a raised timber or stone platform protect grain from rat damage and prevent moisture absorption from the ground (Channal et al, 2004).

Kacheri: Kacheri is a traditional storage structure using paddy or wheat straw, woven as rope. It is made from either paddy straw alone or paddy straw mixed with mud.

Hagevu : Hagevu is an underground structure that is used to store grains. It is a simple pit lined with straw ropes to prevent damage from moisture. In some cases, *hagevu* is constructed as an indoor structure (with stones). After filling the structure fully, the paddy straw is spread on top as a thick layer and the structure is sealed with mud plaster. In some cases a small square or circular opening is provided at the top. The inlet opening is above the ground level. The advantage of this structure is that fumigation is not required for disinfection. Grain can be stored for a longer period. This storage method is suitable for dry agro climatic zones. It is not suitable for storing seeds (Channal et al, 2004).



Corn ears tied and hanged on sticks or ropes: Unhusked corn ears are hung with the tip downward to prevent moisture entry, a technique that is used almost throughout the world.

It is however important to note that these indigenous storage structures are not suitable for storing grains for very long periods. Regular mud plastering is required for a variety of indoor and outdoor storage containers and structures for increasing their life span and ensuring safe storage of grains.

CONVENTIONAL STORAGE STRUCTURES

Structures	Storeditems	Capacity	Remarks
1. Bamboostructures	Paddy,wheat and sorghum	500 kg	Life 4-5 years.Weight loss due to insect attack is 5 % in paddy and 15 % in sorghum.
2. Mud and earthen structures	Paddy, wheat, sorghum,oil seeds and pulses	5 to 10 q	Life 8- 10 years.During rainy season develop cracks and moisture absorption followed by insect and mould infestation.
3. Wooden structures	Paddy	10 q	15- 20 years. Neither airtight nor moisture proof.
4. Brick structures	Paddy,sorghum and wheat	25- 30 q	25- 30 years. High initial cost, not insect and moisture proof.
5.Underground structures	Cereals	100 –200 q	Safe against insects but, loss of seed viability and handling difficulties made it out of date.

Traditional method of seed treatment

Sl. No.	Crop	Method of seed treatment
1	Paddy	➢ Pongamia leaves were placed as layer in between gunny bags arranaged one above other in store room

	Sorghum	➢ Seeds were mixed with ash @ 4:1 ratio ➢ Good ear heads were selected and kept open in fog in rabi (postrainy) season and kept inside a pot containing neem leaves. Good ear heads were harvested along with awns and kept in the center of dried paddy grass heap (called banave).
	Green gram	➢ Ten kg of seed was mixed with 250 g chili powder and 1 kg of ragi or ➢ finger millet fl our, and then kept in a bamboo pot along with paddy husk.
	Pigeon pea	➢ Seeds were treated with pongamia leaf extract. ➢ Seeds were kept in a gunny bag along with Guntur chili powder and neem leaf powder. ➢ Seeds were kept with powder of bitter gourd or seed extract for 3–6 months. ➢ 200g salt was mixed with kg of seed
	Chick pea	➢ Seeds were stored along with mint leaves (pudina) or sweet ?ag (baje) root powder. ➢ Seeds were treated with citronella leaf oil, cotton seed oil, soybean oil, or castor seed oil; 500 ml of oil was used for 100 kg of seed.

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QUALITY SEEDS FOR SUSTAINABLE AGRICULTURE

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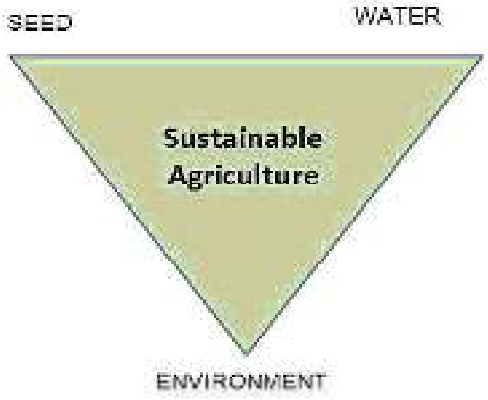
Abstract: The excessive application of fertilizers and chemicals overburdened cost of seed production. It also created problematic soil and ecological issues which further posed debatable question on use of genetically engineered traits. Though the new age agriculture made countries self sufficient but technologies are not sustainable. For agriculture because of its subsistence nature, any new technology should be sustainable and eco-friendly. The quality seed production is vital in sustainable agriculture because modern agricultural practices are heavily depending upon it. The focus now is on the use of quality seeds without any modified genetic traits for sustainable agriculture. The role of quality seed production in sustainable agriculture along with water and environment is the basis for sustainability. The success and sustenance of hybrid seed technology depends on the efficient and economic hybrid seed production, so as to provide good quality seed at reasonable price to the farmers. Strengthening the management of seed programmes at the farm level as well as planning and guidance of seed programmes, of seed production and certification technicians are best practices. To reinforce sustainability, an inbuilt sustainability strategy involving continual skill and knowledge transfer during implementation of any targeted project needs to be adopted. A system comprising of techniques, technologies, knowledge products, services and training modalities that ensure the adoption of improved practices, which will form part of the exit strategy.

Introduction : Seed is the basic input in agriculture and the most important catalyst for other inputs to be cost effective, good quality seed plays a pivotal role in crop production. It is very important not only to higher yield but also to get high monetary returns. Quality seed alone can increase the production by 25% wisely combined with other inputs significantly increase yield levels. In India, with the introduction of high yielding and hybrid varieties in 1966-67, it made a rapid progress in production of grain and other agricultural crops and lead to "Green Revolution" and made our country self sustainable. With the advent of *green revolution* came high input intensive agriculture with little concern for environment. The excessive application of fertilizers and chemicals overburdened cost of production. It also created problematic soil and ecological issues which further posed debatable question on use of genetically engineered traits. Though the new age agriculture made countries self sufficient but technologies are not sustainable. For agriculture because of its subsistence nature any new technology should be sustainable and eco-friendly. The quality seed production is vital in sus-

tainable agriculture because modern agricultural practices are heavily depending upon it. The focus now is on the use of quality seed without any modified genetic traits for sustainable agriculture. The roles for quality seed production in sustainable agriculture along with water and environment is the basis for sustainability



(Fig.1)

The modern agriculture practices though provide very little chances for the manipulation of seed but any system of quality seed production should bear the following before implementation.

Physiological, physical and sanitary parameters:

· good germination and vigour
· low moisture content
· well-filled grain
· high physical purity, i.e. near absence of inert matter (stones, sand) and of broken seed
· absence of noxious weeds and low presence of other weeds
· absence of visible fungi/disease and living insects

Varietal or genetic parameters:

· must be adapted varieties
· varietal characteristics should be described and meet farmers' requirements. Typically, they should be of good yield potential under farmers' conditions and ideally would be pest/disease-resistant/tolerant
· may be a pure variety, or a population or mixture, depending on farmers' needs
· may be a traditional or newly introduced variety, depending on farmers' needs and capacity to "experiment" and the presence or absence of reliable mechanisms to deliver new varieties
· presence of genetically modified organisms (GMOs) must be declared; GMOs should only be provided after prior informed consent.

Organic seed Production:

Organic seed has different meanings and, depending on people, may refer to:

· Seed of any variety produced organically, i.e., according to organic production standards
· Seed of varieties specially adapted to organic agriculture and developed through any breeding techniques, except recombinant DNA, available to plant breeders
· Seed of so-called 'organic varieties' bred using methods that don't "break the continuity between the soil and the plant". This definition of breeding methods prohibits all in-vitro techniques (see also ISF's position paper on Plant Breeding for Organic Farming)

Recently many countries have passed legislations that call for the compulsory use of seed that has been organically produced (category a. above) (see European Union and US legislations) for crops to be certified as having been produced organically. During the international Organic Seed Conference held in Rome in July 2004 several speakers reported that the production of organic seed in sufficient quantity, quality and varietal diversity is challenging for several reasons: lower yields/ha, seed quality concerns such as germination and vigour, seed health and physical purity. Nevertheless, production in most cases is possible although in many cases more expensive. In response to the demand from the organic sector, companies of ISF members have been supplying organic seed. However, they have incurred additional investment (e.g. start-up and inventory) and faced regulatory and market uncertainties. Inconsistency in the enforcement of regulatory requirements has been a particularly difficult issue. Reducing uncertainties through a consistent enforcement of regulations and producing organic seed under contract would encourage companies to increase the availability and range of organic seed.

Seed Treatment as a tool for sustainable agriculture : The FAO International Code of Conduct on the Distribution and Use of Pesticides (Revised version) adopted in 2002 defines Integrated Pest Management (IPM) as meaning "the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimise risks to human health and the environment. IPM emphasises the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms". Seed treatments can be used as a primary tool in a successful Integrated Pest Management Program for sustainable agriculture since they target the pests and diseases with smaller amounts of active ingredients per hectare and are not introduced into the atmosphere. In many cases, without the use of seed treatment, growers would have great difficulty in controlling certain seed-borne and early season seedling pests and diseases and would have to resort to more expensive and less environment-friendly methods.

Seed treatment is sometimes the only delivery route for the control of certain seed-borne pathogens. Seed treatment can also deliver high levels of efficacy for the control of early

season pests and diseases at a much reduced usage rate compared to many foliar or soil applied alternatives. Using a seed treatment reduces the area in contact with a crop protection product from 10,000 m2 for foliar application or 500 m2 for furrow application to only 50 m2. As an example, for an insecticide in corn, at a plant rate of 100,000 seeds per ha, the application rate is also reduced from 1,350 g active ingredient per hectare (ai/ha) for foliar application or 600 g ai/ ha for furrow application to 50 g ai/ha for a seed treatment. This reduced active ingredient loading minimises the impact on the environment significantly by decreasing the effect on non-target organisms and the movement of the product in the environment.

Seed diversity, healthy food, food safety, and food security, including:

· Protection of worldwide seed diversity. Further study of genetically modified organisms (GMO) crops to determine safety. Expansion of food labeling laws to include foods that contain genetically engineered ingredients.

· Support for programs for farmers in increasing the production of healthy foods such as fruits and vegetables (referred to as "specialty crops" in the farm bill), and continued encouragement of locally grown food and Farm-to-School initiatives.

· Encouraging minimal use of pesticides and herbicides on farm crops.

· Discouraging the overuse of hormones and antibiotics in farm animals.

· Supporting the regulatory authority of the Environmental Protection Agency and the U.S. Department of Agriculture to achieve these ends.

The role of traditional breeding and hybrid seed production: The success and sustenance of hybrid seed technology depends on the efficient and economic hybrid seed production, so as to provide good quality seed at reasonable price to the farmers. Various requirements for successful seed production such as ideal locations/seasons, seed rate, row ratio, supplementary pollination techniques etc., have been worked out and a seed production package has been developed. Hybrid seed began with maize in the 1920s, and became extended to vegetables and flowers; and more recently, rice, cotton and some other crops. Hybrid seeds are produced from naturally out-breeding crops, from which inbred lines are produced by repeated self-pollination. The established inbred lines are being crossed to produce first generations (F1) hybrid seeds.

The hybrid seeds are prized because they produce uniform plants benefiting from the effect called heterosis (hybrid vigor). Heterosis can result in a large increase in yield over the inbred lines or comparable lines that are out-crossing. The precise basis of heterosis is still unclear, but epistasis and over-dominance are thought to be involved. Epistasis is the interaction between different genes, and over-dominance is a condition where the heterozygotes (genes represented by two different versions) are superior to either homozygotes (gene represented by the same versions). The F1 hybrid seed is heterozygous in many genes. Hybrid seed is planted to produce a crop that is harvested for use. Saving seed from the crop and planting it is undesirable because the two different versions of the genes in the F1 hybrid segregate out in the offspring, producing an extremely variable progeny. In other words, the superior qualities of the F1 hybrid will have all disappeared.

Thus, only the seed companies produce hybrid seeds, and farmers must buy those seeds from the company every year. Hybrid seed production involves the crossing of a female line to a male line. Either line can be the female or male parent, but normally the best seed yielder is selected as the female parent. Both parents should be pure, preferably being self pollinated for more than six generations (this is called inbreeding).The inbred parents are selected for their desirable traits e.g., high yields, disease resistance, fruit quality, earliness, etc. Ratio of male to female plants is also important in hybrid seed production. It is necessary to have plenty of pollen available for making hybrid crosses. Normally, a ratio of one male for every four female plants is recommended. Self-pollination cannot be allowed in hybrid seed production. The female flower must be pollinated by the pollen from the male line. To prevent self-pollination, remove the stamens from the flower buds of the female line before they shed their pollen. This process is called emasculation.

The female flowers are emasculated usually with a forceps at 2 days before anthesis. Too early emasculation can damage the bud and too late stage increases the chances of selfing. Pollination is done first thing in the morning. The emasculated flowers are pollinated on the day of flowering. It is important to introduce enough pollen onto the stigma to ensure high seed set because normally pollination is done only once in a flower and one pollen can give only one seed. Fully matured fruits with full color are harvested and any selfed fruit found should be discarded. The fruits can be immediate seed extraction or kept in a cool place for 3- 4 days for post-harvest maturation before extraction.The development of hybrid seed had left seed production to seed companies for the practical reason that it is the most economical way to maintain appropriate inbred lines. But it prevents farmers from saving and replanting seeds, making it necessary to purchase seeds every season. Advantages of Hybrid Seed Production/ Hybrid varieties have many advantages compared to open-pollinated varieties. Hybrids usually produce higher yields; they generally mature earlier and more uniformly; and many hybrids have better fruit quality and disease resistance. With all of these advantages, many farmers prefer to sow hybrid seeds in spite of the higher seed cost. Constraints of Hybrid Seed Production is not so easy because it requires much labor oriented but fortunately, this is not a problem in

developing countries like Pakistan, where affordable labor is available. It requires the mastery of special skills and a close attention to detail. And ideal growing conditions are needed to produce high quality seed. Seed production during the rainy season generally leads to low yields and poor seed quality.

Consequently, many organic growers want to grow open-pollinated as well as hybrid cultivars. To be considered a hybrid, the seed must be the offspring of two parents that differ in one or more heritable characteristics. For example, a green bean cultivar that has excellent flavor but is susceptible to a certain pest and a different cultivar that is tolerant of the same pest could be crossed, and the new hybrid might have both excellent flavor and be resistant to the pest, provided the parents are homozygous. Seeds collected from a grown hybrid cultivar will not be true to type when replanted and thus cannot be saved to plant next year's crop.

To achieve food security through raising productivity of food crops by way of supplying good quality seeds of high yielding varieties to farming communities (though improvements in seed quality) and building farmers knowledge and skills (by promoting adoption of modern techniques of seed variety breeding and maintenance). Systemic seed production of all classes of seed must be undertaken covering all aspects of seed quality, seed hybridization (of rice and a wide range of vegetable crops) and seed conditioning and testing to achieve the targeted goals.

Strengthening the management of seed programmes at the farm level as well as planning and guidance of seed programmes, of seed production and certification technicians in best practices. To reinforce sustainability, an inbuilt sustainability strategy involving continual skill and knowledge transfer during implementation of any targeted project needs to be adopted. A system comprising of techniques, technologies, knowledge products, services and training modalities that ensure the adoption of improved practices, which will form part of the exit strategy.

IMPORTANCE OF BOTANICALS ON SEED QUALITY ENHANCEMENT

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Abstract: The prime role does by the organics in improving yield as well as enhancing seed quality makes it more valued in organic seed production and certification leading to motivate farm women in agriculture to practice these for converting inorganic to organic agriculture where most of the agriculture work is carried out by women. In this context a laboratory experiment was carried out to know the influence of organic seed treatment on seed quality of old and new seeds of Bengal gram cv.JG-11 which indicated that among the various organics used for treating old and fresh bengalgram seeds with 3% concentrations, custard apple leaf extract (3%) recorded significantly highest seed quality parameters namely germination percentage (95.03 and 98.30%), seedling length (30.50cm and 29.50), seedling dry weight (1.977 and 2.077g), vigour index (2896 and 2902.6), dehydrogenase enzyme activity (0.525 and 0.535OD value) respectively followed by prosopis (3%), calotropis (3%), panchagavya (3%),CaCl2 (2%), neem (3%), water soaking and control. The custard apple leaf extract (3%) showed percent increase of germination of 9.2% and 3.1% and seedling vigour index of 62.9% and 32.7% in old and fresh seeds respectively over control which recorded lowest germination percentage (87.0 and 95.3%) and seedling vigour index of 1777.7 and 2186.6 respectively. The percent increase response of organics on seed quality was better in old seeds compared to fresh seeds. Further the role of organics in seed quality enhancement is also reviewed hereunder for better understanding of the benefits of usage of organics in agriculture.

Intorduction : Stored products of agricultural and animal origin are attacked by more than 600 species of beetle pests, 70 species of moths and about 355 species of mites causing quantitative and qualitative losses (Rajendran, 2002) Plant products like essential oils, possess a broad spectrum of pest control properties and have been widely investigated for their larvicidal, toxic, repellent, ovicidal, antifeedant and anti-ovipositor effects (Zhu *et al*., 2001). These plant derivatives are safe to man and other non target organisms and friendly to the environment. Plant extracts are considered to be non-pollutant, less toxic and easily bio-egradable.

Among these plants, neem tree provides a good source for the control of these insect pest in the form of neem oil extracts and even seed water extracts. Its safe nature makes neem superior to the other synthetic chemicals. The most important compounds in neem are Azadirachtin, Salanin, Nimbin and Malentroil which have feeding deterrence, repellence, ovipositional inhibition and growth regulating activities against a great variety of insects (Jacobson, 1993). Recently, herbal extracts that are not harmful to the environment, have been shown to be effective natural preservatives (Grafius and Hayden, 1998; Sen, 2001). In addition, plant-based pesticides are renewable in nature and cheaper. Also, some plants have more than one chemical as an active principle responsible for their biological properties.

History of botanical usage

1. 400BC-Use of plant extract ant powdered plant material,
2. 1200 BC Botanical insecticides were being used for seed treatments and as fungicides in China.
3. 1700-use nicotine as a first botanical insecticide against plum beetle
4. 1850- new plant insecticide known as rotenone(*Tephrosia)*

Botanical status seed treatment: Farmers in their traditional wisodom have identified and used a variety of plant products and extracts for pest control during storage.Botanical protestant covers only 12 % world wide and less than 1 % in India. 2121 Plant spp used for pest management. Out of which,1005 –insecticide, 384-antifeedent,297-repellent,27-attractant,31-growth inhibiting Purohit and Vyas(2004)

Botanical products: Many plants have insecticidal properties. Extracts of these plants can be sprayed on the crop to either kill or repel insects. A well-known example is the Neem tree (*Azadirachta indica*). All parts of this tree, but especially the seeds, contain active ingredients, which can be used as insecticide. Neem is found to be active against a large number of pests, including the African bollworm (*Helicoverpa armigera*), Diamond-back moth (*Plutella xylostella*), thrips and aphids.

Another plant, well known for its insecticidal properties is Tobacco (*Nicotiana tabacum*). Extracts of tobacco leaves are effective against aphids and thrips. Many other plants can also be used to prepare extracts with pesticidal properties. For example garlic, chili pepper (*Capsicum*) and onion. An important advantage of botanical pesticides is that they are cheap and affordable for small-scale farmers.Compared to synthetic pesticides, botanical products are generally safer to use, but care should be taken, as some plants contain very toxic substances. For example, the nicotine in tobacco is a highly toxic chemical. Another advantage of botanical products is that they are not very persistent. Most of them will break down quickly under influence of high temperature or sunshine. Therefore they don't have a long lasting contaminating effect on the environment. A disadvantage of botanical products is that they are generally not specific. Many plant extracts will also kill or repel beneficial insects. Just like synthetic pesticides, the botanical products should thus be avoided and only be used as a last resort. However, if a farmer decides, after careful consideration, that active control of a pest is required, botanical extracts are usually a better choice than chemical pesticides.

The First Seed Treatments : Some of the first recorded uses of Seed Treatment are from the Egyptian and Roman periods and involved a technique of using sap from onion *(Allium spp.).* In the middle ages, Seed Treatments were made with liquid manure and chlorine salts. Salt water treatments have been used since the mid-1600s and the first copper products were introduced in the mid-1700s. The "still used today" technology of hot water treatment is documented from as early as 1765 in Wittenberg, Germany. Seed was placed in 45oC water for 2 hours, this provided control of certain fungal pathogens on the outer surface of the seed.

Requirements of the botanicals for Seed Treatment : The toxic effect of synthetic chemicals can be overcome, only by persistent search for new and safer pesticides accompanied by wide use of pest control methods, which are eco-friendly and effective. The problem of the development of resistant strains of fungi and insects may be solved by the use of essential oils of higher plants. In the context of agricultural pest management, botanical insecticides are best suited for use in organic food production. (Isman, 2006). Extracts of many higher plants have been reported to exhibit antifungal properties. One of the most important steps in the use of these aromatic plants is too precise the persistence of their insecticidal activity. In addition, the insecticidal product should effectively control the range of pests encountered in local storage situations, be safe to use, pose no environmental hazard, be easy to extract, formulate and use with available skills.

Characteristics of Ideal Botanicals: Easy to extract, Formulate, Use with available skills, No environmental or other hazard, effectively control the wide range of pests encountered in local storage situations

Classification of bio-potential plant products:
On the basis of physiological activities on insects, Jacobson (1986) classified the plant component into 6groups
1. Repellents
2. Antifeedants
3. Toxicants
4. Growth retardants
5. Chemisterilants
6. Attractants

Mode of action of botanicals: Plant is a living entities and they work as natural laboratories where a large number of chemicals are biosynthesized like**,** amino acids, steroids, phenols, flavonoids, glycosides, glucosinolates, quinones, tanins, polyacetylenes, sugars, and terpenoids these compounds roles are not clearly knownThey having mode of action such as, On insects: ovicidal,repellent, antifeedants, insectisidal etc. On non-insect pest : Fungicidal, Bactericidal, Acarisidal On seed: increase the seed quality

Plants and plant products can affect insects and other storage pests in various ways. They may exhibit pest control activity as toxicants, attractants, repellents, antifeedants, and as growth regulators. They are also effective as antimicrobials and antifungals. A description of each is given below:

Sl. No	Action against pests	No. of plant spp.
1.	Insecticidal	1[illegible]
2	Antifeedant	3[illegible]
3.	Repellent	9[illegible]
4	Growth inhibitor	3[illegible]
5.	Attractant	27
6.	Rodenticidal	29
7.	Acaricidal	2
8.	Nematicidal	09
9.	Fungicidal	120
10.	Bactericidal	2
11	Viricidal	2
12.	Molluscicidal	11
13	Antifeedant	15
14.	Toxic poison	107
15.	Arrow poison	07
16.	Poisonous	69

Toxicology of Plant Materials:

Plant species	*Toxins*
Acorus	asarone, calamus oil, camphor, choline, eugenol, eugenol ethyl ether, heptanoic acid, methylamine, saponin, tannic acid, trimethylamine.
Chenopodium	Ascaridole, carene, cymene, histamine, hydrocyanic acid, limonene, methyl salicylate, oxalic acid, safrole, saponin, trimethylamine.
Eucalyptus	Benzaldehyde, borneol, butyraldehyde, butyric acid, carene, carvone, cineole, citral, cuminic acid, cymene, ethyl alcohol, eucalyptus oil, gallic acid, geraniol, hydrocyanic acid, isoamyl alcohol, isobutyric acid, isoprene, isovaleraldehyde, isovaleric acid,
Mentha	Acetaldehyde, amyl alcohol, caproic acid, caprylic acid, carvacrol, carvone, cineole, ethyl alcohol, formic acid, furfural, isoamyl alcohol, isovaleraldehyde, isovaleric acid, limonene, linalool, menthol,
Ocimum	Anethole, camphor, carvacrol, cineole, citral, esdragole, eugenol, hydrocyanic acid, limonene, linalool, safrole, saponin, thymol.
Piper	Anethole, apiole, asarone, carene, cineole, citral, dihyrokawain, eugenol, eugenol methyl ether, hydrocyanic acid, limonene, phellandrene, piperidine, piperonal, safrole, stearyl alchol.

Toxicants: Many plants and plant products (particularly extracts and essential oils) possess insecticidal properties.
Attractants: Attractants are physiologically active chemical substances, which elicit oriented movements by insects towards their source. Attractants may consist of pheromones, natural food lures, ovipositor lures, and poison baits. Although not considered true insecticides, as they do not kill insects, they do alter the physiological activities of insects to such an extent that insects do not perform their normal functions.

Repellents: Repellents are deterrents that cause the insect and other pests (especially rodents) to avoid contact with their targets in stored products.

Antifeedants: Various medicinal plants and spices that exhibit strong inhibitory activity in feeding certain insects. The chemical compound, absinthin, for example, isolated from Artemisia absinthium develops a variable feeding ratio, depending on the age and the rearing medium.

Disadvantages of chemicals over botanicals
1. Higher cost
2. Resistance against widely used chemicals by pathogens gradually increasing.
3. They are highly resistant to degradation.
4. Many of these chemicals are bio-accumulative (i.e., they are transmitted up to food chain).
5. They pollute soil and water.
6. These chemicals kill many useful microorganisms, which take part in nutrient cycle
7. Many of these chemicals are bio-accumulative (i.e., they are transmitted up to food chain).

Improved method of Application of Botanicals
Seed dressing : Treating the seeds with botanicals in the dust from Seed film.
Coating : Application of precise amount of active ingredients along with a liquid material Directly on to the seed surface without obscuring its shape.
Seed Coloring : Application of precise amount of natural dyes or pigments directly on the seeds To improve its brand identity and marketability.
Seed pelleting: Process of enclosing the seed with small quantity of ingredients along with filler materials to produce a globular unit of uniform size to facilitate precision planting.

Properties of botanicals
1. Botanicals against storage pest : Insect infestation is a major contributor to quality deterioration of durables (cereals, pulses, roots and tubers) stored in warm and humid climates. Considerable physical and nutritional loss sustained in these countries are due to infestation of stored food products by weevils, bruchids and other insects. Apart from the detrimental economic impact, these losses pose a major threat to food security. Insects are the most important group of pests attacking stored food, including cereals (paddy and milled rice, maize, wheat, millets,); shelled and unshelled pulses (e.g. mungbean, blackgram, soybeans, groundnut, kidney

bean, lablab, chickpea, lathyrus, etc.). And, other dried products such as: coffee, pepper, chilies, cardamom, coriander seed, etc. Nearly one thousand species of insects have been found associated with stored products in various parts of the world.The majority of the insect pests belong to the orders Coleoptera and Lepidoptera, which account for about 60 and 8-9%, respectively, of the total number of species of stored product insect pests.

2. Botanicals against seed borne pathogen

Fungi: Storage fungi are generally present as mycelia below the pericarp, or as dormant spores on the surface of seeds. They cause spoilage of stored foods through discoloration, loss of viability, heating and mustiness, biochemical changes leading to quality loss and production of toxins. Among the most serious is Aspergillus flavus, which produces 'aflatoxin' on many grains and oilseeds, and causes quality deterioration. Aflatoxin and other mycotoxins are highly poisonous and carcinogenic compounds. Aspergillus and Penicillium are important fungi that are generally associated with stored products. The nutritional status of grain, moisture, temperature, infestation by insects, mites and foreign matter, influence the microbial invasion and subsequent spoilage during storage.

Bacteria: Bacteria pose relatively few problems in grain and dry products as they are associated with processed foods. Important food spoilage bacteria include Bacillus, Clostridium, Staphylococcus and Salmonella.

Actinomycetes: Actinomycetes are a group of microorganisms classified with bacteria, but whose cells are elongated and branched. Thermoactinomycetes spp. grows on cereals in storage where heating has taken place. Inhalation of spores during handling of such highly contaminated produce can cause lung disease in human.

Miscellaneous Invertebrates: These include nematodes and various kinds of arthropods. However, they cause much less damage to stored food as compared to insects and microorganisms.

3. Botanicals for maintain seed germination

Deshpande et al. (2004) evaluated plant products on the viability and vigour of black gram seeds and concluded that sweet flag rhizome powder at 1.00 per cent followed by neem seed kernel powder at 5.0 per cent exhibited superior effect against bruchid attack and also maintained the seed viability.

4. Improve seed qualities like: vigour, viabality, field emergence, seedling length, dry weight

Gidaganti (1990) observed that cowpea seeds treated with sweet flag at 5 g per kg maintained higher 100 seed weight, germination, field emergence, seedling length, dry weight and vigour index with moisture content throughout the storage period of 210 days under ambient conditions. Patil (2000) reported that chickpea seeds treated with neem oil @ 5 ml per kg recorded significantly higher germination (68.18%), vigour index (1336) and seedling dry weight (163 mg). While, these were 60.17 per cent, 1208 and 144 mg, respectively with control. Merwade (2000) reported that chickpea seed treated with leaf powder of neem, yakke, lakke and pongamia (@ 10 g/kg) showed higher germination, seedling length, seedling dry weight, viogur index and lower electrical conductivity of seed leachate through at the storage period of 10 months.

Botanicals and Inert Materials Used in Stored Food Protection

Spices: In addition to being used to flavour foods, spices have been used from ancient times to protect stored products from pests. Traditionally, pieces of dried spices or ground spices were used to spinkle over or mix with stored foods, but recently the use of extracts or oils has been experimentally tried with encouraging results.

Ginger: It has been generally known that ginger is effective against a number of stored insect pests. For example, it caused adult mortality in C. chinensis, and had a repellent effect on T. castaneum (Ho 1995).

Neem: Neem is probably the oldest botanical, which has been used as botanical pesticides. Its use in stored food protection has also been well known, especially in South Asian countries.

Sweet Flag: Rhizomes of sweet flag is used as medicinal plants, for example in epilepsy and other mental ailments, chronic diarrhaea and dysentery. They are also used in stored pest protection but they are quite rare and become expensive.

Sugar Apple: The seeds are toxic to many insects. Its leaves have certain ingredients that inhibit the growth of certain stored grain insects.

Indian Privet: Its leaves exhibit insecticidal property against stored grain insects.

Turmeric: Turmeric has been reported to be repellent against a number of storage insects (Jilani and Su 1983; Jilani and Saxena 1990).

CASE STUDIES

Antifungal potentiality of some botanical extracts against important seedborne fungal pathogen associated with brinjal seeds, *Solanum melongena* L. Kuri *et al* (2011)

Aqueous leaf extracts of *Azadirachta indica, Calotropic procera, Clerodendron spp.,Croton spasriflorous,* leaf and seed of *Lantana camara,* leaf of *Luffa cylidrica , Moringa oleifera,* leaf and seed of *Putranjiva roxburghii,* leaves of *Salvadora persica, Senna alata , Trema orientales* and *Trichosanthes dioica* showed some potentiality to inhibit the growth of some seed borne fungi, *Phomopsis vexans, Fusarium oxysporum, Aspergillus flavus, Aspergillus nigar,Curvularia lunata, Penicillium* spp., and enhanced the seed germination of brinjal (*Solanum melongena*). Leaf extract of *M. oleifera* increased seed germination of 92% as compared with control treatment. Leaf extracts of *A. indica* and *P. roxburghii* gave the best potential against all tested pathogen with 4% seed infection, followed by leaf extract of *S. persica* and *C. procera* were shown activities of 5.33% seed infection against tested pathogens.

Effect of Botanical Seed Treatment on Storability of Wheat. An experiment was carried out to know the effect of seed treatment with plant products and deltamethrin on storability of wheat seeds at University of Agricultural Sciences, Dharwad. The results revealed that, the botanicals and deltamethrin seed treatments were significantly superior in controlling the storage insect and maintaining higher seed quality throughout the storage when compared to untreated control. Among the botanicals, the sweet flag rhizome powder @ 10.0 g / kg of seed found better by recording significantly higher germination percentage (87.00%), vigour index (2694) and dry weight of seedlings (329.50 mg) and lower electrical conductivity (0.488 dSm-1) and insect infestation (3.33%) compared to untreated control (77.31 %, 2265, 326.67 mg, 0.540 dSm-1, 32.67% respectively) at the end of 10th month of storage.

The seeds treated with sweet flag rhizome powder @ 5 ml per kg seed, nimbicidine @ 5 ml per kg seed and neem oil @ 5 ml per kg seed also recorded higher rate of germination throughout the storage period and at the end of storage the rate of germination recorded with these treatments was 18.00, 18.00 and 17.60, respectively. Seed treated with sweet flag rhizome powder @ 5 g per kg seed, nimbicidine, neem oil and neem seed kernel powder also recorded significantly higher root length throughout storage period and at tenth month it was 17.21 cm, 17.03 cm, 17.02 cm and 16.73 cm, respectively with these treatments. The shoot length of seeds treated with sweet flag rhizome powder @ 5 g per kg seed, nimbicidine @ 5 ml per kg seed, neem oil @ 5 ml per kg seed and neem seed kernel powder also recorded higher shoot length throughout storage period and at the end of 10th months of storage it was 13.43 cm, 13.60 cm, 13.52 cm and 13.21 cm, respectively.

They concluded that the moisture content significantly varied with seed treatments throughout the storage period. The seeds treated with botonicals and chemical recorded lower moisture content throughout the storage period as compared to control. During 10th month of storage seed germination recorded in T7, T2, T1 and T5 was 90.33, 87.00, 86.67 and 85.33 per cent, whereas untreated control (T8) recorded 77.33 per cent germination.

Efficacy of botanicals for the management of lesser grain borer, *Rhizopertha dominica* Fab.in sorghum during storage. Kudachi and Balikai (2009) A laboratory experiment was conducted to know the efficacy of botanical powders for the management of lesser grain borer, *Rhizopertha dominica* Fab. In stored sorghum during 2007-08. The treatments included (1) Lakke, *Vitex negundo* L. leaves @ 5% (2) Kharanja/ honge, *Pongamia glabra* L. fruits @ 5% (3) Kharanja/ honge, *P. glabra* leaves @ 5% (4) Sweet flag, *Acorus calamus* L. rhizomes @ 1% (5) Tulsi, *Oscimum basilicum* L. leaves @ 5% (6) Custard apple, *Annona squamosa* L. seeds @ 5% (7) Adasali, *Adathoda vesica* L. leaves @ 5% (8) Neem, *Azadirachta indica* A. Juss seeds @ 5% (9) Neem, *A. indica* leaves @ 5% (10) Periwinkle, *Vinca rosea* L. leaves @ 5% (11) Turmeric, *Curcuma longa* L. rhizome @ 5% (12) Eucalyptus, *Eucalyptus* sp. leaves @ 5% (13) Garlic, *Allium sativum* L. bulbs @ 5% (14) Malathion 5% D and (15) Untreated check. Results revealed that, *A. calamus rhizomes* @ 1% was found to be significantly superior in protecting sorghum grains from *R. dominica* up to 180 days after treatment, followed by *A. squamosa* seed powder @ 5%, malathion 5% D and *A. indica* seed powder @ 5% with minimum seed damage, higher germination percentage, minimum weight loss and maximum adult mortality.

Inhibition of aflatoxin B1 production of Aspergillus flavus, isolated from soybean seeds by certain natural plant products (Y.L. Krishnamurthy and J. Shashikala)

The inhibitory effect of cowdung fumes, Captan, leaf powder of Withania somnifera, Hyptis suaveolens, Eucalyptus citriodora, peel powder of Citrus sinensis, Citrus medica and Punica granatum, neem cake and pongamia cake and spore suspension of Trichoderma harzianum and Aspergillus niger on aflatoxin B1 production by toxigenic strain of Aspergillus flavus isolated from soybean seeds was investigated.

Soybean seed was treated with different natural products and fungicide captan and was inoculated with toxigenic strain of A. flavus and incubated for different periods. The results showed that all the treatments were effective in controlling aflatoxin B1 production. Captan, neem cake, spore suspension of T. harzianum, A. niger and combination of both reduced the level of aflatoxin B1 to a great extent. Leaf powder of W. somnifera, H. suaveolens, peel powder of C. sinensis, C. medica and pongamia cake also controlled the aflatoxin B1 production.

All the natural product treatments applied were significantly effective in inhibiting aflatoxin B1 production on soybean seeds by A. flavus. Significance and Impact of the Study: These natural plant products may successfully replace chemical fungicides and provide an alternative method to protect soybean and other agricultural commodities from aflatoxin B1 production by A. flavus.

Potential of botanicals and biocontrol agents on growth and aflatoxin production by *Aspergillus flavus* infecting rice grains (Reddy *et al*(2009)

The potential of certain plant extracts and biocontrol agents for the reduction of aflatoxin B1 (AFB1) in stored rice was investigated. Among the plant extracts tested, *Syzigium aromaticum* (5 g/kg) showed complete inhibition of Aspergillus flavus growth and AFB1 production. *Curcuma longa, Allium sativum* and *Ocimum sanctum* also effectively inhibited the A. flavus growth (65–78%) and AFB1 production (72.2–85.7%) at 5 g/kg concentration. Among the biocontrol agents, culture filtrate of Rhodococcus erythropolis completely inhibited the AFB1 production at 25 ml/kg concentration. The other biocontrol agents, Pseudomonas fluorescens, Trichoderma virens and Bacillus subtilis showed 93%, 80% and 68% reduction of A. flavus growth and 83.7%, 72.2% and

58% reduction of AFB1 at 200 ml/kg, respectively.

Efficacy of Garlic Tablet to Control Seed-Borne Fungal Pathogens of Cucumber : An experiment was conducted to find out the efficacy of garlic tablets in controlling seed-borne fungal pathogens of cucumber. Suspention of garlic tablet was prepared in water at the concentrations of 1:3, 1:4, 1:5 and 1:6. Seeds of cucumber were treated with the suspentions for 15 minutes. Seeds under control were treated with plain water. Seven fungal pathogens, namely *Aspergillus flavus, Aspergillus niger, Fusarium oxysporum, Fusarium moniliforme, Penicillium spp., Doratomycetes sp.* and Rhizopus stolonifer were found to be associated with the cucumber seeds. Their prevalence ranged from 1.0-8.0, 1.0-4.0, 1.0-15.0, 1.0-8.0, 0.0-9.0, 1.0-17.0 and 0.0-12.0% respectively under different treatments including control. All concentrations of the material caused significant decrease in the prevalence of seed-bornefungi, occurrence of abnormal seedlings and rotten seeds as compared to control. On the other hand, germination increased over control due to seed treatment with garlic tablet. The higher increase in germination and reduction in occurrence of seed-borne fungi, rotten seed and abnormal seedling were corroborated with higher doses of garlic tablet.

Seed quality enhancement and storability studies in chilli (*capsicum annuum* l.) Kavitha. M : The higher seed quality parameters noticed in seed pelleted with Captan + Imidachloprid was followed by neem leaf powder may be ascribed to its antioxidant and antilipid peroxidation property and to fungicidal and insect repellent property , resulting in better protection of seeds against membrane disintegrity, lipid autoxidation and peroxidation and storage pathogens. Further, botanicals contain growth promoting substance and nutrients which helped for better seedling performance. Such beneficial influence of botanicals in enhancing storability and seed quality. The seeds treated with captan + imidachloprid, neem leaf powder, KNO3, arappu leaf powder and stored in cold condition recorded better quality parameters. Among the eight treatments, seed pelleting with captan + imidachloprid and stored in cold condition recorded significantly higher germination percentage, speed of germination root length, shoot length, vigour index, seedling dry weight, field emergence than those seed treated and stored in ambient condition..

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SWADESHI VIJNANA ANDOLANA-KARNATAKA
ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

DIFFERENT METHODS OF FERTILIZER APPLICATION TO Bt. COTTON

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Abstract: The suitable method of fertilizer application for Bt Cotton was studied in deep black soils of Shahapur and Shorapur taluks of Yadagir district in North-Eastern Dry Zone of Karnataka under Upper Krishna Command Project area during 2010 – 11 and 2011 – 12. The results (pooled over two years) indicated that cotton seed and dry matter yield was recorded significantly higher in the STCR approach (29.8 q/ha and 48.8 q/ha, respectively) as compared to all other treatments and was followed by NK + 50 % & P + 25 % (27.9 and 44.8 q/ha respectively). The per cent increase in seed yield was 49 % with application of fertilizer by STCR approach followed by NK + 50 % & P + 25 % (40 %) over other treatments. The discounted net returns and B: C ratio was significantly higher in treatment receiving fertilizer by STCR approach (Rs.166788 and 4.55/ha, respectively). This was followed by soil test based NK + 50 % & P + 25 % (Rs. 155896 and 4.43/ha, respectively). Soil available nutrients were also found significantly higher with STCR approach fertilizer recommendation.

Key words: STCR, soil test, discounted net returns and B:C.

INTRODUCTION: Upper Krishna Project command area has largest irrigation project in India and also state of Karnataka, ultimate irrigation potential area of about 6.22 lakh hectares for which suggested cropping patterns are bajra, maize, groundnut, green gram and sunflower during *kharif* season, Sorghum, wheat, chickpea, and sunflower during *rabi* season and long duration crops like redgram, cotton and chilli and horticultural crops. Farmers are practicing cotton, chilli and paddy – paddy, crops in command area.

Due to adaption of high yielding varieties of principal crops and multiple cropping, soils are depleted in nutrients at a much faster rate than in the case of old cropping system. As a result, crop production has become highly fertilizer oriented. Judicious use of fertilizers is required as cost of fertilizer is very high in our country. Soil test based fertilizer recommendation result in efficient fertilizer use and maintenance of soil fertility. Among the various methods of fertilizer recommendations, the one based on yield targeting (Ramamoorthy *et al.,* 1967) is unique as it not only indicates soil test based fertilizer dose but also the level of yield that can be obtained if appropriate practices are allowed in raising the crops.

The existing state blanket recommendation for Bt. Cotton in Karnataka does not ensure efficient and economic use of fertilizers, as it does not take into account the fertility variations resulting in imbalanced use of fertilizer nutrients. The present study was undertaken to develop balanced fertilizer schedule to increase the productivity and fertilizer use efficiency in Bt Cotton crop and to investigate the changes in soil available N, P and K and yield of Bt Cotton under different fertilizer application practices.

MATERIALS AND METHODS: The suitable method of fertilizer application for Bt Cotton was studied in deep black soils of Shahapur and Shorapur taluks of Yadagir district in North Eastern Dry zone of Karnataka under irrigated situation. The experiment was laid out in Randomized Block design with six treatments (T_1: Recommended NPK + FYM (As per POP), T_2: STCR Approach (Yield target: 45q/ha), T_3: Soil test based NPK (LMH Approach or STL method), T_4: Soil test based NPK $\pm$ 25 %, T_5: Soil test based NK $\pm$ 50 % & P $\pm$ 25 % and T_6: T_3 + 75 % RDP + PSB) and four replications. The fertilizer dosage varied with respect to treatments (Table 1). For all the treatments, recommended FYM and deficient nutrients application were common. The initial soil fertility status of all the locations was low in nitrogen, medium in phosphorus and high in potassium. Soil samples were collected from each plot and analyzed for alkaline $KMnO_4$ –N (Subbiah and Asija, 1956), Olsen's –P by Ascorbic acid method (Jackson, 1967) and NH_4OAC-K (Jackson, 1967). The experiment was conducted for two years 2010-11 and 2011-12. The data collected from the experimental field and laboratory analysis were subjected to statistical analysis by adopting Fischer's method of analysis of variance as outlined by Gomez and Gomez (1984). The level of significance used in 'F' and 't' test was P=0.05. Critical differenced were calculated wherever 'F' test was significant.

RESULTS AND DISCUSSION: The results (pooled over two years) indicated that (Table 2) cotton seed and dry matter yield was recorded significantly higher in the STCR approach (T_2) i.e 29.8 and 48.8 q/ha, respectively (increase in seed yield was 49 %) followed by NK $\pm$ 50 % & P $\pm$ 25 % (T_5) i.e 27.9 and 44.8 q/ha respectively (increase in seed yield was 40 %). The lowest seed and dry matter yield was recorded in the treatment receiving recommended NPK + FYM (As per POP) (T_1) i.e 20.0 and 29.7 q/ha respectively. This can be attributed to nature of crop which is exhaustive and grow well with higher dose of fertilizer based on soil test value. The findings of Gayathri *et al* (2009) were in accordance with this resulted where they suggested that STCR - IPNS recommendations for potato are better for the efficient and economic use of fertilizer. Stalin and Thiyagirajan (2000) reported that STCR-N methods produce high grain yield with low NUE values. Similarly Srinivasan and Angayarkanni (2008), Subba Rao and Srivastava (1998) also highlighted the STCR approach of fertilizer recommendation in increasing grain yields of the crops.

Soil available nutrients also varied with the method of fertilizer application. The pooled results showed that (Table 3) the available N was significantly higher in the treatment receiving fertilizer dosage as per STCR approach (193 kg/ha) and was found to be superior over other all other treatments. In the treatment receiving fertilizer as per package of practice (T1) the available N was 158 kg/ha. In STCR approach around 35 kg N /ha and in treatment receiving soil test based NK$\pm$ 50% & P $\pm$ 25 % around 27 kg N /ha was higher than only recommended dose of NPK . However, the available N in the soil was low in category. The pooled results showed that (Table 3) the available P_2O_5 was significantly higher with fertilizer dosage as per STCR approach (32.6 kg/ha) and was found to be superior over other all other treatments. In the treatment receiving fertilizer as per package of practice (T1) was noticed lowest available P_2O_5 (19.8 kg/ha). In STCR approach (13 kg P_2O_5 /ha) and soil test based NK$\pm$ 50% & P $\pm$ 25 % application (10 kg P_2O_5 /ha) was higher than the recommended dose of NPK. However, available P_2O_5 in the soil was medium in category. The available K_2O was also significantly higher with fertilizer dosage as per STCR approach (499 kg/ha) and was found to be superior over other all other treatments (pooled data, Table 3). Application of fertilizer as per package of practice (T1) recorded lowest available K_2O (454 kg/ha). In STCR approach (45 kg K_2O /ha) and soil test based NK$\pm$ 50% & P $\pm$ 25 % application (33 kg K_2O /ha) was higher than recommended dose of NPK. However, the available K_2O in the soil was high in category. Findings of Subba Rao and Srivastava (1998), Srinivasan and Angayarkanni (2008) were in accordance with the present study.

The effect of treatments on the economics of Bt Cotton was also studied, the results (pooled) showed that discounted net returns and B:C ratio was higher with application of fertilizer by STCR approach (Rs.166788 and 4.55/ha, respectively)as compared with all other treatments. However, it was followed by soil test based NK $\pm$ 50 % & P $\pm$ 25 % (Rs. 155896 and 4.43/ha, respectively). On the other hand the lowest discounted net returns and B:C was recorded where recommended NPK + FYM (As per POP) (T_1) was applied (Rs.99086 and 3.23/ha, respectively). It can be concluded that among the different methods of fertilizer application, STCR approach performed better in irrigated Bt cotton by increasing the yield ,available nutrients in soil, net returns and B:C as compared to the other methods and also helps to maintaining the soil fertility.

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Table1: Details of fertilizer application treatment wise

Treatments	**N:P_2O_5:K_2O applied (kg/ha)**
T1: Recommended NPK (As per POP)	150:75:75
T2: STCR Approach (Yield target : 45 q/ha)	204-289:51-113:38-67 (2010-11)
	251:93:58 204-251:113:66-74 (2011-12) 228:113:69
T3: Soil test based NPK (LMH Approach or STL method)	175:75:50
T4: Soil test based NPK $\pm$ 25 %	188:75:56
T5: Soil test based NK $\pm$ 50 % & P $\pm$ 25 %	225:75:38
T6: T3 + 75 % RDP + PSB	175:56:50

Table 2: Effect of methods of fertilizer application on yield of Bt Cotton

Treatments	Seed yield (q/ha)			Dry matter yield (q/ha)		
	2010-11	2011-12	Pooled	2010-11	2011-12	Pooled
T1: Recommended NPK (As per POP)	21.19	18.89	20.04	31.76	27.57	29.67
T2: STCR Approach (Yield target : 45 q/ha)	31.63	27.88	29.76	51.40	46.13	48.77
T3: Soil test based NPK (LMH Approach or STL method)	26.09	22.88	24.49	41.17	35.00	38.09
T4: Soil test based NPK ± 25 %	27.47	24.53	26.00	43.31	38.70	41.01
T5: Soil test based NK ± 50 % & P ± 25 %	29.44	26.39	27.92	47.15	42.48	44.82
T6: T3 + 75 % RDP + PSB	24.63	20.89	22.76	37.87	31.03	34.45
SEm±	0.44	0.35	0.28	0.66	0.66	0.46
C.D (P=0.05)	1.23	0.98	0.78	1.84	1.83	1.29
CV (%)	9.28	8.40	8.93	8.85	10.06	9.42

Table 3: Effect of methods of fertilizer application on available N, P_2O_5 and K_2O in Bt Cotton grown soil

Treatments	Nitrogen (kg/ha)			P_2O_5 (kg/ha)			K_2O (kg/ha)		
	2010-11	2011-12	Pooled	2010-11	2011-12	Pooled	2010-11	2011-12	Pooled
T1: Recommended NPK (As per POP)	149.25	167.00	158.13	17.88	21.63	19.76	459.00	449.00	454.00
T2: STCR Approach (Yield target : 45 q/ha)	179.13	208.00	193.57	25.63	39.63	32.63	498.75	499.50	499.13
T3: Soil test based NPK (LMH Approach or STL method)	161.25	188.00	174.63	21.25	30.13	25.69	484.50	477.00	480.75
T4: Soil test based NPK ± 25 %	164.19	194.25	179.22	22.44	32.63	27.54	484.25	482.50	483.38
T5: Soil test based NK ± 50 % & P ± 25 %	169.75	201.25	185.50	23.50	36.00	29.75	483.25	490.38	486.82
T6: T3 + 75 % RDP + PSB	157.63	181.25	169.44	19.00	27.00	23.00	477.94	472.50	475.22
SEm±	1.48	3.28	1.80	0.24	0.61	0.33	2.18	6.24	3.30
C.D (P=0.05)	4.15	9.18	5.00	0.67	1.71	0.91	6.10	17.47	9.18
CV (%)	5.12	9.77	8.14	6.24	11..07	9.93	2.56	7.38	5.51

Table 4: Effect of methods of fertilizer application on economics of Bt Cotton

Treatments	Cost of cultivation (Rs./ha)			Gross returns (Rs./ha)			Net returns (Rs./ha)			
	2010-11	2011-12	Dis. Cost of Cultivation	2010-11	2011-12	Dis.GR	2010-11	2011-12	Dis. NR or NPV	B:C ratio
T1: Recommended NPK (As per POP)	25408	25713	44335	89998	74592	143421	64590	48879	99086	3.23
T2: STCR Approach (Yield target : 45 q/ha)	26731	27462	46982	135114	110111	213770	108383	82649	166788	4.55
T3: Soil test based NPK (LMH Approach or STL method)	25512	25825	44522	112136	90370	176577	86624	64545	132055	3.97
T4: Soil test based NPK ± 25 %	25708	26028	44868	117713	96892	187034	92005	70864	142166	4.17
T5: Soil test based NK ± 50 % & P ± 25 %	26003	26338	45392	126716	104241	201288	100713	77903	155896	4.43
T6: T3 + 75 % RDP + PSB	25172	25430	43887	105484	82501	164031	80312	57071	120144	3.74

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ISSN 2250 - 3978 LILAVATI (PRINT)
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INFLUENCE OF FERTILIZER LEVELS AND HARVESTING STAGES ON PHYSIOLOGICAL MATURITY AND SEED QUALITY IN CLUSTER BEAN

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Abstract: The experiment was conducted at Department of Seed Science and Technology, UAS, Dharwad to ascertain the influence of harvesting stages on seed quality parameters in clusterbean. The clusterbean crop were applied with three different levels of fertilizer (F_1-25:75:60, F_2-25:100:75 and F_3- 25:125:90 NPK kg per ha) and harvested at five different stages at 15 days intervals (60, 75,90,105and 120 DAS). The study revealed that the clusterbean crop applied with higher fertilizer level (F_3- 25:125:90 NPK kg per ha) and harvested at105 DAS recorded significantly highest seed quality parameters viz., germination percentage, seedling length, vigour index and lower EC.

Introduction : Cluster bean (*Cyamopsis tetragonoloba* L.Taub) is an important multipurpose drought as well as a restorative leguminous vegetable crop. Quality seeds play an important role in seed production. The seed reaches its maximum dry weight at physiological maturity. Seed development and physiological maturity become important because seeds should be harvested at proper time to ensure their quality in terms of germinability and vigour (Kalavathi *et al*; 1988). If the seeds are retained on mother plant after physiological maturity, physiological changes in seed may lead to formation of hard seeds or off colour seeds in pulse crops. At physiological maturity, seed shall have maximum viability and vigour. Attainment of physiological maturity is a genotypic character which is influenced by environmental factors (Kole and Gupta, 1982; Mahesha *et al.,* 2001). As such harvesting of seed crop at optimum stage of seed maturation is essential to obtain better seed quality. Harvesting seed crop at physiological maturity reduces the risk of various biological and climatic hazards. Therefore an experiment was conducted to find out the effect of nutrition and stage of harvest for quality seed production.

Material and Methods: A field trial was laid out with clusterbean cv. Pusa Navabahar during kharif at University of Agricultural Sciences, Dharwad. The treatments involved three fertilizer levels viz., F_1-25:75:60, F_2-25:100:75 and F_3-25:125:90 NPK kg per ha and five harvesting stages starting from 60DAS to 120 DAS at fifteen days intervals. Fifty pods in each four replication were randomly selected from each harvesting stage for recording observations on fresh weight of pod, fresh weight of seed, moisture content of seed, dry weight of seed, germination per centage, seedling length, vigour index (SVI=germination percentage x seedling length in cm) and electrical conductivity were recorded. The germination test and moisture test was conducted as per ISTA rules ((Anon., 1999) and SVI as per Abdul-Baki and Anderson (1973). The data were statistically analyzed for completely randomized block design with four replications (Panse and Sukhatme, 1978 and Sundararajan *et al*., 1972**).**

Results and Discussion : In present study the fertilizer levels have shown greater influence on pod and seed quality parameters. The fresh weight of seed (7.89 g) were observed in plants receiving higher levels of nutrients 25:125:90 NPK kg per ha (F_3) followed by F_2 level. The major possible reasons for higher fresh weight of seed might be due to better nourishment of seed crop leading to efficient crop growth, photosynthesis production and greater accumulation of food reserves in the pod which in turn may have enhanced growth and development of the pod. The results are in conformity with the findings of Ramachandra Reddy *et al*. (1998) in pea. The seed quality parameters were also better with higher doses of fertilizer (F_3) which recorded maximum seed germination percentage (62.81%) with low electrical conductivity (1.437 dSm^{-1}) followed by F_2 fertilizer level (59.28% and 1.659 dSm^{-1}, respectively). The higher test weight may be due increased accumulation of phytosynthates and their distribution to the developing ovules and pods. The resultant seedlings from such well developed seeds generally will be vigorous with higher root and shoot length. Likewise at higher levels of nutrients increased seed quality parameters were reported Merwade (2000) in chickpea, Patil (2002) in garden pea and Rajpal *et al.* (2003) in cluster bean have been reported.

In the present study fresh weight of seed and seed moisture content were significantly influenced by pod harvesting stages. The pod harvested at 75 DAS recorded higher as significantly higher (10.73 g) fresh weight of seed was noticed at 90 DAS, then it slowly decreased in later stages. The decrease in fresh weight of seed was concomitant with decrease in moisture content of seed owing to prevailing higher temperature and lower relative humidity at harvesting time.

The maximum moisture content (76.96%) of seed was recorded at 60 DAS and minimum (13.69%) at 120 DAS. This decrease in moisture content of seed at maturity may be due to more accumulation of dry matter in seed as days advanced. The results are in conformity with the reports of Anita (1987) in urd bean, Mahesha *et al.,(* 2001) in sunflower and Venture *et al*. (1996) in *Phasealous vulgaris*. Seed quality is sum total of physical, physiological and bio-chemical attributes which influence germination and vigour of seed. All the seed quality parameters in the present study were found to differ significantly with stage of harvesting and were improved with advances in seed maturation from 60 DAS (H_1) to 105 DAS (H_4). The seeds collected from 105 DAS recorded higher seed quality parameters *viz*., germination (91.80%) with low EC (0.830 dSm^{-1}). At physiological maturity, seeds are said to be completely developed due to maximum accumulation of food reserves, amino acids, dry matter, sugar, water soluble proteins in the seed (Dermir *et al*., 1994). Khatun *et al* (2009) reported that seeds harvested when most of the pods were light brown with a few yellow (H_2 stage) recorded the highest germination percentage.

The interaction effects of fertilizer and stages of harvesting (F x H) was found to be significant with respect to fresh weight of pod and fresh weight of seed. In general F_3H_2 treatment combination recorded significantly highest (6.05 g) fresh weight of pod. While, F_3H_3 interaction effect produced significantly highest (11.73 g) fresh weight of seed. F_3H_3 and F_2H_3 treatment combination recorded on par result with respect to fresh weight of seed (10.83 g).

The interaction between fertilizer and stages of harvesting showed significant effect on all the quality parameters. The F_3H_4 treatment combination recorded significantly highest germination percentage (94.90%) with lower electrical conductivity (0.740 dSm^{-1}) compared to other treatment combination.

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ISSN 2250 - 3978 LILAVATI (PRINT)
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Table 1. Influence of fertilizer doses and harvesting stages on) fresh weight of seed (g), moisture content of seed (%),germination percentage and electrical conductivity

Treatments	Fresh weight of seed (g)				Moisture content of seed (%)				Germination (%)				Electrical conductivity (dSm^{-1})			
	F_1	F_2	F_3	Mean	F_1	F_2	F_3	Mean	F_1	F_2	F_3	Mean	F_1	F_2	F_3	Mean
E_1– 60 DAS	3.50	4.24	5.78	**4.53**	76.12	78.12	76.63	**76.96**	–	–	–	–	3.587	3.037	2.632	**3.084**
E_2– 75 DAS	5.96	7.93	8.93	**7.62**	74.13	71.08	73.23	**72.81**	35.80 (36.73)	39.70 (39.05)	48.26 (44.00)	**41.25 (39.92)**	2.590	2.048	1.744	**2.127**
E_3– 90 DAS	9.63	10.83	11.73	**10.73**	67.80	68.12	67.76	**67.89**	68.33 (56.50)	75.26 (60.27)	79.73 (63.23)	**74.84 (60.00)**	1.651	1.327	1.019	**1.332**
E_4– 105 DAS	4.00	5.00	6.50	**5.17**	29.56	30.16	31.39	**30.37**	89.33 (70.99)	91.16 (72.74)	94.90 (76.93)	**91.80 (73.50)**	0.928	0.824	0.742	**0.830**
E_5– 120 DAS	3.73	4.66	6.46	**4.95**	13.65	14.80	12.61	**13.69**	88.96 (70.52)	90.30 (71.85)	91.15 (73.37)	**90.14 (71.95)**	1.228	1.060	1.051	**1.113**
Mean	**5.37**	**6.54**	**7.89**	**6.60**	**52.25**	**52.46**	**52.14**	**52.38**	**56.72 (46.96)**	**59.28 (48.78)**	**62.81 (51.51)**	**59.60 (49.09)**	**1.997**	**1.659**	**1.437**	**1.697**
	S.Em=		CD at 5%		S.Em=		CD at 5%		S.Em=		CD at 5%		S.Em=		CD at 5%	
Fertilizer (F)	0.183		0.531		1.018		NS		0.463		1.348		0.044		0.126	
Harvesting stage (H)	0.236		0.685		1.314		3.80		0.600		1.740		0.056		0.163	
Interaction (F x H)	0.410		1.187		2.276		NS		1.040		3.014		0.283		0.283	

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ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

INTER AND INTRASPECIFIC COMPETITION IN PARASITOID WASPS

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Abstract: Inter and Intraspecific Competition is the two important competitive interactions occur in most of parasitiod species. Parasitoid wasps are the natural enemies of arthropod hosts in natural ecosystems and can be used as biological control agents against insect pests in agro ecosystems. These parasitoids are developed in or on the bodies of other arthropods (usually insects) and their development are crucially dependent on the limited resources contained single host individual that is frequently not much longer than the parasitoid itself. In the situation, where the availability of the resources are scarce the intense of inter and intraspecific competition takes place for the access of the resources among the species or individuals occupying the same guild. This competitive interaction will be useful in assessing maximum control of pest species which might be achieved by releasing the most efficient of the parasitoid species. Competition among parasitoids may be influenced by differences in the parasitoid host finding efficiency. Different parasitoid species may co-exist in the same locality and enhance the control efficiency against the pest.

Key words: Parasitoid wasp, Inter and Intraspecific Competition

Introduction: Parasitoid wasps are the natural enemies of arthropod hosts in natural ecosystems and can be used as biological control agents against insect pests in agro ecosystems. These parasitoids are developed in or on the bodies of other arthropods (usually insects) and their development are crucially dependent on the limited resources contained single host individual that is frequently not much longer than the parasitoid itself. In the situation, where the availability of the resources are scarce the intense of inter and intraspecific competition takes place for the access of the resources among the species or individuals occupying the same guild. Hymenoptera have around 320,000 species mostly more than 75% (2, 40,000) are parasitoid. Parasitoid wasps are highly diverse and specialized to attack a particular host life stage (egg, larvae, pupae and adults) most arthropods mainly insects.

Parasitoid: An organism that, during its development, live in or on the body of a single host individually, eventually killing the host.

Parasitoid Wasps: The term "wasp" usually conjures up a negative image because some wasps such as hornets and yellow jackets sting and can be somewhat aggressive when they or their nests are disturbed. However, the vast majority of wasps are beneficial, incapable of stinging humans. Such wasps use the stinger part of their egg-laying structure (ovipositor) to lay eggs in a host (they are termed parasitoids). Wasps comprise the single largest and most important group of natural enemies of insect pests. It has been said that nearly every species of insect that attacks plants is itself attacked by one (or usually more) species of parasitoid wasp.

Parasitoid wasps in hymenoptera: These are the super families of the parasitoid wasps in hymenoptera

- Superfamily Ceraphronoidea
- Superfamily Chalcidoidea
- Superfamily Cynipoidea
- Superfamily Evanioidea
- Superfamily Ichneumonoidea
- Superfamily Megalyroidea
- Superfamily Mymarommatoidea
- Superfamily Platygastroidea
- Superfamily Proctotrupoidea
- Superfamily Serphitoidea (fossil)
- Superfamily Stephanoidea
- Superfamily Trigonaloidea

Table 1: Main Super families of Hymenoptera containing Parasitoid species:

Order	Super family	World species
Hymenoptera	Cynipoidea	2,335
	Proctotrupoidea	2,135
	Stephanoidea	300
	Chalcidoidea	**22,000**
	Platygastroidae	4,000
	Ceraphronoidea	800
	Icheunmonoidea	**25,000**
	chrysidoidae	3000
	Vespoidea	5,500

Among all the super families Icheunmonoidea super family containing highest parasitoid species than followed by Chalcidoidea. **Godfray (2004)**

Table 2: Parasitoid Wasps of Agricultural Importance

Parasitoid	***Host***
Microplitis prodeniae	*Spodoptera litura*
Campoletis chlorideae	*Helicoverpa armigera, Spodoptera litura*
Microplitis mediator	*Helicoverpa armigera*
Cotesia plutellae	*Plutella xylostella.*
Microplitis croceips	*Heliothis virescens*
Cardiochiles nigriceps	*Heliothis virescens*
Meteorus pulchricornis	*Mythimna separata*
Cotesia rufricrus	*Mythimna separata*
Cotesia kariyai	*Mythimna separata*
Cephalonomia stephanoderis	*Hypothenemus hampei*
Prorops nasuta	*Hypothenemus hampei*
cephalonomia hyalinipennis	*Hypothenemus hampei*

Eupelmus vuilletti	*Callosobruchus maculata*
Dinarmus basali	*Callosobruchus maculata*
Apanteles ruidis	*Achea janata*
Bracon hebetor	*Helicoverpa armigera* *P. gossypiella ,*
Encarsia issaci	*Aleurolobus barodensis*
Isotima javensis	*Acigona steniella*
Ooencyrtus papilonsis	*P. purpusilla*
Rogas aligarhensis	*P. gossypiella*
Trichogramma achaeae	*P. gossypiella*
Trichogramma chilonis	*C. infudcatellus*
T . japonicum	*S. incertulus*
Xanthopimpla punctata	*C. partellus*

Here I coated example of some of parasitoid and their host which is having agricultural importance

Competition: Competition is a negative interaction that occurs among organisms whenever two or more organisms require the same limited resource. Competition is a universal phenomenon in nature, and in particular, among natural enemies. In general, the adults of parasitoid wasps cannot kill their competitors, but they can drive competitors away for inhabiting advantageous niches and having access to more food (Bajpai *et al*., 2005).Competition between natural enemy species influences the size, structure, and stability of insect communities (Jalali *et al.,* 1988).

Competitive Exclusion Principle: When two species compete for identical resources, one will be more successful and will eventually eliminate the other. That is complete competitors cannot coexist. The completion exclusion principle is also called as Gause's principle or simply Gause's law.

Gause, 1934

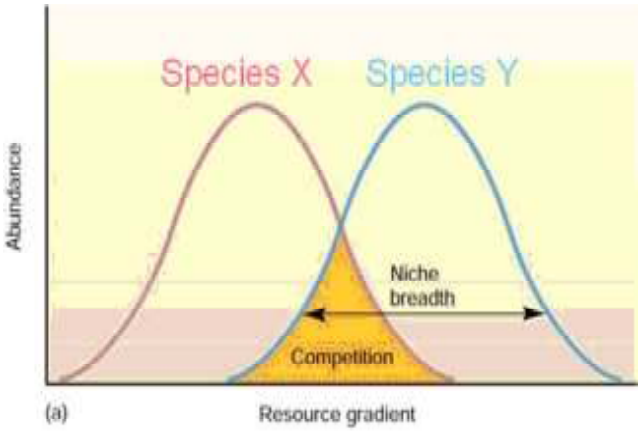
Types of competition

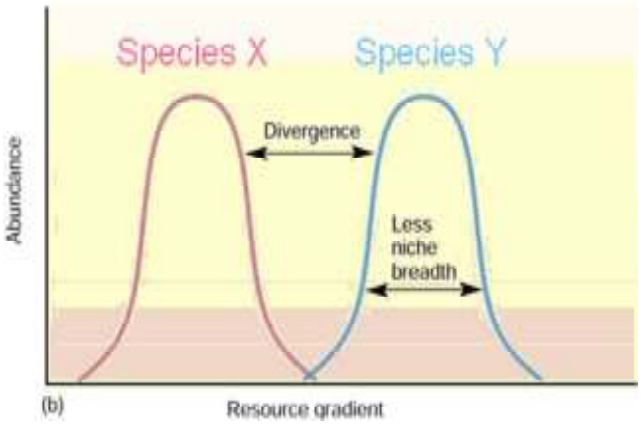
1. Interspecific competition
2. Intraspecific competition

Interspecific competition: When different species are having for the same food, habitat, or some other environmental resource it is called interspecific competition. These interactions are typically somewhat less intense. This is because while the requirements of two species might be similar, they can never be as close as they are for individuals of the same species.

- Inter specific competition occur Between species
  - within same guild/tropic level
  - same resources/set of resources
- Mutually negative interaction (-/-)
- Decrease in fitness (*e.g*., fecundity) presumed to cause reduced abundance

Guinan *et al.* (2005)





The two different species having a wider niche and the niche breadth overlaps than the competition will occur where as niche breadth is lesser the availability food also less than they become divergence.

Examples*:* *Campoletes chlorideae* is the braconidae and *Microplitis mediator* is the ichaeunomonidae, these two different species attack on the same host i.e. *Helicoverpa armigera.*

Melittobia digitata and *Nasonia vitripennis* are the two different species attack on the same host i.e. *Neobellieria bullata.*

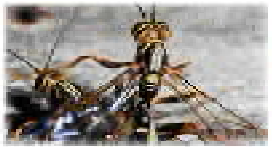
Intraspecific competition: occurs when different individuals of the same species compete for a resource. These interactions can be fierce because the individuals require the same limited resources to survive and reproduce.

Guinan *et al.* (2005)

Examples: *Cephalonomia hylinipennis and Cephalonomia stephanoderis* are the same bethylidae wasps/species which attack on the same host i.e. *Hypothenemus hampei* and the same species of *Goniozuswhich* attack on the coconut black headed caterpillar

Why does competition between and within the species occur?

Food **Space**



Mate **Habitat/ niche**

Site for oviposition

Models of Competition

- **Lotka (1925) & Volterra (1926)**
- **Extended logistic model to include two-species competition**
- **Neighbourhood Models of Competition.**
- **Tilman's Models of Competition**

Neighborhood Models of Competition: plants compete within neighborhoods.

Tilman's Models of Competition: worked for competition in phytoplanktons.

Exploring the Lotka-Volterra Competition Model using Two Species of Parasitoid Wasps: The Lotka-Volterra model was developed to allow ecologists to predict the potential outcome when two species are in competition for the same resources. Basically, the model attempts to account for the effect that the presence of one species will have on the population growth of the other species, relative to the competitive effect that two members of the same species would have on each other.

Nasonia vitripennis ***Melittobia digitata***

Here these two parasitoid wasps species used for studies Although they are not particularly closely related to one another, the life histories of two parasitoid wasp species, *Melittobia digitata* and *Nasonia vitripennis*, are quite similar. Both species are capable of using the same host, although in nature they used different hosts. *Melittobia* are about half as large as *Nasonia*, but both are quite small and completely harmless to humans.

Table 3: Categories of direct interactions between two species in the same community

Name of interaction	Type of contact	Direct effect on species #1	Direct effect on species #2	Other aspects of the relationship
Neutral relationship	Two species are linked only indirectly through interact ions with other species.	0	0	Each species has a neutral relation ship with most species in its habitat
Commensalism	A relationship that directly helps one species but does not affect the other much, if at all.	+	0	Commensalism, mutualism, and para sitism are all cases of symbiosis ('living together").
Mutualism	Benefits flow both ways between the interacting Species.	+	+	Better viewed as two-way exploitation than as cozy Cooperation.

Predation	Predator attacks and feeds upon a series of prey but does not take up residence in or on them.	+	–	Prey generally dies.
Parasitism	Parasite feeds on tissues of one or more hosts, residing in or on them for at least part of their life cycle.	+	–	A host might or might not die as a result of the interaction. Interspecific
competition	Disadvantages flow both ways between species	–	–	Generally less intense than competi tion between members of the same species.

If two species are competition for the same host resources the following interaction will take place i.e. Neutral relationship there is no effect on both species. Commensalism, here one species is benefited and other species will effect, Mutualism is one that both the species will benefit. Predation and Parasitism is one that species will benefited and other will harmful/effected, Interspecific competition, here both the species will effect/harmful because competition takes place.

The equation for the population growth of species 1 is:

$$dn1/dt = r_1 * N_1 * (K_1 - N_1 - a_{12} * N_2)/K_1$$

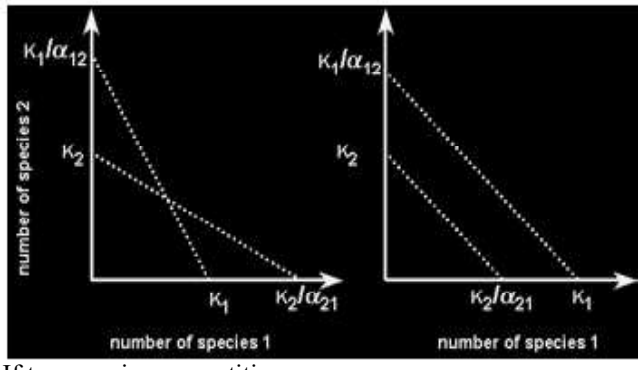
And for species 2, it is: $dn2/dt = r_2 * N_2 * (K_2 - N_2 - a_{21} * N_1)/K_2$

Where:

* N_1 and N_2 are the population sizes of species 1 and 2,
* r_1 and r_2 are the intrinsic rates of increase for these species,
* K_1 and K_2 are the carrying capacities of the habitat for each species,
* $alpha_{12}$ and $alpha_{21}$ are the effects of one species on the population growth of the other. Specifically, $alpha_{12}$ is the effect of species 2 on the growth of species 1, and $alpha_{21}$ is the effect of species 1 on the growth of species 2.

If we know the values of these equations then this equation can be used to predict the potential outcome of a competition that is whether they can co-exist or if one will eventually exclude the other.

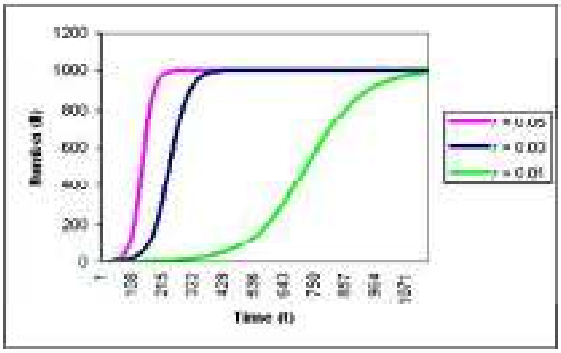
Outcome of Lotka-Volterra Competition Model:



If two species competition occurs

- Species 1 becomes extinct.
- Species 2 becomes extinct.
- Either species 1 or species 2 becomes extinct based on starting conditions.
- Both species are coexistence

Logistic Growth Model:



- It is S curve
- The equation for logestic growth model

$dN/dt = rN(1-N/K)$

dN/dt - population growth rate
r - Per capita rate of increase
K - Carrying capacity

- Growth rate decreases as approaches K
- Maximum population size occurs when $dN/dt = 0$
- Carrying capacity K includes food shortage, predation, disease, competition, etc.

Here, the growth and development of population will carrying by the environment only up to the certain extent after that the growth and development of population will stop or constant so it is called as carrying capacity because carrying capacity K includes food shortage, predation, disease, competition etc.

Mechanisms of competition:

1. Physical attack
2. Physiological suppression
3. Hatching Time
4. Resource sharing
5. Fighting Behaviour

Physical attack: here, one species will attack by other species through their mandible, threatening. Some of scientists are reported as follows

Physical attack by using mandibles has been observed in some solitary parasitoid larvae.

McBrien & Mackauer, 1990

The braconid *Cotesia plutella,* with sickle-like mandibles had

an advantage over the
Ichnuemonid, *Diadegma semiclausum* in competition within their host *Plutella xylostella.*

Shi *et al.* (2004)

Physiological Suppression: Physiological suppression by secreting substances toxic to the competitors shutting out oxygen or locking out the supply of nutrients from the host has also been reported.

Hagver, 1988

Physiological suppression is also common and may occur by toxic secretion shortly after eclosion of the embryo, by starvation or asphyxiation of competitors later in larval development, or as a result of toxins injected by the adult female during oviposition.

Mackauer, 1990

Hatching Time: Here, while two species which one is hatching early that species will having competition advantageous. *Microplitis croceipes,* with *a* shorter hatching time, dominates competition against another parasitoid *Cardiochiles nigriceps,* when the interval between primary and secondary parasitization did not exceed 8 hours.

De Moraes *et al.* (1999)

Resource Sharing: The braconid wasp, *Cotesia rubecula* Marshall (solitary) out competes *Cotesia glomerata L.* (gregarious) in their shared host, *P. rapae L.*

Laing *&* Corrigan, 1987

Fighting Behavior: Here, if two species having an equal size or if two female species having an equal size then fighting behavior will occur among the species or female. *Goniozus nephantidis* females are known to fight aggressively during the contests.

Gabriela *et al.* (2002)

Intra- and interspecific competition *by Fopius arisanus* and *diachasmimorpha tryoni* (Hymenoptera: Braconidae), parasitoids of tephritid fruit flies

Fopius arisanus (Sonan) and *Diachasmimorpha tryoni* (Cameron) are two important solitary endoparasitoids of tephritid fruit flies. The former species attacks host eggs while the latter attacks host larvae, and both species emerge as adults from the host puparium. These studies investigated inter competition between these two parasitoids, as well as aspects of intraspecific competition within each species in the Mediterranean fruit fly, *Ceratitis capitata* (Wiedemann). Result revealed that the parasitism by *D. tryoni* was significantly higher in fly larvae exposed to *D. tryoni* only than in those previously exposed to *F. arisanus* as eggs but there was no significantly difference parasitism by *F. arisanus* alone and both species. There is no significant difference of superparasitisms between among the species.

Subsequent exposure of *F. arisanus* parasitized flies to *D. tryoni* resulted in, on an average, 25.6% multiparasitism.

Wang and Messing (2003)

Niches and interspecific competitive relationships of the parasitoids, *Microplitis prodeniae* and *Campoletis chlorideae*, of the Oriental leafworm moth, *Spodoptera litura*, in tobacco

Both *Microplitis prodeniae* Rao and Chandry (Hymenoptera: Bracondidae) and *Campoletis chlorideae* Uchida (Hymenoptera: Ichnumonidae) are major parasitoids of *Spodoptera litura* (Fabricious) (Lepidoptera: Noctuidae) in tobacco, *Nicotiana tabacum* L. (Solanales: Solanaceae) at Nanxiong, Guangdong Province, South China. The niches and interspecific competition relationships of the two species were studied. The results show that the competition between the two species for spatial and food resources was very intense, and *C. chlorideae* was always dominant when the two species compete for spatial and food resources in different periods. Thus *C. chlorideae* may drive *M. prodeniae* away when they occupy the same spatial or food resource.The adaptability of *C. chlorideae* to the environment in the tobacco fields may be greater thanthat of *M. prodeniae*, so *C. chlorideae* can maintain a higher population compared to that of *M. prodeniae*.

Zhou *et al*., 2010

Conclusion: The competitive interactions will be useful in assessing maximum control of pest species which might be achieved by releasing the most efficient of the parasitoid species. Competition among parasitoids may be influenced by differences in the parasitoid host finding efficiency. Different parasitoid species may co-exist in the same locality and enhance the control efficiency against the pest. Further research is needed to assess the exact mechanisms of physiological suppression which is poorly understood in most parasitoids in agricultural practices including relative pesticide susceptibility in the parasitoid.

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VARIABILITY AND MANAGEMENT OF STEM AND POD ROT OF GROUNDNUT CAUSED BY *SCLEROTIUM ROLFSII SACC.*

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Abstract: Stem and pod rot of groundnut caused by *Sclerotium rolfsii* Sacc. is the major constraint to groundnut production in many countries in Asia, Africa and America. The disease is a potential threat to groundnut production in warm, humid area, especially where irrigated cultivation is expanding. Stem and pod rot inflicts 10 to 25% yield losses, but it can reach over 80% in heavily infected fields. In India, stem rot of groundnut was first recorded by Butler and Bisby (1931) and causes yield losses over 25 per cent. Infected plants becomes yellow and then wilt, and the collar roots turn brown and rots in addition *S. rolfsii* infects the groundnut pegs and pods, leading to yield losses. Genetic variability among the virulent isolates of *Sclerotium rolfsii* using molecular techniques like RAPD, ITS-PCR and RFLP. The RAPD banding pattern reflected the genetic diversity among the isolates by formation of two clusters. Genetic and phenotypic diversity of *Sclerotium rolfsii* in groundnut fields in Central Vietnam. Based on internal transcribed spacer (ITS) ribosomal DNA sequence analyses, three distinct groups were identified among a total of 103 randomly selected *S. rolfsii* field isolates, with the majority of the isolates (n = 90) in one ITS group. Application of tebuconazole 2%DS @ 1g/kg seed to groundnut kernels prior to sowing was found to be highly effective in the management of stem rot of groundnut with least disease incidence (7.31%) with higher pod yield (2664 kg/ha) and benefit cost ratio (5.42). Integration of seed treatment with carboxin and thiram (Vitavax powder 3g/kg seed) , application of a pre-emergence fluchloralin (Basalin @1.5 a.i. kg/ ha), furrow application of bioagent three sprayings of hexaconazole (0.005%) or mancozeb (0.2%) gave the highest yield and showed the least disease incidence. *Sclerotium rolfsii*-incited stem and pod rots continue to be major constraints to groundnut production in many groundnut growing regions, since it is a soil borne disease attention needs to be paid to developing effective field and greenhouse resistance screening techniques. It is important to understand the mechanisms of resistance to *S. rolfsii*. Efforts should be made to utilize all feasible components of disease management into an integrated approach to the problem.

Introduction : Groundnut (*Arachis hypogea* L.) is a major legume and important oil seed crop in India which is grown over an area of 5.31 m.ha. with an annual production and productivity of 6.93 m.t. and 1305 kg/ha respectively (Anon., 2012). In Karnataka, groundnut (*Arachis hypogaea*) is cultivated in an area of 0.70 m.ha with production of 0.50 m.t and productivity being 589 kg/ha (Anon., 2012). **G**roundnut (*Arachis hypogea* L.) is believed to be native to South America and the Caribbean. The plant was introduced by the Portuguese into Africa, from where it was introduced into North America. It came to India during the first half of the 16th century from one of the Pacific islands of China, where it was introduced earlier from either Central or South America. The oil content of the seed varies from 44 to 50 per cent, depending on the varieties and agronomic conditions. Groundnut oil is edible and extensively used as a cooking medium, both as refined oil and vanaspati. It is also used in soap making, manufacturing cosmetics and lubricants. Groundnut kernels are also eaten raw, roasted or sweetened. They are rich in protein and vitamins A, B and some members of the B2 group.

Fig 1. Groundnut growing areas in India

Sclerotium rolfsii Sacc. which is a serious soil borne pathogen common in tropical and sub-tropical regions of the world where high temperature coupled with high humidity is prevalent during the rainy season causing severe damage to the crop with yield losses of over 25 per cent (Mayee and Datar 1998). In India, stem rot of groundnut was first recorded by Butler and Bisby (1931) and causes yield losses of over 25 per cent (Mayee and Datar, 1988). An ailment of stem rot of groundnut causes 13 to 59 per cent yield loss during both the rainy and summer seasons (Nautiyal, 2002).

Stem and pod rots caused by *S. rolfsii* occur wherever groundnut is grown. They are widely distributed in India and the USA, and cause serious losses in Bolivia, China, Egypt, India, Taiwan, Thailand, and the USA. The diseases are also important in parts of Argentina, Australia, Bangladesh, Brazil, Indonesia, Israel, Japan, Nepal, Nigeria, New Guinea, Paraguay, Peru, the Philippines, Senegal, South Africa, and Zimbabwe. In the USA, stem rot is most severe in the southeastern states.

Symptoms: The symptoms of *S. rolfsii* include yellowing and wilting of branches, presence of mustard seed like sclerotia at the site of infection.

Discoloration on an infected branch

Wilting of multiple branches

White fungal growth on the branches

Mustard size sclerotia on the soil

* The name *Sclerotium rolfsii* was given by *Saccardo* (1911), who characterized the fungus as an imperfect form without asexual spores.
* *Sclerotium rolfsii* is a soil borne fungus.

* It is a polyphagous and facultative parasite.

Taxonomy

* The species was first described in 1911 by Italian mycologist Pier Andrea Saccardo.

* He placed the species in the old form genus *Sclerotium*, naming it *Sclerotium rolfsii*.

* In 1932, Mario Curzi discovered that the teleomorph (spore-bearing state) was a corticioid fungus and accordingly placed the species in the form genus *Corticium*. With a move to a more natural classification of fungi, *Corticium rolfsii* was transferred to *Athelia* in 1978.

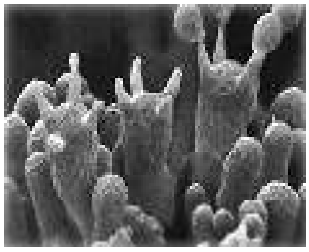
Taxonomical position

Group : True fungi
Kingdom : Fungi
Phylum : Ascomycota
Class : Dueteromycets
Order : Agonomycetales
Family : Aganomycetaceae
Genus : *Sclerotium*
Species : *rolfsii*

Perfect stage: ***Athelia rolfsii***

Scientific classification

Kingdom : Fungi
Phylum : Basidiomycota
Class : Basidiomycetes
Order : Atheliales
Family : Atheliaceae
Genus : *Athelia*



Host range

Sclerotium rolfsii has an extensive host range; at least 500 sp in 100 families are susceptible.

• Allium (Onion, garlic)	Amaryllis
• Ananas (Pineapple)	Apium (Carrot, celery)
• Arachis (Peanuts)	Beta (Beet)
• Brassica	Capsicum (Pepper)
• Chrysanthemum	Cichorium (Endive, escarole)
• Citrullus (Watermelon)	Coffea (Coffee)
• Colocasia (Taro)	Cucumis (Cucumber, melon)
• Cucurbita (Squash)	Cynara (Artichoke)
• Cynodon (Bermudagrass)	Dianthus (Carnations, pinks)
• Delphinium	Digitaria (Crabgrass)
• Dioscorea (Yam)	Glycine (Soybean)
• Gossypium (Cotton)	Hemerocallis
• Hibiscus	Hosta
• Ipomoea (Sweet potato)	Iris morning glory)
• Lactuca (Lettuce)	Lagenaria (Gourds)
• Lycopersicon (Tomato)	Mangifera (Mango)
• Medicago (Alfalfa)	Musa (Banana)
• Narcissus	Nicotiana (Tobacco)

Variability

Genetic and Phenotypic Diversity of *Sclerotium rolfsii* in Groundnut Fields in Central Vietnam. (Le *et.al*., 2012).

Survey showed that the incidence o stem rot of groundnut caused by *S. rolfsii* ranged from approximately 5 to 25%. Furthermore, a gradient in stem rot disease incidence was observed across central Vietnam with an increase in disease incidence from the northern to the southern field sites (Fig. 1). This might be related to the effect of temperature on disease development because, along with the lower latitude, the average daily temperature increases from the north to the south of Vietnam. For two of the four provinces (i.e., locations B and C), the disease incidence of groundnut plants cultivated in clay loam soil was significantly higher than in sandy soil (Fig. 2).

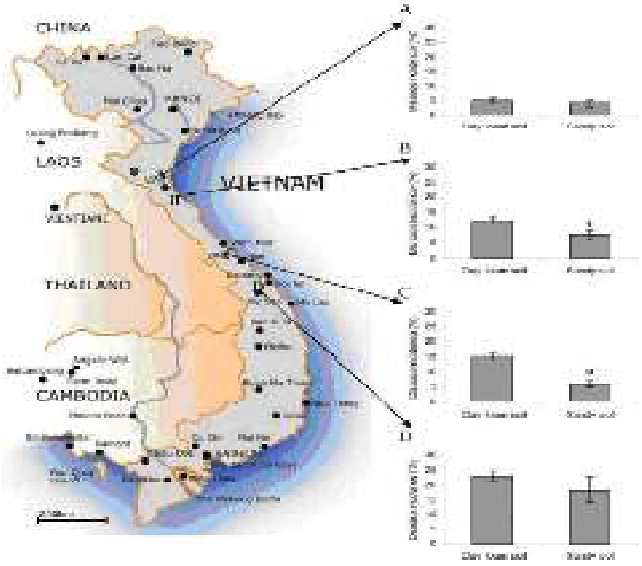


Fig 2.Map of Vietnam showing the provinces where the incidence of stem rot of groundnut was monitored in 2009 and where *Sclerotium rolfsii* isolates were collected.

Genetic diversity of *S. rolfsii*. In total, 198 purified *S. rolfsii* isolates, obtained from more than 400 randomly collected samples from different host plants (groundnut, tomato, and taro) in the four provinces and in the remote upland region were subjected to ITSrDNA sequence analysis. Phylogenetic analysis of the ITS-rDNA sequences of the reference isolates of *S. rolfsii* (i.e., isolates for which ITS-rDNA sequences are present in the National Center for Biotechnology Information database), revealed three main groups designated ITS groups 1 to 3. Most isolates (n = 90) collected from central Vietnam belong to ITS group 1 and were identical to reference isolates of *S. rolfsii* that were previously collected from groundnut, tobacco, and sweet pepper. The three isolates in ITS group 2 were collected from the remote upland region of Nghe An province and cluster with an *S. rolfsii* isolate collected from Ascocenda orchids in Florida (12). Of the 10 isolates in ITS group 3, 8 were collected in Quang Nam province.

Growth rate and sclerotial characteristics. *S. rolfsii* is notorious for its high growth rate in vitro (2,28,29). Indeed, the 103 Vietnamese isolates tested here exhibited a high growth rate of 0.28 to 0.79 mm h–1. On average, isolates from ITS groups 1, 2, and 3 showed no significant differences in growth rate. On PDA, the *S. rolfsii* isolates produced typical silkywhite mycelium and brown or dark brown sclerotia. For the 103 isolates tested, considerable variation was observed in the time to form sclerotia, their maturation time, and their number and size. For example, the number of sclerotia formed per plate after 21 days of incubation ranged from 79 to 1,080 and their size from 0.88 to 2.24 mm. When comparing the sclerotial traits, the three isolates in ITS group 2 were different from the isolates in ITS groups 1 and 3. ITS group 2 isolates produced substantially fewer sclerotia per plate; also, the average maturation time and sclerotial diameter were approximately two times greater than for isolates of ITS groups 1 and 3.

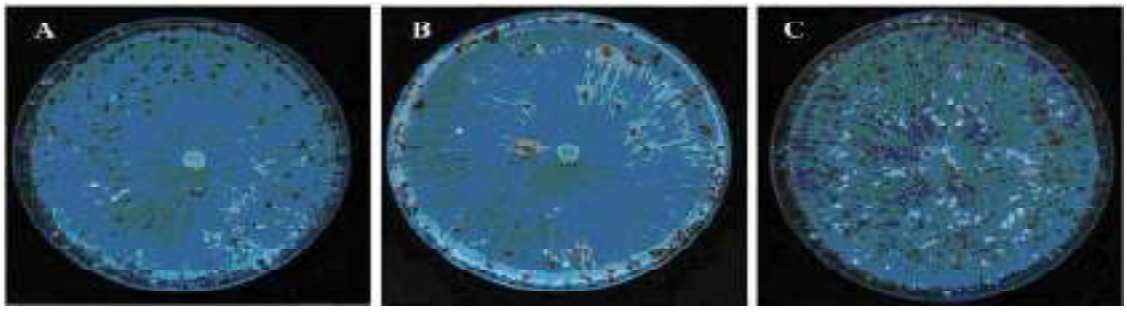


Fig 3.Phenotypic characteristics of mycelium and sclerotia of three *Sclerotium rolfsii isolates belonging to internal transcribed spacer ribosomal DNA groups 1 (A), 2 (B),* and 3 (C). A 5-mm-diameter mycelial agar plug was inoculated in the center of a 9-cm-diameter potato dextrose agar plate and incubated at 25°C. All isolates have the typical white-silky mycelium with round or irregular, light- to dark-brown sclerotia.

Molecular variability among the isolates of *Sclerotium rolfsii* causing stem rot of groundnut by RAPD, ITS-PCR and RFLP (Prasad *et al.,* 2010).

Characterization of *S. rolfsii* isolates by RAPD

Five random primers *viz.*, OPA-01, OPA-12, OPA-17, OPA-18 and OPA-20 generated reproducible polymorphism among the eight isolates. Amplified products with all the primers have showed polymorphic and distinguishable banding pattern indicating the genetic diversity among all isolates of *S. rolfsii*. A total of 221 reproducible and scorable polymorphic bands ranging approximately as low as 100 bp to as high as 2500 bp were generated with five primers among the eight isolates characterized. The primer OPA-01 amplified two unique fragments of approximately 100 bp and 250 bp in case of KSr19 isolate. Primer OPA-12 amplified specific bands of 1400 bp and 1500 bp in case of KSr15 isolate. Moreover, 600 bp fragment was absent in case of CSr1 isolate compared to other isolates. OPA-17 primer yielded a specific fragment approximately 200 bp in case of isolates CSr9 and KSr17 and absent in all other isolates. The 700 and 650 bp bands were specifically amplified in case of isolate KSr20 showing the polymorphism among the isolates. The primer OPA-18 amplified a unique band of approximately 500 bp in case of CSr1, 575 bp in case of CSr9 and 750 bp in case of KSr20. Primer OPA-20 amplified a fragment of 1000 bp and 1050 bp both in case of KSr15 and KSr17 isolates.

Management:

Biological control

Biological control of groundnut stem rot caused by *Sclerotium rolfsii* (Sacc.) (Karthikeyan *et al.,* 2006).

Pot culture experiments were conducted in the greenhouse to study the influence of antagonists found to be effective in vitro and three oilcakes on stem rot incidence. Earthen pots of 20 cm-diameter were filled with 1 kg of potting medium (red earth: sand: farmyard manure at 1:1:1 w/w/w). Oil cakes were applied at the rate of 5 g/kg of soil and mixed thoroughly. After two days talc-based formulation of *T. viride* (16107 CFU/g) or *P. fluorescens* (16108 CFU/g) was delivered at the rate of 5 g/kg soil. The pathogen inoculums was applied a week later at the rate of 10 g/kg of soil. Three seeds were sown in each pot after a day. Four replicates were maintained for each treatment. The following treatments were included in the experiment (1) *T. viride*, (2) *P. fluorescens*, (3) mahua cake, (4) neem cake, (5) pungam cake, (6) *T. viride* and mahua cake, (7) *P. fluorescens* and mahua cake, (8) *T. viride* and neem cake, (9) *P. fluorescens* and neem cake, (10) *T. viride* and pungam cake, (11) *P. fluorescens* and pungam cake, (12) carbendazim 0.1% and (13) pathogen inoculated control. AT 60 DAS, stem rot incidence was the minimum (3.75%) with the combined application of *T. viride* and mahua cake. There was a reduction of 90.62% in disease incidence over control. This treatment was on a par with the combination of *T. viride* and neem cake (5.00%). Soil application of *P. fluorescens* recorded 15.00% disease incidence. Among the combinations of *P. fluorescens* with oilcakes, the rhizobacterium with mahua cake was highly inhibitory to stem rot incidence (5.62%) at 60 DAS. A highest disease incidence of 39.98% was observed in control.

Chemical control:

Tebuconazole: A new triazole fungicide molecule for the management of stem rot of groundnut caused by *Sclerotium rolfsii.* (Sunkad 2012).

A field experiment was conducted at Main Agricultural Research Station, Raichur, Karnataka for two seasons. Groundnut cultivar, KRG-1, susceptible to *Sclerotium rolfsii* was sown in 5 x 3 sq. m sick plots during rainy season in 2002 and 2003. The experiment was laid out in a randomized block design with three replications and seven treatments as mentioned below.T1 - Tebuconazole 2% DS @ 0.75 g/kg seed; T2 – Tebuconazole 2% DS @ 1.00 g/kg seed; T3 - Tebuconazole 2% DS @ 1.25 g/kg seed; T4 - Mancozeb 75WP @ 3.00 g/kg seed; T5 - Carbendazim 50% WP @ 2.00 g/kg seed; T6 – *Trichoderma viridae* @ 4.00 g/kg seed; T7 - Untreated control. The test fungicides at different concentrations along with bioagent *Trichoderma viridae* were applied to groundnut seed kernels prior to sowing. The observation on disease incidences of stem rot was recorded a week before the harvest of the crop. All the plants were counted for stem rot incidence and ten diseased plants were physically examined

for number of pods showing complete or partial rotting. The data were converted into per cent disease incidence. The pod yield was recorded from the whole plot and converted to per ha.

Farm trials (FT) and large scale demonstration trials (LSD) Based on the experimental results over two seasons during 2002-03, farm and large scale trials were conducted to test the efficacy of best treatment that is tebuconazole (1g/kg seed) in comparison to a recommended fungicide of carbendazim (3g/kg seed) in farmers fields.

Seven farm trials (1000 mt2 area each) were laid out in farmers fields of Raichur and Gulbarga districts in addition to one large scale trial (8000mt2) in Raichur district with a spacing of 30x10 cm during kharif, 2004 and 2005. All the recommended package of practices for tillage, manuring and irrigation etc. were followed. Two treatments include tebuconazole 2% DS (1g/kg) in comparison with a recommended fungicide of carbendazim (3g/kg seed) were selected for trials to confirm their efficacy against the disease in 6 farm trials and one large scale demonstration trial. The test fungicides were applied to groundnut seeds a day prior to sowing and shade dried. In each fungicidal treatment, the observation on incidence of stem rot and dry pod yield were recorded as mentioned above. Results indicated that tebuconazole @ 1.25g/kg seed was found highly effective in reducing the incidence of stem rot followed by its lower dosage that is tebuconazole @ 1.00g/kg seed, they were on par each other and significantly different from lower dosage (Tebuconazole @ 0.75g/kg) in addition to other fungicidal treatments. The fungicides viz., mancozeb, carbendazim and *Trichoderma viridae* were also effective in controlling the disease but they were not superior to tebuconazole (1-1.25g/kg). Significantly least disease incidence of 6.71% was recorded in tebuconazole @ 1.25g/kg while, it was 7.31 per cent in tebuconazole @ 1.00g/kg when compared to tebuconazole @ 0.75g/kg (9.86%), mancozeb (13.31%), carbendazim (11.31%) and *Trichoderma viridae* (10.26%). With regard to cost benefit ratio, tebuconazole @ 1.00g/kg recorded highest BC ratio when compared to all other fungicidal treatments. The treatment recorded BCR of 5.42 while, it was slightly less (4.86 and 5.20) in case of its higher dosage (1.25g/kg) and lower dosage (0.75g/kg) respectively. Further, the treatment (Tebuconazole @ 1.00g/ kg) was superior to a recommended carbendazim with respect to increase in groundnut yield. An overall increase in yield of 11.50 per cent was obtained in the treatment over recommended carbendazim in farm trials and large scale demonstration trials. Seed treatment of tebuconazole @ 1.25g/kg followed by its lower dosage (1.00g/kg seed) was found significantly superior in the management of stem rot with least disease incidence and higher pod yield in experimental trials as well as farm and large scale demonstration trials. From the farmers point of view, the treatment which gives maximum returns is more important than a mere control of the disease.

Resistant varieties:

Relative resistance in groundnut genotypes to pod rot disease. (Gopal *et al*., 2006). Ten genotypes, three belonging to Virginia bunch *(A. hypogaea* var. *hypogaea)* (TCG 1525, P 1269710, NCAc 38), and two belonging to Virginia runner *(A. hypogaea* var *hypogaea)* (Haryanawadi) (NO 8-2), four belonging to valgaris *(A. hypogaea* var. *fastigiata)* (SS 34, VRR 472, Tai son (Jewel Nut) and P1268559 (NCAC 10121) and two belonging to Spanish *(A. hypogaea* var. *vulgaris)* (NCAc 18019 and RR5290) were highly resistant to stem and pod rot pathogen of groundnut.

Twenty advanced groundnut genotypes were sown in the plot where the high incidence of pod rot disease was occurring every year. Each genotype was sown in a plot size of 5 x 0.9 M with a spacing of 30 x 10cm. Shells of previously pod rot infected pods were powdered and applied in the furrows at the time of seeding in both the years. Recommended package of practices were followed to raise the crop. All the genotypes were harvested as per their maturity. Pod rot severity was recorded by adopting 1-5 scale based on area of spots covered on pods and per cent disease index (PDI) was calculated. Based on mean disease index, the genotypes were grouped into five categories viz., immune (disease free), resistant (0.1-10 PDI), moderately resistant (11.1 to 30 PDI), susceptible (30.1 to 50 MDI) and highly susceptible (> 50 MDI).

The results clearly indicated that genotypes varied in severity of the pod rot incidence. Among the genotypes, the PDI, PI and PPI were in the range of 38.8 to 65.9, 39.9 to 94.4 and 9.3 to 90.8, respectively. The susceptible checks, JL 24 and KRG 1 scored the severity of 54.6 PDI and 58 PDI, respectively. The test genotype, Dh 39 recorded 65.9 PDI followed by Dh 40 (64.8 PDI) and Dh 41 (63.6 PDI). The lowest PDI of 38.8 was scored by INS 9013 followed by R 8808 (38.8), R 8972 (38.9) and ICGV 86885 (39.2).

Integrated disease mangement

Integrated management of stem and pod rot of groundnut. (Rakholiya and Jadeja 2010)

Integration of seed treatment with carboxin and thiram (Vitavax powder 3g/kg seed) , application of a pre-emergence fluchloralin (Basalin @1.5 a.i. kg/ ha), furrow application of bioagent three sprayings of hexaconazole (0.005%) or mancozeb (0.2%) gave the highest yield and showed the least disease incidence.

Conclusion: *Sclerotium rolfsii*-incited stem and pod rots continue to be major constraints to groundnut production in many groundnut growing regions, since it is a soil borne disease attention needs to be paid to developing effective field and greenhouse resistance screening techniques. It is important to understand the mechanisms of resistance to *S. rolfsii*. Efforts should be made to utilize all feasible components of disease management into an integrated approach to the problem.

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STUDIES ON STERILITY MOSAIC DISEASE OF PIGEONPEA

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Abstract: Pigeonpea is an important pulse crop in Karnataka, India. Sterility mosaic (SMD) is the most damaging disease of pigeonpea (*Cajanus cajan*). SMD is transmitted by an eriophyid mite, *Aceria cajani,* is a major problem of pigeonpea. The disease is sometimes referred to as the "Green Plague". At flowering time, affected plants remains green with excessive vegetative growth and have no flowers or seed pods. Under congenial conditions, it spreads rapidly like a plague, leading to severe epidemics. Affected plants show complete or partial cessation of flower production (sterility), mosaic or chlorotic ringspot symptoms on leaves, excessive vegetative growth, stunting and reduction in leaf size. The nature of inheritance of SMD in resistant (BRG 3 and ICP7035) and susceptible (ICP 8863 and TTB 7) genotypes. Visual observations recorded for leaf colour and texture revealed that the leaves of resistant genotypes were dark green and leathery textured while, that of susceptible individuals were light green and non-leathery indicating leaf traits to be associated with SMD resistance in the parents. Modern molecular breeding methods together with the power of genomics and genetic resources developed through the PGI should revolutionize pigeonpea crop improvement, and consequently benefit farmers and consumers of this important pulse crop of India and the semi-arid regions of the world.

Pigeonpea (*Cajanus cajan*) is a short lived perennial grain legume belonging to Cajaninae subtribe of the economically most important leguminous tribe Phaseoleae. It is widely cultivated as an annual crop in semiarid tropics. It plays an important role in food and nutritional security because it is a rich source of proteins, minerals and vitamins. Its seeds are mainly consumed as split peas soups or 'dal' but a significant proportion is also eaten as a green pea vegetable and as whole grain preparation. Its stems provide a good source of fuel wood.

Common names are Pigeonpea, Arhar, Red gram, Tur , Thogari (kannada).

The biotic stresses are considered as one of the main reasons for limiting the yields in pigeonpea. More than 210 pathogens have been reported to infect pigeonpea Nene (1996), which includes fungi, bacteria viruses, nematodes and phytoplasma. Among them, few are considered as economically important which includes Fusarium wilt, sterility mosaic virus (SMD), Phytopthora blight (PB), nematodes, Macrophomina root rot and Alternaria blight which cause considerable yield losses in Pigeonpea in Indian subcontinent (Reddy *et al.,*1998). SMD is caused by a virus and transmitted by eriophyid mite*, Aceria cajani*.

Characteristic disease symptoms are complete or partial cessation of flower production (sterility), mosaic or chlorotic ringspot symptoms on leaves, excessive vegetative growth, stunting and reduction in leaf size.

Plate 1. Close up view of healthy and sterility mosaic infected plants at flowering stage (D- diseased plant, H- healthy plant)

Nutritional Quality: Pigeonpea consists of 22 % protein, which is almost 3 times that of cereals, other nutrients such as- fibre, ash, fat, magnesium, manganese, and copper. They also contain high levels of amino acids methionine, lysine, and tryptophan.

Pigeonpea sterility mosaic disease (PPSMD)

Mitra (1931) was the first to report the disease from Pusa, Bihar. McRae (1932) failed to transmit the disease by sap inoculation. Capoor (1952) was the first to report successful graft and mechanical transmission and established infectious nature of the disease. Seth (1962) successfully proved an eriophyid mite (*Aceria cajani* channabasavanna)to be the vector.

Fig. 1. Effect of SMD infection of pigeonpea yield. Maximum yield loss results when infection takes place when crop <45 days old

About 80% of the total pigeonpea production in Karnataka state is confined to Bidar and Gulbarga districts. This region was regarded as "pigeonpea bowl" of Karnataka. SMD is a major problem in this area, and the disease was occurring in severe proportion every year. To understand the reasons for high disease incidence, surveys were conducted. SMD was assessed based on symptoms and random testing of plants by DAS-ELISA to confirm virus infection.

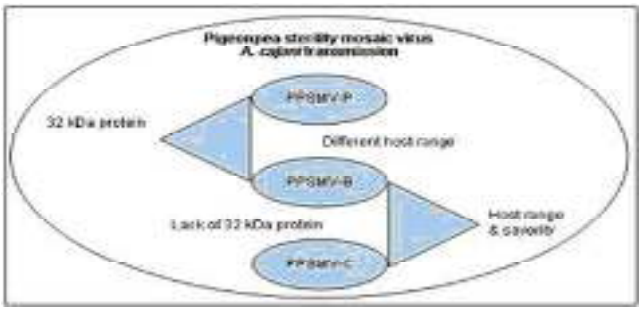

Fig. 2. Relationships of three PPSMV isolates: Patancheru (P), Bangalore (B) and Coimbatore (C).

The PPSMV isolates present on pigeonpea at Patancheru, Andhra Pradesh (P), Bangalore, Karnataka (B), and Coimbatore, Tamil Nadu (C), were found to be different (Table 1). Analysis of the virus isolates at these locations showed that they were indistinguishable serologically in ELISA and at the genome level using reverse transcription– polymerase chain reaction (RT-PCR) with primers based on the sequence to part of RNA 5. However, in Western blot analysis to detect the PPSMV-specific 32-kDa protein in leaf sap, isolate C was clearly distinguished from the other two isolates in reacting only weakly with antiserum to isolate P.

Furthermore, the protein specifically associated with the VLP preparations of isolate C had a size of c. 35 kDa, and not 32 kDa as with isolates P and B. This difference in the size of the VLP-associated protein may be due to the fact that they do differ in size or that all three isolates have a protein of 35 kDa but that those in preparations of isolates P and B are readily degraded to 32 kDa. Whatever the precise reason for the difference in size, isolate C is clearly different chemically as well as biologically from the other two isolates. The basis for the breakdown in PPSMV-resistant genotypes seems therefore to be due to regional variation in PPSMV isolates (P. L. Kumar and A. T. Jones).

Tenui-like virus of asymmetric morphology. Virus particles are highly flexuous and irregularly branched filaments measuring 3-8nm. Virus contain a 32 kDa coat protein and 4-5 segmented RNA of size 0.8-3.5 kilo bases

Mite vector (*Aceria cajani*) : Visible only under stereomicroscope(at least 40X). Short life cycle (<2 weeks) egg, two nymphal and adult stage. Two pairs of legs at the anterior end. Dispersal is passive mainly by wind current. Presence of *A.cajani* on pigeonpea goes unnoticed because there is no visible injury. Population will be more under warm and humid condition

Transmission: Eriophyd mite (*A.cajani)* transmits PPSMV in a semi persistent manner. The transmission efficiency of a single eriophyid mite is 53%, when >5mites per plant are used 100% transmission. The infection is most damaging when it occurs early in the season. Even single mites can transmit PPSMV. There is no transovarial transmission.

Plate 1. Eryiphoid Mite *Aceria cajani*

Biology and habitat of mite vector *Aceria cajani*

EGGS	30-40 µm, parallel & rounded at the ends, loosely attached to filamentous trichomes of the veg etative terminals & often protected by bud scales. Eggs are slightly smaller & milky white rather than pale yellow , hatch in 4-5 days.
NYMPHS	I- stage- not determined , II stage ,48-hrs to 5 days.
ADULT	At the end of II nymphal stage mite attaches its caudam to leaf and moults to adult (200- 250µm

	long)in 24 hours. Total life cycle is >2 weeks.
MALE	Smaller than female, deposits stalked spermato phores firmly attached to leaf with an expanded base.
FEMALE	Parellel ribbed flap covering the genitalia. Lays 1-3 eggs daily.

Screening techniques available pigeonpea germplasm lines for sterility mosaic disease(SMD)

- Twig tying technique
- Leaf stapling technique
- Infector hedge technique

Spreader row technique

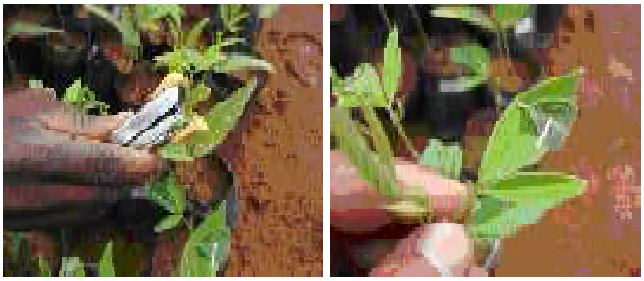

Plate 2. Leaf stapling technique

Effective method of managing virus diseases of crop plants is by using resistant varieties which is most economical, inexpensive and eco-friendly for resource poor farmers in comparison to chemicals. The cost of cultivation with disease/ pest resistant varieties was found to be less in comparison to other methods. Technologies are already available for precise screening for virus resistance for developing broad based durable SMD resistance pigeonpea genotypes

existing genomics resources (BACs, BES, transcript sequences, high density molecular maps) together with NGS technology could allow the assembly of a significant fraction of the low copy genomic portions of the genome (euchromatin) in the near term, which in itself should revolutionize molecular breeding in pigeonpea. Ongoing rapid advances in sequencing technologies are likely to make complete genome sequencing in pigeonpea achievable in the not too distant future.

Conclusion: In many crop species, genomic tools and approaches have enhanced the precision and efficiency of prediction of phenotype from genotype (Varshney et al. 2005a) and have been instrumental in developing superior genotypes and varieties. However, until recently appropriate genomic tools were not available in pigeonpea. The PGI consortium, during the last 3 years, has been very successful in developing a significant amount of genetic and genomic resources in pigeonpea, with the majority of the data already in the public domain, or nearly so. Generation of a variety of genetic and genomic tools such as mapping populations, mutant population, different kinds of molecular markers. Molecular markers identified from these approaches that are associated with traits of importance to breeders should accelerate pigeonpea improvement via marker assisted selection (MAS) or transgenic approaches. Largely through the efforts of the PGI, In summary, modern molecular breeding methods together with the power of genomics and genetic resources developed through the PGI should revolutionize pigeonpea crop improvement, and consequently benefit farmers and consumers of this important pulse crop of India and the semi-arid regions of the world.

Table 1. Resistant and susceptible reaction of F1 hybrids to SMD indicating recessive nature of genes governing resistance in FI hybrids.

F1 hybrids	Total plants	R	S	Diseased incidence	Disease reaction
ICP 8863x ICP 7035	15	-	15	100	S
TTB 7 XBRG 3	16	-	16	100	S
BRG 3X ICP 7035	14	14	-	0	R
TTB 7 X ICP 8863	16	-	16	100	S

R= Number of resistant plants; S= Number of susceptible plants, '-'Indicates no plants The F1 hybrids of the susceptible × resistant cross combinations (TTB 7 × BRG 3 and ICP 8863 × ICP 7035) were susceptible indicating susceptibility to be dominant over resistance. Similar studies showing susceptibility controlled by dominant genes have been reported. (Singh et al., 1983; Ganapathy et al., 2009; Gnanesh et al., 2010).

Towards genome sequencing of pigeonpea

At the inception of the PGI, a clone-by-clone approach was proposed to sequence the pigeonpea genome in Phase 3. However, recent developments in sequencing technologies. suggest possible revisions to this approach. NGS technologies can "democratize"genome sequencing for crops with little political and/or research support (Varshney *et al.,* 2010) such as pigeonpea. Although complete genome sequence would require more extensive resources, we anticipate that

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MUSCULOSKELETAL STUDYOF WOMEN INVOLVED IN PADDY CULTIVATION

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ABSTRACT : Women are an indispensable constituent of any economy. Throughout the world, rural women historically have played, and continue to play an important role in farming system. Overall, women's involvement in farming varies from region to region, and even within regions, visible variation can be seen. Likewise their involvement in irrigation ecosystem varies from that of dry land ecosystem. But irrespective of dryland or irrigation ecosystem she is involved in various drudgery prone activities. An attempt was made to assess physiological stress exerted by farm women in farm and non farm activities in Raichurtaluka. Personal profile of women farmers was collected through interview schedule, performance of women in paddy cultivation irrespective of dry direct sown or transplanting method and the physiological stress exerted by women in non farm activities was assessed through Rapid Entire body Assessment Scale (REBA) . By simple random sampling, 30 women were selected in Raichurtaluka. Seventy percent were 40 years of age and educated up to5th standard. About95 percent were dependent on paddy cultivation for livelihood. Sixty three percent women had income in the range of Rs 5,000 to 10,000/-. Uprooting of seedlings, tying into bundles, loading to tractor, unloading, distributing to other coworkers from a centralized place, and transplanting, weeding were the major activities performed by women in transplanted paddy, while weeding was the major activity performed in dry Direct sown paddy. Among domestic activities cooking, collecting water, fuel,collecting fodder, grazing watering the animals were the major activities involving more physical strain. Weeding activity was done by 93.33 percent respondents. REBA results showed that 40 percent of the activities performed both in farm and in home were in a score range of 10-14 which means that they were in high risklevel.

Introduction : The women is the backbone of the agricultural workforce, but worldwide her hard work has mostly been unpaid. She does the most tedious and back-breaking tasks in agriculture, animal husbandry and homes. The research efforts at the ICAR institutes have been tried to relieve her of the drudgery by providing time and laboursaving tools Vocational trainings are also being conducted to impart skills to undertake different vocational skills. In extension activities the women is now centre point and activities are being planned keeping her in view. Her enlightenment will change the face of the rural India. Women are involved in various activities related to agricultural and allied enterprises and some of these activities have found to have profound health risks on women. Many of the important activities in animal

husbandry were also performed by women besides fulfilling their responsibilities as home makers (Randhawa and Chandra 1993). Several researchers have studied and confirmed. that women work for 14-18 hours daily (Ancheta 1982;Kaur and Punia 1986) on livestock raising, fetching fodder, farming operations, collecting fuel and water from far off places and expend more total energy a day as compared to men. Paddy cultivation work puts more stress on the musculoskeletal system. Especially the transplanting activity is a tedious operation which is normally performed by women power in upright bending posture. A woman has to dip her hand 6000-7000 times for transplanting of paddy seedlings in standing water. This posture when continued for years together results in low back pain (LBP) and spinal disorders. Work related musculoskeletal disorders are caused due to frequent bending, pulling or pushing of muscle, overexertion, adoption of awkward postures used for task completion. Therefore, this study was an attempt to provide an objective measure of the postural discomfort of women workers with the application of REBA (Rapid Entire Body Assessment).

Material and methods : Because Raichur district is known for paddy cultivation, the women involved in different activities were selected purposively. Non-probability sampling method was used to draw the sample, a sample of thirty women farmers under the On Farm Testing was recruited for the study from Kasabe camp. These women farmers belonged to the age group of 20 -48 years. All these respondents did not have any complaints of illness during the study period.The general profile of the women was elicited using the schedule developed for the purpose. Rapid Entire Body Analysis (REBA) tool developed by Hignett and McAtamney (2000) to assess the Musculoskeletal disorders was used.

Results and Discussion : It is obvious from the Table 1 that majority of the women respondents (70 %) were in the age group of 30 years and above. It means only adult members of the family were doing the farm and non-farm activities. More than half of the respondents (53.33%) were educated up to high school level, which showed a good sign of educational status of the village. Majority of the respondents (90 %) belonged to nuclear families. Seventy percent were 40 years of age and educated up to 5th standard. About 95 percent were dependent on paddy cultivation for livelihood. Sixty three percent women had income in the range of Rs 5,000 to 10,000/-.

Table.1.Background Information of the Women Respondents

Sl. No.	Parameters	Category	Percentage
1	Age	Middle age (30 years and above)	21 (70)
		Young (25-30)	9 (30)
2	Education	Primary	5 (53.33)
		Middle	9 (30)
		Highschool	16 (53.33)
3	Occupation	Agriculture	20 (66.67)
		Agriculture and livestock	10 (33.33)
4	Income	Low (<5000)	13(36.67)
		Medium (5000-10,000)	19 (63.33)

Two-thirds of the women respondents (66.67%)were dependent on agriculture particularly working in paddy fields as a source of livelihood.

Table 2. REBA scores for farm and non-farm activities performed by women

Sl. No.	Activity	REBA Score	Risk level
1	Sowing	11	Very High
2	Weeding	14	Very High
3	Uprooting the seedlings	10	High
4	Bundling	6	Medium
5	Loading	10	Very High
6	Unloading	10	Very High
7	Transplanting	14	Very High
8	Cooking	9	High
9	Collecting water	12	Very High
10	Collecting fuel	12	Very High
11	Collecting fodder	12	Very High
12	Grazing the animals	7	Medium
13	Cleaning vessels	6	Medium

The findings related with assessment of postural discomfort are given in Table 2. Various postures of neck, trunk and leg in group A (plus load/force), upper arms, lower arms and wrists in group B (plus coupling) along with activity score were observed and analyzed. The risk levels according to REBA Scores are 1-Negligible, 2-3 Low, 4-7 medium, 8-10 High and 11-15 very high.It was found that, out of 13 listed activities eight activities were in very high risk level indicating the women who are involved in these activities are more prone for musculoskeletal disorders. Of these activities manual transplanting, manual uprooting and weeding were further assessed for their discomfort level as perceived by women (table 3). It was revealed by the results that, all the respondents reported that they experience pain or discomfort in neck, elbow, wrist, lower back, upper back, hips/thighs, knees and feet as it required constant bending for eight hours in water while transplanting paddy. Similarly for uprooting and weeding activity all the respondents complained neck pain, pain in right shoulders, right elbow, and right wrist. All the respondents in manual weeding complained knees and anklet pain.

Table 3. Prevalence of musculoskeletal pain/discomfort in performing farm activities

Body parts	Manual transplanting	Manual uprooting	Manual weeding
Neck	30(100)	30 (100)	30(100)
Shoulder			
Right		30(100)	30(100)
Left		18(60)	18(60)
Both	30(100)	12(40)	12(40)
Elbow			
Right		30(100)	30(100)
Left		18(60)	18(60)
Both	30(100)	12(40)	12(40)
Wrist			
Right		30(100)	30(100)
Left		18(60)	18(60)
Both	30(100)	12(40)	12(40)
Lower back	30(100)	12(40)	12(40)
Upper back	30(100)	12(40)	24(80)
Hips/thighs	30(100)	8(24)	24(80)
Knees	30(100)	24(80)	30(100)
Ankles/feet	30(100)	8(24)	30(100)

The results are in line with the studies conducted by Gangopadhyay et al. (2005) where in they assessed the postural discomfort level of agriculture farmers, In that study fifty male and fifty female preadolescent agricultural workers were randomly selected and a detailed postureanalysis was performed with the Ovako Working Posture Analysis System (OWAS) 2003. He observed that agriculture workers worked continuously in awkward postures during certain agricultural activities. Consequently they suffered from discomfort in different parts of their body.Rapid Entire Body Assessment score as an indicator of drudgery in weeding, revealed that, the manual weeding was the highest REBA score (14) as compared with other methods of weeding, which adds to the aggravation of Work Related Musculoskeletal disorders(Kammar and Katti, 2013).Pragya and Seema (2012), found that the pain and discomfort with the locomotive organs persisted in manual uprooting and transplanting activities.

This study has highlighted the potential association between postural discomforts and rice transplanting activity. Thus, it can be concluded that manual uprooting and transplanting is more physically demanding activity as compared to mechanical uprooting and transplanting activity. Most of the times workers adopted standing, bending and sitting posture for performing manual and mechanical rice transplanting. They were not taking proper rests in between and during the activities. Respondents involved in manual method were suffering from high level of MSDs in back, neck, shoulders, legs and thighs whereas very low level of MSDs was found in farm workers performing the activity using mechanical uprooting and transplanting. Thus it can be concluded that through mechanization,the level of MSDs can be reduced or minimized. In another study by Karki et al (2012) women were found to be significantly working in farm and non farm activities and due to overexertion of work schedule, they were developing biomechanical stress and health hazards.

The study implies the need to emphasize on farm mechanization for transplanting. The machines so developed need to be assessed for their ergonomic suitability for both the gender. The women need to be trained on the safety measures to be adopted in case of occupational health hazards The medical insurance for women working in paddy fields may be introduced to facilitate good health of farm women. Wherever possible, the judicious use of herbicides may help preventing MSDs among women.

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ENTOMOPATHOGENIC NEMATODES IN BIOLOGICAL CONTROL OF INSECT PESTS

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Abstract: Entomopathogenic nematodes (EPNs) are emerging as promising alternative in insect pest management. These are highly insect pathogenic known to parasitize, cause disease and kill the insects . These are soft bodied, non-segmented roundworms that are obligate or sometimes facultative parasites of insects. Entomopathogenic nematodes occur naturally in soil environments and locate their host in response to carbon dioxide, vibration and other chemical cues. Species in two families (Heterorhabditidae and Steinernematidae) have been effectively used as biological insecticides in pest management programs having host range of over 200 species of insects including many of the major pests.Entomopathogenic nematodes fit well into integrated pest management or IPM programs because they are considered non-toxic to humans, relatively specific

Introduction : Pests and diseases have become an integral part of constraints in agricultural production. Among pests, the losses caused by insects, which constitute the largest group of metazoans, are significantly higher than others. For the successful cultivation of crops and to get maximum output each of these pests are to be taken care off. Use of insecticides gained popularity among growers in view of the quick action. However, due to the increasing awareness about the persistent residual problems, contamination of food, water sources, and high cost involved etc. Sole reliance on pesticides is not sustainable because of the associated problems of environmental degradation and secondary outbreak due to elimination of natural enemies. Other effective and environment friendly methods have to be adopted and this trend has gained momentum in recent years.

The growing concern about the ill effect of these chemicals has created a need to develop suitable non-toxic and ecofriendly strategies involving bio-pesticides as alternatives to such hazardous chemicals. Biological control offers a tremendous opportunity to supply agriculture with effective tools for the development of production techniques, which minimize impacts on human health, livestock and the environment. The field of agricultural pest control is undergoing a quiet revolution at ground level and entomogenous nematodes are at the root of the uprising representing an important part of the spectrum of biocontrol agents.Nematodes associated with insects, referred to as entomophilic, entomogenous or entomopathogenic are known to parasitize, cause disease and kill the insects.

EPN types and mode of action: Although nematode families have been found associated with insects, only two families, Heterorhabditidae and Steinernematidae have widely been used as biological control agents. Nematodes in genera Steinernema and Heterorhabditis are unique among insect parasitic nematodes due to several reasons. They are widely distributed infecting more than 250 different species of insects belonging to 10 orders (Poinar, 1979). Heterorhabditids and Steinernematids have mutualistic association with the bacteria of the genera Photorhabdus and Xenorhabdus, respectively (Glazer, 1992). The third stage infective juvenile is a free-living, non-feeding active stage, which is capable of withstanding adverse climatic conditions and non -availability of the host for a long period. Other advantages include a durable infective stage capable of long term storage, wide distribution and persistence with no evidence of insect immunity, safety to plants and vertebrates, ease of mass production and field application with existing spray application techniques (Glazer and Golberg, 1993).After invading the host body, nematode releases bacteria from its lumen, which multiply rapidly in the host haemolymph causing septicemia resulting in the death of the host within 24-72 h. Later, nematode feeds on the host tissues along with the bacteria multiply and emerge as infective juveniles (IJs) in search of new host, as the host tissues deplete. Since the bacteria kill the host very quickly, these nematodes have no need to adapt to a specific host life cycle and therefore, have a wide host range. Because of these qualities, nematodes have generated interest in their use as biocontrol agents in integrated pest management.

Searching Behaviour : An understanding of host finding strategies will help us properly match EPN species to insect pests to ensure infection and control.Infective juveniles of EPNs locate their hosts in soil by means of two strategies ambushing and cruising (Gaugler *et al*.,1989).

Ambushing: Entomopathogenic nematodes that use the ambushing strategy tend to remain stationary at or near the soil surface and locate host insects by direct contact (Campbell *et al.,* 1996). An ambusher searches by standing on its tail so that most of its body is in the air, referred to as "nictation." The nictating nematode attaches to and attacks passing insect hosts. Ambusher entomopathogenic nematodes most effectively control insect pests that are highly mobile at the

soil surface, such as cutworms, armyworms, and mole crickets.

Cruising: Entomopathogenic nematodes that use the cruising strategy are highly mobile and able to move throughout the soil profile. Cruisers locate their host by sensing carbon dioxide or other volatiles released by the host. Cruiser entomopathogenic nematodes are most effective against sedentary and slow-moving insect pests at various soil depths, such as white grubs and root weevils.

Entomopathogenic Nematodes Usage : Worlwide over 80 species of EPNs have been identified and 11 commercialized (kaya and Koppenhofer,1999).The different species of EPNs vary in the range of insects they attack,environmental needs and stability in commercial products.A given species of EPN may also control a particular pest more effectively than another species.Therefore, the insect pest must be identified before choosing the EPN species most appropriate for biological control. Table 1 is a general guide of available EPNs and the pests and the pests they have been shown to control.

Table1:Commercial use of entomopathogenic nematode (EPN) Steinernema andHeterorhabditis as bioinsecticides

EPN species	**Major pest(s) targeted- as recom mended by various commercial companies**
S. glaseri	White grubs (scarabs, especially Japanese beetle, *Popillia* sp.)
S. kraussei	Black vine weevil, *Otiorhynchus sulcatus*
S. carpocapsae	Turfgrass pests- billbugs, cutworms, armyworms, sod webworms, chinch bugs. Orchard, ornamental and vegetable pests- codling moth, cranberry girdler, dogwood borer and other clearwing borer species, black vine weevil, peachtree borer, shore flies (*Scatella* spp.)
S. feltiae	Fungus gnats (*Bradysia* spp.), shore flies, western flower thrips
S. scapterisci	Mole crickets (*Scapteriscus* spp.)
S. riobrave	Citrus root weevils (*Diaprepes* spp.)
H. bacteriophora	White grubs (scarabs), cutworms, black vine weevil, flea beetles, corn root worm
H. megidis	Weevils
H. indica	Fungus gnats, root mealybug, grubs
H. marelatus	White grubs (scarabs), cutworms, black vine weevil

EPN Formulations : EPN are available in different formulations (Grewal, 2002). While formulating nematodes, two things are deemed necessary, a long shelf-life of nematodes and their ease in application. The simplest method is impregnating a moist substrate (such as sponge, peat, vermiculite, etc.) with nematodes. The sponge needs to be squeezed in water before application, to release the nematodes, whereas nematodes from other carriers could be applied directly to the soil as a mulch. However, these formulations are labour-intensive, require continuous refrigeration and lack economy of scale and therefore can be used on small scale only. Some of the better formulations developed include activated charcoal , calcium alginate (Navon *et al.*, 2002), flow able gels (Georgis and Dunlop, 1994), wheat flour and attapalgite clay chips . The calcium alginate formulation increases the shelf-life of *S. carpocapsae* up to 3-4 months. However, the disposal of thin sheets of plastics and time-consuming extraction steps were some of the problems which rendered this formulation unsuitable for commercial application. One of the better formulations is Water Dispersible Granules (WDG) which gives a maximum shelf-life of up to 6 months for the comparatively storage-stable nematode, *S. carpocapsae* (Silver *et al.*, 1995). The improvement in shelf-life was attributed to the induction of partial anhydrobiosis by a mixture of ingredients in the formulation such as silica, clays, cellulose, lignin, and starches (Grewal, 2000). Nematode-infected cadavers have also been used,but these formulations lack economy of scale since they involve *in vivo* production and there are difficulties in dose determination, storage and application (Shapiro-Ilan *et al.*, 2001).

In India the latest formulation developed by Multiplex Biotech Pvt.Ltd., is comprised hydro gel based semi solid cream with IJs suspension containing 1 million nematodes in a polythene pouch that can be readily mixed in a water spray tank without blocking the nozzles. The nematode shelf life of 2-3 months was achieved at room temperature (27-28 0 C) with maximum of 80% survival by increasing the nematodes metabolic rate mixing silica powder (0.1%). Presently the company is marketing the products of EPN in the name of "Soldier" recommended as soil application for soil dwelling insect pests and "Bouncer" as foliar application for leaf , fruit,pods stem and borer insect pests against agriculture, horticulture and forest insect pests (Divya and Sankar,2009)

Application Methods : Production and application technology is critical for the success of EPNs in biological control.Infective juveniles of EPNs are usually applied using various spray equipment and standard irrigation systems.Nematode require a film of water around soil particles to move through the soil profile in search of a host.Therefore, it is important to ensure adequate agitation during application.Enhanced efficacy in EPN applications can be facilitated through improved delivery mechanisms (e.g.,cadaver application) or optimization of spray equipment.Substantial progress has been made in recent years in developing EPN formulations,particularly for above ground applications. E.g., water dispersible granules,nematodes on gel,micronized vermiculite and an aqueous suspension of nematodes.Bait formulations and insect host cadavers can

enhance EPN persistence and reduce the quantity of nematodes required per unit area.Finally, superior biocontrol applications with EPNs can also be achieved through strain improvement.Improved strains may possess enhanced levels of various beneficial traits such as environmental tolerance,virulence,reproductive capacity etc.Methods to imrove EPNs include strain or species discovery or genetic enhancement via selection,hybridization or molecular manipulation (Grewal *et al*.,2005).

Table : 2 Commercially available EPN based formulations

Formulation	Nema spp	Product
Aliginate gel	*S.carpocapsae*	Biosafe
		Mioplant
Flowable gel	*S.feltiae*	Exhibit
		Stealth
Clay	*H.megidis*	Nemasys-H
		Larvanem
Water–dispersible granules	*S.carpocapsae*	Helix
	S.feltiae	Magnet
	S.riobrave	Biovector

Future Directions: One of the important criteria for a successful biocontrol agent is formulation of nematodes into a stable product, which has played a significant role in commercialization of these biological control agents. The first attempt of formulating entomopathogenic nematode (EPN) was initiated in 1979, but its best shelf life was about one month. The successful market introduction of an EPN based product requires reliable and stable formulations. This has been a difficult task, because larger markets are demanding a product with a maximum shelf life that has certain temperature, oxygen and moisture requirements necessary for their survival and effectiveness as control agents.

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SUCKING PEST SCENARIO IN MULBERRY AND THEIR MANAGEMENT

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Abstract: Several pests have been reported on mulberry over the years and of late Papaya mealy bug and Spiralling white fly are becoming serious pests on mulberry. Seasonal incidence of thrips, *P. mori,* mites, *Polyphagotarsonemus latus* and white fly revealed that the highest mean population of these pests was observed during summer months. The population of thrips showed significant positive correlation with maximum temperature and significant negative correlation with relative humidity. Studies on the efficacy of insecticides and a botanical against mulberry thrips revealed fipronil, flupyradifurone, imidacloprid, thiamethoxam and acetamiprid were found to be most effective and were on par with each other in reducing the thrips population up to five days after spray.

Key words: Sucking pest, Mulberry and Insecticide

Introduction: The sericulture industry has a history of over 4000 years in Asia and is an important part contributing to our National economy. Mulberry (*Morus* spp.) a sole food plant of mulberry silkworms, *Bombyx mori* L. and is cultivated in about 1, 70,314 ha in India with the raw silk production of 16,360 MT in 2010-2011. In recent years many pests and dis-

eases have been reported to be the major limiting factors affecting production and productivity of mulberry. There is change in the insect pest scenario in mulberry due to changes in climate and agro ecosystem. The mulberry is infested by several pests viz., Leaf roller with (31.18% incidence), Bihar hairy caterpillar (21.72%), Mealy bug (19.21%), Thrips (17.18%), Cutworm (15.09%) and Spiralling whitefly (12.62%) as reported by Rajdurai, (2005). Feeding silkworms with such mulberry leaves resulted in poor development and increased larval mortality. Consequently, there is a drop in the production of silkworm cocoons and reduction in profit.

DIVERSITY OF INSECTS IN THE MULBERRY ECOSYSTEM

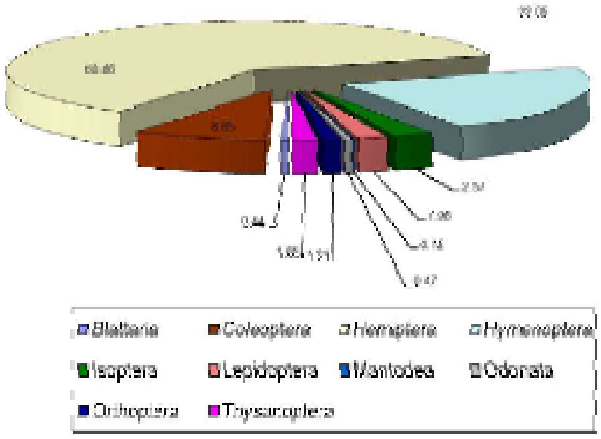

Figure1. DIVERSITY OF INSECTS IN THE MULBERRY ECOSYSTEM

The insects collected were identified and grouped in different orders of inseta. An average of 3388 insects was recorded per ample. Insects belonging to ten orders were recorded. The order Hemiptera recorded 60.86 per cent of total insects and order Hymenoptera recorded 22.05 per cent of insects. The order Coleoptera recorded 8.65 per cent. Other orders such as Isoptera, Lepidoptera, Dictyoptera, Odonota, and Thysanoptera accounted the rest.

Mahima Santhi and Prasanna Kumar (2010)

Classification of pests:

Major sap feeders: Mealy bug, *Maconellicoccus hirsutus,* Thrips, *Pseudodendrothrips mori Nawa.*

Minor sap feeders: Jassid/leaf hopper, *Empoasca flavescens*,Spiralling white fly, *Aleurodicus dispersus and* Scale insect *Saissetia nigra.*

Major defoliators: Leaf roller, *Diaphania pulverulentalis* Bihar hairy caterpillar, *Spilosoma oblique.*

Minor defoliators: Cut worm, *Spodoptera litura,* and Wingless grasshopper, *Neorthacris acuticeps nilgirensis.*

STATUS OF MULBERRY PESTS: About 50 pests are known to cause economic injury to the mulberry crop. Based on the seasonal occurrence, intensity of attack, types of injury inflicted to the mulberry crop, the pests have been grouped under root feeders, stem borers, foliage feeders etc.

In any crop ecosystem, if a pest can be controlled at a low cost resulting in a potential increase in yield, then that pest in an economic pest or controlled pest. This is referred to as the 'economic threshold'. If a pest causes a loss of less than 5 per cent of the yield, infestation is negligible. The pest which normally cause a loss from 5 – 10 per cent are minor pests and those which cause a loss of 10 per cent on more of yield are called major pests.

USE OF INSECTICIDES: Usage of insecticides (pesticides) should be minimized on if possible avoided as silkworms are sensitive and hence cause mortality or death. However under invariable conditions they can be used provided a safety period or waiting period is practiced before mulberry leaf harvest meant for silkworm rearing. Selected insecticides that may be used following safe period are, Nuvan (Dchlorvas) at 0.05 % with safe period (SP) of 13 days or 0.01 % - safe period – 7 days.

Demecron (Phosphomidon) at 0.01 % - safe period 11 days, 0.05 % with SP 13 days. Sevin (Carbaryl) at 0.05 % with SP 11 days or 0.01 % with SP of 9 days. Malathion (Cythion) at 0.05 % - with safe period 13 days or 1.0 % with safe period of 17 days.

The results revealed that waiting periods were different for different insecticides *viz.,* nimbicidine (seven days), dichlorvos (nine days), fipronil(11 days), flupyradifurone and imidacloprid (15 days each), acetamiprid and thiamethoxam (21 days each), and spinosad (35 days). The residual toxicity of insecticides and a botanical on economic parameters of mulberry silkworm indicated that there was no deleterious effects of toxicants on silkworm growth and development as evidenced through non-significant differences in economic and survival parameters of mulberry dilkworm.

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Incidence of different mulberry pests:

Table1: Incidence of important mulberry pests

Sap feeders	incidence
Thrips	42.55
Mealy bug	20.80
Leaf hoper	20.80
Scale insects	1.65

Among the sap feeders thrips incidence was highest followed by mealy bug, Leaf hopper and scale insects.

Sathyaprasad and Manjunath (1993)

In Karnataka, crop loss inflicted by mulberry leaf roller, mealy bug (tukra) and Bihar hairy caterpillar is recorded to 12-15 per cent, 10-15 per cent and 30 per cent respectively.

Manjunath *et al*., 2000

Sap feeders:

1. Thrips *Pseudodendrothrips mori* (Thysanoptera: Thripidae):

Biology: *Pseudodendrothrips mori* (Niwa) eggs were in-

serted in the leaf tissue near the midrib and side veins. The incubation period was 6.17 ± 0.24 days. It has two nymphal instars, pre- pupa and pupa with duration of 2.70 ± 0.32, 3.53 ± 0.40, 1.10 ± 0.21 and 2.30 ± 0.25 days, respectively. The longevity of male and female was 4.57 ± 0.42 days and 6.70 ± 0.37 days, respectively. Pre-oviposition, oviposition and post oviposition periods were averaged to 2.17 ± 0.24, 2.23 ± 0.26 and 1.87 ± 0.35 days, respectively and the average fecundity was 15.30 ± 1.71eggs. The total life cycle was averaged to 20.94 ± 1.17 days.

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Nature of damage: In early stage of infestation white streaks are observed on leaves. In advanced stages, the leaves become yellowish brown on maturity. Nymphs and adults of thrips lacerate the epidermal leaf tissues and suck the oozing cell sap leading to damage of guard cells and finally drying of the leaves. Affected leaves show streaks in the early stages and blotches in the advanced stage of the attack.

Seasonal incidence of thrips, *P. mori* revealed that the highest mean population of thrips was observed during last week of January (55.94) followed by first week of February (29.80). The thrips population was lower during second week of October and first week of January which ranged from 3.13 – 8.18 thrips per three leaves. The thrips population increased from January and March which ranged from 8.77 to 55.94 thrips per three leaves (Table 2). The population of thrips showed significant positive correlation with maximum temperature and non significant negative correlation with rainfall, rainy days and had significant negative correlation with relative humidity (Table 3). It was interesting to note that the thrips population was higher in the drier months and rainfall, rainy days and relative humidity had negative effect on the population. Similarly, in mites and whitefly, the maximum mite population was recorded during first (5.17 per sq.cm) and second (5.90 per sq.cm) week of February and also in first (4.56 per sq.cm) and second (5.46 per sq.cm) week of September. The mite population was lower from third week of September (1.29 per sq.cm) up to first week of January (2.91 per sq.cm) (Table 2) and the population of mites showed non-significant positive correlation with maximum temperature and rainfall whereas, non-significant negative correlation with minimum temperature, rainy days and relative humidity (Table 3). It was evident from the study that increased temperature has direct influence on increased mite population. The white fly incidence was noticed from January to April and was very less. The highest population of white fly was recorded in the month of April (3.93 per three leaves). During the study period, natural enemies' *viz.,* coccinellids, spiders, predatory mites and predatory thrips were recorded

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Table 2. Seasonal incidence of different pests and natural enemies in mulberry ecosystem

Date wise	ISW	*Thrips/ top three leaves	*Mites/ cm^2	*White fly three leaves	*Predators Coccinellids /Plant	Spider/ Plant	Predatory mites/cm^2
25-07-2011	30	12.10	0.00	0.00	0.25	0.30	0.00
01-08-2011	31	15.80	0.00	0.00	0.20	0.30	0.00
08-08-2011	32	12.01	0.00	0.00	0.40	0.30	0.00
17-08-2011	33	11.61	0.00	0.00	0.35	0.45	0.00
22-08-2011	34	10.25	0.00	0.00	0.40	0.35	0.00
25-08-2011	34	17.70	0.00	0.00	0.30	0.35	0.00
29-08-2011	35	18.10	3.81	0.00	0.35	0.40	2.09
05-09-2011	36	15.70	4.56	0.00	0.30	0.30	1.99
12-09-2011	37	12.76	5.46	0.00	0.65	0.35	2.08
19-09-2011	38	13.29	1.71	0.00	0.50	0.35	2.13
26-09-2011	39	6.90	2.36	0.00	0.55	0.45	1.29
10-03-2011	40	10.50	2.45	0.00	0.65	0.35	1.88
10-10-2011	41	14.38	2.91	0.00	0.65	0.40	2.05
17-10-2011	42	04.21	2.19	0.00	0.75	0.50	1.32
24-10-2011	43	03.68	1.68	0.00	0.70	0.55	1.60
31-10-2011	44	03.13	1.91	0.00	0.60	0.55	1.30
08-11-2011	45	08.18	1.92	0.00	0.90	0.35	1.50
15-11-2011	46	03.81	1.29	0.00	1.00	0.40	1.29
21-11-2011	47	03.50	1.56	0.00	1.05	0.45	1.35
28-11-2011	48	04.65	1.54	0.00	0.95	0.30	1.27
05-12-2011	49	04.60	1.67	0.00	0.95	0.35	1.39
12-12-2011	50	04.25	1.93	0.00	1.10	0.40	1.80
19-12-2011	51	06.51	1.95	0.00	1.00	0.40	1.36

26-12-2011	52	06.44	2.32	0.00	0.85	0.45	2.24
02-01-2012	1	06.22	2.13	0.47	1.00	0.55	2.30
09-01-2012	2	08.77	1.82	0.35	0.65	0.40	2.24
16-01-2012	3	13.99	1.97	0.35	0.55	0.45	2.00
23-01-2012	4	28.23	2.69	0.45	0.75	0.60	1.90
30-01-2012	5	55.94	4.13	0.38	0.6	0.45	2.30
06-02-2012	6	29.8	5.17	1.06	0.7	0.50	2.50
13-02-2012	7	27.69	5.90	0.68	0.6	0.50	2.10
20-02-2012	8	24.34	3.95	0.62	0.6	0.55	2.50
27-02-2012	9	25.30	4.63	1.18	0.65	0.40	2.63
05-03-2012	10	23.40	4.83	1.30	0.55	0.50	2.40
12-03-2012	11	22.20	2.69	1.22	0.45	0.40	1.95
19-03-2012	12	22.30	3.55	1.87	0.55	0.35	2.30
26-03-2012	13	21.50	3.41	2.31	0.40	0.45	1.86
02-04-2012	14	18.33	2.14	2.57	0.50	0.40	1.98
09-04-2012	15	19.17	2.05	3.36	0.50	0.25	1.80
16-04-2012	16	16.08	2.00	3.33	0.60	0.45	1.90
23-04-2012	17	14.92	1.80	3.93	0.70	0.40	1.10
30-04-2012	18	13.28	1.65	3.19	0.50	0.35	1.90

*Mean of 20 plants

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Table 3. Correlation between weather parameters as well as thrips and mites on mulberry

Pest	Temperature (° C)		Rainfall (mm)	Rainy days	RH-I	RH-II
	Maximum	Minimum				
Thrips	0.277*	0.102	-0.06	-0.069	-0.377*	-0.306*
Mites	0.1327	-0.0209	0.0018	-0.0694	-0.2583	-0.0895

** - Correlation is significant at the 0.01 level (2- tailed) * - Correlation is significant at the 0.05 level (2- tailed)

The studies on the efficacy of insecticides and botanical against mulberry thrips revealed that, fipronil, flupyradifurone, imidacloprid, thiamethoxam and acetamiprid were found to be most effective and were on par with each other in reducing the thrips population up to five days after spray. Spinosad was next best insecticide followed by dichlorvos and nimbicidine. The dichlorvos and nimbicidine were least effective but superior compared to untreated control (Table 4).

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Table 4. Management of thrips using insecticides and botanical on mulberry

Treatments	Dosage/l	No of thrips/ three leaves					
		1 DBS	1 DAS	3 DAS	5 DAS	7 DAS	10 DAS
Spinosad 45% SC	0.1 ml	14.18	2.80(1.82)*[b]	2.70(1.79)[b]	1.98(1.57)[b]	2.24(1.66)[c]	5.87(2.52)[b]
Fipronil 5% SC	*1 ml*	*14.99*	*1.13(1.28)[a]*	*1.65(1.47)[a]*	*0.97(1.21)[a]*	*1.67(1.47)[a]*	*3.58(2.02)[a]*
Imidacloprid 17.8% SL	*0.3 ml*	*13.98*	*1.51(1.45)[a]*	*1.85(1.53)[a]*	*1.05(1.24)[a]*	*1.92(1.56)[b]*	*4.80(2.30)[ab]*
Acetamiprid 20% SP	*0.2 g*	*13.95*	*1.61(1.45)[a]*	*1.86(1.54)[a]*	*1.03(1.24)[a]*	*1.98(1.57)[b]*	*4.10(2.14)[a]*
Thiamethoxam 25% WG	*0.2 g*	*14.69*	*1.48(1.41)[a]*	*2.77(1.81)[b]*	*1.08(1.26)[a]*	*2.08(1.61)[bc]*	*4.54(2.25)[a]*
Flupyradifuron 20% SL	0.1 ml	14.44	1.38(1.37)[a]	1.82(1.52)[a]	0.99(1.22)[a]	2.0(1.58)[b]	3.93(2.10)
Dichlorvos 76% EC	*0.5 ml*	*13.97*	*3.50(2.00)[c]*	*4.12(2.15)[c]*	*4.83(2.31)[c]*	*5.14(2.37)[d]*	*8.09(2.93)[c]*
Nimbicidine 0.03% EC	*5 ml*	*14.70*	*5.05(2.36)[d]*	*5.41(2.43)[d]*	*5.66(2.48)[d]*	*6.74(2.69)[e]*	*9.14(3.10)[c]*
Control	-	15.19	15.39(3.99)[e]	14.57(3.88)[e]	15.31(3.98)[e]	14.47(3.87)[f]	15.04(3.94)[d]
CV (%)		**15.89**	**10.23**	**11.54**	**9.87**	**10.71**	**10.89**
S.Em±		**0.42**	**0.05**	**0.08**	**0.03**	**0.02**	**0.12**
CD (5%)		**NS**	**0.17**	**0.25**	**0.11**	**0.07**	**0.35**

DBS - Day before spray DAS - Day after spray

*Figures in the parentheses are vx+0.5 transformed value

Means followed by same letter (s) in a column are not significantly different by DMRT (P=0.05)

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OUT BREAK OF A NEW INVASIVE PEST, PAPAYA MEALYBUG *Paracoccus marginatus* IN SOUTH INDIA:

The papaya mealy bug, *Paracoccus marginatus* (Hemiptera: Pseudococcidae) is native of Mexico and Central America and it was first noticed in the year 1992 (Williams and Granara de Willink, 1992). During the year 2006, this pest was first reported in Coimbatore area of Tamil Nadu on Papaya. Now it has become a major pest of mulberry spreading fast in sericulture districts of Tamil Nadu causing heavy loss to sericulture industry and has made an entry into bordering districts of Karnataka also, I, e. Chamarajanagar and Mysore. As per a recent survey report, an area of about 2,500 acres of mulberry plantation in three districts of Tamil Nadu is severely infested with this invasive pest. Many mulberry gardens have been dried up due to severe infestation and considerable acreage of mulberry has been uprooted.

Narendra Kumar and Shekhar (2010)

LIFE CYCLE: Each adult female mealybug lays about 400-500 eggs with an incubation period of 3 to 4 days depending up on the prevailing temperature. In females, there are 3 stages (ie., egg, nymph & adult) and in case of males, there are 5 stages of development (ie., egg, nymph, pre-pupa, pupa & adult). The first instar nymphs (crawlers) are very active, very small and occupy tender shoot portion or tender leaves and feed by sucking the sap. Later they settle at one place, and continuously suck the sap. Adult females live for 30 to 60 days whereas males do not feed and live for very short duration.

Narendra Kumar and Shekhar (2010)

HOST RANGE: It has got a wide host range of over 60 species of plants including economically important ones such as Annona squamosa (Custard apple), Carica papaya (Papaya), Psidium guajava (Guava), Hibiscus rosa-sinensis (Shoe flower), Cajanus cajan (red gram), Ipomoea spp. (sweet potato), Manihot esculenta (Tapioca), Gossypium hirsutum (cotton), Jatropha curcus (Jatropha), Vigna ungiculata (Cow pea), Tectona grandis (Teak), Solanum melongena (brinjal), Lycopersicon esculentum (Tomato) and weed plants like Parthenium hysterophorus (parthenium) & Abutilon indicum (country mallow). Annona squamosa, Carica papaya, Manihot esculenta and Melongena (Meyerdirk and Kauffman, 2001). It is infesting many weeds like Parthenium, hedge plants belonging to Euphorbiaceae family. In Tamil Nadu it has even devastated Jatropa plants which were grown for bio diesel purpose.

DAMAGE SYMPTOMS IN MULBERRY: Heavy infestation of the Papaya mealy bug is noticed on the under surface of leaves and usually along the veins and midribs in older leaves and on all areas on the tender leaves. Severely affected older leaves turn yellow and dry up. Tender leaves become crinkled. Terminal shoots become bunched and distorted. Heavy mealy bug populations produce a large volume of honeydew, which facilitate the development of black sooty mould, which covers the infected portion. The mealy bug injects a toxin as it feeds on leaves, which results in chlorosis (yellowing) stunting, deformation, early leaf fall. Development of sooty mould makes the mulberry leaves unfit for silkworm rearing. The Papaya mealy bug infests all parts of the mulberry plant unlike the pink mealy bug, Maconellicoccus hirsutus, which infests only the apical portion.

Narendra Kumar and Shekhar (2010)

Imp package for Papaya mealy bug *P. marginatus*:

- Prune the entire mulberry garden and make in to one batch. (If 2 batches are maintained, the pest will migrate from one garden to adjoining garden. To avoid this prune the entire garden at one time).
- Collect the pruned shoots along with infested portions in polythene bags. Place these cut infested portions on burning fire.
- Immediately after pruning, spray 0.2 % DDVP (25ml in 10 lts water) over the pruned stumps and surrounding soil.
- Burn all dry branches, shoots present in and around mulberry field by taking it out of the plot.
- 2nd spray of 0.1% Roger 10 – 15 days after pruning (30ml in 10lts)
- 3rd spray of 0.2% DDVP 10 days after 2nd spray.
- 5 days after 3rd spray, release predatory lady bird beetles (Cryptolaemus montrouzieri or Scymnus coccivora) @ 250/ 500 beetles for 1 acre.

Biological control:

- Exotic parasitoids such as *Anagyrus loecki* and *Acerophagous papayae* and *Pseudleptomastrix mexicana* (Hymenoptera: Encyrtidae) were released in Sri Lanka in May 2009 and resulted in 95 to 100% control of the papaya mealy bug.
- There is a need to introduce such exotic parasitoids in India

Narendra Kumar and Shekhar (2010)

Spiralling white fly, *Aleurodicus dispersus:* a new major pest of mulberry in south India: In West Bengal, *Dialeuro pora decempuncta* and *Aleuroclava pentatuberc ulata* are major types of white flies which are reported in 1999. The damage caused by the whiteflies, *Dialeuropora decempunc ta, Aleurodicus dispersus* and *Aleuroclava* spp. to mulberry plants is extensive and they cause a huge economic loss in silkworm rearing. The whiteflies are present throughout the year in south India, with high populations in summer (March-June) and low in winter (October-January).

Life Cycle: In the temperature range of 20°C to 39°C development from egg to adult takes 34 to 38 days (eggs 9-11 days, 1st instar (stage) larvae 6-7 days, 2nd instar 4-5 days, 3rd instar 5-7 days and 4th instar larva (pupa) 10-11 days). Under laboratory conditions the adult can live for up to 39 days.

Vijaya Kumari (2011)

Nature of damage: Lower surface of leaves resulting in chlorosis, yellowing, speckling, leaf fall and retards the growth. These whiteflies produce honeydew and this may provide a

substrate for the growth of sooty mould which interferes with photosynthesis. White fly cause direct feeding damage by sucking plant sap, which can cause premature leaf fall. Indirect damage is due to the heavy production of honeydew and white, waxy material produced by the insect. Sooty mould develops on honeydew and decreases photosynthetic activity. Plants are also disfigured and may be unsuitable for feeding the silkworm. In heavy infestations, feeding damage may cause leaf drop or reduced yield in crops.

In the present study it was observed that the intensity of the whiteflies was severe in guava as well as mulberry comparing to the other crops and moderate infestations were observed in the jackfruit and pongamia (Table 5).

Table 5: White fly infestation on different crops:

Sl. no	Name of the crop	No. Of spiral	No. Of eggs/ spiral	1st instar nymphs	2nd instar nymphs	3rd instar nymphs	No. of pupae	No. Of flies	Degree of infestation
1	Mulberry	8.9	58.9	173	168	159	141	35.0	Sever infestation
2	Guava	10.6	64.8	248	190	233	185	41.0	Sever infestation
3	Jack fruit	5.7	50.0	55	59	76	35	20.8	Moderate infestation
4	Pongamia	6.0	52.0	37	34	19	22	19.7	Moderate infestation

Management of spiraling white fly:

- **Mechanical methods:** Collection and Destruction of mulberry leaves containing egg masses, nymphs and adults of spiraling white fly. Regular weed removing to avoid availability of alternate hosts monitoring the pest occurrence on the alternate cultivated crop hosts to prevent attack on mulberry. Fish oil insecticidal soap at 2.5 per cent also deter the adults of the spiraling whitefly
- **Chemical methods:** The pest can be effectively managed by applying triazophos 40EC at 0.06 per cent, dimethoate 30 EC at 0.05 per cent and biomite, and profenofos. Neem oil and cotton seed oil at 0.01 per cent were also found to cause considerable mortality of the different stages of the pest
- **Natural enemies:** Aphelinidae : *Encarsia guadeloupae , Encarsia haitiensis Dozier, Encarsia meritoria*

Coccinellidae: *Anegleis cardoni, Anegleis perrotteti Mulsant, Cryptolaemus montrouzieriiMulsant, Scymnuscoccivora*

Cecidomyiidae - *Triommata coccidivora* Felt

Vijaya Kumari (2011)

Conclusion: Several pests have been reported on mulberry over the years and of late Leaf roller, Papaya mealy bug and Spiralling white fly are becoming serious pests on mulberry. IPM modules/ chemical control measures have been developed for management of different pests with due importance to the safety aspect for silkworms. Hence, the management measures for different pests should be carefully and judiciously used keeping in mind the silkworm's safety. There is ample scope to develop eco-friendly pest management in mulberry.

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EFFECT OF SALT STRESS ON GERMINATION OF FOXTAIL MILLET VAREITIES

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ABSTRACT: Foxtail millet (Navane) is an important minor millet which is neglected and consumption has been reduced. It is nutritious millet. It is tolerant to drought and salt. It is free from major pests and diseases and its cultivable area has been

reduced. Soil salinity is one of the main important constraints for agricultural production, are being spoiled to the greater extent by accumulation of salts in high concentration with irrigation systems for crop production. The physiological toxic effects of salt stress include decreased germination and seedling growth, reduced leaf expansion which causes a reduction in the photosynthetic area and dry matter production. To study the effect of different concentrations of salt stress on germination of foxtail millet a laboratory experiment was conducted at College of Agriculture, Raichur. The experiment included two varieties Srilakshmi and HMT 100 -1 of foxtail millet and ten salt (NaCl) concentrations 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0% and one control (0%). The experiment was replicated twice. 25 seeds were kept in a petridish containing filter paper dipped in different salt concentrations. Germination was observed from the next day onwards. The germinated seeds were counted every two days interval up to 10^{th} day of sowing. At 10^{th} day, shoot length and root length were measured and the germination percentage was worked out. The data was subjected to statistical analysis according to the two factor complete block design. The significant differences were observed for concentration for all the three characters and variety for shoot length and germination percentage and variety and concentration interaction was significant for only germination percentage. Among concentrations, there was no significant difference from control up to 0.4% NaCl salt concentrations, which indicates that foxtail millet crop can performs better up to NaCl salt concentrations of 0.4%. Among the two varieties, variety HMT 100-1 showed better germination percentage as compared to the variety Sri lakshmi.

INTRODUCTION: Foxtail millet (Navane) is an important minor millet belonging to the family poaceae. This is a neglected crop and its consumption has been reduced. It is suited to conditions of low and moderate rainfall area due to early maturity period. It is tolerant to drought and salt. It is free from major pests and diseases and its cultivable area has been reduced. Besides India, it is also grown in China, Russia. Japan, USA and other African and East Asian countries. In India, the cultivation of fox millet is confined to Andhra Pradesh, Karnataka, and Tamil Nadu. The potentiality of foxtail millet is not yet exploited properly in India, The yield levels in China is 11 t /ha, whereas in India it is just ranging between 0.4-0.8t/ha suggesting a greater scope for exploitation of this millet under Indian conditions (Jiayju, 1996). Foxtail millet is nutritious millet

Soil salinity is one of the main important constraints for agricultural production, are being spoiled to the greater extent by accumulation of salts in high concentration with irrigation systems for crop production. Worldwide, approximately 100 millions hectare of arable lands are affected by salinity, which accounts for about 6-7% of total land (Munns and James, 2003), whereas only in India around 13.3 million hectares of land is affected by salinity (Consortium for Unfavorable Rice Environment, IRRI, 2003). The physiological toxic effects of salt stress include decreased germination and seedling growth, reduced leaf expansion which causes a reduction in the photosynthetic area and dry matter production.

Enormous work has been done on various crops with reference to salinity, however, little information is known regarding the effect of salinity on foxtail millet. Therefore, the present study was conducted to determine the effect of different concentrations of NaCl salt stress on germination of fox tail millet varieties.

MATERIALAND METHODS: A laboratory experiment was conducted at College of Agriculture, Raichur, Department of Crop Physiology, to assess the salt tolerance levels of navane varieties. The two varieties were tested with different salt concentrations viz., 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0 % Nacl and control . The experiment was replicated twice. The two varieties namely HMT 100-1 and Sri lakshmi were used. The salt concentrations were made by dissolving 1g of NaCl in one litre of distilled water to obtain 0.1% NaCl , like wise other concentrations were prepared. For control, the distilled water was used. The petriplates of equal sizes were used for the experiment. Filter papers were placed inside the petri plates. 25 seeds of a variety were placed on the filter paper in equal distance and 10 ml of the different salt concentrations was poured in to the petriplates. Total 22 treatments were imposed. Germination of seeds were counted every two days interval after sowing. At the tenth day the final germination of seeds were counted. The shoot length and root length was measured. The data on these characters were analysed using the software.

RESULTS AND DISCUSSION: The data was subjected to statistical analysis according to the design. From the anova it was found that there was a significant difference existed for variety, concentration and variety and concentration interaction for germination percentage. The significant differences were observed among varieties and concentrations treatments for shoot length. And there was no significant difference was observed for interaction. For root length, only significant difference was observed for concentrations (Table 1).

Germination percentage : Among the two varieties, variety HMT 100-1 showed better germination percentage as compared to the variety Sri lakshmi. The salt concentrations 0.1%, 0.2%, 0.3% and 0.4% effect on seed germination was non significant from the control, which indicates that germination was not affected by 0% to 0.4% NaCl salt concentration . When interaction of variety and concentration was observed, the germination percentage of variety HMT 100-1 was significantly high in all concentrations except for 1.0% NaCl concentration. The germination percentage was more than 90% up to salt concentrations 0.7% for variety HMT 100-1. Afterwards salt concentrations, germination percentage was affected in this variety. Whereas for another variety, Sri laksmi, the germination percentage was affected from 0.4% Nacl on-

wards. This indicates that variety HMT 100-1 is salt tolerant than the variety Sri lakshmi.

Seed germination is the most crucial and sensitive stage of a plants life cycle, particularly in the presence of environmental stresses. The soluble salts in the rhizosphere, beyond a critical limit, adversely influence germination and subsequent growth. Germination is one of the most salt-sensitive stages of plant growth and is severely inhibited with increasing salinity particularly in glycophytes. The present findings same results were also reported in other crops also in rice (Anbumalarmathi & Preeti Mehta, 2013) and in sorghum (Ahmed *et al*., 2012).

The seed germination in different varieties of finger millet had been differentially affected at different salinity levels. In general, seed germination was not significantly affected at initial level of salinity i.e. 3 dSm-1 but significant reductions were noted at 6 to 14 dSm-1 (Sanjay Agarwal *et al.,* 2011**)**. Germination percentage was reduced by 125mM NaCl salt concentration onwards for almost all varieties except HD-6859 wheat cultivar (Datta *et al.*, 2009).

Shoot length and root length: For shoot length character, variety Sri laksmi performed better than HMT 100-1. The shoot length did not differed significantly from control upto salt concentration 0.4%.

There was significant difference for root length for concentration . like shoot length, root length was also didnot differed significantly from control up to salt concentrations 0.4%.

The same results of decreasing the length of shoot and root were observed in rice by Anbumalarmathi & Preeti Mehta, 2013, in sorghum by Ahmed et al., 2012.

From all these characters, it indicates that the navane variety sri laksmi is superior to Sri lakshmi and both can perform upto 0.4% NaCl salt concentration.

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Table 1. Mean data of germination percentage, shoot length and root length of two foxtail millet varieties at different NaCl salt concentrations.

NaCl Salt Concentration	Shoot length			Root length			Germination Percentage		
	HMT 100-1	**Sri lakshmi**	**Mean**	HMT 100-1	Sri lakshmi	mean	HMT 100-1	Sri lakshmi	Mean
0.0%	6.88	6.68	6.78	11.05	10.18	10.61	98	78	88
0.1%	5.43	5.47	5.45	10.19	9.52	9.85	96	78	87
0.2%	5.12	6.34	5.73	9.15	9.62	9.38	98	74	86
0.3%	4.98	5.80	5.39	8.54	9.29	8.91	96	84	90
0.4%	4.96	5.10	5.03	9.71	9.05	9.38	94	64	79
0.5%	3.06	4.57	3.82	2.35	2.23	2.29	94	55	74.5
0.6%	3.17	3.77	3.47	3.31	2.98	3.15	92	56	74
0.7%	3.45	2.69	3.07	2.60	0.82	1.71	92	62	77
0.8%	2.35	3.59	2.97	2.22	3.23	2.73	74	62	68
0.9%	2.21	3.49	2.85	1.39	2.47	1.93	74	58	66
1.0%	1.67	3.04	2.35	1.40	2.00	1.70	56	50	53
Mean	3.93	4.59	4.26	5.63	5.58	5.60	87.6	65.5	76.6
CD @ 5% for variety			0.406			NS			2.32
CD @ 5% for concentration			0.954			1.27			5.45
CD @ 5% for variety and concentration			NS			NS			7.708

SWADESHI VIJNANA ANDOLANA-KARNATAKA
ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

BIO-EFFICACY OF FLUVALINATE 25% EC AGAINST SUCKING PESTS AND BOLLWORM IN COTTON

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Abstract: The results of field experiment conducted at MARS,Raichur during the year 2011-12 on the evaluation of the bio-efficacy of Fluvalinate 25% revealed that, the chemical Fluvalinate 25%EC @50 g a.i./ha was found best and effective in controlling the sucking pests *viz*, Aphids, red cotton bug and leaf hopper. Lowest per cent damage by bollworm *(Helicoverpa armigera)* was observed in the treatment Fluvalinate 25%EC @100 g a.i./ha (2.1%) and was at par with Fluvalinate 25%EC @50 g a.i./ha (2.43%) and Fluvalinate 25%EC (market standard)@100 g a.i./ha (2.6%). No phytotoxicity was found in all treatments and also there was no effect on non-target organisms (Coccinellids and spiders). The highest yield (22.5 q/ha) was obtained in the treatment Fluvalinate 25%EC @50 g a.i./ha and on par with Fluvalinate 25%EC @100 g a.i./ha (21.3 q/ha).

Introduction: Cotton, is the most important commercial crop of India. In India cotton is grown in an area of 89.60 lakh hectares with a production of 232 lakh bales and productivity of 440 kg lint/ha as against world average production of 682 kg lint/ha(Anon.2005). In India about 156 species of insect pests have been reported to be associated with cotton and among them only a dozen of pests cause economic damage to the crop. Sucking pests have become quite serious from seedling stage, their heavy infestation at times reduces the crop yield to a great extent. The estimated loss due to sucking pests is up to 21.20% (Dhawan *et al*., 1988). Among the sap feeders aphids *Aphis gossypii,* leafhoppers *Amrasca biguttula biguttula*, Red cotton bug *Dysdercus cingulatus* and among bollworms American bollworm *Helicoverpa armigera* are deadly pests on cotton. Cotton growers in India depend heavily on synthetic pesticides to combat sucking pests. Atleast 2-3 sprays are directed against sucking pests. Continuous and indiscriminate use of synthetic insecticides led to insecticidal resistance, pest resurgence and destruction of natural enemies and hence the efficacy has become less reliable. To overcome this problem discovery of new substances effective at low doses and have less exposure in the environment. Therefore, considering all the above problems the present field ''evaluation of Fluvalinate 25% EC against sucking pests and bollworm in cotton" provided by Makhteshim-Agan India Pvt. Ltd.

Materials and method: The experiment was laid out in a complete randomized block design with seven treatments [as detailed in item No.9 (I)] replicated thrice in 32.4 m^2 plots during Kharif 2012 at MARS, UAS Raichur. Cotton variety Bunny NCS-145 was selected as per the recommended package of practices in the agronomy section of UAS Raichur. The crop received three sprays during the period based o the pest load at 15 days intervals at 41, 56 and 71 days after sowing. The water volume used was 500 liter/ha for various treatments. The number of aphids per top 3 leaves, number of bugs per plant, number of hoppers per top 3 leaves and number of bollworm larvae per plant were recorded on 5 randomly selected plants in each plot before application and 1, 5, and 10 days after application of the chemical. The grain yield per plot was also recorded at each replication and pooled. The observation on phytotoxicity of the chemical at higher dosages [as detailed in item No.9 (II)] was also recorded separately. Number of beneficial insects and their population was noted to assess the toxicity of the dosages to the non-target organisms.

Results:

Bio-efficacy of Fluvalinate 25% EC on aphid population: The incidence of aphids was observed about 35 days after sowing. The population ranged from 19.6 to 26.2 per top 3 leaves before spraying. The treatment Fluvalinate 25%EC @50 g a.i./ha was found effective in reducing the aphid population where initial population of 26.0 was reduced to 1.2/top 3 leaves at 10 days after first application which was on par with Fluvalinate 25% EC @100 g a.i./ha (19.6 to 1.17/top 3 leaves) and Fluvalinate 25% EC (market standard) @100 g a.i./ha (26.2 to 1.27/top 3 leaves). Same trend was noticed in second and third application of the chemical. And these treatments were significantly superior to all other treatments in controlling aphids on cotton (Table 1).

Bio-efficacy of Fluvalinate 25% EC on Red cotton bugs population: During first spray of application there was no incidence of the red cotton bug, they appeared late in the season during second spray of the chemical. The pretreatment population of red cotton bugs ranged from 2.1 to 2.6 per plant. At 10 days after second application lowest population of bugs (0.3/plant) was observed in treatment Fluvalinate 25%EC @100 g a.i./ha and was at par with Fluvalinate 25%EC @50 g a.i./ha (0.4/plant) followed by Fluvalinate 25%EC (market standard)@100 g a.i./ha (0.5/plant). And the same trend was observed after third application also. Remaining treatments were found inferior to above treatments (Table 2).

Bio-efficacy of Fluvalinate 25% EC on population of Leaf hopper: Before the application of insecticides leafhoppers population was uniform and varied between 7.00 to 8.6/top 3 leaves. The data of 10 days after first spray indicated the superiority of both the treatments (Fluvalinate 25%EC @50 g a.i./ha and Fluvalinate 25%EC @100 g a.i./ha) by recording lower leafhopper population (2.4to 2.27/top 3 leaves) followed by Fluvalinate 25%EC (market standard)@100 g a.i./ha(2.7/top 3 leaves). Efficacy of these treatments remained effective

and followed the similar trend even after second and third sprays (Table 3).

Bio-efficacy of Fluvalinate 25% EC on American bollworm (*Helicoverpa armigera*): The bollworms incidence was noticed on the crop 45 days after sowing and prevailed throughout the cropping period. The bollworm damage ranged from 2.1 to 4.7 per cent at final spray and the highest per cent damage was recorded in control treatment. Among treatments, lowest per cent damage was observed in the treatment Fluvalinate 25%EC @100 g a.i./ha (2.1%) and was at par with Fluvalinate 25%EC @50 g a.i./ha (2.43%) and Fluvalinate 25%EC (market standard)@100 g a.i./ha (2.6%) (Table 4).

Effect on yield: The highest cotton yield was obtained by the treatment Fluvalinate 25%EC @50 g a.i./ha (22.5 q/ha) which was on par with Fluvalinate 25%EC @100 g a.i./ha (21.3 q/ha) and Fluvalinate 25%EC (market standard)@100 g a.i./ha (20.9 q/ha) (Table 5).

Phytotoxicity: No Phytotoxicity symptoms were noticed on the crop after 1, 3, 5, 7 and 10 days after spraying on the treatment for bio-efficacy and phytotoxicity

Effect on non-target organisms: Coccinellids and spider were noticed on the crop. The coccinellid and population was low in all the chemical treatments on ten days after spray when compared to untreated check which recorded maximum population .However, there is no ill effect of the treatments under trial on the natural enemies population (Table 6).

Conclusion:

- The data from the field trial of the evaluation of the bio-efficacy concluded that, the chemical Fluvalinate 25%EC @50 g a.i./ha was found best and effective in controlling the sucking pests and bollworm incidence on cotton which was on par with Fluvalinate 25%EC @100 g a.i./ha.
- No phytotoxicity was found in all treatments and also there was no effect on non-target organisms (Coccinellids and spiders).
- The highest yield (22.5 q/ha) obtained in the treatment Fluvalinate 25%EC @50 g a.i./ha and on par with Fluvalinate 25%EC @100 g a.i./ha (21.3 q/ha).

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Table 1: Bio-efficacy of Fluvalinate 25% EC against Aphids in Cotton

Treatments	Dosage g a.i./ha	Population of Aphids (No. of aphids/top 3 leaves)									
		Pre-count	I Spray			II Spray			III Spray		
			1DAS	5DAS	10DAS	1DAS	5DAS	10DAS	1DAS	5DAS	10DAS
Fluvalinate 25% EC	25	22.3 (4.83)	3.73 (2.06)	2.9 (1.84)	1.80 (1.52)	3.1 (1.90)	2.6 (1.76)	3.5 (2.00)	3.7 (2.05)	2.5 (1.73)	2.2 (1.64)
Fluvalinate 25% EC	50	26.0 (5.20)	2.8 (1.82)	1.9 (1.55)	1.2 (1.30)	2.13 (1.62)	1.4 (1.38)	2.4 (1.70)	2.5 (1.73)	1.3 (1.34)	1.1 (1.26)
Fluvalinate 25% EC	100	19.6 (4.54)	3.0 (1.87)	2.1 (1.61)	1.17 (1.29)	2.4 (1.70)	1.8 (1.52)	2.7 (1.79)	2.3 (1.67)	1.2 (1.30)	1.3 (1.34)
Fluvalinate 25% EC (Market Standard)	100	26.2 (5.22)	3.27 (1.94)	2.3 (1.67)	1.27 (1.33)	2.5 (1.73)	1.93 (1.56)	2.5 (1.73)	3.6 (2.02)	1.5 (1.41)	1.5 (1.41)
Imidachloprid 17.8% SL	25	22.8 (4.88)	6.6 (2.60)	5.07 (2.36)	4.3 (2.19)	4.0 (2.12)	4.47 (2.23)	5.1 (2.37)	6.7 (2.68)	5.7 (2.49)	5.6 (2.47)
Lambda Cyhalo thrin 2.5%EC	25	20.9 (4.68)	7.2 (2.77)	6.00 (2.55)	4.63 (2.27)	5.57 (2.46)	5.90 (2.53)	6.3 (2.61)	7.0 (2.74)	6.00 (2.55)	5.5 (2.45)
Untreated control	-	21.3 (4.72)	27.3 (5.27)	28.33 (5.37)	28.0 (5.33)	28.0 (5.34)	29.67 (5.48)	31.67 (5.67)	35.0 (5.95)	32.67 (5.76)	35.6 (6.01)
CD @5%		NS	0.16	0.1	0.18	0.14	0.29	0.11	0.16	0.17	0.13
Sem±			0.05	0.03	0.08	0.05	0.09	0.04	0.05	0.05	0.04

DAS: Days After Spray

Note: Figures in the parenthesis are square root transformed values

Table 2: Bio-efficacy of Fluvalinate 25% EC against Red Cotton Bug in Cotton

Treatments	Dosage g a.i./ha	Population of Red cotton Bug (No. of Bugs/plant)								
		Pre-count	I Spray			II Spray			III Spray	
			1DAS	5DAS	10DAS	1DAS	5DAS	10DAS	1DAS	5DAS	10DAS
Fluvalinate 25% EC	25	2.2 (1.79)	Nil	Nil	Nil	1.0 (1.24)	0.73 (1.11)	0.7 (1.09)	0.8 (1.14)	0.7 (1.09)	0.6 (1.05)
Fluvalinate 25% EC	50	2.6 (1.90)	Nil	Nil	Nil	0.4 (0.95)	0.5 (1.00)	0.4 (0.95)	0.5 (1.0)	0.3 (0.89)	0.2 (0.84)
Fluvalinate 25% EC	100	2.3 (1.82)	Nil	Nil	Nil	0.5 (0.98)	0.33 (0.91)	0.3 (0.89)	0.4 (0.75)	0.33 (0.91)	0.3 (0.89)
Fluvalinate 25% EC (Market Standard)	100	2.5 (1.87)	Nil	Nil	Nil	0.58 (1.00)	0.63 (1.06)	0.5 (1.00)	0.6 (1.05)	0.5 (1.00)	0.1 (1.78)
Imidachloprid 17.8% SL	25	2.4 (1.84)	Nil	Nil	Nil	1.0 (1.24)	1.0 (1.22)	1.1 (1.26)	1.13 (1.28)	1.3 (1.34)	1.5 (1.41)
Lambda Cyhalo thrin 2.5%EC	25	2.6 (1.90)	Nil	Nil	Nil	1.1 (1.28)	0.8 (1.14)	0.9 (1.18)	1.3 (1.34)	1.3 (1.34)	1.6 (1.45)
Untreated control	-	2.1 (1.76)	Nil	Nil	Nil	2.3 (1.66)	2.33 (1.68)	2.43 (1.71)	2.6 (1.76)	2.73 (1.80)	2.9 (1.83)
CD @5%		NS				0.12	0.09	0.09	0.08	0.11	0.12
Sem±						0.04	0.03	0.03	0.03	0.03	0.04

DAS: Days After Spray

Note: · Red cotton bugs appeared late in the season so population of the bugs was not found during first application.
· Figures in the parenthesis are square root transformed values.

Table 3: Bio-efficacy of Fluvalinate 25% EC against Leaf hopper in Cotton

Treatments	Dosage g a.i./ha	Pre-count	Population of Leaf hopper (No. of hoppers/top 3 leaves)								
			I Spray			II Spray			III Spray		
			1DAS	5DAS	10DAS	1DAS	5DAS	10DAS	1DAS	5DAS	10DAS
Fluvalinate 25% EC	25	7.0 (2.83)	4.2 (2.17)	4.0 (2.12)	3.7 (2.05)	4.0 (2.12)	3.5 (2.00)	3.1 (1.90)	2.73 (1.80)	2.5 (1.7)	1.970 (1.57)
Fluvalinate 25% EC	50	8.2 (3.03)	3.3 (1.95)	2.4 (1.70)	2.4 (1.70)	2.63 (1.77)	2.2 (1.64)	1.77 (1.50)	2.17 (1.63)	1.3 (1.34)	1.07 (1.25)
Fluvalinate 25% EC	100	7.0 (2.83)	3.2 (1.92)	1.9 (1.55)	2.27 (1.66)	2.5 (1.73)	1.9 (1.55)	1.4 (1.38)	2.23 (1.65)	1.4 (1.38)	1.20 (1.30)
Fluvalinate 25% EC (Market Standard)	100	8.6 (3.10)	3.6 (2.02)	3.17 (1.91)	2.7 (1.79)	3.23 (1.93)	2.17 (1.63)	1.83 (1.53)	2.60 (1.76)	1.7 (1.48)	1.5 (1.41)
Imidachloprid 17.8% SL	25	7.6 (2.93)	4.67 (2.27)	4.47 (2.23)	4.5 (2.24)	4.63 (2.27)	4.57 (2.25)	4.17 (2.16)	4.5 (2.24)	4.0 (2.12)	4.1 (2.14)
Lambda Cyhalot hrin 2.5%EC	25	7.0 (2.83)	5.0 (2.34)	5.2 (2.39)	5.27 (2.40)	5.33 (2.42)	5.0 (2.34)	4.5 (2.24)	4.67 (2.27)	4.1 (2.14)	4.17 (2.16)
Untreated control	-	7.3 (2.88)	8.17 (2.94)	7.8 (2.88)	8.23 (2.96)	8.33 (2.97)	8.53 (3.00)	6.9 (2.72)	76.90 (2.72)	7.5 (2.83)	7.23 (2.78)
CD @5%		NS	0.12	0.07	0.12	0.10	0.08	0.07	0.09	0.06	0.12
Sem±			0.04	0.02	0.04	0.03	0.02	0.02	0.03	0.02	0.04

DAS: Days After Spray

Note: Figures in the parenthesis are Arc sine transformed values.

Table 4: Bio-efficacy of Fluvalinate 25% EC against *Helicoverpa armigera* in Cotton

Treatments	Dosage g a.i./ha	Fruiting bodies damage (%)	No. of GOB/plant	No. of BOB/plant
Fluvalinate 25% EC	25	3.1(10.14)*	36.03 (6.04)**	7.5 (2.83)**
Fluvalinate 25% EC	50	2.43 (8.97)	43.1(6.60)	3.83 (2.08)
Fluvalinate 25% EC	100	2.1 (8.33)	41.17(6.45)	4.10 (2.14)
Fluvalinate 25% EC				
(Market Standard)	100	2.6 (9.28)	40.0 (6.36)	4.23 (2.18)
Imidachloprid 17.8% SL	25	4.7 (12.52)	31.67 (5.67)	6.8 (2.70)
Lambda Cyhalothrin 2.5%EC	25	4.1(11.68)	36.17 (6.06)	627 (2.60)
Untreated control	-	29.83 (33.09)	9.6 (3.18)	30.03 (5.52)
CD @5%		1.17	0.17	0.13
Sem±		0.38	0.06	0.04

GOB: Good Opened Bolls, **BOB**: Bad Opened Bolls

Note: *Figures in the parenthesis are Arc sign transformed values.

** Figures in the parenthesis are square root transformed values

Table 5: Effect of Fluvalinate 25% EC on yield of Cotton

SL. No.	Treatments	Yield (q/ha)
1	Fluvalinate 25% EC	18.8
2	Fluvalinate 25% EC	22.5
3	Fluvalinate 25% EC	21.3
4	Fluvalinate 25% EC (Market Standard)	20.9
5	Imidachloprid 17.8% SL	19.0
6	Lambda Cyhalothrin 2.5%EC	17.5
7	Untreated control	11.0
	CD@5%	5.3

ROLE OF ENTOMOPATHOGENIC NEMATODES IN INSECT PEST CONTROL AND ITS PRODUCTION TECHNOLOGY

ಕೀಟ ನಿರ್ವಹಣೆಯಲ್ಲಿ ಜಂತುಹುಳುಗಳ ಪಾತ್ರ ಹಾಗು ಉತ್ಪಾದನಾ ತಾಂತ್ರಿಕತೆ

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Entomopathogenic nematode (EPN) especially members of the genus *Steinernema* and *Heterorhabditis* are innovative bio-agents for plant protection scientist in India. These EPNs have symbiotic bacteria (Genus *Steinernema-Xenorhabdus* and Genus *Heterorhabditis-Photorhabdus*) which are mutually associated causes mortality of host insect within 24-48 hours of nematode entry in to the host and having wide range amongst class Insecta. Interest in the management of insects through EPN during last two decades increased to surprising level in developed countries. Efforts to use EPN in India were started in the late 40's but till day it is under extensive research phase only. A few workers in India have tested EPN and found them very effective and useful for pest management during last decade. Nematode-based products are available in international market for the control of a wide spectrum of insects. Improvements in formulation have resulted in nematode products that have longer shelf life and stability and are easier to mix and apply. Development of local market will be a challenging task. EPN are generally more expensive to produce than are chemical larvicides in the quantities required for efficacy and require more training to use. A final opportunity worthy of development is to incorporate EPN into an integrated pest management programme.

ಪರಿಚಯ: ಆಂಗ್ಲ ಭಾಷೆಯಲ್ಲಿ ನೆಮೆಟೋಡ್ ಎಂದು ಕರೆಯಲ್ಪಡುವ ಜಂತು ಹುಳುಗಳು ಒಂದು ಕೀಟ ಪರಾವಲಂಬಿ ರೋಗಕಾರಕ ಹುಳು. ಈ ಜಂತು ಹುಳುಗಳು ಸರ್ವವ್ಯಾಪಿಯಾಗಿದ್ದು, ಇತ್ತೀಚಿನ ದಿನಗಳಲ್ಲಿ ಜೈವಿಕ ಕೀಟ ನಿಯಂತ್ರಣದಲ್ಲಿ ಚೇತೋಹಾರಿ ಫಲಿತಾಂಶ ನೀಡುತ್ತಿರುವುದರಿಂದ ಹಾಗೂ ಪ್ರಪಂಚದಾದ್ಯಂತ ಅನೇಕ ಪೀಡೆ ನಿರ್ವಹಣೆಯಲ್ಲಿ ಅದರಲ್ಲೂ ಬಹು ಮುಖ್ಯವಾಗಿ ಬೇರುಹುಳುಗಳ ಹತೋಟಿಗಾಗಿ ಉಪಯೋಗಿಸಲಾಗುತ್ತಿದೆ. ಆದರಿಂದ ಇತ್ತೀಚಿನ ದಿನಗಳಲ್ಲಿ ಸಂಶೋಧನೆಯ ಬಹುಭಾಗ ಇದರ ಮೇಲೆ ಕೇಂದ್ರಿಕೃತವಾಗಿದೆ ಮತ್ತು ಇದರ ಬಳಕೆಗೆ ಅಧಿಕ ಒತ್ತನ್ನು ನೀಡಲಾಗುತ್ತಿದೆ. ಇವು ಕೀಟಗಳಿಗಷ್ಟೇ ಅಪಾಯಕಾರಿಯಾಗಿದ್ದು, ಇತರ ಯಾವುದೇ ಪ್ರಾಣಿ ಹಾಗೂ ಸಸ್ಯಗಳಿಗೆ ಅಪಾಯಕಾರಿಯಾಗಿರುವುದಿಲ್ಲ. ಇದಲ್ಲದೆ ಝೆನೊರಾಬ್ಡಸ್ ಹಾಗೂ ಫೋಟೋರಾಬ್ಡಸ್ ಎಂಬ ದಂಡಾಣುಗಳು ಈ ಜಂತುಹುಳುಗಳ ಸಹಜೀವಿಯಾಗಿದ್ದು, ಪರಪೋಷಿ ಕೀಟಗಳನ್ನು ಕೊಲ್ಲುವಲ್ಲಿ ಸಹಾಯ

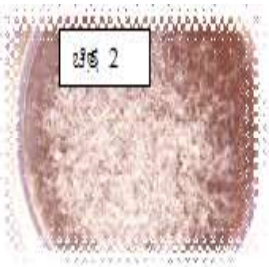
ಮಾಡುವುದಲ್ಲದೆ ಆ ಸತ್ತ ಕೀಟದ ಮೇಲೆ ಅಭಿವೃದ್ಧಿಯಾಗಲು ಅನುಕೂಲ ವಾತಾವರಣವನ್ನು ಕಲ್ಪಿಸಿಕೊಡುತ್ತವೆ.

ಜಂತು ಹುಳುಗಳ ಜೀವವರ್ಗೀಕರಣ ನೆಮಟೋಡಾ ಫೈಲಮ್ ಗೆ ಬರುವ ಜಂತು ಹುಳುಗಳು 9 ಗುಂಪುಗಳಾಗಿ ವಿಭಜನೆಗೊಂಡಿದ್ದು ಅದರಲ್ಲಿ 9 ಜಾತಿಗಳು ಮುಖ್ಯವಾದ್ದು ಮತ್ತು 30ಕ್ಕು ಹೆಚ್ಚು ಪ್ರಭೇದಗಳಿದ್ದು ಅದರಲ್ಲಿ ಪ್ರಮುಖವಾದ್ದು ಸ್ಟೆನೆರ್‌ನೆಮ್ಯಾಟಿಡೆ ಮತ್ತು ಹೆಟೆರೋರ್ಯಾಬ್ಡಿಟಿಡೆ (ಚಿತ್ರ 1).

ಜಂತುಹುಳುಗಳು ಬೆಳೆದು ಬಂದ ದಾರಿ: ಜಂತುಹುಳುಗಳು 17ನೇ ಶತಮಾನದಿಂದಲೂ ಪ್ರಚಲಿತೆಯಲ್ಲಿದೆ ಆದರೆ ಅದ್ದು ಪ್ರಮುಖಯತ್ತೆ ಪಡೆದಿದ್ದು 19 ಮತ್ತು 20 ನೇ ಶತಮಾನದಿಂದಿಚೆಗೆ (ನ್ಗುಯೆನ್ ಮತ್ತು ಸ್ಮಾರ್ಟ,2004). ಮೊದಲ ಬಾರಿಗೆ ಮೆರ್ಮಿಥಿಡೆ ಜಾತಿಗೆ ಸೇರಿದ ಜಂತುಹುಳು ಮಿಡತೆಯನ್ನು ಭಾದಿಸಿ ಜಂತುಹುಳುಗಳ ಶಾಸ್ತ್ರದ ಅತ್ಯತ್ಕೃಷ್ಟ ಸ್ಥಾನವನ್ನು ಪಡೆದಿದೆ. ಬಸಿರ್ 1956ರಲ್ಲಿ ಅಕ್ಸ್ಯೂರೈಡ್ ಜಂತು ಹುಳು ತುಂಬ ಉತ್ತಮವಾದ ಸಂಶೋದನೆಯನ್ನು ಮಾಡಿದ್ದಾದೆ ಮತ್ತು ಇನ್ನು ಅಲವರು ಜಂತು ಹುಳುಗಳ ಬಗೆ ಸಂಶೋದನೆ ನೆಡೆಸುತ್ತ ಬಂದ್ದಿದಾರೆ. ಫೋಯ್ನರ್ 1970 ರಿಂದ ಇಲ್ಲಿಯವರೆಗೆ ಸಂಶೋದನೆಯನ್ನು ನೆಡೆಸುತ್ತಿದಾರೆ.

ಉತ್ತರ ಭಾರತದಲ್ಲಿ ಬಸಿರ್ 1940ಲ್ಲಿ ಜಂತು ಹುಳುಗಳ ಮೇಲೆ ಮೊದಲ ಬಾರಿಗೆ ಸಂಶೋದನೆಯನ್ನು ಪ್ರಾರಂಭಿಸಿದರು ಮತ್ತು ಇವರ ನಂತರ ಸಿದ್ದಕ್ಕಿ (1960– ಈವರೆಗೆ), ಫಾರುಖಿ (1967), ಸಿಂಗ್ ಮ್ತು ಸಿಂಗ್ (1988,1989),ಗಂಗುಲಿ (2000–ಈವರೆಗೆ),ಆಲಿ (2000–ಈವರೆಗೆ),ಪ್ರಭುರಾಜ (1997–ಈವರೆಗೆ) ಕಾರ್ಯ ನಿರ್ವಹಿಸುತ್ತಿದ್ದಾರೆ ಮತ್ತು ದಕ್ಷಿಣ ಭಾದತ್ತದಲ್ಲಿ ಅಲವಾರು ಸಂಸ್ಥೆಗಳಲ್ಲಿ ಈ ಜಂತು ಹುಳುಗಳ ಮೇಲೆ ಕಾರ್ಯ ಮುಂದುವದೆದಿದೆ.

ಜಂತು ಹುಳುಗಳ ಕಾರ್ಯ ವಿಧಾನ ಮತ್ತು ಜೀವನ ಚಕ್ರ : ಕೀಟ ಪೂರಾವಲಂಬಿ ಜಂತುಹುಳುಗಳಲ್ಲಿ ಮೂರನೆ ಹಂತದ ಮರಿ ಹುಳುವಿಗೆ (ಚಿತ್ರ:2) ಪರಪೋಷಿ ಕೀಟವನ್ನು ಕೊಲ್ಲುವ ಸಾಮರ್ಥ್ಯವಿದ್ದು, ಅತೀ ಚಿಕ್ಕದಾಗಿರುತ್ತದೆ (500 ಮೈಕ್ರಾನ್) ಮತ್ತು ಪ್ರತಿಕೂಲ ಹವಾಮಾನವನ್ನು ತಡೆದುಕೂಳ್ಳುವ ಶಕ್ತಿ ಇರುತ್ತದೆ. ಈ ಹಂತವು ಸ್ವತಂತ್ರ ಜೀವಿಯಾಗಿದ್ದು ಬಹುದಿನಗಳ ಕಾಲ ಆಹಾರವಿಲ್ಲದೆ ಬದುಕಬಲ್ಲದು. ಯಾವುದೇ ಕೀಟವನ್ನು ಕಂಡ ತಕ್ಷಣ ಮೂರನೆ ಹಂತದ ಜಂತುಹುಳು ಅದರ ಬಾಯಿ ಅಥವಾ ಗುಧದ್ವಾರದ ಮುಖಾಂತರ ಕೀಟದ



ದೇಹದೂಳಗೆ ಸೇರುತ್ತದೆ. ಹೀಗೆ ಸೇರಿದ ಮೇಲೆ ತನ್ನ ಜಠರದಲ್ಲಿರುವ ದಂಡಾಣು ಜೀವಕೋಶಗಳನ್ನು ಕೀಟದ ರಕ್ತದೊಳಕ್ಕೆ ಹರಿಬಿಡುತ್ತದೆ. ಈ ದಂಡಾಣು ಪರಪೋಷಿ ಕೀಟದ ಮೈಯಲ್ಲಿ ಅತಿ ಬೇಗನೆ ಅಭಿವೃದ್ದಿ ಹೊಂದಿ ಕೀಟವನ್ನು ಸಾಯಿಸುತ್ತದೆ. ಹೀಗೆ ಸತ್ತ ಕೀಟದ ಅಂಗಾಂಶಗಳ ಮೇಲೆ ಜಂತುಹುಳು ತನ್ನ ಜೀವನ ಚರಿತ್ರೆಯನ್ನು ಮುಂದುವರೆಸುತ್ತದೆ. (ಚಿತ್ರ:3 ಗೆಲೆರಿಯಾ ಕೀಟದ ದೇಹದಲ್ಲಿ ಅಭಿವೃದ್ದಿ ಹೊಂದುತ್ತಿರುವ ಜಂತು ಹುಳು) ಮೂರನೆ ಹಂತದ ಮರಿ ಜಂತುಹುಳು ನಾಲ್ಕನೇ ಹಂತಕ್ಕೆ ರೂಪಾಂತರ ಹೊಂದಿ ಸ್ವಲ್ಪ ಸಮಯದಲ್ಲಿ ಪ್ರೌಢಾವಸ್ಥೆಯನ್ನು ತಲುಪುತ್ತದೆ. ಜಂತು ಹುಳುವಿನ ಜೀವನ ಚಕ್ರದಲ್ಲಿ ಮೂಟ್ಟೆ, ಮರಿ ಹಾಗೂ ಪ್ರೌಢ ಹುಳು ಎಂಬ ಮೂರು ಹಂತಗಳಿರುತ್ತದೆ. ಸ್ಟೈನೆರ್ನೆಮಾಟಿಡೆ ಜಾತಿಗೆ ಸೇರಿದ ಜಂತುಹುಳುವಿನಲ್ಲಿ ದ್ವಿಲಿಂಗ ಸಂತಾನೋತ್ಪತ್ತಿ ಕಂಡುಬಂದರೆ, ಹಟೆರೊರಾಬ್ಡಿಟಿಡೆ ಜಾತಿಯ ಜಂತುಹುಳುವಿನ ಮೊದಲನೆ ಪೀಳಿಗೆಯಲ್ಲಿ ಬರೀ ಪ್ರೌಢ ಹೆಣ್ಣು ಹುಳುಗಳಿದ್ದು, ಎಲ್ಲವೂ ಉಭಯಲಿಂಗಿಗಳಾಗಿರುತ್ತವೆ. ಆದರೆ ಎರಡನೇ ಪೀಳಿಗೆಯಲ್ಲಿ ದ್ವಿಲಿಂಗ ಸಂತಾನೋತ್ಪತ್ತಿ ಮುಂದುವರೆಯುತ್ತದೆ. ನಂತರದ ಪೀಳಿಗೆಯಲ್ಲಿ ಮೊಟ್ಟೆಯೊಡೆದು ಹೊರಬಂದ ಮೊದಲನೆ ಹಂತದ ಜಂತುಹುಳು ನೇರವಾಗಿ ನಾಲ್ಕನೆ ಹಂತಕ್ಕೆ ರೂಪಾಂತರ ಹೊಂದಿ, ಪ್ರೌಢಾವಸ್ಥೆಯನ್ನು ತಲುಪುತ್ತದೆ. ಆಹಾರ ಕಡಿಮೆಯಾಗುತ್ತಿದ್ದಂತೆಯೇ ಮೊದಲ ಹಾಗೂ ಎರಡನೇ ಹಂತದ ಮರಿಗಳು ಮೂರನೆ ಹಂತಕ್ಕೆ ರೂಪಾಂತರ ಹೊಂದಿ ನಂತರದ ಬೆಳವಣಿಗೆ ನಿಂತುಹೋಗುತ್ತದೆ. ಈ ಮೂರನೆ ಹಂತದ ಜಂತುಹುಳುಗಳು ಪರಪೋಷಿ ಕೀಟದ ಚರ್ಮವನ್ನು ಬೇಧಿಸಿ ಹೊರಬರುತ್ತದೆ. ಹೀಗೆ ಹೊರಬಂದ ಹುಳುಗಳು ಹೊಸ ಕೀಟದ ಅನ್ವೇಷಣೆಗೆ ತೊಡಗುತ್ತದೆ.

ಜಂತುಹುಳುಗಳನ್ನು ಅಧಿಕ ಸಂಖ್ಯೆಯಲ್ಲಿ ಉತ್ಪಾದಿಸುವ ವಿಧಾನಗಳು ಮತ್ತು ಸೂತ್ರೀಕರಣ: ಜೀವಿಯ ಒಳಗಡೆ (*In vivo*) ಮತ್ತು ಜೀವಿಯ ಒರಗಡೆ (*In vitro*) ಉತ್ಪಾದಿಸ ಬಹುದು (ಶಾಪಿರೊ ಮತ್ತು ಗಾಗಲೆರ್,2002).ಜೀವಯ ಒಳಗಡೆ ಅಭಿವೃದಿಪಡಿಸುವುದು ತುಂಬ ಸುಲಭ. ಪ್ರಯೋಗಶಾಲೆಗಳಲ್ಲಿ ಕೀಟಗಳಾದ ಮೇಣದ ಪತಂಗ (ಗೆಲೆರಿಯಾ), ಸ್ಪೋಡೋಪ್ಟೆರಾ, ಅಕ್ಕಿ ಚಿಟ್ಟೆ, ಹೆಲಿಕೋವರ್ಪಾಗಳ ಮೇಲೆ ವೈಟ್‌ಟ್ರಾಪ್ ಬಳಸಿ ಅಭಿವೃದ್ದಿಪಡಿಸಬಹುದು (ವೈಟ್,1927), ಹೋಸ್ಟ್ ಕಳೆಬರಹದಿಂದ ಹೊರ ಬಂದ ತಾರುಣ್ಯದ ಹಂತದ ನೈಸರ್ಗಿಕ ವಲಸೆಯ ಲಾಭವನ್ನು ಪಡೆದುಕೊಳ್ಳುತ್ತದೆ. ಆದಾಗ್ಯೂ, ಈ ವಿಧಾನ ನಿರ್ಮಾಣ ವೆಚ್ಚ ಪರಿಣಾಮಕಾರಿ ಅಲ್ಲ ಮತ್ತು ಸಣ್ಣ ಮಾರುಕಟ್ಟೆಗಳಿಗೆ ಮಾತ್ರ ಆದರ್ಶ ಇರಬಹುದು. ಜೀವಿಯ ಒರಗಡೆ ಉತ್ಪಾದಿಸುವ ವಿಧಾನ ವಾಣಿಜ್ಯ ಮಟ್ಟದಲ್ಲಿ ಫರ್ಮೆಂಟರ್ಗಳ ಮೂಲಕ ಮಾಡಲಾಗುತ್ತದೆ. ಮತ್ತು ಕೃತಕ ಮಾದ್ಯಮಗಳಾದ ನಾಯಿ ಬಿಸ್ಕತ್ತು, ಸೋಯಾ ಹಿಟ್ಟು, ಕೋಳಿ ಮೊಟ್ಟೆಯ ಹಳದಿ ಭಾಗ ಮತ್ತು ನಿರುಪಯುಕ್ತ ಕೋಳಿ ಮಾಂಸದ ಮೇಲೆ ಅಭಿವೃದ್ದಿಪಡಿಸಬಹುದು.

ಇತರೇ ಕೀಟಗಳ ಮೇಲೆ ಅಭಿವೃದ್ದಿಪಡಿಸುವ ವಿಧಾನಗಳು

1. ಒಂದು ಮಿ.ಲೀ. ನೀರಿನಲ್ಲಿ ಸುಮಾರು 200 ಜಂತುಹುಳುಗಳಿರುವಷ್ಟು ಬಾಷ್ಪೀಕರಿಸಿದ ದ್ರಾವಣವನ್ನು ತಯಾರುಮಾಡಿಕೊಳ್ಳಬೇಕು.
2. ಒಂದು ಶುದ್ದವಾದ ಗಾಜಿನ ಪೆಟ್ರಿಪ್ಲೇಟ್‌ನಲ್ಲಿ ಅದರದೇ ಅಳತೆಯ ಹೀರುವ ಕಾಗದವನ್ನು (ಫಿಲ್ಟರ್ ಪೇಪರ್) ಇಟ್ಟು ಅದರಲ್ಲಿ ಸುಮಾರು 5 ದೊಡ್ಡ ಗಾತ್ರದ ಮರಿಪೋಷಿ ಕೀಟಗಳನ್ನು (ಮೇಣದ ಪತಂಗ ಅಥವಾ ಸ್ಪೋಡಾಪ್ಟೆರಾ) ಬಿಡಬೇಕು.
3. ಇದಾದ ನಂತರ ಮೇಲೆ ತಯಾರಿಸಿದ ಜಂತುಹುಳುವಿನ ದ್ರಾವಣದಿಂದ 1 ಮಿ.ಲೀ. ನೀರನ್ನು ಪೆಟ್ರಿಪ್ಲೇಟಿಗೆ ಹಾಕಿದ ನಂತರ ಪೆಟ್ರಿಪ್ಲೇಟ್‌ನ್ನು ಮುಚ್ಚಳದಿಂದ ಮುಚ್ಚಬೇಕು.
4. ಪೆಟ್ರಿಪ್ಲೇಟ್‌ನ್ನು ಒಂದು ಪಾಲಿಥಿನ್ ಚೀಲದಲ್ಲಿ ಮುಚ್ಚಿ ಇಕ್ಯುಂಬೇಟರ್‌ನಲ್ಲಿ

(27^0 ಸಿ) ಇಡಬೇಕು ಎರಡು ದಿನಗಳಲ್ಲಿ ಪರಮೋಷಿ ಕೀಟಗಳು ಸಾಯುತ್ತವೆ.
5. ಹೀಗೆ ಸತ್ತಿರುವ ಪರಮೋಷಿ ಕೀಟಗಳನ್ನು ವೈಟ್ಸ್‌ಟ್ರಾಪ್‌ಗೆ ಸ್ಥಳಾಂತರಿಸಬೇಕು. ಪ್ರತಿ ಮೇಣದ ಪತಂಗದ ಮರಿಹುಳುವಿನಿಂದ ಸುಮಾರು 27,000–30,000 ಜಂತುಹುಳುಗಳನ್ನು ಉತ್ಪಾದಿಸಬಹುದು. ಹಾಗೆಯೇ ಪ್ರತಿ 10 ಗ್ರಾಂ ನಿರುಪಯುಕ್ತ ಕೋಳಿ ಮಾಂಸ ಅಥವಾ ನಾಯಿ ಬಿಸ್ಕತ್ತಿನಿಂದ 15–20 ಲಕ್ಷ ಜಂತುಹುಳುಗಳನ್ನು ಉತ್ಪಾದಿಸಬಹುದು. ಹೀಗೆ ಉತ್ಪಾದಿಸಿದ ಜಂತುಹುಳುಗಳನ್ನು ಹಲವಾರು ತಿಂಗಳುಗಳವರೆಗೆ ಶೀತಕಗಳಲ್ಲಿ ಇಡಬಹುದು.

ವೈಟ್‌ಟ್ರಾಪ್ ತಯಾರಿಸುವ ವಿಧಾನ: ನಮಗೆ ಬೇಕಾದ ಅಳತೆಯ ಅಲ್ಯುಮಿನಿಯಂ ಜಾಲರಿಯನ್ನು ತೆಗೆದುಕೊಂಡು ಎರಡೂ ತುದಿಯನ್ನು ಬಾಗಿಸಬೇಕು. ಹೀಗೆ ಬಾಗಿಸುವಾಗ, ಒಂದು ತುದಿಯು ಇನ್ನೊಂದು ತುದಿಗಿಂತ ಹೆಚ್ಚು ಬಾಗಿರುವಂತೆ ನೋಡಿಕೊಳ್ಳಬೇಕು. ಒಂದು ಚೌಕಾಕಾರದ $2^{1/2}$ ಲೀ ಅಳತೆಯ ಪ್ಲಾಸ್ಟಿಕ್ ಡಬ್ಬದಲ್ಲಿ ಸುಮಾರು 200–270 ಮಿ.ಲೀ. ಬಾಷ್ಪೀಕರಿಸಿದ ನೀರನ್ನು ಹಾಕಿ ಅದರಲ್ಲಿ ಅಲ್ಯುಮಿನಿಯಂ ಜಾಲರಿಯನ್ನು ಇಡಬೇಕು. ಆ ಜಾಲರಿಯ ಮೇಲೆ ಹೀರುವ ಕಾಗದವನ್ನು ಹೊದಿಸಬೇಕು. ಹೀಗೆ ಹೊದಿಸುವಾಗ ಕಡಿಮೆ ಬಾಗಿರುವ ತುದಿಯ ಕಡೆ ಇರುವ ಕಾಗದ ಸದಾ ನೀರಿನಲ್ಲಿರುವಂತೆ ನೋಡಿಕೊಳ್ಳಬೇಕು. ಹೀಗೆ ಮಾಡುವುದರಿಂದ ಹೀರು ಕಾಗದ ಯಾವಾಗಲೂ ಒದ್ದೆಯಾಗಿದ್ದು, ಜಂತುಹುಳುಗಳ ಅಭಿವೃದ್ದಿಗೆ ಸಹಾಯವಾಗುತ್ತದೆ. ಇದಕ್ಕೆ ವೈಟ್‌ಟ್ರಾಪ್ ಎಂದು ಕರೆಯುತ್ತಾರೆ. (ಚಿತ್ರ: 3)

ಸತ್ತ ಪರಿಪೋಷಿ ಕೀಟಗಳನ್ನು ವೈಟ್‌ಟ್ರಾಪ್‌ಗೆ ಸ್ಥಳಾಂತರಿಸಿದ ನಂತರ ಆ ಡಬ್ಬದ ಬಾಯಿಯನ್ನು ಮುಚ್ಚಿ ಇನ್‌ಕ್ಯೂಬೇಟರ್‌ನಲ್ಲಿ 6–8 ದಿನಗಳವರೆಗೆ ಇಡಬೇಕು.

ಜಂತುಹುಳುಗಳು ಪರಿಪೋಷಿ ಕೀಟಗಳಲ್ಲಿ ಅಭಿವೃದ್ದಿ ಹೊಂದಿ, ಹೊರಬಂದು ಡಬ್ಬದ ತಳದಲ್ಲಿರುವ ನೀರಿನಲ್ಲಿ ಶೇಖರಣೆ ಹೊಂದುತ್ತದೆ. ಹೀಗೆ ಶೇಖರಣೆ ಹೊಂದಿದ ಜಂತುಹುಳುಗಳನ್ನು ಬಸಿದು, ಶೋಧಿಸಿ, ಶೇಖರಿಸಿ ಇಡಬೇಕು. (ಚಿತ್ರ 4 : ಕೀಟಗಳ ಮೇಲೆ ಜಂತುಹುಳುಗಳನ್ನು ಅಭಿವೃದ್ದಿ ಪಡಿಸುವ ವಿಧಾನ)

ಕೃತಕ ಮಾಧ್ಯಮಗಳ ಮೇಲೆ ತಯಾರಿಸುವ ವಿಧಾನ:

1. ಮೊದಲಿಗೆ ಜಂತುಹುಳುವಿನಲ್ಲಿರುವ ದಂಡಾಣುವನ್ನು ಬೇರ್ಪಡಿಸಿ ಅಗಾರ್ ಮಾಧ್ಯಮದ ಮೇಲೆ ಬೆಳೆಸಿಕೊಳ್ಳಬೇಕು. ನಂತರ ಅಗಾರ್ ಮಾಧ್ಯಮದಿಂದ ದಂಡಾಣುವನ್ನು ನ್ಯೂಟ್ರಿಯಂಟ್ ಬ್ರಾತ್‌ನಲ್ಲಿ ಅಭಿವೃದ್ದಿಪಡಿಸಬೇಕು.
2. ಸುಮಾರು 100 ಗ್ರಾಂ ಕೃತಕ ಮಾಧ್ಯಮವನ್ನು (ನಾಯಿ ಬಿಸ್ಕತ್ತು) ತಯಾರಿಸಿಕೊಳ್ಳಬೇಕು. ಹೀಗೆ ತಯಾರಿಸಿದ ಮಾಧ್ಯಮವನ್ನು 2 * 1 ಸೆಂ.ಮೀ ಮೇಲೆ 1:10 (ಸ್ಪಂಜ್: ಕೃತಕ ಮಾಧ್ಯಮ) ಅನುಪಾತದಲ್ಲಿ ಸವರಬೇಕು. 10 ಗ್ರಾಂ. ನಷ್ಟು ಮಾಧ್ಯಮ ಸವರಿದ ಸ್ಪಂಜ್‌ನ್ನು 270 ಮಿ.ಲೀ. ಗಾಜಿನ ಕೊನಿಕಲ್ ಫ್ಲಾಸ್ಕಿನಲ್ಲಿ ಇಟ್ಟು ಆಟೋಕ್ಲೇವ್‌ನಲ್ಲಿ ಸೋಂಕು

ನಿವಾರಣೆ ಮಾಡಬೇಕು.
3. ನ್ಯೂಟ್ರಿಯಂಟ್ ಬ್ರಾತ್‌ನಲ್ಲಿ ಅಭಿವೃದ್ದಿ ಹೊಂದಿದ ದಂಡಾಣುವನ್ನು ಸ್ಪಂಜ್ ಇರುವ ಫ್ಲಾಸ್ಕಿಗೆ ಹಾಕಿ ಇಕ್ಯೂಬೇಟರ್‌ನಲ್ಲಿ (27^0 ಸಿ) ಎರಡು ದಿವಸಗಳವರೆಗೆ ಇಡಬೇಕು. ಇದರಿಂದ ದಂಡಾಣು ಕೃತಕ ಮಾಧ್ಯಮದ ಮೇಲೆಲ್ಲಾ ಅಭಿವೃದ್ದಿಹೊಂದಿ ಜಂತುಹುಳುವಿಗೆ ಅನುಕೂಲ ವಾತಾವರಣ ಕಲ್ಪಿಸುತ್ತದೆ. ಸುಮಾರು 10,000 ಜಂತುಹುಳುಗಳಿರುವ ಬಾಷ್ಪೀಕರಿಸಿದ ದ್ರಾವಣವನ್ನು ರೋಗಮುಕ್ತ ವಾತಾವರಣದಲ್ಲಿ ಗಾಜಿನ ಕೊನಿಕಲ್ ಫ್ಲಾಸ್ಕಿಗೆ ಬೆರಸಿಬೇಕು. ಹೀಗೆ ಬೆರೆಸಿದ ಫ್ಲಾಸ್ಕ್‌ನ್ನು ಇಂಕ್ಯೂಬೇಟರ್‌ನಲ್ಲಿ (27^0 ಸಿ) 3 ವಾರಗಳವರೆಗೆ ಇಡಬೇಕು. (: ಕೃತಕ ಮಾಧ್ಯಮಗಳ ಮೇಲೆ ಜಂತು ಹುಳುಗಳನ್ನು ಅಭಿವೃದ್ದಿ ಪಡಿಸುವ ವಿಧಾನ)
4. ಮೂರು ವಾರಗಳ ನಂತರ ಸ್ಪಂಜನ್ನು ವೈಟ್ ಟ್ರಾಪ್‌ಗೆ ವರ್ಗಾಯಿಸಬೇಕು. ಸ್ಪಂಜನಿಂದ ಹೊರಬಂದ ಜಂತುಹುಳುಗಳು ಕೆಳಗೆ ಇರುವ ನೀರಿನಲ್ಲಿ ಶೇಖಣೆಗೊಳ್ಳುತ್ತವೆ. ಅವುಗಳನ್ನು ಆಗಿಂದಾಗ್ಗೆ ಬಸಿದುಕೊಳ್ಳಬೇಕು. ಹೀಗೆ ಉತ್ಪಾದಿಸಿದ ಜಂತುಹುಳುಗನ್ನು ಹಲವಾರು ತಿಂಗಳುಗಳವರೆಗೆ ಶೀತಕದಲ್ಲಿ ಇಡಬೇಕು.

ಜಂತು ಹುಳುಗಳಿಂದ ಕೀಟ ನಿರ್ವಹಣೆ : ಪ್ರಪಂಚದಾದ್ಯಂತ ಇವುಗಳನ್ನು ಜಪಾನಿನ ಬೇರುಹುಳು ಹಾಗೂ ದ್ರಾಕ್ಷಿಯ ಬೇರುಹುಳು ಹತೋಟಿಗಾಗಿ ವ್ಯಾಪಕವಾಗಿ ಬಳಸಲಾಗಿತ್ತಿದೆ. ಇವುಗಳ ನಿರ್ವಹಣೆಗೆ ಜಂತುಹುಳುಗಳನ್ನು ನೀರಿನಲ್ಲಿ ಬೆರೆಸಿ ನೆಲ ಚೆನ್ನಾಗಿ ನೆನೆಯುವಂತೆ ಸಿಂಪಡಿಸಬೆಕು. ಇವುಗಳನ್ನು ಮಣ್ಣಿನಲ್ಲಿ ವಾಸಿಸುವ ಕೀಟಗಳ ಮೇಲಷ್ಟೇ ಅಲ್ಲದೆ ಕಾಂಡ ಕೊರೆಯುವ ಹುಳು, ಎಲೆ ಸುರಳಿ ಹುಳು ಮತ್ತು ಇತರೆ ಕೀಟಗಳ ಹತೋಟೆಗಾಗಿಯೂ ಉಪಯೋಗಿಸಬಹುದು. ಹಸಿರು ಕೀಡೆ ಮತ್ತು ಭತ್ತದ ಕಾಂಡ ಕೊರೆಯುವ ಹುಳುವಿನ ಹತೋಟೆಗೆ ಪ್ರತಿ ಎಕರೆಗೆ 20–40 ಮಿಲಿಯನ್ ಜಂತು ಹುಳುಗಳನ್ನು ಬಳಸಬೇಕಾಗುತ್ತದೆ. ಇವು ಗಾತ್ರದಲ್ಲಿ ಅತೀ ಚಿಕ್ಕದಾಗಿರುವುದರಿಂದ ಸುಲಭವಾಗಿ ಸಿಂಪರಣಾ ದ್ರಾವಣದಲ್ಲಿ ಸೇರಿಸಿ ಸಿಂಪಡಿಸಬಹುದು. ಇದರಿಂದ ಇಲೆ, ಕಾಯಿ ಹಣ್ಣು ಮತು ಹೂಗಳ ಮೇಲೆ ಬರುವ ಕೀಟಗಳ ನಿರ್ವಹಣೆಯೂ ಸಾಧ್ಯ. ಮೋಡ ಕವಿದ ವಾತಾವರಣ ಅಥವಾ ಸಾಯಾಂಕಾಲದ ಸಮಯದಲ್ಲಿ ಇವುಗಳನ್ನು ಉಪಯೋಗಿಸುವುದರಿಂದ ಕೀಟ ನಿರ್ವಹಣೆ ಪರಿಣಾಮಕಾರಿಯಾಗುತ್ತದೆ. ಈ ಎಲ್ಲಾ ಕಾರಣಗಳಿಂದ ಕೀಟ ಪರಾವಲಂಬಿ ಜಂತುಹುಳುಗಳನ್ನು ಪ್ರಪಂಚದ ಅನೇಕ ಕಡೆಗಳಲ್ಲಿ ಕೃತಕವಾಗಿ ಉತ್ಪಾದಿಸಿ ಕೀಟ ನಿರ್ವಹಣೆಯಲ್ಲಿ ಉಪಯೋಗಿಸಲಾಗುತ್ತಿದೆ.

ಜಂತು ಹುಳುಗಳ ಸಂಗ್ರಹಣೆ

ರೂಪ	ಸಂಗ್ರಹಣೆ
ದ್ರವ ರೋಪದಲ್ಲಿ	12–15 ದಿನಗಳು
ಸ್ಪನ್‌ಜ	2–3 ತಿಂಗಳು
ವೆರ್ಮಿಕ್ಯುಲೈಟ್	2–3 ತಿಂಗಳು
ಅಲ್ಜಿನೇಟ್ ಜ್ಯುಲ್	6–9 ತಿಂಗಳ
ನೀರಿನಲ್ಲಿ ಹರಡುವ ಕಾಳುಗಳು	9–12 ತಿಂಗಳ

ಉಲ್ಲೇಖನ

ವೈಟ್ ಜಿ ಎಫ್, 1927, ಸೋಂಕಿತ ಹುಳುಗಳಿಂದ ನೆಮಟೋಡ್ ಮರಿಗಳ ಪಡೆದುಕೊಳ್ಳುವುದಕ್ಕಾಗಿ ಒಂದು ವಿಧಾನ. ಸೈನ್ಸ್, 66:302–303

PHENOTYPIC DIVERSITY IN GROUNDNUT TARACHISHYPOGAEA L.) MINI CORE COLLECTION ALONG WITH OTHER ADVANCED BREEDING LINES.

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ABSRACT : The groundnut (Arachishypogaea L.) mini core collection consists of 188 accessions. This mini core collection along with other advanced breeding lines was evaluated for 13 traits during Kharij2011 to estimate phenotypic diversity using Euclidian distance method. This method grouped 225 genotypes under study into ten different clusters based on K-means method, where K represents the number of clusters in which all the genotypes were distributed. Maximum number of genotypes was included in Cluster IX. Clusters I and VII were found to be the solitary clusters possessing single genotype viz., ICG 13941 having highest mean values for pods per plant, shelling percentage and oil content and rCG 13942 which was having highest mean values for almost all important yield contributing traits respectively. Intra-cluster distance value ranged from 0.00 to 19.17 and inter-cluster distances ranged between 19.98 to 83.38. The Clusters I and VII were strictly more diverse from rest of the clusters hence these genotypes were used as parents for hybridization. The minimum inter-cluster distance (19.98) was observed between cluster VIII and X, indicating close genetic association between the genotypes of these two clusters. The members of cluster V and cluster VII were characterized as evidenced by lowest Cluster means for days to fifty per cent flowering were considered to be the early flowering genotypes. Cluster r and VII were more divergent for pod yield per plant and days to 50% flowering yield and seed weight. Hence, crossing between genotypes of these two clusters may appear to be most promising to combine considerable pod yield. It is suggested that crosses should be affected between the genotypes of said clusters, for improving more than one economic character to develop potential seggregants and future selection needs to be made in seggregants, to develop high yielding cultivars. Among the thirteen characters studied, the most important trait contributing to the total divergence was sound mature kernel per cent (28.22 %).

Keywords: Diversity, Euclidian distance, Groundnut.

INTRODUCTION : Groundnut (Arachishypogaea L.) is one of the important oil seed crops of the world, which is native to Brazil in South America and presently cultivated throughout tropical, subtropical and warm temperate regions of the world. International Crops Research Institute for Semi-Arid Tropics(lCRISAT) and the United Nations Food and Agricultural Organization (UN-F AO) identified it as the third most important source of vegetable protein, fourth most important source of vegetable oil, and twelfth most important food crop.

It belongs to the family Leguminosae or Fabaceae. It is a self-pollinating, allotetraploid with basic chromosome number ten (2n = 4x = 40) with two genomes, A and B. (Stebbins 1957; Stalker and Dalmacio 1986) and genome size 2800 Mb (Guoet al., 2009). It is believed to have originated in South America via hybridization of two diploid wild species (A. duranensis and A. ipaensis) followed by rare spontaneous duplication of the chromosomes (Halwardet al., 1991; Young et al., 1996).

Based on the differences in the branching pattern and presence of reproductive node on the main stem, the gene pool of cultivated groundnut is divided into two subspecies jastigiataand hypogaea (Krapovickas and Rigoni, 1960). Further, each subspecies has been divided into two botanical varieties viz. subsp. hypogaeainto var. hypogaea(virginia) and var. hirsutaand subsp. Fastigiatainto var. jastigiata(valencia), var. vulgaris (spanish), var. peruvianaand var. aequatoriana (Karpovickas and Gregory, 1994).

It is cultivated in around 100 countries located between 400 N to 400 S with a world production of 34.9 million tonnes from an area of 23.4 million hectares with productivity of 1490 kg per hectare. India shares 22 per cent of the world groundnut production and grown in about 5.95 million hectares with a production of7.54 million tonnes and productivity of 1286 kg per hectare (2010-11 Indiastat.com). Within India, the principal groundnut growing states are Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, and Maharashtra which accounts for more than 80 per cent of the all India production as well as area.

For a crop improvement program, it is a pre-requisite to maintain the genetic variability. Germplasm collection contains a vast reservoir of genetic variability which would help to broaden the genetic base of the cultivars. This could be done through identification of promising genes in the germplasm collection that can be incorporated in the breeding programs to develop promising cultivars. Germplasm has not been extensively used in cultivar development (Knauft and Gorbet 1989) because of size of the collection, costs associated with screerung all the accessions for traits that could be used in cultivars development and non availability of descriptive characters and uncertainty about the best evaluation methods for tapping germplasm resources. Hence, development of core and mini core collections helps in better utilization of vast germplasm through more efficient evaluation techniques to select useful parents.

A core collection is a subset of accessions from the entire collection that captures most of available genetic diversity of the species (Brown, 1989). Frankel and Brown (1984) described the method of developing core collection using information on the origin and characters of the accessions. U padhyaya

contains about one per cent of the entire collection and ten per cent of core collection representing the diversity of the entire collection.

The understanding of the genetic diversity of cultivated and wild species of peanut (Arachis spp.) is essential to develop strategies of collection, conservation and use of the germ plasm in variety development.

Genetic diversity is the basis of any crop improvement programme. In classical breeding, such improvement has been brought about by using promising germplasm identified donors involving the steps "selection- crossing- segregation - selection" in the cycle. In the present study, variation available in the germplasm for different characters was estimated i.e., plant height, pod yield/plant, primary branches per plant, test weight, shelling percentage, late leaf spot, rust, protein content and oil content.

Wider diversity in any crop provides a first step to breeder for its improvement. Crosses between groups with the maximum genetic divergence would be more responsive to improvement since they are likely to produce desirable recombinations in their progenies. Estimates of diversity would also help in the parents for hybridization in order to exploit heterosis in the choice of cross pollinated crops and to select desirable seggregants in the self pollinated crops.

The extent of genetic diversity prevailing in the present population was analyzed by employing Nonhierarchical Euclidian Cluster analysis based on K-means method, where K represents the number of clusters in which all the genotypes were distributed. Euclidian distance was used to assign the items to the clusters having nearest means. It was worked out by using the mean data of all the characters under study.

MATERIALAND METHODS: The present investigation was carried out in two seasons, during kharif 2011 and summer 2012 at GKVK, Bangalore. The experimental material comprised of 225 genotypes which includes 188 accessions of ground nut minicore set representingjastigiata(33), vulgaris (71), peruviana(2), aequatoriana (1), hypogaearunner (33) and hypogaea bunch (48) and other advanced breeding lines. The experiment was taken in Kharif2011 on 1 SI June 2011 in Simple Lattice (15 x 15) Design with two replications. The cultivar TMV 2 was used as susceptible check or spreader row for natural late leaf spot and rust disease incidence and its spread. Each genotype was grown with a spacing of 40 em between rows and 15 em between plant to plant within the rows. Data were recorded for Days to fifty per cent flowering, plant height, primary branches per plant, pods per plant, kernel yield per plant, test weight, shelling percentage, sound mature kernel per cent, pod yield per plant, protein content, oil content, late leaf spot and rust scoring on 1-9 scale. Euclidian distance (Sneath and Sokal, 1973) method is used in this study for diversity analysis.

RESULTS AND DISCUSSION : In the present study, the two hundred and twenty five genotypes which were considered under evaluation were grouped in to ten clusters based on the Euclidian distance. Clustering pattern showed appreciable amount of divergence among the genotypes.

Maximum number of genotypes was included in Cluster IX (and was considered to be the largest cluster, followed by clusters IV and II with forty and thirty two genotypes respectively. Cluster VI and X comprised twenty nine genotypes each. Clusters I and VII were found to be the solitary clusters possessing single genotype viz., leG 13941 yielding more pods per plant and ICG 13942 which was having higher pods per plant, kernel yield per plant, pod yield per plant and sound mature kernel per cent respectively. The formation of cluster with only one or two accessions may be due to total isolation preventing the gene flow or intensive natural or human selection for diverse adaptive complexes.

The summarized information on intra-cluster (diagonal) and inter-cluster distances among ten clusters is presented in the Table 13, which revealed that the intra-cluster distance value ranged from 0.00 to 19.17. The results of the intra-cluster distance indicated that, the presence of diverse accessions within different clusters, there by maximum amount of heterosis is expected in cross combination involving the genotypes of the most divergent clusters.

Table 12: Distribution of 225 groundnut genotypes into ten different clusters.

CLUSTERS	No. of Genotypes	ACCESSIONS/ GENOTYPES
I	1	ICG 13941
II	32	ICG 76, ICG ll5, ICG 297, rCG 862, ICG 875, ICG 4998, ICG 4598, ICG 4343, rCG 4156, ICG 3992, ICG 3775, ICG 6913, ICG 6402, ICG 7000, lCG 9842, lCG 9666, ICG 12276, ICG 13491, ICG 13787, ICG 13856, ICG 13982, ICG 14630, ICG 14705, GKVK 1, lCG 15309, lCG 15287, ICG 14710
III	21	ICG 5016, ICG 4412, ICG 6022, ICG 9905, rCG 8490, ICG 8285, ICG 8106, ICG 12625, ICG 14008, GKVK 17, lCGV 99004, ICGV 99005, B 37C, VL 1, ICGV 87264, GBFD 5272, NCAC 17090, GPBD 4, ICG 15419, lCG 15042, ICG 14985
IV	40	ICG 36,ICG 332, ICG 334, ICG 397, ICG 442, ICG 1399, ICG 17ll, ICG 1973, ICG 2106, ICG 2738, ICG 5236, ICG 5051, ICG 4955, ICG 4684, ICG 3681, ICG 3343, ICG 6766, ICG 5779, ICG 6201, ICG 7181, ICG 7190, ICG 7243, ICG 7906, ICG 11322, ICG ll219, ICG ll42, ICG 10556, ICG 10474, ICG 10092, ICG 9777, ICG 9507, ICG 8083, ICG 12189, ICG 12682, ICG 12697, ICG12879, ICG 12921, ICG 13858, ICG

		14118, R 8801
V	5	ICGV 99003, ICGV 86590, ICGV 87165, ICGV 93021, JL-24
VI	29	ICG 434, ICG 513, ICG 1415, ICG 1519, lCG 2381, ICG 5221, ICG 4543, ICG 3584, ICG 3053, ICG 5662, ICG 5827, ICG 6057, ICG 6646, ICG 6654, ICG 7963, ICG 10479, ICG 9809, ICG 9418, ICG 9315, lCG 9249, ICG 9037, ICG 8517, ICG ll855, lCG 13099, ICG 13603, ICG 14127, GKVK 2, GKVK 4, ICGV 86155
VII	1	ICG 13942
VIII	26	ICG 163, ICG 532, lCG 2511, ICG 4527, ICG 4389, ICG 3027, ICG 2925, ICG 2827, ICG 2773, ICG 5286, ICG 5327, ICG 6993, ICG 5663, lCG 5745, ICG 5891, ICG 7969, ICG 12672, ICG 14475, ICG 14482, ICG 14523, GPBD 5, ICGV 86699, M 282, ICGV 91177
IX	41	ICG 81, ICG ll37, ICG 1274, ICG 1668, ICG 2019, ICG 5195, ICG 4911, ICG 4750, ICG 4729, ICG 4670, ICG 3745, ICG 3673, ICG 3421, ICG 3240, ICG 3102, ICG 6703, ICG 6888, ICG 6892, ICG 5609, ICG 6263, lCG 6375, ICG 6407, ICG 11249, ICG 11144, lCG 11109, ICG 10890, lCG 10554, lCG 10384, lCG 10185, ICG 10036, ICG 9157, ICG 8567, ICG 11457, lCG 11515, lCG 11651,ICG 11687, ICG 12988, ICG 14106, lCG 14466, GKVK 13, TMV 2
X	29	lCG Ill, ICG 118, ICG 156, ICG 188, lCG 721, ICG 928, lCG 2777, lCG 2772, ICG 4746, lCG 4538, ICG 5475, ICG 6667, lCG 6813, ICG 5494, ICG 7153, lCG 11426, lCG 11088, lCG 9961, ICG 8760, lCG 11862, lCG 12000, ICG 13713, GKVK 12, GKVK 8A, GKVK 8B, NCAC 343, lCG 15190, lCG 12370

Genotypes grouped into the same cluster presumably diverge little from one another as aggregates of characters measured. Theoretically, crossing of genotypes belonging to the same cluster is not expected to yield superior hybrids or desirable seggregants. However, a general notion in theory exists that the larger the divergence between the genotypes, higher will be the heterosis (Falconer, 1981). Therefore, it would be desirable to attempt crosses between genotypes belonging to distant clusters for getting highly heterotic crosses. Further, heterosis cannot be exploited in a highly self-fertilized crop. However, high heterosis might prove potential in isolating superior seggregants in case of additive type of gene action. In this context, inter-cluster distance was worked out considering thirteen characters and these distances ranged between 19.98 to 83.38. The Clusters I and VII were strictly more diverse from rest of the clusters. The criterion used for selection of varieties as parents for hybridization using hierarchical Euclidian cluster analysis is the inter-cluster distance.

Those genotypes included in clusters with maximum inter-cluster distance are obviously genetically more divergent. Hence, it would be logical to incorporate genotypes from these clusters in further breeding programmes. The minimum inter-cluster distance (19.98) was observed between cluster VIII and X, indicating close genetic association between the genotypes of these two clusters.

5.5.2 Cluster mean analysis : The mean values of each cluster for all the thirteen characters on pooled basis are given in the Table 14. It could be seen that clusters differ very much with respect to mean expression of various characters and thus reflect that the clusters formed are very distinct. In the present study, the members of cluster V and cluster VII were characterized as evidenced by lowest Cluster means for days to fifty per cent flowering were considered to be the early flowering genotypes. Cluster V with five and VII with one genotype were early flowering types respectively, while Cluster II, with 32 genotype were late flowering. Cluster r comprising one genotype recorded highest mean values for important yield contributing traits like pods per plant, shelling percentage and oil content.

Cluster VII comprising one genotype recorded highest mean

Table 13: Intra cluster (Diagonal) and inter cluster distances for thirteen traits formed by 225 genotypes of groundnut (AracllisllypogaeaL.)

Clusters	I	II	III	IV	V	VI	VII	VIII	IX	X
I	0.00	67.76	69.78	75.32	83.l2	70.34	83.38	76.89	64.10	75.26
II		16.32	23.16	31.10	53.03	24.31	61.18	28.02	23.07	25.70
III			19.04	49.42	35.08	37.97	66.10	26.01	39.11	33.43
IV				17.71	75.17	19.89	54.65	43.47	31.39	26.06
V					19.17	66.99	72.86	36.16	71.63	52.29
VI						17.48	54.63	39.80	22.51	25.94
VII							0.00	59.60	64.81	52.67
VIII								17.87	49.21	19.98
IX									17.17	40.92
X										18.38

values for almost all important yield contributing traits. Thus Hybridization between genotypes of divergent clusters will lead to accumulation of favorable genes in single variety and also it may suggest creating of variability for developing the varieties involving a large number of divergent lines instead of closely related ones (Bergaleet aI., 2001)

In the present investigation, it was observed that the genotypes in cluster VII can be chosen for hybridization programme, as it recorded highest cluster mean values for most of the yield contributing. In addition cluster I and VII were more divergent for pod yield per plant and days to 50% flowering yield and seed weight. Hence, crossing between genotypes of these two clusters may appear to be most promising to combine considerable pod yield. Hence, it is advisable to consider the genotypes belonging to these distant clusters, which was confirmed through their higher inter-cluster distance. The genotypes from the cluster V, which had highest mean plant height, can be considered as parent in breeding programme to improve plant height which has positive association with pod yield.

It is suggested that crosses should be affected between the genotypes of said clusters, for improving more than one economic character to develop potential seggregants and future selection needs to be made in seggregants, to develop high yielding cultivars.

5.5.3 Contribution of characters towards divergence : Percentage contribution of different characters towards divergence is given in Table 15. Among the thirteen characters studied, the most important character contributing to the total divergence was sound mature kernel per cent (28.22 %).Thus we can choose high yielding genotypes from different clusters formed. Negligible contribution was made from plant height and primary branches per plant.

Table 15: Per cent contribution of growth, yield, quality and diseases towards genetic divergence in 225 groundnut genotypes

Sl. No	Traits	Contribution (%)
1	Days to 50% flowering	1.71
2	Plant height (ern)	0.98
3	Primary branches per plant	0.58
4	Pods per plant	1.89
5	Kernel yield per plant(g)	1.74
6	Test weight(g)	5.98
7	Shelling (%)	6.48
8	Sound mature kernel percent (%)	28.22
9	Protein content (%)	10.43
10	Oil content (%)	7.06
11	Late Leaf Spot (%)	7.04
12	Rust (%)	3.15
13	Pod yield per plant (g)	24.74
	TOTAL	100

Table 14: Mean values often clusters for growth, yield, quality and diseases in groundnut (Arachishypogaea L.)

Cluster No.	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}
I	35.00	29.90	6.32	76.93	5.96	24.67	71.80	40.72	27.69	44.83	73.34	6l.12	8.41
II	36.22	30.31	5.99	12.25	6.15	26.93	68.19	56.33	22.39	45.40	74.64	50.41	9.09
Ill	34.50	33.02	5.65	15.13	7.73	36.21	59.53	47.92	24.13	44.97	66.88	36.19	13.33
IV	34.18	31.04	5.98	15.04	6.52	28.46	68,08	80.12	23.90	47.08	88.46	64.18	9.70
V	3l.30	34.39	6.16	2l.27	13.08	35.70	58.81	53.12	24.39	44.62	42.89	15.11	23.52
VI	35.16	32.13	6.08	15.26	6.99	30.70	55.01	66.33	25.29	46.03	84.91	63.07	12.88
VII	31.00	30.30	10.60	27.68	33.56	29.40	65.87	83.73	27.64	42.12	7l.11	62.23	50.95
VIII	35.92	30.30	5.98	13.70	7.12	33.85	63.75	70.68	23.63	45.41	56.11	37.82	11.33
IX	34.73	32.33	5.98	15.92	6.42	26.25	67.17	49.02	26.72	47.25	89.58	64.96	9.79
X	35.93	31.59	5.93	15.70	7.07	34.01	6l.59	79.09	23.86	46.12	7l.73	46.41	1l.72

X1=Days to 50% flowering
X2=Plant height (ern)
X3=Prirnary branches per plant
X4= Pods per plant
X5= Kernel yield per plant (g)
X6=100 Seed weight (g)
X7= Shelling percentage (%)
X8= Sound mature kernelper cent(%)
X9= Protein content (%)
X10=Oil content (%)
X11= Late leaf spot (%)
X12 = Rust (%)
X13 = Pod yield per plant (g)

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ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

THEME:7 (VASUNDAREEYAM) COSMOLOGY, ECOLOGY, ENVIRONMENTAL AND EARTH SCIENCES

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HAZARD MONITOR: A GEOGRAPHICAL APPROACH

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ABSTRACT: Hazards are threatening to the human society and also burning issues in the present day scenario in the world. Hazards are not only by the nature but also outcome from the human over interaction on the nature. The natural disaster occurs frequently and resulted into not only the damage of the property and assets but also responsible for loss of lives. The consequences of hazards are horrible, settlements are destroyed and irreparable damage has been taken place, soil in productive agricultural areas are swept away and natural habitants degraded. Those who survive can be hit by diseases, suffering and loss that may take years to assuage. Therefore, the attempt has been made in this present paper to concentrate to study the hazards and to discuss the applications of Remote Sensing and GIS in assessing the hazard zone. It may be helped to take necessary preventive measures are to be addressed in forth coming generations.

Key Words: Hazard, Remote Sensing, GIS.

INTRODUCTION: Ever since, from the beginning of history, man has struggled against the forces of nature to establish his mastery over the environment. However, spectacular human development notwithstanding the effects of hazards and the places on the geographical space is often take the form of disaster. As a result, constantly increase in frequency, intensity and its impact not only on the human beings but also on the nature. Disasters are caused not only due to natural hazards but also through the human interference with the environment like accidents, fires, noxious gas leakage etc. The impact of disaster not only depends upon only one force but the effects are multiplier in nature which are not tolerable.

Therefore, an attempt has been made in this present paper to highlight few forms of natural hazards: earthquakes, volcanic eruptions, tsunamis, cyclones, landslides and floods etc., its impact, its prediction and role of latest techniques to assess the damage caused by the hazards as a geographical point of view.

HAZARDS : Hazards are the unpleasant event for the human being in particular and other lives in general, which results in economic disruption, loss of property and loss of life. The hazards are broadly classified into Natural hazards and Anthropogenic hazards. A natural hazard is a threat of a naturally occurring event that will have a negative effect on people or the environment. Many natural hazards are inter-related, e.g. earthquakes can cause tsunamis and drought can lead directly to famine or population displacement. Anthropogenic or human-made hazards occur mainly due to the human interaction with the environment. They include the hazards that have formed only through human interaction, such as acid rain, and contamination of the atmosphere or surface waters with harmful substances, as well as the potential for human destruction of the ozone layer and potential global warming. It also takes place with the human negligence or involving a failure of a human-made system. It results in huge loss of life and property. It further affects a person's mental, physical and social well-being. Both the hazards lead to havoc and huge damage.

DISASTER VULNERABILITY IN INDIA : As per as the disasters are concerned, it has been categorized in to five categories based on the damages on land. These are as follows:
57% of land vulnerable to Earthquakes
23% of land vulnerable to Droughts
11% of land vulnerable to Floods
08% of land vulnerable to Cyclones and
1% Others. Different types of manmade hazards leads to about one million houses damaged annually, in addition to human, economic, social, and other losses.

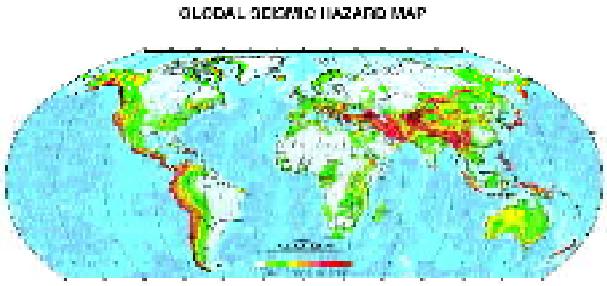
ROLE OF REMOTE SENSING AND GIS : Remote Sensing and GIS is playing the crucial role in providing timely detailed and correct information of the hazards and disasters. This kind of technology helped even beyond the human eyes. Remote sensing has been widely used in hazard detection, mapping, monitoring, damage assessment, and crisis management, and would play a major role in an effective warning system due to its "wide and insightful eyesight". SPOT, IKONOS, LANDSAT, IRS-1C, 1D, OCEANSAT-1 and RESOURCESAT were used for analysis and damage assessment. A technique based on GIS is available to map out the hazard affected areas and prepare the zonation maps that are the best output result for further planning.

The essential characteristics of remote sensing and GIS in providing timely correct and detailed spatial information of a disaster before, during, and after an event. Satellite images are extremely useful and beneficial to in term of accuracy, quality, up-to-dated-ness, timely availability and cost effectiveness. Thus, damage assessments before and after disasters and its capacity to cover a vast area in one acquisition time, satellite remote sensing has been a very powerful tool to monitor the condition of the earth surface and attracted significant attentions among researchers and practitioners of disaster management. The high-resolution satellite imagery, made satellite remote sensing more useful in disaster management since even damage status of individual buildings can be identified without visiting the sites of disasters.

MapAction and its Technology Usage Diagram

HAZARDS AND ITS PREDICTION : Hazards are not inevitable all over the world. But scientists have made great strides in monitoring and predicting the ongoing threat of hazards. Emerging science and technology can help the scientists to predict the hazards and to take proper precautions with the warnings. Thanks to early warning systems, it's now possible to predict the approaching hazards within minutes. The prediction of a natural event is a direct outcome of scientific investigation into its causes and is aimed at establishing the probability of the next occurrence in terms of time, place, and range of severity. Increasingly sophisticated monitoring stations collect information of potentially hazardous events for more accurate prediction.

1.1 Earthquakes : The earthquakes can occur in cycles of decades or centuries and are caused by the sudden release of slowly accumulated strain energy along a fault in the earth's crust. Earthquakes and volcanoes occur most commonly at the collision zone between tectonic plates. Earthquake forecasting and prediction is an active topic of geological research. Geoscientists are able to identify particular areas of risk and, if there is sufficient information, to make probabilistic forecasts about the likelihood of earthquakes happening in a specified area over a specified period. These forecasts are based on data gathered through global seismic monitoring networks, high-density local monitoring in known risk areas, and geological field work, as well as from historical records. Scientists of the U.S. Geological Survey (USGS) have operated seismographic stations throughout the world for more than 35 years and Remote sensing techniques can add-up to the information available through seismic techniques. Generally, the faults associated with earthquakes can be identified on good resolution satellite imagery and along with the geological maps the potential earthquake zones are prepared in a GIS environment. Satellites imageries of IRS, NOAA, SPOT, LANDSAT and IKONOS are of more importance in assessing the damage before and after the event. This type of imagery could be used to assist authorities with immediate mitigation activities such as search and rescue efforts, emergency relief and major infrastructure damage assessment.



1.2 Volcanic Eruptions : There are some 500 active volcanoes around the globe, about 100 of which erupt every year. Volcano monitoring is important simply because an unexpected awakening can imperil thousands of lives over a wide area. Volcanic eruptions are usually preceded by a sudden increase in the number of earthquakes immediately below the volcano and changes in the chemical composition of the gases emitted from a volcanic vent. If these are closely monitored, volcanic eruptions can be often be predicted with reasonable accuracy. Remote sensing techniques can play an important role by providing the vital information particularly; Thermal infrared (TIR) imagery can capture the volcanic heat provided the spatial resolution is high enough which would serve the purpose of finding out the evidence of hazardous activities.

1.3 Tsunami : All tsunamis are potentially dangerous, even though they may not damage every coastline they strike. Damaging tsunamis are very rare. On average, destructive tsunamis occur twice a year, and tsunamis that cause ocean-wide devastation, like the one in 2004, happen only once every 15 years, on average. The Pacific Tsunami Warning Center **(**PTWC**),** West Coast and Alaska Tsunami Warning Center **(**ATWC) and Indian Ocean Tsunami Warning System

is monitoring the seismic events and changes in the tide level and working on early monitoring system. NASA is also heavily involved in the quest to predict deadly tsunamis before it occur. In 2010, researchers at NASA's Jet Propulsion Laboratory successfully demonstrated elements of a prototype tsunami prediction system. Using real-time data from the agency's **Global Differential GPS (GDGPS) network**, the system successfully predicted the size of the tsunami following the Feb. 27, 2010, Chilean earthquake.

1.4 Cyclones: These large-scale low-pressure systems occur throughout the world. The determination of past cyclone paths for the region can be derived from remotely sensed data from the U.S. National Oceanographic and Atmospheric Administration (NOAA) satellite sensors designed and operated for meteorological purposes. Once the cyclone is identified, monitoring allows meteorologists to predict how long the development will take and the eventual path of the storm.

1.5 Floods: Floods are result of excess runoff, which could increase or decrease depending on various factors, such as, intensity of rainfall, snow melt, soil type, soil moisture conditions and land use and land cover. Floods can be predicted with water level tracking systems placed on buoys in the waters. They will measure the speed of current, water level and others. Once the water level reaches a dangerous level, warnings will be given.

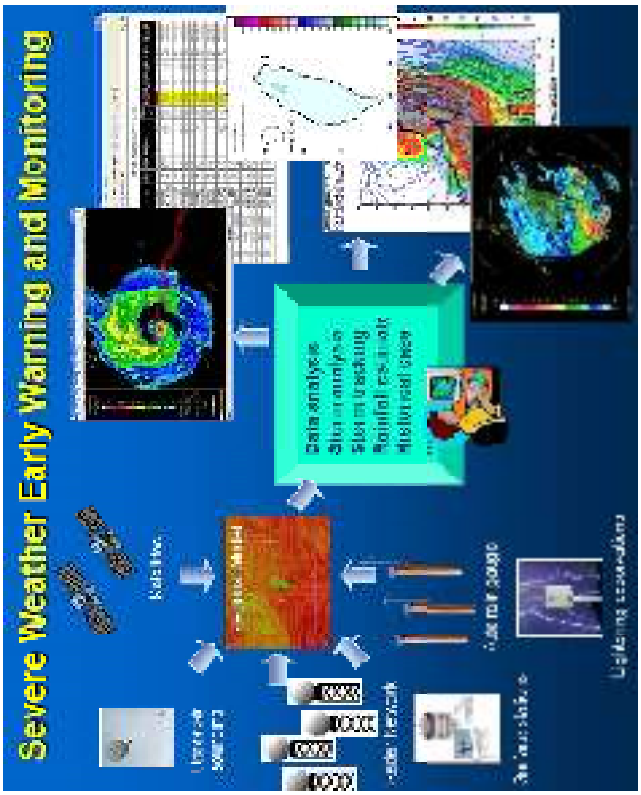
Flood mapping is done by overlaying a pre-flood image and a peak flood image to delineate the area. Damages, in terms of properties and crops, are assessed with the help of existing land use base map (Colby et al, 1999; Brakenridge et al, 1998; Nico et al 2000; Saders and Tabuchi, 2000). Flood prediction based on monitoring the clouds associated with heavy rain can be achieved using satellite imagery.

DISASTER MANAGEMENT : The impact of natural disasters / Hazards can be reduced through a proper disaster management, including disaster prevention, disaster preparedness (forecasts, warning, prediction) and rapid and adequate disaster relief. Mitigation of natural disasters can be successful only when adequate knowledge is obtained about the expected frequency, character, and magnitude of hazardous events. Some types of disasters, like, floods or earthquakes may originate very rapidly and may affect large areas. The use of synoptic earth observation methods (Remote Sensing) has proven to be especially suitable in the field of disaster management. In a number of countries, where warning systems and building codes are more advanced, remote sensing has been found successful to predict the occurrence of disastrous phenomena and to warn people on time.

In disaster management, the aim of the experts (Kundzewicz et al, 1993; Lanza and Conti, 1994; Sabins, 1986) has to monitor the situation, simulate the complicated natural phenomenon as accurately as possible so as to come up with better prediction models, suggest appropriate contingency plans and prepare spatial databases.

There are some of the important steps taken by the experts with the help of technology related to disaster management.

• Quickly assessing severity and impact of damage due to flooding, earthquakes, oil spills and other disasters;
• Planning efficient escape routes from coastal areas during cyclone;
• Finding quickest routes for ambulances to reach victims;
• Locating places for shelter for victims or refugees;
• Calculating population density in disaster-prone areas;
• Rapidly identifying hardest-hit disaster areas in order to provide early warning of potential disasters;
• Pre-disaster assessments to facilitate planning for timely evacuation and recovery operations during a crisis;
• Monitoring reconstruction or rehabilitation after a major disaster; and
• Developing, maintaining or updating accurate base maps.



CONCLUSION : Natural disasters cause damage to life and property on a geographical space in the world in various forms with different dimensions. The pressure on the earth's resources caused by increased population has resulted in increased vulnerability of human and their infrastructure to the natural hazards, which have always existed. Thus, Space technology can help the disaster mitigation process through better future scenario predictions; detection of disaster prone areas; location of protection measures and safe alternate routes etc. Post-disaster satellite data acquisition helps in disaster recovery; damage claim process and fast compensation settlement.

Various satellites and sensors on-board provide with numerous possibilities of analyzing the data for disaster prediction and mitigation purposes. The nature of the natural disasters determines the suitability of sensor types, spectral bands, active or passive radar data and their spectral, temporal and spatial resolutions. Impact of land use on natural disasters and ability to predict them would be one of the main contribution of remote sensing technology. Integration of remote sensing with GIS technology makes it an extremely powerful tool to identify indicators of potential disasters. Information sharing through Internet reduces data acquisition time and thus providing efficient way to carry out real-time disaster predictions (floods, forest fire, tsunami and hurricane etc.).

Hazards are predicted based on the location, strength, and depth below the surface of a quake. A hazard alert is issued on radio channels and TV screens within three minutes for the most at-risk areas, giving a warning to allow residents to evacuate these areas. This type of forecasting is awakened the people in that region to protect their lives. "Prevention is better than cure" slogan holds well and good as far as the prevention measure of all the hazards through the remote sensing and GIS is concerned.

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HIERARCHICAL ORDERS OF PERIODIC MARKETS IN DHARWAD DISTRICT

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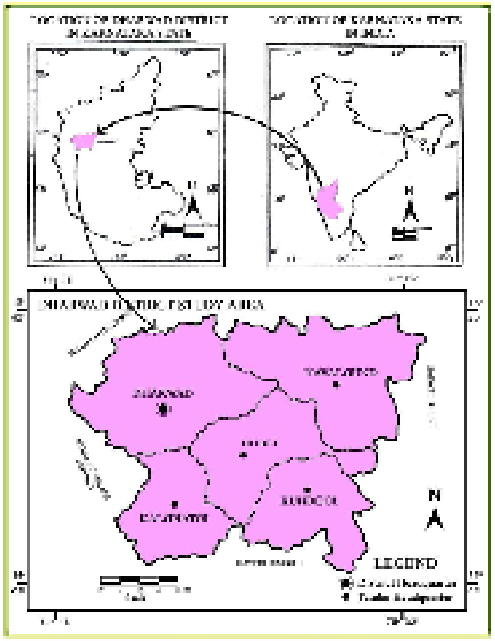
ABSTRACT: Market centers are economically most important and represent the regional pattern of development. Not only this, but also grant various services like trade, commerce to the region and help in rising social contacts, serve as center of diffusion and become focal point for political and other activities. Hence, market centers have prime economic significance in any region. Markets do not offer the stated functions on an equal basis. This is because their developments depend on many factors including, the spatial and temporal organization of the market systems, range of goods and services in them, their spatial accessibility and integration. As a result, the markets exist in a hierarchical organization whereby lower order ones are linked up to the higher-order ones. The spatial organization of the markets centers and their functions are the foremost consideration in this paper. The eight functions have been selected as the parameters. The Christaller Central Place Model has helped to determine the hierarchy and accordingly the hierarchical orders of market centers have been determined.

Key Words: Functions, Spatial Organization and Hierarchy.

INTRODUCTION : The concept of hierarchy plays an important role in the planning of any geographical regions in the world. The planning is one of the aspects of the geographers and is keen to preparing a plan to achieve either a rural development or regional development. Therefore, the present paper aims to discuss the hierarchical orders of periodic markets in Dharwad district from the rural development point of view. The last orders of markets are definitely reflects the planning strategy for further development. Hence, the present study would help to improve the marketing transaction in the interior parts of the districts. The hierarchical pattern of the market centre is a universal phenomenon. Although each market settlement has its individual status, at the same time it is also an integral part of a regional system which has its functional and spatial interrelationship with other market settlements (Saxena, 2006**).** The hierarchy of market centers is very important since they aid in the investigation of the significance of a market within its region. The hierarchical importance of a service centre must depend upon the number and quality of functions it performs for a region and provide a base for regional development and planning. Always the larger cities are functionally more complex than the smaller ones and functional complexity is infact, related to the size of the centre and its complimentary region (Reilly, 1929). The analysis of functions and assessment of hierarchy are undoubtedly very important aspects of regional central place studies. Most of these studies are linking from micro-level to macro level, and helps to identify the spatial gaps to achieve the regional development through the spatial planning strategy.

STUDY AREA : The study area is located at the fringe zone of Semi -Malnad and Maidan of the north-western parts of

the Karnataka state .It has extended between $15^0.2'$ to $15^0 42'$ northern latitude and $74^0 43'$ to$75^0 32'$ eastern longitude having five talukas namely; Dharwad, Hubli, Kalaghatgi, Kundgol and Navalgund .There are 367 Revenue villages and 27 Hamlets, six Urban Centers with five Municipalities, 127 Gram Panchayat. The study region has an area of 4263 square kilometers with population of 1847023. The density of population is 433 persons per square kilometers (2011census). The Navalgund taluk (1080 sq km) is biggest and Hubli taluka (631sqkm) is the smallest taluka in terms of area.



OBJECTIVES

The present study has the following objectives.

1. to study the functions of periodic markets.
2. to determined the hierarchical orders of market centers based on selected parameters.
3. to suggest the measures for further development of periodic markets in the study region.

HYPOTHESIS

The confined study has the following hypothesis. It is hypothised that…….

1. The levels of hierarchical order is directly related to the levels of functions in the market.
2. The lower order markets perform the lower level functions and visa, versa.

DATABASE AND METHODOLOGY : The present paper is based on the both primary data and secondary source of information. The primary source of information is collected through questionnaire method. The secondary source is collected from different offices related to the parameters. The weightages have been given and Centrality Index has calculated. On the basis of Composite Index the hierarchy has been determined based on the Christaller Postulations. The features of hierarchy have been analyzed.

CONCEPT OF HIERARCHY : The concept of hierarchy is very common in geographical study and widely used for determining the categories. In marketing geography it simply means ranking of market centers into successive groups or orders on the basis of a single or a set of variables. It is a fact that, in every region there are fewer larger markets then and smaller ones and their characteristics can be explained properly when hierarchical orders are determined. Such hierarchical order is fundamental to central place models of Christaller and Losch. Similarly Berry and Garrison demonstrated how hierarchies arise on the basis of "threshold". The concept of central place hierarchy refers to the existence of stepped or discontinuous pattern of relationship between population size and functional range. This is a series of distinctive level or orders of central place, which at each limit or order perform set of functions which distinguish this from all the others (S C Singh, 1981).

REVIEW OF LITERATURE : The work of Walter Christaller (1933), in the form of central place theory may be considered as a pioneering work dealing in the hierarchy of central places, both theoretical and empirical in south Germany. The essence of the theory is that a certain amount of productive land supports a center which exists because essential services must be performed for the surrounding land. Dewey (1962), explain a hierarchy of markets through which goods move vertically and horizontally in a series of transactions**.** Skinner (1964), determined five hierarchical levels of markets, namely, minor markets, standard markets, central markets, intermediate and regional markets. Berry (1967), observed seven levels of hierarchy, viz., hamlet, village, large village small town, regional centre, regional metropolis and national metropolis based on different variables and their correlation. Identification of the hierarchy of central places in South –western Iowa, South Dakota and Chicago is the most notable work in the USA by Berry. Abiodun (1967) described the existence of hierarchy of settlements in Ijebu Province of South-western Nigeria through historical factors and the level of economic development in the area. Abiodun identified 74 settlements as qualified for treatment through the use of Principal Component Analysis but only 36 were found to contain certain traits of Central Place Theory's requirements. Mabogunje (1968) identified the development of hierarchy of service centers in South Western Nigeria with the old "Yoruba Empire" which was made up of numerous kingdoms such as Oyo, Owu, Ife, Ijebu, Ijesa, Ekiti, Ibadan, Egba, and Igbomina. The major trading centre was at Ibadan which later developed to become the largest urban settlement in the region. In sum, Mabogunje concluded that, the distribution pattern of cities in Yorubaland can be said to merely approximate Christaller's Central Place Hierarchy. Thorpe (1968), developed hierarchy of service and trade centers in the U.K. on the basis of sale figures of all English centers, and identified seven types of

centers, viz. regional centers, sub regional centers, area centers, major centers, district centers, local centers and village or small suburban centers. Miracle (1969) observed three functional categories of markets such as, local markets, assembly markets and urban markets. Saxena (1971) determined the hierarchy of market centers of Hadaoti region on the basis of four variables such as, periodicity, commodity structure, and extent of service area and also the nature of population served. Garnier and Delobez (1979) opined that hierarchy of market centers can be determined by equipment such as Varity of specially shops, quality of shops, conditions of the shops, Varity of goods sold forms of organizations etc. Singh (1981), described that, the central places or service centers of different orders have a complementary area established by the ranges of the goods and services, located in that vicinity, the higher order centers have a large number of functions of a more specialized nature and serve to larger population within a longer range of distance, where as the lower order centers provide a low level of goods and services within a short distance. Dixit (1989) considered shop opening days as one of the indicators to arrive at a composite hierarchy in his studies on Hamirpur District. Shrivastava (1991) defined the three tier market hierarchy of Miracle and has used different terminologies to determine the market hierarchy as Primary, Village or Weekly markets, Regional, Secondary or Mundi markets and Terminal, Wholesale markets. Hugar (2000) observed that, cess or market fees as one of the prime indicators to arrive at composite hierarchy in his studies of Gulbarga district. In this connection, an attempt is also made by Mulimani (2006) determined the hierarchy of market centers in Raichur district by using composite index.

Table 5.1: Hierarchy of Market Centers

Sl. No.	Centrality Index	No. of Market Settlements	Hierarchical Orders of Market Settlements	Name of Market Settlements
1.	100	02	I Order	Dharwad and Hubli.
2.	92.85-80.35	05	II Order	Kalghatgik Kundagol, Navalgund, Alnaver and Annigeri.
3.	63.69- 50.00	13	III Order	Amminbhavi, Garag, Hebballi,Narendra, Tadakod, Uppin Betgeri, Hebsur, Noolvi, Unkal, Bommigatti, Gudgeri, Saunshi and Shelvadi.
4.	47.61- 40.47	22	IV Order	Tegur, B- Aralikatti, Byahatti, Koliwad, Warur, Dumawad, Hulkoppa, Mishrikoti, Tabkad Honnali, Hireharkuni, Hiregunjal, Ingalgi, Kamdoli, Kubihal, Mattigatti, B Taralghata, Yaliwal, Alagwadi, Byalal, Gumgol, Hebbal and Morab.
5.	39.88 - 26.78	08	V Order	Kalas, Hanshi, Javoor, Sirkol, Shirur, Tirlapur, Nigadi and Mugud.

Source: Personal Computation, 2012.

FEATURES OF HIERARCHY : The hierarchical order does not agree with the natural breaks of population ranking. Shrivastava (1987) noticed a similar phenomenon in his study on Tarai regions of Uttar Pradesh. Some of market centers with low population size are found in higher orders of hierarchical groups. Hugar (2000) observed the same phenomenon while studying the market centers of Gulbarga District. Mulimani (2006) also defined that, the some market centers in Raichur District with low population size are found in higher orders of hierarchical groups. Similarly, many examples can be cited. Hence, the present central place system is not directly correlated to its population size.

The higher order markets are tend to exhibit specialization of commercial activities as compared with the lower order centers. In the study region it is observed that, the market centers with low population size have achieved the higher status tending towards a greater degree of specialization namely, Bommigatti, Hebsur, Narendra, Noolvi, Shelvadi, Tadakod etc. Narendra and Tadakod the dominating factors responsible for achieved higher status are development of industries near these settlements.

FIRST ORDER MARKET CENTEERS : At the apex of the market hierarchy are Dharwad and Hubli. Drarwad being the district headquarter and Hubli being the Commercial center, both cities enjoy historical, economic, social, political and administrative status. These two cities have scored the maximum points in the centrality index and occupied half of the population of the district i.e. 943788 according to 2011 census. These cities are not only high level functions in all facilities but also collection and distribution of number of goods of varying types, order and quality. Large number of traders, middlemen and big producers are engaged in marketing activities of various agriculture and non- agricultural commodities. Specialization in numerous services is common feature. Therefore the gravitational pull unparallel in the study region. As a result these cities attract the people from the district as well as neighbouring districts and provide specialized high level services like medical, banking, insurance, educational, transportation and communication etc. As numerous services are available people have visit these centers for

higher order luxury goods. Farmers also bring their produce, as they are sure to get fair prices and sufficient demand for their commodities. Both cities are having big regulated markets, which attracts farmers from all talukas. Both cities are well connected by Broad Gauge Railway, National Highway, State Highway and Major District Road. Hence they are able to attract various commodities not only from surrounding talukas but also from neighbouring districts of the state.

SECOND ORDER MARKET CENTEERS : There are five second order market centers, which are mostly taluka headquarters and towns. Centrality index of these centers varies from 92.85 – 80.35 viz., Kalghatgi, Kundagol, Navalgund, Alnaver and Annigeri. These market centers are connected with National Highway, State Highway, Broad Gauge Railway, Major District Road, which have enabled them to serve respective talukas for wholesale as well as retail transactions. Markets of these categories serve different number of villages. Although these market settlements have arranged as per centrality index, there are considerable variations in respect of population and settlement serve etc, which may be related to the conditions prevailing in the region. These market centers also act as a center of attraction in particular taluka since the taluka headquarters are always visited by people with multipurpose. Along with marketing they tend to perform other functions such as administrative, recreational, financial, medical etc. While centers like, Alnaver and Annigeri are towns which also attract the people from surrounding villages. Availability of required goods and services, which are not found in lower order market centers, is the main reason for growth of such market centers. These market centers are also having main regulated market or sub-regulated market for handling wholesale transactions.

Table 5.2 I and II Order Markets

Sl No.	Name of the market centers	Centrality Index	Population Served	No. of Settlements Served
I Order				
1	Dharwad	100		
2	Hubli	100		
II Order				
1	Kalghatgi	91.07	16917	11
2	Kundagol	87.05	18726	11
3	Navalgund	92.85	24613	12
4	Alnaver	82.14	17228	09
5	Annigeri	80.35	28267	08

Source: Personal Computation, 2012

THIRD ORDER MARKET CENTERS : The hierarchal system of third order consists of thirteen market settlements and there are no urban centers which fall under this order. Their centrality index ranges from 63.69- 50.00.Such as Amminbhavi, Garag, Hebballi, Narendra, Tadakod, Uppin-Betgeri, Hebsur, Noolvi, Unkal, Bommigatti, Gudgeri, Saunshi and Shelvadi. These market centers are bigger compared to other rural markets and growing rapidly. Here, the inhabitants of surrounding villages assemble to sell their produces/ commodities and purchased their daily requirements for their daily consumption. These market centers are handling mostly retail business, most of the market centers namely, Hebsur, Noolvi, Unkal, Gudgeri, Saunshi and Shelvadi are having sub-regulated markets. Thus, small and marginal farmers usually visit these markets. The distribution of this category of market centers is governed by many factors such as population severed, number of settlement severed etc. It is important to mention that, there is at least one market center in each taluka under this category and also an important market next to taluka headquarters and towns. Such markets are the most useful for mobile traders as well as part time traders.

Table 5.3: III Order Markets

Sl No.	Name of the market centers	Centrality Index	Population Served	No. of Settlements Served
1	Aminbhavi	51.19	12243	06
2	Garag	59.52	10528	07
3	Hebbali	53.57	12659	07
4	Narendra	50.00	5276	06
5	Tadakod	51.78	6524	06
6	U-Betgeri	61.90	7931	11
7	Hebsur	57.73	6245	07
8	Noolvi	52.97	7514	05
9	Unkal	57.73	——	06
10	Bommigatti	53.57	3731	10
11	Gudgeri	60.11	9886	07
12	Saunshi	63.69	12848	08
13	Shelvadi	52.38	6933	08

Source: Personal Computation, 2012

FOURTH ORDER MARKET CENTERS : The number of forth order market centers are highest among all orders of the market centers in the study region. There are twenty two markets, which are widespread in the study region. Some market settlements of this order are, Alagwadi and Morab have been sub- regulated market yards. These markets are generally small periodic markets which are characterized by medium size villages and market meeting is held for few hours on market day with less no of market participants. They deal only in retail business. The traders come to sell in small lots to local people hence, these markets are small collection or assembly points. The mobile sellers generally erect some shed on open spaces and the articles daily use, are exhibited. Most of such market centers are located either on roadside or in most open space near village panchayat.

In spite of the fact that these market centers belong to the fourth hierarchical order of the study region their importance must not be ignored. These are the centers, which supply the articles of daily use such as vegetables, grains, spices, stationary, toys etc to the rural folk. As a matter of fact they

serve as the most immediate trade centers functioning as feeder markets of the surroundings rural landscape itinerant traders sell articles to the rural people. It is quite clear from the study that these small rural markets are held at selected villages under the administration of village panchayat. These markets attract a few surrounding villages. Hence they play an important role in the agrarian economy of the study region. These markets tend to reflect socio-economic and cultural status of the rural folk. Hence the development of these markets is the development of rural economy. Many of the markets in these categories tend to stabilize the market area. The distribution of this category of market centers is governed by many factors. The centrality index value of these markets ranging between 47.61- 40.47.Further the recent studies have indicated that, only 50 percent of the agricultural products are being handling by the regulated markets and the remaining produces enter such rural markets by small and poor farmers. This situation provides ample scope for the development of primary market structure. Integrated rural development programme cannot be accomplished without the development of rural markets (Narasimhan 1991).

Table 5.4 IV Order Markets

Sl. No.	Name of the market centers	Centrality Index	Population Served	No. of Settlements Served
1	Tegur	44.04	3010	06
2	B-Aralikatti	41.66	4357	05
3	Byhatti	46.42	11384	07
4	Koliwad	41.66	5220	05
5	Warur	44.04	3265	05
6	Dummwad	41.66	3827	05
7	Hulkoppa	41.66	1782	07
8	Mishrikoti	41.07	9006	05
9	T-Honnali	41.07	4170	05
10	Hireharkuni	41.81	4721	05
11	Hiregunjal	45.23	2199	05
12	Ingalgi	40.47	4224	05
13	Kamdolli	42.85	7931	06
14	Kubihal	42.26	3683	05
15	Mattigatti	42.26	2908	05
16	B-Tharalgatta	41.07	3458	05
17	Yaliwal	42.26	5212	05
18	Alagwadi	47.61	5838	05
19	Byalal	42.26	1715	06
20	Gumagol	42.26	2861	06
21	Hebbal	41.07	3522	05
22	Morab	44.64	9634	04

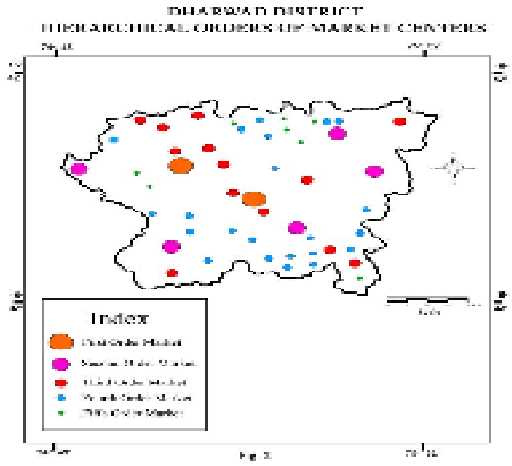
Source: Personal Computation, 2010-11

FIFTH ORDER MARKET CENTERS : This group accounts for eight markets which are situated on rural roads. Their centrality index ranges from 39.88-26.78. These are tiny markets handle only retail trade. The markets comes under this order are Kalas,Hanshi, Javoor, Shirkol, Shirur, Tirlapur, Nigadi and Mugad. These markets severs the limited number of surrounding villages however, these trading centers can be used as focal points of implementation of rural development of the district itself.

Table 5.5: V Order Markets

Sl. No.	Name Of The Market Centers	Centrality Index	Population Served	No. Of Settlements Served
1	Kalas	39.88	7219	06
2	Hanshi	38.69	2127	04
3	Javoor	38.69	2117	04
4	Shirkol	38.69	3668	04
5	Shirur	38.69	3260	04
6	Tirlapur	38.69	5585	04
7	Nigadi	36.90	2295	04
8	Mugad	26.78	5085	04

Source: Personal Computation, 2012



MEASURES FOR THE FUTURE DEVELOPMENTS : Rural markets have been established to be very important to the development of rural communities in developing countries. It is therefore necessary that planners pay greater attention towards sustainable development. This is because an understanding of the ability of a rural market to support a particular service or establishment is a pre-requisite to designing appropriate development strategies. Further, it has been observed that the primary function of all markets is to facilitate the movement of produce between producers and consumers. Therefore, the upgrading of the markets to perform the stated function requires their integration with rural development programmes. This means that, the improvement of the market should be combined with the programmes for general upgrading of post-harvest handling facilities, access road improvement, rural electrification and rural water supply.

This investigation of the markets hierarchical structure provides an important starting step toward market development in particular and rural development in general in the study region. This is because, the understanding of the structure

will enable planners to appreciating how effective the markets act as central places which will guide their policy on rural market development. Based on the analytical observation in the study region, the following measures are considered to be worth implementing in strengthening the existing hierarchical order of market centers. Fourth order and fifth order market centers are inadequate and have insufficient infrastructural facilities to strengthen these market centers, authorities should take care and provide facilities like; Nationalized Banks, Primary Health Service facilities etc. In this context, improvement in the conditions of above mentioned functions will go long way in covering the un-served areas effectively. The market centers of third order are the main connection among rural and urban centers, they should be provided with required infrastructure as well as administrative structure to handle more transactions of a variety of services to minimize the laymen approaching the higher order market centers for small transactions. These market centers should be made to attract people from outside the settlement area to curb the agents of traders and service providers.

CONCLUSION : The composite scores of centrality, clearly indicate high difference between the lower and higher values of centrality score. It is observed that, the places having high centrality value are located in the town or city and big villages. Although there are five hierarchical orders of markets centers are found in the study region. The marketing system as a whole has a distinctive significance for interrelationship among different levels of hierarchy of the market centers. There are two first order market centers have been functioning in the study region i.e. Dharwad and Hubli cities which are more assessable to the other lower order market centers of the study region. So far hierarchical system of market centers is concerned, due to large deviation in assumption is reality. The hierarchical class system of market centers derived is very important and it will be useful for solving various problems in the area and it will provide information to the planners and decision makers for the regional planning and overall development of the region.

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THREATENED AMPHIBIAN FAUNA OF WESTERN GHATS : CAUSES AND REMEDIES

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ABSTRACT: Amphibians are the most important component of ecosystem. They are threatened worldwide and are declining rapidly, mostly due to anthropogenic pressures. The species richness is high in humid tropical forests and comparatively poor in the semi arid and arid regions of the world. Amphibians are generally classified into three orders. The first order Caudata comprises newts and salamanders. The second order Gymnophiona/Apoda consists of caecilians of which only very few species are now existing. The third order Anura comprises about 3500 species of frogs and toads which constitute about 75% of the total amphibians.

About 51 mllion hectares of land has been estimated to be available as the habitat of amphibians, such rich and interesting amphibian fauna, India has. Direct habitat destruction has been considered as a reason for the major loss of bio diversity. Clearance of forest also causes desiccation of forest floor and also eliminates insects, which is an important food of amphibians. Forest fire is another threat to amphibian population in drier forests. Pollutiion of water bodies, toxic chemicals, industrial discharge , ammonia ,copper, iodine and many other compounds have proven lethal. The growths of tadpoles have found to be retarded when exposed to fenithroin & carbaryl. Global warming, Acid rain, effect of UV radiation are symptoms of multiple environmental stresses.

Captive breeding and reintroduction of species which are locally extinct, might help in sustaining populations. Genetic engineering provides yet another scope. The government should take strict measures against releasing the untreated effluent into the water courses. There is a desparate need of systematic long term studies of amphibian communities in tropical regions to appreciate the causes of mysterious species declines. The area of western ghats is one of the world's ten "Hottest biodiversity

hotspots" and has over 5000 species of flowering plants, 139 mammal species, 508 bird species and 179 amphibian species; it is likely that many undiscovered species live in the Western Ghats. At least 325 globally threatened species occur in the Western Ghats.The range starts near the border of Gujarat and Maharashtra, south of the Tapti river, and runs approximately 1,600 km (990 mi) through the states of Maharashtra, Goa, Karnataka, Tamil Nadu and Kerala ending at Kanyakumari, at the southern tip of India.

Keywords: Amphibian fauna, classification, lethal causes, strict measures, long term studies

INTRODUCTION : Amphibians are commonly known as the animals which live a double life; These definitions may not be acceptable in true sense because there are certain species of amphibians of which lead a fully aquatic life while some others never willingly enter the water during their life. Nevertheless, many species have a bimodal life-style and because of this peculiar feature all these species are known as amphibians. Generally, all amphibians lay eggs in water, and development involves metamorphosis. The aquatic larval life is followed by a life on land in case of many species. But most adult amphibians are aquatic or semi aquatic. The habitat preference of these cold-blood vertebrates varies from arid and wamp to permanent water. Though amphibians are found from equator to Arctic circle, no species has a worldwide distribution. The species richness is high in humid tropical forests and comparatively poor in the semiarid and arid regions of the world.

The species richness is high in Western Ghats or sahyadri mountain ranges. The regions are Gujarat, Maharastra, Karnataka, Kerala & Tamil Nadu.

SUBCLASSES OF CLASS AMPHIBIA:

- Caudata – newts and salamanders: The caudata have a long, narrow body comprising head, trunk and tail. The tail assists in locomotion, both on land and in water. It may bear a tail fin devoid of fin rays. Skin is scaleless. Eyes are small and have eyelids in land forms. Middle ear is absent. There are no sensory tentacles on the head. Gills and gill slits may persist in the adult.Both the pairs of the limbs are weak and nearly of the equal size. Vocal cords are absent.Skull is poorly ossified.Fertilization is usually internal. Larva resembles the adult in body form so that its metamorphosis into an adult is less marked.It includes two orders:
Perennibranchiata and Caducibranchiata
- Apoda- Ichthyophis and gegenophis: The Apoda have a long worm like body marked externally by ring like grooves. It consists of only head and trunk.The tail is practically absent and anus being nearly terminal.Skin may contain minute dermal scales embedded deep in it. Eyes are very small and non-functional, being buried beneath the skin or under the skull bones. Middle ear is absent. Fertilization is internal, male having a protrusible copulatory organ for this purpose.
- Anura-Frogs and toads: The anura have a short, broad body comprising head and trunk. Tail is lacking in the adult. Skin is scaleless. Eyes are large and have eyelids. Middle ear is generally present.There are no sensory tentacles on the head.Gills and gill slits disappear in the adults. Fertilization is external.Larva is very different from the adult so that its metamorphosis into an adult is marked.The sub class anura is divided into two orders: Aglossa and phaneroglossa.

Table 1: Endemic and Non-endemic amphibians of India and the Western Ghats.

Group	Family	Genus	Species	Endemic (non-endemic)
Anura(Frogs and toads)	11	49	278	
Caudata (Salamanders)	01	01	01	
Gymnophiona (Caecilians)	02	04	33	
Total in India	14	54	312	
Anura(Frogs and toads)	09	25	135	115(20)
Caudata (Salamanders)	0	0	0	0
Gymnophiona (Caecilians)	02	04	23	23(0)
Total in western ghats	11	29	158	138(20)

Table 2: List of families of amphibians reported from India and corresponding distribution of genera andspecies in India and the Western Ghats.

Group/Family	Genera In India	Species In India	Species in the WG
ANURA			
Bufonidae	7	27	14
Dicroglossidae	12	58	24
Hylidae	1	1	0
Megophryidae	4	16	0
Micrixalidae	1	11	11
Microhylidae	7	23	13
Nasikabatrachidae	1	1	1
Nyctibatrachidae	1	16	16
Ranidae	6	30	4
Ranixalidae	1	10	10
Rhacophoridae	8	84	42
CAUDATA			
Salamandridae	1	1	0
GYMNOPHIONA			
Caeciliidae	2	12	11
Ichthyophiidae	2	21	12
TOTAL	54	311	158

The Western Ghats harbours 161 species of which137 are Anurans (frogs and toads) and 24 are Gymnophiona (caecilians) belonging to 11 families and 30genera (Table 1). The families Micrixalidae, Nasikabatrachidae and Ranixalidae are exclusive to theWestern Ghats represented by only one genus, whereas the Family Nyctibatrachidae is endemic to bothWestern Ghats and Sri Lanka with genus Nyctibatrachus endemic to the Western Ghats and genus Lankanectus to Sri Lanka.The amphibians of the Western Ghats are very diverse and unique, with nearly 87 percent (138 species)of the 158 species are endemic to this region, which is highest for any group of animal in the WesternGhats.

THREATENED SPECIES: According to 2006 IUCN red list assessment, 30 percent of the Western Ghatsamphibians are threatened, 4 percent is near threatened, 29 percent is data deficient and 22 percent isleast concern (Figure 1). The species *Raorchestes travancoricus* is assessed as extinct. Twenty-twospecies of globally threatened species of amphibians found in the Western Ghats are highly restrictedand occurs only in one or two locations (Das et al., 2006). Since year 2000, over 50 new species havebeen described from the Western Ghats, status of which has not been assessed yet. Highest number of threatened species is found in the genera

Raorchestes (11 species) and Nyctibatrachus (9 species). This is mainly because of their specialised habitat requirements and restricted distribution.

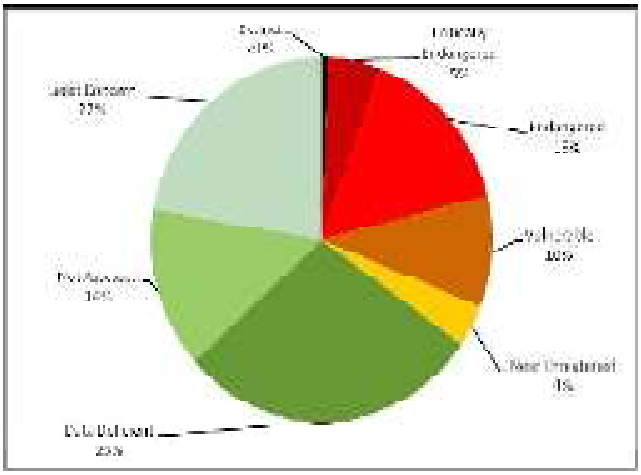

Fig 1: Number of amphibians in different IUCN categories

Nasikabatrachus sahyadrensis is a frog species belonging to the family Sooglossidae. It can be found in the Western Ghats in India. Names in English that have been used for this species are **purple frog**, **Indian purple frog** or **pignose frog**. Although the adult frog was formally described in October 2003, the taxon was recognized much earlier by its tadpole, which had been described in 1918. With its closest relatives in theSeychelles, *Nasikabatrachus* is thought to have evolved separately for millennia. Its discovery also adds to the evidence that Madagascar and the Seychelles separated from the Indian landmass sometime well after the breakup of Gondwana had started.This is endangered species(IUCN 3.1)

Nasikabatrachus sahyadrensis

Salamandridae

The Salamandridae are a family of salamanders consisting of true salamanders and newts. Currently, 74 species (with more expected) have been identified in the Northern Hemisphere - Europe, Asia, the northern tip of Africa, and North America. Salamandrids are distinguished from other salamanders by the lack of rib or costal grooves along the sides of their bodies and by their rough skin.In western ghats its extinct species.

Ichthyophiidae

the Ichthyophiidae are the family of Asiatic tailed caecilians or fish caecilians found in South and Southeast Asia as well as southernmostChina.

They are primitive caecilians, lacking many of the derived characters found in the other families. For example, their mouths are not recessed underneath their heads, they possess tails, and they have numerous scales on their bodies. However, they have two sets of muscles for closing the jaw, a feature unique to caecilians, but absent in the related family Rhinatrematidae. It is almost endangered species.

CONCLUSION:

Long-term monitoring: In India, we do not have a national long-term monitoring program for anygroups. The need of the hour is to have national program on long-term monitoring program for studying 20 amphibian communities. The program should be based on statistically sensitive monitoring approach as suggested by Storfe (2003). Studies have noted that populations of most of the amphibians generally fluctuate and also the population tend to decline between years than they increase (Storfe 2003). Long-term monitoring program will be able to address cause and consequence of amphibian population fluctuation in the wake of climate change and increased human disturbance on to its habitats.

Innovative conservation measures: In some agricultural regions, natural wetlands are scarce, and constructed agricultural ponds may represent important alternative breeding habitats for amphibians. Properly managed, these agricultural ponds may effectively increase the total amount of breeding habitat and help to sustain populations (Knutson et al., 2004).

Popularizing amphibian conservation: Awareness and education is the key for any successful biodiversity conservation program. This is especially true in Indian scenario. In case of amphibians, of late there has been some effort in creating awareness and education among various sections of thesociety and stakeholders. But this effort has to be magnified for better conservation. The major hurdle in popularising amphibian watching is the lack of good illustrated/ photographic guide of amphibians unlike birds or butterflies.

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IMPACT OF CLIMATE CHANGE ON TRI-TROPHIC INTERACTIONS IN PLANT ECOSYSTEM

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Abstract: Given the fundamental role of agriculture in human welfare, concern has been expressed by federal agencies regarding the potential effects of climate change on agricultural productivity. In the near future, agriculture will inevitably face challenges caused by climate change, which might lead to both global and local alteration**.** Global carbon dioxide (CO_2) concentration has been increased by approximately 30 % since the industrial revolution believed to be responsible for an increase of ~0.66 °C in mean annual global surface temperature; meanwhile it will increase further by 1.4-5.8 °C by 2100 with

equally increasing atmospheric CO_2 since pre-industrial value of about 280-379 ppm in 2005, will pass 550 ppm by 2050 and a value of 770 ppm is expected for 2100 as a result of fossil fuel use and deforestation. Such climatic changes could profoundly affect insects both directly by seasonal shifts of insects and indirectly *i.e.,* changing phytochemistry, changing predators increasing insect pests' population.

Enriched atmospheric CO_2 and temperature can have various effects at different trophic levels in ecosystems *viz.,* plants, herbivores, predators and parasitoids. The tri-trophic interactions among plants, herbivores, and predators are a topic of long-standing interest in both community and evolutionary ecology. For nearly half a century, it has been recognized that predators can facilitate plant growth from the top-down by protecting plants from their herbivores. Plants simultaneously affect predators from the bottom-up. They do so indirectly *via* their influences on the chemical composition of herbivore tissues and directly by emitting predator attracting volatiles and by providing the physical habitats in which predators reside. However, across the trophic levels, the change is slow and might be attributed to the magnitude of transfer of energy from one trophic level to other;

Introduction : Given the fundamental role of agriculture in human welfare, concern has been expressed by federal agencies and others regarding the potential effects of climate change on agricultural productivity. In the near future, agriculture will inevitably face challenges caused by climate change, which might lead to both global and local alteration. Enriched atmospheric carbon dioxide (CO_2) and temperature can have various effects at different trophic levels in ecosystems *viz.,* plants, herbivores, predators and parasitoids. Global CO_2 concentration has been increased by approximately 30 % since the industrial revolution believed to be responsible for an increase of ~0.66 °C in mean annual global surface temperature; meanwhile it will increase further by 1.4-5.8 °C by 2100 with equally increasing atmospheric CO_2 since pre-industrial value of about 280-379 ppm in 2005, will pass 550 ppm by 2050 and a value of 770 ppm is expected for 2100 as a result of fossil fuel use and deforestation (IPCC, 2007). Such climatic changes could profoundly affect insects both directly by seasonal shifts of insects and indirectly *i.e.,* changing plant phytochemistry, changing predators increasing insect pests' population (Aslam *et al.,* 2013).

The tri-trophic interactions among plants, herbivores, and predators are a topic of long-standing interest in both community and evolutionary ecology. For nearly half a century, it has been recognized that predators can facilitate plant growth from the top-down by protecting plants from their herbivores. Plants simultaneously affect predators from the bottom-up. For example, they do so indirectly *via* their influences on the chemical composition of herbivore tissues and directly by emitting predator attracting volatiles and by providing the physical habitats in which predators reside. The direct "fertilizing" effects of enriched atmospheric CO_2 on plant growth, physiology and community structure have been well documented. In general, elevated CO_2 increases biomass, reduces foliar nitrogen and increases C:N ratio for most plants, especially C_3 plants. Elevated CO_2 also generally decreases nitrogen concentrations and increases phenolic and carbohydrate concentrations and C:N ratios (Lindroth, 2010).

Global Warming and Climate Change : Climatic variability, together with increase in atmospheric temperature and carbon dioxide has lot of implication in agriculture sector. Latest assessment report from the Intergovernmental Panel on Climate Change (IPCC) predicts an increment in mean atmospheric temperature from 1.4 to 5.8°C toward the year 2100 with equally increasing atmospheric carbon dioxide (CO_2).Since from industrial revolution both CO_2 and temperature increasing rapidly.Increase in atmospheric temperature and carbon dioxide do have lot of implication in agriculture sector. Elevated levels of CO_2 (e-CO_2), the most important anthropogenic greenhouse gas, have positive effects on plant growth and yield. Levels have increased from a pre-industrial level of about 280 ppm CO_2 to 379 ppm in 2005. On its present trajectory, atmospheric CO_2 will pass 550 ppm by 2050.

Global warming is nothing but increase in the overall global temperature more than normal leading to consequences like climate change. Global warming is caused by two factors namely Natural events - Volcanic eruptions, Solar variations, Earths orbital changes etc. Dust particles from volcano will result cooling effect on environment. Aerosols tiny particles reflect solar radiations back into atmosphere. A case study, 1991, regarding Mount Pintatubo in Philiphines lowered global temperature by about 0.4 - 0.5 ^oC and made made causes result in Green house effect due to burning of fossil fuel, methane emission from paddy field and cattle population and deforestation. In 2005, burning fossil fuels sent about 27 billion tonnes of carbon dioxide into the atmosphere. Studies say that 1gm fuel = 3 gm CO_2. When fossil fuels like coal, oil and gas are burned, they release greenhouse gases.

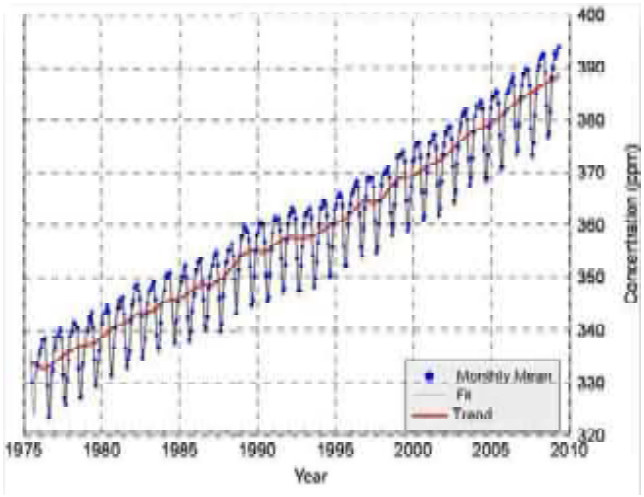
The greenhouse effect is the natural process where the atmosphere traps part of the sun's energy, a necessary process to keep the planet warm enough for life as we know it. Today scientists believe an anthropogenic increase in greenhouse gases such as carbon dioxide is increasing the effect dramatically and causes anthropogenic climate change. Green house gases include carbon dioxide, methane, nitrous oxide and water vapors.

Change in climate over time, either due to natural variability or as a result of human activity is called climate change. Climate change in terms of change in rain and snow pattern, change in animal migration and life cycles, stronger storms, higher temperature and heat waves, more drought and wild fires, damaged corals, rise in sea levels, warmer oceans, less

snow and ice, changes in plant life cycles and thawing permafrost. Permafrost refers to a layer of soil or rock that is frozen all year round. Permafrost is found throughout much of Alaska, parts of Canada, and other countries in the far north. You might think a place with permafrost would be barren, but plants can still grow in the soil at the surface, which is not frozen during warmer parts of the year. However, there may be a thick layer of permafrost underneath. As air temperature rises, so does the temperature of the ground, which can cause permafrost to thaw (or melt).

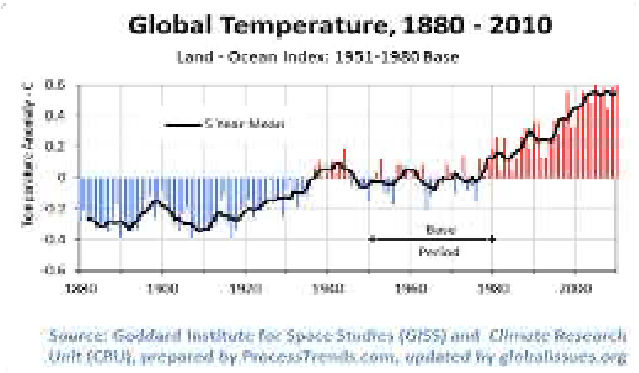
According to IPPC, there are about twenty countries around the World in the verge of extinction due to rise in sea level resulting from global warming. The last days of paradise are on and what we aspire to give our great grand children is nothing but a world worth not living.

Past, present and future trends of atmospheric Co_2 and temperature : Global mean temperature has increased by 0.66° C during the last 100 years. Global average sea level has increased at the rate of 1.8 mm/yr over 1961 to 2003. About 3.1mm/yr over 1993 to 2003. Frequency of heavy precipitation events has increased over most land areas. According to National Oceanic and Atmospheric Administration In 2006 the global average atmospheric concentration of CO_2 was 381 parts per million (ppm), compared with 280 ppm at the start of the industrial revolution in about 1750.



Atmospheric CO_2 Projection

Carbon dioxide (CO_2) is the chief greenhouse gas that results from human activities and causes global warming and climate change. The upper safety limit for atmospheric CO_2 is 350 parts per million (ppm). Atmospheric CO_2 levels have stayed higher than 350 ppm since early 1988 (300 ppm means 300 molecules of a greenhouse gas per million molecules of dry air) (NOAA, 2010).



Source: Goddard Institute for Space Studies (GISS) and Climate Research Unit (CRU), prepared by ProcessTrends.com, updated by globalissues.org

According to GISS Surface Temperature Analysis, NASA 2011- Temperature has increased by 0.6°C in 20th century and may increase by 1.4 – 5.8 °C by the end of this century. Increase in the frequency, intensity and duration of floods, droughts and heat waves and if no climate policy interventions made then, concentration of atmospheric CO_2 may increase up to – 405-460 ppm (2025),445-640ppm (2050) and 540-970 ppm (2100) respectively and temperature may increase upto 0.4-1.1°C, 0.8-2.6°C and 1.4-5.8°C during 2025, 2050 and 2100 years respectively (IPCC, 2007).

Impact of Climate Change – *In General :* The main impacts are predicted to be temperature and carbon dioxide increases, mean sea level rises, changes to rainfall patterns and increased variability of weather events. Impacts on Indian Agriculture showed that an increase of 2 ° C in temperature could decrease the rice yield by about 0.75 ton/ha in the high yield areas; and a 0.5 ° C increase in winter temperature would reduce wheat yield by 9.45 ton/ha. On human life there has been a considerable effect of climate change.

The anamolies and catastrophies in the recent years like hurricanes named Katrina, Sandy have shown a wide range disaster in western countries. In Indian context, cyclones like Laila and Neelam which cased much disaster especially in Andhra Pradesh. Rao and Sinha (1994) showed that wheat yields could decrease between 28 to 68 % without considering the CO_2 fertilization effects; and would range between + 4 to -34 % after considering CO_2 fertilization effects.

Lal *et al.,* 1998 concluded that carbon fertilization effects would not be able to offset the negative impacts of high temperature on rice yields. No long-term trend in all-India mean Monsoon Rainfall since 1871, Epochs of above/below normal monsoon activity with a periodicity of approximately 3 decades. The current below normal epoch is still continuing and some changes are taking place in the monsoon rainfall character like increase in the frequency and intensity of heavy rainfall events at the expense of low rainfall events and substantial decline in monsoon depressions and increase in low-pressure systems.

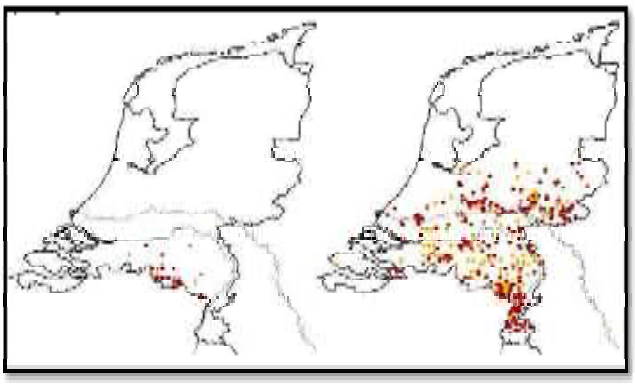
Impact of Climate Change on *Insects and Insect Plant Inter-*

actions : Insects are the numerous form of animal on the planet with one million insect species described. Close to 80% of all animal species, human have described are insects. The Warmer weather directly effect by shortening the life cycle of insects and more number of generations. The indirect effects of elevated CO_2 are change in host plant phenology which will create serious imbalance in the insect - plant relationships and tritrophic interactions.

Effect of Elevated temperature on insects: Extension of geographical range, increased over wintering, changes in population growth rate, increased number of generations, extension of development season and changes in interspecific interaction are some of the behavioural changes seen in insects due to increase in temperature (Bale *et al.,* 2002).

- At higher temperatures, aphids have been shown to be less responsive to alarm pheromone resulting in potential for greater predation(Awmack *et al.,* 2004)
- Temperature may change gender ratios of some pest species such as thrips potentially affecting reproduction rates Lewis (1997).
- *Ostrinia nubilalis* is predicted to become bivoltine due to increases in temperatures during the period 2025-50 Trnka *et al.* (2007).
- Developmental times of beetles *Octotoma championi* and *O. scabripennis* feeding on *Lantana camara* was accelerated by 10-13 days at higher temperature Johns *et al*. (2003)
- Larval development and adult fecundity of winter moth, *Operophtera brumata* was adversely affected by increased temperature when reared on Pendulate or English oak *Quercus robur* (Dury *et al.,* 1998)

Climate change exacerbates the oak processionary caterpillar problem in the Netherlands Alexander *et al*., 2008
Since its first observation in the south of The Netherlands in 1991, the geographical range of the Oak processionary caterpillar (*Thaumetopoea processionea*, "OPC" in the following text) has increased steadily over the years, moving in north-eastern direction. Figure 1 shows that it now occurs in the whole southern part of The Netherlands. During its expansion, the observed numbers clearly peaked in 1996 an in 2004. Both peaks were followed by severe decreases in 1997 as well as in 2005. The spreading of the caterpillar causes considerable health problems as each caterpillar has over 1.8 million urticating hairs. The causes of the observed change in occurrence as well as potential future changes are unknown. The OPC is an egg-overwintering insect, a group of insect species that as a whole has become increasingly successful over the years. As the OPC is mainly found on solitary oaks and then mainly on the southern side of the trees we hypothesise that the OPC prefers warm conditions. Therefore, it is likely that the observed 1°C increase in temperature and the corresponding increase in growing season length in the recent decades have stimulated the spreading.



Oak processionary caterpillar (OPC) distribution maps in Netherlands

Oak processionary caterpillar (OPC) distribution maps of the periods 1991/1993 and 2006/2007 in The Netherlands. The darker dots represent the more recent years. Since the OPC's first appearance in 1991 its distribution area has moved in north-eastern direction, expanded rapidly as well.

The first objective of our study was to determine which climate variables could explain the observed changes in the spatial distribution and changing population dynamics of the OPC. Our second objective was to determine the potential future changes in its distribution under different climate scenarios. We created annual distribution maps of the OPC based on observations gathered by Alterra Wageningen UR, the Dutch Butterfly Conservation and the Dutch phenological network Nature's Calendar. The period covered was 1991 to 2007. We correlated the distribution maps of the OPC with weather data that were based on data from thirty to fourty MeteoConsult weather stations, comparing the region where the OPC occurred to regions without OPC observations. The large number of weather stations gave us a unique insight in regional climate differences. By combining the found relation between climate and occurrence with the four climate change scenarios of the KNMI, we assessed the potential future distribution of the OPC.

We conclude that the temperatures in May, June, July, September and October are significantly higher in the OPC region. May, June and July are the months in which the eggs hatch and the caterpillars grow, September and October is the period of flight and reproduction of the OPC. The summer temperature in the OPC region currently averages 17.6°C. In the north of the country this is 16.7°C. Our analysis also showed that September on average was significantly drier in the OPC region. This suggests that much rain during the flight period has a negative impact on reproduction. Our scenario analysis showed that the average summer temperature in the north of The Netherlands will be between 16.6 and 17.6°C in 2020 and between 17.0 and 19,0 in 2050 (depending on the scenario). Therefore, weconclude that the OPC distribution area is likely to expand further; in 2020 the entire country could become an "OPC region".

The need for more detailed information about the OPC and the locations has become clear. By improving the level of detail in the information as well as the cooperation in the management the nationwide risk posed by the OPC could be contained or prevented more efficiently. Moreover, attention must be paid to the distribution of potentially infected oak trees throughout The Netherlands. Important for the management of the OPC (locations) is the coupling between reported observations on the one hand and information about the confirmation and management practices on the other hand.

Increased temperature could increase pest population

- Some secondary pests might become serious pests. Ex: Winter mortality of adults of *Nezara viridula* reduced by 15% for each rise of 1^0C (Kiritani,2005)
- Rising temperature have negative effect on certain natural enemies

Ex: BPH 17 times more tolerant than its *C. lividipennis* at 40^0C.

- Rise in temperature in winter help to continue the life cycle of some insects (Williams *et al*., 2003).

Elevated CO_2: CO_2 in the atmosphere make plants to take up more carbon and leaves become less nutritious and results in voluminous feeding. Enriched CO_2 benefits to C_3 Plants than C_4 : Excess CO_2 gave a 35% photosynthesis boost to rice and 32% boost to soybeans (both C_3 plants), but only a 4% boost to C_4 crops (Maize, Jowar) . In c3 pathway enzyme utilized to fix CO_2 is Rubisco but in C4 Pepco enzyme is utilized to fix CO_2.

Impact of elevated CO_2 on phytochemistry of plants

Forest trees: Birch, Aspen oak and Pine

- Decrease in N content (Williams *et al.,* 1997)
- Decrease in flavonyl glycoside
- Increase in condensed tannins levels
- (Kopper and Lindroth, 2003)
- Increase in starch
- Increase in catechin
- Decrease in cyanoglycosides
- High C: N ratio
- Decreases nitrogen concentrations and increases phenolic and carbohydrate concentrations and C:N ratios (Lindroth, 2010).

Grasses: Decrease in N content

Crops: Cotton, Soybean, Mungbean and Spring wheat

- Increase in C:N ratio (Chen *et al.,* 2005)
- Increased content of starch

Effect of elevated CO_2 on Insects

By increasing	References
Food consumption by caterpillars	Osbrink *et al.* (1987)
Reproduction of aphids	Bezemer *et al.* (1999)
Predation by lady beetle	Chen *et al.* (2005)
Carbon-based plant defenses	Coviella (1999)
By decreasing	References
Insect growth rates	Osbrink *et al.* (1987)
Response to alarm pheromones by aphids	Awmack *et al.* (1997)
Parasitism	Roth and Lindroth (1999)
Effects of transgenic B.t	Coviella *et al.* (2000)

Effect of elevated CO_2 on INSECT – PLANT INTERACTIONS

Common name	Host plant	CO_2 Conc. (ppm)	Effect on Host plant	Impact on Insect
Gypsy moth	Sessile Oak	530	42% increase in Starch. Decrease N , increase in condensed tannins	RGR reduced by 30%
Gypsy moth	Red maple	Amb.+300	Decreased N and Increased C:N ratio	Reduced larval growth
Gypsy moth	White oak	Amb.+300	Decreased N and higher TNC	Growth reduction in early instar
Gypsy moth	Gray birch	700	Decrease N , increase in condensed tannins	38% decrease in pupal mass and decline in RGR

Effect of elevated CO_2 on Lepidoptera Positive

Insects	**Host plant**	**Conc. of CO_2**	**Impact on insects**
Spodoptera exigua	*G.hirsutum*	900	25% increase in consumption & longer devpt. time
P. icarus	*L.corniculatus*	700	Greater pupal weight & short devpt. time
C.pamphilus	Grasses	600	Increased lipid conc. in adults & high fecundity rate
S.litura	*V.radiata*	600	Increased feeding

Negative

Insects	Host plant	Conc. of CO_2	Impact on insects
L. dispar	Gray birch	300,530 & 700	Declined RGR by 30 % & growth reduction of early instar larvae
Small heath	*F.rubra*	750	Larval growth slower

Effect of elevated CO_2 on Homoptera

Insects	Host plant	Conc. of CO_2	Impact on insects
A.gossypii	*G.hirsutum*	1050	Fecundity significantly increased
Grain aphid	*T. aestivum*	750	Local population increased

Effect of elevated CO_2 on Diptera

Crane fly	Quaking aspen	720	Decreased consumption & assimilation; Growth 15 times slower
Chy. Leaf miner	Common sow thistle	200	Slow devpt. & low pupal weight

Effect of elevated CO_2 on Thysanoptera

F.occidentalis	Common milkweed	700	Density decreased, increased consumption & leaf area damage by 33%

Effect of elevated CO_2 on Coleoptera

Insects	Host plant	Conc. of CO_2	Impact on insects
Willow beetle	*Salix myrsinifolia*	700	Reduced RGR of larvae & increased consumption
Green leaf weevil	*Betula pendula*	700	Preferred leaves of elevated CO_2

Effect of elevated CO_2 on Hymenoptera

Red headed pine saw fly	Loblolly pine	650	Increased consumption & N utilization efficiency
Red headed pine saw fly	Loblolly pine	300	Overall larval growth higher

Impact of Climate Change on *Tri-Trophic Interactions*: Climate change can have diverse effects on natural enemies of pest species. Here we review these effects and their likely impacts on pest control. The fitness of natural enemies can be altered in response to changes in herbivore quality and size induced by temperature and CO_2 effects on plants. The susceptibility of herbivores to predation and parasitism could be decreased through the production of additional plant foliage or altered timing of herbivore life cycles in response to plant phenological changes.

The effectiveness of natural enemies in controlling pests will decrease if pest distributions shift into regions outside the distribution of their natural enemies, although a new community of enemies might then provide some level of control. As well as being affected by climate through host plants and associated herbivores, the abundance and activity of natural enemies will be altered through adaptive management strategies adopted by farmers to cope with climate change. These strategies may lead to a mismatch between pests and enemies in space and time, decreasing their effectiveness for biocontrol. Because of the diverse and often indirect effects of climate change on natural enemies, predictions will be difficult unless there is a good understanding of the way environmental effects impact on tritrophic interactions. In addition, evolutionary changes in both hosts and natural enemies might have unexpected consequences on levels of biocontrol exerted by enemies. We consider interactions between the pest light brown apple moth and its natural enemies to illustrate the type of data that needs to be collected to make useful predictions (Linda *et al*., 2010).

Impact of elevated CO_2 on the third trophic level: A predator *Harmonia axyridis* and a parasitoid *Aphidius picipes*

Chen *et al*. (2007)

The effects of elevated CO_2 (550 and 750 mL/L vs. ambient CO_2) on the third trophic level, a predator Harmonia axyridis (Pallas) and a parasitoid Aphidius picipes (Nees), were studied in open-top chambers. Profound impacts of elevated CO_2 on individual species and communities are expected, including various effects on the trophic relationships between plants, their herbivores and the herbivores' natural enemies.

Effect of elevated CO_2 on the growth and development of *H. Axyridis:* The stage-specific developmental duration marginally shortened with increased CO_2 level, but the differences were not statistically significant. The increased CO_2 levels did not significantly affect the body weights at the developmental stages. The mean relative growth rate (MRGR) of *H. axyridis* was also not significantly influenced by CO_2 treatments.

The level of CO_2 significantly affected parasitized aphid abundance with a 12.5% increase in the 550 mL/L CO_2 treatment and a 19.6% increase in the 750 mL/L CO_2 treatment compared

to that of the ambient CO_2 treatment. There was no significant difference in parasitized aphid abundance between the two elevated CO_2 treatments. Moreover, parasitized aphid abundance in the absence of an exit hole consistently increased with increased CO_2 level. Significant increases in parasitized aphid abundance in the absence of an exit hole were observed in 550 mL/L CO_2 (10.6%) and the 750 mL/L CO_2 (18.8%) treatments compared with that of the ambient CO_2 treatment, respectively, and there was no significant difference between the two elevated CO_2 treatments. Moreover, a significant increase was only observed in parasitized aphid abundance in the presence of an exit hole for the 750 mL/L CO_2 treatment compared to ambient CO_2 treatment. *Harmonia axyridis* had negligible impact on Aphid, *Sitobion avenae* under elevated CO_2 condition but increased abundance of Braconid parasitoid, *Aphidius picipes* resulting in increased aphid parasitism.

Interaction between Pentatomid bug, *Oechalia schellenbergii* and cotton bollworm, *Helicoverpa armigera* when feeding on peas grown under elevated CO_2

A decrease in prey size will not necessarily always lead to a reduction in the success of natural enemies. The number of prey consumed by predators might be increased and lead to improved pest control (Chen *et al.,* 2005; Coll and Hughes, 2008). While few evaluations have been undertaken, Coll and Hughes (2008) considered the interaction between an omnivorous pentatomid bug, *Oechalia schellenbergii* Guérin-Méneville (Hemiptera: Pentatomidae), and the cotton bollworm, *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae), when feeding on peas (*Pisum sativum* L.). In this case, pea plants had reduced nitrogen content when grown under higher levels of CO_2 and this in turn in?uenced the size of the cotton bollworm larvae. The predatory bugs were more effective under higher CO2 levels because they appeared to be better at subduing the smaller bollworm larvae.

Elevated Temperature and Drought Interact to Reduce Parasitoid Effectiveness in Suppressing Hosts

Romo and Tylianakis 2013

Using field observations, they examined the response of an aphid host-parasitoid system to variation in temperature. Temperature was positively associated with attack rates by parasitoids, but also with a non-significant trend towards increased attack rates by higher-level hyperparasitoids. Elevated hyperparasitism could partly offset any benefit of climate warming to parasitoids, and would suggest that higher trophic levels may hamper predictions of predator-prey interactions. Additionally, the mechanisms affecting host-parasitoid dynamics were examined using controlled laboratory experiments that simulated both temperature increase and drought. Parasitoid fitness and longevity responded differently when exposed to each climatic variable in isolation, compared to the interaction of both variables at once.

Although temperature increase or drought tended to positively affect the ability of parasitoids to control aphid populations, these effects were significantly reversed when the drivers were expressed in concert. Additionally, separate warming and drought treatments reduced parasitoid longevity, and although temperature increased parasitoid emergence success and drought increased offspring production, combined temperature and drought produced the lowest parasitoid emergence. The non-additive effects of different climate drivers, combined with differing responses across trophic levels, suggest that predicting future pest outbreaks will be more challenging than previously imagined.

CONCLUSION: It is clear that elevated CO_2 generally increase the productivity of plants. However this can be countered by effects mediated through high temperatures. Alterations of CO_2 and temperature will affect the insect pests by decreasing their relative growth rate (RGR) and prolonged developmental time in Lepidoptera (leaf chewers) where as increased abundance and fecundity in homoptera (sap suckers). Changes in foliar chemistry under elevated condition are likely to alter interaction between herbivorous insect and their natural enemies.

Due to change in the climate it is finally noticed that, because of the higher temperature there will be gradual loss of resistance in some of the crops and then becomes susceptible to the insects pests, because of the increased temperature there will be reduction in the leaf cuticle thickness and the reduction in the trichome bearing capacity and as well as there will be the lower in the biochemical production in the hosts plants and more susceptible to the insects.

Tri-trophic interactions are affected by climate change which varies from one group to other. However, across the trophic levels the change is slow and might be attributed to the magnitude of transfer of energy from one trophic level to other; which might be known in further generations. Hence, there is a need to carry out research on multiple generations of insects and natural enemies which can minimize the complexity of understanding the tri-trophic relationships. Whatever the cause of these changes in climate, it now seems appropriate to put much more effort into direct monitoring in order to understand and assess the effects as they occur. Prediction is not going to be easy unless and until there is a clear understanding of the environment.

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HERBS AND COSMETICS

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Abstract: The concept of beauty and cosmetics is as ancient as mankind and civilization. Women are obsessed with looking beautiful. So, they use various homemade herbal beauty products to look charming and young. Our Indian women folk have used herbs since from ancient periods, such as sandalwood and turmeric for skin care like dryness, eczema, acne, anti-aging etc.; Henna to color the hair, palms and soles; and natural oils to perfume their bodies.

The herbal plants are used as one of the natural resources, for making the cosmetics. The natural content in the herbs does not have any side effects on the human body. The herbal homemade cosmetics enrich and enhance the body with nutrients and other useful minerals.

All the parts of herbal plants are used for making the cosmetics. The roots, stems, leaves, flowers and seeds are having natural nutrients and minerals. Herbal cosmetics are also known as “natural cosmetics”. The best thing of the herbal cosmetics is that it is purely made by the herbs and shrubs.

Herbal Cosmetics are having demand in all over the world market. Herbal Cosmetics are the invaluable gifts of the nature. Hence, it is the responsibility of all mankind to save the nature and preserve the gift of the nature for our coming generations in the future.

General: Herbal cosmetic also known as “natural cosmetics”, since the beginning of the civilization, mankind had the interest towards impressing others with their look. Herbal extracts as the name suggests, is the extract of herbs. Herbal extract is an ancient methodology as its references have been found in holy Vedas. Herbs played a significant role, especially in modem times, to protect skin, and hair. The growing interest in herbs is a part of the movement towards change in modern life-styles.

1. The knowledge of nature, compiled in the ayurveda. The Ayurveda has used several herbs and floras to make ayurvedic cosmetics. Ayurvedic cosmetics is not only beautified the skin but acted as the shield against any kind of external affects for the body.

2. Ayurvedic cosmetics also known as the herbal cosmetics. There is a wide gamut of the herbal cosmetics that are manufactured and commonly used for daily purposes. Herbal cosmetics like herbal face wash, herbal conditioner, herbal soaps, herbal shampoo, and many more are highly acclaimed by the masses.

3. The natural content in the herbs does not have any side effects on the human body; instead enrich the body with nutrients and other useful minerals. Herbal cosmetics are comprised of floras like ashwagandha, sandal (chandan), saffron (kesar) and many more that is augmented with healthy nutrient sand all the other necessary components.

4. Herbalists today, believe to help people build their good appearance with the help of natural resources.

5. Herbs do not produce instant cures, but rather offer a way to put the body in proper tune with nature to look appearance good.

Herbal Cosmetics:

Some common cosmetics include lipsticks, blush-on or rouge as it is sometimes known eyeliners, mascaras, foundations, and, eye shadows. Lipsticks are made using color pigments, oils, waxes and often fragrances as well. Different cosmetic companies also add various other substances to create other effects with lipstick. The oldest use of lipstick can be traced back to almost five thousand years ago; Perfume is another popular cosmetic product. It is a fragrant mixture made using various oils and aromatic compounds. Usually every perfume manufacturer keeps the exact combination of ingredients.**6**In the case of perfumes that are manufactured by large brand names. Eye liner is used to emphasize the shape of the eyes. Today there are many kinds of eyeliners like liquid eyeliners, or kohl and **kajal**, all of which can be used to create different effects and looks. Smoky eyes and the gothic look are in vogue nowadays and these looks can be created using kohl over and under the eye with metallic gold or silver eye shadow.

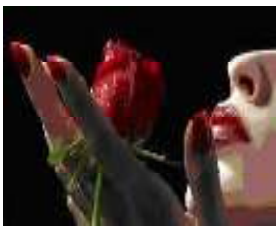
1. Turmeric

Turmeric, Curcuma longa is a rhizomatous herbal essential oils us perennial plant of the ginger family Zingiberaceae Turmeric is used in many celebrations of Hindus. Especially in Hindu wedding brides would rub with turmeric on their bodies for glowing look. New born babies also rubbed with turmeric on their forehead for good luck. Traditionally women rub turmeric on their cheeks to produce a natural golden glow.

2. Amla

Amla is obtained from the plant Emblica Officinalis, Family Euphorbiaceae. Amla is rich in vitamin C, tannins and minerals such as phosphorus, iron and calcium which provides nutrition to hair and also causes darkening of hair. Amla facial scrub is found effective in treating acne, controlling oil secretion from skin and cleansing skin pores. Most facial scrubs are made from whole fruit powdered along with its seed.

3. Rose oil



The well-known essential oil is probably rose oil, produced from the petals of Rosa damascena and Rosa centifolia, family Rosaceae. Steam-distilled rose oil is known as "rose otto". It is used more commonly in perfumery.

4. Neem

The Neem, Azadirachta indica, family Meliaceae has been found to have the properties of a Blood purifier, beauty enhancer. The Neem oil is extracted from the pulp of the fruits, which is used in the manufacture of Margosa soap and several skin ointments

5. Henna

Henna Lawsonia inermis family Lythraceae, which contain a dye molecule called Lawson, which when processed becomes Henna powder. Henna is used for colouring palms of hands, soles of feet and finger nails. It is also used for dyeing hair.

6. Carrot

It is obtained from the plant Daucus carota belonging to family Apiaceae. .It is a valuable herb since ages as it is rich natural source of Vitamin A along with other essential vitamins. Carrot seed oil is indicated for anti-aging, revitalizing and rejuvenating. As it promotes the formation of new cells and helps in reducing wrinkles. It acts as Natural toner and rejuvenator for the skin.

7. Aloe Vera (Liliaceae)

The Aloe Vera plant has fleshy spiny-toothed leaves and red or yellow flowers. It is an ingredient in many cosmetics because it heals moisturizes, and softens skin. Simply cut one of the Aloe Vera leaves to easily extract the soothing gel. Aloe Vera provides the answer to safely removing your eye makeup and gentle for the delicate skin around your eyes. Aloe also contains cooling properties similar to menthol which makes it a great way to sooth sunburns. It acts as a protective layer on the skin and helps replenish its moisture. When the skin is hydrated, then it will recover faster from the sunburn.

8. Sandal wood (Santalum album) Santalaceae

Sandal wood is aromatic tree, initially used mostly by perfume makers. Sandalwood contains powerful antioxidants and is also an anti-inflammatory agent that helps to improve blood circulation to your face, remove toxins and fight the formation of wrinkle-causing free radicals. A sandalwood face pack also helps to remove damage caused by the sun, and works as an excellent anti-ageing treatment. Sandalwood oil is often used in aromatherapy massages and also fragrance promotes a sense of peace and meditation.

9. Cucumber (cucumis sativus)

Everybody knows that cucumber is a healthy snack and a part of healthy diet. Beside as healthy food, the cucumber is used to treat our skin and eyes. You can use grated cucumber as face tonic, spread all over face and neck to reduce the overall appearance of freckles. Reduce dark circles and the large amount of antioxidants in cucumber can rejuvenate the skin after just 5 - 10 minutes of use. Treat Puffy eyes with cucumber the abundance of ascorbic acid within cucumber can decrease water retention and reduce puffiness overall. Soothe tired eyes by cutting two rounds and place them on the eyelids.

10. Shikakai

Shikaka (AcasiaConcinna): Acacia Concinna is a small shrub-like tree, which grows in the warm, dry plains of central India. For centuries the people who have had access to this tree have used its pod-like fruit to clean their hair. It's considered a superior cleanser for "lustrous long hair" and has been reported as "promoting hair growth and preventing dandruff. It also helps in removing dandruff and lice & very effective in removing oil and dirt from hair

12. Apple

Apple's botanical name is malus pumila family of Rosaceae. Apples contain skin-friendly nutrients, including vitamin C and copper. Apples also benefit your appearance, since they contain nutrients that nourish your skin. Apple fruit is effectively brightens, soothes and lightens the skin. Apple fruit makes farewell to pimples.

Conclusion : Herbal cosmetics are oldest products used by Mankind's which does not have any kind of side effects. Some common cosmetics include creams, face packs, scrubs, hair oils, hair colors, shampoos, hair conditioners, lipsticks, blush-on or rouge as it is sometimes known, eyeliners, mascaras, foundations

and eye shadow, perfumes and fragrance, soaps, etc. The formulation of these entire cosmetic products includes addition of various natural additives like oils, waxes, natural colour, natural fragrances and parts of plants like leaves, flowers etc. by specific formulation methods. 'Quality control for efficacy and safety of herbal cosmetic products is of paramount importance. So quality control test must be carried out for herbal cosmetics. It is assumed to be safe for longer periods of time.

ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

THEME:8 (NAGARJUNEEYAM) CHEMICAL, BIOLOGICAL AND MATERIALS SCIENCES

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ANALYTICAL DETERMINATION OF VITAMIN 'C' IN FRUITS AND VEGETABLES USING B.Z. OSCILLATING REACTIONS.

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Vitamin 'C' also known as Ascorbic Acid is commonly found in Fruits and Vegetables. It is an essential nutrient for humans and certain other animals.

In this backdrop of Vitamin 'C' here we present a simple and sensitive analytical method for the determination of concentration of Vitamin 'C' in Sample Analyte of Fruits and Vegetables available in plenty at lesser costs in Raichur District of Karnataka, has yielded a result by perturbation caused by different amount of Vitamin C (Ascorbic Acid) on the B.Z. (Belousov – Zhabotinski) Oscillating Chemical System.

Manganese (II) catalysed was found to be involved between Potassium Bromate ($KBrO_3$) and Malonic Acid in a proposed Acidic medium. Based on the observations of a series of experiments indicates that there is linear relationships between the change in the Oscillation Amplitude, and hence the concentration of Vitamin 'C', as Ascorbic Acid of various samples can be found to be existing in variant values.

Vitamic 'C' which is also known as Ascorbic Acid is commonly present in Fruits and Vegetables. It is an essential nutrient for humans.

Oscillating Chemical Reaction is an important area which triggers many subjects like Life Sciences and Chemistry etc. An intense study indicates that the use of these oscillating reactions continue to be an important object. One of its main applications is in Analytical Chemistry, Physical Chemistry and its usage. As an Analytical method, an Oscillating Chemical Reaction can extremely be investigated and applied in relevant sectors in future.

INTRODUCTION

Objective and Significance: The application of oscillating chemical reactions to analytical chemistry has received more and more attention because of its unique advantages such as a simple set-up, largely linear range (ca.10^{-7} to 10^{-4} mol·L^{-1}) and lower detection limit (ca.10^{-6} to 10^{-8} mol·L^{-1}, rarely down to 10^{-12} mol·L^{-1}), which could be satisfied the need of common determination. The analytical application of the oscillating reactions involve not only inorganic ions but also organic compounds. In addition, the combinations of chemical reaction with other analytical method, such as the analyte pulse perturbation technique (APP) in the continuously stirred tank reactor (CSTR), chemiluminenscence[11], broaden its applied fields and foreground. From the early FKN mechanism to the recently theoretical analysis by Taylor, the mechanisms to interpret the perturbation of analytes on the oscillating system are increasingly clear and intelligible. All of these effective efforts proved that the oscillating chemical reactions as an analytical technique have been used successfully. All of these effective efforts proved that the oscillating chemical reactions as an analytical technique have been used successfully.

Ascorbic acid is a **weak sugar acid** structurally related to glucose. The richest natural sources are fruits and vegetables . In biological systems, ascorbic acid can be found only at low pH, but in neutral solutions above pH 5 is predominantly found in the ionized form, ascorbate. All of these molecules have vitamin C activity, therefore, and are used synonymously with vitamin C, unless otherwise specified. The biological role of ascorbate is to act as a reducing agent, donating electrons to various enzymatic and a few non-enzymatic reactions. Ascorbic acid can be oxidized (broken down) in the human body by the enzyme L-ascorbate oxidase.

The Chemists Behind the Reactions : B.P. Belousov - Russian Chemist 1950s - attempting to simulate Krebs cycle Discovered his reaction oscillated Submitted manuscript to a journal, rejected on. The grounds that "it's impossible" Conventional opinion of the time - all reactions should go to thermodynamic equilibrium

B-Z Reaction: 3 Solutions are combined A: 0.23M $KBrO_3$ B: 0.31M malonic acid and 0.059M KBr C: 0.019M cerium(IV) ammonium nitrate and 2.7M H_2SO_4 Spiked with ferroin solution 1,10-phenanthroline, ferrous sulfate Belousov originally used citric acid instead of malonic acid It was later found that a number of different carboxylic acids could be used Also, manganese ions could be used instead of cerium ions This overall rxn is cerium-catalyzed oxidation of malonic acid by bromate ions in dilute sulfuric acid. The overall rxn is represented by this eqn: $3\ CH_2(CO_2H)_2 + 4\ BrO_3^- \rightarrow 4\ Br^- + 9\ CO_2 + 6\ H_2O(1)$ But, this equation does not account for the color changes seen in the reaction, the catalytic effect of cerium, or the role of bromide ions Again, the mechanism involves 2 different processes Process A: ions and 2-electron transfers Process B: radicals and 1-electron transfers

B-Z Reaction : Concentration of Br^- ions determines which process is dominant. Process A: High Br^- concentration. Process B: Low Br^- concentration Concentration of Br^- ions determines which process is dominant. Process A: High Br^- concentration Process B: Low Br^- concentration Process A net

reaction:

– $BrO_3^- + 5\,Br^- + 6\,H^+ \rightarrow 3\,Br_2 + 3\,H_2O$ (2)

This is a reduction of bromate ions by bromide ions in 2 electron transfers This occurs when solutions A and B are mixed This process occurs through these three steps:

– $BrO_3^- + Br^- + 2\,H^+ \rightarrow HBrO_2 + HOBr$ (3)

– $HBrO_2 + Br^- + H^+$ 2 HOBr (4)

– $HOBr + Br^- + H^+ \rightarrow Br_2 + H_2O$ (5)

B-Z Reaction

Malonic acid exists mainly in the diacid form but slowly enolizes.

The bromine reacts with the enol form of malonic acid:

– $Br_2 + CH_2(CO_2H)_2 \rightarrow BrCH(CO_2H)_2 + Br^- + H^+$ (6)

These reactions together reduce the concentration of Br^- in the solution. Once process A has consumed most of the Br^-, process B takes over The overall reaction of process B is represented by:

– $2\,BrO_3^- + 12\,H^+ + 10\,Ce^{3+} \rightarrow Br_2 + 6\,H_2O\ 10\,Ce^{4+}$ (7)

This process is composed the following rxns:

– $BrO_3^- + HBrO_2 + H^+ \rightarrow 2\,BrO_2\bullet + H_2O$ (8)

– $BrO_2\bullet + Ce^{3+} + H^+ \rightarrow HBrO_2 + Ce^{4+}$ (9)

– $2\,HBrO_2 \rightarrow HOBr + BrO_3^- + H^+$ (10)

– $2\,HOBr \rightarrow HBrO_2 + Br^- + H^+$ (11)

– $HOBr + Br^- + H^+ \rightarrow Br_2 + H_2O$ (12)

The net result of eqn 8 + 2 (eqn 9) is:

– $2\,Ce^{3+} + BrO_3^- + HBrO_2 + 3\,H^+ \rightarrow 2\,Ce^{4+} + H_2O + 2HBrO_2$ (13)

This sequence produces $HBrO_2$ auto catalytically

B-Z Reaction : Autocatalysis is an essential feature of this reaction, but does not continue until the reactants are depleted, because there is a 2nd-order destruction of $HBrO_2$ (rxn 10) Rxns 11 and 12 represent the disproportionation of hyperbromous acid (HOBr) to bromous acid ($HBrO_2$) and Br_2 Ce^{4+} and Br_2 oxidize malonic acid to form bromide ions Once this concentration of Br^- becomes high enough, process A is reactivated Ferroin provides two of the colors seen in this reaction

– As [Ce(IV)] increases, it oxidizes the iron in ferroin from iron(II) (red) to iron(III) (blue)

Cerium(III) is colorless, and Ce (IV) is yellow

– The combination of Ce(IV) and Fe(III) make the green color The oscillating concentrations and oxidation states of Fe and Ce account for the color changes

EXPERIMENTAL

It consists of two parts

I) Effect of variables such as concentrations of oxidant and reductant with and without analyte samples of fruits and vegetables A series of experiments were conducted in order to study the nature of oscillation profile with respect to Effect of variables such as concentrations of oxidant and reductant with and without analyte samples of fruits and vegetables. This helps in understanding the optimum conditions of the reaction system so that the stability of the reaction system could be maintained.

II) Determination of amount of AA (Vit-C) of analyte samples of fruits and vegetables Based on the observations of the oscillation profile in the I part of the experimental study, the amount of anlyte samples of unknown concentrations could be determined by correlating the potentials of known concentrations of analyte samples by calibration curve method

Apparatus and Instrument : The experimental assembly consisted of an oscillation reactor (ca.50 mL) and a potential measuring system. The reactor was coupled with a Model 501 thermostat and a Model ML-902 magnetic stirrer to keep the system at 303±0.1 K.. A micro-syringe was also used in the experiment for injecting different amounts of Analyte samples.

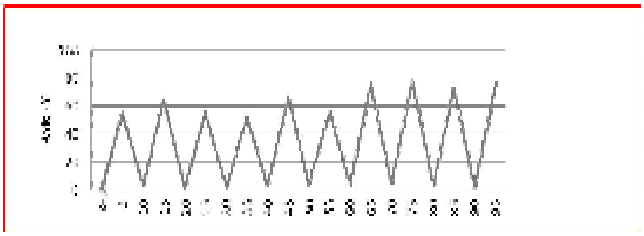
Materials : All chemicals used were of analytical grade and doubly distilled-deionized water was used throughout. Solutions of $KBrO_3$ (0.2 mol·L^{-1}), $MnSO_4$ (6×10^{-4} mol·L^{-1}) and malonic acid (0.05 mol·L^{-1}) were prepared in 1.2 mol·L^{-1} sulfuric acid. Stock standard solutions of fruits and vegetables were prepared with doubly distilled-deionized water and stored in refrigerator at 5 °C. Working standard solutions were prepared daily by appropriate dilution.

Procedure: A mixture solution containing 7.0 ml of 6×10^{-4} mol·L^{-1} Mn (II), 5.0 ml of 0.05 mol·L^{-1} malonic acid, 3.0ml of 1.2 mol·L^{-1} H_2SO_4 and 5.0 ml of 0.2 mol·L^{-1} $KBrO_3$ were loaded in a 50 mL water-jacket reactor and mixed well by stirring. Meanwhile, the indicator, counter and reference electrodes were immersed into the reaction solution. The nature of oscillating reaction system was studied with respect to I) Effect of variables such as concentrations of oxidant and reductant with and without analyte samples of fruits and vegetables and II)Determination of amount of AA (Vit-C) of analyte samples of fruits and vegetables Once a regular oscillating profile was appeared, various amounts of AA were injected to perturb the profile. In order to get an accurate result, the position of adding analyte (or called injection point) should be carefully tested. In general, the position of adding analyte should be chosen at the maximum or minimum amplitude in the regular profile. Repeat adding analyte at the same position to ensure the reproducibility is the key way for the determination precision. Changes in the oscillating amplitude by following perturbation were used as measured parameter to construct the calibration plot. All of these data will be automatically recorded with a computer. Each experiment was repeated at least three times at the same condition to ensure the repeatability.

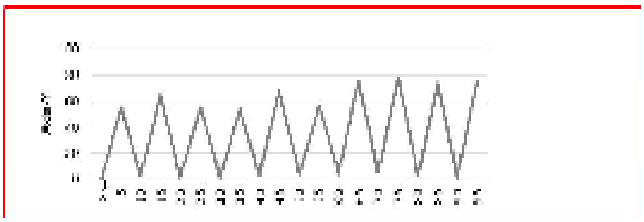
RESULTS AND DISCUSSION : The Mn(II)-catalyzed oxidation of malonic acid by BrO_3^- in a strong acid medium goes with periodic change in the concentration of Mn(II) and Br^- that reflect in potential change and cyclic color between yellowish-green and colorless. There is a rhythmic and sustained potential-time oscillation shown in Figure 1(a) in the absence

of the Analyte sample perturbation. When the variable amounts of AA sample were injected to the oscillating system, the amplitude of cycles decreased immediately as presented in Figure 1(b) and another oscillating state with smaller amplitude started. To an extent, the change of the amplitude was proportional to the concentration of analyte, so we explored the possibility of applying this method to the determination of Analtye concentrations

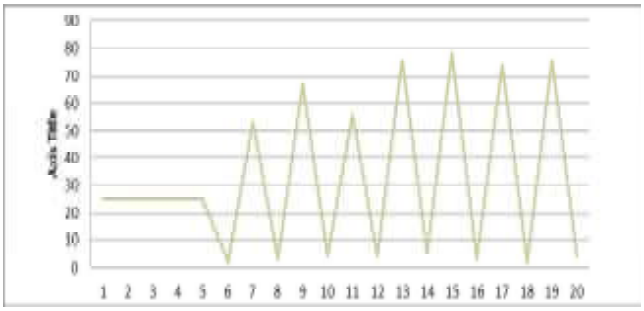
A Typical Oscillation Profile:
In absence of Analyte
KBrO3= o.1M,CH2(COOH)2 = O.1M , MnSO4 =0.1M T= 303K



Oscillation Profile

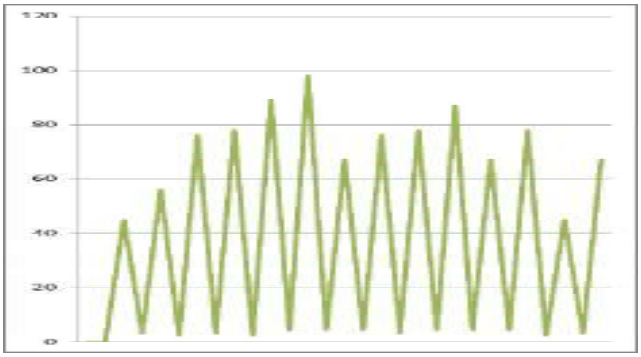


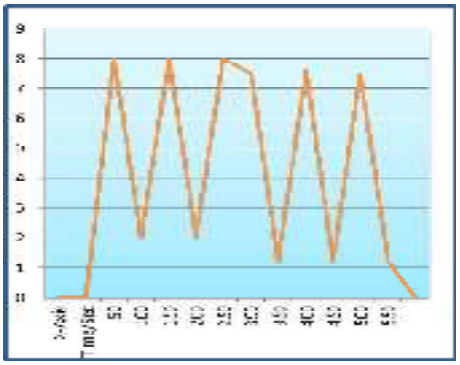
A Typical Oscillation Profile
in presence of Analyte
KBrO3= o.1M,CH2(COOH)2 = O.1M , MnSO4 =0.1M T= 303K



In this study, the response to the furfural perturbation was evaluated by *AA,* which was defined as following:
Where A and A_0 represents the amplitudes of oscillation with and without analyte injection, respectively. In order to ensure the accurate results, the region where the injection should be performed is a crucial variable. Several injection points have been tested in the process of oscillating cycle, and finally the optimal injection point, where the potential is at the top of the 14th cycle, is chosen for maximum response to the analyte.

A Typical Oscillation Profile





CONCLUSION : ASCORBIC ACID is an important VITAMIN with multiple biological activities which may individually or collectively contribute to its clinical utility in treating many diseases. At the present stage, this work presents a detailed study of oscillation profile and its applications. Compared with other analytical instruments, the set-up used in the proposed method is cost effective. This Experimental set up is simple & Convenient to operate.

DEEPENING RELATIONSHIPS BETWEEN SCIENCE, TECHNOLOGY AND SOCIETY.

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The subject proceeds with an analysis of the deepening relationship between Science & Technology and Society and offers an insight of the policy responses around the world to this relationship.

Scientific & Technological Progress has had various effects on Society. These effects have not been limited to one are but have extended to altering the paradigms under which Society operates.

The Progress in Science & Technology has broadened and enlivened human activity, while new issues are appearing in the Society, the demand for new Sciences & Technologies capable of resolving these issues have risen.

Science & Technology has formed foundations in the Society and have helped achieve progress in the lives of the people.

Progress in Medical, Biomedical, Microbiological, Biotechnological & Environmental Sciences has greatly extended people's average life span and reduced infant and child mortality rates, increased agricultural outputs, helped in early detection of diseases, reduced environmental pollution and hazards, and also has led to a dramatic rise in world population.

As seen in the areas of global environmental problems and bioethical issues, there exists Sciences and Technologies that are essential for Society and for peoples' lives. In short the deepening relationship between Science, Technology and Society is becoming close and in-separable and the time is approaching when we must think about the kind of relationship we must have with Science and Technology, as a harbinger in a healthy Society.

Science and Technology is the best thing society could ever ask for. Since the industrial revolution in the 18th century science has been in progress. Some sectors that have been boosted by science and technology are Energy, Physical Sciences, Microbiology & Biotechnology, Information and Communication. The society has greatly gained with the invention of technology.

Infrastructure in the society has grown with the help of science and technology. Modes of transport like, electronic railway lines were realized and these actually benefited the society by offering them a better means of transport. In the past, almost everything was analog but thanks to the science and technology we are now being digitalized by the day. The invention of the telephone and radio services has broadened human communication.

Without society then there would be no science and technology and that is why the invention of certain tools and equipment have helped achieve big things. Society cannot do without the industries we have today. The society needs science and technology. The creation of computers is work of art by individuals was a milestone that would come a long way in helping the society Science & the development of Information Technology & Microbial Science has contributed to enrich our lives. The impact of science and technology can seriously be recognized. Many people around the world take for example scholars in colleges and universities have taken the lead examining the relationship between science and technology.

The evaluation of this relationship has emerged as an important area of research. Public interest groups and academic organizations throughout the world are recognizing the importance of Science, Technology & Society (**STS**). The reason is that people need to recognize that there are people who are affected by the science and technology. Controversies such as modified foods, stem cell research are the issues that have brought policy makers and scientists together to have a way forward on this.

Science and technology has actually largely contributed to the vision of man about himself. Science has been modified the opinion about the origin of man and place of origin too. Through the results of scientific discoveries the perception of man about his behavior and his place of origin has been modified diversely. Experiments in science today are in one way or another affecting the society. In pursuance it is to be noted that in the modern day life use of genetically modified (GM) foods, invention of many inorganic substances and detection of various viruses and infectious media has been discovered through the advancement through the science of

Microbiology : How is science and technology related to society: The developing world has a long tradition of participatory action research, popular education and community organization joining up to solve some science and technology issues that affect the society. Science and technology related issues are actually been discussed worldwide today. Progress in this has resulted to the ability to produce diverse types of material items. Answering the question how science and technology is related to society.

Science and Technology have formed the foundations for progress in society, and have helped to make people's lives. Deepening relationship today between science and technology and society, and offers an overview of the policy responses around the world to this relationship

1. Changes in Society Due to Scientific and Technological Progress: Scientific and technological progress has had various effects on society. These effects have not been limited to the improvement of society's material wealth, but have also extended to altering the paradigms under which society operates. Information and telecommunications technology (IT) is one example of a paradigm-changing technology. Furthermore, as progress in science and technology has broadened and enlivened human activity, new issues have appeared in society, and these have in turn led to demands for new sciences and technologies capable of resolving the new issues arising from the changes in society.

2. Achievement of Societal Formations : Progress in energy and materials technologies has given rise to a variety of new transport modes, such as the railroad, the automobile, and the airplane, vastly improving human mobility in terms of both time and space. These advances in mobility, joined with inventions in the area of telecommunications technology, such as the telephone and radio, have served to broaden the range of human activities and to expand the scope of human exchanges.

In addition, inventions in machine tools have been linked to advances in energy technology to achieve automation

and acceleration of manufacturing processes. The result has been large-volume production of goods in ever-shorter periods of time. Moreover, progress in materials technology has resulted in the ability to produce diverse types of material items.

Progress in medical technology has greatly extended people's average life spans and reduced infant and child mortality rates, resulting in a dramatic rise in the world's population Science and technology have formed the foundations for progress in society, and have helped to make people's lives more materially prosperous.

3. Qualitative Changes in Society on a Worldwide Scale : Scientific and Technological progress does not merely make people's lives more convenient and prosperous; it has also brought huge changes to how society itself operates.

Science & Technology has served to boost people's prosperity, and to broaden their range of activities, to the point that the very nature of human lives is changing. This trend has also given rise to issues that society has never faced before Moreover, as seen by the appearance in recent years of such deadly diseases as highly pathogenic avian **Influenza** (**B**ird **F**lu), **Bovine Spongiform Encephalopathy (BSE)**, and Severe **Acute Respiratory Syndrome (SARS)**, problems arising in a single region can now spread rapidly to everywhere around the world, and a global watch must be constantly maintained to ensure the safety and security of society. Furthermore, intensifying competition on a worldwide scale due to rapid globalization has resulted in a new class of competitive losers and others left behind by competition, in both developing countries and in the advanced nations, which has raised fears of social instability, and has stimulated critical reactions from those who believe that market principles ignore people's humanity, culture, and traditions. Many people are beginning to rebel against what they view as a market-coerced "global standard."

4. New Societal Issues Arising from Scientific and Technological Progress : While scientific and technological progress has broadened the range of people's activities, and made their lives more prosperous, new societal issues arising from the progress of science and technology have also become apparent. The most representative example of these issues is undoubtedly the global environmental issue. The content of global environmental issues can vary widely, from global warming to acid rain, destruction of the ozone layer, destruction of tropical rainforests, and desertification, and a common characteristic of these issues is that they can be traced to increased human activity due to progress in science and technology.

Scientific and technological progress helped mankind to build industrial societies in the present century that made wide use of underground resources, and to create prosperous societies and lifestyles. The result, however, was a society based on large-volume production, large volume consumption, and large-volume waste. But the Earth's resources are obviously not limitless, and there is a limit to the ability of the natural environment to assimilate large volumes of waste. At the same time, development has also progressed rapidly, contributing to a deepening crisis for the global environment, a situation made abundantly clear by ever more sophisticated methods of monitoring the globe.

A greater harbinger should be attainable, in the form of development that takes protection of the global environment into account. Sustainable development is now the basic philosophy behind all efforts to deal with global environmental issues today.

5. As global environmental issues have evolved, the People's awareness has also evolved. Mankind always evolved, desired, and deciphered to lead a happy life devoid of health, Environmental and Socio-economic hazards. This is depicted in the layout mentioned here in.

6. Another new societal issue arising from progress in science and technology is in regards to biotechnology. In particular, recent progress in genome analysis is being utilized in the medical and agricultural fields, and the results are expected to contribute greatly to improved human health and the assurance of stable food supplies. These same advances, however, have also raised ethical issues and concerns about safety.

As can be seen from the foregoing, various new issues have arisen alongside the progress of science and technology. Moreover, these issues have been made more complex as various ideas were raised in response to the content of specific issues, or to the Social standing of different individuals, and have been applied in response to individual issues. Furthermore, another point that needs mentioning is the fact that science and technology can be the key to responding to these issues. For example, the very existence of global environmental issues first became clear through the development of monitoring technologies, and science and technology is expected to play an important role in resolving such global environmental issues as reduction in the emission of greenhouse effect gases, Sulphur Dioxides, and Nitrogen oxides. And in the area of gene recombination technology, further scientific knowledge is needed regarding its effects.
So far, the majority of people believe that the Positive aspects of scientific and technological progress outweigh the negative aspects. Care will be needed, however, t o ensure appropriate attention.

7. Increase of New Factors Threatening Societal Safety and Security: So far, this section has mainly focused on the effect of scientific and technological progress on society. However, if a suitable relationship is to be built between

science and technology and society, it is important that science and technology respond appropriately to what society demands. In the past, societal demands on science and technology centered mainly on people's prosperity, on such things as increasing economic prosperity, health, and other aspects of people's lives. While demands for a prosperous life remain strong even today, of course, people have responded to changing conditions in recent years in India and abroad with increased expectations for science and technology to ensure the societal safety and security that is a precondition for prosperous societies and lifestyles.

In response to these myriad risks, people have in recent years become much more concerned about safety and security.

8. Science and Technology and the Individual : Until recent years, the relationship between science and technology and the individual, has basically been one of the individual passively receiving the results of science and technology. While the benefits of science and technology have varied to some degree depending on the country or region, they have basically been recognized as being shared all across society and the reception of people to scientific and technological progress has generally been positive and shared in an extremely inconvenient situation.

With progress in science and technology changing the very nature of society, failure to utilize the results of science and technology could leave an individual incapable of dealing with the new society, and saddled with a narrow range of choices regarding utilization of scientific and technological results.

Moreover, the global environmental problems that have arisen in the wake of the expansion of human activities due to scientific and technological and as the case of gene-recombinant crops shows, those who benefit from the utilization of scientific and technological results are beginning to steer a different course from those who must bear the risks. Meanwhile, society's demands on science and technology are rising, as can be seen by the expectations society places on science and technology in regards to the safety and security issue.

The relationship between science and technology and individuals, therefore, is becoming close and inseparable, and is also becoming more diverse, according to the needs of each individual. As a result, the time is approaching when individuals will need to make decisions on how to relate to science and technology. Toward this objective, individuals will need to have an interest in science and technology, and to possess enough knowledge to be able to make an informed decision and responses to societal issues that arise alongside the progress of science and technology, so that this attitude is not reversed in the future.

ANTICATATONIC ACTIVITY OF EVOLVULUS ALSINOIDES

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The history of medicine in India can be traced to the remote past. The earliest mention of the medicinal use of plants is found in Rig-Veda. The medicinal plants gain special significance. The use of indigenous drugs in India has been in existence for several centuries and at present 80% of the population depends on indigenous system of medicine, involving mostly the herbal drugs

Evolvulus alsinoides is a profusely branched herb belonging to convolvulaceae family. In Sanskrit it is called Vishnu gundhi, in Kannada Vishnu kranthi and in Hindi sankha pushpi. Earlier literature survey has revealed that it is used as oil for promoting hair growth, power to strengthen the brain and memory and anthelmentic property, etc. The antipsychotic drugs like phenothiazine and butyrophenone cause side effects like Parkinsonism. The plant is now tested for its anticatatonic activity (antiparkinsonian).

The plant was collected, dried under shade and extracted with water, pet ether and chloroform. The water extract showed positive test for carbohydrates and glycosides and steroids in chloroform extract. The water extract was tested on rats for the anticatatonic activity and behaved like a stimulant.

HISTORY : The history of medicine in India can be traced to the remote past. The earliest mention of the medicinal use of plants is found in Rig-Veda. India is blessed with many natural endowments, favourable among which are the climate and soil suitable for rich plant growth and in terms of human health and welfare. The medicinal plants gain special significance. The use of indigenous drugs in India has been in existence for several centuries and at present 80% of the population depends on indigenous system of medicine, involving mostly the herbal drugs

Apart from its internal consumption, India tops in the export of medicinal plants and related products though synthetic organic substances have taken a share in pharmaceutical applications; crude drugs and plant derived substances occupy an important place in medicine in country like ours.

The collection of crude drugs, both for commercial and medicinal purpose dates back to antiquity. In Rig-Veda there is reference that there were sages who accompanied the wandering Aryan tribes bag full of healing herbs. In Atharveda, it

is mentioned that Kirata girls used to dig out drugs in the mountains.

"keratica kumarika saka khanti bhesjan,
Hrindyaecbhu bhirbhi girar eenamup sanusa".

(Atharveda)

Physicians of the ancient days identified and collected herbs for their own use from the forests and compounded and dispensed their own medicinal preparations. During the Vedic age any such person who collected the drugs was much revered and was known "Parameshti prjapati". Yesatwas sale mimimath sanjabhar varaspatin, prajayayai chatre twa sale parameshti prjapati".

Records are available to show that crude drugs like cinnamon, ginger, pomegranate,calamus, sandalwood and asafetida found d their way to Mesopotamia about 3000 B.C. and to Egypt about 1500 B.C. from India as mentioned din the Thompsons Assyrian Herbal and Ebers Papyrus respectively.

Synthetic processes for which a chemist employs heat and pressure are affected. in plants at ordinary temperature and pressure. Chemists synthesized such alkaloids as Quinine after intensive work extending over half a century, whereas the cinchona plant does this without difficulty every day. Many active antibiotics occur in plants and this is at an unexplored and unexploited field in fact, we are only at the threshold of the plant research. What is store nature alone knows. Research on plant should, therefore go on in the interest of humanity. Great Britain, Switzerland and the United States of America, intensive studies of Indian indigenous drugs have been taken up in various research centers.

Evolvulus alsinoides (convolvulaceae- Morning Glory Family) : The plant kingdom is a rich source of biologically active agents revealing various types of pharmacological activities. This family contains about 47 genera and 1100species found mostly in tropical part of the globe. Most of the plants are annual or perennial herbs. They may be xerophytes, hydrophytes or parasites. Some of these herbs may be erect and some are profusely branched.Evolvulus alsinoides is a profusely branched herb coming in convolvulaceas family.

It is called **VISHNUGUNDHI** in Sanskrit, **SHAYMAKRANTA** or **SHANKPUSHPI** in Hindi and **VISHNUKRANTI** in kannada.

It is a common herb spreading throughout India ascending at 6000ft in the Himalayas. The plant is bitter and reported to be used as a tonic and febrifuge. The plant is used as vermifuge and oil for promoting the growth of hair. It is a nootropic drug and has the power to strengthen the brain and memory. It has antiulcer, anthelmantic property, useful as bronchitis, improves complexion& apatite. The leaves are made into cigarettes and smoked in chronic bronchitis and asthma.

LITERATURE SURVEY : Chemical examination of Evolvulusm Alsinoides have been reported by Mehta et al. They have been isolated three components from the petroleum ether extract. These were identified and characterized as pentatricontane ($C_{35}H_{72}$ m.p. 75-76^{0}C); tricontane ($C_{30}H_{62}$ m.p 65-66^{0}C) and B-sitosterol ($c_{29}H_{49}OH$ m.p. 135-136^{0}C). it has been reported by karnick, that Gibberlic acid has its effect in the growth of Evolvulus Alsinoides.

It has been reported that plants coming in this group have a important role in maintaining the concentration of heavy metals in the water and soil. there are no reports on the extraction and detailed chemical examination and screening ,hence the present work was under taken.

Collection and drying of the plant: The fresh plant of Evolvulus Alsinoides (12kg) was collected and immediately sprayed with alcohol 95% to cease the enzymatic degradations, they were chipped into small fragments, thick stem, root twigs and other parts were chipped in to 1" to 2" pieces and split longitudinally in to several sections to enable early drying under shade. Chopping fresh plant materials at once after collection hastens drying and advantages are reduction in bulk and the plant was under shade for drying for 15 days.

Extraction of the whole plant: The shade dried whole plant (150 grams) was powdered and extracted successively with distilled water, petroleum ether (40-60), alcohol and chloroform in a soxhlet extract for 18 -20 hours each. The aqueous extract was concentrated at reduced pressure on water bath yielding a brown gummy solid. The petroleum ether, chloroform and alcoholic extracts yielded greenish semisolids. These extracts were preserved in a refrigerator at 5^{0}C. Out of the four solvent extracts, only water and chloroform extracts were taken for further studies.

PHYTOCHEMICAL STUDY OF PLANTS

Schematic procedure for the extraction and separation of components from fresh plant materials

Non polar Pet-Ether (evaporated under reduced pressure to a dark mass and kept at 5^{0}C)	**moderately polar chloroform extract evaporated under reduced pressure to a green mass kept at 5^{0}c)**	Polar alcohol extract (evaporated under reduced pressure to a dark mass and kept at 5^{0}c)	**More polar water extract (evaporated under reduced pressure to a dark mass and kept at 5^{0}c)**
	1. Chemical test Steroids present **2. T.L.C. R_f values are 0.472, 0.5454 and 0.636**		**1. Chemical test Carbohydrates, glycosides present** **2. T.L.C. R_f values are 0.083, 0.1833 0.433, 0.6166 , 0.8, 0.883.**

	3.Pharmacological activity No significant anticatatonic activity was observed.		**3. Pharmacological activity Significant anticatatonic activity was observed**

THIN LAYER CHROMATOGRAPHY OF EXTRACTS : Thin layer chromatography is considered an indispensible tool in many laboratories. The technique is easy to learn and application is comparatively inexpensive. It is fast, convenient and versatile.

Adsorbents and other coating materials usually are applied as aqueous slurries. Slurry is made by thoroughly mixing 25gm of silica gel with 50ml of distilled water in a mortar until it is a uniform consistency and free of air bubbles. The coating of plates with adsorbents containing gypsum must be completed in about 4 min before the slurry hardens. Adsorbents layers are dried for 10-20 min, then placed vertically in a well ventilated oven and activated by heating to 110-120^{0}c for 1-2 hrs. As the activity and thus the resolving power of an adsorbent layer is greatly influenced by its water content, it is advisable to store freshly activated plates over silica gel in a desiccators.

The water extract and chloroform extract was spotted on the plates prepared as mentioned earlier using capillary tube. The plates are kept in the solvent chamber for the development of the chromatogram. The plates were air dried and kept in iodine chamber for identification.

R_f values of major water spot were found to be 0.883, 0.8, 0.616, 0.433, 0.1833 respectively. The R_f values $CHCl_3$ extract were 0.636, 0.5454, 0.472 respectively.

PHARMACOLOGICAL SCREENING

ANTI-CATATONIC ACTIVITY : Phenothiazine and butyrophenone type of antipsychotic drugs are known to produce extrapyramidal side effects in man. These effects such as akinesia, rigidity and tremors are called Parkinson like because in Parkinson's disease the major symptoms include difficulty to move and change posture and tremours. These effects of antipsychotic drugs are due to excessive blockade of dopamine receptors in the extrapyramidal motor systems. Therefore phenothiazines like perphenazine or chloropromaz ine are commonly used to produce Parkinson's-like extrapyramidal symptoms in lab animals and to study anti parkinsons drugs.

REQURIMENTS:

ANIMALS: Rats(150-200gms)

DRUGS: Perphenazine(Dose:5mg/kg ip: prepare a stock solution containing 1mg/ml of the drug and inject 0.5ml/100gms body weight of the animal.)

EQUIPMENTS: Two wooden blocks of 3cm and 9cm height.

PROCEDURE: Weigh and number the animals. Divide the animals into two groups,one for control (for study of perphenazine effect) and the other to study the effect of prepared drugs. Each group should consist of at least 4 animals. Inject perphenazine to control animals end observe the severity of catatonic response.

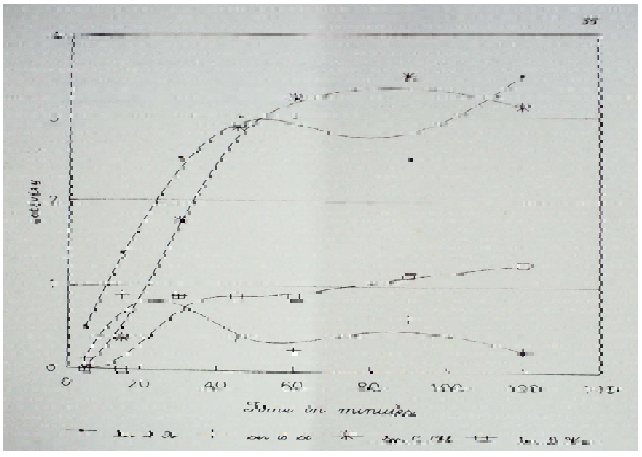
STAGE1: Rat moves normally when placed on the table.Then the score will be zero.

STAGE2: Rat moves only when touched or pushed. Then the scores will be o.5

STAGE3: Rat placed on the table with front paws set alternately on a 3cm block fails to correct the position in 10 seconds.score=0.5 for each paw with a total of 1 for this stage.

STAGE4: Rat fails to remove when the front paws are placed alternatively om a 9cm block, score =1 for each paw with a total score of 2 for this stage.

Thus for a single rat,the maximum possible score would be 3.5 revealing total catatonia. Observe the severity of catatonia at 5, 15, 30, 45, 60, 90 and 120 min after injecting peraphenazine. To the second group, inject scopolamine and after 30min inject peraphenazine to these animals already treated with scopolamine. Observe the score severity of catatonia as above. Now inject the test drugs to the rats and observe the anticatatonic activity.



RESULT: According to the results obtained from the anticatatonic activity of both water and $CHCl_3$ extract of evolvulus Alsinoides, it is found that water extract is stimulant.

DISCUSSION: It is worth going in for the isolation, identification and further screening of the individual compounds for their biological activities. They may give new systems which have better activity than the existing systems. Also this would lead to a new structure activity relationship and to new theory.

DOWN SYNDROME (MATERNAL AGE MAY BE A RISK FACTOR)

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Abstract : Down syndrome is the most common genetic disorder associated with mental retardation. Down sysdrome, named after John Langdon Down who identified the syndrome. This is caused by a chromosomal abnormality, a individual with Down syndrome will have 47 chromosomes instead of usual 46 chromosomes (i.e. 21st chromosome is 3 in number-trisomy-21). Surprisingly developed countries have reported more cases with Down syndrome, for example: estimates show 4,000 children with down syndrome are born in the U.S. each year or about 1 in every 800-1000 live births. The most common risk factor for giving birth to a child with Down syndrome is age. Although parents of any age may have a child with down syndrome, the incidence is higher for maternal age over 35 years. The risk for a child to be born with Down syndrome is age of mother above 35 years. There are over 50 clinical signs of Down syndrome, but not all in one person. Some common characteristics like

· Poor muscle tone.
· Slanting eyes (epicanthal folds)
· Short, broad hand with single crease across the palm.

The developmental milestones and the learning ability of children with Down syndrome are some what later than their peers without Down syndrome. They have specific health related problems. Prenatal diagnosis is done by amniocentesis, chorionic villus sampling (CVS) and percutaneous umbilical blood sampling (PUBS). The diagnosis in new born, first by appearance of physical characteristics and in the suspected, karyotype will be performed to determine the diagnosis. Research has shown that stimulation during early developmental stages improves a child's chances of developing to his or her fullest potential.

In this presentation, we discuss various factors associated with Down syndrome, diagnosis methods and suggestions to overcome this disorder to lead semi independent or independent life.

1. Introduction : Down syndrome is a genetic disorder. Down syndrome is named after John Langdon Down who identified the syndrome in 1866. Down syndrome is the most common and readily identifiable chromosomal disorder associated with mental retardation. It is also referred as Triomy-21 due to presence of three copies of chromosome 21. It occurs about one in every 800 to 1000 live births. Although parents of any age may have a child with Down syndrome, but the incidence is higher for older mother after 35 years of age.

J. L. Down described the condition as a distinct and separate entity. In 1959, Jerome Lejeune identified Down syndrome as a chromosomal anamoly. Instead of the usual 46 chromosomes present in each cell, Lejeune observed 47 chromosomes in the cells of individual with Down syndrome. A syndrome is a combination of physical, mental and health characteristics that are seen together

Fig 1.1 Photographs of children suffering from Down syndrome

2. Down syndrome - a genetic condition : Normally the nucleus of each cell contains 23 pairs of chromosomes, half of which are inherited from each parent. In individual with Down syndrome, the cells contain 47 chromosomes instead of 46 chromosomes. The extra chromosome is the 21st Chromosome. This excess genetic material in the form of additional genes along chromosome 21 results in Down syndrome. The extra 21st chromosome is detected by using a procedure called Karyotype. A karyotype is a visual display of the chromosomes grouped by size, number and shape. Chromosomes may be studied by examining blood or tissue cells. The chromosomes in the cell are identified, stained and numbered from largest to smallest.

3. Characteristics : Some common characteristics of Down syndrome individual includes: Poor muscle tone; Slanting eyes with folds of skin at the inner corners of eyes (epicanthal folds); Hyperflexibility (an excessive ability to extend the joints); Short, borad hands with single crease across the palm; Broad feet with short toes; Flat bridge of the nose; Short, low-set ears; Short neck; Small oral cavity; Large tongue in relation to size of mouth; Excessive space between first and second toe; Short high-pitched crises in infancy; Individuals (children) with Down syndrome are usually smaller than normal individuals; Physical and intellectual development is slower compared to normal individuals.

4. Associated conditions : People with Down syndrome are at increased risk for certain health problems. An estimate, of 50% of children with Down syndrome also have congenital heart disease which can be associated with high blood pressure in the lungs. Increased susceptibility to infection, respiratory and hearing problems, obstructed digestive tracts, sleep apnea and childhood leukemia occur with greater frequency in children with Down syndrome. Vision problems such as near sightedness, cataracts and near or far sightedness affect approximately 60% of children with Down syndrome. In new born, complications include poor muscle tone and malformations of the upper part of the spine. Adults with Down syndrome are also at increased risk for Alzheimers disease, thyroid conditions and sleep apnea

5. Causes and risk factors : Down syndrome is caused by a chromosomal abnormality. For some unexplained reason, an accident in cell development results in 47 instead of usual 46 chromosomes. This extra chromosome changes the orderly development of the body and brain. Down syndrome is usually caused by an error in the cell division called nondisjunction. The failure of two chromosomes to segregate properly is called non disjunction.Virtually all cases of Trisomy 21 are due to **nondisjunction** at the first meiotic division in the mother during the production of gametes. Techniques like DNA polymorphism and analysis of DNA markers show that the extra copy of chromosome 21 almost always comes from the mother.

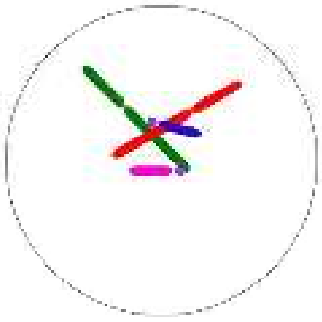


Fig 1.2 Nondisjunction in meiosis I results in trisomy 21 Down syndrome

However other two types of chromosomal abnormalities that is **mosaicism** and **translocation** are implicated in Down syndrome.
95% of Down syndrome cases are caused by nondisjunction. 4% cases by Translocation and 1% by mosaicism. All people suffering from Down syndrome have an extra critical portion of chromosome 21 present in all or some of their cells.

5.1 Nondisjunction : Nondisjunction is a faulty cell division that results in an embryo with three copies of chromosome 21 instead of usual two chromosomes. Prior to or at conception, a pair of 21st chromosomes in the egg fails to separate. As the embryo develops the extra chromosome is replicated in every cell of the body. Nondisjunction may be due to failure of the processes that move chromosome to opposite poles at first meiosis. Nondisjunction results in the production of gametes that are aneuploid (gametes that carry wrong number of chromosomes). When such a gamete is involved in a fertilization event, the resulting zygote is also aneuploid. Most autosomal aneuploids are virtually always incompatible with life. Most aneuploid zygotes are not viable and result in early spontaneous abortion and a few trisomic zygotes are capable of survival.

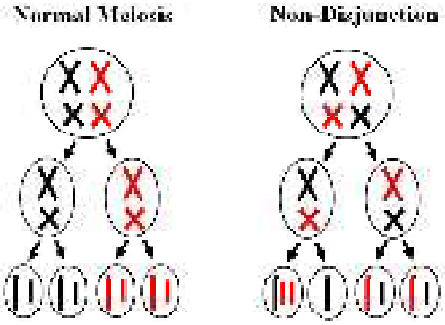


Fig1.3

5.2 Mosaicism: In this pattern of Down syndrome, individual have a mixture of two types of cells, some cells with 46 chromosomes and some with 47 chromosomes. The cells with 47 chromosomes contain an extra chromosome 21. The term mosaicism is due to the presence of **mosaic** pattern of the cells. Mosaicism is seen when nondisjunction of chromosome 21 occurs **postzygotically** (after fertilization during initial cell division). Mosaicism is rare and accounts 1%, have mild features than Trisomy 21. Individuals with mosaicism may be less affected by physical and mental characteristics of Down syndrome.

5.3 Translocation : Translocation accounts for 3-4% of cases of Down syndrome. It is a Robertsonian translocation. In translocation, a part of chromosome 21 breaks off during cell division and attaches to another chromosome. The individual will have 46 chromosomes in the cells in addition to an extra part of chromosome 21. Translocation occurs either prior to or at conception. Maternal age is not a risk factor for translocation. Its occurrence is a chance event. In one third of translocation incidents one parent is a carrier of translocated chromosome.The risk recurrence of translocation in a subsequent child is higher than that of nondisjunction. Genetic counseling can determine the origin of translocation.

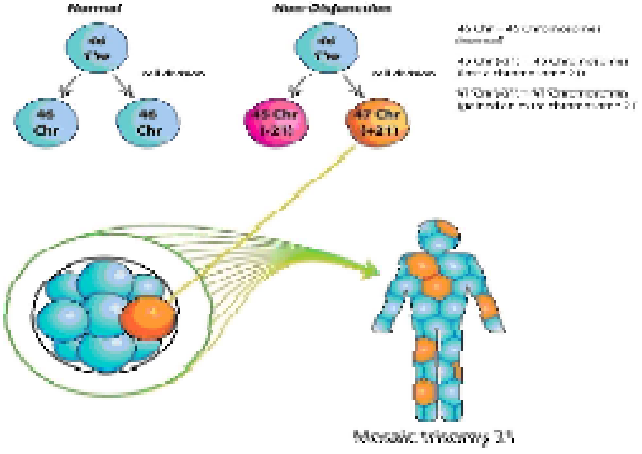


Fig 1.5 Mosaicism

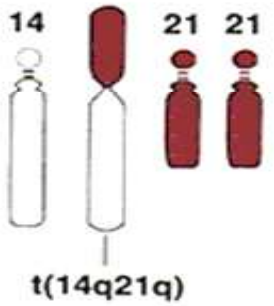


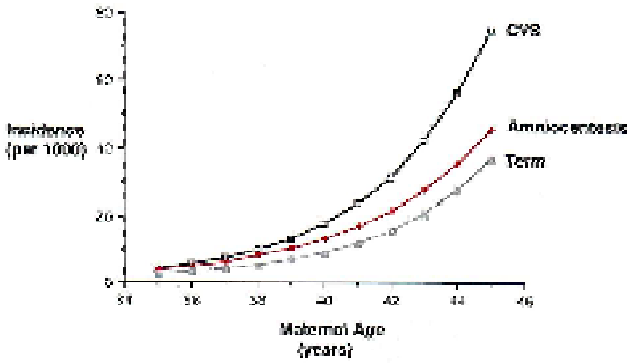
Fig1.6 Robertsonian translocation

5.4 The Maternal age effect : The most common risk factor for giving birth to a child with Down syndrome is maternal age. Down syndrome is normally a consequence of nondisjunction during meiosis in oocytes of mother. The frequency of Down syndrome births increases dramatically with **advancing maternal age.**

Frequency of Down syndrome births (child with Down syndrome), is shown in the following table:

Maternal age	Incidence of Down syndrome
25 years	1/1500
35 years	1/300 to 1/100
40 years	1/100 to 1/50
45 years	1/25

The age dependent increase for the frequency of nondisjunction are not observed in men. The basis for the maternal effect is unknown, but it is likely to be a consequence of the long delay between prophase and the first meiotic division in oocytes. Human oocytes begin meiosis long before the female is born. They arrest in the late meiotic prophase, after pairing and recombination have taken place, some months before birth. The oocytes stay in a state of suspended animation until the girl/women attains puberty some 10-13 years later. Then several oocytes are givin permission to restart meiosis each month, only one oocyte of these is allowed



Graphical representation of frequency of Down syndrome increases with maternal age

to complete the first meiotic division. For example the egg ovulated by a 45 year old woman has been stalled part way through meiosis for 45 years. During this period of time the error in cell division can occur (nondisjunction in men is not affected by age, male meiosis is a continuous process, with no built in halts, unlike female). It is important to understand the cause (etiology) of nondisjunction during meiosis to improve the methods for prenatal diagnosis.

5.5. Other risk factors : In addition to maternal age, **family history** and **chromosome anomalies** in the parents are the other risk factors. If the parents in question have had a previous aneuploid fetus or liveborn child, this increases the risk of a trisomic child in the present and subsequent pregnancies. Similarly, if one parent is known to carry an altered form of chromosome 21 (eg:Translocation) then the risk of an aneuploid conception increases greatly. Aneuploidy in the fetus may be the reason for couple to have unusually high number of miscarriages. The unusual occurrence of miscarriages raises the possibility that one of the parents might carry a genetic aberration or chromosome rearrangement. This increases the probability of producing trisomic fetus.

6. Prenatal Diagnosis

Screening & diagnostic tests: These tests are done to detect Down syndrome in pregnant women. Screening tests estimate the risk of the fetus having Down syndrome in addition considering the maternal age. Diognstics test accurately detect the fetus condition.

6.1 Screening tests :The most common screening test is the **Triple screen**. A combination of three tests that measures **alpha-fetoprotein (AFP), Human Chorionic Gonadotropin (HCG)** and **estriol** in the maternal blood stream. Triple screen test along with maternal age as risk factor, it is possible to estimate the risk of having a child with Down syndrome. These screening tests done at 15 to 20 weeks of gestation. **Quad test** measures **inhibin – A** for accurate screening. Screening are often done in conjunction with a detailed Sonogram. Sonogram show some physical or developmental traits that are helpful in calculating the risk of Down syndrome. It is important to note that screening tests are of limited valve. These tests will sometimes give false positive readings or false negative readings.

6.2 Diagnosis: If risk factor exist the prenatal diagnosis of Down syndrome is performed by procedures of amniocentesis, Chorionic Villus Sampling (CVS) and Percutaneous Umbilical blood Sampling (PUBS). These procedures are 98 to 99 percent accurate in the detection of Down syndrome. Amniocentesis performed between 12-20 weeks of gestation,CVS during 8-12 weeks of gestation,and PUBS after 20 weeks of gestation.

CVS requires an actually biopsy of the tissue that will form placenta. This tissue used for karyotyping and DNA analysis. Amniocentesis is a procedure where a needle is inserted into uterus, monitored by an scanner around 13^{th} – 16^{th} week of pregnancy and a small amount of fluid surrounding the fetus is removed and used for chromosome analysis.The technique of amniocentesis is safe and has 0.5% of miscarriage

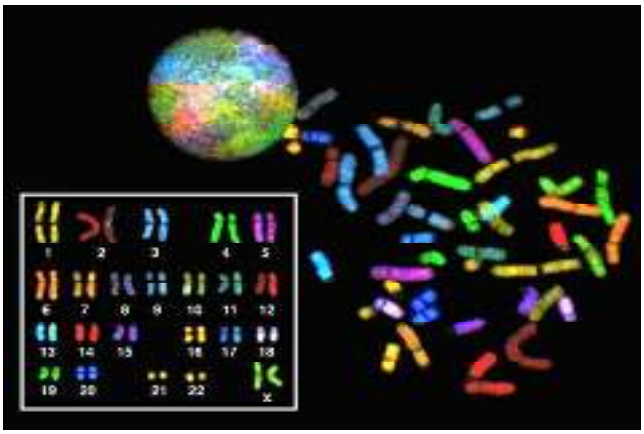


Fig 1.7 karyotyping

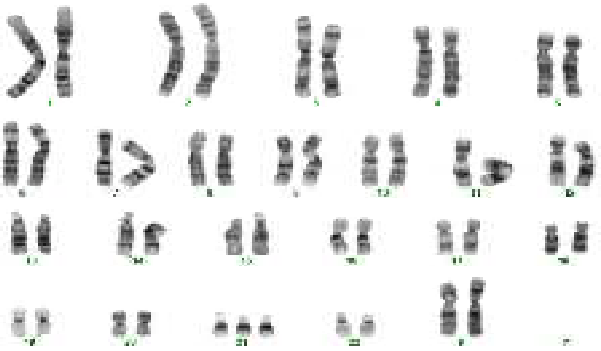


Fig 1.8 Karyotype of Trisomy 21: 47,XX, +21

7. Preventive measures : Increase in maternal age above 35 is a risk factor for a mother to carry a child with Down syndrome. Most mothers of this age group are advised for prenatal diagnosis of Down syndrome in the fetus. The parents need to seek the advice of a Medical genetist in the following situations:

a) Advanced maternal age
b) Previously affected (Trisomy - 21) child
c) Presence of a chromosomal rearrangement in one parent (translocation)
d) When a couple face unusually high number of miscarriages.

In the above cases where a risk factor exist it is necessary to confirm the occurrence of Down syndrome in the fetus by screening and diagnostic tests. If the diagnostics test show a positive result the parents have to decide whether to have a child with Down syndrome or to have an abortion. All the pregnant women irrespective of age should have a prenatal diagnosis to check the condition of the fetus. One step to prevent Down syndrome in children, is to have children in early age below 35 years(age of mother). However there are cases of Down syndrome children born to young couples (mother below 25 years).

8. Medical Care: There is no standard treatment for Down syndrome. Course of treatment is decided on an individual basis. Children with Down syndrome need hearing screening and regular dental care , although tooth eruption may be delayed. Yearly thyroid function testing is recommended. Early on, they may learn faster with sign language than with speech.

9. Long term outcomes and future for people with Down syndrome : People with Down syndrome are living much longer lives. The average life expentancy in 1929 was nine years old. Today, average life expentancy is 50 years, may extend to 70 years. Progressive legislation such as section 504 of Rehabilitation Act of 1973, the individuals with Disabilities Education Act has recognized that people with Down syndrome and other disabilities are individuals and citizens, and are entitled to equal protection and opportunity under law. People with Down syndrome are unique and must be treated as individuals. Children with Down syndrome have delay in developmental milestones such as gross motor, language, personal and social. Early intervention services, started shortly after birth, help children with Down syndrome develop to their maximum potential. Evidence shows that computer assisted teaching may be of real help to children with Down syndrome. Research has shown that stimulation during early developmental stages improves a childs chances of developing to his or her fullest potential. Quality education programs, a stimulating home environment and good medical care can develop skills that may allow them to live semi independently. NDSS(National Down Syndrome Society) is the largesr private funder of Down syndrome research(U.S).The Society hosts international research conferences. In cooperation with more than165 affiliate groups, NDSS established October as National Down syndrome Awareness month and organizes related programs. Resources such as the Down syndrome Health Care Guidelines and specialized growth charts can further assist families and medical professionals in providing medical and preventive care. Independent living centers, group shared and support services in the community are important resources for persons with Down syndrome.

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IMIDAZOLE AND ITS BIOLOGICAL IMPORTANCE

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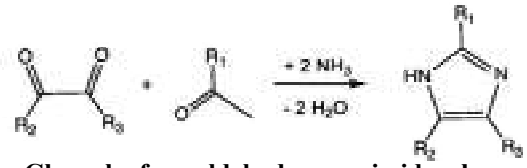
Imidazole is a precursor molecule for the construction of genetic material. Because DNA is made of purine and pyrimidine in which purine can be synthesized by imidazole as a parental molecule.A purine is a heterocyclic aromatic organic compound, consisting of a pyrimidine ring fused to an imidazole ring.

Imidazole is a one of the biological building block, hence this 5 membered ring system present in histidin and the related hormone histamine. Histidin is present in many proteins and enzymes and plays vital part, in structure and binding function of hemoglobin.

Imidazole helps in producing industrially important organic compounds with well-known synthetic methods. And it has biological activities and important pharmacological action.

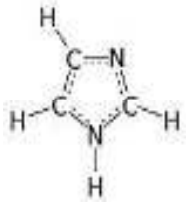
IMIDAZOLE : Imidazole (1,3-diaza-2,4-cyclopentadiene) is a planar five-member ring system with 3C and 2N atom in 1 and 3 positions. The simplest member of the imidazole family is imidazole itself, a compound with molecular formula $C_3H_4N_2$. The systemic name for the compound is 1, 3 diazole.

DISCOVERY OF IMIDAZOLE : Imidazole was first synthesized by Heinrich Debus in 1858, but various imidazole derivatives had been discovered as early as the 1840s.He, used glyoxal and formaldehyde in ammonia to form imidazole. This synthesis, while producing relatively low yields, is still used for creating C-substituted imidazoles.



Glyoxal formaldehyde imidazole

IMIDAZOLE STRUCTURE



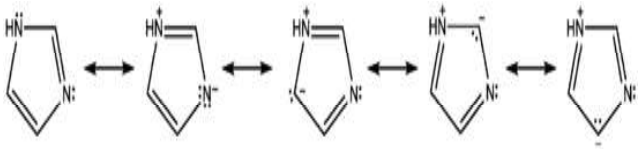
Numbering starts from N atom

Crystal structure- monoclonic structure, Coordination geomitry of imidazole is planar 5-membered ring. Dipole moment is -3.61D

Physical properties of Imidazole : It is soluble in water and other polar solvents. It exists in two equivalent tautomeric forms because the hydrogen atom can be located on either of the two nitrogen atoms. Imidazole is a highly polar compound, as evidenced by a calculated dipole of 3.61D, and is entirely soluble in water. The compound is classified as aromatic due to the presence of a sextet of ð-electrons, consisting of a pair of electrons from the protonated nitrogen atom and one from each of the remaining four atoms of the ring.

Imidazole is amphoteric, *i.e.* it can function as both an acid and as a base. As an acid, the pK_a of imidazole is 14.5, making it less acidic than carboxylic acids, phenols, and imides, but slightly more acidic than alcohols.

RESONANCE STRUCTURE OF IMIDAZOLE



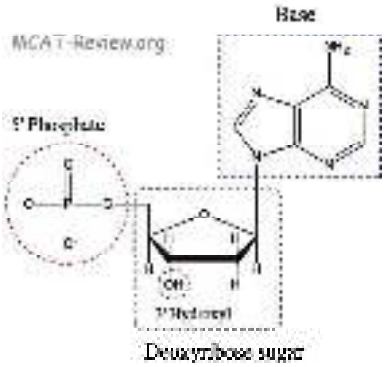
It's spectroscopic parameters are λ_{max} of 207 nm, I.R.=1550, 1492, 1451(cm^{-1}), τ = 2.30, 2.86, mass spectroscopy is studied for heterocyclic compounds containing one hetero-atom, in detail, not in case containing two or more .

NOW WE CAN SAY THAT IMIDAZOLE IS A PRECURSER, HETEROCYCLIC ORGANIC MOLECULE FOR DNA CONSTRUCTION. THAT CAN BE DEPICTED AS FOLLOWES: Nucleic acids are polynucleotide's—that is, long chain like molecules composed of a series of nearly identical building blocks called nucleotides. Each nucleotide consists of a nitrogen-containing aromatic base attached to a pentose (five-carbon) sugar, which is in turn attached to a phosphate group. Each nucleic acid contains four of five possible nitrogen-Containing bases: adenine (A), guanine (G), cytosine (C), thymine (T), and uracil (U). A and G are categorized as purines, and C, T, and U are collectively called pyrimidines.

All nucleic acids contain the bases A, C, and G; T, however, is found only in DNA, while U is found in RNA. The pentose sugar in DNA (2'-deoxyribose) differs from the sugar in RNA (ribose) by the absence of a hydroxyl group (-OH) on the 2' carbon of the sugar ring. Without an attached phosphate group, the sugar attached to one of the bases is known as a nucleoside.

The phosphate group connects successive sugar residues by bridging the 5'-hydroxyl group on one sugar to the 3'-hydroxyl group of the next sugar in the chain. These nucleoside linkages are called phosphodiester bonds and are the same in RNA and DNA.

DNA COMPOSATION



Purine

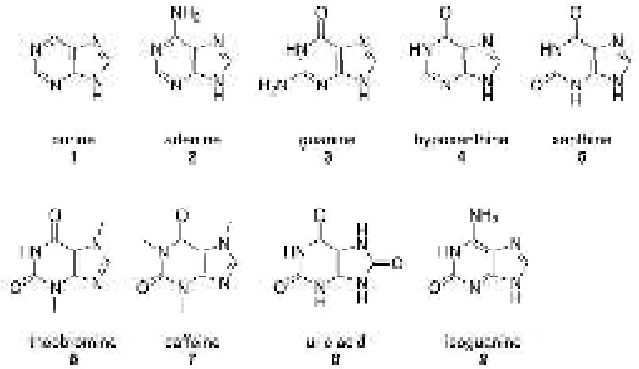
A Purine is a heterocyclic aromatic organic compound.It consists of a pyrimidine ring fused to an imidazole ring. Purines, including substituted purines and their tautomers, are the most widely occurring nitrogen-containing heterocycle in nature.

Purines and pyrimidines make up the two groups of nitrogenous bases, including the two groups of nucleotide bases. Two of the our deoxyribonucleotides and two of the four ribonucleotides, the respective building-blocks of DNA and RNA, are purines.

There are many naturally occurring purines. Two of the five bases in nucleic acids, adenine (**2**) and guanine (**3**), are purines. In DNA, these bases form hydrogen bonds with their complementary pyrimidines thymine and cytosine, respectively. This is called complementary base pairing. In RNA, the complement of adenine is uracil instead of thymine.

Other notable purines are hypoxanthine (**4**), xanthine (**5**), theobromine (**6**), caffeine (**7**), uric acid (**8**) and isog uanine (**9**).

Important **Imidazole** as a functional group in **purines** molecules are given bellow:

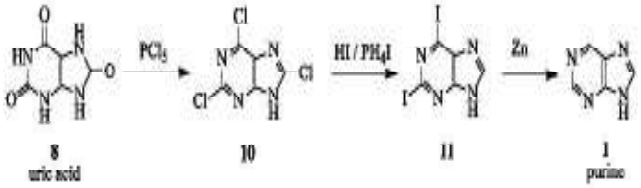


Functions of Purine: Aside from the crucial roles of purines (adenine and guanine) in DNA and RNA, purines are also significant components in a number of other important biomolecules, such as ATP, GTP, cyclic AMP, NADH, and coenzyme A.

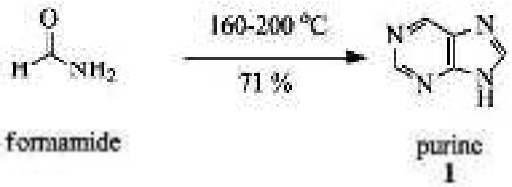
Purine (**1**) itself, has not been found in nature, but it can be produced by organic synthesis.

They may also function directly as neurotransmitters, acting upon purinergic receptors. Adenosine activates adenosine receptors.

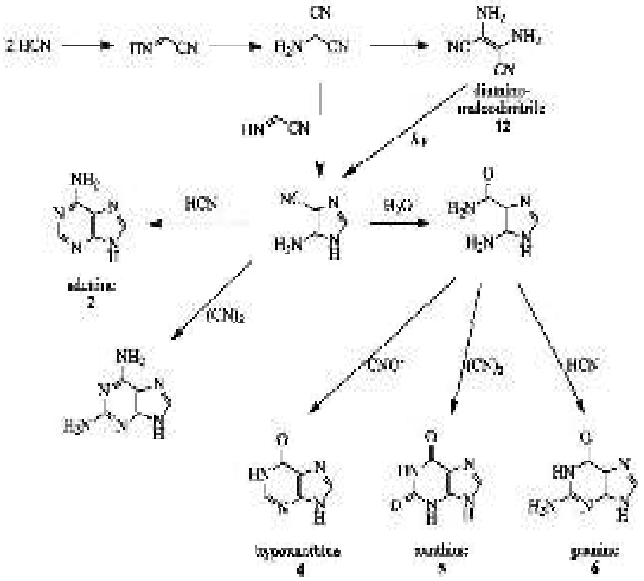
Uric acid (8) was reacted with PCl_5 to give 2, 6, 8-trichloropurine (**10**), which was converted with HI and PH_4I to give 2,6-diiodopurine (**11**). The product was reduced to Purine (**1**) using zinc-dust. Purines are also much larger than pyrimidines.



In addition to in vivo synthesis of purines in Purine metabolism, Purine can also be created artificially. Purine (**1**) is obtained in good yield when formamide is heated in an open vessel at 170 °C for 28 hours

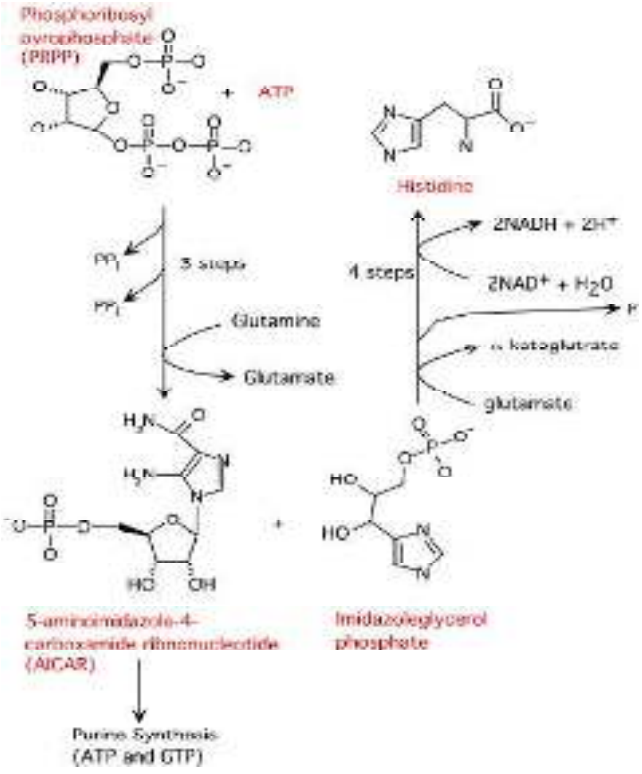


Oro, Orgel and co-workers have shown that four molecules of HCN tetramerize to form diaminomaleodinitrile (**12**), which can be Converted into almost all natural-occurring purines.

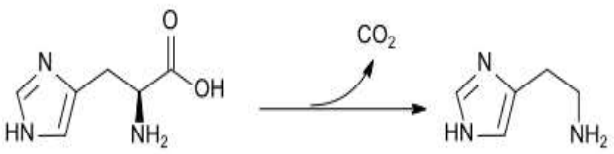


HISTIDINE (abbreviated as **His** or **H**)
Is a á-amino acid with an imidazole functional group. It is one of the 22 proteinogenic amino acids. Its codons are CAU and CAC. Histidine was first isolated by German physicia n Albrecht Kossel in 1896. Histidine is an essential amino acid in humans and other mammals. It was initially thought that it was only essential for infants and also for adult humans.

Chemical properties : The imidazole side chain of Histidine has a pKa of approximately 6.0, and, overall, the amino acid has a pKa of 6.5. This means that, at physiologically relevant pH values, relatively small shifts in pH will change its average charge. Below a pH of 6, the imidazole ring is mostl y protonated as described by the Henderson–Hasselbalch equation. When protonated, the imidazole ring bears two NH bonds and has a positive charge. The positive charge is equally distributed between both nitrogen's and can be presented with two equally important resonance structures.



Metabolism: The amino acid is a precursor for histami ne and carnosine biosynthesis



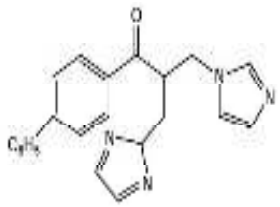
Conversion of Histidine to histamine by Histidine
The enzyme Histidine ammonia-lyase converts Histidine into ammonia and urocanic acid. A deficiency in this enzyme is present in the rare metabolic disorder histidinemia.

HISTAMINE : Is an organic nitrogen compound involved in local immune responses as well as regulating physiological function in the gut and acting as a neurotransmitter.

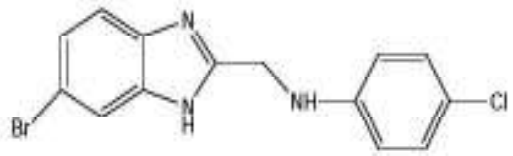
Histamine triggers the inflammatory response. As part of an immune response to foreign pathogens, histamine is produced by basophile and by mast cells found in nearby connective tissues. Histamine increases the permeability of the capillaries to white blood cells and some proteins, to allow them to engage pathogens in the infected tissues.

Pharmacological action of Imidazole: Imidazole derivatives have occupied a unique place in the field of medicinal chemistry. The high therapeutic properties of the imidazole related drugs have encouraged the medicinal chemists to synthesize a large number of novel chemotherapeutic agents.. Imidazole and its derivatives are reported to be physiologically and pharmacologically active and find applications in the treatment of several diseases. On the basis of various literature surveys Imidazole derivatives shows various pharmacological activities

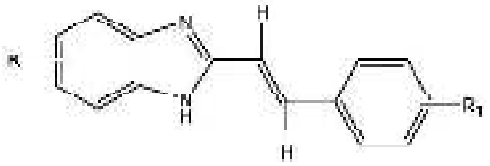
1) **Antifungal activity**: **Miconazole**



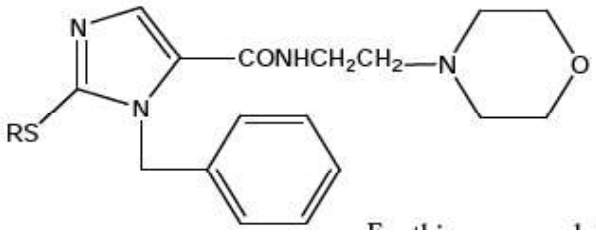
2) **Anti inflammatory activity and analgesic activity: 2-methylaminibenzimidazole derivatives**



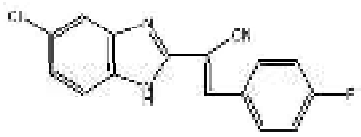
3) **Anti-tubercle activity: 5-nitro/bromo)-styryl-2-benzimidazole**



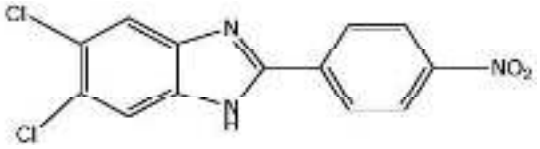
4) Anti depressant activity: Moclobemide analogue



5) Anti cancer activity: 2-substituted benzimidazole



6) Anti viral activity: 2-phenylbenzimidazole



Conclusion: Imidazole is a important heterocyclic organic compound. It can be concluded by considering above review articles, imidazole is precursor molecule for the construction DNA molecule. And maintaining several enzyme actions in the body.

It has important, pharmacological actions like:

Anti-inflammatory and Analgesic, Anti-tubercle,

Anti-depressant, Anti-cancer and finally Anti-viral.

BIOCONTROL OF FUNGAL PATHOGENS:A CURRENT FEATURE, PROSPECTS AND LIMITATIONS

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Abstract: Plant diseases need to be controlled to maintain the quality and abundance of food, feed, and fiber produced by growers around the world. Different approaches may be used to prevent, mitigate or control plant diseases. Beyond good agronomic and horticultural practices, growers often rely heavily on chemical fertilizers and pesticides. Such inputs to agriculture have contributed significantly to the spectacular improvements in crop productivity and quality over the past 100 years. However, the environmental pollution caused by excessive use and misuse of agrochemicals, as well as fear-mongering by some opponents of pesticides, has led to considerable changes in people's attitudes towards the use of pesticides in agriculture. Today, there are strict regulations on chemical pesticide use, and there is political pressure to remove the most hazardous chemicals from the market. Additionally, the spread of plant diseases in natural ecosystems may preclude successful application of chemicals, because of the scale to which such applications might have to be applied. Consequently, some pest management researchers have focused their efforts on developing alternative inputs to synthetic chemicals for controlling pests and diseases. Among these alternatives are those referred to as biological controls. A variety of biological controls are available for use, but further development and effective adoption will require a greater understanding of the complex interactions among plants, people, and the environment.

Key words: Bio control, biocontrol agents, Trichoderma spp and Pseudomonas flueroscens

Pathogenic microorganisms affecting plant health are a majorand chronic threat to food production and ecosystem stability worldwide. As agricultural production intensified over the past few decades, producers became more and more dependent on agrochemicals as a relatively reliable method of crop protection helping with economic stability of their operations. However, increasing use of chemical inputs causes several negative effects, i.e., development of pathogen resistance to the applied agents and their nontarget environmental impacts. Furthermore, the growing cost of pesticides, particularly in less-affluent regions of the world, and consumer demand for pesticide-free food has led to a search for substitutes for these products. There are also a number of fastidious diseases for which chemical solutions are few, ineffective, or nonexistent. In the recent years, there has been a world wide swing to the use of eco-friendly methods for protecting the crops from pest and disease (Rao et al., 1998). Biological control of plant disease especially soil borne plant pathogens and nematodes by microorganisms has been considered a more natural and environmentally acceptable alternative to the existing chemical treatment methods (Barker and Panlitz, 1996; Eziashi et al., 2007). Weindling (1932) over 75 years ago, demonstrated the antagonistic nature of fungal species from the genus, Trichoderma. The genus, Trichoderma is common filamentous imperfect fungi (Deutromycetes, Dematiaceae), the most common saprophytic fungi in the rhizosphere and found in almost any soil. The mycoparasite ability 1968 Afr. J. Biotechnol. of Trichoderma species against some economically important aerial and soil borne plant pathogens (Papavizas, 1985; Elad et al., 1993; Elad, 2000; Freeman et al., 2004, Dubey et al., 2007) and nematodes (Windham et al., 1989; Sharon et al., 2001) allows for the development of biocontrol strategies.

Why we have to control fungal pathogens?

Fungi interact with their hosts, and also with abiotic variables in the environment. They occur on rocks, in soil, in sea and fresh water in extreme habitats, experiencing high and low temperature, on dry substrates and in concentrated nutrients.They can survive on any degree of temperature of

mucorales are considered as ruderals since they survive in soil as long as nutrients are available although they are nit capable of degrading cellulose or lignin. Fungi like Fusarium, Gliocladium, Penicillium and Trichoderma are stress tolerant. Majority of fungi are mesophilic with maximum growth between 25 and 30º C (Mucor mucedo, Mortierella, Penicillium chrysogenium) however Cylindrocarpon sp., Candida scotti are cold tolerant (Psychrotolerant) and can grow near 0º C; others are thermo tolerant and grow above 40º (Rhizomucor, Thermomyces, Talaromyces) .Majority of fungi are mesophilic with maximum growth between 25 and 30º C (Mucor mucedo, Mortierella, Penicillium chrysogenium) however Cylindrocarp on sp., Candida scotti are cold tolerant (Psychrotolerant) and can grow near 0º C; others are thermo tolerant and grow above 40o (Rhizomucor,Thermomyces,Talaromyces). Xerotolerant fungi can grow on dry material (Aspergillus, Penicillium) with low matric potential while Osmotolerants grow at very low osmotic Potential (Pichia sp.)Dung of herbivorous mammals harbors a large number of fungi, termed coprophiles, of which Pilobolous, Ascobolus and Basidiobolous are famous for their special shot gun dispersal mechanism.The number of fungi recorded in India exceeds 27,000 species the largest biotic community after insects. The true fungi belong to kingdom Eukaryota which has 4 phyla, 103 orders, 484 families and 4970 genera. The eigth edition of Dictionary of the Fungi has recognised eleven phyla.The Deutromycotina is not accepted as a formal taxonomic category.

Mechanisms of biocontrol agents: The antifungal mechanism of Trichoderma spp., the best known biocontrol fungi, involves fungal cell wall degrading enzymes, such as chitinas es and glucanases (3–7). The purified enzymes from T. harzian um, which have an antagonistic and a nutritional role, are strong inhibitors of many important plant pathogens and are able to lyse not only the ''soft'' structure of the hyphal tip but also the ''hard'' chitin wall of mature hyphae, conidia, chlamydospores, and sclerotia. They are substantially more antifungal than chitinolytic and glucanolytic enzymes purified thus far from any other source when assayed under the same conditions (i.e., up to 100 times more active than the corresponding plant enzymes and effective on a much wider range of pathogens) (3–7) and nontoxic to plants even at high concentrations.

Root colonization and site-specific recombinase. Bacterial traits required for effective root colonization are subject to phase variation, a regulatory process for DNA rearrangements orchestrated by site-specific recombinase. In certain PGPB, efficient root colonization is linked to their ability to secrete a site-specific recombinase. Transfer of the site-specific recombinase gene from a rhizosphere-competent P. fluores cens into a rhizosphere-incompetent Pseudomonas strain enhanced its ability to colonize root tips.

Utilization of root exudates and root mucilage by PGPB.
Since root exudates are the primary source of nutrients forrhizosphere microorganisms, rhizosphere competence implies that PGPB are well adapted to their utilization. Despite the fact that sugars have often been reported as the major carbon source in exudates, the ability to use specific sugars does not play a major role in tomato root colonization.Similarly, although amino acids are present in root exudates, the bioavailability of amino acids alone is considered insufficient to support root tip colonization by auxotrophic mutants of P. fluorescens WCS365 In contrast, Simons et al. (1958) reported that amino acid synthesis is required for root colonization by P. fluorescens WCS365, indicating that amino acid prototrophy is involved in rhizosphere competence. In addition, PGPB regulate the rate of uptake of polyamines such as putrescine, spermine, and spermidine, since their high titer could retard bacterial growth and reduce their ability to competitively colonize roots.

Competitive root colonization: Despite their potential as low-input practical agents of plant protection, application of PGPB has been hampered by inconsistent performance in field tests; this is usually attributed to their poor rhizosphere competence. Rhizosphere competence of biocontrol agents comprises effective root colonization combined with the ability to survive and proliferate along growing plant roots over a considerable time period, in the presence of the indigenous microflora. Given the importance of rhizosphere competence as a prerequisite of effective biological control, understanding root-microbe communication, as affected by genetic and environmental determinants in spatial and temporal contexts, will significantly contribute to improve the efficacy of these biocontrol agents.

Competition for root niches and bacterial determinants directly involves root colonization. The root surface and surrounding rhizosphere are significant carbon sinks. Photosynthate allocation to this zone can be as high as 40%. Thus, along root surfaces there are various suitable nutrientrich niches attracting a great diversity of microorganisms, including phytopathogens. Competition for these nutrients and niches is a fundamental mechanism by which PGPB protect plants from phytopathogens. PGPB reach root surfaces by active motility facilitated by flagella and are guided by chemotactic responses. Known chemical attractants present in root exudates include organic acids, amino acids, and specific sugars. Some exudates can also be effective as antimicrobial agents and thus give ecological niche advantage to organisms that have adequate enzymatic machinery to detoxify them. The quantity and composition of chemoattractants and antimicrobials exuded by plant roots are under genetic and environmental control.

Root colonization and site-specific recombinase. Bacterial

traits required for effective root colonization are subject to phase variation, a regulatory process for DNA rearrangements orchestrated by site-specific recombinase. In certain PGPB, efficient root colonization is linked to their ability to secrete a site-specific recombinase. Transfer of the site-specific recombinase gene from a rhizosphere-competent P. fluorescens into a rhizosphere-incompetent Pseudomonas strain enhanced its ability to colonize root tips .

Antibiosis. The basis of antibiosis as a biocontrol mechanism of PGPB has become increasingly better understood over the past two decades. A variety of antibiotics have been identified, including compounds such as amphisin, 2,4-diacetylphloro glucinol (DAPG), hydrogen cyanide, oomycin A, phenazine, pyoluteorin, pyrrolnitrin, tensin, tropolone, and cyclic lipopeptides produced by pseudomonads and oligomycin A, kanosamine, zwittermicin A, and xanthobaccin produced by Bacillus, Streptomyces, and Stenotrophomonasspp. Interestin gly, some antibiotics produced by PGPB are finding new uses as experimental pharmaceuticals, and this group of bacteria may offer an untapped resource for compounds to deal with the alarming ascent of multidrug-resistant human pathogenic bacteria. Regulatory cascades of these antibiotics involve GacA/GacS or GrrA/GrrS, RpoD, and RpoS, N-acyl homose rine lactone derivatives and positive autoregulation. Antibiotic synthesis is tightly linked to the overall metabolic status of the cell, which in turn is dictated by nutrient availability and other environmental stimuli, such as major and minor minerals, type of carbon source and supply, pH, temperature, and other parameters. Trace elements, particularly zinc, and carbon source levels influence the genetic stability/instability of bacteria, affecting their ability to produce secondary metabolites. It is important to note that many strains produce pallet of secondary antimicrobial metabolites and that conditions favoring one compound may not favor another. Thus, the varied arsenal of biocontrol strains may enable antagonists to perform their ultimate objective of pathogen suppression under the widest range of environmental conditions.

Lytic enzyme production. A variety of microorganisms also exhibit hyperparasitic activity, attacking pathogens by excreting cell wall hydrolases (26). Chitinase produced by S. plymuthica C48 inhibited spore germination and germ-tube elongation in Botrytis cinerea (58). The ability to produce extracellular chitinases is considered crucial for Serratia marcescens to act as antagonist against Sclerotium rolfsii (121), and for Paenibacillus sp. strain 300 and Streptomyces sp. strain 385 to suppress Fusarium oxysporum f. sp. cucumerinum. It has been also demonstrated that extracellular chitinase and laminarinase synthesized by Pseudomonas stutzeri digest and lyse mycelia of F. solani.

Detoxification and degradation of virulence factors. Another mechanism of biological control is the detoxification of pathogen virulence factors. For example, certain biocontrol agents are able to detoxify albicidin toxin produced by Xanthomonas albilineans. The detoxification mechanisms include production of a protein that reversibly binds the toxin in both Klebsiella oxytoca and Alcaligenes denitrificans, as well as an irreversible detoxification of albicidin mediated by an esterase that occurs in Pantoea dispersa. Several different microorganisms, including strains of B. cepacia and Ralstonia solanacearum, can also hydrolyze fusaric acid, a phytotoxin produced by various Fusarium species. More often though, pathogen toxins display a broad-spectrum activity and can suppress growth of microbial competitors, or detoxify antiobiotics produced by some biocontrol microorganisms, as a self-defense mechanismagainst biocontrol agents.

Indirect plant growth promotion through induced systemic resistance: Biopriming plants with some PGPB can also provide systemic resistance against a broad spectrum of plant pathogens. Diseases of fungal, bacterial, and viral origin, and in some instances even damage caused by insects and nematodes, can be reduced after application of PGPB.

Induced systemic resistance. Certain bacteria trigger a phenomenon known as ISR phenotypically similar to systemic acquired resistance (SAR). SAR develops when plants successfully activate their defense mechanism in response to primary infection by a pathogen, notably when the latter induces a hypersensitive reaction through which it becomes limited in a local necrotic lesion of brown, desiccated tissue. As SAR, ISR is effective against different types of pathogens but differs from SAR in that the inducing PGPB does not cause visible symptoms on the host plant. PGPB-elicited ISR was first observed on carnation (Dianthus caryophillus) with reduced susceptibility to wilt caused by Fusarium sp. and on cucumber (Cucumis sativus) with reduced susceptibility to foliar disease caused by Colletotrichum orbiculare.

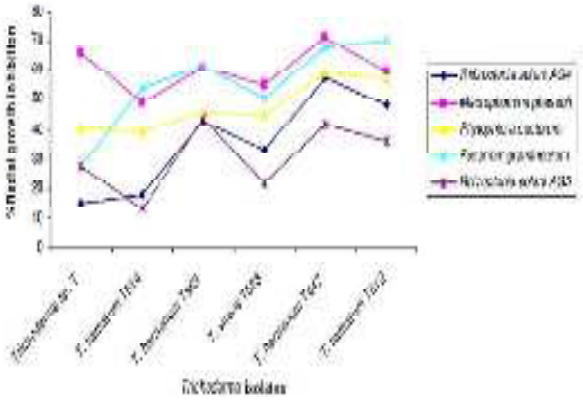
Defense mechanisms of ISR-mediated by PGPB. PGPB-triggered ISR fortifies plant cell wall strength and alters host physiology and metabolic responses, leading to an enhanced synthesis of plant defense chemicals upon challenge by pathogens and/or abiotic stress factors. After inoculation of tomato with endophytic P. fluorescens WCS417r, a thickening of the outer tangential and outermost part of the radial side of the first layer of cortical cell walls occurred when epidermal or hypodermal cells were colonized. In Burkholderia phytofirmans PsJN-grapevine interaction, a host defense reaction coinciding with phenolic compound accumulation and a strengthening of cell walls in the exodermis and in several cortical cell layers was also observed during endophytic colonization of the bacterium. The type of bacterized plant response induced after challenge with a pathogen resulted in the formation of structural barriers, such as thickened cell wall papillae due to the deposition of callose and the accumulation of phenolic compounds at the site of pathogen attack.

Effect of Trichoderma isolate Macrophomina phaseolina isolates and their interaction on preemergence damping-off of cotton seedlings(cultivar Giza 89) under greenhouse conditions

M. phaseolina isolate	Isolate of *Trichoderma* sp.													
	Trichoderma 1		*Trichoderma* 2		*Trichoderma* 3		*Trichoderma* 4		*Trichoderma* 5		Control		Mean	
	[%]	Transformed	[%]	Transformed	[%]	Transformed	[%]	Transformed	[%]	Transformed	[%]	Transformed	[%]	Transformed
1	14.00[a]	(21.69)[b]	34.00	(35.02)	24.00	(28.80)	16.00	(23.02)	22.00	(27.60)	26.00	(30.55)	22.67	(27.78)
2	16.00	(20.95)	36.00	(36.82)	20.00	(26.27)	18.00	(22.28)	26.00	(30.55)	42.00	(40.33)	26.33	(29.54)
3	28.00	(31.88)	24.00	(29.09)	10.00	(16.38)	14.00	(19.33)	20.00	(26.27)	18.00	(24.35)	19.00	(24.55)
4	36.00	(36.65)	10.00	(18.44)	34.00	(35.49)	26.00	(30.55)	22.00	(27.60)	36.00	(36.65)	27.33	(30.90)
5	34.00	(35.62)	42.00	(40.33)	74.00	(47.31)	30.00	(32.96)	18.00	(24.35)	68.00	(55.59)	44.33	(39.36)
6	34.00	(35.02)	50.00	(45.00)	56.00	(48.46)	20.00	(25.85)	30.00	(32.78)	54.00	(47.31)	40.67	(39.07)
7	38.00	(37.98)	26.00	(30.55)	68.00	(55.59)	34.00	(35.49)	48.00	(43.85)	54.00	(47.31)	44.67	(41.79)
8	26.00	(30.55)	24.00	(29.22)	28.00	(31.26)	60.00	(50.77)	54.00	(47.26)	44.00	(41.54)	39.33	(38.44)
9	32.00	(34.29)	28.00	(31.75)	50.00	(45.00)	38.00	(39.13)	48.00	(43.85)	62.00	(51.97)	43.00	(40.99)
10	22.00	(27.89)	38.00	(38.03)	30.00	(32.66)	56.00	(48.46)	32.00	(34.24)	18.00	(24.64)	32.67	(34.32)
11	10.00	(16.38)	18.00	(24.64)	28.00	(31.33)	28.00	(31.88)	42.00	(40.33)	24.00	(28.80)	25.00	(28.89)
12	12.00	(20.06)	14.00	(21.69)	60.00	(48.51)	36.00	(36.65)	16.00	(23.31)	34.00	(35.27)	28.67	(30.92)
13	20.00	(26.56)	26.00	(30.42)	40.00	(39.13)	14.00	(21.69)	12.00	(20.06)	32.00	(34.29)	24.00	(28.69)
14	10.00	(16.38)	34.00	(38.03)	40.00	(38.95)	60.00	(50.87)	12.00	(20.06)	46.00	(42.64)	33.67	(34.49)
Mean	23.71	(27.99)	28.86	(32.07)	40.14	(37.51)	32.14	(33.50)	28.71	(31.58)	39.86	(38.66)	32.24	(33.55)

Due to the very highly significant effect of Trichoderma isolate x M. phaseolina isolate interaction on preemergence damping-off, LSD was calculated to compare means of Trichoderma isolates within each isolate of M. phaseolina (Table 5). These comparisons showed that the differences in preemergence damping-off between Trichoderma isolates and the control were not the same for each M. phaseolina isolate that is, M. phaseolina isolates responded differently to the application of Trichoderma isolates. For example, Trichoderma 1 was the only isolate, which significantly reduced preemergence damping-off caused by M. phaseolina 1. Preemergance damping-off caused by M. phaseolina 5 was significantly suppressed by all the Trichoderma isolates; however, Trichoderma isolates showed different levels of efficiency in suppressing this isolate of M. phaseolina. It is worth noting that some Trichoderma isolates proved to be stimulatory for pathogenicity of some M. phaseolina isolates like Trichoderma 3 and Trichoderma 4, which significantly increased pathogenicity of M. phaseolina 12 and M. phaseolina 10, respectively. It was also found that the magnitude of the differences between Trichoderma isolates differed from one M. phaseolina isolate to another (Aly et al.2007).

Figure 1. Pathogen growth inhibition by Trichoderma isolates after 6 days of inoculation in dual culture.



Maximum pathogens growth inhibitions occurred in interacting with T. harzianum T447. By 48 h after interaction between mycelia of Trichoderma isolates and the pathogens mycelia, a clear zone of interaction was formed in all Trichoderma-pathogen combination. In dual cultures of T. virens T523 and T. harzianum T969 with all of the pathogens, an inhibition zone without physical contact between the colonies around the pathogen colony was observed. And also, this inhibition zone without hyphae contact was observed in R. solani AG4 and AG5-T. harzianum T447 and P.

cactorum-Trichoderma sp. T interaction. No apparent inhibition zone in other pathogen- Trichoderma interaction was observed macroscopically(Hajieghrari et al,2008).
Microscopically observation of the interaction zone showed vacuolization and mycelial tip denaturizing of the F. graminearum-Trichoderma virens T523 hyphae followed by disintegration. No hyphae coiling was observed in Pathogen-Trichoderma interactions. F. graminearum was most inhibited by T. hamatum T612 and R. solani AG4 was least inhibited by T. hamatum T614 (Figure 1).

Conclusion: Excessive use of chemicals in plant disease management has resulted in number of problems related to fungicide resistance, damage to non target flora and fauna and other usefull organisms along with hazardous effect of residue on environment. The application of biocontrol agents in plant disease management is more usefull and it is a very prospective method for keeping an environment clean and healthy. The current study assures the efficiency of biocontrol agent which will minimize the diseases so there is need of production and development of bio control agents to serve as model for environment friendly.

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DISEASE MANAGEMENT UNDER CONSERVATION AGRICULTURE

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Abstract: Conservation Agriculture (CA) is a concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment. CA is based on enhancing natural biological processes above and below the ground. Interventions such as mechanical soil tillage are

reduced to an absolute minimum, and the use of external inputs such as agrochemicals and nutrients of mineral or organic origin are applied at an optimum level and in a way and quantity that does not interfere with, or disrupt, the biological processes. CA is characterized by three principles which are linked to each other, namely: 1.Continuous minimum mechanical soil disturbance.2. Permanent organic soil cover and 3.Diversified crop rotations in the case of annual crops or plant associations in case of perennial crops. Disease are very problematic in Agriculture. 8-10% loss is due to the occurrence of disease and production of crop yield is also going down, all these reason we have to manage the disease. Complete removal of disease problem is not possible but management of disease will possible. Now a days new molecules of fungicides are available against disease but use of the these chemicals, soil fertility goes on decreasing, they are harmfull to natural enemies and bio agents and also effects on environment. To minimaise above problem Conservation Agriculture give a solution, in these concept healthy practices will carry out such as minimum or no tillage practice: soil will not get disturb, permanent soil cover(mulching): this practice increase the soil moisture level, produce humus this will help to bio control agent and as compare to other practice, the population of bio control agents are more and these agents fight against pathogens and lastly crop rotation: diversified crops will grow that will avoid occurrence of same disease and also reduce inoculums in the soil. All these principles are helpful in management of disease. so essentiality is more to adopt Conservation Agriculture practice.

Key words: Conservation Agriculture, Conservation tillage, disease management

The challenge for agricultural scientists to increase food production to meet food security needs and more still persists 40 years after the start of the Green Revolution as population growth continues to increase in many developing countries. However, today such production increases must be accomplished sustainably, by minimizing negative environmental effects and, equally important, providing increased income to help improve the livelihoods of those employed in agricultural production. There are several key issues in this equation on which there is almost unanimous consensus.

• The demand for food is still increasing, not only to meet food security for a growing population, but also to provide more nutritious food that makes protein quality, vitamins, and some essential minerals (iron and zinc) more available.

Benefits of Conservation Agriculture

The benefits will be looked at in relation to minimal soil disturbance, permanent ground cover, and rotation since they all interact to provide the benefits, which include the following:

a) Yields in the rice-wheat (RW) systems of the Indo-Gangetic Plains in South Asia are higher with no-till because of timelier planting and better stands. Yields of 200-500 kg/ha are found with no-till wheat in this system (Hobbs and Gupta 2004). Yield gains are also reported in other systems.

b) One of the major benefits of CA, which makes it popular with farmers, is it costs less in terms of money but also time. Once again in the RW systems of South Asia (Hobbs and Gupta 2004), no-till wheat significantly reduced the costs of production; farmers estimate this at about 2,500 rupees/ha (US$ 60/ha), mostly due to using less diesel fuel, less labor, and less pumping of water. Since planting can be accomplished in one pass of the seed drill, time for planting was also reduced, thus freeing farmers to do other productive work.

c) Water-use efficiency increased in the RW system because often the first irrigation could be dispensed with, and when the first irrigation was given the water flowed faster across the field. Water savings of 15-50% have been calculated with the greater savings occurring when crops are planted on beds. Other systems using no-till and permanent ground cover show reduced water runoff, better water infiltration, and more water in the soil profile throughout the growing period. There is also increasing demand for meat products and hence the grains and fodder needed to feed livestock.

• The land available to produce this extra food is shrinking because of urbanization and use of agricultural land for other purposes. Expansion is possible in some parts of the world, but the quality of this new land may be less than that already in use for agriculture.

• Most of the sources of productivity growth used in the last 40 Green Revolution years are already being utilized—improved varieties, fertilizer, and water. Future sources of productivity growth will be more complex and harder to find.

• Competition for water resources, especially surface and groundwater, will be more severe as domestic and industrial needs will compete for it.

• Fossil fuels will be more costly, adding to production costs through higher diesel prices but also higher fertilizer and other input costs.

• Greenhouse gas emissions such as carbon dioxide, methane, and nitrous oxide that have inherent warming effects on the atmosphere will increase with subsequent effects on climate, especially an increase in severe climatic events such as drought, floods, etc.

This will make the challenge more difficult and complex. One obvious way to accomplish this sustainable food production objective is to make more efficient use of the natural resources that are needed to produce food; this includes water, soils, air, inputs, and people. This paper discusses how promotion and adoption of conservation agriculture (CA) by farmers should be considered as one avenue to pursue in meeting the challenge.

What Is Conservation Tillage and Agriculture?

One of the more famous results of poor tillage choice is the Dust Bowl of the 1930s in the in the U.S. Great Plains. This resulted from excessive tillage and exposure of soil to wind.

The tragic dust storms of that time and place served as a wakeup call about how man's interventions in soil management and plowing can lead to unsustainable agricultural systems. In the 1930s it was estimated that 91 million hectares of land was degraded by severe soil erosion (Utz et al. 1938); this area has been dramatically reduced today.

The key components of optimum Conservation Agriculture The three components of optimum CA are:

(1) Maintaining year-round organic matter cover over the soil, including specially introduced cover crops and intercrops and/or the mulch provided by retained residues from the previous crop;

(2) Minimizing soil disturbance by tillage and thus seeding directly into untilled soil, eliminating tillage altogether once the soil has been brought to good condition, and keeping soil disturbance from cultural operations to the minimum possible;

(3) Diversifying crop rotations, sequences and associations, adapted to local environmental conditions, and including appropriate nitrogenfixing legumes; such rotations contribute to maintaining biodiversity above and in the soil, contribute nitrogen to the soil/plant system, and help avoid build-up of pest populations.

Disease scenario under Conservation Agriculture: Recent changes in agricultual practices towords conservation tillage cause us to wonder if farming is entering a new era of disease problems. Residue cover provides soil and residue borne micro- organism with a favorable habitat Conservation practices in combination with the crop residue may physically, biologically and structurally alter the local field environment by affecting soil temperature and moisture, competition among micro-organisms and soil disturbence(Rothrock,1992). Under these conditions, some disease will increase in incidence and severity whereas others will decrease. Disease that had negligible economic impact with conventional tillage may become a threat to crop production with reduced tillage.

Successful disease management will only be achieved through awareness and integration of techniques to manage the complex interactions between the pathogens, hosts and environments. Producers often ask researchers questions such as what diseases will cause problems if reduced tillage is used? And what is the best disease control strategy that is compatible with my economic and agronomic constraints.

Effect of residue cover, previous crop and tillage practices on incidence and severity of FHB Residue cover(%) Corn Wheat soybean Avg.

MP	12.4	9.1	4.9	8.8
CP	41.7	34.1	16.7	30.8
NT	67.4	82.2	45.9	65.4
Average	40.5	42.0	22.5	
Disease incid(%)				
MP	65.9	63.7	61.0	63.5
CP	79.7	70.3	65.1	71.8
NT	79.7	67.5	64.9	70.8
Average	75.1	67.2	63.3	

Soil coverage with crop residues was the lowest in mouldboard plough treatments (9%) and greater in chisel plough (31%) and no till (65%) treatments. Residues were greater in plots following corn (MP, 12%, CP, 42%, NT, 67%) than wheat (MP, 9%: CP, 34%) excpect in no-till wheat (NT, 83%) where residues were the most abundunt of all tratments examined soybeans generated less residue (23% coverage) than the other crops tested 41% wheat 42%) examined the effect of previous crop residues and tillage on Fusarium Head blight of wheat. This study reveals that disease incidence was greater when wheat was planted on corn residue and least when wheat followed by soy beans. Among the previous crop tillage combinations, disease incidence was significantly higher in the chisel plough and no till treatments of corn residues in any other combinarions (Dill-macky and Jones, 2000).

Crops	Disease	Pathogen Lives in	Surface residue disease risk	Disease trends with ZT	Suggested interval b/w similar crops
Cereals					
Wheat	FHB	Residue, soil	High	Increase	
Barley	Loose smut	seed	none	No change	2- 3 year
Oil seed					
Sunflower	Sclerotinia	Soil	Low	Decrease	3 year
mustard	White rust	Soil	none	No change	3 year
Pulses	Aschochyt	Residue	High	Increase	3-4 yr
Peas	Blight	Residue	High	Decrease	3 yr
Beans	Anthracnose	Residue	medium	No change	3-4 yr
Lentils	Powdery mildew				

Management practices under Conservation Agriculture
• Crop rotation
• Use of resistant and adapted varieties
• Correct planting time
• Time of sowing date and seedling rate
• Balanced fertilizers
• Utilization of green manures/ cover crops
• Strategic tillage
• Fungicides application
• Bio agents
• Farm and machinary hygiene

Crop rotations: The rotation of crops is not only necessary to offer a diverse "diet" to the soil micro organisms, but as they root at different soil depths, they are capable of exploring different soil layers for nutrients. Nutrients that have been leached to deeper layers and that are no longer available for the commercial crop, can be "recycled" by the crops in rotation. This way the rotation crops function as biological pumps. Furthermore, a diversity of crops in rotation leads to a diverse soil flora and fauna, as the roots excrete different organic substances that attract different types of bacteria and fungi, which in turn, play an important role in the transformation of these substances into plant available nutrients. Crop rotation also has an important phytosanitary function as it prevents the carry over of crop-specific pests and diseases from one crop to the next via crop residues

The effects of crop rotation:
• Higher diversity in plant production and thus in human and livestock nutrition.
• Reduction and reduced risk of pest and weed infestations.
• Greater distribution of channels or biopores created by diverse roots (various forms, sizes and depths).
• Better distribution of water and nutrients through the soil profile.
• Exploration for nutrients and water of diverse strata of the soil profile by roots of many different plant species resulting in a greater use of the available nutrients and water.
• Increased nitrogen fixation through certain plant-soil biota symbionts and improved balance of N/P/K from both organic and mineral sources.
• Increased humus formation.

Direct seeding or planting: Direct seeding involves growing crops without mechanical seedbed preparation and with minimal soil disturbance since the harvest of the previous crop. The term direct seeding is understood in CA systems as synonymous with no-till farming, zero tillage, no-tillage, direct drilling, etc. Planting refers to the precise placing of large seeds (maize and beans for example); whereas seeding usually refers to a continuous flow of seed as in the case of small cereals (wheat and barley for example). The equipment penetrates the soil cover, opens a seeding slot and places the seed into that slot. The size of the seed slot and the associated movement of soil are to be kept at the absolute minimum possible. Ideally the seed slot is completely covered by mulch again after seeding and no loose soil should be visible on the surface. Land preparation for seeding or planting under no-tillage involves slashing or rolling the weeds, previous crop residues or cover crops; or spraying herbicides for weed control, and seeding directly through the mulch. Crop residues are retained either completely or to a suitable amount to guarantee the complete soil cover, and fertilizer and amendments are either broadcast on the soil surface or applied during seeding.

Permanent soil cover : A permanent soil cover is important to: protect the soil against the deleterious effects of exposure to rain and sun; to provide the micro and macro organisms in the soil with a constant supply of "food"; and alter the microclimate in the soil for optimal growth and development of soil organisms, including plant roots. Cover crops need to be managed before planting the main crop. This can be done manually or with animal or tractor power. The important point is that the soil is always kept covered. (FAO).

The effects of soil cover:
• Improved infiltration and retention of soil moisture resulting in less severe, less prolonged crop water stress and increased availability of plant nutrients.
• Source of food and habitat for diverse soil life: creation of channels for air and water, biological tillage and substrate for biological activity through the recycling of organic matter and plant nutrients.
• Increased humus formation.
• Reduction of impact of rain drops on soil surface resulting in reduced crusting and surface sealing.
• Consequential reduction of runoff and erosion.
• Soil regeneration is higher than soil degradation.
• Mitigation of temperature variations on and in the soil.
• Better conditions for the development of roots and seedling growth.

Means and practices:
• Use of appropriate/improved seeds for high yields as well as high residue production and good root development.
• Integrated management and reduced competition with livestock or other uses e.g. through increased forage and fodder crops in the rotation.
• Use of various cover crops, especially multi-purpose crops, like nitrogenfixing, soil-porosity-restoring, pest repellent, etc.Optimization of crop rotations in spatial, timing and economic terms." Targeted" use of herbicides for controlling cover crop and weed development. Conservation agriculture (CA) methods, are much more than just reducing the mechanical tillage. In a soil that is not tilled for many years, the crop residues remain on the soil surface and produce a layer of mulch. This layer protects the soil from the physical impact of rain and wind but it also stabilizes the soil moisture and temperature in the surface layers. Thus this zone becomes a habitat for a number of organisms, from larger insects down

to soil borne fungi and bacteria. These organisms macerate the mulch, incorporate and mix it with the soil and decompose it so that it becomes humus and contributes to the physical stabilization of the soil structure. At the same time this soil organic matter provides a buffer function for water and nutrients. Larger components of the soil fauna, such as earthworms, provide a soil structuring effect producing very stable soil aggregates as well as uninterrupted macropores leading from the soil surface straight to the subsoil and allowing fast water infiltration in case of heavy rainfall events. Keeping the soil covered and planting through the mulch will protect the soil and improve the growing environment for the crop. This picture shows soya planted into wheat straw (a good rotation; by direct planter (minimal soil disturbance), without removing the previous crop residue (permanent soil cover). Good CA. (J.Benites). This process carried out by the edaphon, the living component of a soil, can be called "biological tillage". However, biological tillage is not compatible with mechanical tillage and with increased mechanical tillage the biological soil structuring processes will disappear. Certain operations such as mouldboard or disc ploughing have a stronger impact on soil life than others as for example chisel ploughs. Most tillage operations are, however, targeted at loosening the soil which inevitably increases its oxygen content leading in turn to the mineralization of the soil organic matter. This inevitably leads to a reduction of soil organic matter which is the substrate for soil life.

Conclusion : Under Conservation Agriculture, appearance of disease was less because of tillage practices such as zero tillage, minimum tillage which enhance the biological actiuvity of soil microbes. With heavy tillage increase the soil erosion which reducs the biological activity of soil microbes hence disease management is very difficult. In this regard some of the important practices such as rotation, fungicide application balanced fertilizers, some of the bio agents and resistant varieties tackle with the diseases under Conservation Agriculture.

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ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

THEME:9 (BHASKAREEYAM) PHYSICAL, MATHEMATICAL AND ASTRO-PHYSICAL SCIENCES

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DETERMINING THE STRUCTURE OF PYRUVATE KINASE OF *HERMUSTHERMOPHILUS* H8.

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Pyruvate kinase (EC:2.7.1.40) (PK) catalyses the final step in glycolysis, the conversion of phosphoenolpyruvate to pyruvate with phosphorylation of ADP to ATP (Munoz and Ponce, 2003)

ADP + phosphoenolpyruvate = ATP + pyruvate

The enzyme, which is found in all living organisms, requires both magnesium and potassium ions for its activity. In vertebrates, there are four tissue-specific isozymes: L (liver), R (red cells), M1 (muscle, heart and brain), and M2 (early foetal tissue). In plants, PK exists as cytoplasmic and plastid isozymes, while most bacteria and lower eukaryotes have one form, except in certain bacteria, such as *E. coli*, that have two isozymes. All isozymes appear to be tetramers of identical subunits of approximately 500 residues or 57KDa (Sakai *et al*., 1986,).*Thermusthermophilus* H8 is a thermophilic bacterium found in hot springs of Japan. It can thrive in temperatures of up to 85°C. Pk of Thermophilic organisms has not been characterized fully. The structure of PK of a moderate thermophile, *Bacillus stearothermophilus* is available.

The structure of several pyruvate kinases (1PKY, 3TO5, 3E0W, 3GG8) from various organisms, including thermophilic bacteria (2E28), have been determined (Walker *et al*., 1992,Suzuki *et al*., 2005, Suzuki *et al*, 2008, Sakai and Ohta, 1993) . The protein comprises three-four domains: a small N-terminal helical domain (absent in bacterial PK), a beta/alpha-barrel domain, a beta-barrel domain (inserted within the beta/alpha-barrel domain), and a 3-layer alpha/beta/alpha sandwich domain.

The *Thermusthermophilus* Pyruvate kinase has been purified from the clones available in the lab from the Whole Cell Project Database (WCPDB), Japan. Biochemical specific activity, SDS_PAGE and a Native PAGE confirm that the protein is pure enough for crystallographic studies. The crystallization trials yield microcrystals. The conditions are being refined to produce diffraction quality crystals. The bioinformatics analysis of the protein shows that there are motifs in the protein which differentiate the proteins from aerobic and the anaerobic organisms. The bioinformatics analysis would further be extended to check if the pathogenic and non pathogenic organisms would be differentiated based on the PK sequence. If so the motif which helps in this differentiation would be targeted for drug design.

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Introduction : *Thermusthermophilus* H8 is a thermophilic bacterium found in hot springs of Japan. It can thrive in temperatures of up to 85°C. There are approximately 2200 genes in the organism and around 40% of the proteins encoded by these genes are hypothetical proteins whose functions have not been annotated. In view of structurally characterizing these proteins and attempting to analyse the function of these proteins through the structure, the Whole cell Project Database (WCPDB) was launched.

Pyruvate kinase (EC:2.7.1.40) (PK) catalyses the final step in glycolysis, the conversion of phosphoenolpyruvate to pyruvate with phosphorylation of ADP to ATP (Munoz and Ponce, 2003)

ADP + phosphoenolpyruvate = ATP + pyruvate

The enzyme, which is found in all living organisms, requires both magnesium and potassium ions for its activity. In vertebrates, there are four tissue-specific isozymes: L (liver), R (red cells), M1 (muscle, heart and brain), and M2 (early foetal tissue). In plants, PK exists as cytoplasmic and plastid isozymes, while most bacteria and lower eukaryotes have one form, except in certain bacteria, such as *E. coli*, that have two isozymes. All isozymes appear to be tetramers of identi-

cal subunits of approximately 500 residues or 57KDa (Sakai *et al*., 1986).

PK helps control the rate of glycolysis, along with phosphofructokinase and hexokinase. PK possesses allosteric sites for numerous effectors, yet the isozymes respond differently, in keeping with their different tissue distributions. The activity of L-type (liver) PK is increased by fructose-1,6-bisphosphate (F1,6BP) and lowered by ATP and alanine (gluconeogenic precursor), therefore when glucose levels are high, glycolysis is promoted, and when levels are low, gluconeogenesis is promoted. L-type PK is also hormonally regulated, being activated by insulin and inhibited by glucagon, which covalently modifies the PK enzyme. M1-type (muscle, brain) PK is inhibited by ATP, but F1,6BP and alanine have no effect, which correlates with the function of muscle and brain, as opposed to the liver.

The structure of several pyruvate kinases (1PKY, 3TO5, 3E0W, 3GG8) from various organisms, including thermophilic bacteria (2E28), have been determined(Walker *et al*., 1992,Suzuki *et al*., 2005, Suzuki *et al*, 2008, Sakai and Ohta, 1993) . The protein comprises three-four domains: a small N-terminal helical domain (absent in bacterial PK), a beta/alpha-barrel domain, a beta-barrel domain (inserted within the beta/alpha-barrel domain), and a 3-layer alpha/beta/alpha sandwich domain. The structure of *Thermusthermophilus* pyruvate kinase is however not available. The protein would be characterized biochemically as well as structurally.

Materials and Methods:

Transformation: Transformation of the pET11a plasmid in which the gene has been cloned into E.coli BL21-DE(3) cells was done through $CaCl_2$ based heat shock method. $CaCl_2$ competent E.coli BL21-DE(3) were prepared using standard protocols and the cells were transformed by subjecting them to a heat shock at 42°C. The transformed cells were selected through antibiotic selection by plating in ampicillin containing medium.(Sambrook*et al*.,1989)

Expression of the protein Pyruvate kinase: From the colonies that grew in the ampicillin plate 10 were then grown on LB broth containing ampicillin and the cells were induced with IPTG to check over expression of the desired enzyme. .(Sambrook *et al*.,1989)

SDS-PAGE and enzyme assay: The over-expression of the protein was checked using SDS-PAGE. The activity of the enzyme was checked using published methods.(Sakai *et al*.,1986)

Growth studies: In order to determine the medium that was most suitable for the growth and expression of the enzyme the clones were grown in various media and the growth curve determined. The composition of the growth media is as follows:

S. No	Medium	Composition	Amount of components in 1L
1.	HiVEG(HIMedia)	Peptone Yeast Extract NaCl	 20g
2.	HIMEdia(Miller)	Tryptone Yeast extract NaCl	10g 5g 10g
3.	Accumix(Miller)	Tryptone yeast extract NaCl	10g 5g 10g
4.	SRL(Lennox)	Tryptone Yeast extract NaCl	10g 5g 5g
5.	LB modified	peptone Yeast extract Sucrose Potassium sulphite DiSodium hydrogen phosphate Magnesium sulphate Ferric chloride Manganese chloride Citric acid	5g 5g 10g 1.3g 6.4g 0.27g 7mg 15mg 0.32g
6.	LB(Miller)	Tryptone Yeast extract NaCl	10g 5g 10g
7.	LB(Lennox)	Tryptone Yeast extract NaCl	10g 5g 5g

Determination of growth was done by spectrophotometrically checking the optical density of the culture, over a period of 10 hours with the respective media as blanks. The optical density values were measured using a spectrophotometer every hour for 10 hours and then plotted on Microsoft Excel.

Activity of enzyme: The specific activity of the enzyme was measured using the protocol described in Sakai *et al*., 1986. The concentrations of various reagents used in the assay are as follows:100mM imidazole buffer pH7.2, 20mM KCl, 10mM $MgCl_2$, 2mM Phosphoenol pyruvate, 4mM ADP. The protein sample was prepared by diluting the sample to a concentration of 10μg/mL.

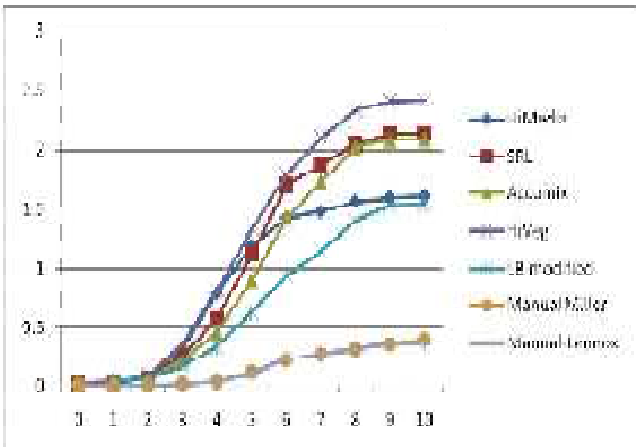
Purification of Pyruvate kinase: Purification of the enzyme pyruvate kinase was done by methods used for isolating the thermophilic proteins cloned in *E.coli*. The transformed cells

were grown in LB (HiVEG medium)-amp medium for three hours by which time they would have reached 0.4-0.6 OD at 595nm. 0.1M IPTG was used to induce expression of the cloned protein, the cells were grown for a further 3 hours and they harvested by centrifugation at 6000rpm at 4°C for 30 minutes. The cell pellet was then resuspended in lysis buffer containing 10mM $MgCl_2$, 100mM KCl, 1mM β-mercapto ethanol, 1mM PMSF in 50mM Tris-HCl buffer pH 7.0. The cell suspension was sonicsated using a Branson sonifier, with an amplitude of 25% for 1 minute (5 second pulses followed by 20 second pauses). The cell debris was removed by centrifugation at 6000 rpm for 30 minutes at 4oC. The clear lysate was then transferred to a fresh tube and aliquoted into small portions. These were subjected to heat denaturation at 70oC for 1 hour. This time and heat was optimised to yield almost pure pyruvate kinase which showed maximum specific activity. The tubes were then centrifuged at 12000rpm for 45 minutes to separate the precipitated proteins. The clear solution, the supernatant was the fraction which contained the thermostable pyruvate kinase. This was concentrated and used for further purification using Gel filtration chromatography using an ACTA purifier. The matrix used was a 50Kda cut off coarse sephadexcolum. The contaminating protein which was below 50 Kda was trapped and the pyruvate kinase enzyme was eluted as the flow through. The fractions in the first 10 mL were pooled and concentrated further to get the purified pyruvate kinase.

Crystallizaion of Pyruvate kinase: Crystallization conditions for pyruvate kinase were designed based on the conditions used for crystallization of pyruvate kinase from sources like Rabbit muscle, cat muscle, *Geobacillus stearothermophilus* etc. The conditions which yield crystals are 14% PEG 8000, 10 mM MgCl2, 200mM KCl in Tris buffer pH 7.0 and 12 % PEG 8000, 10 mM $MgCl_2$, 200mM KCl in Tris buffer pH 7.0.

Results and discussion:

Growth curve: In order to understand the medium in which there will be optimum growth of the transformants and maximal expression of pyruvate kinase, the growth curve experiment was carried out. The results of the experiment are summarised in the graph shown below. It was observed that components of the LB medium when mixed manually in the Miller or the Lennox mixes showed poor growth rate and the protein yield was also insignificant as compared to the other ready-made media. HiVEG yielded maximum growth rate followed by SRL-Lennox mix. It was observed that the clones preferred Lennox mixes rather than Miller mixes. The amount of NaCl in the two media might have contributed to the difference in preference.

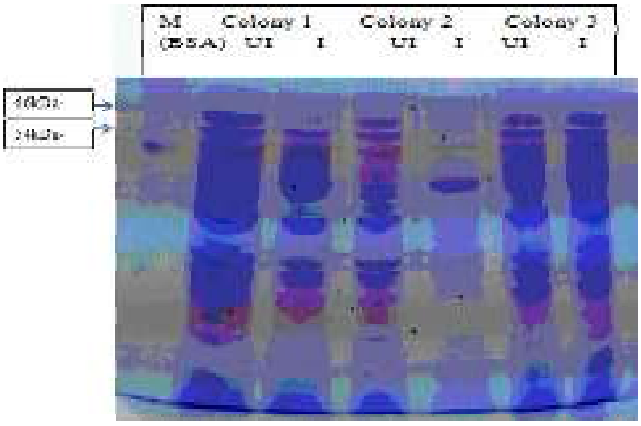


Over-expression of Pyruvate kinase of *Thermus thermophilus* H8 in *E.coli* BL21-DE(3):

The transformants of *E.coli* BL21-DE(3) were plated on a LB-ampicillin medium and 4 colonies were chosen and revived in LB-amp medium. The colonies were then subjected to a small scale IPTG induction. Fig.1 shows the SDS-PAGE results of the expression profile of three colonies. It can be noted that the band corresponding to about 54kDa is over expressed.

Fig.1

Overexpression of Pyruvate kinase of *Thermus thermophilus* H8 in *E.coli* BL21-DE(3):



Legends:
BSA: Bovine serum albumin
UI: Unindued cell lysate
I: IPTG induced cell lysate.
Colony 2 was used for further purification of the protein.

Purification of Pyruvate kinase:

Glycerol stocks of Colony 2 were prepared from the mid log cells of the culture. These were stored at -80°C for further experiments. The stocks were revived and culture was purified following the heat denaturation procedure described in the materials and methods section. The optimum temperature for denaturation was however optimised by the following experiment. Aliquots of the clear lysate of culture were placed at 70°C for 10 minutes, 20 minutes, 30 minutes and 60 minutes. Similarly at 80oC for 10 minutes, 20 minutes, 30 minutes and 60 minutes. The precipitates were then removed by centrifu-

gation and the supernatant was stored for SDS-PAGE and activity studies.

The SDS-PAGE results of the 70°C and 80°C treated proteins shown in fig. 2 and fig.3 respectively.

Figure.2

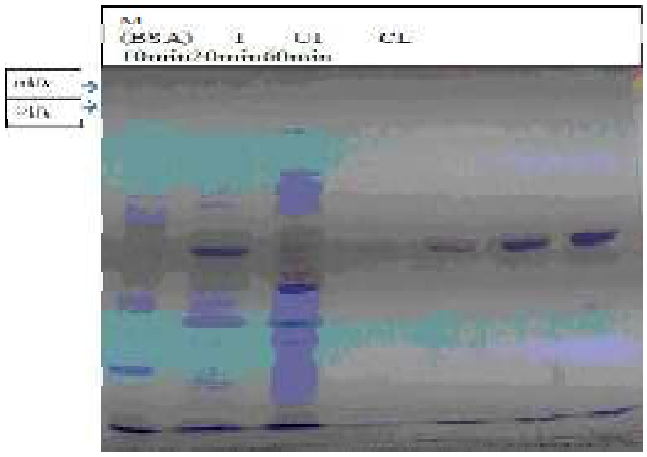
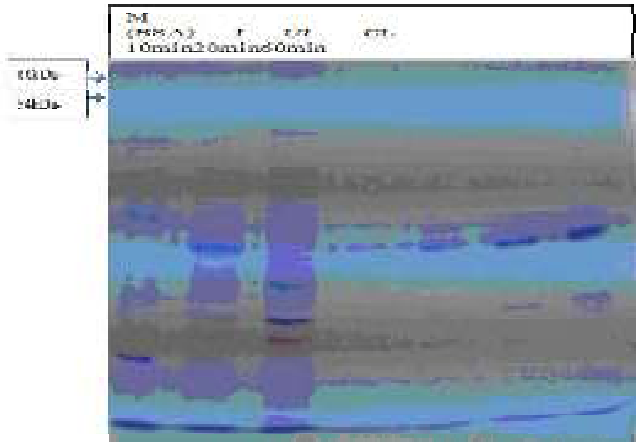


Figure.3

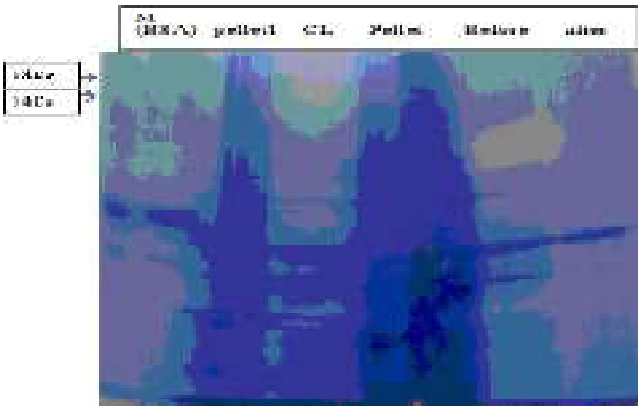


Legends:
BSA: Bovine serum albumin
I: IPTG Induced sample
UI: Uninduced(Negative control)
CL: Clear lysate, obtained after sonication.
10 min: protein fraction obtained after incubation at 70°C and 80°C respectively for 10 minutes.
20min: protein fraction obtained after incubation at 70°C and 80°C respectively for 20 minutes.
60min:protein fraction obtained after incubation at 70°C and 80°C respectively for 60 minutes.

Activity assay: It was observed by enzyme assay that the activity of the enzyme was not lost upto 1 hour at 70°C whereas it was active upto 20 minutes at 80 °C. Further purification of pyruvate kinase was therefore done by incubating the clear lysate at 70°C for 1 hour.

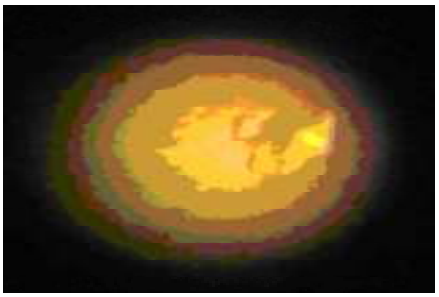
Gel filtration: Figure 4 shows the SDS-PAGE results of the samples after gel filtration chromatography. It can be observed that gel filtration was able to purify the protein to homogeneity. The protein fractions from the first 10 mL were pooled and concentrated for crystallization purposes.

figure 4



Legends:
BSA: Bovine serum albumin
Pellet1: The cell debris obtained after sonication.
CL: Clear lysate. The supernatant obtained after sonication
Pellet: the pellet obtained after heat denaturation.
Before: The heat denatured sample with the heat stable proteins alone
After: After gel filtration.

Crystallization trials: Crystallization of Pyruvate kinase was attempted using the Hanging drop vapour diffusion method. The conditions for crystallization were obtained by reviewing literature. It was observed that most of the pyruvate kinases purified from various sources preferred PEG 8000 in the presence of KCL and MgCl2 in a buffer of pH 6-6.5. I therefore tried conditions based on this information. 14% PEG 8000, 10mM MgCl2 and 200mM KCl in 50mM Tris pH 7.0 yielded the following crystal. The conditions are being optimised.



The crystals are reproducible and grow to about 1.5mm in a week. Further characterizations of the crystal and structure determination are underway

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AN EFFICIENT APPROACH TO DENOISE MICROSCOPIC IMAGE BY USING SHARPENING METHOD

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ABSTRACT : Image Processing refers to the use of algorithm to perform processing on digital image. Microscopic images like some microorganism images contain different type of noises which reduce the quality of the images. Removing noise is a difficult task. Noise removal is an issue of image processing. Images containing noise degrade the quality of the images. Removing noise is an important processing task. After removing noise from the images, the visual effect will not be proper. Image Sharpening in an image is basically a process of extracting high frequency details from the image and then adding this information to the blurred image. This paper presents an approach to a de-noise method for noisy image and a method of sharpening of the noisy image.

Images of microorganism are extensively used in the area of medicine and biotechnology. Microorganism image analysis is having very important role in modern diseases diagnosis. The study of microorganism needs identification of different type of microorganism. For that qualitative analysis is required. By the term qualitative analysis mean the differentiation of different type of microorganism that are present in industrial sludge. In microscopic image capturing, due to environmental conditions, system noise, and motion of the object and so on, there will be difference between the original image and the resulting image. Noise must be removed for its improvement so that real information about image will be obtained for special purpose. There are number of algorithms for noise removal

Image de-noising methods include spatial domain method and frequency domain methods.
This paper will suggest to denoising an image

$$I = P + Q$$

Where P is original image and Q is noise with unknown variance or density.

The objective of the sharpening is to process an image so that the result is more suitable than the original image for a specific application. Image enhancement is used to improve the interpretability or perception of information in images for human viewers or to provide better input for a specific application. The enhancement of the noisy image is difficult because the sharpening operation increase the noise.

In this paper, a simple method of sharpening of noisy image is presented. The proposed method includes two steps: suppressing the noise step and sharpening step. Here optical microscope (400X) image of Cyanobacteria with a size of 583 X 345 has been taken for analysis

1. INTRODUCTION : Microscopic Images are extensively used in the area of medicine and biotechnology. Microorganism image analysis is having very important role in modern diseases diagnosis. The study of microorganism needs identification of different type of microorganism. For that qualitative analysis is required. By the term qualitative analysis mean the differentiation of different type of microorganism that are present in industrial sludge. In microscopic image capturing, due to environmental conditions, system noise, and motion of the object and so on, there will be difference between the original image and the resulting image. Noise must be removed for its

improvement so that real information about image will be obtained for special purpose. Noise that commonly disturb microscopic image can be divided in to three categories. First image originally recorded on photographic film are detected by noise called film grain noise can be called as Gaussian white noise. Second photo electronic noise is due to the statistical nature of light and of the photo electronic conversion process that takes place in image sensor. At low light levels, photo electronic noise is often modeled as random with Poisson density. At high levels, the Poisson distribution approaches the Gaussian. Finally, electronic noise due to the thermal motion of electrons in resistive circuits is modeled as white Gaussian noise with zero mean value.

There are number of algorithms for noise removal [1]-[5].

Image de-noising methods include spatial domain method and frequency domain methods.

This paper will suggest to denoise an image

$$M = I + Q \quad [1]$$

Where I is original image and Q is noise with unknown variance or density.

The objective of the sharpening is to process an image so that the result is more suitable than the original image for a specific application. [2]-[8] Image enhancement is used to improve the interpretability or perception of information in images for human viewers or to provide better input for a specific application. The enhancement of the noisy image is difficult because the sharpening operation increase the noise. [7]

In this paper, a simple method of sharpening of noisy image is presented. The proposed method includes two steps: suppressing the noise step and sharpening step. Here optical microscope (400X) image of Cyanobacteria with a size of 583 X 345 has been taken for analysis

The rest of the paper is organized as follows:- In the second section the type of noise and Noise Suppressing method in spatial domain and frequency domain is described. In the third section the sharpening methods is described. In the fourth section assessment parameter is discussed .Experimental result and discussion is presented in section 5.

2. IMAGE NOISE AND NOISE SUPPRESSING METHODS

2.1 Image Noise

Image noise is called as unwanted product of image capture. Image noise can be divided differently according to different criterion. The criterion includes the cause of image noise generation, the shape of the noise amplitude distribution over time, noise spectrum and the relationship between noise and signal and so on. The noise type can be Gaussian Noise, Impulse Noise, Speckle Noise, and additive Noise. Gaussian noise is the type of noise in which, at each pixel position (i,j),the random noise value ,that effects the true pixel value is drawn from a Gaussian probability density function with mean μ(i,j) and standard deviation ó(i,j) [4]. The probability Density Function of a Gaussian random variable, z, is given by

$$P(z) = (1/\sigma\sqrt{2\Pi})e^{-(z-\mu)^2/2\sigma^2} \quad [2]$$

Where z represents gray level.

Impulse noise also known as shot noise or spec noise alters at random the value of some pixels. In Binary image some white pixel become black and some black pixel become white [4]. In binary image this means that some black pixels become white and white pixels become black. This is why this noise is also called salt and pepper noise. The PDF of Salt and pepper noise is given by

$$p(z) = \begin{cases} P_a & z = a \\ P_b & z = b \\ 0 & otherwise \end{cases} \quad [3]$$

If b > a gray level b will appear as a light dot in the image. Conversely, level a will appear like a dark dot [4].

It is assumed to be poisson distributed.

Figure 1 shows the original image of Cyanobacteria.To see the different types of noise on the quality of original image, figure 2 and 3 show the corrupted image by salt & pepper noise with different noise density and Gaussian noise with mean 0 and different variance respectively.

2.2 Noise Suppressing Methods: Different methods of denoising based on noise characteristics can be selected. Noise can be suppressed in both space domain and frequency domain.

Spatial domain refers to the image plane itself , and the manipulation will be done directly on pixels itself. Frequency domain involves transforming of an image in to transform domain, doing processing there and obtaining the inverse transform to bring the result back in spatial domain.

A linear filter called Gaussian filter in two dimension is given by

$$H(u,v) = \exp(-D^2(u,v)/2\sigma^2) \quad [4]$$

Where D (u, v) is the distance from any point to the origin of Fourier transform. σ is the measure of the spread of the Gaussian curve. A non linear operation called Median Filter is a spatial method of reducing salt and pepper noise in an image. Median filter replaces the value of a pixel by the median of the intensity level in the neighborhood of that pixel. [4]

Such noise reduction is preprocessing step to improve the result of later processing. The main idea of the median filter is to run through the signal entry by entry, replacing each entry with the median of the neighborhood. [6]

Figure 4 shows the result of filtering the noise image shown in figure 2 with a median filter of size 3X3 and Figure 5 show the result of filtering the noise image shown in Figure 3 with a Gaussian filter of sigma 0.62.

3. IMAGE SHARPENING

Process called Sharpening is to manipulating an image so that image is more visible than the original image [6]. In general if only single image enhancement method will be implemented, actual requirements will not be obtained. To get better visual effect for images, researcher perform filtering of image first and then sharpen the image. Image enhancement can be divided in to two.

3.1 Spatial Domain Image Sharpening

Number of methods for image enhancement in spatial domain is: gray level transformation, Histogram, processing, basic spatial filters and unsharp masking. Here unsharp masking is used. The process of unsharp masking includes

1) Blur the original image.
2) Subtract the blurred image from the original.
3) Add the difference to the original image.

Here linear unsharp filter is used to enhance the noisy image. With this visual effect will increase.

3.2 Image sharpening in frequency domain

Number of methods for image enhancement in frequency domain is sharpening frequency domain filters, smoothing frequency domain filter and Homomorphic filtering.

In this section Homomorphic fitter is used.. A Homomorphic filter enhances the high frequencies and suppresses the low frequencies, so that the variation in the illumination is reduced, while edges and details are sharpened. [5].

The image is slightly blurry and many of its low intensity features are obscured.

4. ASSESSMENT PARAMETER USED FOR ANALYZING THE OUTPUT OF THE ALGORITHM

There are number of parameters such as Noise Standard Deviation (NSD), Mean Square Error (MSE), Equivalent Numbers of Looks (ENL), and Peak Signal to Noise Ratio (PSNR) .Here PSNR and MSE are used to assess the algorithm.

4.1 Mean Square Error (MSE)

The Mean Square Error is used to find the total amount of difference between two images. It indicates average difference average difference of the pixels of throughout the image where K is the de noised image and I is the original image with noise.A lower MSE indicates that there is small difference between the original image with noise and nosied image. The formula is.

$$MSE = 1/mn \sum_{i=0}^{m-1} \sum_{j=0}^{n-1} \left(I(i,j) - K(i,j)\right)^2 \quad [5]$$

4.2 Peak Signal To Noise Ratio (PSNR)

To assess the performance of the noise removal method, PSNR is used. The formula is

$$PSNR = 10\log_{10}\left(255^2 / MSE\right) \quad [6]$$

5. DISCUSSIONS AND CONCLUSION

Here the Image sharpening method is proposed. The microscopic image of Cyanobacteria with a size of 583 X 345 has been corrupted by two different type of noise at different variance and density, including Gaussian noise and salt pepper noise. In this section result are presented to illustrate the performance of algorithm. An original noise free image shown in figure 1 is given as reference. A quantitative comparison is performed between different techniques in terms of PSNR and MSE. Figure 2 and 3 shows the result of Cyanobacteria corrupted by noise at different density and variance.

The de-noising method is a median filter in spatial domain and Figure 4 show the noise free images. The de-noising method is Low pass filter in frequency domain and Figure 5 show the noise free image. The de-nosing effect of median filter on salt and pepper noise is much better than low pass filter on Gaussian noise.

First, noisy image is sharpened using unsharp filter in the spatial domain and result is shown in the figure 6,7,8,9. Figure 6 is enhanced image of Cyanobacteria which is corrupted by salt and pepper noise of different density and figure 7 is enhanced image of Cyanobacteria from which noise density is removed. Figure 8 is the enhanced image of Cyanobacteria corrupted by Gaussian noise with different variance and figure 9 is enhanced image of Cyanobacteria from which noise density is removed.

It can be seen that visual effect of enhanced image of denoised image is better than enhanced image of noisy image

Second, noisy image is sharpened using Homomorphic filter in the frequency domain and the result is shown in the figure 10,11,12,13. Figure 10 is enhanced image of Cyanobacteria which is corrupted by salt and pepper noise of different density and figure 11 is enhanced image of Cyanobacteria from which noise density is removed. Figure 12 is the enhanced image of Cyanobacteria corrupted by Gaussian noise with different variance and figure 13 is enhanced image of Cyanobacteria from which noise density is removed.

Table 1A and 1B shows the comparison table of PSNR of different techniques. Table 2A and 2B shows the comparison table of MSE of different techniques Figure 12 show the comparison graph of PSNR and MSE of different techniques for Cyanobacteria.

The experimental result shows that de-nosing effect of median filter on salt and pepper noise is much better than low pass filter on Gaussian noise and if noise is salt and pepper then de-noising with sharpening in spatial domain is much better than in frequency domain for this type of images, microorganisms. Here analysis is done by putting different type of artificial noise on microorganism but the special attention is to classify the noise type in microorganism and select the appropriate de-noising and enhancement method according

to different purpose. With this we will get better visual effect of noisy image.The method can help us to find special characteristics of microorganism.

It shows that the method proposed in the paper is effective for microbiologist in digital image processing . With this it will have high visual effect under signal enhancement approaches such as sharpening, histogram

Table 1A. Comparison of PSNR of Different Techniques for Cyanobacteria

Noise Density	Median Filter without any sharpenening	Median Filter with Unsharp Masking	Median Filter with Homomorphic	Homomorphic	Unsharp Masking
10	4.5688e-004	0.0088	0.1185	0.1640	0.3452
20	0.0013	0.0177	0.1533	0.2743	0.6765
30	0.0039	0.0573	0.1864	0.4350	1.0050
40	0.0112	0.1524	0.2411	0.6511	1.3268
50	0.0270	0.3289	0.3333	0.9784	1.6610
60	0.0525	0.5612	0.4947	1.3798	1.9752
70	0.0911	0.8859	0.8033	1.9395	2.3033

Table 1B. Comparison of PSNR of Different Techniques for Cyanobacteria

Noise with variance	GLP without Sharpening	GLP with Unsharp Masking	GLP with Homomorphic	Homomorphic	Unsharp Masking
0.01	20.0964	26.5355	11.1658	20.8558	17.9928
0.02	17.5340	24.5806	10.7645	20.7936	15.6781
0.03	15.9469	23.2628	10.3484	20.2712	14.5614
0.04	14.8717	22.3426	10.0490	19.9630	14.1444
0.05	14.0970	21.5192	9.7420	19.8866	13.3005
0.06	13.4392	21.0046	9.5617	18.6630	12.8971
0.07	12.9366	20.5003	9.3733	18.2551	12.4698

Table 2A. Comparison of MSE of Different Techniques for Cyanobacteria

Noise Density	Median Filter without any sharpenening	Median Filter with UM	Median Filter with Homomorphic	Homomorphic	Unsharp Masking
10	33.4019	35.6980	22.2886	21.6443	16.2408
20	28.8281	29.5962	21.1609	19.9884	14.0375
30	24.0519	27.9781	20.3285	18.2484	12.3421
40	19.5160	22.8732	20.0348	16.9440	11.5085
50	15.6808	18.7064	19.8350	15.7440	10.5326
60	12.8002	16.4250	19.2911	15.2985	9.7804
70	10.4048	15.0521	17.6506	14.4442	9.1129

Table 2B. Comparison of MSE of Different Techniques for Cyanobacteria

Noise with variance	GLP without Sharpening	GLP with Unsharp Masking	GLP with Homomorphic	Homomorphic	Unsharp Masking
0.01	0.0098	0.0022	0.0841	0.0907	0.1380
0.02	0.0176	0.0035	0.0917	0.0982	0.2639
0.03	0.0254	0.0047	0.0990	0.1080	0.3860
0.04	0.0326	0.0058	0.1060	0.1216	0.5046
0.05	0.0389	0.0070	0.1122	0.1375	0.6076
0.06	0.045	0.0079	0.1182	0.1536	0.7080
0.07	0.0509	0.0089	0.1241	0.1726	0.7989

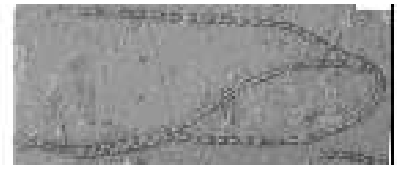
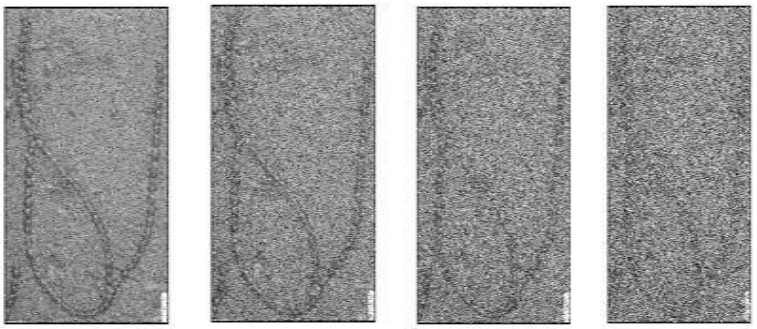
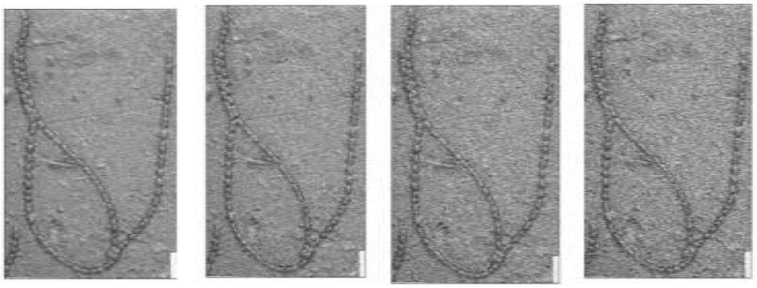


Figure 1 Original microscopic image of Cyanobacteria.



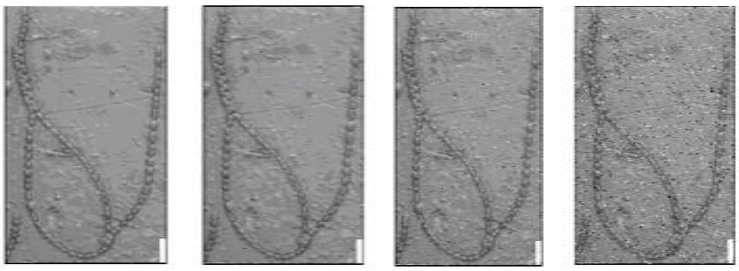
(a) (b) (c) (d)

Figure 2 Image Cyanobacteria corrupted by salt & pepper noise. (a) Noise Density 20% (b) Noise Density 30% (c) Noise Density 40% (d) Noise Density 50%



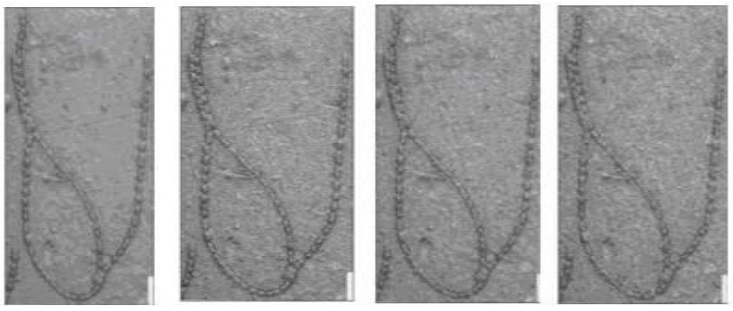
(a) (b) (c) (d)

Figure 3 Image Cyanobacteria corrupted by Gaussian noise. (a) Noise with variance 0.02 (b) Noise with variance 0.03 (c) Noise with variance 0.04 (d) Noise with variance 0.05



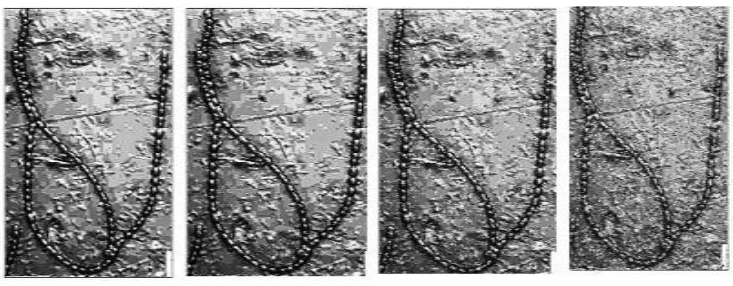
(a) (b) (c) (d)

Figure 4 De-noising by Median filter (a) De-noising image of figure 2(a) ,(b) De-noising image of figure 2(b) ,(c) De-noising image of figure 2(c) , (d) De-noising image of figure 2(d)



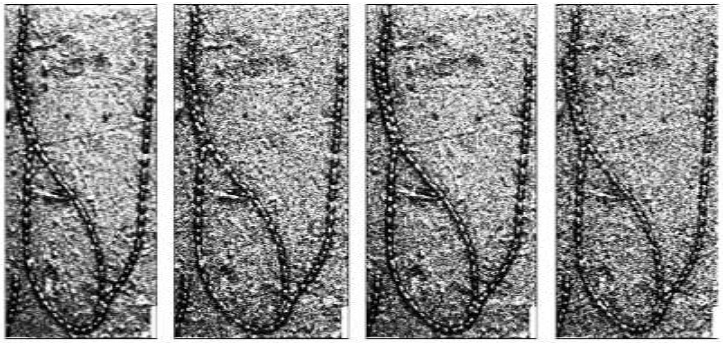
(a) (b) (c) (d)

Figure 5 De-noising by Gaussian Low Pass filter (a) De-noising image of figure 3(a) ,(b) De-noising image of figure 3(b) ,(c) De-noising image of figure 3(c) , (d) De-noising image of figure 3(d)



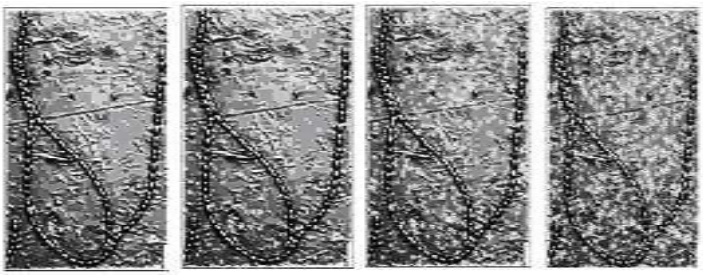
(a) (b) (c) (d)

Figure 6 Enhanced image using unsharp masking filter (a) Sharpen image of 4(a),(b) Sharpen image of 4(b),(c) Sharpen image of 4(c), (d) Sharpen image of 4(d)



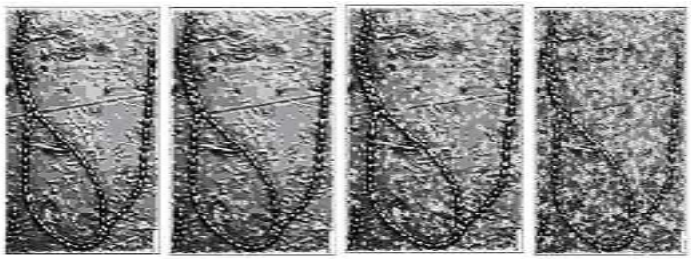
(a) (b) (c) (d)

Figure 7 Enhanced image using unsharp masking filter on Gaussian denoised (a) Sharpen image of 5(a),(b) Sharpen image of 5(b),(c) Sharpen image of 5(c), (d) Sharpen image of 5(d)



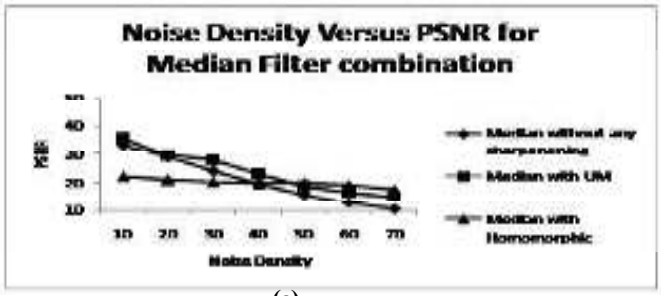
(a) (b) (c) (d)

Figure 8 Enhanced image using Homomorphic filter (a) Sharpen image of 4(a),(b) Sharpen image of 4(b),(c) Sharpen image of 4(c), (d) Sharpen image of 4(d)

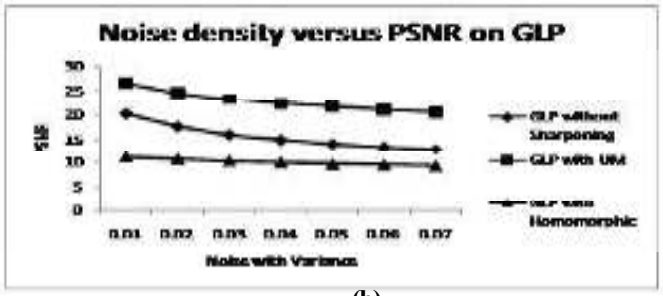


(a) (b) (c) (d)

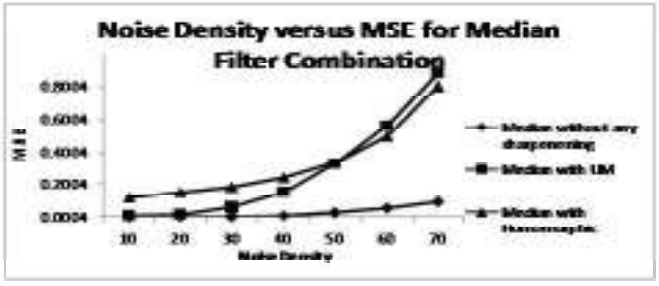
Figure 9 Enhanced image using Homomorphic filter on Gaussian denoised (a) Sharpen image of 5(a),(b) Sharpen image of 5(b),(c) Sharpen image of 5(c), (d) Sharpen image of 5(d)



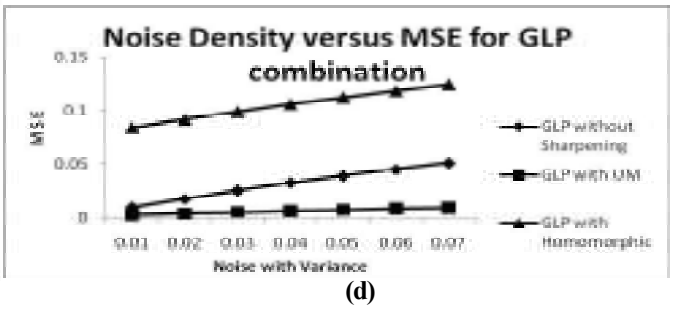
(a)



(b)



(c)



(d)

Figure 10. (a) and (b) Comparison graph of PSNR at different noise density for different techniques. (c) and (d) Comparison graph of MSE at different noise density for different techniques.

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ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

THEME:11 (J. C. BOSEEYAM) ELECTRONICS, ELECTRICAL ENERGY AND COMMUNICATION SCIENCES

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GSM BASED DC MOTOR ANGULAR POSITION CONTROL SYSTEM

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Abstract: Design and Development of global system for mobile (GSM) communication based DC motor angular position control system is presented in this paper. It mainly consists of the position sensor, PMDC motor, microcontroller (C8051F020), 2X16 LCD, RS232 line driver (MAX232) and GSM modem. The angular position of DC motor is sensed by a special rotational servo potentiometer attached to the motor. Shaft of the motor is coupled to the wiper of potentiometer, excited with stable voltage source of 5V whose output voltage varies with the movement of the shaft and is directly proportional to the angular position of the motor. This analog voltage is acquired and digitized by analog to digital converter. The acquired data represents the proportional angular position. The measured angular position is displayed on LCD which is interfaced to microcontroller. The GSM modem is interfaced to the microcontroller through serial port. The required set point command from the cell phone is received by the microcontroller via GSM modem, once the set point command is received the microcontroller measures the current angular position, calculates the error and produces necessary control action to bring motor shaft to the required position. This error is applied to the PID control algorithm to produce the control action. This control action is applied to the actuator through on-chip DAC of microcontroller. The output of the actuator controls power to the motor to bring it to the desired position. This process is continuously in the loop and maintains the DC motor shaft to the desired angular position. In this way, the user being at remote place can control the angular position of the DC motor via the GSM network.

Keywords: GSM Modem; Microcontroller; DC motor; Position; PID;

1. Introduction: In 1982, the European Conference of Postal and Telecommunications Administrations (ECPT) created the Groupe Spécial Mobile (GSM) to develop a standard for a mobile telephone system that could be used across Europe. In 1987, a memorandum of understanding was signed by 13 countries to develop a common cellular telephone system across Europe. In 1989, GSM responsibility was transferred to the European Telecommunications Standards Institute (ETSI) and phase I of the GSM specifications were published in 1990. The first GSM network was launched in 1991 by Radiolinja in Finland with joint technical infrastructure maintenance from Ericsson. By the end of 1993, over a million subscribers were using GSM phone networks being operated by 70 carriers across 48 countries.

GSM is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity. GSM networks operate in four different frequency ranges. Most GSM networks operate in the 900 MHz or 1800 MHz bands. Some countries in the Americas (including Canada and the United States) use the 850 MHz and 1900 MHz bands because the 900 and 1800 MHz frequency bands were already allocated. The rarer 400 and 450 MHz frequency bands are assigned in some countries, notably Scandinavia, where these frequencies were previously used for first-generation systems. The transmission power in the handset is limited to a maximum of 2 watts in GSM850/900 and 1 watt in GSM1800/1900.

There are five different cell sizes in a GSM network—macro, micro, pico, femto and umbrella cells. The coverage area of each cell varies according to the implementation environment. Macro cells can be regarded as cells where the base station antenna is installed on a mast or a building above average roof top level. Micro cells are cells whose antenna height is under average roof top level; they are typically used in urban areas. Picocells are small cells whose coverage diameter is a few dozen meters; they are mainly used indoors. Femtocells are cells designed for use in residential or small business environments and connect to the service provider's network via a broadband internet connection. Umbrella cells are used to cover shadowed regions of smaller cells and fill in gaps in coverage between those cells.

Cell horizontal radius varies depending on antenna height, antenna gain and propagation conditions from a couple of hundred meters to several tens of kilometers. The longest distance the GSM specification supports in practical use is 35 kilometers (22 mi). There are also several implementations of the concept of an extended cell, where the cell radius could be double or even more, depending on the antenna system, the type of terrain and the timing advance.

Indoor coverage is also supported by GSM and may be achieved by using an indoor picocell base station, or an indoor repeater with distributed indoor antennas fed through power splitters, to deliver the radio signals from an antenna outdoors to the separate indoor distributed antenna system. These are typically deployed when a lot of call capacity is needed indoors, for example in shopping centers or airports. However, this is not a prerequisite, since indoor coverage is also provided by in-building penetration of the radio signals from nearby cells.

The modulation used in GSM is Gaussian minimum-shift keying (GMSK), a kind of continuous-phase frequency shift keying. In GMSK, the signal to be modulated onto the carrier is first smoothed with a Gaussian low-pass filter prior to being fed to a frequency modulator, which greatly reduces the in-

terference to neighboring channels (adjacent channel interference).

The structure of a GSM network

The Fig. 1 Shows structure of a GSM network. The network behind the **GSM** system seen by the customer is large and complicated in order to provide all of the services which are required. It is divided into a number of sections and these are each covered in separate articles.

- The Base Station Subsystem (the base stations and their controllers).
- The Network and Switching Subsystem (the part of the network most similar to a fixed network). This is sometimes also just called the core network.
- The GPRS Core Network (the optional part which allows packet based Internet connections).

All of the elements in the system combine to produce many GSM services such as voice calls and SMS.

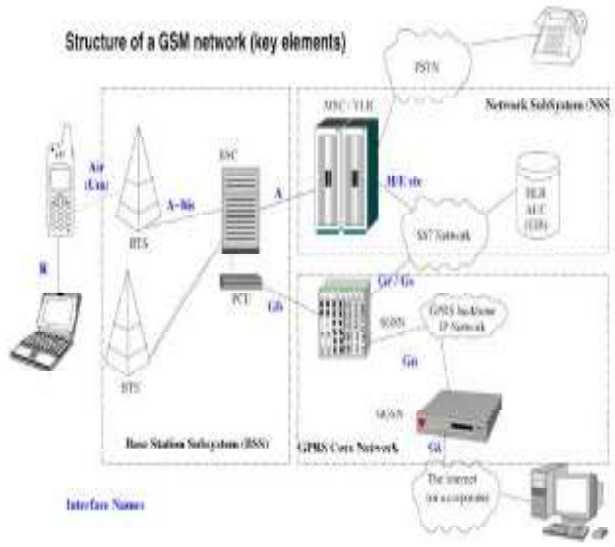


Fig. 1 Structure of GSM network

Subscriber Identity Module: One of the key features of GSM is the Subscriber Identity Module (SIM), commonly known as a **SIM card**. GSM was designed with a moderate level of security. The system was designed to authenticate the subscriber using a pre-shared key and challenge-response. Communications between the subscriber and the base station can be encrypted. The development of UMTS introduces an optional USIM, that uses a longer authentication key to give greater security, as well as mutually authenticating the network and the user - whereas GSM only authenticated the user to the network (and not vice versa). The security model therefore offers confidentiality and authentication, but limited authorization capabilities, and no non-repudiation.

2. Principle and block diagram : The GSM based DC motor angular position control system is shown in the Fig. 2. Cygnal C8051F020 microcontroller is used to acquire, measure, display, and produce control action. The angular position of the DC motor is sensed by a special rotational servo potentiometer attached to the motor. Shaft of the motor is coupled to the wiper of potentiometer, excited with stable voltage source of 5V, whose output voltage varies with the movement of the shaft and is directly proportional to the angular position of the motor. This analog voltage is acquired and digitized by analog to digital converter (ADC) available on microcontroller. The acquired data represents the proportional angular position. It is further converted into actual angular position of the motor in terms of degrees using straight-line equation derived by least square curve fitting method. The relationship between angular position of the shaft of the motor and voltage from the potentiometer is given below.

$$\mathbf{p = a_1 v + a_0}$$

where, $\mathbf{p}$ = angular position of DC motor

$\mathbf{v}$ = digital data from ADC

$\mathbf{a_1}$ = slope of the angular position v/s voltage graph

$\mathbf{a_0}$ = intercept on Y-axis

The measured angular position in degrees is displayed on LCD interfaced to microcontroller. Taking ADC output for different angular position of DC motor fits the above equation. To control the angular position of the motor, the measured position is subtracted from the desired position, which received, by mobile phone through modem and difference, called error and hence the change-in-error, are obtained. These errors are applied to PID control algorithm to produce the control action (digital data) to be given to D/A converter. The output of the D/A converter is applied to DC motor through driver. The output of driver controls the power to the motor to bring it to the desired position. This process is continuously in the loop and maintains the DC motor shaft to the desired angular position.

This system is placed in the laboratory. The required set point command from the cell phone (user) is received by the microcontroller via the GSM modem interfaced to the microcontroller through serial port. Once the set-point command is received, the microcontroller measures the current angular position, calculates the error, and produces necessary control action to bring motor shaft to the required position. The user can know the current angular position of the motor by sending the proper command through his/her GSM cell phone. In this way, the user, being at remote place, can control the angular position of the DC motor via the GSM network.

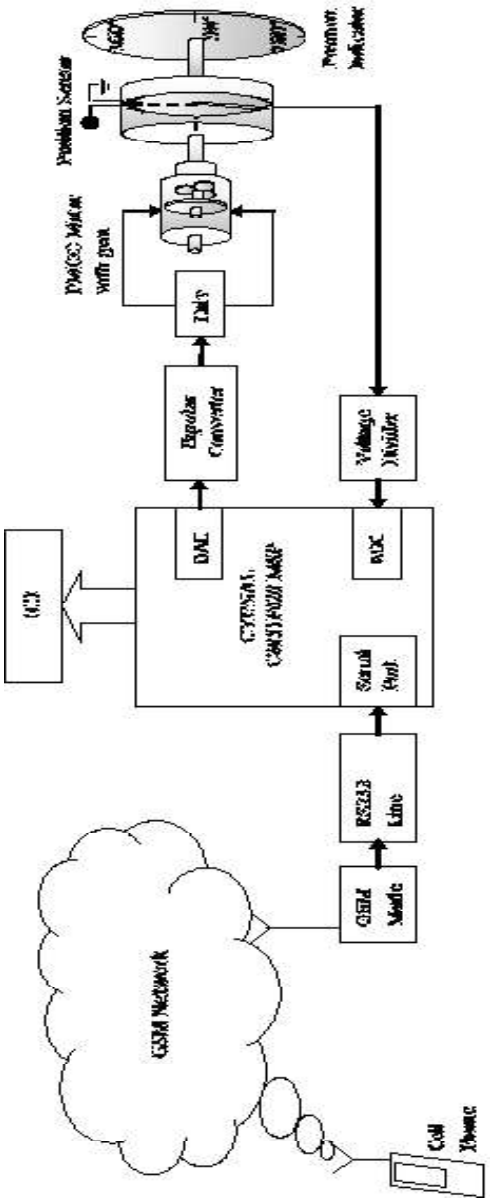


Fig. 2 Block diagram of GSM based DC Motor angular position control system

3. Hardware Details: The following section describes the hardware features of the position control system. Fig. 3 shows the complete schematic of GSM based DC motor angular position control system. It consists of the following major elements.

- DC motor unit with gear
- Angular position sensor and indicator
- Cygnal microcontroller C8051F020
- Signal conditioning circuit
- Driver/Actuator
- Serial port with RS232 line drivers
- GSM Modem

3.1 DC Motor Unit with Gear: A permanent magnet geared DC motor with the following specifications is used in the present study.

Operating voltage : 12V DC
Full load current : 1.2A
Rated speed : 50 RPM

3.2 Angular Position Sensor and Indicator : The angular position of motor shaft is sensed by a 360° rotation specially designed servo potentiometer attached to it. A well-calibrated disk mounted on the potentiometer indicates its angular position in degrees. The potentiometer has three terminals (1, 2 & 3). Terminal-1 is

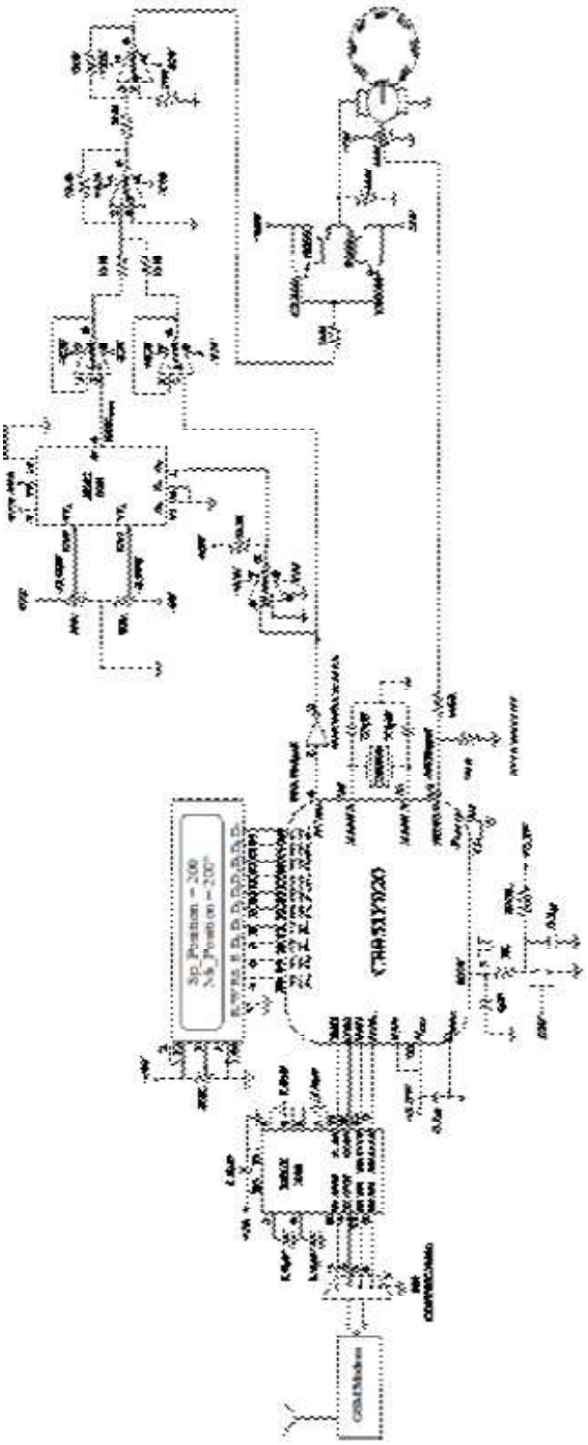


Fig. 3 .Complete schematic diagram of GSM based position control system

connected to +5V and terminal-3 is grounded. The angular position (in terms of voltage) is obtained by the potentiometer at terminal-2. The shaft of DCMM is coupled to wiper of the Potentiometer. Another end of the wiper is connected to a disk calibrated in degrees from 0 to 360.

3.3 Cygnal C8051f020 Microcontroller: The C8051F020/1/2/3 devices are fully integrated mixed signal System-on-a-Chip MCUs with 64 digital I/O pins (C8051F020/2) or 32 digital I/O pins (C8051F021/3).

Features of C8051F020 Microcontroller:

- High-speed pipelined 8051 compatible CIP-51 Microcontroller core (up to 25 MIPS).
- In –system, full –speed, non –intrusive debug interface (on–chip).
- True 12 bit (C8051F020) or 10bit (C8051F022/3) 100 ksps 8channel ADC with PGA and analog multiplexer.
- True 8-bit DACs with programmable update scheduling.
- 64k bytes of in –system programmable FLASH memory.
- 4352 (4096+256) bytes of on chip RAM.
- External data memory interface with 64k byte address space.
- SPI, SMB bus /I^2C, and (2) UART serial interfaces imple mented in hardware.
- Five general-purpose 16-bit timers.
- Programmable counter/ Timer array with five capture / compare modules.
- On –chip watchdog timer, VDD monitor, and tempera ture sensor
- 64 –Digital port I/O's
- 2 – Analog comparators

3.4 Signal Conditioning Circuit: The output signal conditioning circuit consists of External Bipolar Converter and Dead Band elimination (linearization) circuit. The output of on-chip DAC of microcontroller (C8051F020) is a unipolar voltage. The motor is rotated in both positive and negative direction. So that the output of DAC is converted in to bipolar mode with the help of a simple differential amplifier as shown in schematic diagram. The voltage range of on-chip DAC is 0-2.4v. That is made in bipolar range –1.2v to +1.2v.

The motor characteristic's i.e. non-linearity and dead bands are given as 0.1% and 4v (+2.0v to –2.0v) respectively. The dead band of the motor is the voltage range (levels) with in this motor can't be rotated (responded). Hence we designed the hardware externally, which removes the dead band of the motor and brings the motor in active state. The hardware includes are DG508, Comparator and amplifier circuits as shown in schematic diagram. Here comparator output is used to select either channel '0' or channel '1' to which the external voltage is applied.

3.5 Driver: The actuator is also called as Final Control Element The voltage from D/A converter cannot drive the motor directly due to mismatch of power. The circuit consists the Complementary Symmetry Class-B Push Pull amplifier. The hardware included is four transistors (two CL100, two SL100) as show in schematic diagram. Actuator is used to deliver sufficient power to drive the motor to the required position that depends upon the output of the controller. Both positive and negative voltage is delivered to motor to rotate in both the directions. Like this the position of DC Motor is controlled to a desired angle.

3.6 Serial Port and Rs232 Line Driver (Max232): The serial port along with RS232 line driver (MAX232) is provided to connect the designed system to a GSM modem (SIM300S) for the data transmission, storage, and further analysis of the acquired data The on-chip serial port lines (RxD and TxD) of microcontroller are used. The IC MAX232 is used as RS232 line driver/receiver for serial communication with the GSM modem. The serial port also enables the user to store the information regarding the parameter being measured in the personal computer. This facility makes the instrument suitable for research application.

The MAX232 line drivers/receivers is intended for all EIA/TIA-232E and V.28/V.24 communications interfaces, particularly applications where ±12V is not available. These parts are especially useful in battery-powered systems, since their low-power shutdown mode reduces power dissipation to less than 5µW. The MAX232 use no external components and are recommended for applications where printed circuit board space is critical.

3.7 GSM Modem: A GSM Modem modulates outgoing digital signals from a computer or other digital device to signals for a GSM network and demodulates the incoming GSM signal and converts it to a digital signal for the computer or other digital device.

Strictly speaking a GSM Modem can be considered as a GSM phone without the conventional keypad and display and that it is not battery operated as the conventional GSM phone. However, most GSM phones of today have the modem functionality inbuilt into them which allows them to be interfaced with a PC and to be used as a GSM Modem.

A PC or any other digital device uses AT Commands to interact with a GSM modem. AT Commands allow a host of functions to be performed viz sending/receiving SMS, Making a voice call, Accepting an incoming voice call, Modem configuration etc.

General features

- Tri-Band GSM/GPRS 900/ 1800/1900 MHz

- Plug-in modules for direct interfacing with microcontrollers
- GPRS multi-slot class 10
- Compliant to GSM phase 2/2+
  - Class 4 (2W@ 900 MHz)
  - Class 1 (1W@ 1800/1900MHz)
- Control via AT commands (GSM 07.07 ,07.05 and SIMCOM enhanced AT Commands)
- SIM application toolkit
- Supply voltage range 3.4 ... 4.5 V
- Normal operation temperature: -20 °C to +55 °C
- An embedded Powerful TCP/IP

Data specifications

- GPRS Class 10 – max 85.6 kbps (downlink)
- Coding scheme 1, 2, 3, 4
- CSD up to 14.4 kbps
- PPP Stack
- Non transparent mode

SMS specifications

- Point to Point MO and MT
- SMS Cell broadcast
- Text and PDU mode

SIM300s Modem specifications

- RS232 interface for direct communication with computer or MCU dev kit
- Push type SIM Card holder.
- SMA connector for GSM Antenna.
- Network LED on Module for indicating module state - power on/network registration/GPRS registration.
- On board power supply regulator for external Supply voltage range 7V to 32V
- Powerful TCP/IP protocol stack for M2M applications and bi-directional data transfer over GPRS.
- ABS plastic enclosure for rugged environment

4. Working of the System: The main objective of our work is to measure and control the real time angular position of PMDC motor for the desired position. The complete schematic diagram of GSM based DC motor angular position control system using microcontroller is shown in the Fig. 10. It mainly consists of the modem, microcontroller (C8051F020), 2X16 LCD, and RS232 line driver (MAX232). The shaft of PMDC motor is connected to the potentiometer (position sensor), which converts the angular position of shaft of PMDC motor into analog voltage. The analog voltage, proportional to the angular position, is acquired and further digitized by the A/D converter available on chip. The microcontroller reads the digital data from A/D converter by polling technique and converts into actual angular position in degrees by the equation $\mathbf{p = a_1 v + a_0}$. This equation is fitted by least square curve fitting method, where **p** is the angular position of the shaft and **v** is the output voltage of position sensor. $\mathbf{a_1}$**=68.12068** and $\mathbf{a_0}$**=10.29128** are the slope and intercept of the characteristic line of PMDC motor respectively. After finding the actual angular position, the microcontroller displays it on the LCD module.

This is the measured value of PMDC motor position, which is compared with the set value to get error i.e., error = set value - measured value. This error is used to solve the proportional + integral + derivative (PID) control algorithm. The output of control program is a digital value, which is fed to the D/A converter to convert the digital data into corresponding analog voltage. Since the D/A converter cannot drive the motor due to mismatch of power, voltage follower with Darlington pair is added as an actuator to drive the motor.

The measured information is transmitted to a GSM MODEM through the serial port provided on the system. The serial port is designed using MAX232. The MAX232 is RS232 line driver/receiver, which is interfaced to the microcontroller. The port lines P3.0, P3.1, P3.2 and P3.3 are used to interface the serial port with the microcontroller as explained in the previous sections. The serial port is provided to connect the designed system to a GSM MODEM for the transmission, storage and further analysis of the acquired data. This facility makes the instrument suitable for research application. The software stored in the on chip flash memory of the microcontroller accomplishes the above-mentioned procedure.

Design of PID controller

The PID controller algorithm is implemented with the following well-known PID difference equation given by:

$$V_n = K_p (e_n - e_{n-1}) + K_i e_n T + K_d/T [(e_n - 2e_{n-1} + e_{n-2})]$$

where, V_n is the control action,

e_n, e_{n-1}, and e_{n-2} are the present, previous, and previous to previous errors respectively, and Kp, K_i, and K_d are proportional, integral, and derivative constants respectively and T is the cycle time.

In the present application, the best-tuned K_p, K_i, and K_d values are found to be equal to 150.0, 352.0, and 11.0 respectively and T is equal to 10ms.

5. Software Details: The complete software for DC motor angular position control is written in Embedded C language under RIDE (Raisonance Integrated Development Environment). Fig. 4 shows the flowchart of the motor position measurement and control program.

Program Description: The following section describes the software development for GSM based DC motor angular position control system and implementation of PID in embedded C language in detail. The necessary flowchart and embedded C programs are presented and discussed.

Flowchart

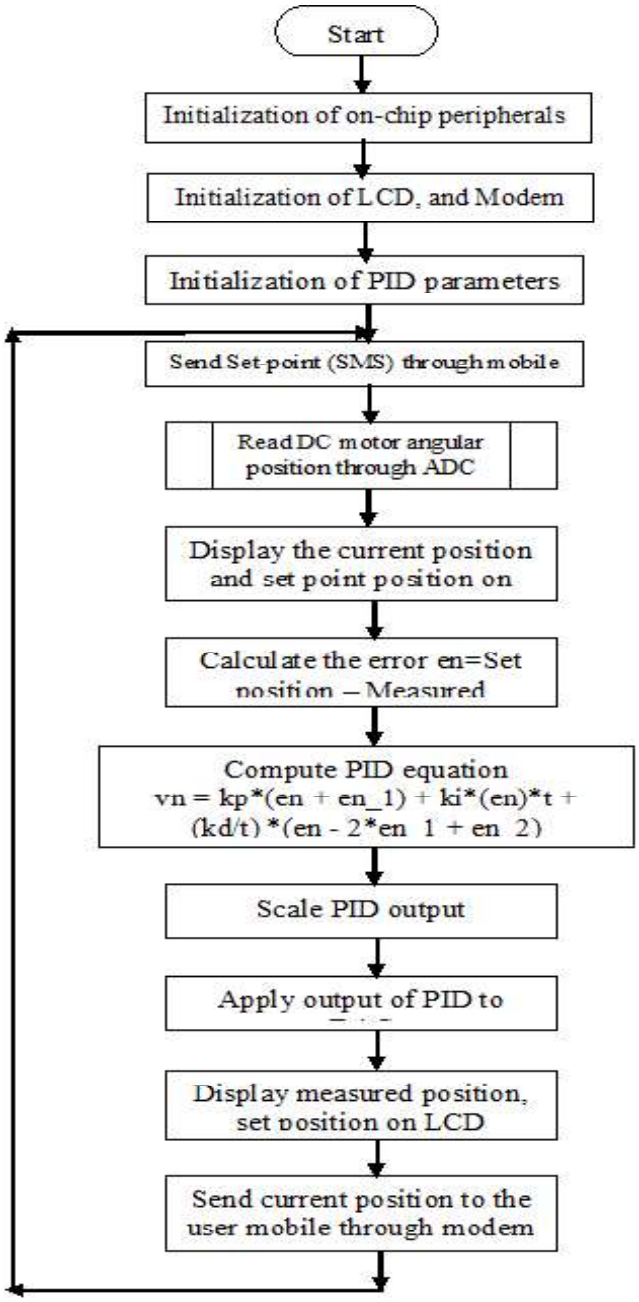
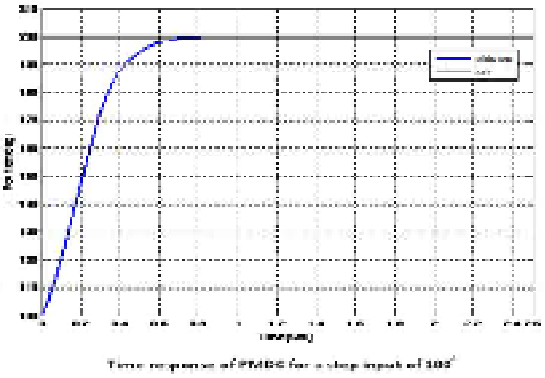


Fig.4 Flowchart of the system

The software developed for DC motor angular position control system has a provision for the user to enter the set point through cell phone (as SMS) via GSM modem. The complete software is divided into two major parts viz., measurement and control. Besides the two major tasks of measurement and control the software first declares and initializes all program variables, constants, and functions. It also initializes system hardware i.e., GSM modem, LCD, A/D converter etc. The software then enters the measurement and control programs. In measurement, the software acquires the voltage proportional to the position of the DC motor through A/D converter, substitutes it into the least square curve fitting equation to convert into actual angular position of the motor in terms of degrees (radians), and displays it on LCD.

On other hand in control, the software receives the set point command from the user, computes the error by subtracting the set point from the measured (or current) and applies the error to control algorithm i.e., PID to generate the control action. Since control action is digital value, the software loads it to the D/A converter to convert it in to the analog signal as the actuating signal for the final control element. The measured and set position displayed on LCD module. Then microcontroller gives the acknowledgement to user by SMS through GSM modem.

6. Results and Conclusions: A GSM based DC motor angular position control system is designed and fabricated. The system is designed using a Cygnal microcontroller C8051F020. Below figure shows the response of PID controller for GSM based DC motor position control. The system is tested in laboratory. The set point commands are given by the user, at far distance through a cell phone as a SMS. The performance of the P, PI, and PID controller is studied for a step input of 100º. The rise time for step input of 100º under no load is found to be equal to 0.45 Sec. The angular position of the DC motor is controlled with an accuracy of ±0.1º. From the results, it is concluded that PID controller performs better than earlier controllers. The performance indices are shown in the below table.



Performance indices of output response of DCMM for PID controller

Parameter	Value
Rise time (t_r)	0.45 sec
Settling time (t_s)	0.68 sec
Steady state error (e_{ss})	0.1 °

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THERAPEUTIC IMPLICATION USING "S-INDICATOR" IN CHILDREN WITH COMMUNICATION NEEDS

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Effective production of 'S' is an important aspect in speech. The main purpose of this paper is to demonstrate how to pronounce the word 'S' encourage the use of 'S' sound with the help of visual cues. To provide therapy using Mat Lab program for effective and economical way.

This is accomplished by taking voice samples of normal children from age 4 to 10 years which are taken as the reference samples. Once the reference sample is recorded with the help of MIC, then recording of voice samples of the children with hearing impaired is collected and saved as wave files. On running the program two waveforms are displayed on the screen. One the reference and the other will be the client's sample, along with the readings like mean, median, average SPL in dB which are displayed on the screen. A red led or a green led display appears on screen which shows the percentage of misarticulated 'S' sound after comparison with reference sample. This visual helps the therapist to give visual feedback to the client and helps them to know how good they can articulate 'S' sound.

One of the prime defect in speech is 'S' defect. It is commonly occurring speech defect in the children and also in hearing impaired person. It's a voiceless fricative and used in almost all the languages spoken throughout the world. 'S' is high frequency and hearing impaired person cannot listen to 'S' sound with even their hearing aids on. As 'S' sound is invisible sound and lately acquired sound in children during their articulation development skills. This paper is mainly focused on the children with articulation disorder in pronouncing 'S'. Children having difficulty in interacting, expressing, articulation disorder, hearing impaired and cleft lip pallet population are screened and treated. This helps the children to improve their effectiveness in producing the toughest sound 'S' which helps them to achieve one of their milestone's . This is the easiest tool where the therapist can keep track of their clients improvement record in articulating 'S' sound and can be retrieved when required from the file stored in the system .

Clinical implication of producing 'S' sound with the help of this MatLab program therapist can treat and train the clients very effectively. To provide a program for future use in artificial neural networks that can be used to increase the accuracy of the system.

1.1.0verview : This paper helps in providing the exact levels of gain which *Isl* sound is articulated. The visual display of graphs (frequency versus gain) exactly shows how the child is improving on his defective *Isl* sound pronunciation. This is achieved by this programme displays the parameters like frequency, Mean, deviation, which gives accurate readings. This will help the therapist to know how the child has improved over the trials and gauging him the exact percentage of loss in pronouncing the word *Is/.*

1.2.Scope : The scope of this paper is in developing an'S' - Indicator which will not only indicate voiceless *Isl* sound, but will also give a visual feedback by displaying the dBSPL values. Hence the patient will be able to keep track of his improvement. The different stages of developing the frame work include the following.

Indicator is intended to be used in training voiceless /s/ sound. The indicators also may be used for other voiceless fricatives. It has been tested with English and Swedish speakers and was shown to be highly efficient. It is also useful for discriminating voiceless fricatives from voiced.

The study of "Modeling of speech signals". [2] Which mainly gives the articulation of sounds signal, voiced sounds, unvoiced sounds, plosives; fricatives are very useful in the study of speech signal.

For the Analysis of the speech signals "Cepstrum Analysis". While speaker recognizing the speaker through the sound signals on comparing with standards. [3] This also helps in sound feature extraction, Cepstral Analysis with respect to human Anatomy.

"K-means algorithm" [4] where seven clusters separation using K-means algorithm in three dimensions are studied. With help of this pattern matching is measured and can be compared.

During expressive speech the voice is enriched to convey not only the intended semantic message but also the emotional state of the speaker. [5] The pitch contours is one of the important properties of speech that is affected by this emotional modulation. By this the accuracy of the sound

signals can be achieved.

21. Speech defects : One of the prime defects in speech is 's'defect.lt is a commonly occurring speech defect in children and also in hearing impaired persons. Here defect is being considered as prime defect because of the following factors.

a) 's' is a frequently occurring voiceless fricative III almost all the languages spoken throughout the world.

b) 's' is a high frequency sound because of which the hearing impaired persons cannot listens sound properly though they are having hearing aid and therefore they cannot pronounce the 's' sound.

c) 's' is a complex sound.

d) 's' is a lately acquired sound in children during their articulation development skills.

e) 's' is an invisible sound as we cannot predict the sound by looking at lip movement or movement of tongue I oral cavity. This is because the air stream is being speeded up and forced through a narrow gap.

f) 's' defect is a common defect in both hearing impaired and mis articulation problems.

2.1 Reasons for S defects

The prime reason for defect in person are

a) Due to inherited influence the defect may occur

b) Due to delayed articulatory growth in children the defect occurs

c) Dental anomalies also cause this defect, as the air stream should be directed through narrow gap between the upper teeth and the tongue.

d) Hole in the palatal region of articulatory system caused this defect.

e~ Due to hearing loss in the children, they cannot listen's' sounds and also cannot reproduce the sound ,as they are unaware of the sound.

d) In some person the tongue is carried too high so that the's' sound is pronounced through other sounds.

2.2e) Due to nasal lisping the defect occurs.

3 Existing used S-indicator

a) A microphone picks the voice signal. The output of the microphone is in range of few mill volts. Hence a preamplifier is required to amplify the signal it provides impedance matching also.

H) The output of preamplifier is passed through an active band pass filter (2.5-8kkHz) to isolate the *Isl* sound. This signal from filter is fed to two channels, one is for the led bar graph display and the other is for LCD display.

c) In the first channel series of Led arranged in bar graphs and driven by a bar graph driver. The LED light indicate the level of *Isl* sound produced. The ADC is used to digitize the filter signal.

d) EPROM is stored with previously calculated dBSPL values. Look up table is stored in EPROM .Each entry in the table shows the value of dBSPL to be displayed and is stored against an EPROM address, which corresponds to microphone output. The corresponding data values of EPROM are displayed on LCD.

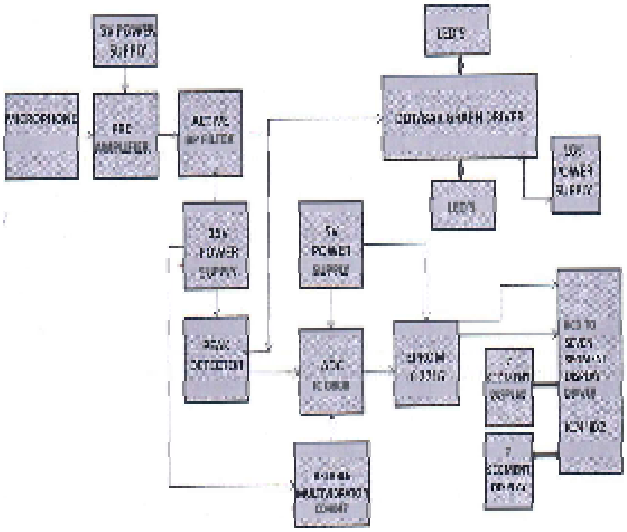


Fig 3.1 Block diagram of an existing S-Indicator

4.0'S'-Indicator USING MAT LAB

4.1 Microphone and the Pre amplifier

A microphone is an example of a transducer, a device that changes information from one form to another. Sound information exists as patterns of air pressure the microphone changes this information into patterns of electric current the recording engineer is interested in the accuracy of this transformation, a concept he thinks of as fidelity.

A variety of mechanical techniques can be used in building microphones. The two most commonly encountered in recording studios are the magneto-dynamic and the variable condenser designs.

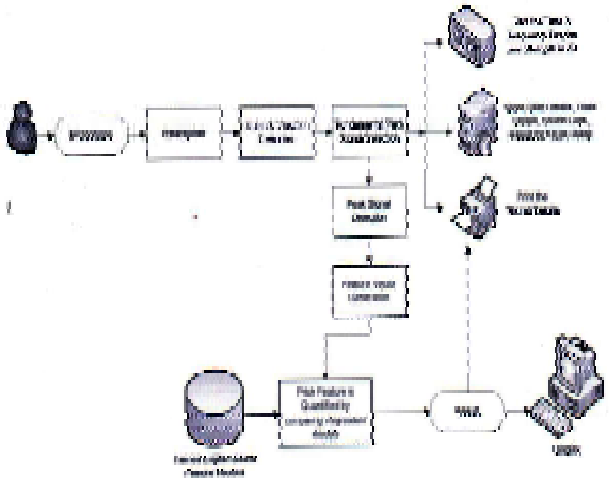


Fig 4.1 Newly developed block diagram of an S-Indicator

4.2 Sound Pressure Level (SPL) : The term most often used in measuring the magnitude of sound. It is a relative quantity in that it is the ratio between the actual sound pressure and a fixed reference pressure. This

reference pressure is usually that of the threshold of hearing, which has been internationally agreed upon as having the value. 0002 dynes/em'. SPL may be measured with a sound level meter_weighted according to a specific frequency response pattern and termed sound level. The electro acoustic equivalent to SPL is measured with a vu meter.

Because the square of the sound pressure is proportional to, sound intensity, SPL can be calculated in the same manner and is measured in decibels.

SPL: 10 log (P/Pref)2 = 20 (p/Pref)……Eqn No. (4.1)

where P is the given sound pressure and Pref is the reference sound pressure as given in Eqn No(4.1) .

Two SPL measurements in decibels may be combined with the aid of the following chart.

The difference in decibels between the two readings is found on the upper scale, and the corresponding correction appears opposite it on the lower scale. This correction is added to the higher SPL to give the combined measurement. Multiple readings may be combined by repeating this process. For example, equal SPL readings (0 on top scale) produce a 3.0 increase when combined. A 5 dB difference (say between 60 and 65 dB) produces a 1.2 dB increase (a total of 66.2 dB for the same example). A 10 dB difference requires a 0.4 dB correction, and so on.

4.3 Sound Signal Analysis : The sound signal is generated when the excitation signal from the vocal cords is passed though the vocal tract and oral cavity. Hence the nature of the sound signal depends on the anatomy of the human vocal tract. Due to this fact each person has his distinct voice pattern. From the sound signal certain features can be extracted. These features can be used to distinguish between different sound patterns. There are many operations which can be done on the sound signal which leads to some of the features of the signal.

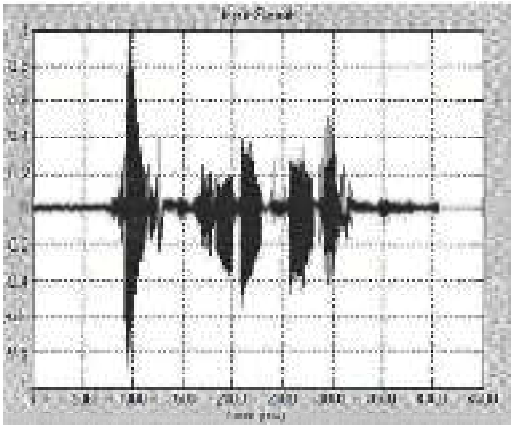


Fig 4.2 The sound signal (normalized, 16 KHz, 16 bit, Mono)

4.4 Framing and windowing

As shown in the Figure 4.2 the sound signal is slowly varying over time and so it is called "Quasi Stationary". Above plot shows some words spoken by a speaker. The recordings were digitized at Fs = 16 KHz (16000 samples per second) and at 16 bits per sample. Time goes from left to right and amplitude is shown vertically. When the sound signal is examined over a short period of time such as 5 to 50 milliseconds, the signal is reasonably stationery, and therefore these signals are examined in short time segment. These short time segments of the Speaker Recognition System with Smart Card Interface Sound Signal Analysis 7 signal are subjected to spectral analysis. In this analysis the signal is divided into frames with generally 15-30 milliseconds in each frame.

To remove the effect of "Gibb's Phenomenon" due to truncation of the signal, each frame is multiplied by a window function w (n). Also to avoid the loss of any information due to windowing, adjacent frames are overlapped with each other by 30-50 percent. As soon as the signal has been framed, each frame is multiplied with the window function w *(n)* with length N. The function as in Eqn No(4.2) we are using is called "Hamming Window".

$$w(i) = 0.54 + 0.45 * \cos(21ti / N) \quad \text{Eqn No. (4.2)}$$

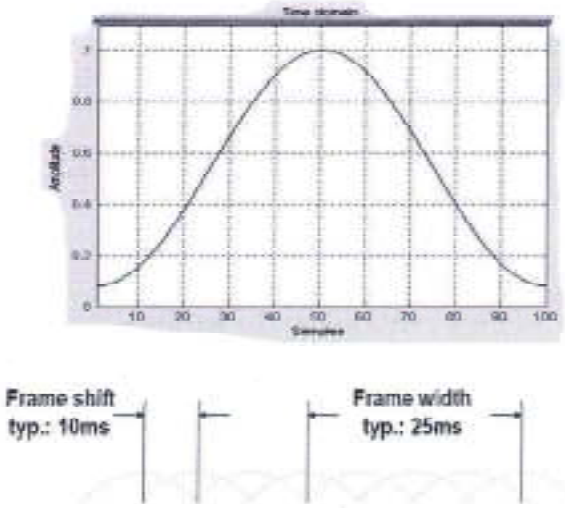


Fig 4.3 Hamming window and Overlapping frames

The part of signal in figure above divided in frames is shown in figure 4.3 is divided into frames as shown in Fig 4.4.

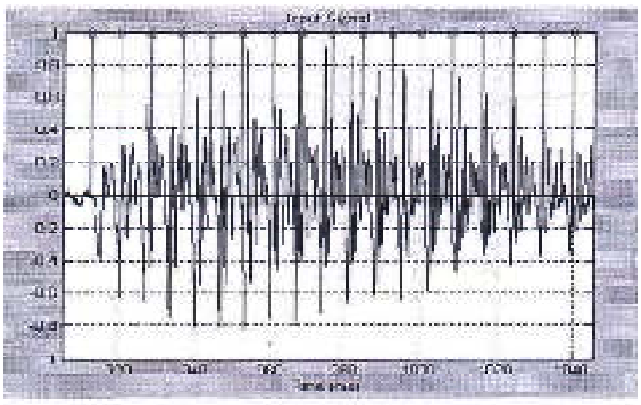


Fig 4.4 The signal divided into frames

4.5 Sound feature extraction

The most important issue in a pattern recognition system is to extract the feature from the input signal. The feature extraction in a categorization problem is about reducing the dimensionality of the input-vector while maintaining the discriminating power of the signal. Brom the fundamental formation of speaker identification and verification systems, the number of training and test vectors needed for the classification problem grows exponentially with the dimension of the given input vector, so we need feature extraction. The extracted feature should meet some criteria while dealing with the sound signal. Some of them are given below.

4.6 Sound Features

a. Pitch

b. Formant frequencies

c. LPC (Linear Predictive Coding) coefficients

d. MFCC (Mel Frequency Cepstral Coefficients)

e. Delta MFCC and Delta-Delta MFCC

One of the most popular techniques to extract features for sound recognition and speaker recognition systems is Mel Frequency Cepstral Coefficients (MFCC). These coefficients are computed using cepstral analysis and Mel frequency warping. Each windowed frame with 30 ms of sound data is passed to an MFCC feature extractor. This feature extractor gives a 12 dimensional vector for each frame. If there are n frames in the signal then MFCC coefficients will be (n x 12) dimensional matrix efficiently.

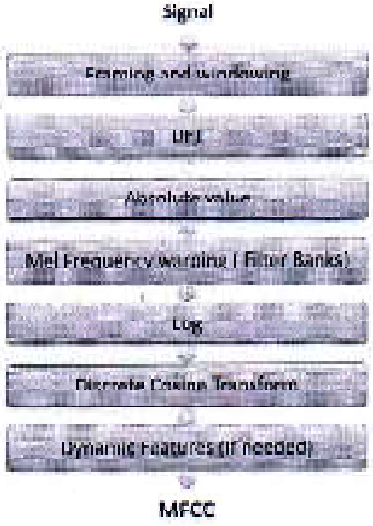


Fig 4.5 The complete computation chain for MFCC

4.7Dynamic Features : From Fig 4.5 shows the computation procedure for MFCC. The last block in the chain calculates the dynamic features from the signal. They are not necessary but they give a bit more discrimination power at the cost of increased dimensionality. Dynamic features are basically 1 st and 2nd derivatives of the Mel Cepstrum. They are called Delta MFCC and Delta- Delta MFCC. These features represent the change in the audio signal frame by frame. These dynamic features can be thought as velocity and acceleration of the audio signal. In this project dynamic features due to their increased dimensions. Using simple MFCC it counts 12 coefficients for each frame and if DMFCC and DDMFCC, 36 coefficients are needed to represent each frame.

5.0 Pattern Matching and Distance Measurement

The method we have used to compare two Feature Matrices is the measurement of the distortion distance between two vector sets by minimizing the Euclidian distance. The Euclidean

Distance is the 'ordinary' distance between the two points that one would measure with a ruler, which can be proven by repeated application of the Pythagorean Theorem in two dimensions and is given in Eqn No (5.1). For multi dimensional case also the distance formula can be generalized. The formula used to calculate the Euclidean distance in n dimensions is as follows.

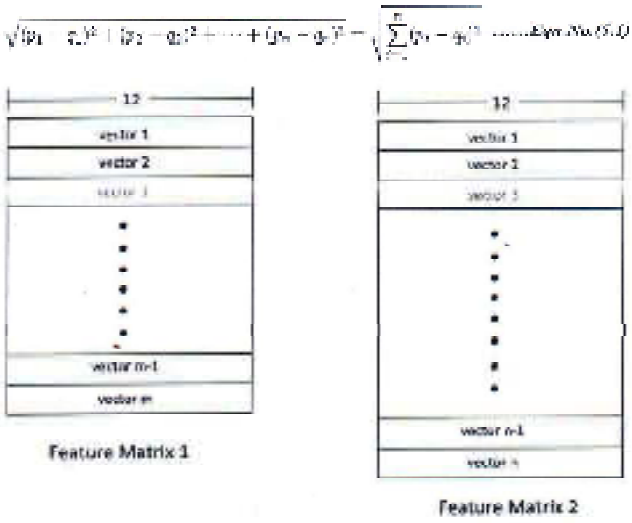


Fig 5.1 Comparison of two Feature Matrices of different sizes

Figure 5.1 shows two Feature Matrices to be compared usmg distance measurement

Digorifim. These mauices are the final features after application of the VQ algoridum. In a typical case one matrix is generated by the current recording of the voice at the time of verification and the other matrix is stored in the smart card or in the system database. They differ in size even for the same speaker because the time of recording and the voice variations are different at registration and verification time.

5.1 The distance measurement algorithm

Simple minimum Euclidian distance algorithm to compare two matrices is given by the following.

1. Find Euclidian distance between each vector i of the matrix 1 and every vector j of matrix 2 to using the distance formula given above. Hence we get a complete distance matrix of size (m x n) and having elements dij (dll, d12 etc. up to dmn). Here dij is the Euclidian distance between vector i of the matrix 1 and vector j of matrix 2. See Fig 5.2.

2. Now find a vector j in matrix 2 that is closest to vector i in matrix 1. To do this, find the minimum of each row of the distance matrix. Hence we get a minimum distance vector of length m. Similarly for columns we get a minimum distance vector of length n.
3. Find average of the two minimum distance vectors and calculate their mean value. The mean of the averages of the distance vectors will be the final distance between the two matrices.

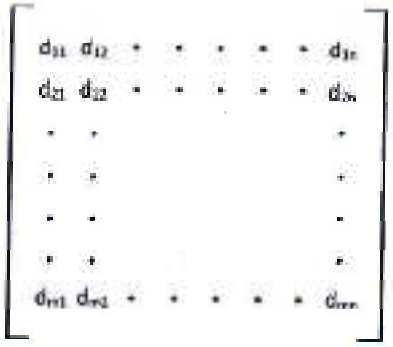
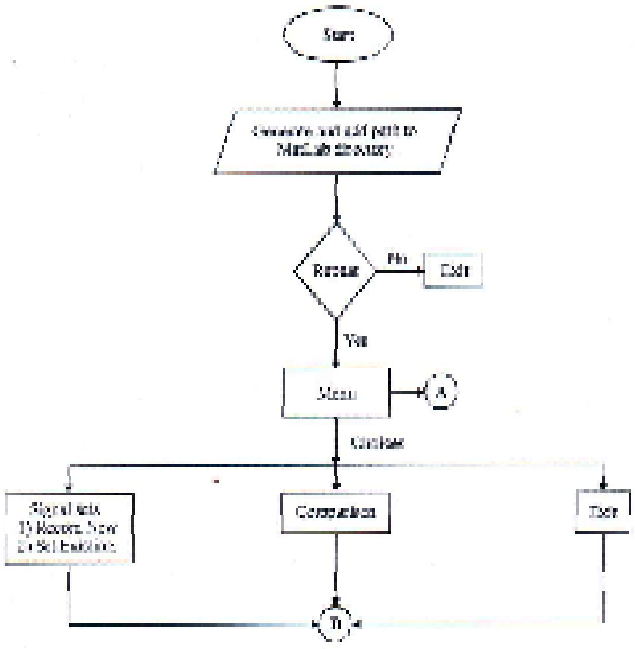


Fig 5.2 The distance matrix calculated using the algorithm

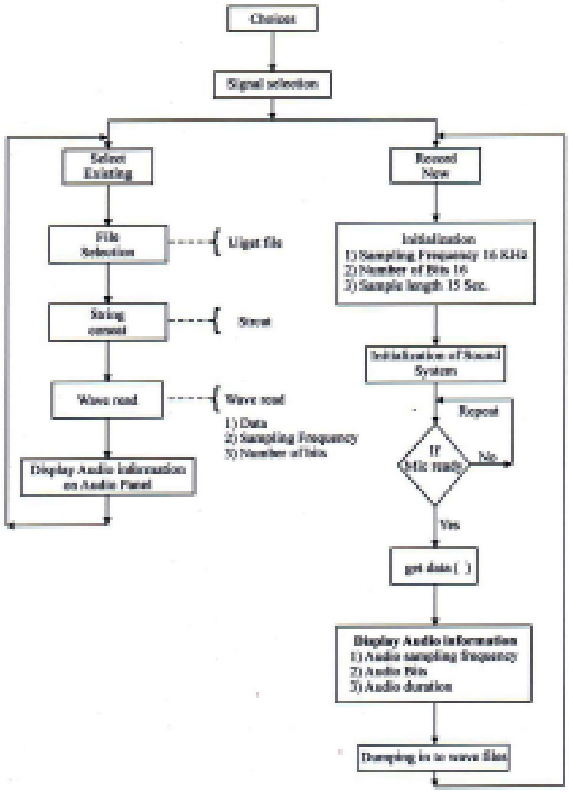
The final distance calculated using the algorithm is the minimum Euclidian distance between the two vector sets. This distance shows the similarity between the two voice profiles. It is time invariant, the time shift of the same phrase in two voices does not affect the distance value. So, it is used as the comparison metric for the voice profiles.

6.1Proposed '8' Indictor Flow Chart



As shown in the Fig 6.1 the initial step is to generate and add path to MatLab Directory. This process is repeated until the path is setup. Once the path is setup then the control moves to menu else exists.
In the menu option we have the control button signal set with record new and set existing, comparison and exit.

6.2Flow Control for Signal Selection



As shown in the Fig 6.2 once the choice is made as signal selection we have two selections, one is select existing and the other record new.
Under select existing using Uiget file select file is done, strcat will string concat, wave read is done by wave read command where, data, sampling frequency, number of bits will be displayed on the window. Which will be pure audio information on audio panel? This process is repeated as the control is switched back to select existing.
If the selected signal choice is record new then initialization is done. Where sampling frequency is taken for 16 KHz number of bits 16, sample length is 15 seconds. Then the initialization of sound system is done. Only when the mic is ready it get data ( ), if not it looks back. On get data ( ) display audio information. Where audio sampling frequency, audio bits, audio duration is displayed. Then the details are dumped in the wave files then the process repeats for different samples from record new.
As shown in the Fig 6.3 there will be comparison done between the standard signal and testing signal. The contents that will display operating frequency FO min, max, range, mean, medium, standard for both standard as well as test signals.
On matching the standards and test samples stop and executes the information and inference is obtained by the LED Display which shows the exact dBSPL loss in the articulation of the word *Isl* else the controlled directly is transferred to the main menu as indicated in fig. 6.3.

Flow Control on Choosing comparison

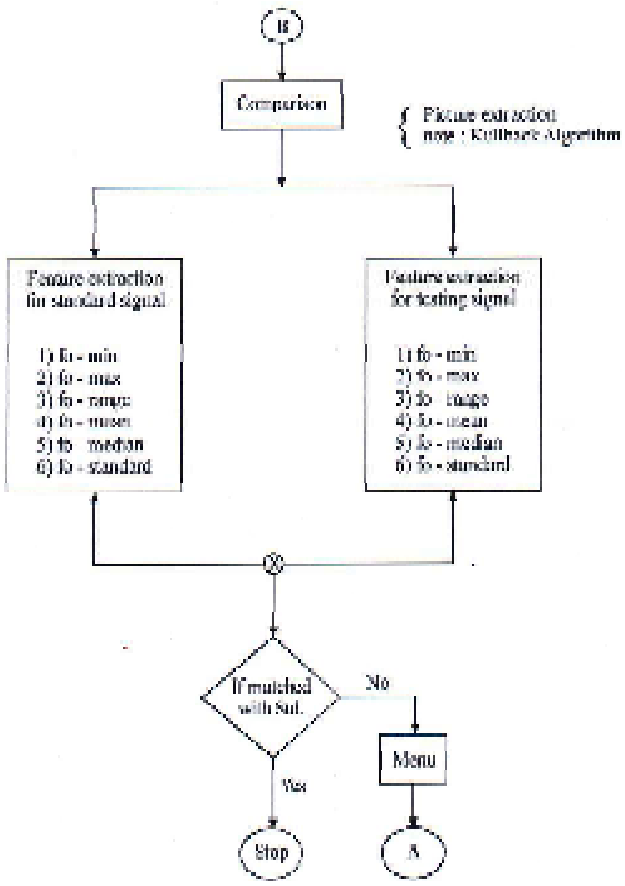


Fig 6.3 Flow Control For comparison

Conclusion and Future Works

The S-Indicator using MatLab is very efficient and accurate. Number of LEDs glowing depends on the frequency contents of the sound. A vowel will give a very small deflection. The low frequency fricative (as in the word "show") gives a larger deflection and a sharp *Is/-sound* gives a very large deflection. When a *Is/-sound* is pronounced correctly the deflection should be more than 5 LEDs. When *Isl* is pronounced in the context of rounded vowels (0, u,) the deflection is lower than that with unrounded vowels (a, i, e). This uncertainty of output which is displayed with the help of LEDs is over come by MA TLAB simulation which gives exact SPL dB levels which helps in therapy for clients with speech problem.

Sound Recognition is a complicated task, MatLab simulation has made it possible to pre define, record and compare results with expected results. Our system has helped the therapist to give therapy in efficient way. Dynamic features, more complex feature extraction methods and other pattern matching methods like Artificial Neural Networks (ANN) can be used to increase the accuracy of the system.

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ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

THEME:12 (VARAHAMIHIRAM) IT, BT, NT, FT AND FRONTIER SCIENCES

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ARTIFICIAL INTELLIGENCE FRAMEWORK FOR SIMULATING CLINICAL DECISION MAKING: A REVIEW

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Objective: In the modern healthcare system, it is increasingly becoming impossible to choose the optimal treatment decisions over time. This is due to rapidly increasing costs, increasing complexity and also due to myriad of treatment options available. This also happens due to the exploding information streams that often do not reach the front lines which, as a result, hinders the ability to choose the optimal treatment.
The foal of this paper is to develop a general purpose (non-disease-specific) computational/artificial intelligence framework to address the challenges. It serves two potential functions:
1) A simulation environment for exploring various healthcare policies, payment methodologies etc, and,
2) The basis for clinical artificial intelligence.
Basically the aim is to produce an Artificial Intelligence framework that *"thinks like a doctor"*.

Methods: This paper reviews the Markov decision making process that is used in the dynamic decision making from the available data. It involves the Markov decision process and the dynamic decision networks to learn from the clinical data and develop complex plans via simulation of alternative sequential decision paths while capturing the conflicting, synergistic interactions of various components in the health care systems. It can operate in partially observable environments by maintaining belief states about patient health status and functions as an online agent that plans and re-plans as actions are performed and new observations are obtained.

Results: The results demonstrate the feasibility of this approach: such an AI framework easily outperforms the current treatment-as-usual (TAU). It is a cost effective technique. This AI technique will at the same time obtain a 30-35% increase in patient outcome. Tweaking certain AI parameters could further enhance this advantage, obtaining approximately 50% more improvement for roughly half costs.

Conclusion: Given careful design and problem formulation, an AI simulation framework can approximate optimal decisions even in complex and uncertain environments. Future work is described that will outline potential lines of research and integration of machine learning algorithms for personalized medicine.

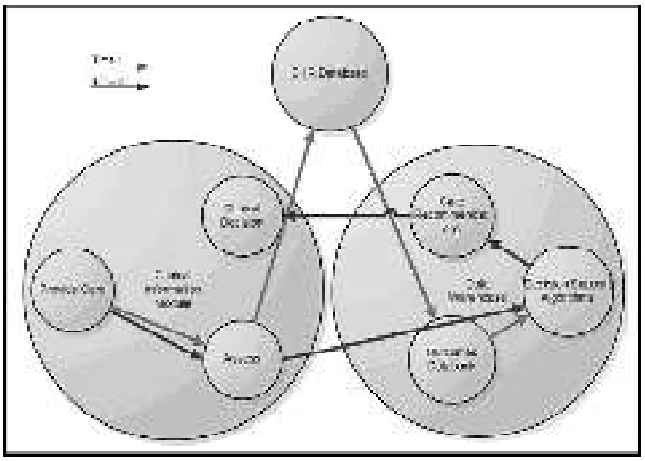
1.1Objective: In the modern healthcare system, rapidly expanding costs/complexity, the growing myriad of treatment options, and exploding information streams that often do not effectively reach the front lines hinder the ability to choose optimal treatment decisions over time. The goal in this paper is to develop a general purpose (non-disease-specific) computational/artificial intelligence (AI) framework to address these challenges. This framework serves two potential functions: 1) a simulation environment for exploring various healthcare policies, payment methodologies, etc., and 2) the basis for clinical artificial intelligence – an AI that can "think like a doctor."

1.2 Previous work : In previous work, we have detailed computational approaches for determining optimal treatment decisions at single timepoints via the use of data mining/machine learning techniques. Initial results of such approaches have achieved success rates of near 80% in predicting optimal treatment for individual patients with complex, chronic illness, and hold promise for further improvement. Predictive algorithms based on such data-driven models are essentially an individualized form of practice-based evidence drawn from the live population. Another term for this is "personalized medicine."

The ability to adapt specific treatments to fit the characteristics of an individual's disorder transcends the traditional disease model. Prior work in this area has primarily addressed the utility of genetic data to inform individualized care. However, it is likely that the next decade will see the integration of multiple sources of data - genetic, clinical, socio-demographic – to build a more complete profile of the individual, their inherited risks, and the environmental/behavioral factors associated with disorder and the effective treatment thereof. Indeed, we already see the trend of combining clinical and genetic indicators in prediction of cancer prognosis as a way of developing cheaper, more effective prognostic tools.

Such computational approaches can serve as a component of a larger potential framework for real-time data-driven clinical decision support, or "adaptive decision support." This framework can be integrated into an existing clinical workflow, essentially functioning as a form of artificial intelligence that "lives" within the clinical system, can "learn" over time, and can adapt to the variation seen in the actual real-world population (Figure 1). The approach is two-pronged – both developing new knowledge about effective clinical practices as well as modifying existing knowledge and evidence-based models to fit real-world settings.

Figure 1: Clinical decision-making – flow diagram
A high-level example of information flow during the clinical process through an electronic health record (EHR) across time. Information gleaned at Time 1 can be utilized at Time 2. Data flows from the front-end (clinical information module) to a backend EHR database, which can then be pushed into a data warehouse (DW). The DW can analyze this raw data and then push information or recommendations back to the front-end. AI algorithms can "live" in this DW and integrate into an existing clinical workflow, learning over time.



1.3 Computational approaches to sequential decision making

The focus of the current study is to extend the prior work beyond optimizing treatments at single decision points in clinical settings. This paper considers sequential decision processes, in which a sequence of interrelated decisions must be made over time, such as those encountered in the treatment of chronic disorders.

Markov decision processes (MDPs) are one efficient technique for determining such optimal sequential decisions (termed a "policy") in dynamic and uncertain environments, and have been explored in medical decision-making problems in recent years. MDPs (and their partially observable cousins) directly address many of the challenges faced in clinical decision-making . Clinicians typically determine the course of treatment considering current health status as well as some internal approximation of the outcome of possible future treatment decisions. However, the effect of treatment for a given patient is non-deterministic (i.e. uncertain), and attempting to predict the effects of a series of treatments over time only compounds this uncertainty. A Markov approach provides a principled, efficient method to perform probabilistic inference over time given such non-deterministic action effects. Other complexities (and/or sources of uncertainty) include limited resources, unpredictable patient behavior (e.g., lack of medication adherence), and variable treatment response time. These sources of uncertainty can be directly modeled as probabilistic components in a Markov model. Additionally, the use of outcome deltas, averse to clinical outcomes themselves, can provide a convenient history *meta-variable* for maintaining the central Markov assumption: that the state at time *t* depends only on the information at time *t*-1 . Currently, most treatment decisions in the medical domain are made via ad-hoc or heuristic approaches, but there is a growing body of evidence that such complex treatment decisions are better handled through modeling rather than intuition alone.

Partially observable Markov decision processes (POMDPs) extend MDPs by maintaining internal *belief states* about patient status, treatment effect, etc., similar to the cognitive planning aspects in a human clinician. This is essential for dealing with real-world clinical issues of noisy observations and missing data (e.g. no observation at a given timepoint). By using temporal belief states, POMDPs can account for the probabilistic relationship between observations and underlying health status over time and reason/predict even when observations are missing, while still using existing methods to perform efficient Bayesian inference. MDPs/POMDPs can also be designed as online AI agents – determining an optimal policy at each timepoint (*t*), taking an action based on that optimal policy, then re-determining the optimal policy at the next timepoint (*t*+1) based on new information and/or the observed effects of performed actions.

2. Methods

2.1 Data : Clinical data, including outcomes, treatment information, demographic information, and other clinical indicators, was obtained from the electronic health record (EHR). This sample contained 5,807 patients, primarily consisting of major clinical depression diagnoses, with a significant number of patients (~65%) exhibiting co-occurring chronic physical disorders including hypertension, diabetes, chronic pain, and cardiovascular disease. In all simulations, 500 randomly selected patients were used. All other aspects, probabilities, and parameters for modeling were estimated directly from the EHR data. In all subsequent simulations, a single physician agent with a caseload of 500 randomly selected patients was used. The framework can handle multiple physician agents (from a programming code standpoint, see Section 2.2), but at the present time there are no variable behaviors across physicians (e.g. variable attitudes towards outcome significance, where one physician pays a lot of attention to outcome observations and another does not). The physician agent must make a treatment decision for each patient at each timepoint over the course of seven sessions (plus baseline/ intake, max total sessions=8).

The primary outcome of interest used here is the Outcome Rating Scale (ORS) component of the CDOI assessment, which is a validated ultra-brief measure of functioning and symptomology for chronic and acute mental disorders, with over a decade of research supporting its use in similar settings and populations. The utility metric, which is used to evaluate the quality of decisions in a model, is cost per unit change (CPUC), which measures the cost in dollars it takes to

obtain one unit of outcome change (delta) on a given outcome. In essence, CPUC is a *relative* measure of cost-effectiveness of treatment, given as a ratio between costs and outcome change.

2.2 Framework overview : A general framework overview can be seen in Figure 2, which is further elaborated in Sections 2.3-2.5 below. The agents (shown in double-line borders) encapsulate the characteristics and functions of their respective real-life counterparts – e.g. patient agents incorporate individual patient-specific data and individualized transition models while physician agents maintain beliefs about patients' health status and treatment effects and have decision-making capabilities.

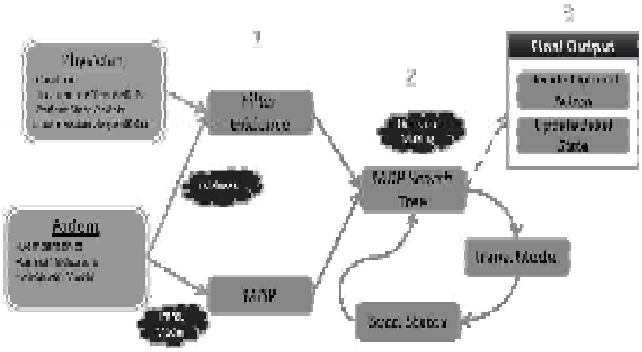


Figure 2: Framework overview

Figure 2 also displays the general algorithm (implemented in Python 2.7, www.python.org), where initially patient-specific MDPs are created from the transition models and physician agents must incorporate patient-specific evidence/information into existing beliefs prior to decision-making at each timepoint. The decision-making process then recurses down the MDP search tree, resulting finally in a determination of an optimal current action and updates to patient belief states.
The algorithm steps are as follows:
1) Create patient and physician agents
2) Create patient-specific MDP
Then, for each timepoint (if not horizon):
3) Calculate current outcome delta, physician agent filters evidence
4) Determine optimal current action via MDP search tree
5) Perform action and update belief states
6) If action ? not treat, return to step 3

2.3 POMDP decision-making environment : We model the decision-making environment as a finite-horizon, undiscoun ted, sequential decision-making process in which the *state st* from the *state space S* consists of a patient's health status at time *t*. At each time step the physician agent makes a decision to treat or stop treatment (an *action at* from the binary *action space A*={0,1}). Here time corresponds to the number of treatment sessions since the patient's first visit (typically one session=one week). The physician agent receives rewards/ utilities, and is asked to pick actions in order to maximize overall utilities.

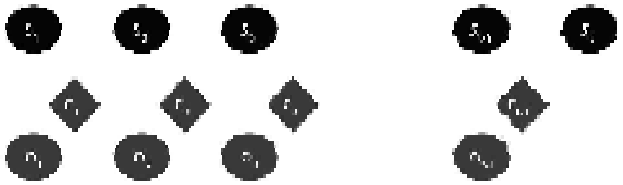
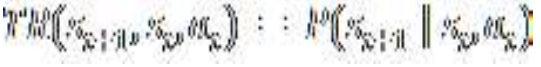


Figure 3: Dynamic decision network (DDN)

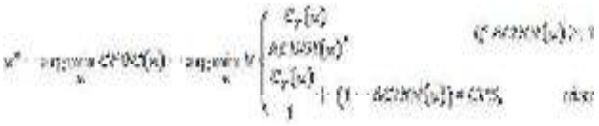
A dynamic decision network for clinical decision-making. a = action (e.g. treatment option), s = state (patient's actual underlying health status), o = observation (patient's observed status/outcome), c = treatment costs, CPUC = utilities/rewards (cost per unit change of some outcome measure). The subscripts represent time slices (e.g. treatment sessions).
Here:
• *s* = State (patient's actual status, not directly observable)
• *o* = Observation (patient's observed status/outcome, can be missing)
• *a* = Action (e.g. treatment option, not treat)
• *c* = Treatment costs
• CPUC = Utilities/Rewards (in this case, patient's CPUC)

In our current implementation, health status is taken to be the delta value (change over time, see Section 2.4) of the CDOI-ORS (ÄCDOI), given an observation at time *t*, but more generally state models could represent underlying characteristics of disease, clinical/demographic characteristics, and individual genetic predispositions. *States* – actual, *st*, and belief states, *bt* (see below) – are derived by discretizing continuous CDOI delta values into five discrete bins: High Deterioration (ÄCDOI < -4), Low Deterioration (-4 <= ÄCDOI < -1), Flatline/Stable (-1 <= ÄCDOI <= 1), Low Improvement (1 < ÄCDOI <= 4) and High Improvement (ÄCDOI > 4). These bins are derived from research-validated clinical categorization of significant outcome delta classes for CDOI-ORS
We model the effects of actions on the state using a *transition model* (*TR*) that encodes the probabilistic effects of various treatment actions:



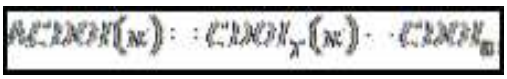
(1)

The physician agent's performance objective is to maximize the improvement in patient health, as measured by the change in CDOI-ORS score at the end of treatment, while minimizing cost of treatment (e.g. by stopping treatment when the probability of further improvement is low). These two competing objectives are combined via the cost per unit change (CPUC) metric that incorporates both outcome delta (change over time) and treatment costs. Treatment strategies with low CPUC are cost effective (high utility). An optimal strategy * that *minimizes* CPUC is given as:



(2)

where CPS=cost per service for a given session, *CT* is a random variable denoting accumulated cost at the end of treatment, *E* indicates expected value (since we are calculating over future events), and ÄCDOI(ð) is calculated as:

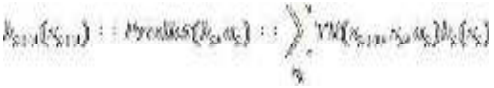


(3)

where *CDOIT* is a random variable denoting the CDOI-ORS value at the end of treatment. The expectation is taken over future patient health trajectories up to a finite horizon *T*, here taken to be *T*=8 treatments (based on the typical average number of sessions amongst Centerstone's outpatient population).

In all cases, the treatment decision must be based on the belief state rather than the true underlying state (which cannot be directly observed) – that is, a strategy is defined as a map from belief states to actions: : 2S A. In other words, the physician agent's reasoning is performed in a space of *belief states*, which are *probability distributions* over the patient's health status, *bt*(*s*)=*P*(*st*=*s*).

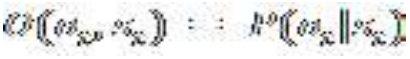
Unconditional on observations, the next belief state, *bt+1*, is predicted from the prior belief (over all possible prior states) using the following exact equation:



(4)

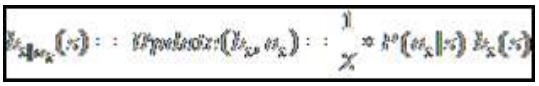
By repeated application of this predict operation our system can compute forecasts of the patient's health status into the future.

In our problem, observations *ot* are drawn from the *observation space* O = {missing} CDOI. In the case of a missing observation, *ot* = {missing}, the belief *bt(s)* is maintained as is after the observation. This provides a probabilistic *observation model*, which defines the relationship between the true underlying state and possible observations:



(5)

Upon receiving an observation *ot* , we find the posterior belief over the patient's state using the update operation, which uses Bayes rule to derive the backward relationship from an observation to the state distribution:



(6)

where *Z* is a normalization factor equal to the unconditional probability of observing *ot*.

2.4 Estimation of transition models : The goal of the transition model is to use the history of health status – i.e. outcome delta – to predict the probability distribution of future health states on the subsequent time step. Let ht denote the history of observations (o1,…,ot). We compare three model classes for predicting the change in CDOI-ORS from the current to the next step: CDOIt = CDOIt+1- CDOIt.

1) **0th order** – a raw stationary distribution over CDOIt independent of history (i.e. the probability of treatment effect, regardless of improvement/deterioration seen thus far): P(CDOIt | ht) = P(CDOIt)

2) **1st order autoregressive (Local)** – the distribution over CDOIt depends only on change since the previous timepoint (local change): P(CDOIt | ht) = P(CDOIt | CDOIt-1).

3) **Global average** – the distribution over CDOIt depends on the *entire* patient history (i.e. delta since baseline): P(CDOIt ht) = P(CDOIt | (CDOIt-CDOI0)).

The 0th order model ignores any effect of the history on future patient outcomes and treats each patient like a new average patient regardless of previous observations. the 0th order model still assumes they are just as likely to improve in the future. On the other hand, the 1st order local model uses the short-term trajectory of prior improvement/deterioration in order to gain somewhat better forecasting ability, but only since the most recent timepoint (previous treatment session). The global averaging technique looks at trends over a longer time horizon (change since baseline, t=0). It provides the most comprehensive measure but is less sensitive to recent changes, which can be significant for real-world treatment decisions.

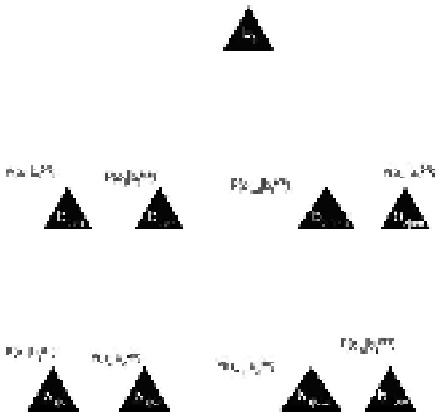
For each transition model class, we build a discrete conditional probability table over the values of the independent variable using observed statistics from our EHR data (in other words, using a separate sample of patients from the EHR, we estimate the transition probabilities needed for the model). To obtain sufficient sample size for the estimation procedure, we bin deltas into 5 bins (High Deterioration, Low Deterioration, Flatline/Stable, Low improvement, High Improvement) based on research-validated clinical categories.

2.5 Decision-making strategies

2.5.1 MDP models : To determine optimal actions via the DDN, we compute an *optimal* treatment strategy via exploration of a belief-space search tree (MDP search tree). Here, we present an online approach where the system continually plans, executes, observes, and re-plans the optimal treatment strategy from any given timepoint [33]. The MDP/POMDP search tree, also sometimes referred to as a stochastic decision tree [34], explores the beliefs (*b)* obtained for all possible actions (*a*) and probabilistic treatment outcomes (observations, *o*) out into the future (Figure 4).

We then make a backwards pass to compute the optimal decisions at each decision node that optimizes CPUC. The first step in this pass computes the overall CPUC at leaves and terminal nodes. Then, we recursively backup the optimal CPUC for interior nodes all the way to the root. The backup operation for chance nodes calculates the expected CPUC over its children (based on probabilities), while at decision nodes the backup picks the action that leads to the optimal

(in this case, minimal) CPUC for its subtree. Once this operation is complete, we can compute the optimal strategy. The optimal strategy is a *subtree* obtained by keeping all children of chance nodes and the single child corresponding to the optimal action at each decision node. This optimal strategy represents a treatment *plan* given current information.



An example MDP search tree for clinical decision-making. At each layer/time slice, we have a series of decision and chance (or terminal) nodes. Decision nodes represent choices of actions (*a*, given *k* possible actions), while chance nodes represent possible resulting observations (*o*, given *m* possible observations). Terminal nodes present a utility measure (CPUC, represented in dollars). As none of these actions or observations has occurred yet, we must use probabilistic beliefs (*b*) at each planning step.

Where the various branches, *b*, can relate to possible observations, *o={o1…om}*, at the decision nodes and actions, *a={a1…ak}*, at the probabilistic nodes. Each node contains some utility value (here a CPUC value shown in dollars).

A primary challenge in this approach is exploring the large search tree that can result. Here, we consider 5 observation bins and a "stop treatment" action with no subsequent branches, resulting in a search tree with branching factor = 5 and depth = 10 and the generation of over 100,000 belief states in the worst case. While tractable for the problem at hand, more complex decision problems – such as larger state spaces, action types, or time frames – may require approximate solutions.

2.6 Simulation analysis approach : For purposes of analysis, simulation experiments were performed across multiple permutations of the transition and decision-making models laid out in Sections 2.4 and 2.5 (henceforth termed *constructs*). We also considered datasets with and without missing observation points.

Additionally, for the MDP model solved via DDN/search tree, the significance of the outcomes was varied via an *outcome scaling factor* (OSF) that adds in scaled outcome values {0-1} as an additional component of the utility metric. The outcomes (current *delta*) are scaled and flipped based on the maximum possible delta for a patient at a given timepoint (*deltamax*), so that higher values (near 1) are worse than lower values (given that we are attempting to minimize CPUC):

$$CPUC_{scaled} = CPUC \cdot (1 - OSF \cdot \left[\frac{delta_{current}}{delta_{max}}\right]) \quad (7)$$

3. Results

3.1 General results : Nearly 100 different constructs were evaluated during this study. For brevity, a sampling of the main results is shown in Table 1 (with OSF=0). In general, the purely probabilistic decision-making models performed poorly, and are not shown here. In all tables, results are based averages/percentages across all patients (n=500, see Section 2.1) in each construct simulation. As defined in Section 2.3, the goal here (i.e. optimality) is defined as maximizing patient improvement while minimizing treatment costs, which equates to minimizing CPUC.

Additionally, we would prefer models that maintain reasonably high average final delta values and lower standard deviations of delta values.

Table 1 shows the results of the Hard Stop (i.e. case rate) and the Raw Effect (i.e. fee-for-service) decision models first. It should be noted that – for the former – CPUC is reduced but still generally higher than other decision making approaches while outcomes are very low, and that – for the latter – outcomes are improved but still generally lower than other decision making approaches while CPUC is significantly higher. In short, neither is optimal.

Decision Model	Transition Model	Missing Obs[1]	CPUC[2]	Avg Final Delta[3]	Std Dev Final Delta[3]	Avg # of Services	% Patients Max Services[4]
Hard Stop	N/A	No	302.38	3.22	7.30	3.18	0%
Hard Stop	N/A	Yes	305.38	2.56	8.07	3.18	0%
Raw Effect	1st Order	No	470.38	4.60	8.01	8.08	100%
Raw Effect	1st Order	Yes	497.38	4.73	8.45	8.08	100%
Max Improve	1st Order	No	257.47	3.28	7.87	5.36	30%
Max Improve	1st Order	Yes	316.84	3.77	8.29	5.42	39%
MDP	1st Order	No	226.91	3.60	7.17	6.13	8%
MDP	1st Order	Yes	257.21	3.33	7.97	6.03	5%
Max Improve	Global	No	220.44	3.41	6.98	6.73	24%
Max Improve	Global	Yes	251.33	3.07	8.09	6.76	30%
MDP	Global	No	191.73	3.08	6.69	6.18	11%
MDP	Global	Yes	188.38	3.59	8.66	6.11	9%

1Missing observation
2Cost per Unit Change
3Final Delta = change in outcome from baseline to end of treatment
4Percent of patients receiving maximum number of treatment sessions

3.2 MDP variation in outcome scaling factor : Since the MDP decision-making approaches consider utilities inherently as part of their decision-making approach, they provide additional opportunities for model refinement over other approaches, such as the simpler Max Improve model (Section 3.1). One way to refine the model is by adjusting the outcome

scaling factor (OSF, Section 2.6). The results of such adjustment for the MDP model (using the global transition model and inclusion of missing observations) are shown in Table 2. Additionally, we ran the same experiment on a variation of the MDP model which takes the action with maximum probability (MaxProb) at each chance node, rather than the average/expected values (see Section 2.5.1). This is shown in Table 3.

Table 2: Outcome scaling – normal MDP

Outcome Scaling Factor	Decision Model	Transition Model	Missing Obs[1]	CPUC[2]	Avg Final Delta[3]	Std Dev Final Delta[3]	Avg # of Services	% Patients Max Dosage[4]
0	MDP	Global	Yes	189.93	5.59	6.44	4.112	9%
1	MDP	Global	Yes	210.54	5.71	6.58	4.32	12%
2	MDP	Global	Yes	219.95	6.17	6.58	4.62	14%
3	MDP	Global	Yes	223.74	6.24	6.63	4.68	16%
4	MDP	Global	Yes	235.87	6.26	6.62	4.70	16%
5	MDP	Global	Yes	236.99	6.32	6.63	4.76	18%
6	MDP	Global	Yes	243.87	6.29	6.80	4.80	19%
10	MDP	Global	Yes	249.03	6.35	6.90	4.92	21%

1Missing observation
2Cost per unit change
3Final Delta = change in outcome from baseline to end of treatment
4Percent of patients receiving maximum number of treatment sessions

Table 3: Outcome scaling – MaxProb MDP

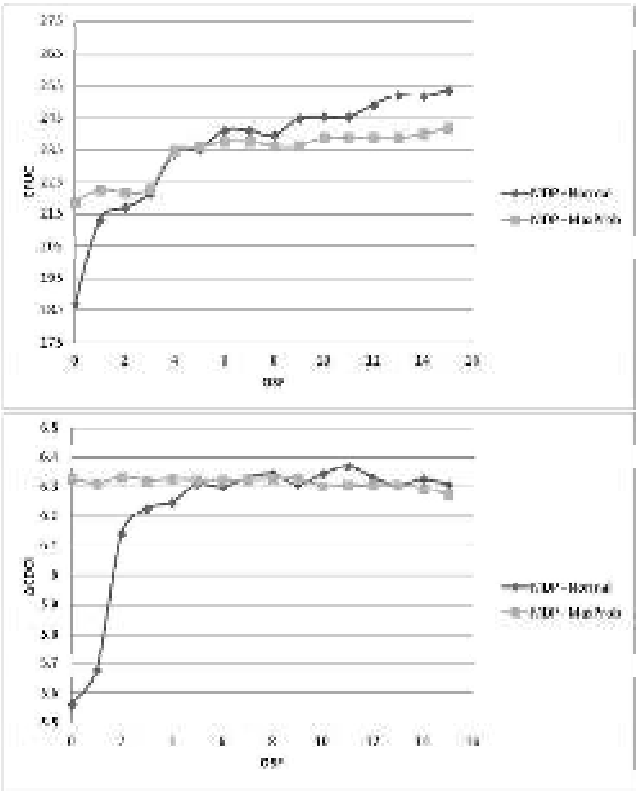
Outcome Scaling Factor	Decision Model	Transition Model	Missing Obs[1]	CPUC[2]	Avg Final Delta[3]	Std Dev Final Delta[3]	Avg # of Services	% Patients Max Dosage[4]
0	MDP	Global	Yes	189.93	5.59	6.44	4.112	9%
1	MDP	Global	Yes	218.54	5.71	6.58	4.32	12%
2	MDP	Global	Yes	219.95	6.17	6.58	4.62	14%
3	MDP	Global	Yes	223.74	6.24	6.63	4.68	16%
4	MDP	Global	Yes	235.87	6.26	6.62	4.70	16%
5	MDP	Global	Yes	236.99	6.32	6.63	4.76	18%
6	MDP	Global	Yes	243.87	6.29	6.80	4.80	19%
10	MDP	Global	Yes	249.03	6.35	6.90	4.92	21%

1Missing observation
2Cost per unit change
3Final Delta = change in outcome from baseline to end of treatment
4Percent of patients receiving maximum number of treatment sessions

In Table 2, we can see that adjusting the OSF from 0 to 10 results in increasing outcome deltas, as well as increasing CPUC's. For the normal MDP, we appear to reach some sort of maxima in outcomes around OSF=3 or 4 (which is reflected in the MaxProb MDP below). After this, CPUC continues to rise, but outcome deltas show minimal improvement, even at OSF=10 and beyond. Effects on CPUC and outcome delta for both models using OSF ranging [0,15] can be seen in Figure 5. We can see in table 3 that the MaxProb MDP show little change across OSF values in terms of CPUC or outcome deltas. This is probably evidence of some global maxima for CPUC ˜ $220-225 and outcome delta ˜ 6.25-6.35. Existence of such maxima should be expected given the optimization-problem nature of the current framework. It does suggest that such problems may be ripe for application of other optimization techniques for determining model parameters such as OSF or action/treatment decision thresholds.

It should be noted that with OSF=3, the normal MDP obtains CPUC=$224 and outcome delta=6.24 in 4.68 treatment sessions. This appears to be an optimal decision-making model across all model formulations given both CPUC and outcome deltas. It also vastly outperforms the aforementioned treatment-as-usual case rate/fee-for-service models (see Section 3.1). Essentially, we can obtain approximately 50% more improvement (outcome change) for roughly half the costs.

Figure 5: Outcome scaling effects



The figure shows the effect of different values of the OSF parameter on CPUC (top) and outcome delta, i.e. ÄCDOI (bottom), for both the MDP-Normal and MDP-MaxProb Models. The delta values level off around ˜ 6.25-6.35 while CPUC values continue to increase.

4. Discussion

4.1 Summarization of findings

The goal in this paper was to develop a general purpose (non-disease-specific) computational/AI framework in attempt to address fundamental healthcare challenges – rising costs, sub-optimal quality, difficulty moving research evidence into practice, among others. This framework serves two potential purposes:

1) A simulation environment for exploring various healthcare policies, payment methodologies, etc.
2) The basis for clinical artificial intelligence – an AI that can "think like a doctor"

This framework utilizes modern computational approaches to learn from clinical data and develop complex plans via simulation of numerous, alternative sequential decision paths. It determines optimal actions based on what has been observed so far, the beliefs inferred from those observations, and what we expect might happen in the future. It must do so in a dynamic environment as an online agent – which continually plans, observes, and re-plans over time as evidence/facts change. The framework is structured as a multi-agent system, which in future work has potential to account for the various conflicting and synergistic interactions of various components in the healthcare system.

The results shown here demonstrate the feasibility of such an approach relative to human decision-making performance. Even in its early stages of development, such an AI framework easily outperforms the current treatment-as-usual case-rate/fee-for-service models of healthcare (Section 3.1). Sophisticated modeling approaches utilizing MDPs and DDNs can be further tweaked to provide finer control over the utility input of higher outcomes or lower costs (Section 3.2), providing robust tools for simulation and AI development in the medical domain.

4.3 Conclusion

At the end of the day, if we can predict the likely result of a sequence of actions/treatment for some time out into the future, we can use that to determine the optimal action *right now*. As recently pointed out by the Institute of Medicine, does it make sense to continue to have human clinicians attempt to estimate the probabilistic effects of multiple actions over time, across multitudes of treatment options and variable patient characteristics, in order to derive some intuition of the optimal course of action? Or would we be better served to free them to focus on delivery of actual patient care ? The work presented here adds to a growing body of evidence that such complex treatment decisions may be better handled through modeling than intuition alone. Furthermore, the potential exists to extend this framework as a technical infrastructure for delivering personalized medicine. Such an approach presents real opportunities to address the fundamental healthcare challenges of our time, and may serve a critical role in advancing human performance as well.

EFFICACY OF GPS IN TECHNOLOGY

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ABSTRACT: Global Positioning System (GPS) is the only system today able to show one's own position on the earth any time in any weather, anywhere. Now a day's GPS playing a vital role in technology and lot of research also is going on. In this paper we will focus about concepts of GPS and satellite based navigation system, the different segments of GPS. The various errors that degrade the performance of GPS are also included. DIFFERENTIAL GPS, which is used to improve the accuracy of measurements, is also studied. The need, working and implementation of DGPS are discussed at length. Finally, the paper ends with advanced application of GPS and future areas in which it can be focused.

Keywords: GPS, Waypoints, Routes, Trackback

Introduction : The Global Positioning System (GPS) is a satellite-based navigation system. System made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense. GPS was originally intended for military applications, but in the 1980s, the government made the system available for civilian use. GPS works in any weather conditions, anywhere in the world, 24 hours a day. There are no subscription fees or setup charges to use GPS. GPS satellites are powered by solar energy. They have backup batteries onboard to keep them running in the event of a solar eclipse, when there's no solar power. Small rocket boosters on each satellite keep them flying in the correct path. The 24 satellites that make up the GPS space segment are orbiting the earth about 12,000 miles above us. They are constantly moving, making two complete orbits in less than 24 hours. These satellites are travelling at speeds of roughly 7,000 miles an hour.

Aim: To know the importance of GPS in Upgrading Technology.

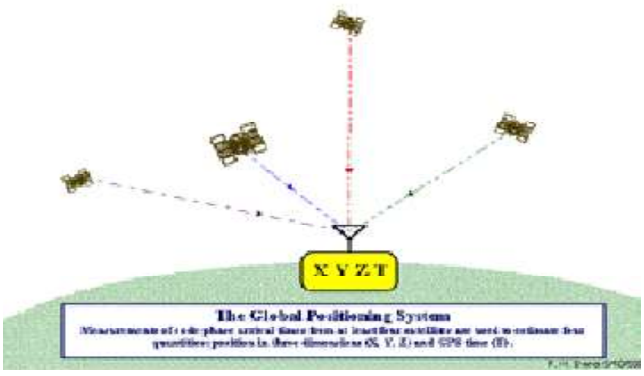
Objectives:
1. Why GPS
2. How to apply GPS in Different fields

Scope: Application of advanced technology in different fields so that common man can handle the situations with the help of new available techniques like GPS.

Global Position System: The Global Positioning System (GPS) is a worldwide radio-navigation system formed from a constellation of 24 satellites and their ground stations. GPS uses these **"man-made stars"** as reference points to calculate positions accurate to a matter of meters. In fact, with advanced forms of GPS can make measurements to better than a centimeter. In a sense it's like giving every square meter on the planet a unique address. GPS receivers have been miniaturized to just a few integrated circuits and so are becoming very economical. And that makes the technology accessible to virtually everyone. These days GPS is finding its way into cars, boats, planes, construction equipment, movie making gear, farm machinery, even laptop computers.

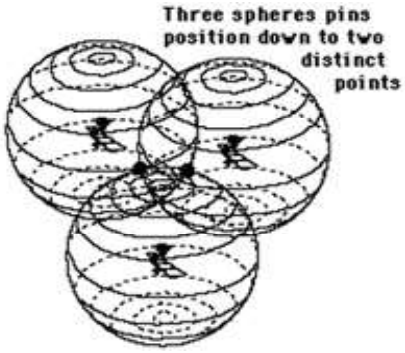
These radio signals carry satellite time ticks, which are kept accurate by on-board atomic time measurements. The GPS receiver calculates the distance to each one of the satellites by the amount of time delay and the velocity of radio waves in both free spaces as well as through the atmosphere and ionosphere at certain elevations off the horizon. The misnomer is to call these calculations "**triangulation**." Since we are not taking bearings on the satellites, but rather measuring time delay, this is technically called **"trilateration."**

Once the GPS has calculated a position fix, usually have anywhere from five to twelve satellites in view. The receiver will then continuously select the best satellites in view to update position. Although a GPS receiver needs four satellites to provide a three-dimensional (3D) fix, it can maintain a two-dimensional (2D) fix with only three satellites. *A three-dimensional fix means the unit knows its latitude, longitude, and altitude, while a two-dimensional fix means the unit knows only its latitude and longitude.*



WORKING OF GPS: The principle behind GPS is the measurement of distance (or "range") between the receiver and the satellites. The satellites also tell us exactly where they are in their orbits above the Earth. Four satellites are required to compute the four dimensions of X, Y, Z (position) and Time. GPS receivers are used for navigation, positioning, time dissemination, and other research.

One trip around the Earth in space equals one orbit. The GPS satellites each take 12 hours to orbit the Earth. Each satellite is equipped with an accurate clock to let it broadcast signals coupled with a precise time message. The ground unit receives the satellite signal, which travels at the speed of light. Even at this speed, the signal takes a measurable amount of time to reach the receiver. The difference between the time the signal is sent and the time it is received, multiplied by the speed of light, enables the receiver to calculate the distance to the satellite. To measure precise latitude, longitude, and altitude, the receiver measures the time it took for the signals from four separate satellites to get to the receiver



It works something like this: If we know our exact distance from a satellite in space, we know we are somewhere on the surface of an imaginary sphere with radius equal to the distance to the satellite radius. **If we know our exact distance from two satellites, we know that we are located somewhere on the line where the two spheres intersect**. And, if we take a third measurement, there are only two possible points where we could be located. By taking the measurement from the fourth satellite we can exactly point out our location.

GPS ELEMENTS: GPS has 3 parts**: <u>the space segment, the user segment, and the control segment.</u>** The space segment consists of 24 satellites, each in its own orbit 11,000 nautical miles above the Earth. The user segment consists of receivers, which can hold in hand or mount in car. The control segment consists of ground stations (five of them, located around the world) that make sure the satellites are working properly.

* **Space segment:** The complete GPS space system includes 24 satellites, 11,000 nautical miles above the Earth, which take 12 hours each to go around the Earth once (one orbit). They are positioned so that we can receive signals from six of

them nearly 100 percent of the time at any point on Earth. There are six orbital planes (with nominally four Space Vehicles in each), equally spaced (60 degrees apart), and inclined at about fifty-five degrees with respect to the equatorial plane.

Satellites are equipped with very precise clocks that keep accurate time to within three nanoseconds. This precision timing is important because the receiver must determine exactly how long it takes for signals to travel from each GPS satellite. The receiver uses this information to calculate its position.

The first GPS satellite was launched in 1978. The first 10 satellites were developmental satellites, called Block I. From 1989 to 1993, 23 production satellites, called Block II, were launched. The launch of the 24th satellite in 1994 completed the system.

* Control Segment**: The control segment consists of a worldwide system of tracking and monitoring stations. The monitor stations measure signals from the GPS satellites and relay *the information they collect to the Master Control Station.* The Master Control Station uses this data to compute precise orbital models for the entire GPS constellation. This information is then formatted into updated navigation messages for each satellite.**

* User Segment**: The user segment consists of the GPS receivers, processors and antennas utilized for positioning and timing by the community and military. Users figure their position on the earth by measuring their distance to a group of satellites in space. The user's receiver measures the time delay for the signal to reach the receiver.**

DIFFERENTIAL GPS:

Need for DGPS: As the GPS receivers use timing signals from at least four satellites to establish a position, each of those timing signals is going to have some error or delay, depending on what sort of perils have befallen it on its trip down to receiver. Since each of the timing signals that go into a position calculation has some error, that calculation is going to be a compounding of those errors.

The sheer scale of the GPS system solves the problem. The satellites are so far out in space that the little distances we travel here on earth are insignificant. So if two receivers are fairly close to each other, say within a few hundred kilometers, the signals that reach both of them will have traveled through virtually the same slice of atmosphere, and so will have virtually the same errors.

Working: The underlying premise of differential GPS (DGPS) is that any two receivers that are relatively close together will experience similar atmospheric errors. Differential GPS involves the cooperation of two receivers, one that's stationary and another that's roving around making position measurements. The reference receiver has no way of knowing which of the many available satellites a roving receiver might be using to calculate its position, the reference receiver quickly runs through all the visible satellites and computes each of their errors. Then it encodes this information into a standard format and transmits to the roving receivers. It's as if the reference receiver is saying: *"OK everybody, right now the signal from satellite #1 is ten nanoseconds delayed, satellite #2 is three nanoseconds delayed, and satellite #3 is sixteen nanoseconds delayed..."* and so on. The roving receivers get the complete list of errors and apply the corrections for the particular satellites they're using.

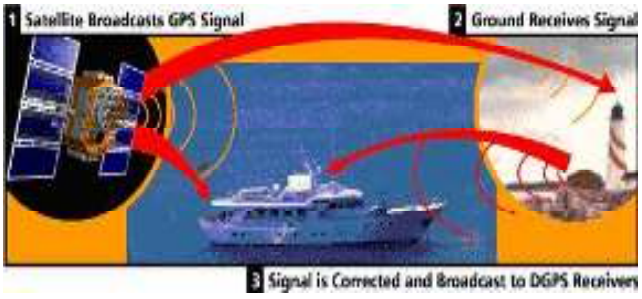
Implementing DGPS: ***The three main methods currently used for ensuring data accuracy are real-time differential correction, reprocessing real-time data, and post processing.***

1. Real-Time DGPS : Real-time DGPS occurs when the base station calculates and broadcasts corrections for each satellite as it receives the data. As a result, the position displayed and logged to the data file of the roving GPS receiver is a differential corrected procedure.

2. Reprocessing Real-Time Data : A satellite can be so low on the horizon that it provides only a weak signal, which causes spikes in the data. Reprocessing real-time data removes these spikes and allows real-time data that has been used in the field for navigation or viewing purposes to be made more reliable before it is added to a GIS.

3. Post processing Correction: Differentially correcting GPS data by post processing uses a base GPS receiver that logs positions at a known location and a rover GPS receiver that collects positions in the field. Differential GPS or "DGPS" can yield measurements good to a couple of meters in moving applications and even better in stationary situations. With it, GPS becomes more than just a system for navigating boats and planes around the world*. It becomes a universal measurement system capable of positioning things on a very precise scale.*

How accurate is GPS: *Today's GPS receivers are extremely accurate, thanks to their parallel multi-channel design. Garmin's 12 parallel channel receivers are quick to lock onto satellites when first turned on and they maintain strong locks, even in dense foliage or urban settings with tall buildings. Certain atmospheric factors and other sources of error can affect the accuracy of GPS receivers. Garmin® GPS receivers are accurate to within 15 meters on average.*



Newer Garmin GPS receivers with **WAAS (Wide Area Augmentation System) capability can improve accuracy to less than three meters on average. No additional equipment or fees are required to take advantage of WAAS.** Users can also get better accuracy with Differential GPS (DGPS), which corrects GPS signals to within an average of three to five meters. The U.S. Coast Guard operates the most common DGPS correction service.

There are two basic types of GPS receivers on the market today that adapt to the motorcycle community. The original and still popular models are those that show waypoints, routes, distance and time information, track, heading and "trackback" routes. These GPS receivers are less expensive then **"map Based"** GPS models and generally will provide all the needed information to navigate in the dual sport environment. They are simple to use, effective, and have been in use for many years.

Many of the GPS manufactures are now introducing the **"map Based" GPS receivers the model is Garmin GPSIII model.** The road map is visible at all times and one can observe their movement across the map from waypoint to waypoint on a pre-determined route. The map base model provides greater navigation capability as one can see terrain features, roads, lakes, seashore and other major map features.

*** Waypoints:** Waypoints are specific locations on the earth's surface that the user designates by entering a latitude/longitude and giving that location a name or number (or symbol). One may enter hundreds of waypoints into their GPS memory. There are a number of methods to use:

1. Take the lat/lon off a map sheet. (Least accurate unless one has a large scale map)
2. Use a map program like Delorme's "Map-n-Go" or "Street Atlas" to obtain lat/lon's (one may place lat/lon's on a map or screen at any point one chooses.
3. Use Microsoft's "Virtual Globe". The program will show lat/lon for any place position the map pointer.
4. with the map based GPS (like Garmin's GPSIII) one can make a waypoint simply by placing the base map pointer anywhere on the map and pressing "enter."

*** Routes:** Routes are specific directions from one place to other using pre-entered waypoints to define the route. The advantage of making a route is that it gives one overall distance, leg distances, leg times, arrival times, and total time for the route, etc.

*** Trackback:** It simply allows one to press the **"trackback"** button and receive instructions on how to return to the original start point from ones present location. Trackback routes may also be "saved" and used again to follow a particular route or even uploaded to a computer and printed out on a map for others to use.

Advantages and Disadvantages

Advantages:

1. A gps system comes with a "panic" button. When this button is pressed an operator at the gps carrier can listen in on the conversation and either helps out or alert the authorities. This will keep safe in case of accidents or hi jacks.
2. If vehicle is ever stolen the gps system will track the vehicle and the authorities will be able to get it back in no time.
3. A gps system in a car, boat, plane or haversack will ensure they never lost.
4. A gps system streamlines supply chains and truck movements. The system can track goods at any point of time and accurately predict when goods will reach their destination.
5. Gps systems are used to detect structural problems in buildings and roads and to predict disasters like earthquakes and so on.
6. A gps system can be used to locate a lost child, pet or family. The device is quite small and is like a watch or button on a collar.

Disadvantages: GPS can provide worldwide, three-dimensional positions, 24 hours a day, in any type of weather. However, the system does have some limitations. There must be a relatively clear **"line of sight"** between the GPS antenna and four or more satellites. Objects, such as buildings, overpasses, and other obstructions, that shield the antenna from a satellite can potentially weaken a satellite's signal such that it becomes too difficult to ensure reliable positioning. These difficulties are particularly prevalent in urban areas. The GPS signal may bounce off nearby objects causing another problem called multipath interference.

Suggestions for the Future GPS: External sensing devices will augment GPS data collection. This auto-toggle-gps feature makes sense for the navigation application. It really like to have an application that could potentially enable GPS and keep pumping accurate location information over the network overriding whatever we do through settings?

1. Laser guns attached to a GPS receiver can do offsets too hard to reach features. A three-dimensional GPS position with attached features and attributes is provided. The laser gun reduces data collection costs and speeds data gathering.
2. Digital cameras are the next external sensing wave. The digital image is a valuable feature attribute for GIS display and query. GPS positions can be joined to scientific data collected by temperature probes and magnetometers.
3. As with any new technology, progress brings risk, and GPS potentially could be used to aid smugglers, terrorists, or hostile forces. The Pentagon made the GPS system available

for commercial use only after being pressured by the companies that built the equipment and saw the enormous potential market for it.

4. GPS satellites now broadcast two signals: a civilian signal that is accurate to within 100 feet and a second signal that only the military can decode that is accurate to within 60 feet. The Pentagon has also reserved the ability to introduce errors at any time into the civilian signal to reduce its accuracy to about 300 feet.

Conclusion: GPS, a satellite based navigation system, thus can be used to determine the position of an object on earth. As discussed above, its application field is vast and new applications will continue to be created as the technology evolves. GPS can also interface with other similar projects such EU's GALILEO to account for unpredictable applications. Thus, the GPS constellation, like manmade stars in the sky, can be used for guiding and navigation.

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A SURVEY ON PERFORMANCE OF QOS AMONG AD HOC NETWORK ROUTING PROTOCOLS

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ABSTRACT: An ad hoc network is a collection of wireless mobile nodes dynamically forming a temporary network without the use of any existing network infrastructure or centralized administration. In wireless research area, efficient routing algorithm can provide remarkable benefits in Ad-hoc networks, including higher through, lower average end-to-end delay, less number of dropped data packet and generally better performance in network. According to our reference, the On-demand protocols: AODV and DSR along with traditional proactive DSDV protocol. The result obtained the On-demand protocols: AODV and DSR perform much better than the Table-driven DSDV protocol.

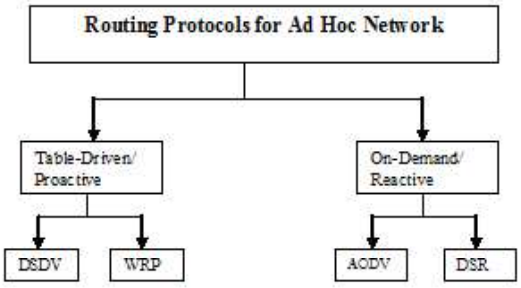
KEYWORDS: Qualities of service (QoS), end-to-end delay, throughput, packet loss

1. INTRODUCTION: In ad hoc networks, each mobile node operates not only as a host but also as a router, forwarding packets for other mobile nodes in the network that may not be within direct wireless transmission range of each other. Each node participates in ad hoc routing protocols that allow it to discover "multi-hop" paths through the network to any other node. The advantages of such a network are robustness, flexibility etc. Quality of Service (Qos) means that the network should provide some kind of guarantee or assurance about the level or grade of service provided to an application.

2. MOBILE AD-HOC NETWORK : A Mobile Ad Hoc Network (MANET) is an autonomous system of nodes connected by wireless links. They are self-organizing and self-configuring multihop wireless networks [5]. The network's wireless topology may dynamically change in an unpredictable manner since nodes are free to move. Each node equipped with a wireless transmitter and a receiver with an appropriate antenna. In mobile ad hoc networks where there is no infra structure support as in the case with wireless network and since a destination node might be out of range of a source node transmitting packets; a routing procedure is always needed to find a path So as to forward the packets appropriately between the source and destination.

3. CLASSIFICATION OF AD-HOC NETWORK

Ad hoc networks are classified as follows:-



1 Table-Driven Routing Protocols or Proactive

Table –Driven Routing Protocols attempt to maintain consistent, up-to-date routing information from each node to every other node in the network [4]. The routing information is kept in a number of different tables and they respond to changes in network topology by propagating updates throughout the network in order to maintain a consistence network view. The proactive protocols are not suitable for larger networks, as they need to maintain node entries for each and every node in the routing table of every node [6]. This causes more overhead in the routing table leading to consumption of more bandwidth.

3.1.1 Destination Sequenced Distance Vector (DSDV)
DSDV is a proactive table driven algorithm based on classic Bellman-Ford routing. In proactive protocols all nodes learn the network topology before a forward request comes in. In DSDV protocol each node maintains routing information for all known destinations [7]. The routing information is updated periodically. Each node maintains a table, which contains information for all available destinations, the next node to reach the destination, number of hops to reach the destination sequence number. The nodes periodically send this table to all neighbours to maintain the topology, which adds to the network overhead. Each entry in the routing table is marked with a sequence number assigned by destination node. The sequence numbers enable the mobile nodes to distinguish stale routs form new ones, thereby avoiding the formation of routing loops.

Advantages of DSDV
- DSDV protocol guarantees loop free paths.
- We can avoid extra traffic with incremental updates instead of full dump updates.
- Count to infinity problem is reduced in DSDV.

Disadvantages of DSDV
- Wasted of bandwidth due to unnecessary advertising of routing information even if there is change in the network topology.
- It is difficult to determine time delay for the advertisement of routes.
- DSDV does not support Multi Path Routing.

3.1.2 Wireless Routing Protocols (WRP) : The WRP is proactive uncast routing protocols for mobile ad hoc network. Each node maintains four tables: distance table, routing table, link cost table, Message Retransmission List table (MRL) [8]. MRL contains sequence number of update message, a retransmission counter and a list of updates sent in update sent message [9]. Nodes inform each other of link changes using update message. Node send update messages after processing updates from their neighbours or after detecting change in the link. It's one of the advantage is, it avoids "count to infinity" problem [10].

3.2 On Demand Routing Protocols or Reactive: Reactive protocols do not maintain routing information or routing activity at the network nodes if there is no communication. If a node wants to send a packet to another nodes then these protocols searches for the route in an on-demand manner and establishes the connection in order to transmit or receive the packet [4]. The route discovery usually occurs by flooding the route request packet throughout the network.

3.2.1Dynamic Source Routing (DSR) : DSR is proactive protocol i.e. it does not use periodic advertisement. Source routing is a routing technique in which the sender of packet determines the complete sequence of nodes through which the packet has to pass; the sender explicitly lists this route in the packet header, identifying each forwarding hop by the address of next node to which transmit the packet on its way to the destination host [8].

3.2.2 Ad Hoc On-Demand Distance Vector Routing (AODV) : AODV is a combination of both DSDV and DSR. It borrows the basic on-demand mechanism of route discovery and route maintenance from DSR, plus the use of hop-by-hop routing, sequence numbers, and periodic beacons from DSDV. It uses destination sequence numbers to ensure loop freedom at all times and by avoiding the Bellmen Ford count to infinity problem offers quick convergence when the ad hoc network topology changes [1].

Advantages of AODV
- Because of its reactive nature, AODV can handle highly dynamic behaviour of vehicle Ad-hoc network.
- Used for both unicasts and multicasts using the 'J' (Join multicast group) flag in the packets.

Disadvantages of AVODV
- No reuse of routing info: AODV lacks an efficient route maintenance technique.
- The routing info is always obtained on-demand, including of common case traffic.

4. QoS PERFORMANCE
4.1 Packet Loss: The protocols maintain a send buffer of 64 packets. It contains all data packets waiting for a route, such as packets for which route discovery has started, but no reply has arrived at. To prevent buffering of packets indefinitely, packets are dropped if they wait in the send buffer for more than 30s.All packets (both data and routing) sent by the routing layer are queued at the interface queue until the MAC layer can transmit them. The interface queue has a maximum size of 100 packets and is maintained as a priority queue with two priorities each served in FIFO order. Routing packets get higher priority than data packets.

4.2 Average End-to-End delay: Average end-to-end delay includes all possible delays caused by buffering during route discovery latency, queuing at the interface queue, retransmission delays at the MAC and propagation and transfer times of data packet.

4.3 Throughput: Also called packet delivery ratio, this is the ratio of the number of the packets received by the CBR sink to the number of packets set by the CBR source, both at the application layer. Packets that are sent but not received are lost in the network due to malicious drops, route failures, congestion, and wireless channel losses. A higher throughput will directly impact the user's perception of the quality of service.

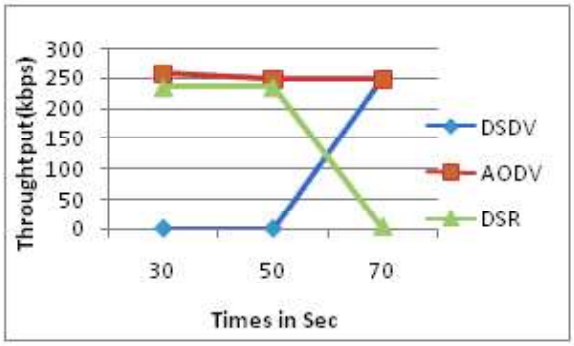
5. Comparison of QoS Parameters
5.1 Throughput vs. Node : DSDV shows higher throughput than the DSR and AODV since its routing overhead is less than others. The rate of packet received for AODV is better

than the DSDV.

Table 1:Throughput (kbps) for 20 nodes for 1-Agent and 1-Sink as in [2]

Time in second / Protocols	30	50	70
DSDV	0	0	248.400
AODV	257.600	248.400	248.400
DSR	235.199	235.199	218.4

Figure1: Throughput for Routing protocols in 20 nodes.

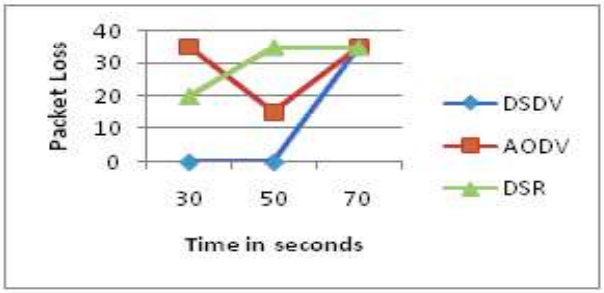


5.2 Packet Dropped vs. Node: Mainly packet drop occurs due to the end of the TTL (Time To Live). If a protocol takes much time to decide destination path then the packets having short life time, fall into victim to dropped. Efficient protocols can wisely find out routing direction the packets dropping rate reduces for them. The dropped packet for DSR is less than that of DSDV, AODV has no periodic updates existing DSR.

Table 2: Packet loss (No. of nodes) for 20 nodes for 1-Agent and 1-Sink as in [2]

Time in seconds / Protocols	30	50	70
DSDV	0	0	35
AODV	35	15	35
DSR	20	35	35

Figure2: Packet Loss for routing protocols for 20 nodes



5.3 End-to-End delay: DSDV which is a table-driven proactive routing protocol completely wins over the on-demand reactive routing protocols AODV and DSR. Since DSDV proactively keeps the routes to all destinations in its table it does not have to initiate the route request process as frequently as in AODV and DSR while sending protocol. Hence on average DSDV clearly has less delay. Now we can easily observe that DSR is worst protocol in terms of delay. At high mobility and more networks load (512 bytes packets at 3packets/sec) aggressive route catching strategy of DSR fails

Table 3: Delay (sec) for 20 nodes for 1-Agent and 1-Sink as in [2]

Delay(seconds) / Protocols	30	50	70
DSDV	0.0	0.0	0.00755
AODV	0.00696	0.00735	0.00755
DSR	0.00708	0.00716	0.00745

Figure3: Delay of routing protocols in 20 nodes

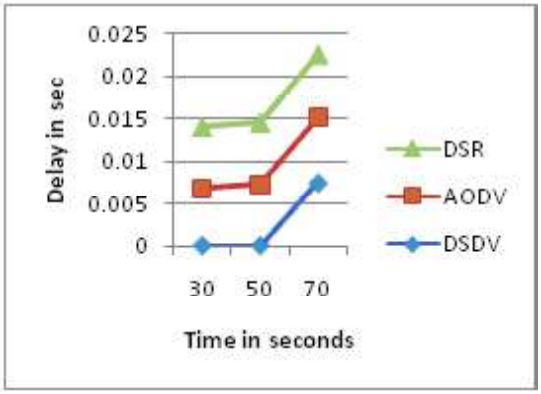


Table 4:Performance of Routing Protocols in 30sec

QoS / Protocols	Throughput	Packet Loss	Delay
DSDV	Low	Low	Low
AODV	High	High	Medium
DSR	Medium	Medium	High

Table 5: Performance of Routing Protocols in 50sec

QoS / Protocols	Throughput	Packet Loss	Delay
DSDV	Low	Low	Low
AODV	High	Medium	High
DSR	Medium	High	Medium

Table 6: Performance of Routing Protocols in 70sec

QoS / Protocols	Throughput	Packet Loss	Delay
DSDV	High	High	High
AODV	High	High	High
DSR	Medium	High	Medium

6. CONCLUSION : DSDV shows higher throughput than the DSR and AODV since its routing overhead is less than others. The rate of packet received for AODV is better than the DSDV. The dropped packet for DSR is less than that of the DSDV. AODV has not periodic updates exist in DSR. DSDV routing protocol consumes more bandwidth, because of the frequent broadcasting of routing updates. While AODV is better than DSDV as it does not maintain any routing tables at nodes which results in less overhead and more bandwidth. It can be assumed that DSDV routing protocols works better for smaller networks but not for larger networks.

In the end-to-end delay, DSDV which is a table driven proactive routing protocol completely wins over the On-Demand reactive routing protocols AODV and DSR. Since DSDV proactively keeps the routes to the entire destination in its table it does not have to initiate the route request process as frequently as in AODV and DSR while sending packets. Hence on an average DSDV clearly has less delay. It can be observed that DSR is the worst protocol in terms of delay.

So, my conclusion is that, a combination of DSR and DSDV would result in protocol with better performance than either of the two.

7. FUTURE SCOPE: For the future work, this area will investigate not only the comparison between AODV, DSDV and DSR routing protocols in grid but more on the vast areas. Routing protocol in grid environment is a rather hot concept in computer communication. May be for the future we would be able to focus more on security issues. Security must be handled in a distributed fashion.

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DATA CLUSTERING ,VARIOUS ALGORITHMS AND ITS APPLICATIONS

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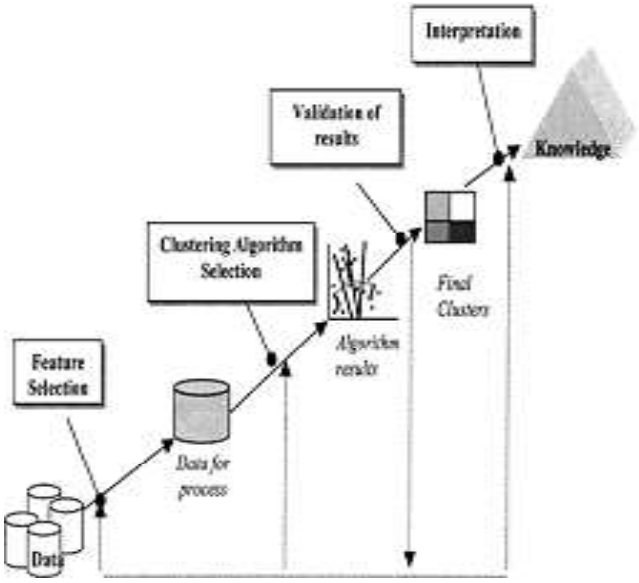
Abstract. Cluster analysis aims at identifying groups of similar objects and, therefore helps to discover distribution of patterns and interesting correlations in large data sets. It has been subject of wide research since it arises in many application domains in engineering, business and social sciences. Especially, in the last years the availability of huge transactional and experimental data sets and the arising requirements for data mining created needs for clustering algorithms that scale and can be applied in diverse domains. This paper introduces the fundamental concepts of clustering while it surveys the widely known clustering algorithms in a comparative way. Moreover, it addresses an important issue of clustering process regarding the quality assessment of the clustering results. This is also related to the inherent features of the data set under concern. A review of clustering validity measures and approaches available in the literature is presented. Furthermore, the paper illustrates the issues that are under-addressed by the recent algorithms and gives the trends in clustering process.

Keywords: clustering algorithms, unsupervised learning, cluster validity, validity indices.

1. Introduction: Clustering is one of the most useful tasks in data mining process for discovering groups and identifying interesting distributions and patterns in the underlying data. Clustering problem is about partitioning a given data set into groups (clusters) such that the data points in a cluster are more similar to each other than points in different clusters (Guha et al., 1998). For example, consider a retail database records containing items purchased by customers.

A clustering procedure could group the customers in such a way that customers with similar buying patterns are in the same cluster. Thus, the main concern in the clustering process is to reveal the organization of patterns into "sensible" groups, which allow us to discover similarities and differences, as well as to derive useful conclusions about them. This idea is applicable in many fields, such as life sciences, medical sciences and engineering. Clustering may be found under different names in different contexts, such as unsupervised learning



The clustering process may result in different partitioning of a data set, depending on the specific criterion used for clustering. Thus, there is a need of preprocessing before we assume a clustering task in a data set. The basic steps to develop clustering process are presented in figure 1 and can be summarized as follows (Fayyad et al., 1996):

• ***Feature selection.*** The goal is to select properly the features on which clustering is to be performed so as to encode as much information as possible concerning the task of our interest. Thus, preprocessing of data may be necessary prior to their utilization in clustering task.

• ***Clustering algorithm.*** This step refers to the choice of an algorithm that results in the definition of a good clustering scheme for a data set. Approximate measure and a clustering criterion mainly characterize a clustering algorithm as well as its efficiency to define a clustering scheme that fits the data set.

i) *Proximity measure* is a measure that quantifies how "similar" two data points (i.e. feature vectors) are. In most of the cases we have to ensure that all selected features contribute equally to the computation of the proximity measure and there are no features that dominate others.

ii) *Clustering criterion.* In this step, we have to define the clustering criterion, which can be expressed via a cost function or some other type of rules. We should stress that we have to take into account the type of clusters that are expected to occur in the data set. Thus, we may define a "good" clustering criterion, leading to a partitioning that fits well the data set.

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• ***Validation of the results.*** The correctness of clustering algorithm results is verified using appropriate criteria and techniques. Since clustering algorithms define clusters that are not known a priori, irrespective of the clustering methods, the final partition of data requires some kind of evaluation in most applications (Rezaee et al., 1998).

• ***Interpretation of the results.*** In many cases, the experts in the application area have to integrate the clustering results with other experimental evidence and analysis in order to draw the right conclusion.

1.1. Clustering applications : Cluster analysis is a major tool in a number of applications in many fields of business and science. Hereby,we summarize the basic directions in which clustering is used (Theodoridis and Koutroubas, 1999):

• ***Data reduction***. Cluster analysis can contribute in compression of the information included in data. In several cases, the amount of available data is very large and its processing becomes very demanding. Clustering can be used to partition data set into a number of "interesting" clusters. Then, instead of processing the data set as an entity, we adopt the representatives of the defined clusters in our process. Thus, data compression is achieved.

• ***Hypothesis generation***. Cluster analysis is used here in order to infer some hypotheses concerning the data. For instance we may find in a retail database that there are two significant groups of customers based on their age and the time of purchases. Then, we may infer some hypotheses for the data, that it, "*young people go shopping in the evening*", "*old people go shopping in the morning*".

• ***Hypothesis testing***. In this case, the cluster analysis is used for the verification of the validity of a specific hypothesis. For example, we consider the following hypothesis: "*Young people go shopping in the evening*". One way to verify whether this is true is to apply cluster analysis to a representative set of stores. Suppose that each store is represented by its customer's details (age, job etc) and the time of transactions. If, after applying cluster analysis, a cluster that cor-

responds to "*young people buy in the evening*" is formed, then the hypothesis is supported by cluster analysis.

• ***Prediction based on groups***. Cluster analysis is applied to the data set and the resulting clusters are characterized by the features of the patterns that belong to these clusters.

Then, unknown patterns can be classified into specified clusters based on their similarity to the clusters' features. Useful knowledge related to our data can be extracted. Assume, for example, that the cluster analysis is applied to a data set concerning patients infected by the same disease. The result is a number of clusters of patients, according to their reaction to specific drugs. Then for a new patient, we identify the cluster in which he/she can be classified and based on this decision his/her medication can be made. More specifically, some typical applications of the clustering are in the following fields (Han and Kamber, 2001):

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• ***Business***. In business, clustering may help marketers discover significant groups in their customers' database and characterize them based on purchasing patterns.

• ***Biology***. In biology, it can be used to define taxonomies, categorize genes with similar functionality and gain insights into structures inherent in populations.

• ***Spatial data analysis***. Due to the huge amounts of spatial data that may be obtained from satellite images, medical equipment, Geographical Information Systems (GIS), image database exploration etc., it is expensive and difficult for the users to examine spatial data in detail. Clustering may help to automate the process of analysing and understanding spatial data. It is used to identify and extract interesting characteristics and patterns that may exist in large spatial databases.

• ***Web mining***. In this case, clustering is used to discover significant groups of documents on the Web huge collection of semi-structured documents. This classification of Web documents assists in information discovery. In general terms, clustering may serve as a pre-processing step for other algorithms, such as classification, which would then operate on the detected clusters.

1.2. Clustering algorithms categories : A multitude of clustering methods are proposed in the literature. Clustering algorithms can
be classified according to:

• *The type of data input to the algorithm.*

• *The clustering criterion defining the similarity between data points.*

• *The theory and fundamental concepts on which clustering analysis techniques are based (e.g. fuzzy theory, statistics).*

Thus according to the method adopted to define clusters, the algorithms can be broadly classified into the following types (Jain et al., 1999):

• *Partitional clustering* attempts to directly decompose the data set into a set of disjoint clusters. More specifically, they attempt to determine an integer number of partitions that optimise a certain criterion function. The criterion function may emphasize the local or global structure of the data and its optimization is an iterative procedure.

• *Hierarchical clustering* proceeds successively by either merging smaller clusters into larger ones, or by splitting larger clusters. The result of the algorithm is a tree of clusters, called dendrogram, which shows how the clusters are related. By cutting the dendrogram at a desired level, a clustering of the data items into disjoint groups is obtained.

• *Density-based clustering.* The key idea of this type of clustering is to group neighboring objects of a data set into clusters based on density conditions.

• *Grid-based clustering*. This type of algorithms is mainly proposed for spatial data mining. Their main characteristic is that they quantize the space into a finite number of cells and then they do all operations on the quantized space.

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For each of above categories there is a wealth of subtypes and different algorithms for finding the clusters. Thus, according to the type of variables allowed in the data set can be categorized into (Guha et al., 1999; Huang et al., 1997; Rezaee et al., 1998):

• *Statistical*, which are based on statistical analysis concepts. They use similarity measures to partition objects and they are limited to numeric data.

• *Conceptual*, which are used to cluster categorical data. They cluster objects according to the concepts they carry. Another classification criterion is the way clustering handles uncertainty in terms of cluster overlapping.

• *Fuzzy clustering*, which uses fuzzy techniques to cluster data and they consider that an object can be classified to more than one clusters. This type of algorithms leads to clustering schemes that are compatible with everyday life experience as they handle the uncertainty of real data. The most important fuzzy clustering algorithm is *Fuzzy C-Means* (Bezdeck et al., 1984).

• *Crisp clustering*, considers non-overlapping partitions meaning that a data point either belongs to a class or not. Most of the clustering algorithms result in crisp clusters, and thus can be categorized in crisp clustering.

• *Kohonen net clustering*, which is based on the concepts of neural networks. The Kohonen network has input and output nodes. The input layer (input nodes) has a node for each attribute of the record, each one connected to every output node (output layer). Each connection is associated with a weight, which determines the position of the corresponding output node. Thus, according to an algorithm, which changes the weights properly, output nodes move to form clusters. In general terms, the clustering algorithms are based on a criterion for assessing the quality of a given partitioning. More specifically, they take as input some parameters (e.g. number of clusters, density of clusters) and attempt to define the

best partitioning of a data set for the given parameters. Thus, they define a partitioning of a data set based on certain assumptions and *not* necessarily the "best" one that fits the data set.

Since clustering algorithms discover clusters, which are not known a priori, the final partitions of a data set requires some sort of evaluation in most applications (Rezaee et al., 1998). For instance questions like "how many clusters are there in the data set?", "does the resulting clustering scheme fits our data set?", "is there a better partitioning for our data set?" call for clustering results validation and are the subjects of methods discussed in the literature. They aim at the quantitative evaluation of the results of the clustering algorithms and are known under the general term *cluster validity* methods.

The remainder of the paper is organized as follows. In the next section we present the main categories of clustering algorithms that are available in literature. Then, in Section 3 we discuss the main characteristics of these algorithms in a comparative way. In Section 4 we present the main concepts of clustering validity indices and the techniques proposed in literature for evaluating the clustering results. Moreover, an experimental study based on some of these validity indices is presented in Section 5, using synthetic and real data sets.

We conclude in Section 6 by summarizing and providing the trends in clustering.

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2. Clustering algorithms: In recent years, a number of clustering algorithms has been proposed and is available in the literature. Some representative algorithms of the above categories follow.

2.1. Partitional algorithms: In this category, *K-Means* is a commonly used algorithm (MacQueen, 1967). The aim of *K-Means* clustering is the optimisation of an objective function that is described by the equation

$$E = \sum_{I=1}^{c} \sum_{x \in Ci} d(x, mi) \quad (1)$$

In the above equation, *mi* is the center of cluster *Ci* , while *d(x,mi)* is the Euclidean distance between a point *x* and *mi* . Thus, the criterion function *E* attempts to minimize the distance of each point from the center of the cluster to which the point belongs.

More specifically, the algorithm begins by initializing a set of *c* cluster centers. Then, it assigns each object of the dataset to the cluster whose center is the nearest, and recomputes the centers. The process continues until the centers of the clusters stop changing.

Another algorithm of this category is *PAM* (*Partitioning Around Medoids*). The objective of PAM is to determine a representative object (*medoid*) for each cluster, that is, to find the most centrally located objects within the clusters. The algorithm begins by selecting an object as medoid for each of *c* clusters. Then, each of the non-selected objects is grouped with the medoid to which it is the most similar. PAM swaps medoids with other non-selected objects until all objects qualify as medoid. It is clear that PAM is an expensive algorithm as regards finding the medoids, as it compares an object with entire dataset (Ng and Han, 1994).

CLARA (*Clustering Large Applications*), is an implementation of PAMin a subset of the dataset. It draws multiple samples of the dataset, applies PAMon samples, and then outputs the best clustering out of these samples (Ng and Han, 1994).

CLARANS (*Clustering Large Applications based on Randomized Search*), combines the sampling techniques with PAM.The clustering process can be presented as searching a graph where every node is a potential solution, that is, a set of *k* medoids. The clustering obtained after replacing a medoid is called the *neighbour* of the current clustering. CLARANS selects a node and compares it to a user-defined number of their neighbors searching for a local minimum. If a better neighbor is found (i.e., having lower-square error),CLARANS moves to the neighbor's node and the process start again; otherwise the current clustering is a local optimum. If the local optimum is found, CLARANS starts with a new randomly selected node in search for a new local optimum. Finally *K*-prototypes*, K-mode* (Huang, 1997) are based on *K*-Means algorithm, but they aim at clustering categorical data.

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2.2. Hierarchical algorithms: Hierarchical clustering algorithms according to the method that produce clusters can further be divided into (Theodoridis and Koutroubas, 1999):

• *Agglomerative algorithms*. They produce a sequence of clustering schemes of decreasing number of clusters at east step. The clustering scheme produced at each step results from the previous one by merging the two closest clusters into one.

• *Divisive algorithms*. These algorithms produce a sequence of clustering schemes of increasing number of clusters at each step. Contrary to the agglomerative algorithms the clustering produced at each step results from the previous one by splitting a cluster into two.

In sequel, we describe some representative *hierarchical clustering* algorithms.

BIRCH (Zhang et al., 1996) uses a hierarchical data structure called CF-tree for partitioning the incoming data points in an incremental and dynamic way. CF-tree is a heightbalanced tree, which stores the clustering features and it is based on two parameters:

branching factor B and *threshold T*, which referred to the diameter of a cluster (the diameter (or radius) of each cluster must be less than *T). BIRCH* can typically find a good clustering with a single scan of the data and improve the quality further with a fewadditional scans. It is also the first clustering algorithm to handle noise effectively (Zhang et al., 1996). However, it does not always correspond to a natural cluster, since each node in CF-tree can hold a limited number of entries due to its size. Moreover, it is order-sensitive as it may generate different clusters for different orders of the same input data.

CURE (Guha et al., 1998) represents each cluster by a certain number of points that are generated by selecting well-scattered points and then shrinking them toward the cluster centroid by a specified fraction. It uses a combination of random sampling and partition clustering to handle large databases. *ROCK* (Guha et al., 1999), is a robust clustering algorithm for Boolean and categorical data. It introduces two new concepts, that is a point's neighbours and links, and it is based on them in order to measure the similarity/proximity between a pair of data points.

2.3. Density-based algorithms: Density based algorithms typically regard clusters as dense regions of objects in the data space that are separated by regions of low density.

Awidely known algorithm of this category is*DBSCAN*(Ester et al., 1996). The key idea in *DBSCAN*is that for each point in a cluster, the neighbourhood of a given radius has to contain at least a minimum number of points. DBSCAN can handle noise (outliers) and discover clusters of arbitrary shape. Moreover, *DBSCAN* is used as the basis for an incremental clustering algorithm proposed in Ester et al. (1998). Due to its density-based nature, the insertion or deletion of an object affects the current clustering only in the neighborhood of this object and thus efficient algorithms based on *DBSCAN* can be given for incremental insertions and deletions to an existing clustering (Ester et al., 1998).

In Hinneburg andKeim (1998) another density-based clustering algorithm,*DENCLUE*, is proposed. This algorithm introduces a new approach to cluster large multimedia databases.

114 HALKIDI, BATISTAKIS AND VAZIRGIANNIS: The basic idea of this approach is to model the overall point density analytically as the sum of influence functions of the data points. The influence function can be seen as a function, which describes the impact of a data point within its neighborhood. Then clusters can be identified by determining density attractors. Density attractors are local maximum of the overall density function. In addition, clusters of arbitrary shape can be easily described by a simple equation based on overall density function. The main advantages of DENCLUE are that it has good clustering properties in data sets with large amounts of noise and it allows a compact mathematically description of arbitrary shaped clusters in high-dimensional data sets. However, DENCLUE clustering is based on two parameters and as in most other approaches the quality of the resulting clustering depends on the choice of them. These parameters are (Hinneburg and Keim, 1998): i) parameter *N* which determines the influence of a data point in its neighborhood and ii) < describes hether a density-attractor is significant, allowing a reduction of the number of density-attractors and helping to improve the performance.

2.4. Grid-based algorithms: Recently a number of clustering algorithms have been presented for spatial data, known as grid-based algorithms. These algorithms quantize the space into a finite number of cells and then do all operations on the quantised space.

STING (Statistical Information Grid-based method) is representative of this category. It divides the spatial area into rectangular cells using a hierarchical structure. *STING* (Wang et al., 1997) goes through the data set and computes the statistical parameters (such as mean, variance, minimum, maximum and type of distribution) of each numerical feature of the objects within cells. Then it generates a hierarchical structure of the grid cells so as to represent the clustering information at different levels. Based on this structure *STING* enables the usage of clustering information to search for queries or the efficient assignment of a new object to the clusters.

WaveCluster (Sheikholeslami et al., 1998) is the latest grid-based algorithm proposed in literature. It is based on signal processing techniques (wavelet transformation) to convert the spatial data into frequency domain. More specifically, it first summarizes the data by imposing a multidimensional grid structure onto the data space (Han and Kamber, 2001).

Each grid cell summarizes the information of a group of points that map into the cell. Then it uses a wavelet transformation to transform the original feature space. In wavelet transform, convolution with an appropriate function results in a transformed space where the natural clusters in the data become distinguishable. Thus, we can identify the clusters by finding the dense regions in the transformed domain. A-priori knowledge about the exact number of clusters is not required in *WaveCluster*.

2.5. Fuzzy clustering: The algorithms described above result in crisp clusters, meaning that a data point either belongs to a cluster or not. The clusters are non-overlapping and this kind of partitioning is further called *crisp clustering*. The issue of uncertainty support in clustering task leads to

CLUSTERING VALIDATION TECHNIQUES 115: the introduction of algorithms that use fuzzy logic concepts in their procedure. A common fuzzy clustering algorithm is the *Fuzzy C-Means* (*FCM*), an extension of classical *C-Means* algorithm for fuzzy applications (Bezdeck et al., 1984). *FCM* attempts to find the most characteristic point in each cluster, which can be considered as the "center" of the cluster and,

then, the grade of membership for each object in the clusters. Another approach proposed in literature to solve the problems of crisp clustering is based on probabilistic models. The basis of this type of clustering algorithms is the EM algorithm, which provides a quite general approach to learning in presence of unobservable variables (Mitchell, 1997). A common algorithm is the probabilistic variant of *K*-Means, which is based on the mixture of Gaussian distributions. This approach of *K*-Means uses probability density rather than distance to associate records with clusters (Berry and Linoff, 1996). More specifically, it regards the centers of clusters as means of Gaussian distributions. Then, it estimates the probability that a data point is generated by *j* th Gaussian (i.e., belongs to *j* th cluster). This approach is based on Gaussian model to extract clusters and assigns the data points to clusters assuming that they are generated by normal distribution. Also, this approach is implemented only in the case of algorithms, which are based on EM(Expectation Maximization) algorithm.

3. Comparison of clustering algorithms: Clustering is broadly recognized as a useful tool in many applications. Researchers of many disciplines have addressed the clustering problem. However, it is a difficult problem, which combines concepts of diverse scientific fields (such as databases, machine learning, pattern recognition, statistics). Thus, the differences in assumptions and context among different research communities caused a number of clustering methodologies and algorithms to be defined.

This section offers an overview of the main characteristics of the clustering algorithms presented in a comparative way. We consider the algorithms categorized in four groups based on their clustering method: *partitional, hierarchical, density-based* and *grid-based* algorithms. Tables 1–4 summarize the main concepts and the characteristics of the most representative algorithms of these clustering categories. More specifically our study is based on the following features of the algorithms:
i) the type of the data that an algorithm supports (numerical, categorical), ii) the shape of clusters, iii) ability to handle noise and outliers, iv) the clustering criterion and, v) complexity. Moreover, we present the input parameters of the algorithms while we study the influence of these parameters to the clustering results. Finally we describe the type of algorithms results, i.e., the information that an algorithm gives so as to represent the discovered clusters in a data set.

As Table 1 depicts, *partitional algorithms* are applicable mainly to numerical data sets. However, there are some variants of *K*-Means such as *K*-mode, which handle categorical data. *K*-Mode is based on *K*-means method to discover clusters while it adopts new concepts in order to handle categorical data. Thus, the cluster centers are replaced with "modes", a new dissimilarity measure used to deal with categorical objects. Another characteristic of partitional algorithms is that they are unable to handle noise and outliers and they are not suitable to discover clusters with non-convex shapes.

Trends in clustering process: Though cluster analysis is subject of thorough research for many years and in a variety of disciplines, there are still several open of research issues. We summarize some of the most interesting trends in clustering as follows:
i) *Discovering and finding representatives of arbitrary shaped clusters.* One of the requirements in clustering is the handling of arbitrary shaped clusters and there are some efforts in this context. However, there is no well-established method to describe the structure of arbitrary shaped clusters as defined by an algorithm. Considering that clustering is a major tool for data reduction, it is important to find the appropriate representatives of the clusters describing their shape. Thus, we may effectively describe the underlying data based on clustering results while we achieve a significant compression of the huge amount of stored data (data reduction).
ii) *Non-point clustering.* The vast majority of algorithms have only considered point objects, though in many cases we have to handle sets of extended objects such as (hyper)- rectangles. Thus, a method that handles efficiently sets of non-point objects and discovers the inherent clusters presented in them is a subject of further research with applications in diverse domains (such as spatial databases, medicine, biology).
iii) *Handling uncertainty in the clustering process and visualization of results.* The majority of clustering techniques assumes that the limits of clusters are crisp. Thus each data point may be classified into at most one cluster. Moreover all points classified into a cluster, belong to it with the same degree of belief (i.e., all values are treated equally in the clustering process). The result is that, in some cases "interesting" data points fall out of the cluster limits so they are not classified at all. This is unlikely to everyday life experience where a value may be classified into more than one categories. Thus a further work direction is taking in account the uncertainty inherent in the data. Another interesting direction is the study of techniques that efficiently visualize multidimensional clusters taking also in account uncertainty features.
iv) *Incremental clustering.* The clusters in a data set may change as insertions/updates and deletions occur through out its life cycle. Then it is clear that there is a need of evaluating the clustering scheme defined for a data set so as to update it in a timely manner.
However, it is important to exploit the information hidden in the earlier clustering schemes so as to update them in an incremental way.
v) *Constraint-based clustering.* Depending on the application domain we may consider different clustering aspects as more significant. It may be important to stress or ignore some aspects of data according to the requirements of the considered application. In recent years, there is a trend so that clus-

ter analysis is based on less parameters but on more constraints. These constrains may exist in data space or in users' queries. Then a clustering process has to be defined so as to take in account these constrains and define the inherent clusters fitting a dataset. 144 HALKIDI, BATISTAKIS AND VAZIRGIANNIS

Acknowledgments: This work was supported by the General Secretariat for Research and Technology through the PENED ("99E_ 85") project.We thank C. Amanatidis for his suggestions and his help in the experimental study. Also, we are grateful to C. Rodopoulos for the implementation of CURE algorithm as well as to Dr Eui-Hong (Sam) Han for providing information and the source code for CURE algorithm.

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PROS AND CONS OF SOCIAL NETWORKING SITES (SNS)

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ABSTRACT: Social networking is one of the popular communication mechanisms in which on a dedicated website users are allowed to connect with each other. In the 21st century social networks are very common and popular among all age group of people. Today Social Networking Sites (SNS) are playing vital role in connecting people and helping them to communicate with friends and family members staying far away from each other. It has become an important media in which people share information, messages, thoughts and views on different topics.

The Present work enlightens the strong influence of SNS on modern human lives and also raises the issues on disadvantages of SNS and provides guide lines to the users for careful and proper use of social media networks for a happy life.

INTRODUCTION: Social network is one of the popular communication mechanisms in which on a dedicated web site, where users are allowed to communicate with each other. Communication mechanisms have been developing day by day. In olden days communication between two people used to occur by signals and it has been developed by using some images, vocal interactions and finally human find out a language for his convenience.

After few decades communication between people became easy by telegrams, telephones and pagers. When computer introduce new 0's and 1's language to the world, where it is limited only for business use the incredible human make use this 0 and 1 also for communication. This ideological view of human being gives birth to Social Network Sites (SNS).

Social Network Sites: - Definition: A social network is an association of social interaction and individual relationships on dedicated web sites where users are allowed to communicate with each other by posting messages, comments, images and videos.

OR

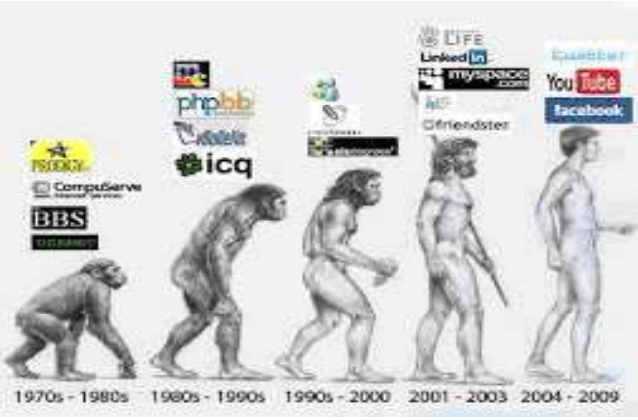
Social network sites is a web based service that allow individuals to

a. Construct a public or semi-public profile within a bounded system.

b. Articulate a list of other users with whom they share a connection.

c. View and traverse their list of connections and those made by others within the system.

Growth of Social Network Sites



The first recognizable social network site launched in 1997. **Sixdegrees.com** allowed users to create profiles, list their friends. **Classmate.com** allowed people to affiliate with their high school or college and surf the network for others who were also affiliated, but users could not create profiles or list friends until year later. Sixdigrees was first to combine these features. From 1997 to 2001, a number of community tools began supporting various combinations of profiles and publicly articulated friends. **AsianAvenue, BlackPlanet,** and **Migente** allowed users to create personal and professional profiles.

The next wave of SNSs began when **Ryze.com** was launched in 2001 to help people leverage their business networks. Later **Tribe.net, LinkedIn** and **Friendster** were introduced. In the end, Ryze never acquired mass popularity, Tribe.net grew to attract a passionate niche user base, and LinkedIn became a powerful business service.

MySpace was founded in 2003 and by 2006 had grown to be the most popular social network in the world. MySpace differentiated itself from competitors by allowing users to completely customize the look of their profiles. Users could also post music from artists on MySpace and embed videos from other sites on their profiles.

Facebook started out as a Harvard-only social network back in 2004, it quickly expanded to other schools, then to high schools, businesses and eventually everyone (by 2006).

In 2008 Facebook became the most popular social networking site, surpassing MySpace, and continues to grow.

Twitter was founded in the year 2006 and supports real-time update. It gained a lot of popularity during the year 2007 and has become the new norm in social media. Virtually all major social networks now allow real-time updates.

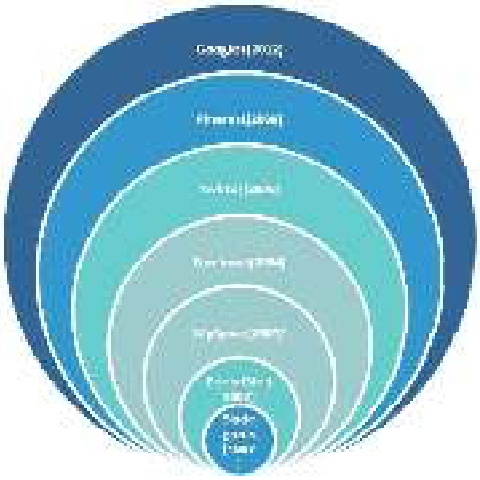


Figure 1 Growth of Social Network Sites

The most popular social network site is Facebook, the 2nd largest social network site is twitter, 3rd is Pinterest, followed by LinkedIn, Tagged, Google+ and MySpace.

Pros.:-

1. Entertainment: Social Network brings worldwide people under one roof and provides them a platform to shake their hands with each other. According to my survey 90% of the people said that they use social network sites like **Facebook, twitter, MySpace** etc to connect with their friends and family members and make new friends.

SNS helps people to strengthen their relationships and to know part of their friend's life even though they are 1000kms

away. It also facilitates the people to discuss on a different topics, share information and thoughts, additionally it also make visualize their friend's sweetest movements by sharing images and videos.

2. Education: There are niche social media sites those are specially made for educators, professionals and other groups. There will be crore together of E-books which provide bundle of study materials to students, researchers on their finger tips; this ends over head for lending books from libraries and from friends. For researchers it is now so easy and fast to take comments/compliments on their papers.

Many social media acting like a bridge to connect teachers and parents to know their children performance at school. It is also helping students to connect with their teachers after school hours.

3. Business: The social network sites are showing their charm in the world of business and work. **LinkedIn** is one of the most useful and particular business tool, which makes all the business activities like new business proposal, business amalgamation, hiring employees from top companies and promote their products even with no cost by online advertisements in the form of banners and ads. These applications are more beneficial for entrepreneurs and small scale industries.

It is helpful for customer side also; now young generations are crazy about online shopping on dedicated websites like **HomeShope.com** and etc, imagine if anyone sitting at home and purchasing any product. Yes! This is possible because websites are providing product's features, compliments including comments by other user of the product; these facilities make release from roaming in the market and seeing the stuffs.

4. Political and Social: It is very easy to use SNS for political activities, for example during elections instead of spending lot of money, time and to be safe from loud speakers on the roads they can use SNS for their own exposure because, now everyone is spending half of the day in front of the social networks only.

SNS are also helping the people to raise voice against informal social activities and spreading the necessity of brings changes in the society. Many social websites are there like **Facebook, twitter, anti_reservations** etc, in which people are sharing their thoughts about reservation and corruption in almost all government services.

5. Helping people to lead good life: SNS like **Facebook** and **twitter** supports the people to reduce psychological and physical stigmas and helping the people to learn how to fight with these disabilities. Many stigma projects like starting from HIV problems to most recent endosulphate problems undertaken by the government uses Facebook, twitter and etc to educate the people.

SNS provide mass information and funds to person who is in need of kidney, blood, bone marrow etc by posting videos and images on a Facebook or any other dedicated websites like **planethunters.org** which is science social media.

Cons.:-

1. Privacy: SNS is making youth to become more open up about their personal life. Even though there are many accounts in Facebook without profile photo, there are equal portion of account holders who forget their limits and feeling free to post any type of photos and videos. Once if a user uploads a photo even a very next second he/she can't take it back and the next problem is the user uploaded photo can be downloaded by others and they can make any edit on it.

There are many challenges to SNS themselves to maintain user's privacy. Among them the most important points are:
a. Using unsafe passwords like family members names, date of birth, nick name and etc, which give chance to unauthorized access.
b. According to cyber investigation there are more than 50% accounts with fake name, age and sex.

2. Cyber-Bullying: One of the disadvantages of SNS is cyber bullying. According to consumer survey of SNS 49.5% of students are being victims of online bullying, particularly middle school children and even celebrities are failed to escape from this.

3. Phishing or Identity theft: Phishing is one of the main problems of SNS users; it is a process of identity theft by fake emails and websites. In India nearby 10,000 people are suffering from phishing in a day. The main targeted websites are Facebook, yahoo, Google+ and etc. According to the Ministry of Information Technology, 78 government websites were hacked within first four months of this year.

The main sources of phishing are: Email/Spam, fake websites, Trojan host, system reconfiguration messages, content injunction etc…

There are many activities which lead users to suffer from Phishing such as:
a. If you open any unknown emails or if you are tempted by any lottery messages and start giving information like your name, address, phone numbers and bank details; it can be misused.
b. If you click OK for any system reconfiguration messages; all important information which is stored in your computer can be downloaded by others.
c. If you agree with any navigation from one believable websites to any other unknown websites the true website will be suffered from content injunction.

4. Virus: Virus is another problem to the SNS user. It is a small malicious function which enters your system in the form of small messages and in the fraction of second they corrupt your entire system.

5. Physical and Psychological problems: The increasing popularity of social network sites makes people to spend huge amount of time in front of the SNS. Hence youth are suffering from many physical and mental problems like they feel alone, anxiety, depression, and stress and most importantly they are facing problem in face-to-face conversation. "With all these problems can young do really well in their life?"

6. Investigation: Now-a-days SNS is being used for school and college admissions and for job placements, 75% of employers' use SNS like, Facebook, MySpace, Twitter and etc to know about their employees' nature and personality. In case if any informal photos or videos are seen by the employer it will affect the employees' professional life.

7. Loss of morals: In the crazy minds of adults and young adults now it is important to increase their online friends list than in the real life. They are forgetting real meaning of relationship. Commenting on others thoughts and ideas, criticizing towards others nature on Social Medias where many can view it, all these affect individual's morals. It is most important to notice that now India's hat is losing its feather of culture.

To be happy on SNS here are some tips

1. WAIT! think and do Suppose if you are posting something online wait for a while and think, because your friends and family members and relatives are seeing your posts.
'Is it okay?'
If it is 'NO' then don't do it.
2. Use safe passwords: Do not give your name, date of birth, family members name as passwords and also doesn't display on your profile, both activities give chance to unauthorized access and identity fraud.
3. If anybody is searching you on Google, make sure that only selected information is visible and also can have alert messages by using "Google Web profile Settings".
4. Use privacy settings : Use privacy settings on any Social Medias like Facebook, YouTube, and also tell your friends to use privacy settings, because the photos or any videos which are privately uploaded by you can publicly seen by your friend's friends.
5. Tie your hands.: Yes! If you are registering with any new websites always give information according to the true necessity of questioner.
6. Use antivirus software.: Before going to do any new installation and download unknown mails make sure that you have protected your system from virus.
7. If you have account in Google+, Hangout, Doxgmail, use "Google Dashboard" to have full information about what you have saved in your account.
8. Use Google analytics to know who are watching you on any website you can also know about a time at which maximum number of hits occur.
9. To be safe from phishing use http (Hyper Text Transport Protocol) secured websites. If you are facing problem from phishing report immediately to ant-phishing group (www.antiphishing.org)
10. Watch your children if they are sitting in front of SNS make them to use only those websites which allow them to login only with your registration. Ex: www.worldoo.com is a niche website for children it allows them to login with their parent's registration.

ARTIFICIAL INTELLIGENCE AND ROBOTICS

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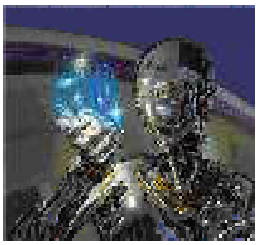
ABSTRACT: Artificial intelligence (AI) is technology and a branch of computer science that studies and develops intelligent machines and software. AI can be defined as the field of "the study and design of intelligent agents", where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success. The central problems (or goals) of AI research include reasoning, knowledge, planning, learning, communication, perception and the ability to move and manipulate objects. Today it has become an essential part of the technology industry and many of the most difficult problems in computer science.

Robotics is the branch of technology that deals with the design, construction, operation, and application of robots, as well as computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans in dangerous environments or manufacturing processes, or resemble humans in appearance, behavior, and/or cognition. Many of today's robots are inspired by nature contributing to the field of robotics. Today, robotics is a rapidly growing field, as technological advances continue; research, design, and building new robots serve various practical purposes, whether domestically, commercially, or militarily. Many robots do jobs that are hazardous to people such as defusing bombs, mines and exploring shipwrecks.

In this work we discuss Goals of AI, Applications of AI, Pros & Cons. Advantages and Disadvantages of Robots, Real world Applications of Robots and three laws of Robotics.

INTRODUCTION: Artificial intelligence (**AI**) is technology and a branch of computer science that studies and develops intelligent machines and software. AI can be defined as the field of "the study and design of intelligent agents", where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success. The central problems (or goals) of AI research include reasoning, knowledge, planning, learning, communication, perception and the ability to move and manipulate objects. General intelligence (or "strong AI") is still among the field's long term goals. Currently popular approaches include statistical methods, computational intelligence and traditional symbolic AI. There are an enormous number of tools used in AI, including versions of search and mathematical optimization, logic, methods based on probability and economics, and many others.

The special ability of artificial intelligence is to reach a solution based on facts rather than on a preset series of steps—is what most closely resembles the thinking function of the human brain



Artificial Intelligence (AI) is usually defined as the science of making computers do things that require intelligence when done by humans.

AI is the study of ideas that enable computers to be intelligent.

Why we need AI?

To supplement natural intelligence for e.g. we are building intelligence in an object so that it can do what we want it to do, as for example— robots, thus reducing human labor and reducing human mistakes.

Goals:

1) Deduction, reasoning, problem solving: Early AI researchers developed algorithms that imitated the step-by-step reasoning that humans use when they solve puzzles or make logical deductions. By the late 1980s and 1990s, AI research had also developed highly successful methods for dealing with uncertain or incomplete information, employing concepts from probability and economics

2) Knowledge representation : Knowledge representation and knowledge engineering are central to AI research. Many of the problems machines are expected to solve will require extensive knowledge about the world.

3) Planning : Intelligent agents must be able to set goals and achieve them. They need a way to visualize the future (they must have a representation of the state of the world and be able to make predictions about how their actions will change it) and be able to make choices that maximize the utility (or "value") of the available choices.

4) Learning

Machine learning is the study of computer algorithms that improve automatically through experience and has been central to AI research since the field's inception.

5) Natural language processing: Natural language processing gives machines the ability to read and understand the languages that humans speak. A sufficiently powerful natural language processing system would enable natural language user interfaces and the acquisition of knowledge directly from human-written sources, such as Internet texts.

6) Motion and manipulation: The field of robotics is closely related to AI. Intelligence is required for robots to be able to handle such tasks as object manipulation and navigation, with sub-problems of localization (knowing where you are, or finding out where other things are), mapping (learning what is around you, building a map of the environment), and motion planning (figuring out how to get there) or path planning (going from one point in space to another point, which may involve compliant motion - where the robot moves while maintaining physical contact with an object).http://en.wikipedia.org/wiki/Artificial_intelligence - cite_note-Applications_of_natural_language_processing-71

7) Perception: Machine perception is the ability to use input from sensors (such as cameras, microphones, sonar and others more exotic) to deduce aspects of the world. Computer vision is the ability to analyze visual input. A few selected sub problems are speech recognition, facial recognition and object recognition.

➢ **Applications of Artificial Intelligence:** Artificial intelligence has been used in a wide range of fields including medical diagnosis, stock trading, robot control, law, remote sensing, scientific discovery and toys.

1) Finance : Banks use artificial intelligence systems to organize operations, invest in stocks, and manage properties.

2) Heavy industry: Robots have become common in many industries. They are often given jobs that are considered dangerous to humans. Robots have proven effective in jobs that are very repetitive which may lead to mistakes or accidents due to a lapse in concentration and other jobs which humans may find degrading. Japan is the leader in using and producing robots in the world.

3) Online and telephone customer service: Artificial intelligence is implemented in automated online assistants that can be seen as avatars on web pages. It can avail for enterprises to reduce their operation and training cost. A major underly-

ing technology to such systems is natural language processing.

Similar techniques may be used in answering machines of call centre's, such as speech recognition software to allow computers to handle first level of customer support, text mining and natural language processing to allow better customer handling.

4) Telecommunications: Many telecommunications companies make use of heuristic search in the management of their workforces, for example BT Group has deployed heuristic search in a scheduling application that provides the work schedules of 20,000 engineers.

5) Aviation: The Air Operations Division (AOD) uses AI for the rule based expert systems. The AOD has use for artificial intelligence for surrogate operators for combat and training simulators, mission management aids, support systems for tactical decision making, and post processing of the simulator data into symbolic summaries. The use of artificial intelligence in simulators is proving to be very useful for the AOD. Airplane simulators are using artificial intelligence in order to process the data taken from simulated flights. Other than simulated flying, there is also simulated aircraft warfare. The computers are able to come up with the best success scenarios in these situations.

6) Others: Various tools of artificial intelligence are also being widely deployed in homeland security, speech and text recognition, data mining, and e-mail spam filtering. Applications are also being developed for gesture recognition (understanding of sign language by machines), individual voice recognition, global voice recognition (from a variety of people in a noisy room), facial expression recognition for interpretation of emotion and non verbal cues. Other applications are robot navigation, obstacle avoidance, and object recognition.

Pros & Cons: Artificial Intelligence is computer programs that can engage in human-like reasoning. Advantages and disadvantages of AI are listed below.

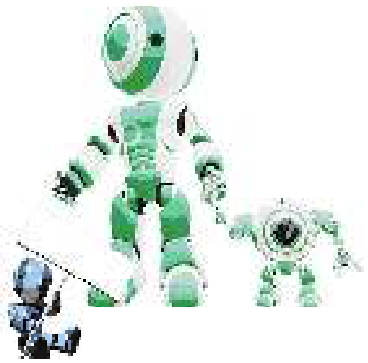
Advantages

- ✓ Can take on stressful and complex work that humans may struggle/cannot do.
- ✓ Can complete task faster than a human can most likely
- ✓ To discover unexplored things. i.e. outer space
- ✓ Less errors and defects
- ✓ Function is infinite

Disadvantages

- ✓ Lacks the "human touch"
- ✓ Has the ability to replace human jobs
- ✓ Can malfunction and do the opposite of what they are programmed to do
- ✓ Can be misused leading to mass scale destruction
- ✓ May corrupt younger generation

Robotics



Robotics is the branch of technology that deals with the design, construction, operation, and application of robots, as well as computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans in dangerous environments or manufacturing processes, or resemble humans in appearance, behavior. Many of today's robots are inspired by nature contributing to the field of bio-inspired robotics. Russian-born American science-fiction writer **Isaac Asimov** first used the word in **1942.**

Today, robotics is a rapidly growing field, as technological advances continue; research, design, and building new robots serve various practical purposes, whether domestically, commercially, or militarily. Many robots do jobs that are hazardous to people such as defusing bombs, mines and exploring shipwrecks.

The **Centre for Artificial Intelligence and Robotics** (CAIR) is a laboratory of the **Defense Research & Development Organization** (DRDO).Located in **Bangalore, Karnataka**, involved in the **Research & Development** of high quality Secure Communication, Command and Control, and Intelligent Systems. CAIR is the primary laboratory for R&D in different areas of Defense Information and Communication Technology (ICT). CAIR was established in October 1986. Its research focus was initially in the areas of Artificial Intelligence (AI), Robotics, and Control systems. CAIR, which was operating from different campuses across Bangalore, has now moved to a new unified campus.

In the last few years robotics activities in India has moved well beyond the traditional areas of industrial applications, atomic energy, etc. and entered newer domains of education, rehabilitation, entertainment, and even into our homes. Indian robotics researchers have similarly grown from a handful to over a hundred engaged in research labs, education, industry, atomic energy, etc. Many of us feel that it is about time to form an academic society to further augment our robotics activities and for better interaction among ourselves. With this objective the Robotics Society of India was formed on 10th July 2011.In the evening at **Indian Institute of Technology** Delhi following the workshop on Hepatics & Virtual Reality. The society wishes to act as an academic center of robotics in India in order to contribute to the field of robotics in cooperation with academic societies of related fields both in India and abroad.

The **Robotics Society of India** (abbreviated RSI) is an academic society founded on July 10, 2011 aimed at promoting Indian robotics and automation activities. The society hopes to serve as a bridge between researchers in institutes, government research centers and industry.

Three laws of robotics: 1. A robot may not injure a human being, or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

Conferences: The Robotics Society of India plans to organize conferences that focus on robotics and automation in India. Hopefully a Journal devoted to robotics in India will also be started in future.

Why Do We Have Robots?: The need for the invention of robot arose out of the limitations that humans faced when performing dangerous tasks. In assembly lines for instance, robots are replacing human labor since they are cheap and ensure consistent quality on the line.

Current Uses of Robots: Though robots have certain limitations in the way they are made, humans are able to utilize them perfectly based on the desired applications. Robotics has come a long way and new findings or developments never end. Here are some applications where robots play important roles

1) **Industrial robots:** Industrial robots are electronically controlled, both programmable and reprogrammable to carry out certain tasks with high precision and accuracy. The most common use of robots is in the automobile industry where they are used for various applications like welding, painting, etc. The robots can carry out tasks which are very difficult or hazardous for human beings.

2) **Aerospace robots:** Another application of robots is in aerospace for outer space exploration. Aerospace robots or unmanned robotic spacecraft play a key role in outer space probe. Scientists can explore in outer space without putting themselves in great danger considering the risks involved if they go to outer space themselves. With controlled robots, the same results can be achieved safely. The risk to lose a human life in outer space has been greatly avoided.

3) **Healthcare delivery:** A highly possible advancement in healthcare is using robots in robotic surgery. Due to technological advancement, this is possible even if the patient is located in remote areas. This possibility defies distance. With the proper tools and set-up in place, proper healthcare could be delivered to the patient even in remote areas without the corresponding risks involved.

4) **Robots resembling human beings and robotic pets:** At home, human-like robots and robotic pets have always been considered friends and companions. They can play a musical instrument, sing, dance, etc. only to please us humans for our own comfort.

5) **Military robots:** Possibly the worst part of robotic application is in military use, as it may curtail human life instead of upholding it. You can conquer or be conquered with a robot.

Real World Applications:

- **Environmental interaction and navigation:**

Though a significant percentage of robots in commission today are either human controlled, or operate in a static environment, there is an increasing interest in robots that can operate autonomously in a dynamic environment. These robots require some combination of navigation hardware and software in order to traverse their environment. In particular unforeseen events (e.g. people and other obstacles that are not stationary) can cause problems or collisions.

- **Control:** The mechanical structure of a robot must be controlled to perform tasks. The control of a robot involves three distinct phases – perception, processing, and action. Sensors give information about the environment or the robot itself (e.g. the position of its joints or its end effectors). This information is then processed to calculate the appropriate signals to the actuators (motors) which move the mechanical.
- **Education and Training:** Robotics engineers design robots, maintain them, develop new applications for them, and conduct research to expand the potential of robotics. Robots have become a popular educational tool in some middle and high schools, as well as in numerous youth summer camps, raising interest in programming, artificial intelligence and robotics among students.

Pros and Cons: As with any business decision, there are pros and cons to integrating automated robotic systems into your workplace. It's important to take time to consider the facts and evaluate your needs. The following points address some of the good and the bad of buying robots.

The Advantages of Robots:

Quality: Automated robots have the capacity to dramatically improve product quality. Applications are performed with precision and high repeatability every time. This level of consistency can be hard to achieve any other way.

Production: With robots, throughput speeds increase, which directly impacts production. Because an automated robot has the ability to work at a constant speed without pausing for breaks, sleep, vacations, it has the potential to produce more than a human worker.

Safety: Robots increase workplace safety. Workers are moved to supervisory roles where they no longer have to perform dangerous applications in hazardous settings.

Savings: Improved worker safety leads to financial savings. There are fewer healthcare and insurance concerns for employers. Robots also offer untiring performance which

saves valuable time. Their movements are always exact, minimizing material waste.

The Disadvantages of Robots:

Expense: The initial investment to integrated automated robotics into your business is significant, especially when business owners are limiting their purchases to new robotic equipment. The cost of robotic automation should be calculated in light of a business' greater financial budget. Regular maintenance needs can have a financial toll as well.

Expertise: Employees will require training program and interact with the new robotic equipment. This normally takes time and financial output.

Safety: Robots may protect workers from some hazards, but in the meantime, their very presence can create other safety problems. These new dangers must be taken into consideration.

IMPEDANCE MEASUREMENT IN BLOOD COAGULATION USING PIC16F877

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Abstract: In this paper we are presenting a system which can measure the impedance of human blood during coagulation. Blood coagulation is a complex, dynamic physiological process by which clots are formed to end bleeding at an injured site. During heart-bypass surgery, blood is diverted out of the body to a heart-lung machine, which maintains heart- and lung functions. To maintain the delicate balance between clotting and bleeding, the clotting time of the patient is monitored every 30 to 60 minutes during surgery and several times after surgery, until a normal clotting time is restored. This work aims to describe a prevention of Losing blood from at the injury site and measuring impedance in blood coagulation with respect to time and frequency within the pre-defined temperature range. Blood coagulation in the body is modulated by a number of cellular and other active components. In most of the biological reactions, temperature variation is an important issue to influence the completion of the process since blood coagulation is influenced by the temperature clinically. Enzyme activities and platelet activation plays a flickering role resulting in a longer coagulation time under temperature variations and significantly increasing the risk of the death.

A PIC16F877 microcontroller based system for the measurement of blood clotting is designed and developed. LCD module is used to display measured values of blood impedance. The MAX232 is a dual line driver/receiver, converts signals from an RS-232 serial port to TTL compatible signals is interfaced with the microcontroller. The embedded code is developed in C language using MPLAB IDE for the Microchip Technology, due to the extent of support and its potential for portability across a wide range of hardware. The instrument is tested and results are found to be satisfactory. The instrument is handheld, low cost, low energy consumption, wearable and cost effective compared to the other commercially available.

Keyword: PIC16F877; blood coagulation; MPLAB

1. Introduction: Blood coagulation offers an extremely complicated and dynamic physiological process providing an important way for maintaining hemostasis. Blood clotting is the human body's way of preventing excessive bleeding, while at the same time, inappropriate clotting at sites of vascular damage is the source of cardiovascular "events" and the driver of thrombotic complications. The detection of clots and characterization of clot function is therefore of paramount medical importance. However, disorders in blood coagulation may lead to serious pathological complications, such as hemorrhage, thrombosis, and embolism in the vascular system. In cardiac surgical procedures, monitoring of blood coagulation is essential to predict the risk of hemorrhage and thrombosis. Continuous measurement of the blood coagulation process can ensure that the patient is effectively treated with an anticoagulant to avoid blood clots [01].

Blood coagulation in the body is amplified by a number of cellular and other active components. The term cascade coagulation illustrates the components of blood and how they are actively involved in the process of the clot formation that is when the cascade is activated the blood progresses from the non-clotting to clotting state causing effective changes in the charge mobility. Thus in the final steps of the cascade involves two components, thrombin and fibrinogen. Thrombin acts by cutting the fibrinogen, forming fibrin filaments—which spontaneously aggregate. The endpoint of clotting time has been defined as the time at which a fibrin clot is formed [02].

A number of methods have been reported to detect the fibrin formation in blood, such as optical measurement [3], ultrasonic measurement, and sensing the change in the mechanical and electrical properties of blood. These methods are required to operate with bulky equipment in laboratory. Moreover, the acquirement of plasma in APTT test is time consuming and labor intensive. The storage conditions of blood need to be constant and any deviations could cause changes in properties such as pH of blood plasma which may result in the devastating conditions.

It must be noted that the aforementioned methods doesn't

hold the properties of feasibility of the miniaturization and disposability. Hence it was reported that electrical impedance measurement is the best method for whole blood coagulation time measurement. Moreover, it is an appropriate method for the development of point-of care coagulation testing device because the electric signal of the measured output can be analyzed by compact electrical circuit with the feature of micro fluidic technology. The main objectives of the development of micro fluidic systems is to implement the entire conventional laboratory protocols automatically and providing good miniaturization and disposability. In additional to all methods we provide a significant way of using the PIC microcontroller which monitors the data of the blood coagulation based on the variation of the electrical impedance. Its speed has also an obvious superiority over other microcontroller over its clock speed flexibly from 20 MHz since blood clotting is spontaneous that responds with no time. The other way round is its code is extremely efficient, allowing the PIC to run with typically less program memory than its larger competitors[4].

2. Methodology

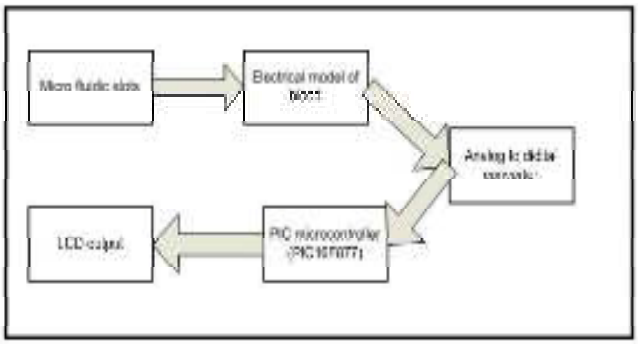

Figure 1: Block diagram of the proposed system

The PIC16F877 is a High performance RISC CPU with only 35 single word instructions, to be more specific all are single cycle instructions except for program branches which are two cycle whose Operating speed 20 MHz clock input DC 20 - 200 ns instruction cycle with 8K x 14 words of FLASH Program Memory, Up to 368 x 8 bytes of Data Memory (RAM), Up to 256 x 8 bytes of EEPROM Data Memory. It also features the interrupt capability, hardware stack with Direct, indirect and relative addressing modes. The powering options are present with Power-on Reset (POR), Power-up Timer (PWRT), Oscillator Start-up Timer (OST), Watchdog Timer (WDT) with its own on-chip RC oscillator for reliable operation. On order for the better power saving sleep mode is enabled in this microcontroller.

A processor register is a small amount of storage available as part of a CPU or other digital processor. Such registers are (typically) addressed by mechanisms other than main memory and can be accessed more quickly. Almost all computers load or not, load data from a larger memory into registers where it is used for arithmetic, manipulated, or tested, by some machine instruction. Registers are provided for the faster access of the memory rather than storing the data in other part of the physical memory. However in the case of the PIC16F877, consisting of the 35 instruction level set all of which outperform in a single cycle. There are thirty five ports for the data input and output which covers form port A to port E and which are designated to their respective divisions. There are five voltage levels that are inscribed in the microcontroller which include Vss and Vdd of pin 11 and 12 which represent the positive voltage supply and the ground potential, Vpp 1 refers to the programmable voltage, Vref- and Vref+ of pin 4 and 5 refers voltage of the analog to digital chip embedded as a part of the microcontroller.

OSC1/CLKIN illustrates an Oscillator crystal input/external clock source input. OSC2/CLKOUT Oscillator crystal output, Connects to crystal or resonator in crystal oscillator mode. In RC mode, OSC2 pin outputs CLKOUT which has 1/4 the frequency of OSC1, and denotes the instruction cycle rate. MCLR/VPP Master Clear (Reset) input or programming voltage input. This pin is an active low RESET to the device. Then coming to the event of ports RA0/AN0 PORT A is a bi-directional I/O port of which RA0 can be analog input0, RA1/AN1 RA1 can also be analog input1, RA2/AN2/VREF- RA2 can also be analog input2 and adds additional features of being a negative reference, RA3/AN3/VREF+ RA3 can also be analog input3 or positive analog reference voltage, RA4/T0CKI RA4 can also be the clock input to the Timer0 timer/counter. Output is open drain type; RA5/SS/AN4 RA5 can also be analog input4 or the slave select for the synchronous serial port. PORTB is a bi-directional I/O port. PORTB can be software programmed for internal weak pull-up on all inputs. RB0/INT RB0 can also be the external interrupt pin, RB3/PGM RB3 can be the low voltage programming input, RB4 interrupt-on-change pin, RB5, RB6/PGC Interrupt-on-change pin or In-Circuit Debugger pin. Serial programming clock, RB7/PGD Interrupt-on-change pin or In-Circuit Debugger pin [04]. Next, the samples were placed in a temperature controlled incubator and investigation of the blood coagulation process was started. Electrical impedance of the blood including magnitude was measured across the electrodes. The analog signal thus obtained is given to the Signal conditioning circuit which is shown in the figure 2. The signal conditioning circuit consists of the operational amplifiers to strengthen the weak signal followed by the biasing circuits integrated to produce a amplified DC signal. The output of signal conditioning cicuit is acquired by the on chip ADC of PIC microcontroller and the corresponding voltage is converted in to equivalent impedance using this microcontroller. The impedance of blood was recorded continuously with a step of 20 sec until the finish of blood coagulation. It must be noted here that PIC microcontroller acts as the soul of the proposed system since it provides a way for the LCD to display the data by providing storage, timely scheduling which is an important criteria in blood coagulation. In our system

impedance is measured with a time gap of 20 seconds.

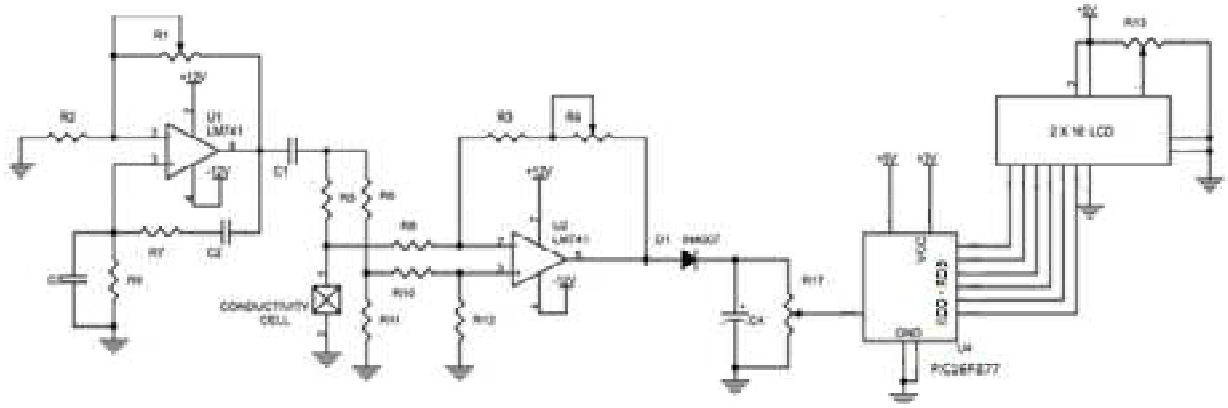

Figure 2:Schematic Diagram of the signal conditioning Circuit.

The impedance thus obtained was measured from the frequency of 100 Hz to 10 kHz in the LCD display. The impedance of blood was recorded continuously with a step of 20 sec until the finish of blood coagulation. It must be noted here that PIC microcontroller acts as the soul of the proposed system since it provides a way for the LCD to display the data by providing storage, timely scheduling which is an important criteria in blood coagulation. In our system impedance is measured with a time gap of 20 seconds.

3. Results and discussions: The blood clot shows insulated, providing the impedance is high and the spectrum is fluctuated. Blood sample in hematocrit of 45% was measured at room temperature (25degree Celsius).

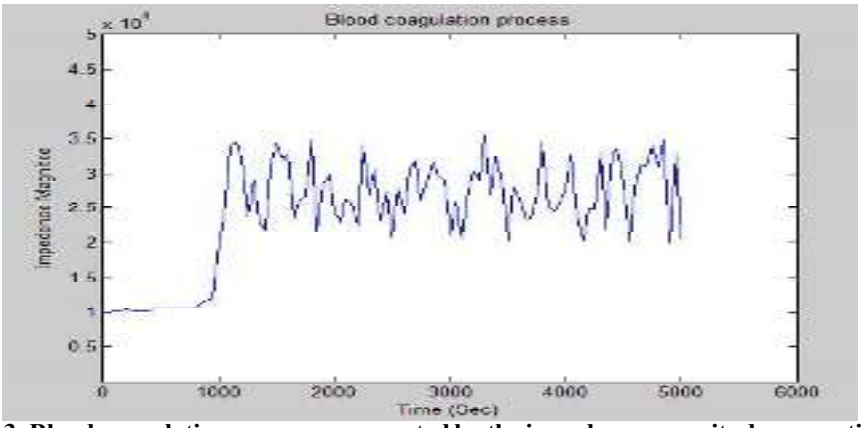

Figure 3: Blood coagulation process represented by the impedance magnitude versus time

4. Conclusions: The proposed device provides a precise and well-controlled environment for the investigation of the blood coagulation process. Blood coagulation time was determined by the electrical impedance of the blood sample by the support of the PIC16F877, which showed a promising technique to quantify the blood coagulation process. Since a small volume of the blood sample was utilized , homogeneity of the sample can be ensured. In this work, analysis of the impedance change of blood sample during coagulation was conducted and the starting time of blood coagulation was defined by the impedance of the blood sample.

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SWADESHI VIJNANA ANDOLANA-KARNATAKA
ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

HOUSEHOLD STORAGE OF GRAINS USING HERBAL MIXTURES FOR SUSTAINABLE FOOD SECURITY

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Abstract: Good storage facilities are important to the farmers all over the world. They help to ensure household and community food security until the next harvest. Though considerable losses occur in the field, both before and during harvest, 5-10% of losses are noticed during storage. Pulses and rice form the major foodgrains stored for household level consumption in Raichur region. Hence,in order to ensure the household food security, an On Farm testing was conducted by KVK Raichur during 2010-11 and 2011-12 in Kurdi village of Manvitaluka and Gonal village of Raichurtaluka respectively . Farmers' practice of grains storage was compared with mixing the grains with boric acid @ 10 gm/kg and a bait prepared from the herbal mixture of neem (50g)+ginger(30 g)+ baje 1 g. For storage of rice the boric acid @ 10gm/kg rice, 2-3 cloves of garlic/kg rice and 200 g of salt per kg rice were the treatments. Results revealed that, both boric powder and herbal mixes for pulse was effective in controlling pulse beetle, the herbal mixtures were recommended over the boric powder because of the likelihood of side effects it may cause on human beings. Similarly, garlic was effective in controlling the pest infestation in rice at household level , due to the flavor of garlic, there is unacceptability and salt was effective in controlling storage pests, and it can be easily washed away while washing the rice, this may be recommended for household storage of rice, mixed and stored in an airtight container.

Key words: Household food grain storage, herbal mixtures

Introduction: Stored products of agricultural and animal origin are attacked by more than 600 species of beetle pests, 70 species of moths and about 355 species of mites causing quantitative and qualitative losses (Rajendran, 2002) and insect contamination in food commodities is an important quality control problem of concern for food industries. Good storage facilities are important to the farmers all over the world. They help to ensure household and community food security until the next harvest. More pest-free storage is needed for handling crops at harvest time and to carry over reserves from year to year. Considerable losses both in quality and quantity of food-grains take place in storage due to a number of factors. Organisms directly responsible for causing loss in stored products are insects, mites, rodents, fungi and bacteria.

Among them, insects and mites are the most important hazards to the safe storage of grains. The insects that attack stored grains are rather general feeders, but some of them prefer certain grains. It is estimated that 5-10 per cent of the stored grain is lost every year due to insect damage in India. Some examples of the major insect pests of stored grain are *Rhyzoperthadominica*(lesser grain borer), *Oryzaephilussur inamensis*(saw toothed grain beetle), *Sitophilusoryzae*(rice weevil), *Trogodermagranaria*(khapra beetle), *Tribolium castaneum* (red flour beetle) and *Plodiainterpunctella*(Indian meal moth).

Pulses and rice form the major foodgrains stored for household level consumption in Raichur region. Every household stores the required quantity of dal and rice for a period of at least one year. During this period , there is an estimated loss of 10 percent due to storage pests. If this damage could be controlled, the hunger could be mitigated to some extent.The present study wasOn Farm testing on assessing the efficiency of different herbal mixtures to control the storage pest at household level.

Material and Methods: On Farm testing is indispensable tool for developing and validating farming technology (Atta-Krah, 1992) which is a research carried out on farmer's fields and in farmer's environment to test the location specificity of the technology. The study was conducted during 2010-11 and 2011-12 in Kurdi village of Manvitaluka and Gonal village of Raichurtaluka respectively to test the efficacy of this mixture against pulse beetle and rice weevil. Treatment details for **pulse storage** included (i) Farmers' practice of storing food grains without any treatment (ii) Treatment 2: Mixing of Boric powder @ 10 g per kg of pulses and (iii) Treatment 3: Neem leaf powder (50g) + Ginger(30 g)+ baje 1 g. The baits were prepared from this mixture and kept in the stored grains in an airtight container.

Rice storage: The indigenous Knowledge technologies in storing rice documented by Directorate of Women in Agriculture were tested for their rationality. The treatment details included (i) Treatment 1: Farmers' practice of storing food grains without any treatment (ii) Treatment 2: Mixing of Boric powder @ 10 g per kg rice (iii) Treatment 3: Mixing of 4-5 garlic cloves per kg of rice and (iv) Treatment 4: Mixing of 200 g salt per 50 kg rice.

In both the experiments the grains after treatment, the pulse beetles were introduced in bins of all the treatment in pulse and rice weevils were introduced in all the treatments of rice and were stored in an airtight container for a period of four months and were evaluated for their egg count and insect count per 100 g grain.

Results and Discussions

Table 1. Efficacy of herbal mixture in controlling pulse beetle

Treatments	Egg count /100 g	Pest count /100 g	Total loss	Cost of treatment
T1	15	6.8	5%	-
T2	0.00	0.00	0%	Re. 1/kg grains
T3	0.00	0.00	0%	Re. 8 per kg grains

Results presented in table 1 revealed that, both Boric powder and herbal mixtures are effective in controlling the pulse beetle. The farmers practice resulted in 5 percent loss due to storage pest. The cost incurred towards each treatment revealed that, storage with herbal mixtures was costliest compared to other two methods, on an average Rs. 80 is spent to store about 10 kg of pulses. Since boric acid is a chemical, continuous consumption of pulses treated with boric acid may be hazardous to human being. The results are in line with the studies conducted by Hansa Singh *et al.* (2010) who found that, among the herbs, Curryleaves proved to be the most effective followed by Neem and then Tulsi in controlling the storage pests of rice and dal. The combined treatments of the selected herbs as well as those of spices were more efficacious than the individual treatments.

Table 2. Efficacy of herbal mixture in controlling rice weevil

Treatments	Egg count /100 g	Pest count /100 g	Total loss
T1	8.00	5.00	4.00
T2	0.00	0.00	0.00
T3	0.00	0.00	0.00
T4	0.00	0.00	0.00

Similarly, the results presented in table 2 depicts that,treatment with boric powder, garlic and salt were effective in controlling the rice weevil. The difficulties expressed by the women in storing the rice with garlic was that the flavor of garlic it leaves behind even after taking it out. The boric powder is also effective in controlling the rice weevil. But again the traces of boric powder remain in rice. In farmers' practice there is loss upto 4 per cent. The results are in line with the results obtained by Shobha*et al* (2004), who documented the Indigenous Technology Knowledge of villages in Dharwad district of Karnataka state, where in the rice was mixed with neem leaves or salt. Rajendranand Sriranjini (2008) reviewed the Plant products as fumigants for stored-product insect control and found that plant products, have the potential for small-scale treatments, space fumigations and as adjuvants for conventional fumigants.

The herbal mixtures are effective in controlling the pulse beetle, but since the ginger is costly, for large scale storage it may be economical. There is need to replace the ginger with other herb which has the same impact in controlling the pulse beetle. The ITKs in controlling the rice beetles are economical and effective. The results imply that, village folk especially women need to be trained in controlling the household storage pests, which are the main source of food security to the family. The results imply that, the biocontrol methods of grain storage using herbal mixture are effective in controlling the storage pests.

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TEXT INDEPENDENT WRITER IDENTIFICATION

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Abstract:The identification of a person on the basis of scanned images of handwriting is a useful biometric modality and application in forsenic and historic document analysis.Person identification using handwriting, a behaviorial biometric is based on the hypothesis that people write uniquely.This paper presents an effective method for writer identification and verification using offline handwriting.Writer individuality is encoded using feature extracted from handwritten text.

1. Introduction: Writer identification and verification methods are categorized into Text dependent and Text independent method. The text independent methods are very similar to signature verification techniques and use the comparison

between individual characters or words of known semantic(ASCII) content. These method therefore require prior localization and segmentation of the relevant information which is usually performed interactively by a human user. The text Independent methods are writer identification and verification use statistical features extracted from the entire image of a text block. A minimal amount of handwriting(eg a paragraph containing a few text lines) is necessary in order to derive stable features insensitive to the text content of the samples.

2 Literature review: A significant progress has been achieved regarding writing identification in general (Plamondon and Lorette, 1989), (Schomaker, 2007). But despite the growing interest in writer identification, Arabic writer identification has not been addressed as extensively as Latin or Chinese writer identification for example, until recently (Bulacu *et al.* 2007).As for Arabic off-line text-independent techniques, global features are mostly used such as textural (Feddaoui and Hamrouni, 2007),(AL-Dmour and Zitar, 2007),(Gazzah and Ben Amara, 2007), angular (Bulacu *et al.* 2007),(Al- Ma'adeed *et al.*, 2008) and directional features (Al-Ma'adeed *et al.*, 2008), as well as statistical distributions of local features such as grapheme maps and thinned stroke features distributions (Abdi *et al.*, 2009).In fact, a number of new approaches have been proposed for Arabic in recent years. In particular, Faddaoui and Hamrouni opted for a set of 16 Gabor filters (Feddaoui and Hamrouni,2007) for handwriting texture analysis. Also, Nejad and Rahmati used a Gabor multi-channel based method (Nejad and Rahmati, 2007) for Persian writer identification.Similarly, Ubul *et al*. proposed another Gabor multi-channel wavelet for the Uyghur language in China (Ubul *et al.*, 2008),which is written using the Arabic and the Persian characters.

On the other hand, Al-Dmour and Zitar addressed the problem of Arabic writer identification using a set of hybrid spectral-statistical measures (AL-Dmour and Zitar, 2007). In (Gazzah and Ben Amara, 2007), Gazzah and Ben Amara applied spatial-temporal textural analysis in the form of lifting scheme wavelet transforms. Angular features were considered as well in the task of Arabic writer identification. Indeed, Bulacu *et al.* (Bulacu *et al.* 2007) considered a set of edge-based joint directional probability distributions, like contour-direction probability distribution function (PDF), contour-hinge PDF and direction co-occurrence PDF. To improve performance, joint directional probability distributions were combined with grapheme-emission distribution. Similarly, Al-Ma'adeed *et al.* (Al-Ma'adeed *et al.*, 2008) employed edge-based directional probability distributions, combined with moment invariants and structural word features, such as area, length, height, length from baseline to upper edge and length from base line to lower edge. On the other hand, Abdi *et al.* used stroke measurements of Arabic words, such as length, ratio and curvature, in the form of PDFs and cross-correlation transform of features (Abdi *et al.*, 2009). Also, Rafiee and Motavalli (Rafiee and Motavalli, 2008) introduced a new Persian writer identification method, using baseline and width structural features, and relying on a feed forward neural network for the classification. In (Ben Amara and Gazzah, 2005) as well, Ben Amara and Gazzah used neural networks and support vector machines on Arabic handwriting for writer identification.

3. Methodology:

a) Sampling technique and Methods of data collection A sample of 10 writers is chosen from professional college for collecting the handwritten documents the writers are not imposed by any constraint like type of pen and style of writing etc.writers are not disclosed purpose of data collection and are asked to write text matter in English on a single unrolled page.

b) Techniques of data analysis: The collected documents are scanned using Hp Laserjet Scanner.Each sample of a pattern is a block of text(128*128) pixels in English.The images are then converted into 0-1(binarised)labels where the label 1 represents the object and 0 represent the background.

c) Feature Extraction: Each sample or pattern that we attempt to classify is a block of text 128*128 pixel in English.It is helpful to study the general properties of the proposed handwriting for feature extraction.

To Extract the character or components containing strokes in vertical,horizontal,right and left diagonal directions,we perform the erosion operation on the input binary image with the line structuring element .The resulting image is used for morphological opening in four directions to obtain the strokes present in the connected components of an image.we extract seven features based on these factors.

4. Proposed algorithm: The various steps involved in the proposed algorithm

1. Pre-prosses the input document.
2. Extract strokes of each connected component of an image in vertical,horizontal,left and right diagonal directions.
3. Compute average stroke lengths of an image.compute the average pixel density of an image.
4. Compute the aspect raio of an imge.
5. Use k-nearest Neighbour to classify the new image.

5. Results and discussion : We use K-NN classifier to classify the image.we calculate the distance of the testing sample from the traing samples,it is assigned to the class based on highest nearest distance.The K-nearest neighbours are calculated and classified as to which class it belongs.the experiment will be carried out by varying the number of neighbours.(k=3,5,7).

6. Conclusions : The performance of this proposed method can be compared with the previous work, but the number of handwritten documents considered varies. Hence the comparison is not performed.

Automatic writer identification systems can be useful in a variety of applications including banks, criminal justice systems,determing the authenticity of handwritten e-mails etc.person identification based on hand writing is the natural choice to establish authorship of a handwritten document.

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KNOWLEDGE DATA DISCOVERY FOR DEVELOPING PATTERNS FOR CROSS-MEDIA KNOWLEDGE MINING

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***Abstract**: Basically Data mining is helpful in extracting data from large data bases. Business is based on information which is in large volume. Customers are given more importance to develop Business. There are many mining patterns which they are not sufficient for some problems. The areas like image retrieval, multimedia document visualization. The vision is cross-media knowledge mining, the process of integrating images text, numerical data, audio data and other formats into single consistency way. By using Knowledge based Data mining there is need to develop sufficient and effective patterns to frame the cross media data mining.*

***Key words:** CRM, Patterns, Data mining, KDD, Repositories, Multimedia.*

Introduction: Electronic commerce is changing the face of business. It makes customer management, new strategies for marketing and expand range of products and more efficient operations . This change is widespread because of increasingly sophisticated data mining tools. Data mining results are expressed in the form of "patterns". These patterns will help for hidden knowledge that may increase sales revenue in profitable manner. Effective application of knowledge represented by data mining patterns are generated by mining algorithms. These patterns are so large and effective such that manual inspection and analysis is impractical. If some mined patterns are strong and domain specific. So there is a need for survey to understanding the problem with multimedia using knowledge discovery. Which has to expand its range of patterns for retrieval and visualization concepts for the area like multimedia document visualization. At the same time the system deployed by the firm must be enough to respond immediately to user with least latency. The balance between techniques that are accurate but need to be more response.

CRM : It is process which manages the interaction between a company and its customers. CRM task is to acquire new customer, which is more expensive task than retaining a current customer. CRM is to please the customer, depending on the sector and kind of customer which can be done with help desk personnel, 24 hour service, IT and with development of new websites. CRM task is to retain customers. Competitors are constantly offering new services and prices. Customer trust is a key to CRM. Businesses spend lot of money on trust.

Data Mining : It is an advanced method in data extraction and data storing techniques. Data mining software allows users to analyze large databases to solve business decision problems. Many applications are growing in different areas. So data mining helps to process data and discover new patterns to extract hidden information from large database. Knowledge discovery in databases helps in knowledge extraction, data and pattern analysis, data archeology, information harvesting for business intelligence. Data mining pursued research in three categories statisticians, AI and data

mining.

Aim:

- The importance of KDD to find useful patterns for cross-media knowledge mining.
- The process for integrating images, text, numerical data, audio into a single consistency.

Objective:

- To know about knowledge discovery
- Pattern Selection for cross-media mining

To know about knowledge discovery

Knowledge Discovery describes overall process of finding and identifying data of interest, extracting and generating knowledge from raw data and present results systematically. "The non – trivial process of identifying valid, novel, potentially useful and ultimately understandable patterns in data." Presently intranet and internet are focusing on multimedia large context for customers. It uses a very high structured repositories in intranets Pattern Selection for cross-media mining.

Patterns : Data mining system/query may generate thousands of patterns, not all of them are interesting. Patterns are suggested human centered, query based and focused mining. A Pattern is interesting if it is easily understood by humans, valid on new or test data with some degree of certainty, potentially useful, novel or validates some hypothesis that user seeks to confirm. Based on the user's interest and expectations the patterns are helpful.

Why KDD?: It refers to the overall process of discovering useful knowledge from data. Data mining refers to application specific algorithms for extracting patterns from data. KDD helps in data preparation, data selection, data clearing and incorporation of appropriate prior knowledge and proper interpretation of the results of mining are essential to ensure that useful knowledge is derived from the data. KDD is also evolved in research fields such as Machine Learning, Pattern Reorganization, Databases, Statistics, AI and Data Visualization. KDD focuses on the overall process of knowledge discovery from data including data are stored and accessed. KDD helps in finding understandable patterns that can be interpreted as useful interesting knowledge.

Introduction to KDD process: The **knowledge discovery process** (KDP), also called knowledge discovery in databases, seeks new knowledge in some application domain. It is defined as the nontrivial process of identifying valid, novel, potentially useful, and ultimately understandable patterns in data. The process generalizes to non-database sources of data, although it emphasizes databases as a primary source of data.

The KDP model consists of a set of processing steps to be followed by practitioners when executing a knowledge discovery project. The model describes procedures that are performed in each of its steps. It is primarily used to plan, work through, and reduce the cost of any given project.

- Learning the application domain
- Creating a target data set
- Data cleaning and preprocessing
- Data reduction and transformation
- Choosing functions of data mining
- Choosing mining Algorithm(s)
- Pattern evolution and knowledge presentation
- Use of discovered knowledge
- Data Mining: KDD process

Main KDD applications:

1. Marketing/Retail
2. Investment/Banking
3. Fraud detection
4. Manufacturing
5. Telecommunications
6. Data Clearing

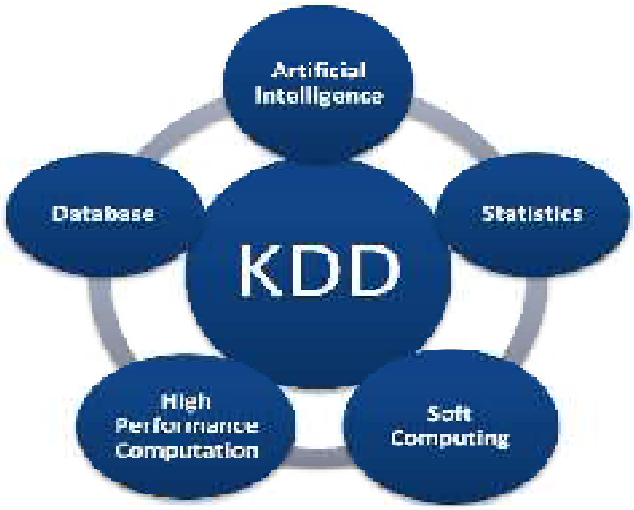
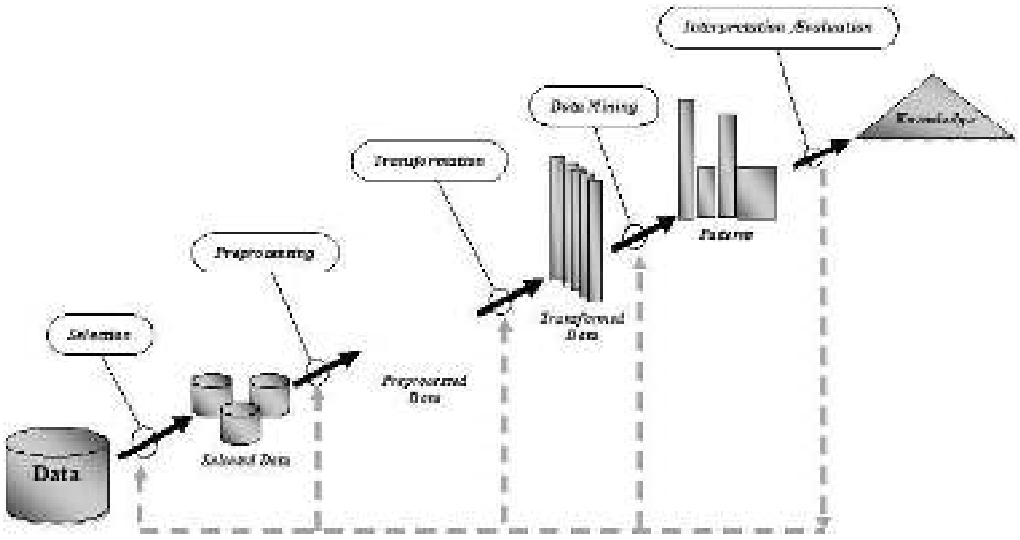


Figure1: KDD Process.

Figure 2. Multidimensional view of data mining classification



1. Databases to be mined: Relational, transactional, object oriented, object relational, time series, text, multimedia, heterogeneous, legacy, www, etc.
2. Knowledge to be mined: Characterization, discrimination, association, classification, clustering, trend, deviation and outer analysis.
3. Multiple Integrate Functions and Mining Multiple Levels
4. Techniques: Database oriented, data warehouse (OLAP), machine learning, statistic visualization, neural networks.
5. Applications: Retail, telecommunication, banking, fraud detection, DNA mining, stock marketing analysis, web mining and web log analysis.

Multimedia Context

The advent of digital cameras allows sharing audio and video files. It is estimated that nearly 300 million digital camera devices are used worldwide from 2004 onwards. These are arranged in some kind of multimedia repository using www. Multimedia uses richer and more diverse content than text based information. This is becoming quite difficult to statisticians and AI methods.

Repositories: With the increase in the number of companies organizations are shifting from past classical and flat repositories. Now they are shaped in hierarchy or graphs with structural information. Knowledge discovery systems must be aware of structural information, their operations and functionality. Structuring and retrieving of the cross mining is a issue in knowledge discovery.

Conclusion: Having huge data, make some problem for detection of hidden relationship among various attributes of data and between snapshots of data over a period of time. To encompass multimedia knowledge repositories, knowledge discovery has to expand its range of retrieval and visualization in concepts areas like image retrieval, multimedia document visualization. The vision is cross-media knowledge mining, the process of integrating images texts, numerical data, audio data and other formats into single consistent way (after query they should represent single consistent (Representation) pattern) using KDD my aim is to find pattern for multimedia visualization.

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DETECTING ARTIFACTS AND TEXTURES IN DIGITAL IMAGES

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Abstract: An algorithm for the segmentation and analysis of wavelet coded images is described. This algorithm forms part of an image post-processing scheme which can successfully restore texture in compressed images suffering from blurring artifacts. The algorithm involves extracting texture, intensity (or color) and spatial features. A variation of the *k*-means algorithm is used to efficiently segment large images. An analysis stage uses a rule-based heuristic to classify segments as potential artifacts or adjacent textures which can be used to restore them. This novel approach to image post-processing requires minimum user interaction and can successful exploit texture level correlation in compressed images.

I. Introduction: Digital imaging devices such as digital cameras, scanners and digital video recorders, have risen in popularity in recent years along with a sudden spurt in the amount of digital content that is being created, transmitted and published. Such content is however susceptible to artifacts arising from processes such as lossy compression and transmission over packet networks, which significantly degrades the perceptual quality of such content and its associated commercial value. Post-processing algorithms which can recover and enhance such images and video thus gain importance.

Most modern image-compression algorithms use a transform domain approach, and quantize those transform coefficients which are considered to be perceptually insignificant. Usually these are high frequency coefficients and at high compression ratios, aggressive quantization can result in artifacts in the compressed image. For older JPEG based compression this resulted in blocking artifacts. In modern wavelet based image compression algorithms like JPEG 2000 this results in blocking, color distortion, ringing and blurring artifacts [1]. Visually, the ringing and blurring artifacts are most prominent. Ringing artifacts affect contour edges and blurring artifacts cause prominent blurred patches in highly textured regions. Blurring artifacts are characterized by the presence of well-preserved texture adjacent to blurred regions. Examples of blurring and ringing artifacts are seen in Figure 1a and 1b.

Many different approaches have been proposed to tackle ringing [2], [3] and blocking [4], [5] type artifacts. Most of these approached involve smoothing the unsightly ringing and blocking. Thus these approaches are designed to remove artifacts rather than recover lost content. Previously Yang and Hu [6] have reported a dithering based approach to recover some high-frequency components in a JPEG-encoded image. However, this approach seems to be applicable only to fine-grain textures like photo granular noise. Krishnamurthy et.al. have reported a texture restoration method [7] based on a Wold-decomposition. This is however applicable to a uniformly blurred image, and thus does not exploit the presence of well preserved texture in JPEG 2000 coded images suffering from blurring artifacts. In [8], Hu and Sambhare demonstrate a post-processing technique based on texture synthesis which exploits the presence of well-preserved texture to patch blurred regions seamlessly. While this technique demonstrates the feasibility of such a patch based texture restoration method, their method requires a high degree of user input and asks the user to identify regions suffering from blurring artifacts and potential source regions which have the same texture preserved. In this paper we plan to automate this process of source and target region identification.

Identifying source and target regions is essentially a texture based segmentation problem. We use Difference of Offset Gaussian filters to create a feature set and a variation of the *k*-means clustering algorithm to segment the image. A rule based heuristic is then applied to the segments to identify potential source and target segments. The rest of this paper is organized as follows. In Section II we discuss feature extraction and feature dimensionality reduction. In Section III we discuss the segmentation technique and explain the rationale behind the variation used in the *k*-means clustering. Section IV describes the rule-based heuristics used and demonstrates the results. Finally Section V summarizes this paper and presents some directions for future results.

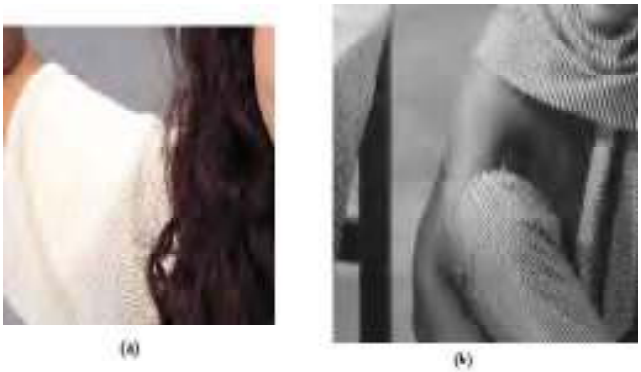


Figure 1: (a) Blurring and ringing artifacts for a color image compressed at an unknown ratio. (b) Blurring and ringing artifacts for a grayscale image compressed at 1.94 ratio.

II. Feature Extraction: We represent each pixel in the image using an 11 or 13 dimensional feature vector. Two features are used to represent spatial relationships between pixels; the x and y pixel coordinates normalized by image dimensions. For grayscale images, one feature is the low pass representation which captures average image intensity. (Low passed r, g and b planes are used for color images). We use 8 features to represent texture information, using responses to a bank of oriented filters. Finally we reduce the dimensionality of feature space using Principal Component Analysis. A

detailed explanation follows.

II. a. Average gray level (and color information): We use median filtering to extract average gray level and color information from an image. We use an 11 pixel wide median filter as it adequately suppresses small scale texture information while still retaining contour and boundary information quite well. For color images we apply a median filter to each color plane. Figures 2a and 2b show the low passed color and gray scale features used.

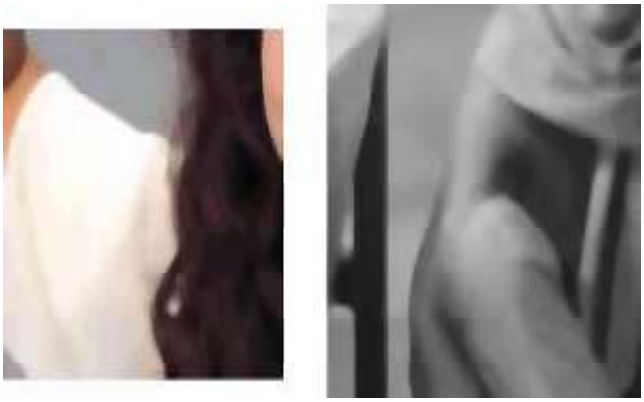


Figure 2: (a) Median filtered color image. (b) Median filtered grayscale image.

II. b. Texture feature extraction: To extract texture features we consider analogies with human preattentive texture discrimination mechanisms [9]. The model consists of (1) convolution with a bank of even-symmetric linear filters followed by half-wave rectification to give a set of responses modeling outputs of V1 simple cells, followed by (2) inhibition localized in space resulting in suppression of weak responses when there are strong responses in same or nearby locations and finally (3) texture boundary detection.

We used Difference of Gaussian (DOG) and Difference of Offset Gaussian (DOOG) filters as our linear filters. The DOG filters used, respond to spotted regions and the DOOG filters used, respond to barred regions at different orientation. We use two different DOG filters to detect two different spotted regions and 6 different orientations of DOOG filters. The filters are shown in Figure 3. The response of a textured image to a single filter is shown in Figure 4. Notice that unlike other texture segmentation approaches we use filters at a single scale only (8 pixels wide). We do this because at higher scales, textured regions do not suffer from blurring artifacts and hence we choose not to use such regions for texture synthesis. Instead of half-wave rectification we apply full wave rectification after this step. Half wave rectification was used to replicate discrimination between textured regions and their negative versions. However, at small scales that we use, such discrimination is not quite necessary and we prefer to use full wave discrimination.

To replicate steps (2) and (3), instead of using inhibition and texture boundary detection we use a simple 9 pixels wide median filter. It is well known that the median filter suppresses weak responses in the presence of strong responses and still maintains boundary information. The median filter thus achieves both steps (2) and (3) in one step. The texture feature extracted for all pixels for a single oriented filter is shown in Figure 5.

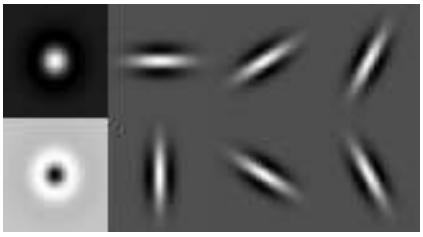


Figure 3: Difference of Gaussian and Difference of Offset Gaussian Filters

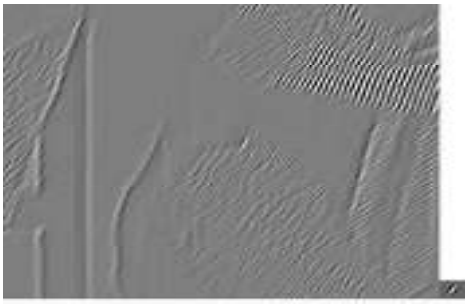


Figure 4: Image filtered using a single DOOG filter oriented at 60°

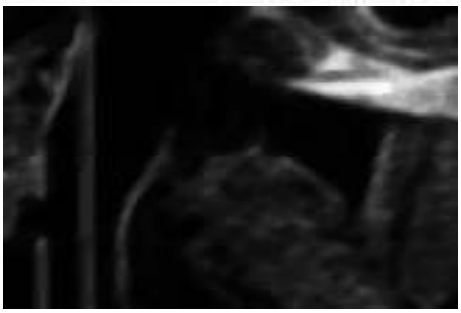


Figure 5: Texture feature for a single DOOG filter oriented at 60°

II. c. Feature dimensionality reduction: As we plan to use *k*-means clustering to segment the image, we need to understand the features we have extracted and how they will affect the computational time required by *k*-means. The *k*-means algorithm has a complexity of O(*cknd*) [10] where *k* is the number of clusters, *n* is the number of feature points, *d* is the dimensionality of the feature space and *c* is the number of iterations used which depends sub-linearly on *k*, *n* and *d*. We see that reducing the number of dimensions will immediately reduce the complexity of algorithm. Another motivation for reducing the dimensionality can be explained as follows. Consider an image with only spotted textures and blurred regions. In such a situation, the barred filters will have hardly any response to both the regions, and the response if any will be redundant as the spotted filters will already have a good response. In such a case we could effectively use only the spatial features, low-pass features and spotted filter response and still get a good segmentation.

This kind out feature dimensionality reduction can be done automatically using Principal Component Analysis [10]. We

find the correlation between features and find the eigenvectors of this correlation matrix. We then retain those eigenvectors for which the eigenvalues are greater than 5% of the maximum eigenvalue. Finally we project the features into this eigenspace to get final feature set. This is the feature space accurately represents image features using the smallest number of dimensions.

III. Segmentation: We use *k*-means clustering for segmentation. *K*-means for image segmentation suffers from the simple defect that spatially discontinuous regions might get classified into the same cluster. To rectify this defect we include spatial features into the feature set, as explained in the previous section. This scheme causes large regions to be split into smaller regions. However, this kind of splitting does not negatively affect the segment identification process unless it is excessive, so we continue to use *k*-means for segmentation. As noted in the previous section however, *k*-means is O(*cknd*) where *n* is the number of points to be classified. For a simple 256 by 256 pixel image, this means that we have to classify 65536 points into say k = 8 clusters. This takes around 5 minutes to do in MATLAB and as *n* is proportional to the square of image dimensions, for larger images this time becomes too large. To keep the computational requirements of the segmentation stage in check we propose to modify the *k*-means algorithm as follows.

III. a. Image segmentation using randomly sampled subset of pixels: We proceed on the basis of the following insight into segmentation. Consider the image shown in Figure 6a and its texture features (using a spotted filter) shown in Figure 6b.We can intuitively segment 4b into two regions, textured and untextured. Now consider Figure 6c which shows a randomly sampled subset of 4b. It is still possible to define a contour and segment the image similar to the segmentation in 4b. After this segmentation, if we consider all the remaining points, then they can be classified as textured or un-textured on the basis of this initial segmentation. Refining on this insight we derive the following algorithm.

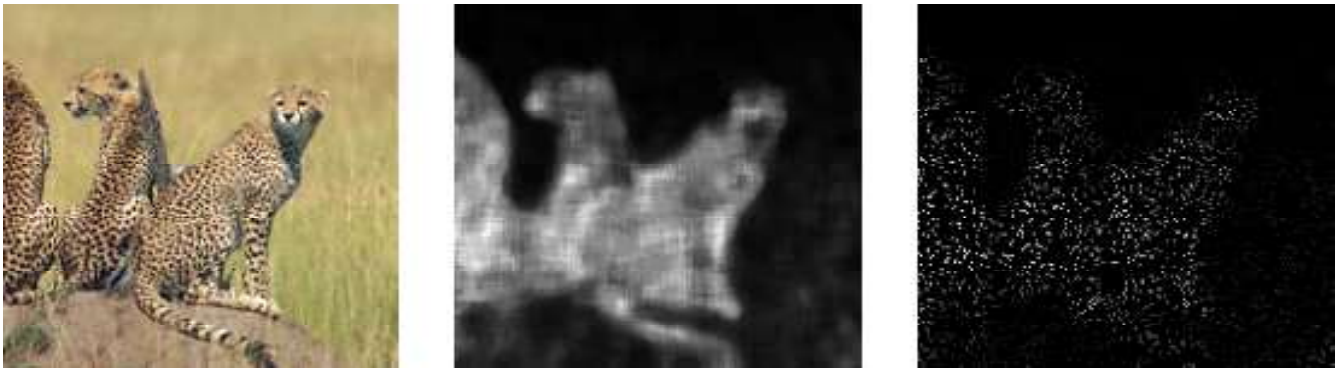
Randomly select 10% of the points of the feature space and use *k*-means to segment them into the required number of clusters. Then consider all the remaining points and use the centroids in the previous steps to classify them (assigning each point to its nearest centroid). Figure 7a shows an image segmented using this modified algorithm.

Figure 7: (a) Segments formed after segmenting image in Figure 1b using the modified k-means algorithm. (b) Segments after splitting disjoint segments.

III. b. Splitting disjoint regions: Notice that in spite of using spatial features in the feature set, there are still some disjoint regions which have been assigned to the same feature set. As a final step assign each disjoint region to a separate region. This is illustrated in Figure 7b.

IV. Identifying source and target regions: After the image has been segmented into different barred, spotted and blurred regions, we apply a simple rule-based heuristic to classify regions as potential blurred artifacts and their corresponding source regions (regions where texture has not been lost). This heuristic should be characterized by low false identifications. As a first stage in this process, we identify each segment derived from the previous section as 'textured' and 'non-textured'.

IV. a. Classifying segments as 'textured' and 'non-textured' As a first stage in this classification we derive a combined texture feature. To do this we apply the max operator to all



(a) (b) (c)

Figure 6: (a) Original image. (b) Response to single DOG filter (after rectification and median filtering). (c) Randomly sampled 10% pixels.

texture features for each pixel. The result of this operation is thresholded using an adaptively decided threshold. To find the threshold we use the graythresh function from the MATLAB image processing toolbox. This implements Otsu's algorithm [11]. Let $|A_i|$ be the number of pixels in the i^{th} region A_i, and let S be the textured region. Then all regions with

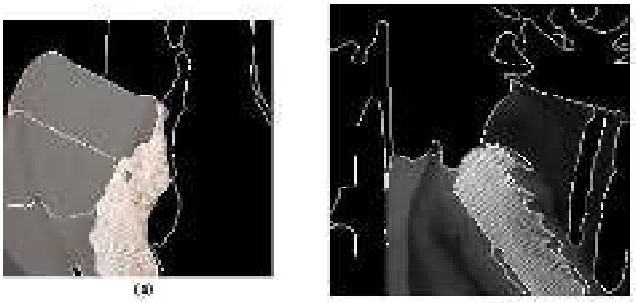
$\frac{|A_i \cap S|}{|A_i|} > 0.8$ are considered to be 'textured'.

IV. b. Rule based heuristic to classify segments as 'source' and 'target': We then construct an adjacency matrix for all textured segments. Let $|B_i|$ be the number of pixels in the boundary of region *i*. Two segments *i* and *j* are considered to be adjacent when $\frac{|B_i \cap B_j|}{|B_i \cup B_j|} > 0.5$ We then apply the following rule-based heuristic to classify segments as source and target and update the adjacency matrix.

for each textured region
  for each adjacent non-textured region
    if (adjacent region is "similar" to textured region)
      mark regions as potential source and target in adjacency matrix

The "similarity" criterion is chosen to be the mean gray level of the region. (Mean of each *r*, *g* and *b* plane for color images). If the difference between the means was less then an experimentally chosen threshold, then the regions were considered similar. Among the other similarity criteria considered was the χ^2 distance between the histograms of the two regions. This metric while seeming to be intuitively better, performed worse then the simple mean metric, but it is suspected that this was due to incorrectly setting the threshold for the histogram based method.

Some results of the post-processing procedure are shown below. Figure 8a shows the results of the algorithm for a color image (portion of "girl" compressed to an unknown ratio) while Figure 8b shows the results for a grayscale image (portion of "barbara" compressed at 1:94). As we see, the results are quite promising for color images. For grayscale images we notice that while the textured regions are quite correctly identified, the blurred artifact regions cannot be discriminated easily. The results are analyzed in the concluding section.



(a) (b)

Fig. 8. (a) Source and target regions identified for a color image (target regions shown half strength). (b) Source and target regions identified for a grayscale image.

V. Conclusion: Consider the results in Figure 8a and Figure 8b. As noted before, the results are quite good for color images, but improvements are still needed for grayscale images. To understand why this is the case, note that we have 2 extra dimensions when we are considering color images. Thus these three r, g, and b dimensions encode more information than the single grayscale dimension. Also note that in many cases, in natural images, different colored objects have textures and this boundary is exploited in our algorithm for colored images. For JPEG2000 coded grayscale images, it is quite difficult to find boundaries between blur artifacts and naturally smooth regions manually. This problem is even more difficult to tackle automatically. One useful cue that could be used is the contour cue, where smooth contours in images could be used as boundaries between regions having similar gray levels.

Among the possible future improvements could be using a better classifier than the k-means classifier used. The recently proposed k-harmonic means classifier [12] could be used to get better results. The normalized cuts method [13] for image segmentation is not plagued by problems like disjoint segments and splitting of large segments. While we avoided using this classifier in the paper due to its computationally intensive nature, the algorithm could be modified in a way similar to our modification of k-means by using random sampling of pixels. Such a method has been recently suggested in [14].

Better identification routines could be to identify source and target regions, instead of the simple rule based heuristic. A fuzzy approach could be ideally suited to this problem. Also while we have ignored contour cues in our paper, judging by the results on grayscale images, it seems quite important to include this information. The intervening contour framework suggested by Malik et. al. in [15] seems quite promising.

Finally, it should be possible to combine this method with a method which reduces ringing artifacts, to get even better results.

This approach to image post-processing is different from most usual approaches. The emphasis in our approach is on visually appealing results instead of criteria like PSNR. Thus there is also a need for a perceptual image quality metric.

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IMPACT OF ICT SKILLS ON WOMAN'S LIS PROFESSIONALS.

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Abstract: Information technology has profound effect on the progress and development of humancivilization. The advances in science and technology has made a tremendous improvement and changed all activities of present society. Due to revolution of information technology,increased tremendously demand, consumption, and importance of information in presentsociety. Woman LIS professional are changing their roles in modern library phenomena. Women's are participating very actively in all field of Information Communication Technology. Now days women's are also get ready to performing the efficient role in their professionals

Woman in society: Present Society has changing in very fast than new shape have given changes to every field of human activities in large scale. Earlier which is called traditional now days it called modernization impact of modernization things are appearing in the society as a face. Woman's are also involved in this process their routines are changed when consider her to only for family duties but now days she got freedom to perform her duties not only within the family she can select her own interested professional serving the society in best manner.

Present days women's are performing different activities in their professional,must of the activities are based on Information Communication Technologies without a perfect knowledge difficult to slawthe quires.In this era women are accepted the situation and created their own image in the society.

Science & Technology have impacted the society it not excepted to women also. New Technologies have making tremendous changes in the every human activity. Changes are natural in the nature rather than some changes are difficult to adopts immediately, in this crucial condition women involved herself& proved that she can able to every professional in present day. own identification in all around the country.Giving huge opportunities to play important role in the modern society Male dominated our society also realized the importance of professional women's sallowthe problems in using the new methods. Woman's are playing a very important role in development in all era of country & extended her services to all field (industrial, science & technology, educational etc…)

Impact of modernization is help full to develop her own qualities & skills to participating effectively and handle the problem in easiest way.

IMPACT OF ICT ON WOMAN: ICT stands for Information and Communication Technology. The focus was on increasing the participation and leadership of women in ICT and improving the lives of women through ICT.

Information needs and diverse information tools have affected our daily life as well as research and developmental activities. Latest devices for information communication have resulted in the expeditious dissemination of information and revolutionized the information handling activities in research and academic libraries in India. Academic libraries, mostly attached to universities and research institutions as centres of information services, have largely benefited by the rapid changes in technology. The advent of digital computer advances in telecommunication and audiovisual technologies has opened up new ways of collecting, organizing and disseminating scientific and technical information. Academic libraries have already transformed their specific functions by

utilizing effectively innovative information technologies to enhance and integrate their specific information resources and services. Eventually, library and information professionals in academic libraries need to update their knowledge and skills in information and communication technology (ICT) as they play the role of key success factor in enabling the library to perform its role as an information support system for society.

The role of information and communication technologies (ICTs) as a tool for all-around development has attracted sustained attention throughout the world. At the same time, it is the stark reality that the benefits of ICTs have been unevenly distributed within and between countries all over the world. Experience indicates that women are the worst sufferers in the process. Until and unless discrimination against women is addressed specifically, there will be every risk that ICTs would exacerbate existing inequalities between men and women. In developing societies the social discrimination trap is very strong – this highlights the ways in which men's and women's, girls' and boys' experiences of poverty differ. The World Economic Forum's Gender Gap Index for the year 2007, ranks India 114th among 128 countries. This index comprises four indicators, namely, economic, political, and educational and health subjects. All these four are intricately related to the status of women. Though the study of empowerment of women as a whole is not the present task, yet these parameters have to be referred because of their influence on overall empowerment process.

Mainstreaming the gender perspective is essential to achieve parity between men and women where mainstreaming is a process of assessing the implications for women and men in respect of any planned action in all areas and at all levels. Therefore, gender dimensions of ICTs in terms of access and use, their capacity-building opportunities, employment and engagement in productive works etc. are explicitly identified and addressed for deriving decent outcome. In general terms, this process is considered as engendering ICTs for the empowerment of women.

Woman's are growing up in a world that has changed sig-in cantle over the past ten years. They are comfortable around technology that they have known all their lives. The changes going on today create an opportunity and a necessity for a transformation in the education system. and in must be prepared for a future of continued rapid change. They are not the only ones who must be prepared for change. There have been great educational changes over the past ten years. "There is one role in education that has been forced to keep up with changes brought about by the information age, computers and the changes in society"

New face of Library: Developments in computers, microelectronics, and communication technologies have radically changed the library and information environment. Gone are the days of stand-alone libraries, in which a library was judged less by the quality of its resources and services than by the number of documents it had available. Traditional libraries were dominated by print publications and the access mechanisms were also by-and-large manual. The paradigm shift from stand-alone libraries to library and information networks, available via the Internet, can provide end-users with a seamless connection to Internet-based services. Moreover, we are surrounded by automated, digital, and virtual libraries as well as by networked data, specialized networks, and library networks. Multimedia and the Internet have further made the job of library and information professionals more challenging.

The development of new technology makes direct access to information easier for users, and, while information skills are required to collect and present that information, in the future there is likely to be less of a role for information workers as intermediaries between users and information sources.

Rapid revolutionary advances in ICT have now transformed the way information is gathered, processed, organised, accessed and disseminated to the user community. Today, the libraries are increasingly viewed as outdated and under rated with the use of modern webbased services. The pressure on libraries to modernise the way of delivering their services is now intense and more demanding. The user expectations on libraries to deliver high quality, comprehensive, user-friendly new generation services have grown tremendously in recent years. The survival demands change, updating and modernisation. Libraries need to change quite dramatically to modernise almost every aspect of their operations, information resources and services in order to meet the rising user's expectations of the modern world. As the world advances, the library must also evolve and redesign their activities in order to deliver highly quality, need based, and value added services according to the expectations of today's library users.

In a modern library, which is dynamic information storage and retrieval centre, the literature explosion in different disciplines, innumerable reading materials, in various formats including conventional and nonconventional are collected, processed and arranged systematically. Still user communities find difficulty in searching information due to lack of awareness about the collection and services. Training in the use of information tools is essential for every user for optimum utilization of resources available. The need to educate the users in utilization of resources has always been recognized. In the present scenario of computerization and IT applications in the libraries it is essential to orient the users in efficient use of these modern tools and to access information quickly.

Library & Information Science Professional: Information Technology is rapidly changing the whole world creating

new challenges and opportunities. Library and Information Service (LIS) profession is one of the most challenging professions in the knowledge society, combining expertise in information management with the Information and Communication Technology (ICT) competencies. ICT has tremendous impact on library operation, resources, services, staff and users. LIS Professionals are confronting challenging dynamic technological environment demanding the extensive and effective utilization of ICT in order to survive and meet the changing complex information needs of user community. The change is the law of nature. ICT is a driving force for change in library. Change is inevitable for the survival and success of any library in the changing technological world. LIS Professionals must develop expert technological competencies required to make best use of the opportunities, the ICT offers in order to provide a gateway access to wide range and variety of information resources and services.

The librarians are faced challenges to managing massive volume of information for storage, process, retrieve, and disseminate in libraries Rapid advances in Information Technology in the past two decades have brought revolutionary changes in the concept, organization, functioning and management of library and information systems through out the world. The modern technology has greatly improved the capabilities of managing this explosive growth of information effectively. Information technologies todayare characterized by their very dynamic development and increasing complexity. Information technology application in library and information field has made remarkable progress in the world. Information Technology not only affects the technical services of libraries but also shapes the library services that are being offered to the public. Worldwide libraries have been exploring new technologies for providing better and faster access to vast information resources and efficient information services to their users. Information Technology has offered better solutions to achieve greater level of efficiency, productivityand excellence services in libraries

SKILLS: Continuing Professional Development is an essential part of the modern library information professional's successful career planning & prospects**.** The LIS Professionals with better personal, professional and technological competencies have great opportunities and bright future in the modern libraries. Application of new ICT in to the libraries immediately requires improvement of different kinds of skills and knowledge in library information science professionals. Continuous staff training on emerging technologies is essential to learn, improve Professional competencies can be thought of as flexible knowledge and skills that allow the librarian to function in a variety of environments and to produce a continuum of value-added, customized information services that cannot be easily duplicated by others. They relate to the librarian's knowledge in the areas of information resources, information access, technology, management and research, and the ability to use these areas of knowledge as a basis for providing library and information services.

The technology is complex and librarians have not developed the skills to understand it, exploit it or create it. Those few who do have such skills find they have a very marketable commodity and can make a better living elsewhere. There is an urgent necessity to learn a great variety of professional competencies to accomplish the role of professional librarian in the constantly changing challenging web environment. Professional competences enable librarians to respond effectively and efficiently to the constant development of new technologies.

1} Managerial skills

•Strive for cost effective utilization of all resources of the library.

• Communicates the value of library and information services to decision makers

•Act as active and effective member of the senior management team and a consultant to the organization on information management issues.

•Understands and uses effective team process skills to realize the objectives, mission, and visionof the library

• Develops and implements policies and procedures for the efficient and effective operation of library functions

• Continually adjusts programs and services to respond to societal changes and service opportunities

2} Knowledge of Information Sources & services

• Develop specialised subject knowledge about the purpose of the organization

• Identify materials appropriate to customers' requirements and their abilities

• Expert knowledge in the content of information resources and ability to critically evaluate and filter them

• Develop and deliver convenient, easily accessible and cost effective information services to the users

3} Technology Skills

• Scans the environment emerging and forecast the future technologies that are relevant to libraryservices

• Use appropriate latest relevant technology to manage and deliver information services

• Continually develops skills in using latest relevant technologies

• Use technology to generate value-added products, such as bibliographies, databases etc.,

• Function creatively and innovatively in a Web-based environment.

4}Professional search skills

• Adequate knowledge about search process, search strategies, search techniques, search Engines and search technology.

• Capable of finding and evaluating the information resources best suited to user needs

• Expert knowledge in searching catalogues databases and web sources

5} Communication skills.
• Communicates the value of library service to decision makers, staff and users.
• Communicates clearly and respectfully with customers and colleagues.
• Demonstrates active listening skills with customers and colleagues.
• Effectively negotiate with publishers, customers, management & vendors

6} User Service
• Demonstrate a sincere commitment to user service
• Understand user needs and preferences for information
• Instruct in information gathering, literacy, research and technical skills
• Continually design and improve user oriented information products & services
• Deliver perfect customer service with confidence & competence

7} Commitment to Life-Long Learning
• Take responsibility for the development of one's own professional career
• Remain knowledgeable in current events and Technologies
• Pursues learning opportunities, personally or through formal training
• Flexible in adapting to new situations, systems, tools, environments
• Anticipates accepts, adapts and manages change effectively.

8} Other Skills
• Marketing and Promotion of Library Service
• Project Management skills
• Time Management Skills
• Digital rights management.
• Knowledge management skills.

9} Sources for Professional Competencies Development
LIS Professionals have a wide range of channels and ways to develop their professional competencies and manage changing technologies effectively. The important methods/ways for improving professional competences.

Impact of ICT on Library & Information Services.
1} E-resources : Present days Library have subscribing online resources it includes Books, Journals & all kinds of Library sources through Consortium. Library consortium is a group of two or more libraries which have agreed to co-operate with one another in order to fulfil certain similar needs, usually resource sharing. It usually, refers to co-operation, Co-ordination and collaboration between, and amongst libraries for the purpose of sharing information. Consortia are basically, evolving a form of cooperation among the libraries which come together to share resources electronically. It has gained momentum even in developing countries like India. Some of the successful library consortia setup so far in India.

2} Internet and E-mail Services: Libraries are providing Internet facility to the users such as faculty, participants of the training programmes/workshops/seminars/conferences and research scholars. It is a suitable medium for accessing, selectingand using resources through web site. Libraries are using Internet for all activities such as acquisition, classification, cataloging, resource sharing, reference services, database access, user education etc.Through E-mail services the user can request for inter library loan, document delivery services etc. Thereare number of bibliographic databases available on the net. Most online search services like DIALOG/ESA/IRS and STN have been offering document supply services to the users. In order to search andbrowse the library catalogue, the end users can transmit orders or request directly from the web OPACs.Several libraries are offering digital reference service using chat software, line interactive communicationactivities etc.

3} CD-ROM Search Services: Library provides abstracting and indexing services through CD-ROMs which are best, powerful and costeffectivetool for information storage and retrieval. Information that can be stored and retrieved in a CDROMcan be of different forms like textual, audio, and video. Many libraries subscribe CD-ROM databasesand information packages, which are not only minimizes the subscription costs, but also facilitates quickspeedy search strategy to researchers.

4} Network Services: The networking can be defined as the combination of more than one computer, which is interlinkedtogether for data communication. Computer networks plays an important role in activities of libraries andinformation centres, information services like reference services, CAS,SDI, Computer assisted learningand user education are feasible with the help of computers beside the house keeping operations.

5}OPAC: OPAC provides public enquiry terminals thereby bringing about considerable improved literature andinformation available on the Internet.

6} News Papers: Several newspapers have been made available on the web. They can be accessed with the subject,Title, Date, Language, Name of the author etc. In addition to News Papers the Government publications,latest G.Os and amendments can also obtained from web sites of individual agencies of such as GPO.

7} Journals: Now a day's most of the libraries and information centers are maintaining electronic aids which consistof lists of electronic data bases and e-journals on their website a part from the online catalogue. Usefultextual matters of certain journals will be down loaded on going through content pages by the scholars fortheir research work

8} Resource Sharing: The development of electronic information network and Internet in particular has provided a wide rangeof opportunities in sharing the access of information. Resource sharing is a way to maximize usersatisfaction at lower cost. Conduct user orientation programmes to tap the resources of various institutions.

Conclusion: Library professionals have to face many complex challenges, make use of the technological opportunities and respond to all these changes positively. LIS professionals with latest technological competencies are in great demand. They have great opportunities and bright career prospects as long as they improve their professional and technological competencies and grab them. Otherwise, it becomes even difficult to survive in the modern libraries. Those professionals that anticipate and embrace change constructively, creatively and intelligently will be the ones, who are most likely to survive, prosper, develop and succeed rather than decline and suffer in the future. LIS professionals need vision for modern professional skills and technological competencies in order to have bright future in the 21st Century.

LIS professionals face complex challenges posed by rapid revolutionary advances in ICT. Libraries have to redesign their positions to meet evolving needs. Librarians need to implement new practices and new technologies, manage change, and improve performance and competencies to face future challenges of knowledge society. They need to develop professional competencies to adapt changing technologies in order to deliver timely, value added quality content and world-class services to the users from their desktop. Library information professionals have to recognize the expanding nature of the technological changes and professional challenges that they face in the modern world and realize to improve the range of professional competencies required to adapt and manage the changing technology successfully. The challenges represented by these competencies must be seized and acted upon today in order to ensure that librarians have better future in the twenty first century. LIS professionals must strive, struggle and improve new skills and knowledge about new technologies that will be needed to provide responsiveLibrary Information Services to the users in the twenty first century.

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INTRODUCTION TO AGRICULTURAL TECHNOLOGY

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Why Agriculture needs to be improved?

Agriculture needs to produce more food because the world's population is growing.

That's certainly true, and many companies, governments and organizations—has been working to develop seeds and other systems that help farmers grow more.

World doesn't just need more food. It also needs better food that's more nutritious. And it needs to find ways to make the process of growing food more efficient and aligned with our environmental needs.

A growing debate!!!: Agriculture affects all of us, directly and indirectly. It affects us directly through the food we eat and it affects us indirectly through its relationship to the environment, the use of natural resources and the global economy Even though farmers grow a lot more than food (such as cotton for clothes and corn and grass for fuel), we think it's a good thing consumers are increasingly interested in understanding where their food

Agriculture Technology: Agricultural technology refers to technology for the production of machines used on a farm to help with farming. Agricultural machines have been designed for practically every stage of the agricultural process. They include machines for tilling the soil, planting seeds, irrigating the land, cultivating crops, protecting them from pests and

weeds, harvesting, threshing grain, livestock feeding, and sorting and packaging the products.

Role of Information Technology in Agriculture in India : Information Technology (IT) has a major role to play in all facets of Indianagriculture. In addition to facilitating farmers in improving the efficiency andproductivity of agriculture and allied activities, the potential of IT lies in bringingabout an overall qualitative improvement in life by providing timely and qualityinformation inputs for decision making. The personnel who work for the welfareof Indian farmers, such as extension workers, do not have access to latestinformation which hinders their ability to serve the farming communityeffectively.

IT Components used in Indian Agriculture

Ø **Input Devices:** The advent of touch screen monitors that allow users to give input to computers bytouching on the appropriate location of the monitor has made it possible to developuser-friendly interface for farmers which is easy, intuitive, circumvents language barrier andat the same time provides a relaxed environment to the users. The present day digital camerasmake it possible to capture and store good quality graphics and large video clips. The smallsize and low weight of these digital cameras, which are increasingly becoming affordable, open up the possibilities of providing computer based demonstration clips to educate thefarmers. The digital cameras can also be used to upload plant stress related images, movieclips which can facilitate an expert residing at a far of location to quickly recommend asolution

Ø **Output devices** : The qualities of these output devices like printers, plotters, data projectors, have the potential of generatingrenewed interest in the farmers in using IT based services. The portable data projectors can be easily carried by the agricultural extension personnel for serving largeraudience. Likewise speakers can also be attached to the computers to incorporate voicebased trainings for farmers

Ø **Networking devices** : The capacity of modems, used to convert the data from digital to analogand vice versa, which are popularly employed to use telephone lines have increased. Internalmodems are available integrated into the computer so that they are not exposed to outsideenvironment. The capacities of other networking devices such as routers have also gone upwhich makes it possible to create large networks with smooth data transmission

Ø **Other accessories** : Uninterrupted Power Supply (UPS) devices are crucial to ensure thelongevity of the IT equipment as well as provide backup mechanisms. The potential of solarpower packs to provide a feasible solution to shortage of power in the rural areas needs to beexploited.

Information technology (IT) can bebroadly classified under two sections: Tool for direct contribution to agricultural productivity Precision farming, popular in developed countries, extensively uses IT to makedirect contribution to agricultural productivity. The techniques of remote sensing using satellite Technologies, geographical information systems, agronomy and soil sciences are used to increasethe agricultural output. This approach is capital intensive and useful where large tracts of land areinvolved. Consequently it is more suitable for farming taken up on corporate lines.

The indirect benefits of IT in empowering Indian farmer are significant andremain to be exploited. The Indian farmer urgently requires timely and reliable sources ofinformation inputs for taking decisions. At present, the farmer depends on trickling down ofdecision inputs from conventional sources which are slow and unreliable. The changingenvironment faced by Indian farmers makes information not merely useful, but necessary toremain competitive.

Various technologies used in Direct Farming

Tractors on autopilot GPS tractors combines, sprayers and more can accurately drive themselves through the field. After the user has told the onboard computer system how wide a path a given piece of equipment will cover he will drive a short distance setting A & B points to make a line. Then the GPS system will have a track to follow and it extrapolates that line into parallel lines set apart by the width of the tool in use. These systems are capable of tracking curved lines as well. The tracking system is tied to the tractor's steering, automatically keeping it on track freeing the operator from driving. This allows the operator to keep a closer eye on other things. Guidance is great for tillage because it removes human error from overlap, saving fuel and equipment hours. Trust me when I tell you that once you starting auto tracking, you'll never go back manual steering.

Smartphone Irrigation: Mobile tech is playing a big role in monitoring and controlling crop irrigation systems. With the right equipment a farmer can control his irrigation systems from a phone or computer instead of driving to each field. Moisture sensors in the ground are able to communicate information about the level of moisture present at certain depths in the soil. This increased flexibility allows for more precise control of water and other inputs like fertilizer that are applied by irrigation pivots. Farmers can also combine this with other tech like VRT mentioned earlier to control the rate of water applied. It's all about more effective and efficient use of resources.

Swath control and variable **rate technology:** The savings come from using fewer inputs like seed, fertilizer, herbicides, etc. Since the size and shapes of fields are irregular you are bound to overlap to some extent in every application. Thanks to GPS mapping the equipment in the field already knows where

it has been. Swath control shuts off sections of the applicator as it enters the overlap area, saving the farmer from applying twice the inputs on the same piece of ground.

VRT works in a similar fashion. Based on production history and soil tests a farmer can build a prescription GPS map for an input. By knowing what areas of a field are most and least productive the application rate of an input like fertilizer can be tailored to increase or decrease automatically at the appropriate time. This is a big benefit for farms. Instead of applying a set rate of fertilizer over the entire field (many times a high rate to help those low producing areas) an operator can now apply a rate most effective for a particular section of ground.

Telematics: This technology allows equipment to talk to farmers, equipment dealers, and even other equipment. Imagine you have a problem in the field and have to stop working. With telematics your dealer can access the onboard diagnostic system of your tractor. Depending on the problem they might be able to fix your equipment right from dealer. No waiting on a mechanic to drive out to wherever you might be. You're back to work, and the dealer saved a trip too. Farmers will be able to keep track of what field equipment is in, fuel consumption, operating hours, and much more. Personally I've noticed on our farm as we become more technologically advanced our downtime is often caused by electrical, software, or hardware problems as opposed to mechanical.

Livestockmanagement

Collars developed for livestock are helping producers keep track of their herds. Sensors in the collar send information to a rancher's smartphone giving the rancher a heads up on where a cow might be, or maybe she's in some sort of distress, or maybe just in the mood for some mating. I suppose you could say it's kind of like telematics for cows!

RFID tags are also a handy device for livestock management. The information kept on a tag helps producers keep track of individual animals, speeding up and making record keeping more precise. I recently read about RFID tags placed in to hay as it is baled. Data such as moisture and weight can be stored in the tag to be scanned later.

Field documentation: Because of onboard monitors and GPS the ability to document yields, application rates, and tillage practices is becoming easier and more precise every year. In fact farmers are getting to the point where they have so much good data on hand that it can be overwhelming to figure out what to do with all of it.

And of course, every farmer's favorite form of documentation is the yield map. It sums up a year's worth of planning and hard work on a piece of colorful paper. As harvesting equipment's rolls through the field it calculates yield and moisture as it goes tying it in with GPS coordinates. When finished a map of the field is printed. These maps are often called heat maps. I liken then to weather radar maps. Each color on the map relates to a certain yield range. Now the farmer can see what varieties had the best, worst, or most consistent yield over varying conditions. Maps like this can tell a farmer how well a field's drainage system is working. (In case you weren't aware, there is a massive network of private and public drainage at work underground on farms.) All this data allows for better agronomic decisions in the future.

Don't forget to flush: An automatic system uses water to flush manure away from the cattle into a holding area where all the solid matter dries up. After it dries the solid manure can be picked up and further processed.

The liquid manure continues on into another area. From here it can be pumped out and used to fertilize Ray's crop or it can be sent back in to flush out more manure. A metering device lets him know exactly how much liquid is used so that just the right amount is placed on the crops. Excess nutrients are at risk of reaching groundwater, but Ray is all over that too. Irrigation runoff is captured in ponds and is recycled over and over again in the system.

Ultrasounds and more for livestock: They aren't just for checking on baby animals in the womb. Ultrasounds can be used to discover what quality of meat might be found in an animal before it goes to market. DNA testing helps producers identify animals with good pedigrees and other desirable qualities. This information can then be used to improve the quality of the herd which helps the farmer improve his bottom line.

There's an app for that : Farmers are using all the social media sites for all types of reasons. Some are using apps like foursquare to keep tabs on employees. Apps can control irrigation and grain storage systems.

Even the camera can be put to work on the farm. If you think you might forget how something goes back together after you take it apart take a picture of it assembled. GDDs are an index based on temperature that gives a grower an idea of how mature a crop may beLoad Out technology: Technology where we want to load grain into a truck without getting out of the cab

Smile for the camera : Putting up cameras around the farm is a trend that's catching on. We have a rear-facing camera on the back of the combine that shows up on a monitor in the cab. I can think of all kinds of places to put cameras on large pieces of equipment to help eliminate blind spots. Our grain cart is wide enough that you can't see around it so I'd like to have one out back to I know if I'm holding up traffic when driving from field to field. Another idea would be to have a camera or two looking at the implement behind the tractor.

Craning your neck around left and right all day to look behind you gets a little painful after a while.

Livestock managers are wiring up their barns, feedlots, and pastures with cameras that send images back to a central location like an office or home computer. They can keep a closer eye on animals when they are away or home for the night. Cameras to monitor cows during calving season to hope is that by being able to watch the cows during this critical time they can lessen the chance of calves being born outside on those well below zero nights.

Sensing how your crop is feeling: Crop sensors. This is taking variable rate technology to the next level. Instead of making a prescription fertilizer map for a field before you go out to apply it, crop sensors tell application equipment how much to apply in **real time**. Optical sensors are able to see how much fertilizer a plant may need based on the amount of light reflected back to the sensor. I haven't seen one of these systems in operation yet, but I'm keeping a close eye on them. It's fairly new and pretty expensive, but I see huge potential here. Crop sensors are going to help farmers apply fertilizer in a very effective manner, maximizing uptake and reducing potential leaching and runoff into ground water.

Indirect tool for empowering farmers to take informed and quality decisions whichwill have positive impact on the way agriculture.

Awareness Databases :The implications for all the stake holdersand the time frames are to be spelt out. This is a priority item which is to be addressedimmediately. The mandatory changes in government policies on tariffs, imports, yearwisephasing of the same, the impact on various subsidy schemes would be of concern to people. An area of immediate concern to farmers is to get an analytical input on howhis/her life is going to be affected. Since removal of restrictions throw open Indian agriculturalmarkets, the macro economic situation related to foreign exchange, inflation, the current tariffstructure within and outside the country etc. and their likely impact on Indian agriculture willhave a direct bearing on the decisions of segments of Indian agriculture

Decision Support Systems: Indian farmer is cautious and usually tends to avoid risk. In order to take advantage of the emerging order, the enterprising Indian farmer needs to beequipped with information that facilitates undertaking a proper analysis.

The data on cost of cultivation, efficient agricultural practices and availability ofinputs will facilitate in assessing the strengths of products also with the imports. In theemerging scenario, competitive advantage is required to be fully exploited to improve exportpotential.

India is believed to have competitive advantage in areas like fruits, oil seeds, cotton,milk products. Special thrust may be accorded to these sectors to meet international standards.

Opportunities for specialization may lead to better export potential. Similarly, forecasts on threatsin terms of information related to cheaper imports, macro-economic conditions of other countriesare also required

Systemsthat facilitate Indian farmers to forge appropriate alliances for collective benefit, The size of land holdings is a major barrier in exploiting any export potential. In order to remain competitive and derive better price realizations, it will be necessary for the farmers to come together through cooperative alliances. It is possible to relieve the farmers of geographical barriers by facilitating farmers to come together online and facilitate disposal of their produce at attractive prices. Online bidding can be introduced for various agricultural product categories. This will require development of complicated IT systems which are to be supported by proper bricks and mortar infrastructure and post-harvest technologies, storage, etc.

Informationon new opportunities : It is necessary to equip Indian farmers to come together for value additions to their agricultural output. This will get them better returns from their produce and at the same time generate new employment opportunities in the rural sector. This will require systems to provide information to farmers on agro processing industries, aqua culture units, animal husbandry, floriculture, etc. Monitoring systems for corrective measures.

Since the domestic agricultural scene is exposed to international fluctuations, it is necessary to be vigilant to external shocks. Systems to monitor international market status, international supply - demand scenario, macro-economic factors, political disruptions are required to be developed. Advance warning systems to alert the farmers are required to be developed. It is necessary to promote monitoring cells in all major institutions related to agriculture and allied activities to maintain data, provide periodic analytical reports and raise advance alerts.

So now we are up to speed on some of the latest and greatest things going on in agriculture. It's all about more data, efficiency, and precision. Farmers have a lot of awesome stuff to help them produce a bountiful harvest. So long as Mother Nature chooses to play along. She'll come up with at least one monkey wrench each year no matter what you do, but that goes with the territory.

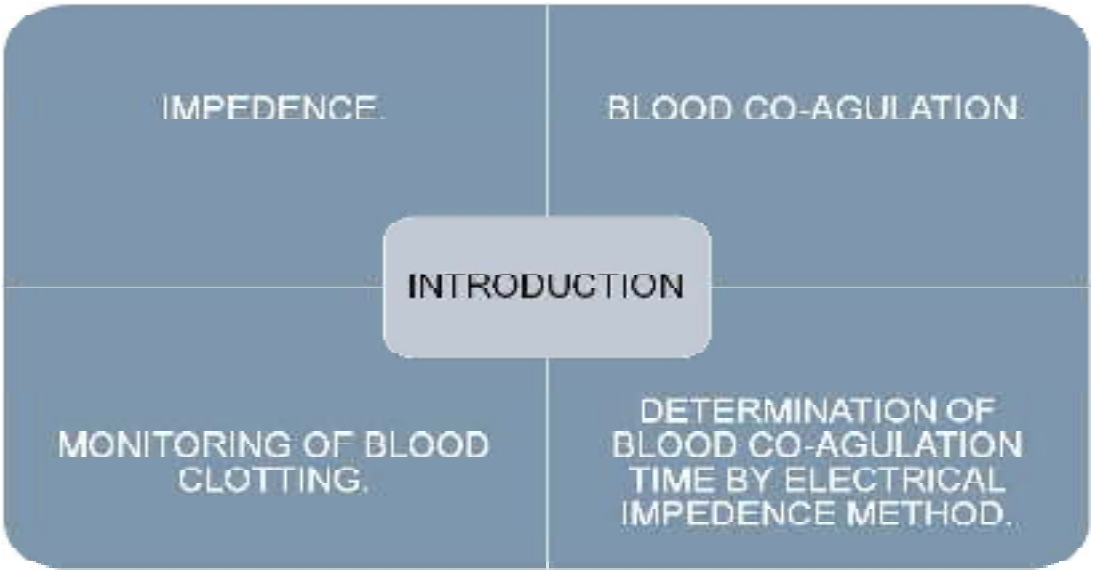
Statistics

Top 5 Countries by agricultural output in the World

China	**911**
India	**343**
European Union	**310**
United States	
Indonesia	**179**
Brazil	**128**

MEASUREMENT OF THE IMPEDENCE OF THE HUMAN BLOOD DURING CO-AGULATION

BHARATI SUGURKAR.
PG Schoalr, Raichur



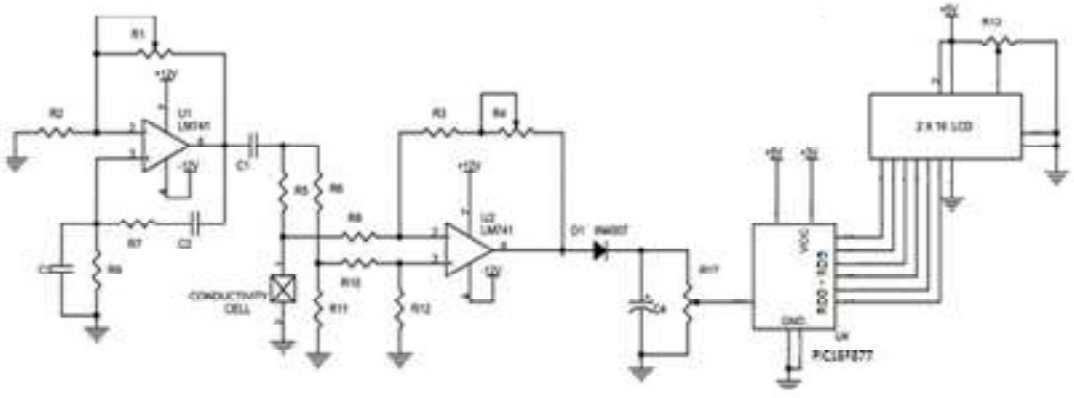
IMPEDENCE (Z)

- A measure of the total opposition to current flow in an alternating current circuit, made up of two components, ohmic resistance and reactance, and usually represented in complex notation as $Z = R + iX$, where R is the ohmic resistance and X is the reactance.
- It can also be defined as an analogous measure of resistance to an alternating effect, as the resistance to vibration of the medium in sound transmission.

BLOOD CO-AGULATION

- Blood coagulation is an extremely complicated and dynamic physiological process.
- Monitoring of blood coagulation is essential to predict the risk of hemorrhage and thrombosis during cardiac surgical procedures.
- The electrical impedance measurement for the definition of blood coagulation process provides a fast and easy measurement technique.
- Disorders in blood coagulation may lead to serious pathological complications, such as hemorrhage, thrombosis, and embolism in the vascular system.
- In cardiac surgical procedures, monitoring of blood coagulation is essential to predict the risk of hemorrhage and thrombosis.
- Continuous measurement of the blood coagulation process can ensure that the patient is effectively treated with an anticoagulant to avoid blood clots.
- Among the different detection methods, it was reported that electrical impedance measurement is the best method for whole blood coagulation time measurement.

Circuit explaining the methodolog



DETERMINATION OF BLOOD CO-AGULATION TIME BY ELECTRICAL IMPEDENCE METHOD

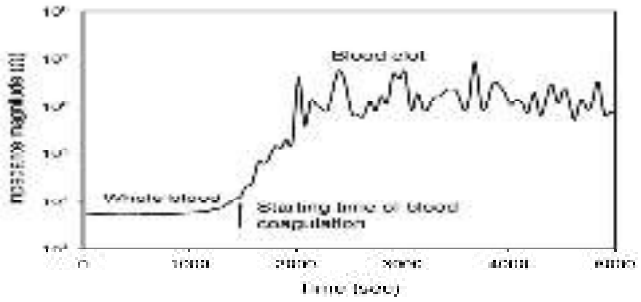
In the proposed experiment the measurement of electrical impedance of blood is carried out by subjecting the sample to an AC source of emf 0.1 volt at 1000 Hz frequency.

The corresponding voltage and current are monitored at different time intervals.

Now impedance Z is calculated for each voltage and current value.

- From this measurement it is observed that , initially the impedance of the blood is minimum.
- As the time elapses the blood coagulates and impedance of blood goes on increasing and becomes almost constant when blood coagulates fully.

Graph



• Blood coagulation process represented by the impedance magnitude at 1000 Hz.

Results

- The impedance spectrum of the whole blood was first studied using the microfluidic chip.
- In the study of blood coagulation process, impedance magnitude at 1000 Hz is measured with time.
- Since the impedance magnitude at 1000 Hz of the blood is composed of the impedance contributed from plasma and cells, it is defined to represent the blood coagulation status for the investigation of the blood coagulation process.
- Result reveals the rapid formation of fibrin during the coagulation cascade, which can be monitored by the impedance change. Moreover, the starting time of the blood coagulation is defined at the impedance magnitude which is 2 times the impedance of the whole blood.

Conclusions

- Blood coagulation time was determined by the electrical impedance of the blood sample, which showed a promising technique to quantify the blood coagulation process.
- Electrical impedance determination of blood coagulation time provides a fast and easy measurement compared with the conventional analysis techniques. This work is found valuable for the development of clinical equipment for routine coagulation tests.

"CURRENT STATUS OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) IN AGRICULTURE WITH SPECIAL REFERENCE TO PLANT PROTECTION"

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Abstract: Pests, basically herbivorous insects and microbial diseases, have always plagued agriculture; the number of problems having multiplied following modernization. Total crop losses, even suicides by farmers have been attributed to pests. In spite of development of several effective solutions by academic institutions like the Universities and Research Institutions on these biotic stresses, the adoptability by the farmer has always met with poor compliance mainly due to ineffective penetration. In addition to this weak knowledge about the nature of biotic stress not only by the famer but also the extension personnel of the line department have resulted in poor management strategies. Attempts to develop linkages through print media, radio and television are far from satisfactory. With the rise in satellite-based communications, mobile telephony and the World Wide Web, there have been noteworthy efforts made to develop new kinds of linkages. With the growing range of mobile ICT applications, such as web-capable mobile phones, handheld computers and global positioning systems (GPS), IPM practitioners will be able to access relevant information anywhere, at any time. This may inspire insect informatics experts to create IPM information and products that are relevant for specific locations at particular times. As a result, we can believe that in the near future more web based intelligent information systems will be developed that will allow users to access real-time online information that is

relevant to their need, rather than the technology-driven products that are currently available.

Keywords: Agriculture, Information communication technology and plant protection.

Introduction: India is one of the biggest and strongest agro-based nations in the world. Inspite of an alarming increase in the population, it has managed to attain self sufficiency in agriculture, thanks to green revolution and sustainable agriculture. However, looking into the total area under cultivation, achievements made in agricultural productivity are far below the desired levels. One of the major constraints facing Indian agriculture is the deficiency in transfer of relevant knowledge from National Agriculture Research System (NARS) and State Government Agriculture Departments to the small and marginal farmers who form bulk of the nation's agricultural population. Hence, farmers are deprived of timely availability of latest technology and support leading to considerable economic loss, distress and suicides in extreme cases. Further, there exists a huge gap between farmers and agricultural scientists and extension agencies involved in technology development and transfer activities. Under such circumstances, innovative Information Communication Technologies (ICTs), can play a major role in bridging this gap.

Agriculture Knowledge Management (AKM) helps in creating knowledge repositories, improving knowledge access, sharing and transfer, and enhancing the knowledge environment in the rural communities. ICTs can make AKM more effective by providing agro-information services that are affordable, relevant (timely and customized), searchable and up-to-date. ICTs is an umbrella term that includes computer hardware and software, digital broadcasting and communication technologies, digital information repositories and internet, television, radio, mobile phones, and the policies and laws that govern the use of these devices and media. The intrinsic and instrumental importance of ICTs in AKM is such as to make it a significant factor in the future competitiveness of agriculture in the global economy. The experience of rural tele- centers in the developing world shows that ICTs can help intermediaries to gather, store, retrieve, adapt, localize and disseminate a broad range of information needed by rural communities. Though tele-centers are beginning to dot the Indian rural landscape, they lack agro-content in local language and quick delivery of the information that is of immediate use to them. The role of ICT to enhance food security and agricultural livelihoods are widely recognized and discussed world over.

On the contrary, the strong ICT sector in India, with rural broad band connectivity in the offing provides a great opportunity for developing effective AKM systems. However, at present, the conventional agricultural extension and farmer-outreach programs in India face major challenges such as quick and timely outreach, solutions tailored to needs of individual farmers and cost effective outreach.

Pests, basically herbivorous insects and microbial diseases, have always plagued agriculture; the number of problems having multiplied following modernization. Total crop losses, even suicides by farmers have been attributed to pests. In spite of development of several effective solutions by academic institutions like the Universities and Research Institutions on these biotic stresses, the adoptability by the farmer has always met with poor compliance mainly due to ineffective penetration. In addition to this weak knowledge about the nature of biotic stress not only by the famer but also the extension personnel of the line department have resulted in poor management strategies. Attempts to develop linkages through print media, radio and television are far from satisfactory. With the rise in satellite-based communications, mobile telephony and the World Wide Web, there have been noteworthy efforts made to develop new kinds of linkages.

Information Communication Technology (ICT): Introduction of ICTs during 1990's in different parts of the country has demonstrated the positive impact on the lives of the rural people. The integration of ICT can help or enable extension professionals to gather, store, retrieve and disseminate a broad range of information needed by the farmers. Thus, transforming them from extension workers to knowledge workers. As a result ICT helps the extension system in re-orienting itself towards the overall rural development or production systems. With the appropriate knowledge, small scale producers can even have a competitive edge over larger operations of small producers. ICT can also play an important role in bringing about sustainable agricultural development. When used to document both organic and traditional cultivation practices. Thus, IT could act as a bridge between traditional and modern knowledge systems. In this, context, this paper address the following:

ICT IN AGRICULTURE: Agricultural Development services that can be provided using ICT are:

- Online information on education, training and consultation.
- e-commerce direct linkage between local producers, traders, retailers and suppliers.
- Facilitation of interaction among researchers, extension workers (knowledge) and farmers.
- Question and answer services (Kissan Calls) where experts respond to quires on specialized subjects.
- Up to date information to formers about package of practices, market information, weather forecasting, input supply, credit, availability etc.,
- Provision of early warning system about disease / pest problems, rural development programmes and crop insurances etc.,
- On line registration services
- Marketing of milk and milk products.

• Increased efficiency of co-operatives thro computer communication network.
• Tele-education to formers
• Websites established by Agril. Research institutions on latest information to extension workers.

Evidences : Soumyashree (2007) cites, most of the calls in KCC were related to plant protection, seeds availability and Marketing. Further, more calls were from Malanadu- (shimoga) least were from Coorg (Hilly area). Awareness among farmers about toll free call number 1551 was medium. Karthekeyan (2006) cites, most of the calls were from Erode, less from Nilageris (in Tamil nadu). All the calls were handled at level I no calls for level III in one year period. KCC were ill equipped. Only one telephone line, without conference facility.

Savithramma (2011) has Investigated the temporal and spatial distribution of KCC calls during 2010. It was found that maximum number of calls were from Gulbarga (2509), Belgaum (2230), Tumkur (2055) and Kolar (1949). Least was fromCoorg (300). Further, the querywise calls attended by Level I officials in KCC were related to Disease control (23.77%), pest control (12.52%) and varieties (14.46%)

K-RIAD (Kiosk for Rural India Agricultural Development)
An Interactive Kiosk is a computer terminal featuring specialized hardware and software designed within a public exhibit that provides access to information and applications for communication, commerce, entertainment, and education. Early interactive kiosks sometimes resembled telephone booths, but can also be used while sitting on a bench or chair. K-RIAD is a agriculture model which will be beneficial to farmers so Agricultural backbone countries like India it will be more useful by this farmers can aware of present trends and agriculture technological changes around the world and they can update them according to the changes by usage of K-RIAD efficiently and effectively.

Subrahmanyam et al., 2012

e–AGRICULTURE PORTALS
ICTs Applications in India
1. Government Initiatives: Agrisnet, Agris, Agmarknet, Dacnet, Vistarnet, Aphnet, Fishnet, Hortnet Seednet, Ppin, Coopnet, Fertnet, Arisnet, Afpinet, Arinet, Ndmnet, etc, with their independent websites
2. State Government Supported: Rajasthan- Jan Mitra, Gujarat-GAU-SAT-KRU, M.P.- Gyandoot, Maharashtra-Maha-Agrinet, A.P.-Rural e-Seva, Karnataka-Rhythu Sampark Kendras and Bhoomi, Kerala- Kissan Kerala, Akshaya Kendras
3. Corporate Sector Initiatives: e-Chaupals of ITC-IBD, Tata Kisan Kendras of Tata Chemicals, Parry's Corners of EID Parry and Chirag Kendras of n-Logue
4. NGOs and other private Sector: Information Village-MSSRF, Drishti.com, Agriwatch.com, TARA Kendras.

For Agricultural Marketing
• Domestic and Market intelligence cell
• Krishi Maratha Vahini
• Bhav puchiye
• e – Choupal: The ITC Company has set up about 6500 e-choupals in 40,000 Indian villages, and is targeting to set up 20,000 e-choupals in one lakh villages by 2010 These e-choupals were initially operated by persons like village panchayat pradhans, village teachers and postmen, who acted as sanchalaks. Now a number of educated farmers also act as sanchalaks. Marketing Channel Public-Partner-Participation\concept (PPP) WORKING:Madhya Pradesh, Haryana, Uttarakhand, Karnataka,Andhra Pradesh Uttar Pradesh, Maharashtra, Rajasthan, Kerela and Tamil Nadu,
• i – kisan: is a comprehensive Agri Portal addressing the Information, Knowledge and Business requirements of various players in the Agri arena -Farmers, Traders and trade channels etc
• APEDA: APEDA, with the funding support of GoI-UNCTAD-DFID has set up a portal named "Indian Agri Trade Junction" as a part of APEDA website

ICT IN PLANT PROTECTION
a-AQUA (Almost All Questions Answered): a- AQUA is a multilingual online question and answer forum. It is developed by Developmental Informatics Laboratory (DIL) of IIT-Bombay sponsored by National Agricultural Innovative Project (NAIP), Media – Lab Asia, Development Gateway Foundation and Pan Asia ICT R&D grants. This portal is supported by Agrocom, III-Bombay, KVK Baramathi, Vigyan Ashram, UAS Dharwad/Raichur and KVKs and GBPUAT Pantnagar and its KVKs.

a-AQUA provides online answers to questions asked by farmers and agriculture professionals engaged in agriculture, animal husbandry and agri business over the internet. a–AQUA service was started in the kiosks and cyber cafes in Pune district during 2003. Today, this portal receives questions from all over the country and with about 66% from Maharastra and 33% from other parts of India and abroad. Currently questions can be asked in English, Hindi, Marathi, Kannada and Telugu.

Questions can be posted on the specific topics such as Crop, animal and others. Any questions related to agriculture and horticulture crops can be posted in crop forum. Similarly, questions on animal husbandry like dairy, sheep, goat, poultry and piggery farming can be asked in animal forum. Other agri related questions like past and present market price of various agricultural commodities, ongoing farmers' schemes can be asked in others forum.

a-AQUA is now one of the modern technologies which can reach each and every section of the farmer in each and every corner of the country. Farmers have to make use of this technology in solving the day today problems in agriculture.

The agropedia: The agropedia (www.agropedia.iitk.ac.in) platform was developed by a team of experts at IIT-Kanpur in

collaboration with ICRISAT, UAS Raichur and GBP University. It allows content contribution by any member of the NARS institutions in India or even abroad. It has built-in features and processes that enable contributions to be reviewed or edited and released for publication after a review process is complete. A group of editors and contributors can manage the process of review or validation from across many centers and locations. A wide range of content can be considered and can include multimedia elements such as audio, video or animations besides text and images.

Content in agropedia can be contributed in one of two streams: the Gyandhara is a stream of content that is created, reviewed and published by a community of experts. Content in Gyandhara is certified. The other stream is the Jangyan which allows practitioners to place relevant and appropriate content in an interaction space, without any certification by experts. In the parlance of today's KM, the agropedia allows both explicit (expert-sourced) and tacit (practice-based, more personal) knowledge to be made available for browsing by all the stakeholders.

At this stage, agropedia focuses on content meant to support extension processes although the technology involved can support educational or research publication processes as well. Standard online tools such as Wikis, Blogs and Discussions Forum applications are available on this platform. It is entirely in the Open Source domain.

The Semantic Web Approaches and Crop Knowledge Models: The team at IIT-Kanpur has enabled the application of the new, cutting-edge technology, called the Semantic Web, in this effort. This technology, first conceived of by Tim Berners-Lee, the inventor of the World Wide Web, overcomes many serious limitations on information discovery in today's web. It proposes a radical set of solutions that involve the knowledg e of subject matter specialists in various domains. Such experts generate a codified system for tagging information pieces and this system can be rendered global much in the way the librarians have been using globally accepted classification schemes. Once available both new and existing digital information pieces can be tagged and the tagged materials can be located more easily and in a way that is sensitive to the context and relationships. The IIT-Kanpur team has built a baseline scheme for crops in general and has codified it with the help of the FAO. The GBPUAT and ICRISAT, both members of this consortium, have developed tagging schemes for nine crops based on institutional expertise. These have been validated in a national workshop held earlier this month. The complete process of codification of known concepts related to a crop is now ready. It uses a technology called Concept Maps. They underlie the architecture of agropedia and thus enable any user to tag a piece of information with just a few clicks. It is possible for an editor to change/alter or tag additionally. Once tagged, the information piece is located by a search that looks at codified tags and not at the exact content. The search thus is more at specific concept level than at the non-specific word level. The application of semantic web techniques in this endeavor is an international first.

It is known that agricultural content is scarce globally on the Web and the very small scale occurrence of agricultural topics in the famous Wikipedia in English is a good example: only about 3000 entries among almost 2 million entries there relate to agriculture. With the availability of these new tools and techniques, we believe the agricultural community in education, research and extension spheres, in both the private and the public sector, can make lasting contributions. Multi-linguality is not a challenge in agropedia but adds to its richness. On a trial basis, the Concept maps have been rendered into Hindi and Telugu and more work along these lines is in progress

Amit et al.,2008.

Recently agropedia has come out with two important portals viz., vKVK and KVK-Net. vKVK or virtual Krishi Vigyan Kendra (www.vkvk.in) is aimed at crop and location specific advisory and alert messages to farmers. It is user friendly and connects KVKs with farmers through internet and mobile technology. It has SMS and voice messages facility which facilitates effective and efficient functioning of KVKs as an agro-advisory service provider. KVK-Net (Krishi Vigyan Knowledge Network) is a platform to experts at KVKs for sharing information and knowledge.

CELLPHONES: Cell phone – A Decision Support For Sustainable Plant Protection of the District South 24 Parganas, West Bengal

RAKVK conducted sets of mobile based programmes comprising of a unique method of mobile SMS alert system and creating provisions for both ways direct contact among the crop doctors and farmers or community resource persons. Two hundred numbers of progressive farmers/rural youth from farm families and twenty resource persons were trained up on different aspects of integrated crop management options before starting this programme. Crop based detailed database along with contact number of the trained persons is maintained in KVK. After two years of getting plant protection service through use of cell phone, the benefited farmers expressed more interest to update themselves.The farmers who receive information through SMS started spreading the information to their fellow farmers. Based on this, their foot falls along with other farmers to KVK have been significantly increasing day by day for obtaining more information against a specific problem. The other important findings of this study among the targeted beneficiaries were

i) the dependency on others for pest or crop management has been reduced

ii) the decision making power for pest management has been significantly improved

iii) the skills and attitude towards bio-intensive pest management is developed
iv) the entrepreneurship development among resource persons by providing various service to farmers is noticed. So, the cell phone would go a long way as sustainable equipment for Integrated Pest Management by creating continuous awareness among the farmers about this technology.

Patel et al.,2012

Crop Protection Compendium: Accessible, cheap ICTs are providing increasingly effective ways to identify pests – the first crucial step in pest management. In several countries in Africa, a multimedia tool called the Crop Protection Compendium (CPC) is helping farmers, agricultural officers and scientists to recognize and control crop diseases and pests.

The CPC is a global compilation of crop protection knowledge for practical decision making, edited by CAB International and supported by an international development consortium of more than 50 organisations in the public and private sectors. The compendium, which is updated annually, is used worldwide by crop protection specialists, extension workers, quarantine officers, plant breeders and policy makers, as well as farmers.

For instance, farmers who want to identify a particular beetle can visit their local telecentre and consult the CPC's vast encyclopedia on plant health and integrated pest management either via the Internet or on CD-ROM. They then select the key, or directory, on beetles, which presents a series of features (size, colour, etc.) from which they select those that apply to that particular beetle. Its clear navigation tools, illustrations and text make it easy to identify the pest quickly and accurately, and obtain information on appropriate management strategies. The CPC is user-friendly and accessible to the officials who travel to villages to help farmers identify pests. The CPC has become an important teaching tool at AGRHYMET, particularly for students enrolled in its crop protection programme.

CABI is continually updating the technology supporting the CPC in order to exploit the opportunities offered by rapid developments in ICTs. One innovative feature of the CPC is its dynamic 'softlinks', which are not 'hard wired' like hyperlinks. When a user enters a query in the CPC, the user is not taken to one fixed location but is instantly 'softlinked' to a wide range of related information, such as on other countries or pests, glossary entries, bibliographic records or other databases.

Amadou and Julia,2003

PestNet: An Asian-Pacific pest management email network
PestNet is an informal network, using email to link people offering advisory pest managemen t services in developing countries. PestNet was created in 1999 to help overcome these constraints in the Asia-Pacific region. It is an informal network, using email to link people offering advisory services in developing countries with specialists worldwide. Although originally set up as a service for the Pacific, the network has since expanded to help farmers in Asia. Registered as a non-governmental organization (NGO) in Fiji, PestNet is a free service run entirely by volunteers.

The network deals with topics ranging from quarantine concerns, biological control and pest management issues, pest outbreak alerts, and various forms of the question: 'what's this pest and how can I control it?' It is this last category that has transformed PestNet from a discussion forum into a free online identification service that has proved extremely effective. Digital photographs of pests attached to messages have yielded quick responses with tentative identifications, often accompanied by offers from taxonomists to examine specimens for confirmation of diagnoses free of charge. PestNet uses the Yahoo! Groups email list server, which is configured to allow a moderator to screen postings before they are distributed to members. This is crucial in order to maintain high standards, and to restrict the size of messages, especially those with image attachments. Many members do not have fast computers and modems. The 'turnaround time' between the posting of a message and its acceptance by a moderator is a few minutes at most. As an example, quarantine officials in the Republic of Palau recently intercepted and photographed a lizard. The image was sent to PestNet, identified by an institute in Beijing, and confirmed by a specialist in Samoa – all within one hour! At present, PestNet has 400 members, more than onethird of whom live in 40 tropical countries, including those in the Pacific and Southeast Asia.

Grahame et al.,2003

Lucid : To identify an insect, an entomologist will first narrow down the range of possibilities by examining the creature's appearance. For instance, if it has two wings it will most probably be a species of fly. If it has eight legs, chances are it will be a spider. This process of identification has become a lot simpler and faster with the advent of database and multimedia software. It is now possible to store large amounts of biological data and to access this information through user-friendly, matrix-based directories, or 'keys'. One such multimedia matrix key is Lucid, a comprehensive and powerful tool developed at the Centre for Biological Information Technology (CBIT), University of Queensland, Brisbane, Australia, that is available via the web or on CD-ROM. Anyone, whether a biology professor or a farmer, can use Lucid to identify any insect pest and retrieve the necessary information on how to combat it.

Amanda et al.,2010

e -SURVEILLANCE OF PESTS : e-Pest surveillance includes collection of survey data (fixed and roving plots) on mandatory crops by the skilled personnel (pest scouts) in a prescribed proforma. Pest Scouts (PS) are engaged @ one per eight villages of the selected crops. The PS are monitored

by PMs (Pest Monitors) (one per district). Pest scouts have to collect data in eight fixed villages in each week. In each village observation will be taken in two fixed and two random plots (each field of one acre will be selected). PS will be taking observation in four fields per village and two villages per day.

Total report of fixed plot and roving plot survey will be properly compiled by PM and get it fed online into the website. The entered data will be analysed and interpreted at the main centre and the suitable pest advisory system will be entered online.

Initially the advisory will be of two types. One, in detailed form which will be disseminated through radio bulletin and press reports. Another, in the form of short SMS tips which will be disseminated through mobiles to concerned farmers of that region. However, once the software for the online pest advisory system is developed, the solution to the concerned problem will be automatically generated based on the queries made 'online' and same can be provided to mobile service which can be obtained by the farmers by registering that service from mobile operators.

NCIPM modules: In case the pest crossed above ETL or of visible epidemic situation, the scientists will visit the spot and assess the situation. Based on the severity of the situation, suitable management strategy will be disseminated through farmers' meet in the evening.

Currently, e-pest surveillance programme has also started in Karnataka state in collaboration with NCIPM. The programme is implemented independently by State agriculture Universities (UASR, UASB and UASD) and State agriculture department. State agriculture universities are jointly conducting surveillance on seven important field crops vis., Cotton, rice, Soybean, sugarcane, groundnut, pegionpea and chickpea covering entire state for both the seasons.

Under the 'e-Pest Surveillance' programme, sponsored by Rashtriya Krishi Vikas Yojana (RKVY) for the management of major pests of rice in Orissa, the infestation and population of swarming caterpillar (S. mauritia) was monitored regularly in 13 districts of Orissa in paddy based cropping system jointly by State Agriculture Department (Orissa), Institute of Management of Agricultural Extension (Orissa), NCIPM (New Delhi), CRRI (Cuttack, Orissa), CIPMC (Orissa), and OUAT (Bhubaneswar, Orissa). The data was collected from 126 blocks and 1760 sample villages covering 13 districts namely Sambalpur, Bargarh, Jharsuguda, Deogarh, Sundargarh, Koraput, Nawrangpur, Rayagada, Malkanagiri, Kalahandi, Nuapada, Bolangir and Subarnapur.

Compilation of data from different locations indicated that during the kharif 2010 rice season the infestation of swarming caterpillar remained below Economic Threshold Level (ETL) in most of the districts except a few villages in Malkangiri and Sambalpur districts which could also be managed by timely application of pesticides. As indicated in the table, the infestation of S. mauritia was at moderate level in 29th Standard Meteorological Week (SMW) at Sambalpur (12.91 %) and Sundergarh (7.43 %) districts and was immediately managed due to the strong linkage under the project involving chain reactions such as e-pest monitoring, issue of advisory and IPM interventions. At Malkangiri district the Infestation appeared at moderate level (3.43 %) but was effectively managed. In Deogarh,Nuapada and Kalahandi districts, though the pest showed its presence throughout the season but remained at low level.

The larval population, in general, remained low at most of the places except Bolangir, Malkangiri and Kalahandi where the larval population showed increasing trend. The population of S. mauritia reached exceptionally high level at Kalahandi in 35/36 SMW. This was due to drifting of larval population from different places in the area along with floodwater in a river (Hathi river) during the period. Monitoring of the pest and advisory issued under the project and subsequently the implementation of the advice has helped in successfully containing S. mauritia infestation during kharif 2010 season in Orissa.

NCIPM, 2011

GIS-BASED e - PEST SURVEILLANCE

Awhere-act, a gis tool to predict pest outbreaks in Africa

Scientists in developing countries are becoming increasingly aware of the value of spatial information for assessing and predicting the distribution of insect pests. In this process, geographical information systems (GIS) can play a key role in the management, visualization and analysis of geographical data in digital format. So far, however, GIS have remained largely in the domain of experts, with access often restricted by factors such as cost, complexity and the availability of data, particularly in developing countries.

To rectify this situation, a team of software developers from Mud Springs Geographers, Inc., in collaboration with the International Maize and Wheat Improvement Centre (CIMMYT), developed the Awhere Almanac Characterization Tool (ACT), a stand-alone package that is well suited to the needs of agricultural researchers and decision makers in developing countries. Awhere-ACT is unique in that it integrates GIS tools with extensive databases (on climate, land use, elevation, etc.) relevant to agriculture. It is also user-friendly – with only a few days' training, users can easily generate maps showing, for example, zones with similar climatic conditions in a particular season. The package is available free to users in developing countries. Scientists involved with a number of insect pest management programmes in Africa are now benefiting from the facilities provided by Awhere-ACT, as the following examples demonstrate.

Predicting the spread of stem borers

Maize is one of the most important staple food crops in sub-Saharan Africa, but farm productivity is limited by a variety of insect pests, in particular the stem borer beetle. There are several native species of stem borer in the African maize belt, but the exotic Chilo partellus is by far the most devastating. Introduced from Asia in the early 20th century, Chilo has spread to all countries in East and Southern Africa, and is still extending its range. The Biological Control of Cereal Stem Borers project of the Nairobi-based International Centre for Insect Physiology and Ecology (ICIPE) is following a classical biological control approach, whereby natural predators associated with Chilo in Asia are being introduced into Africa. Using Awhere-ACT, researchers at ICIPE first determine which climatic factors, such as rainfall and temperature, favour the spread of the borer in Asia. They then identify those areas in Africa where the climate conditions are similar, allowing them to predict those that are likely to be at risk of Chilo invasions in Africa, and to recommend where to introduce natural predators.

Identifying fungus release sites to control the cassava green mite: The cassava green mite, Mononychellus tanajoa, is a major pest that affects cassava in many parts of Africa. Controlling this mite has been the focus of a long-running biological control programme of the International Institute of Tropical Agriculture (IITA). In Brazil, the mite's country of origin, its spread is effectively restricted by a pathogenic fungus, Neozygites tanajoae. IITA has recently introduced the fungus as a control agent in Benin, where it has become established in some areas. Based on this success, researchers at the Kenyan Agricultural Research Institute (KARI) and IITA are now using Awhere-ACT to identify areas in Kenya with agro-meteorological characteristics similar to those in Brazil and Benin where Neozygites has been successful, so that they can specify the most effective release sites. In both of these examples, the application of appropriate GIS tools and databases is helping African scientists to make better decisions regarding where to target their pest control interventions, thereby increasing the efficiency of the research process and contributing to the efforts to ensure food security. Rose et al.,2003

Using ICTs to eradicate the Carambola fruit fly : The Carambola fruit fly project, led by the International Fund for Agricultural Development (IFAD), has successfully employed both state-of-the-art communication technologies as well as traditional information exchange to eradicate this pest, which affects the livelihoods of small holder fruit farmers throughout Suriname and French Guiana.

In the mid-1990s, the presence of the Carambola fruit fly (CFF) represented a major threat to the production and marketing of fruits and vegetables throughout tropical and subtropical Central and South America and the Caribbean. Entomologists identified 236 different species of host fruit, and surveys found that the initial spread of the CFF was linked with increased fruit cultivation and the transportation and marketing of infected material. It was also discovered that the CFF is highly mobile, and can migrate distances of more than 50 km.

Various ICTs were employed to determine the range of the pest, but the simple fax machine proved to be the most effective means of distributing information, such as survey data, bulletins, aerial photographs and maps. It was found that the fly is not constrained by natural barriers such as dense forests, or by the isolated pockets of fruit tree cultivation. In view of the steady increase in the volume of unofficial trade in fruit across countries in the region, the situation demanded an immediate response. Central to the pest control strategy has been the male annihilation technique (MAT), which involves the use of a powerful male attractant mixed with a bioinsecticide. As male flies are attracted to the lure and are killed by the insecticide, the male population is reduced to the point where reproduction is no longer possible, eventually leading to eradication. Fibre blocks impregnated with the mixture are dispersed from ultralight aircraft equipped with a simple geographical information system (GIS)/global positioning system (GPS) unit to ensure comprehensive coverage of the infested area, which straddles several countries.

The ICT-based approach – using technologies ranging from written materials to multimedia and remote sensing – has undoubtedly contributed to the efficiency and effectiveness of the eradication programme. ICTs were also used to support a public relations campaign and an extension programme to ensure that rural communities understand and participate in the programme. Radio, TV and group video sessions were used to build the local institutional capacity, including training, environmental monitoring, and research to provide information for the development of techniques for fruit fly detection, control and eradication.

The lynchpin of the CFF campaign has been the establishment of an efficient regional organizational framework for a concerted effort to detect, monitor and eradicate the CFF. An ICT platform using modern electronic information exchange, combined with conventional knowledge networks, have been indispensable in ensuring the coordination of inputs of scientists, technicians and administrators. Although the project has been remarkably successful in reducing pest populations to zero in most infested areas, future funding is uncertain. It would be unfortunate if the effort is abandoned before the Carambola fruit fly is fully eradicated from the few remaining hot spots. Shantanu, 2003

The Potential Benefits of GIS Techniques in Disease and Pest Control: an Example Based on a Regional Project in Central Africa

The use of GIS tools on data collected to identify critical intervention areas to combat the spread of Banana

Xanthomonas wilt (BXW). In a survey covering the Great Lakes region, on-farm incidence of the disease was monitored and precise GPS coordinates of each sampled field were recorded. This enabled accurate mapping of the disease and performing the various spatial analyses, permitting an understanding of the geographical distribution of BXW infection. Data on food security and dependency on banana to rural populations was linked to the BXW severity to target priority areas of interventions and maximize impact.
Bouwmeester,2010

e- PEST SURVEILLANCE USING HAND HELD DEVICE

e-SAGU: The eSagu system is an IT-based Personalized Agro Advisory System. The objective of eSagu system is to provide agricultural expert advice for each farm at regular intervals in a timely manner. In this system, the agricultural experts generate the advice by using the latest information about the crop situation received in the form of both photographs and text.

The agricultural expert advice is delivered to each farm on a regular basis (typically once in a week/two weeks depending on the type of crop) from the sowing stage to the harvesting stage to the farmer without farmer asking a question. It is a scalable system. Since 2004, the e-Sagu system is being developed by operating on several crops and farms in Andhra Pradesh. It has been found that the agriculture expert can prepare the expert advice in an efficient manner by accessing the crop photographs and the related information from the computer information system. The impact results show that the expert advices helped the farmers to achieve significant savings in the capital investment and improvement in the yield. Encouraged by the results of e-Sagu experiment, a country-wide integrated agri-service program is planned by Media Lab Asia to provide expert advice and other agri-related services to Indian farming community.

e-SAP (e solutions against agricultural pests)

Benefits

• e-Pest device provided quick and uniform data capturing at all the locations reducing manpower and time.
• Since the device is GPS enabled and the data is geo-referenced (Latitude and Longitude stamped) it provided data authenticity.
• Improves the efficiency of employee.
• Device provided uniform/standard protocol for pest/disease capturing.
• GPRS/GSM enabled device allowed transfer of surveyed data from the field itself to the central server reducing the travelling time and cost.
• Data backup and database for future reference and timely advisory services.
• Over a period of time automatic advisories can be sent to Farmers.
• Server software/Reporting software generates reports automatically that give better pest-disease analysis.
• Reduced unnecessary use of pesticides, pest disease forecast, enhanced production yield.

Outcome

? Geo-referenced reliable data points across the country
? Uniform surveillance protocols & convergence
? Processed reports available in 24 hours
? Prediction of pest developments & pest forecasting
? Improved understanding of " climate change" impact, development of appropriate mitigation steps
? Better farm advisories leading to effective pest management & Farmer's prosperity

Anonymous, 2011

Conclusion: With the growing range of mobile ICT applications, such as web-capable mobile phones, handheld computers and global positioning systems (GPS), IPM practitioners will be able to access relevant information anywhere, at any time. This may inspire insect informatics experts to create IPM information and products that are relevant for specific locations at particular times. As a result, we can believe that in the near future more web based intelligent information systems will be developed that will allow users to access real-time online information that is relevant to their need, rather than the technology-driven products that are currently available.

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APPETITE REGULATION COMPOUND DATA BASE

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Obesity is one of the greatest threats to the health of the developed world. In order to design effective drugs to treat the alarming increase in obesity, it is essential to understand the physiology of normal appetite control and the pathophysiology of obesity. The hypothalamus interprets and integrates neural and humoral inputs to provide a coordinated feeding and energy expenditure response. Recent evidence suggests that certain gut hormones – ghrelin, polypeptide YY, pancreatic polypeptide, glucagon-like-peptide 1 and oxyntomodulin – have a physiologi-cal role in governing satiety via the hypothalamus. Gut hormone appetite-regulatory systems represent a potential target for the design of antiobesity drugs.

Key words: appetite hormones, appetite regulation, suppressor molecule, stimulater molecule

It is essential to undrestand the physiological aspects of human to control over obesity and have a normal appetite. It is our body's built-in mechanism for food intake regulation. This serves the purpose of regulating necessary energy intake to meet the body's metabolic needs.

Following are the factors that are now known to influence appetite and how can manipulate them to make appetite more reliable

Food in stomach: When cholecystokinin or CCK is released into the GI tract. This slows the movement of food from the stomach. Because of its effects, CCK is sometimes referred tas the "feel-full" protein.

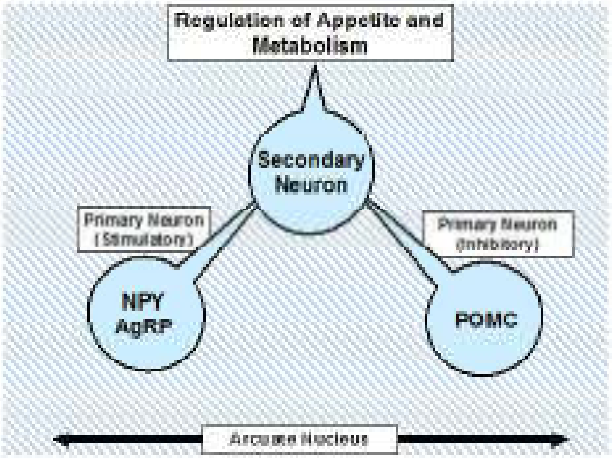
Blood glucose level: Whether hunger results directly from the sensing of declining blood glucose levels by "glycostat" neurons in the brain or through some intermediary factors. Interestingly, the feeling of full-ness that occurs immediately after eating precedes the rise in blood glucose that follows carbohydrate ab-sorption.

Appetite control -A scientific approach: Appetite is regulated by close co-ordination with the brain, adipose tissue and the digestive mechanism.

Hypothalamus : A part of the brain called hypothalamus is the presiding authority for the human appe-tite. The arcuate nucleus, houses the appetite center. The hypothalamus understands external stimuli mainly through a number of hormones such as leptin, insulin, ghrelin, pancreatic polypeptite, PYY 3-36, cholecystokinin(CCK), amylin, orexin. These are produced by the digestive tract and adipose tissue. The hypothalamus controls appetite and coordinates this with energy utilization.

Appetite Regulation:
1 Arcute nucleus
2 Hormones

1 Arcuate nucleus : The appetite center in the arcuate nucleus appears to be composed of at least two classes of neurons: primary neurons that sense metabolite levels and regulating hormones, and secondary neurons that synchronize information from primary neurons and which coordinate bodily functions through vagal signaling.
The primary neurons can be divided into two groups:



1. Those which stimulate appetite through secretion of neuropeptide Y (NPY) and the agouti-related peptide (AgRP).
2. Neurons which depress appetite through secretion of proopiomelanocortin (POMC). Thus, a feeling of hunger can be induced through several competitive mechanisms. Activation of the NPY/AgRP releasing neurons will increase appetite as will inhibition of the POMC-releasing neurons. Inhibition of the first group (NPY/AgRP secreting cells) will dampen appetite as will activation of the POMC-producing neurons.

2.Hormones: Leptin-Leptin is the product of the ob gene expressed predominantly in adipocytes(Zhang Y et al) but also at lower levels in gastric epithelium(Bado A et al) and

placenta(Masuzaki H et al).Leptin signals via a single-transmembrane domain receptor of the cytokine receptor family(Tartaglia LA) Dembski M et al) the receptor may be classified into three forms: long, short, and secreted(Tartaglia LA)(Ge H, Huang L et al). The long form, Ob-Rb, receptor possesses a long intracellular domain that binds to JAK-kinases(Lee GH) and to STAT 3 transcription fac-tors(Vaisse C et al) resulting in signal transduction and leptin's effects on food intake(Lee GH). Activation of the JAK-STAT pathway induces expression of suppressor of cytokine signaling-3 (SOCS-3), one of a family of cytokine-inducible inhibitors of signaling. SOCS-3 expression is upregulated by leptin in hypothalamic nuclei expressing the Ob-Rb receptor.

Insulin- There are two splice variants of the insulin receptor: subtype A with greater affinity for insulin and widespread expression and subtype B with lower affinity and expression in classical insulin-responsive tissues such as fat, muscle, and liver. Insulin receptors are widely distributed in the brain, particularly in hypothalamic nuclei involved in food intake (ARC, DMH, PVN, su-prachiasmatic and periventricular regions).

Cholecystokinin (CCK)- Cholecystokinin (CCK) is expressed widely in the gastrointestinal tract(Larsson LI and Rehfeld JF) It stimulates pancreatic and gall bladder enzyme release, in-hibits gastric emptying, and increases intestinal motility(Liddle RA et al)(Moran TH and Schwartz GJ) CCK acts rapidly to reduce meal size and duration in both humans and ani-mals(Gibbs J et al) and this effect is potentiated by gastric distension(Kissileff HR et al).

Ghrelin-This octanoylation is essential for binding to the GHS-R type 1a and for ghrelin's effects on food intake (Kojima M, Hosoda H, et al) Ghrelin's actions on food intake are probably via the ARC nucleus of the hypothalamus. Peripheral ghrelin administration increases c-fos in ARC NPY neurons,(Wang L, et al) and ghrelin fails to increase food intake.

Pancreatic polypeptide- PYY is released from the L cells of the gastrointestinal tract. PYY re-lease is correlated with calorie intake, with levels rising to a plateau 1–2 h after a meal and re-maining elevated for 6 h (Adrian TE et al). PYY in the circulation exists in two major forms: PYY1–36 and PYY3–36 (Grandt D et al). PYY3–36 is effective in reducing food intake in humans.

MATERIALS AND METHODS: MATERIALS
1 Pub chem 2 Marvin sketch 3 Chem spider 4 Molinspiration 5 microsoft front page
PUB CHEM :PubChem is a repository for information about the chemical, structural, and functional properties of small bioactive molecules grouped into three interlinked databases. PubChem Substance contains data on the biological activity and chemical compositions of bioactive substances, and PubChem Compound contains the chemical and structural data for these substances.
MARVIN SKETCH: MarvinSketch is an advanced, Java based chemical editor for drawing chemical structures, que-ries and reactions. It has a rich (and growing) list of editing features of chemical structures.

CHEMSPIDER: ChemSpider is a chemical database which provides free access to researchers.A number of services are made available online.These include the conversion of chemical names to chemical structures,the generation of SMILES and Inchi strings as well as the prediction of many physicochemical parameters.

MOLIINSPIRATION:Molinspiration is a calculation of molecular physicochemical properties relevant to drug de-sign.It gives the activity score and drug likeness for GPCR ligands,ion channel modulators and kinase inhibitors,choose the “predict bioactivity” option.

Methods : The following are the methods used for the creation of database.

1.PUBCHEM: The pubchem compound database contains validated chemical description information of a in-put.Given a name of a compound to retrieve it’s chemical properties and structure.
It displayed the list of compounds with their CID number.Selected and clicked on the appropriate compound,got the out-put in a synchronous way. The final output gives the information about the structure,chemical properties,physical proper-ties of a compound.Retrieving these properties from pubchem,hence helped us to create database.

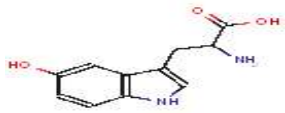
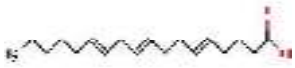
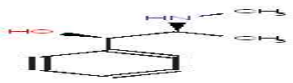
MARVINSKETCH: MarvinSketch is a tool for drawing chemical structures.First step is to save the compound struc-ture in SDfiles.Saved the file with adding the name of a compound to it’s CID number.It display’s a marvinsketch of a compound.Explicating the hydrogen bonds,copyed the structure and used in database.

CHEM SPIDER:The chem. Spider compound database contains validated chemical description information of a input. Given a name of a compound to retrive it’s chemical properties and structure. It displayed the list of compounds with their CID number.The final output gives the information about the structure, chemical properties, physical properties and cano-nial smile of a compound.Retrieving these properties from chem. Spider, hence helped us to create database.

MOLIINSPIRATION: Molinspiration service helps to calculate properties and to predict bioactivity of a compound. Taken canonical SMILES from pubchem pasted in molinspiration SMILES. Retrived physical properties of molecule by going through calculate properties option. Retrieved bioactivity properties of a molecule, by going through bioactivity prediction option.

RESULTS AND DISCUSSION: EXPERIMENT 1: LIST OF APPETITE SUPPRESER
Appetite suppresser are collected from herbals by literature search through journals and other sources. They may be chemical molecules. In the present study 5 molecules are collected.

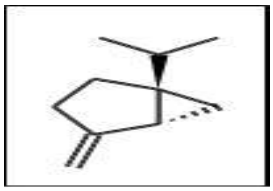
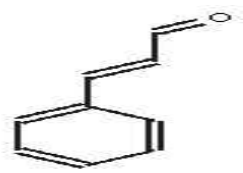
APPETITE SUPRESSOR MOLECULES

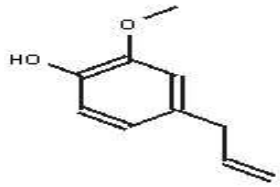
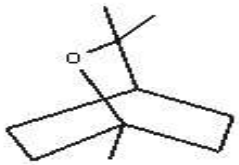
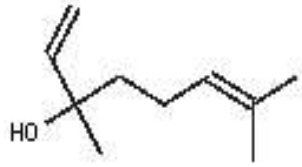
SL.NO	NAME OF MOLECULE	STRUCTURES	SOURCE	WEB LINK
1	5-HTP		Griffonia simplicifolia	http://www.naturalstandard.com/index-abstract.asp?create-abstract=/monographs/herbssupplements/patient-5-htp.asp
2	Cocaine		Erythroxylon coca	http://www.patentstorm.us/patents/4696819/description.html http://www.freepatentsonline.com/4696819.html
3	pinolenic acid		Pine Nuts.	http://books.google.co.in/books?id=Uu4nzKx74noC&pg= PA289&lpg= PA289&dq=linolenic+acid+as+appetite+suppressor&source=bl&ots=H6d2MKBFQ6&sig=7TeLaRqkltVYoT7XZHidJjQoMkU&hl= en&ei=RTf4SbbKOMKPkAWH6IVi&sa=X&oi=book_result&ct=result&resnum=7http://krishnamurthy-iyer.com/ItalianRecipes.htmlhttp://www.ehow.com/how_4783342_health-benefits- of-pine-nuts.html?ref=fuel&utm_source=yahoo&utm_ medium=ssp&utm_campaign=yssp_art
4	Guaranine		Paullinia cupana (Guarana)	http://www.allproducts.com/manufacture100/natureway/product4_print.html http://www.trademart.in/product-2009030334_zhouzhoucs.html
5	Ephedrine		Ma huang or ephedra	http://www.faqs.org/abstracts/Sports-and-fitness/The-two-faces-of-ma-huang-Promising-herbs-for-prostate-problems.html

EXPERIMENT 1: LIST OF APPETITE STIMULATOR

Appetite stimulator are collected from herbals by literature search through journals and other sources. They may be chemical molecules. In the present study 5 molecules are collected.

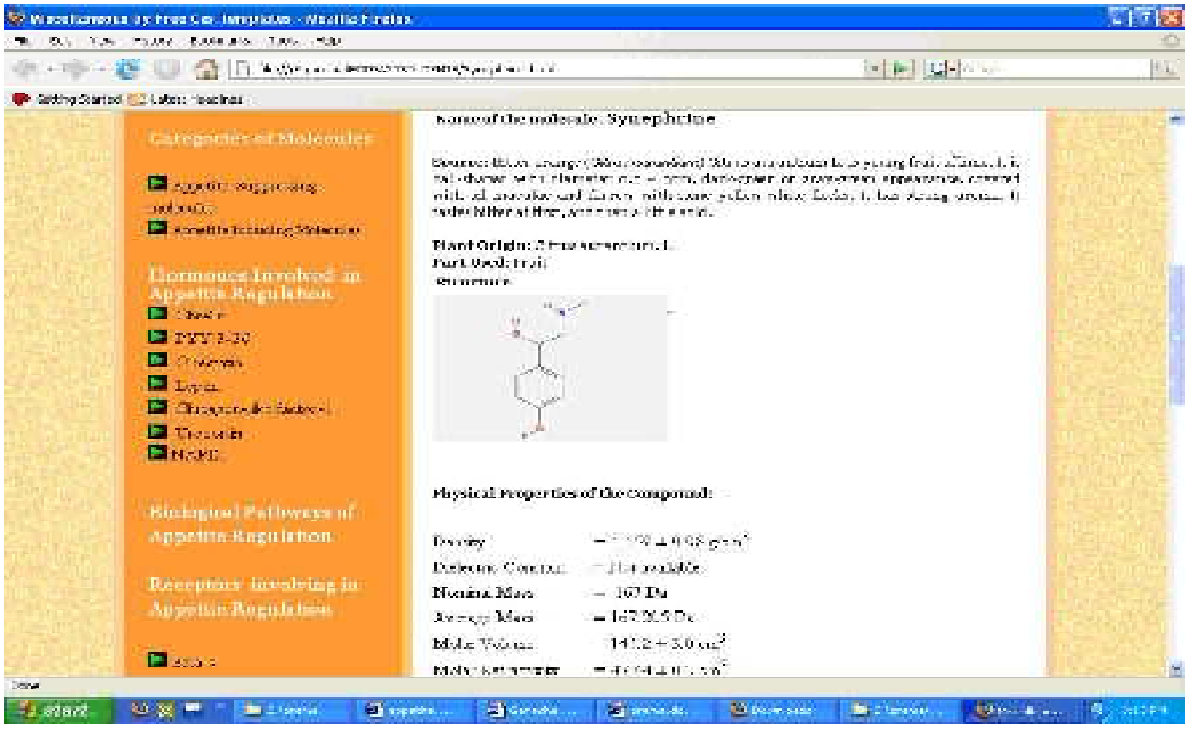
APPETITE INDUCING MOLECULES

S.NO	NAME OF MOLECULES	STRUCTURE	SOURCE	WEB LINK
1	Sabinene		Nutmeg	http://www.ncbi.nlm.nih.gov/pubmed/10702999?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_Discovery Panel.Pubmed_Discovery_RA&linkpos=1&log$=relatedarticles&log dbfrom=pubmedhttp://ressources.ciheam.org/om/pdf/c54/01600008.pdf
2	Cinnamaldehyde		cinnamon	http://www.ncbi.nlm.nih.gov/pubmed/10702999?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DiscoveryPanel.Pubmed_Discovery_RA&linkpos=1&log$=relatedarticles&logdbfrom=pubmed http://ressources.ciheam.org/om/pdf/c54/01600008.pdf

3	Eugenol		Clove	http://www.ncbi.nlm.nih.gov/pubmed/10702999?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DiscoveryPanel.Pubmed_Discovery_RA&linkpos=1&log$=relatedarticles&logdbfrom=pubmed http://ressources.ciheam.org/om/pdf/c54/01600008.pdf
4	Cineol		Cardmom	http://www.ncbi.nlm.nih.gov/pubmed/10702999?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DiscoveryPanel.Pubmed_Discovery_RA&linkpos=1&log$=relatedarticles&logdbfrom=pubmed http://ressources.ciheam.org/om/pdf/c54/01600008.pdf
5	Linalool		Coriander, grapefruit oil	http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T0G-4G3CX2R-2&_user=10&_coverDate=07%2F29%2F2005&_rdoc=1&_fmt=high&_orig=article&_cdi=4862&_sort=v&_docanchor=&view=c&_ct=162&_acct=C000050221&_version= 1&_urlVersion=0&_userid=10&md5=1a1d192892d86b34918673cd9c09f3a3http://ressources.ciheam.org/om/pdf/c54/01600008.pdf

MICROSOFT FRONTPAGE

The Microsoft front page helped us to create a APPETITE REGULATION DATA BASE



CONCLUSION: Natural source like herbs have more efficacy than synthetic medicines in curing diseases.In case of appetite,numerous herbs with a particular phytochemical acts As appetite suppressing and appetite inducing molecules.The appetite suppressing and inducing molecules are collected by the present investigation.The database has been created on these molecules,gives the information about appetite regulation.In the view of this scenario,the database may help in drug designing and in fields of research. As Bioiformatics provided platform for storing data which can help to retrieve the required information as and when required. So development of particular databases for particular disease or abnormality will help in improvising treatment. Hence this project contrib-utes for the studies of such herb molecules and their database development.

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SWADESHI VIJNANA ANDOLANA-KARNATAKA
ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

BIO FERTILIZERS AS POTENTIAL TOOL FOR SUSTAINABLE SOIL HEALTH

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Abstract : The green revolution brought amazing consequences in food grain production but with insufficient concern for agricultural sustainability. The availability and affordability of fossil fuel based chemical fertilizers at farm level in India have been ensured only through imports and subsidies which are largely dependent on GDP of the country. Dependence on chemicals for future agricultural needs would result in further loss in soil health, possibilities of water contamination and calculated burden on the fiscal system. Indiscriminate synthetic fertilizer usage has polluted the soil, water basins, destroyed micro-organisms and ceo-friendly insects, made the crop more susceptible to diseases and depleted soil fertility at the primary levels as of today. In this critical context Microorganisms have been emerged as the potential alternative for the productivity, reliability and sustainability of the global food chain. Sustainable crop production depends much on good soil health. Soil health maintenance warrants optimum combination of organic and inorganic components of the soil. Repeated use of chemical fertilizers destroys soil biota. In nature, there are a number of useful soil micro organisms which can help plants to absorb nutrients. Their utility can be enhanced with human intervention by selecting efficient organisms, culturing them and adding them to soils directly or through seeds. The cultured micro organisms packed in some carrier material for easy application in the field are called bio-fertilizers. Bio-fertilizers are living microorganisms of bacterial, fungal and algal origin. Their mode of action differs and can be applied alone or in combination. By systematic research, efficient strains are identified to suit to given soil and climatic conditions. Such strains have to be mass multiplied in laboratory and distributed to farmers. They are packed in carrier materials like peat, lignite powder in such a way that they will have sufficient shelf life.

Even though biofertilizers are being produced and distributed constantly by private agencies, NGO's, State and Central Government production units for the last three decades, their corresponding usage is not in the satisfactory proportions. To cope with the rising demands for food commodities, serious efforts are being made by the State and Central Governments (under the National Projects) for the sufficient agricultural production by popularizing biofertilizers and making them available to the farmer community. In spite of these efforts, the rate of consumption of biofertilizers is not to the optimum level in comparison with the agrochemicals. The reason attributed is the "non-availability of good and suitable carrier materials and lack of awareness of good benefits of biofertilizers to the farmers" that raises contamination problems and shorter shelf life. To cope with this alarming situation, there is requirement of proper awareness about hole goodness of biofertilizers to the farming community to avoid further soil health deterioration. So popularization of adopting the use of biofertilizers in plant nutrient management thus promoting the healthy soil concept is at most required especially in the Indian farmers situation.

Keywords: Biofenilizers, Sustainable crop production, Soil health

Introduction : India is an agricultural based country. In order to feed the ever growing populations, India has to increase the per unit area productivity. According to United Nations Food and Agriculture Organization (FAO) estimations, the average demand for the agricultural commodities will be 60% higher in 2030 than present time and more than 85% of this additional demand will be from developing countries [MAB, Shamsuddin ZH (2010)]. For over half a century, the world has relied on the concept of mcreasing crop Yields to supply an ever increasing demand of food, Therefore, vertical expansion of food production is necessary, In order to increase the unit area productivity of agricultural land. the role of different crop nutrients in contributing increased crop yield is vital. Among the crop nutrient, nitrogen as well as phosphorus play an important role in increasing the crop productivity. Further, the nitrogenous chemical fertilizers are manufactured industrially using nonrenewable petroleum products under high temperature ando high pressure. Increase in petroleum cost day by day effects the cost of the chemical fertilizers. In addition, more than 50% of the applied N-ferfilizers are somehow lost through different agricultural processes which not only lead to economical loss to the farmers and polluted environment consequently. In agriculture eco--system, microorganisms have vital role in fixing/ solubilizing/mobilizing/nutrient recycling, These microorgani sms occur in sods naturally, but their populations are often scanty. In order to increase the crop yield, the desired microbes from rhizosphere are isolated and artificially cultured in adequate count and mixed with suitable carriers or as they are in suitable combinations (Microbial consortium) by artificial culturing, These are known as biofertilizers or microbial inoculants.

India is one of the important countries in biofertilizer production and consumption, In order to encourage the organic agriculture by biofertilizers, five biofertilizers namely Rhizobium, Azotobacter, Azospirtltum, Phosphate solubilizing bacteria and mycrrhiza have been incorporated in the FCO, 1985 [Chandra K. Greep S, Ravindranath P, Srivathsa RSH], The average consumption In the Country is about 45,000 tons per annum while the production being less than the half, At present in India there is a gap of about 10 million tones of

plant nutrients between remo,val by crops and replenishment through fertilizers, It is evident that there is a tremendous gap between the annual demand and production of the biofertilizers globally especially in India. Hence, the judicious combination of chemical fertilizers and biofertilizers is also encouraged considering economical and ecological concerns, It is estimated that the present level of biofertilizer use is quite low and there is a substantial potential to increase it to 50,000-60,000 tons by 2020. The maximum production capacity is in Agro Industries Corporation followed by State Agriculture Departments, National Biofertilizers Development Centers, State Agricultural universities and private sectors

For optimum plant growth, nutrients must be available in sufficient and balanced quantities (Chen, 2006). The most important constraint limiting crop yield in developing nations worldwide, and especially among resource-poor farmers, is soil infertility. Unless the fertility is restored in these areas, farmers will gain little benefit from the use of improved varieties and more productive cultural practices. Soil fertility can be restored effectively through adopting the concept of integrated soil fertility management (ISFM) encompassing a strategy for nutrient management-based on natural resource conservation, biological nitrogen fixation (BNF) and increased efficiency of the inputs (Vlek and Yielhauer, 1994).

Biofertilizers are important components of integrated nutrients management. These potential biological fertilizers would play key role in productivity and sustainability of soil and also protect the environment as ecofriendly and cost effective inputs for the farmers. They are cost effective, ecofriendly and renewable source of plant nutrients to supplement chemical fertilizers in sustainable agricultural system.

Biofertilizers are products containing living cells of different types of microorganisms which when, applied to seed, plant surface or soil, colonize the rhizosphere or the interior of the plant and promotes growth by converting nutritionally important elements (nitrogen, phosphorus) from unavailable to available form through biological process such as nitrogen fixation and solubilization of rock phosphate (Rokhzadi et al., 2008). Beneficial microorganisms in biofertilizers accelerate and improve plant growth and protect plants from pests and diseases (EI-yazeid et al., 2007). The role of soil microorgan isms in sustainable development of agriculture has been reviewed (Lee and Pankhurst, 1992; Wani et al., 1995).

What is the biofertilizer? : The term biofertilizer or called 'microbial inoculants' can be generally defined as a preparation containing live or latent cells of efficient strains of nitrogen fixing, phosphate solubilizing or cellulytic microorganisms used for application of seed, soil or composting areas with the objective of increasing the numbers of such microorganisms and accelerate certain microbial process to augment the extent of the availability of nutrients in a form which can assimilated by plant (NIIR Board, 2004). In large sense, the term may be used to include all organic resources (manure) forplant growth which are rendered in an available form for plant absorption through microorganisms or plant associations or interactions (NIIR Board,2004).

The knowledge of applied microbial inoculums is long history which passes from generation to generation of farmers. It started with culture of small scale compost production that has evidently proved the ability of biofertilizer. This is recognize when the cultures accelerate the decomposition of organics residues and agricultural by-products through various processes and gives healthy harvest of crops (Abdul Halim, 2009). In Malaysia, industrial scale microbial inoculants are started in the late 1940's and peaking up in 1970's taking guide by Brady rhizobium inoculation on legumes. Government research institute, the Malaysian Rubber Board (MRB) had been conducting research on Rhizobium inoculums for leguminous cover crops in the inter rows of young rubber trees in the large plantations. Besides, University Putra Malaysia (UPM) also has conducted many researches since 1980's on Mycorrhiza and initiated the research to evaluate the contribution of nitrogen from Azospirillum to oil palm seedlings (Abdul Halim, 2009).

Mycorrhiza inoculums are the biofertilizer that is increasingly being utilized and accepted in agriculture industry of Malaysia Large scale productions of biofertilizer are produced mainly for supplying nutrient, amelioration of toxic effect in soils, root pest and disease control, improved water usage and soil fertility (Abdul Halim, 2009). Since the substrate for inoculate are abundant such as the mine sands and agricultural wastes, the production cost is cheaper and environmentally safe.

There are lot of perception is lay on biofertilizer. It is often perceived to be more expensive than the chemical fertilizers due to the lack of skills and technology to produce biofertilizer products from abundant wastes. Besides, the effect on the crops is slow, compared to chemical fertilizers. Special care such as storage or mixing with powders is also needed to handle microbial inocula to make they remain effective for extended use. As biofertilizers contain living organisms, their performance therefore depends on environment surrounding. Hence, outcomes are bound to be inconsistent (Rahim, 2002). Short shelf life, lack of suitable carrier materials, susceptibility to high temperature, problems in transportation and storage are biofertilizer bottlenecks that still need to be solved in order to obtain effective inoculation.

BIOFERTILIZER MAKING : There are several things need to be considered in biofertilizer making such as microbes' growth profile, types and optimum condition of organism, and formulation of inoculum. The formulation of inocula, method of application and storage of the product are all critical to the success of a biological product. In general, there are 6 major steps in making biofertilizer. These includes choosing active organisms, isolation and selection of target

microbes, selection of method and carrier material, selection of propagation method, prototype testing and large scale testing. First of all, active organisms must be decided. For example, we must decide to use whether organic acid bacteria or nitrogen fixer or the combination of fertilizer (Gupta, 2004). In root nodules the 02 level is regulated by special hemoglobin called leg -hemoglobin. This globin protein is encoded by plant genes but the heme cofactor is made by the symbiot!c ba~teria. !his is only produced when the plant is infected with Rhizobium. The plant root cells convert sugar to organic acids which they supply to the bacteroids. In exchange, the plant will receive amino-acids rather than free ammonia.

Azolla biofertilizer is used for rice cultivation in different countries such as Vietnam, China, Thailand and Philippines. Field trial indicated that rice yields are increased by 0.5-2 t/ha due to Azolla application (Gupta, 2004). Azobacter and Azospiri llum can fix atmospheric nitrogen in cereal crops without any symbiosis while blue-green algae have been found to be very effective on the rice and banana plantation (Gupta, 2Q04) . El-Komy (2005) demonstrated the beneficial influence of co-inoculation of Azospirillum lipoferum and Bacillus megaterium for providing balanced nitrogen and phosphorus nutrition of wheat plants. The inoculation with bacterial mixtures provided a more balanced nutrition for the plants and the improvement in root uptake of nitrogen and phosphorus was the major mechanism of interaction between plants and bacteria.

Co-inoculation of some Pseudomonas and Bacillus strains along with effective Rhizobium spp. is shown to stimulate chickpea growth, nodulation and nitrogen fixation. Findings of Mohammadi et al. (20 I 0) showed that the highest sugar, protein, starch contents, nodule weight and seed nitrogen, potassium, phosphorus of chickpea were obtained from combined application of phosphate solubilizing bacteria, Rhizobium and Trichoderma fungus. Shanmugam and Veeraputhran (2000) stated that application of green manure and biofertilizer stimulated the growth of plants with more number of tillers and broader leaves in rice that could be the possible reason for the increased leaf area. Application of biofertilizer increased the number of leaves in betlevine and this could be due to properly colonized roots, increased mineral and water uptake from the soil and biological nitrogen fixation (Okon, 1984) . It could be also attributed to the production of the IAA, gibberellins and cytokinins like substances produced by the bacterium as evident from the findings in banana by Jeeva (1987).

Phosphorus : The fixed phosphorus in the soil can be solubilized by phosphate solubilizing bacteria (PSB), which have the capacity to convert inorganic unavailable phosphorus form to soluble forms HPO/- through the process of organic acid production, chelation and ion exchange reactions and make them available to plants. Therefore, the use of PSB in agricultural practice would not only offset the high cost of manufacturing phosphate fertilizers but would also mobilize insoluble in the fertilizers and soils to which they are applied (Chang and Yang, 2009; Banerjee et al., 2010). Evidence of naturally occurring rhizospheric phosphorus solubilizing microorganism (PSM) dates back to 1903 (Khan et al., 2007). Bacteria are more effective in phosphorus solubilization than fungi (Alam et al., 2002). Among the whole microbial population in soil, phosphate solubilizing bacteria (PSB) constitute I to 50%, while phosphorus solubilizing fungi (PSF) are only 0.1 to 0.5% in P solubilization potential (Chen et al., 2006). Number of PSB among total PSM in north Iranian soil was around 88 % (Fallah, 2006). Microorganisms involved in phosphorus acquisition include mycorrhizal fungi and PSMs (Fankem et al., 2006) . Among the soil bacterial communities, ecto- rhizospheric strains from Pseudomonas and Bacilli, and endosymbiotic rhizobia have been described as effective phosphate solubilizers (Igual et al., 2001). Strains from bacterial genera Pseudomonas, Bacillus, Rhizobium and Enterobacter along with Penicillium and Aspergillus fungi are the most powerful P solubilizers (Whitelaw, 2000). Bacillus megaterium, B. circulans, B.subtilis, B. polymyxa, B. sircalmous, Pseudomonas striata, and Enterobacter could be referred as the most important strains (Subbarao, 1988; Kucey et al., 1989). A nemato fungus Arthrobotrys oligospora also has the ability to solubilize the phosphate rocks (Duponnois et al., 2006).

High proportion of PSM is concentrated in the rhizosphere, and they are metabolically more active than from other sour ces (Vazquez et al., 2000). Usually, one gram of fertile soil contains 101 to 10lO bacteria, and their live weight may exceed 2,000 kg ha-L Soil bacteria are in cocci (sphere, 0.5 11m), bacilli (rod, 0.5-0.3 11m) or spiral (1-100 11m) shapes. Bacilli are common in soil, where as spirilli are very rare in natural environments (Baudoin et al., 2002). The PSB are ubiquitous with variation in forms and population in different soils. Population of PSB depends on different soil properties (physical and chemical properties, organic matter, and P content) and cultural activities (Kim et al., 1998). Larger populations of PSB are found in agricultural and rangeland soils (Yahya and Azawi, 1998). In north of Iran, the PSB count ranged from 0 to 107 cells g-1 soil, with 3.98% population ofPSB among total bacteria (Fallah, 2006).

Some bacterial species have mineralization and solubilization potential for organic and inorganic phosphorus, respectively (Hilda and Fraga, 2000; Khiari and Parent, 2005). Phosphorus solubilizing activity is determined by the ability of microbes to release metabolites such as organic acids, which through their hydroxyl and carboxyl groups chelate the cation bound to phosphate, the latter being converted to soluble forms (Sagoe et al., 1998). Phosphate solubilization takes place through various microbial processes / mechanisms including organic acid production and proton extrusion (Surange, 1995; Dutton and Evans, 1996; Nahas, 1996). General sketch of P solubilization in soil is shown in Figure-I. A wide range of

microbial P solubilization mechanisms exist in nature and much of the global cycling of insoluble organic and inorganic soil phosphates is attributed to bacteria and fungi (Banik and Dey, 1982). Phosphorus solubilization is carried out by a large number of saprophytic bacteria and fungi acting on sparingly soluble soil phosphates, mainly by chelation-mediated mechanisms (Whitelaw, 2000). Phosphate solubilizing microorganism's secret organic acids and enzymes that act on insoluble phosphates and convert it into soluble form, thus, proving P to plants (Ponmurugan and Gopi, 2006). Inorganic P is solubilized by the action of organic and inorganic acids secreted by PSB in which hydroxyl some organisms. Then, isolation is made to separate target microbes from their habitation. Usually organism are isolate from plants root or by luring it using decoy such as putting cool rice underground of bamboo plants. Next, the isolated organisms will be grown on Petri plate, shake flask and then glasshouse to select the best candidates. It is also important to decide form of our biofertilizer product wisely so that the right carrier material can be determined. If it is desired to produce biofertilizer in powder form, then tapioca flour or peat are the right carrier materials. Selection of propagation method is mainly to find out the optimum condition of organism. This can be achieved by obtaining growth profile at different parameter and conditions. After that, prototype (usually in different forms) is made and tested. Lastly, biofertilizer is testing on large scale at different environment to analyze its effectiveness and limitability at different surrounding.

Biofertilizers are usually prepared as carrier-based inoculants containing effective microorganisms. Incorporation of microorganisms in carrier material enables easy-handling, long-term storage and high effectiveness of biofertilizers. Sterilizati on of carrier material is essential to keep high number of inoculant bacteria on carrier for long storage period. Gamma-irradiation or autoclaving can be used as method for sterilization.

Various types of material can be used as carrier for seed or soil inoculation. The properties of a good carrier material for seed inoculation are inexpensive and available in adequate amounts. It must non-toxic to inoculants bacterial strain and non-toxic to plant itself. Because it acts as carrier for seed inoculation, it should have good moisture absorption capacity and good adhesion to seeds. Last but not the least; carrier should have good pH buffering capacity, easy to process and sterilized by either autoclaving or gamma radiation.

MOST IMPORTANT MICROORGANISMS USED IN BIOFERTILIZER : Organisms that are commonly used as biofertilizers component are nitrogen fixers (N-fixer), potassium solubilizer (K- solubilizer) and phosphorus solubilizer (P-solubilizer), or with the combination of molds or fungi. Most of the bacteria included in biofertilizer have close relationship with plant roots. Rhizobium has symbiotic interaction with legume roots, and Rhizobacteria inhabit on root surface or in rhizosphere soil.

The phospho -microorganism mainly bacteria and fungi make insoluble phosphorus available to the plants (Gupta, 2004). Several soil bacteria and a few species of fungi possess the ability to bring insoluble phosphate in soil into soluble forms by secreting organic acids (Gupta, 2004). These acids lower the soil pH and bring about the dissolution of bound forms of phosphate.

While Rhizobium, Blue Green Algae (BGA) and Azollaare crop specific, bio-inoculants like Azotobacter, Azospirillum, Phosphorus Solubilizing Bacteria (PSB), Vesicular Arbuscular Mycorrhiza (YAM) could be regarded as broad spectrum biofertilizers (Gupta, 2004). VAM is fungi that are found associated with majority of agriculture crops and enhanced accumulation of plant nutrients (Gupta, 2004). It has also been suggested that V AM stimulate plant growth by physiological effects or by reducing the severity of diseases caused by the soil pathogens (Gupta, 2004). Examples of free living nitrogen fixing bacteria are obligate anaerobes (Clostridium pasteurianum), obligate aerobes (Azotobacter), facultative anaerobes, photosynthetic bacteria (Rhodobacter), cyanobacteria and some methanogens. The example of K-solubilizer is Bacillus mucilaginous while for P-solubilizer are Bacillus megaterium, Bacillus circulans, Bacillus subtilis and Pseudomonas straita.

Nitrogen : Nitrogen is one of the major important nutrients very essential for crop growth. Atmosphere contains about 80 percent of nitrogen volume in Free State. The major part of the elemental nitrogen that finds its way into the soil is entirely due to its fixation by certain specialized group of microorgan isms. Biological Nitrogen Fixation (BNF) is considered to be an important process which determines nitrogen balance in soil ecosystem. Nitrogen inputs through BNF support sustainable environmentally sound agricultural production. The value of nitrogen fixing legumes in improving and higher yield oflegumes and other crops can be achieved by the application ofbiofertilizers (Kannaiyan, 2002).

Biological nitrogen fixation is one way of converting elemental nitrogen into plant usable form (Gothwal et al., 2007). Nitrogen-fixing bacteria (NFB) that function transform inert atmospheric N2 to organic compounds (Bakulin et al., 2007). Nitrogen fixer or N-fixers organism are used in biofertilizer as a living fertilizer composed of microbial inoculants or groups of microorganisms which are able to fix atmospheric nitrogen. They are grouped into free-living bacteria (Azotobacter and Azospirillium) and the blue green algae and symbionts such as Rhizobium, Frankia and Azolla (Gupta, 2004).

The list of Nj-fixing bacteria associated with non-legumes includes species of Achromobacter, Alcaligenes, Arthrobacte r, Acetobacter, Azomonas, Beijerinckia, Bacillus, Clostridium, Enterobacter, Erwinia, Derxia, Desulfovibrio, Corynebacterium, campylobacter, Herbaspirillum, Klebsiella, Lignobacter,

Mycobacterium, Rhodospirillum, Rhodo- pseudomonas, Xanthobacter, Mycobacterium and Methylosinus (Wani, 1990). Although many genera and species of N2- fixing bacteria are isolated from the rhizosphere of various cereals, mainly members of Azotobacter and Azospirillum genera have been widely tested to increase yield of cereals and legumes under field conditions.

Rhizobium inoculation is well known agronomic practice to ensure adequate nitrogen of legumes instead of N- and carboxyl groups of acids chelate cations (AI, Fe, Ca) and decrease the pH in basic soils (Kpomblekou and Tabatabai, 1994; Stevenson, 2005). The PSB dissolve the soil P through production of low molecular weight organic acids mainly gluconic and ketogluconic acids (Goldstein, 1995; Deubel et al., 2000), in addition to lowering the pH ofrhizosphere. The pH of rhizosphere is lowered through biotical production of proton I bicarbonate release (anion I cation balance) and gaseous (02 IC02) exchanges. Phosphorus solubilization ability ofPSB has direct correlation with pH of the medium.

Release of root exudates such as organic ligands can also alter the concentration of P in the soil solution (Hinsinger, 200 I). Organic acids produced by PSB solubilize insoluble phosphates by lowering the pH, chelation of cations and competing with phosphate for adsorption sites in the soil (Nahas, 1996). Inorganic acids e.g. hydrochloric acid can also solubilize phosphate but they are less effective compared to organic acids at the same pH (Kim et aI., 1997). In addition, the microorganisms involved in P solubilization as well as can enhance plant growth by enhancing the availability of other trace element such as iron (Fe), zinc (Zn), etc. (Ngoc et al., 2006), synthesize enzymes that can modulated plant hormone level, may limit the available iron via siderophore production and can also kill the pathogen with antibiotic (Akhtar and Siddiqui, 2009).

The PSB solubilize the fixed soil P and applied phosphates resulting in higher crop yields (Gull et aI., 2004). Direct application of phosphate rock is often ineffective in the short time period of most annual crops (Goenadi et al., 2000). Acid producing microorganisms are able to enhance the solubilization of phosphatic rock (Gyaneshwar et al., 2002). The PSB strains exhibit inorganic P-solubilizing abilities ranging between 25-42 jJg P mL-l and organic P mineralizing abilities between 8-18 jJ g P mL-l (Tao et al., 2008). The PSB in conjunction with single super phosphate and rock phosphate reduce the P dose by 25 and 50%, respectively (Sundara et al., 2002).

Pseudomonas putida, P. jluorescens Chao and P. jluorescens Tabriz released 51, 29 and 62% P, respectively; with highest value of 0.74 mg P/50 mL from Fe203 (Ghaderi et al., 2008). Pseudomonas striata and Bacillus polymyxa solubilized 156 and 116 mg P L-l, respectively (Rodriguez and Fraga, 1999). Pseudomonas jluorescens solubilized 100 mg P L-I containing Ca3 (P04h or 92 and 51 mg P L- I containing AlP04 and FeP04, respectively (Henri et al., 2008).

PLANT GROWTH PROMOTING RHIZOBACTERIA : A group of rhizosphere bacteria (rhizobacteria) that exerts a beneficial effect on plant growth is referred to as plant growth promoting rhizobacteria or PGPR (Schroth and Hacock, 1981). PGPR belong to several genera, e.g. Agrobacterium, Alcaligenes, Arthrobacter, Actinoplanes, Azotobacter, Bacillus, Pseudomonas sp., Rhizobium, Bradyrhizobium, Erwinia , Enterobacter, Amorpho sporangium, Cellulomonas, Flavobacterium, Streptomyces and Xanthomonas (Weller, 1988).

PGPR increased recently as a result of the numerous studies covering a wider range of plant species and because of the advances made in bacterial taxonomy and the progress in our understanding of the different mechanisms of action of PGPR. In all successful plant-microbe interactions, the competence to colonize plant habitats is important. Single bacterial cells can attach to surfaces and, after cell division and proliferation, form dense aggregates commonly referred to as macro colonies or biofilms. Steps of colonization include attraction, recognition, adherence, invasion (only endophytes and pathogens), colonization and growth, and several strategies to establish interactions (Nihorimbere et al., 2011). Plant roots initiate crosstalk with soil microbes by producing signals that are recognized by the microbes, which in turn produce signals that initiate colonization (Berg, 2009). PGPR reach root surfaces by active motility facilitated by flagella and are guided by chemotactic responses. This implies that PGPR competence highly depends either on their abilities to take advantage of a specific environment or on their abilities to adapt to changing conditions or plant species (Nihorimbere et al.,20Il).

CROP RESPONSES TO INOCULATION : Symbiotic nitrogen fixer and phosphate solubilizing microorganisms play an important role in supplementing nitrogen and phosphorus to the plant, allowing a sustainable use of nitrogen and phosphate fertilizers (Tambekar et al., 2009). Zaddy et al. (1993) studied the promoting of plant growth by inoculation with aggregated and single cell suspensions of A. brasilense. They reported that inoculation of single cell suspensions of Azospirillum (prepared with fructose) significantly increased the root surface area, root and foliage dry weight of the maize seedling as compared to plants inoculated with malate grown Azospirillum or the controls. Fulchieri and Frioni (1994) observed that maize inoculated with Azospirillum had enhanced dry weight of seed by 59 percent and also the yield which was similar to 60 kg urea N ha-I. A significant positive effect on grain yield was obtained due to combined inoculation of Azospirillum and Pseudomonas striata in Zea mays (Prabakaran and Ravi, 1991) and cotton (Radhakrishnan, 1996). Crops inoculated with Azotobacter and Azospirilla reviewed by Wani (1990) indicated that Pearl millet and

Sorghum, which are grown as dryland crops showed 11-12% increased yields due to inoculations. Maize, Wheat and Rice which receive better management and inputs than Pearl millet and Sorghum showed 15-20% increased yields due to inoculation.

Several soil bacteria and fungi notably species of Pseudomo nas, Bacillus, Penicillum and Aspergillus etc., secret organic acids and lower the pH in their vicinity to bring about solubilization of bound phosphates in soil (Sundara Rao and Sinha, 1963). Saving of 50 percent of recommended level of P20S is possible in sugarcane by inoculation with phosphor-bacteria as the cane yield and sugar yield of 50 percent P20S and phosphor- bacteria treatments are on par with 100 percent P20S application (Kathiresan et al., 1995). Habibi et al. (20 II) strongly suggested that using biofertilizers (combined strains) plus half a dose of organic and chemical fertilizers have resulted in the greatest grain yield and oil yield in medicinal pumpkin. They revealed that 50% of required nitrogen and phosphorus fertilizers could be replaced by bio and organic fertilizers, because bio and organic fertilizers improved the use efficiency of recommended nitrogen and phosphorus fertilizers and reduced the cost of chemical fertilizers, also prevented the environment pollution from extensive application of chemical fertilizers (Figure-2). Beans with R. leguminosarum and P. putida R 105 increased the number of nodules and acetylene reduction activity (ARA) significantly (de Freitas et al., 1993). A significant positive effect on grain yield and ARA in roots of barley was obtained due to combined inoculation of nitrogen fixer's A. lipoferum, Arthrobacter mysorens and the phosphate solubilizing strain Agrobacterium radiobacter by Belimov et al. (1995). Radhakris hnan (1996) reported that inoculation of Azospirillum and phosphor-bacteria resulted in higher root biomass and more bolls in cottn. Findings of Mohammadi (20 I 0) showed that inoculation of biofertilizers (PSB+ Trichoderma fungi) + application of FYM had a great influence on canola growth, height and grain yield in compared to control treatment. Findings of Mohammadi et al. (20 II) showed that application of biofertilizers had a significant effects on nutrient uptake of chickpea (Table-I) combined application of Phosphate solubili zing bacteria and Trichoderma harzianum produced the highest leaf P content (0.33%) and grain P content (279 mg 100 g -I). Ability of Bacillus sp. to produce organic acid such asgluconic, citric and fumaric acids under P-limiting conditions may increase the solubility of poorly soluble phosphorus. These findings also showed that chickpea inoculated with biofertili zers have significantly higher grain protein content. Maximum protein content (% 15.06) was observed in the treatment that received a combined inoculation of PSB and T harzianum (Table-2).

CONCLUSIONS : Biofertilizer help in increasing crop productivity by way of increased BNF, increased availability or uptake of nutrients through solubilization or increased absorption stimulation of plant growth through hormonal action or antibiosis, or by decomposition of organic residues. Furthermore, biofertilizer as to replace part of the use of chemical fertilizers reduces amount and cost of chemical fertilizers and thus prevents the environment pollution from extensive application of chemical fertilizers. With using the biological and organic fertilizers, a low input system can be carried out, and it can behelped achieving sustainability of farms.

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ISSN 2250 - 3978 LILAVATI (PRINT)
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भारत में महिलाएँ भारतीय नारिओं की स्थिती गती

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भारत में महिलाओं की थिति ने पिछली कुछ सदियों में कई बडे बदलावों का सामना किया है। प्राचीन काल में पुरुषों के साथ बराबरी की स्थिति से लेकर मध्ययुगीन काल के निम्न स्तरीय जीवन, और साथ ही कई सुधारकों द्वारा समान अधिकारों को बढावा दिए जाने तक, भारत में महिलाओं का इतिहास काफ़ी गति ील रहा है। अधुनिकभारत में महिलाएँ राष्ट्रपति, प्रधानमंत्री, लोक सभा अध्यक्ष, प्रतिपक्ष की नेता आदि जैसे ीर्ष पदों पर आसीन हुई हैं ।

इतिहास

वि ोष रूप से महिलाओं की भूमिका की चर्चा करने वाले साहित्य के स्रोत बहुत ही कम हैं;१७३०ई के आसपास तंजावुर के एक अधिकारी त्र्यंबकयज्वन का स्त्रीधर्मपद्दति इसका एक महत्वपूर्ण अपवाद है, इस पुस्तक में प्राचीन काल के अपस्तंब सूत्र (चौथी ाताब्दी ईपू) के काल के नारी सुलभ आचरण संबंधी नियमों को संकलित किया गया है, इसका मुखडा छंद इस प्रकार है;
मुख्यो धर्म: स्मृतिषु विहितो भार्तृ ुश्रुषानम हि;
स्त्री का मुख्य कर्तव्य उसके पति की सेवा से जुडा हुआ है.
जहाँ सुश्रूषा ाब्द(अर्थात, "सुनने की चाह") में ईश्वर के प्रति भक्ति की प्रार्थना से लेकर एक शब्द दास की निष्ठापूर्ण सेवा तक कई तरह के अर्थ समाहित हैं.

प्राचीन भारत

विद्वानों का मानना है है कि प्रचीन भारत में महिलाओं को जीवन के सभी क्षेत्रों में पुरुषों के साथ बराबरी का दर्जा हासिल था. हालांकि कुछ अन्य विद्वानों का नज़रिया इसके विपरीत है. पतंजलि और कात्यायन जैसे प्राचीन भारतीय व्याकरणवादी का कहना है कि प्रारम्भिक वैदिक काल में महिलाओं को िक्षा दी जाती थी. ऋग्वेदिक ऋचांए यह बताती हैं कि महिलाओं की ादी एक परिपक्व उम्र में होती थी और संभवत: उन्हें अपना पति चुनने की भी आज़ादी थी. ऋग्वेद और उपनिषद जैसे ग्रंथ कई महिला साध्वियों और संतों के बारे में बताते हैं जिसमें गार्गी और मैत्रेयी के नाम उल्लेखनीय है.

प्राचीन भारत के कुछ साम्राज्यों में नगरवधु("नगर की दुल्हन")जैसी परंपराए मौजूद थीं. महिलाओं में नगरवधु के प्रतिष्ठित सम्मान के लिये प्रतियोगिता होती थी. आम्रपाली नगरवधु का सबसे प्रसिध्द उदाहरण रही है.

अध्ययनों के अनुसार प्रारंभिक वैदिक काल में महिलाओं को बराबरी का दर्जा और अधिकार मिलता था.हालांकि बाद में (लगभग ५०० ईसा पूर्व में) स्मृतियों (वि ोषकर मनुस्मृति) के साथ महिलाओं की स्थिति में गिरावट आनी ुरू हो गयी और बाबर एंव मुगल साम्राज्य के इस्लामी आक्रमण के साथ और इसके बाद ईसाइयत ने महिलाओं की आज़ादी को सीमित कर दिया.

हालांकि जैन धर्म जैसे सुधारवादी आंदोलनों में महिलाओं को धार्मिक अनुष्ठानों में ामिल होने की अनुमति दी गयी है, भारत में महिलाओं को कमोबे ा दासता और बंदि ों का ही सामना करना पडा है. माना जाता है कि बाल विवाह की प्रथा छठी ाताब्दी के आसपास ुरू हुई थी.

मध्ययुगीन काल

समाज में भारतीय महिलाओं की स्थिति में मध्ययुगीन काल के दौरान और अधिक गिरावट आयी। जब भारत के कुछ समुदायों में सती प्रथा बाल विवाह और विधवा पुनर्विवाह पर रोक, सामाजिक जिंदगी का एक हिस्सा बन गयी थी. भारतीय उपमहाद्वीप में मुसलमानों की जीत ने परदा प्रथा को भारतीय समाज में ला दिया. राजस्थान के राजपूतों में जौहर की प्रथा थी. भारत के कुछ हिस्सों में देवदासियां या मंदिर की व्यापक रूप से प्रचलित थी. कई मुस्लिम परिवारों में महिलाओं को जनाना क्षेत्रों तक सीमित रखा गया था.

इन परिस्थितियों के बावजूद भी कुछ महिलाओं ने राजनीति, साहित्य, िक्षा और धर्म के क्षेत्रों में सफ़लता हासिल की.रज़िया सुल्ताना दिल्ली पर ासन करने वाली एकमात्र महिला सम्राज्ञी बनीं. गोंड की महारानी दुर्गावती ने १५६४ में मुगल सम्राट अकबर के सेनापति आसफ़ खान से लडकर अपनी जान गंवाने से पहले पंद्रह वर्षों तक ासन किया था. चांद बीबी ने १५९० के द ाक में अकबर की ाक्ति ाली मुगल सेना के खिलाफ़ अहमद्नगर की रक्षा की.जहांगीर की पत्नी नूरजहाँ ने राज ाही ाक्ति का प्रभाव ाली ढंग से इस्तेमाल किया और मुगल राजगद्दी के पीछे वास्तविक ाक्ति के रूप में पहचान हासिल की. मुगल राजकुमारी जहाँआरा और जेबुन्निसा सुप्रसिद्द कवियित्रियाँ थीं और उन्होंने सतारूढ को भी प्रभावित किया. िवाजी की माँ जीजाबाई को एक योद्दा और एक प्र ासक के रूप में उनकी क्षमता के कारण क्वीन रीजेंट के रूप में पदस्थापित किया गया था. दक्षिण भारत में कई महिलाओं ने गाँवों, हरों, और जिलों पर ासन किया और सामाजिक एंव धार्मिक संस्थानों की ुरुआत की. भक्ति आंदोलन ने महिलाओं की बेहतर स्थिति को वापस

हासिल करने की कोि ा की और प्रभुत्व के स्वरूपों पर सवाल उठाया. एक महिला संत–कवियित्री मीराभाई आंदोलन के सबसे महत्वपूर्ण चेहरों में से एक थीं. इस अवधि की कुछ अन्य संत–कवियित्रियों में अक्क महादेवी, रामी जानाबाई और लाल देद ाामिल हैं. हिंदुत्व के अंदर महानुभाव, वरकारी और कई अन्य जैसे भक्ति संप्रदाय, हिंदू समुदाय में पुरुषों और महिलाओं के बीच सामाजिक न्याय और समानता की खुले तौर पर वकालत करने वाले प्रमुख आंदोलन थे.भक्ति आंदोलन के कुछ ही समय बाद सिक्खों के पहले गुरु, गुरु नानक ने भी पुरुषों और महिलाओं के बीच समानता के संदे ा को प्रचरित किया. उन्होंने महिलाओं को धार्मिक संस्थानों का नेतृत्व करने; सामूहिक प्रार्थना के रूप में गाये जानेवाले कीर्तन या भजन को गाने और इनकी अगुअई करने; धार्मिक प्रबंधन समितियों के सदस्य बनने; युध्द के मैदान में सेना का नेतृत्व करने; विवाह में बराबरी का हक और अमृत (दीक्षा) में समानता की अनुमति देने की वकालत की, अन्य सिख गुरूओं ने भी महिलाओं के प्रति भेदभाव के खिलाफ़ उपदे ा दिए।

ऐतिहासिक प्रथाएं

कुछ समुदायों में सती, जौहर और देवदासी जैसी परंपराओं पर प्रतिबंध लगा दिया गया था और आधुनिक भारत में ये काफ़ी हद तक समाप्त हो चुकी हैं हालांकि इन प्रथाओं के मामले भारत के ग्रामीण इलाकों में आज भी देखे जाते हैं, कुछ समुदायों में भारतीय महिलाओं द्वारा परदा को आज जीवित रखा गया है, और वि ोषकर भारत के वर्तमान कानून के तहत एक गैरकानूनी कृत्य होने के बावजूद बाल विवाह की प्रथा आज भी प्रचलित है.

सती

सती प्रथा एक प्राचीन और काफ़ी हद तक विलुस रिवाज है, कुछ समुदायों में विधवा को अपने पति की चिता में अपनी जीवित आहुति देनी पडती थी. हालांकि यह कृत्य विधवा की ओर से स्वैच्छिक रूप से किये जाने की उम्मीद की जाती थी, ऐसा माना जाता है कि कई बार इसके लिये विधवा को मजबूर किया जाता था.१८२९ में अंग्रेज़ों ने इसे समाप्त कर दिया. आज़ादी के बाद से सति होने के लगभग चालीस मामले प्रका ा में आये हैं. १९८७ में राजस्थान की रूपकंवर का मामला सती प्रथा (रोक) अधिनियम का कारण बना.

जौहर

जौहर का मतलब सभी हारे हुए (सिर्फ़ राजपूत) योद्दाओं की पत्नियों और बेटियों के ात्रु द्वारा बंदी बनाये जाने और इसके बाद उत्पीडन से बचने के लिये स्वैच्छिक रूप से अपनी आहुति देने की प्रथा है. अपने सम्मान के लिए मर–मिटने वाले पराजित राजपूत ाासकों की पत्नियों द्वारा इस प्रथा का पालन किया जाता था. वह कुप्रथा केवल भारतीय राजपूतों ाासक वर्ग तक सीमित थी प्रारंभ में, और राजपूतों ने या ाायद एक–आध किसी दूसरी जाति की स्त्री ने सति(पति/पिता की मृत्यु होने पर उसकी चिता में जीवित जल जाना) जिसे उस समय के एक वर्ग पुनीत धार्मिक कार्य मानने लगा था। कभी भारत की दूसरी लडाका कोमो या जिन्हे ईन्गलि ा में "मा लि कैमे" माना गया उनमें यह कुप्रथा कभी भी कोई स्थान न पा सकी। जाटों की स्त्रीयां युध्द क्षेत्र में पति के कन्धे से कन्धा मिला दु मनों के दान्त खटटे करते हुए ाहीद हो जाती थी। मराठा महिलाएँ भी अपने योधा पति की युध्दभूमी में पूरा साथ देती रही हैं

परदा

परदा वह प्रथा है जिसमें कुछ समुदायों में महिलाओं को अपने तन को इस प्रकार से ढंकना ज़रूरी होता है कि उनकी त्वचा और रूप–रंग का किसी को अंदाज़ा ना लगे. यह महिलाओं के क्रियाकलापों को सीमित कर देता है; यह आज़ादी से मिलने–जुलने के उनके अधिकार को सीमित करता है और यह महोलाओं की अधीनता का एक प्रतीक है. आम धारणा के विपरीत यह ना तो हिंदुओं और ना ही मुसलमानों के धार्मिक उपदेशों को प्रतिबिंबित करता है, हालांकि दोनों संप्रदायों के धार्मिक नेताओं की लापरवाही और पूर्वाग्रहों के कारण गलतफ़हमी पैदा हुई है.

देवदासी

देवदासी दक्षिण भारत के कुछ हिस्सों में एक धार्मिक प्रथा है जिसमें देवता या मंदिर के साथ महिलाओं की " ाादी" कर दी जाती है. यह परंपरा दसवीं सदी ए.डी. तक अच्छी तरह अपनी पैठ जमा चुकी थी. बाद की अवधि में देवदासियों का अवैध यौन उत्पाडन भारत के कुछ हिस्सों में एक रिवाज़ बन गया ।

अंग्रेज़ ाासन

यूरोपिया विद्वानों ने १९वीं सदी में यह महसूस किया था कि हिंदू महिलांए "स्वाभाविक रूप से मासूम" और अन्य महिलाओं से "अधिक स रित्र" होती हैं. अंग्रेज़ी ाासन के दौरान राम मोहन राय, ईश्वर चंद्र विद्यासागर, ज्योतिबा फ़ुले, आदि जैसे कई. सुधारकों ने महिलाओं के उत्थान के लिये लडाइयाँ लडीं. हालांकि इस सूची से यह पता चलता है कि राज युग में अंग्ज़ों का कोई भी सकारात्मक योगदान नहीं था, यह पूरी तरह से सही नहीं है क्योंकि मि ानरियों की पत्तियाँ जैसी कि मार्था मौल्ट नी मीड और उनकी बेटी एलिज़ा काल्डवेल नी मौल्ट को दक्षिण भारत में लडकियों की िाक्षा और प्रि ाक्षण के लिये

आज भी याद किया जाता है । यह एक ऐसा प्रयास था जिसकी ुरुआत स्तर पर रुकावटों का सामना करना पडा क्योंकि इसे परंपरा के रूप में अपनाया गया था. १९२९ में गवर्नर–जनरल विलियम केवेंडि ा–बेंटिक के तहत राजा राम मोहन राय के प्रयास सती प्रथा के उन्मूलन का कारण बने.विधवाओं की स्थिति को सुधारने में ईश्वर चंद्र विद्यासागर के संघर्ष का परिणाम विधवा पुनर्विवाह ने भी महिला स ाक्तीकरण के उद्दे य को हासिल करने में मदद की.

कर्नाटक में कित्तूर रियासत की रानी, कित्तूर चेन्नम्मा ने समाप्ति के सिद्दांत(डाक्ट्रिन आफ़ लैप्स प्रतिक्रिया में अंग्रेज़ों के खिलाफ़ स ास्त्र विद्रोह का नेतृत्व किया. तटीय कर्नाटक की माहारानी अब्बक्का रानी ने १६वीं सदी में हमलावर यूरोपीय सेनाओं, उल्लेखनीय रूप से पुर्तगाली सेना के खिलाफ़ सुरक्षा का नेतृत्व किया, झाँसी की महारानी लक्ष्मीबाई ने अंग्रेज़ों के खिलाफ़ १८५७ के भारतीय विद्रोह का झंडा बुलंद किया.आज उन्हें सर्वत्र एक राष्ट्रीय नायिका के रूप में माना जाता है. अवध की सह– ाासिका बेगम हज़रत महल एक अन्य ाासिका थी जिसने १८५७ के विद्रोह का नेतृत्व किया था.उन्होंने अंग्ज़ों के साथसौदेबाज़ी से इनकार कर दिया और बाद में नेपाल चली गयीं.भोपाल की बेगमें भी इस अवधि की कुछ उल्लेखनीय महिला ासिकाओं में ामिल थीं उन्होंने परदा प्रथा को नहीं अपनाया और मा ल आर्ट का प्र िक्षण भी लिया.चंद्रमुखी बसु, कादंबिनी गांगुली और आनंदी गोपाल जो ी कुछ ुरुआती महिलाओं में ामिल थीं जिन्होंने ैक्षणिक डिग्रियाँ हासिल कीं.

१९१७ में महिलाओं के पहले प्रतिनिधिमंडल ने महिलाओं के राजनीतिक अधिकारों की माँग के लिये विदे ा सचिव से मुलाकात की जिसे भारतीय राष्ट्रीय कांग्रेस का समर्थन हासिल था.१९२७ में अखिल भारतीय महिला िक्षा सम्मेलन का आयोजन पुणे में किया गया था. १९२९ में मोहम्मद अली जिन्ना के प्रयासों से बाल विवाह निषेध अधिनियम को पारित किया गया जिसके अनुसार एक लडकी के लिये ादी की न्यूनतम उम्र चौदह वर्ष निर्धारित की गयी थी. हालांकि महात्मा गाँधी ने स्वंय तेरह वर्ष की उम्र में ादी की, बाद में उन्होंने लोगों से बाल विवाहों का बहिष्कार करने का आह्वान किया और युवाओं से बाल विधवाओं के साथ ादी करने की अपील की.

भारत की आज़ादी के संघर्ष में महिलाओं ने एक महत्वपूर्ण भूमिका निभायी. भिकाजी कामा, डा एनी बेसेंट, प्रतिलता वाडेकर, विजयलक्ष्मी पंडित, राजकुमारी अमृत कौर, अरुना आसफ़ अली, सुचेता कृपलानी और कस्तूरबा गाँधी कुछ प्रसिद्द स्वतंत्रता सेनानियों में ामिल हैं. इंडियन ने ानल आर्मी की झाँसी की रानी रेजीमेंट कैप्टेन लक्ष्मी सहगल सहित पूरी तरह से महिलाओं की सेना थी. एक कवियित्री और स्वतंत्रता सेनानी सरोजिनी नायडू भारतीय राष्ट्रीय कांग्रेस की अध्यक्ष बनने वाली पहली भारतीय महिला और भारत के किसी राज्य की पहली महिला राज्यपाल थीं.

स्वतंत्र भारत

भारत में महिलाएँ अब सभी तरह की गतिविधियोंजैसे कि िक्षा, राजनीति, मीडिया, कला और संकृति, सेवा क्षेत्र, वि न एंव प्रौध्योगिकी आदि में हिस्सा ले रही हैं. इंदिरा गांधी जिन्होंने कुल मिलकर पंद्रह वर्षों तक भारत के प्रधानमंत्री के रूप में सेवा की, दुनिया की सबसे लंबे समय तक सेवारत महिला प्रधानमंत्री हैं.

भारत का संविधान सभी भारतीय महिलाओं को समान अधिकार(अनुच्छेद १४), राज्य द्वारा कोई भेदभाव नहीं करने(अनुच्छेद १५ (१), अवसर की समानता (अनुच्छेद १६), समान कार्य के लिए समान वेतन (अनुच्छेद ३९ (घ) की गारंटी देता है. इसके अलावा यह महिलाओं और ब ों के पक्ष में राज्य द्वारा वि ोष प्रावधान बनाए जाने की अनुमतिदेता है (अनुच्छेद १५(३), महिलाओं की गरिमा के लिए अपमानजनक प्रथाओं का परित्याग करने (अनुच्छेद ५१(ए) (ई) और साथ ही काम की उचित एंव मानवीय परिस्थितियाँ सुरक्षित करने और प्रसूति सहायता के लिए राज्य द्वारा प्रावधानों को तैय्यार करने की अनुमति देना है. (अनुच्छेद ४२)].

भारत में नारीवादी सक्रियता ने १९७० के द ाक के उत्तरार्द के दौरान रफ़्तार पकडी. महिलाओं के संगठनों को एक साथ लाने वाले पहले राष्ट्रीय स्तर के मुद्दों में से एक मथुरा बलात्कार का मामला था. एक थाने (पुलिस स्टे ान) में मथुरा नामक युवती के साथ बलात्कार के आरोपी पुलिसकर्मियों के बरी हिने की घटना १९७९–१९८० में एक बडे पैमाने पर विरोध प्रद र्नों का कारण बनी. विरोध प्रद र्नों को राष्ट्रीय मीडिया में व्यापक रूप से कवर किया गया और सरकार को साक्ष्य अधिनियम, की श्रेणी को ामिल करने के लिए मजबूर किया गया. महिला कर्यकर्ताएं कन्या भ्रूण हत्या, लिंग भेद, महिला स्वास्थ्य और साक्षरता जैसे मुद्दों पर एकजुट हुई.

चूंकि ाराब की लत को भारत में अक्सर महिलाओं के खिलाफ़ हिंसा से जोडा जाता है, महिलाओं के कई संगठनों ने आंध्र प्रदे ा, हिमाचल प्रदे ा, हरियाणा, उडीसा, मध्य प्रदे ा और अन्य राज्यों में ाराब–विरोधी अभियानों की ुरुआत की. कई भारतीय मुस्लिम महिलाओं ने ारीयत कानून के तहत महिला अधिकारों के बारे में रूढिवादी नेताओं की व्याख्या पर सवाल खडे किये और

तीन तलाक की व्यवस्था की आलोचना की.१९९० के द ाक में विदे ाी दाता एजेंसियों से प्राप्त अनुदानों ने नई महिला–उन्मुख गैरसरकारी संगठनों (एनजीओ)के गठन को संभव बनाया. स्वयं–सहायता समूहों एवं सेल्फ़ इम्प्लायड वुमेन्स एसोसिए ान (सेवा) जैसे एन्जीओ ने भारत में महिलाओं के अधिकारों के लिए एक प्रमुख भूमिका निभाई है. कई महिलाएँ स्थानीय आंदोलनों की नेताओं के रूप में उभरी हैं. उदाहरण के लिए, नर्मदा बचाओ आंदोलन की मेधा पाटकर.

भारत सरकार ने २००१ को महिलओं के स ाक्तीकरण (स्व ाक्ति) वर्षा के रूप में घोषित किया था. महिलाओं के स ाक्तीकरण की राष्ट्रीय नीति २००१ में पारित की गयी थी. २००६ में बलत्कार की ि ाकार एक मुस्लिम महिला इमराना की कहानी मीडिया में प्रचरित की गयी थी.इमराना का बलात्कार उसके ससुर ने किया था. कुछ मुस्लिम मौलवियों की उन घोषणाओं का जिसमें इमराना को अपने ससुर से ाादी कर लेने की बात कही गयी थी, व्यापक रूप से विरोध किया गया और अतंत: इमराना के ससुर को १० साल की कैद की सजा दी गयी. कई महिला संगठनों और आल इंडिया मुस्लिम पर्सनल ला बोर्ड द्वारा इस फ़ैसले का स्वागत किया गया.

अंतराष्ट्रीय महिला दिवस के एक दिन बाद, ९ मार्च २०१० को राज्यसभा ने महिला आरक्षण बिल को पारित कर दिया जिसमें संसद और राज्य की विधान सभाओं में महिलाओं के लिए ३३% आरक्षण की व्यवस्था है.

"अल्मा कबूतरी" उपन्यास में नारी का स्वरूप ।

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"अल्मा कबूतरी" उपन्यास अपराधी माने जाने वाली जनजाति कबूतराओं के इतिहास,जंगल से जल के सफर और संघर्स की दास्तान है जिसमें ममता-प्रेम , वासना ,घृणाद्वेष , संघर्ष और विद्रोह के कुरूप यथार्थ का रूप दर्शाया गया है । यह उपन्यास कबूतरा जनजाति जीवन को केंद्र में रख कर लिखा गया उपन्यास है । इस उपन्यास में लेखिका ने एक ऐसे समाज को प्रस्तुत किया है जो समाज की मुख्य धारा से छिटका हुआ है । ऐसे समाज में नारी की स्थिति कितनी दयनीय है, यह मै इस उपन्यास के माध्यम से बताने की कोशिस कर रही हूँ । नारी शोषण भारतीय समाज में परंपरा से लगा एक रोग है । जो आधुनिक काल में भी सामाजिक स्वस्थ को जर्जर बना रहा है । इस उपन्यास में लेखिका ने यह भी दिखाया है कि आज की स्त्री किस तरह से शोषण के खिलाफ आवाज उठा रही है ।

नारी के विभिन्न आयामों को मैत्रेयीजी ने पाठकों के सामने रखा है । यहाँ अल्मा आनेक समस्याओं से घिरी हुई नारी है । वह अपनी रुचि अभिव्यक्ति को कैसे सम्पन्न कर सकती है ? जीवन में जो सूक्षमता है वह महसूस करने के लिए अल्मा के पास अवसर ही नहीं था हालात ही कुछ ऐसे थे। कबूतरा समाज में नारी की स्थिति ना के बराबर है । किन्तु स्त्री -पुरुष आधिपत्य के संदर्भ में वो पुरुष पर प्रशासन करती हुई नजर आती है । वो पुरुषों की महत्ता पौरुष बताने में अपने आप को सक्षम समझती है ।

20वीं सदी के अंतिम दशक में साहित्य में प्रवेश कर उत्कृष्ट साहित्य लिखने वाली सुप्रसिद्ध रचनाकर मैत्रेयी पुष्पाजी स्त्रीविमर्श से जुड़ी रचनाएँ रचने वाली साहित्यकार के रूप में जनी जाती हैं । मगर 'अल्मा कबूतरी' उपन्यास में लेखिका ने आदिवासी चिंतन को प्रस्तुत किया है । इस उपन्यास में मैत्रेयीजी ने अपराधी मनी जाने वाली कबूतरा जनजाति का समाजशास्त्रीय विश्लेषण कर आदिवशियों और अन्य जनजतियों पर किए जा रहे लेखन कार्य को गति प्रदान की है । अल्मा कबूतरी के बारे में राजेन्द्र यादव ने लिखा है -"अल्मा कबूतरी को मैत्रेयी के लेखन का महत्वपूर्ण मोड़ मानता हूँ । अल्मा इसलिए भी महत्वपूर्ण है कि दलितों से आगे जाकर अपराधी जनजाति कि दुनिया और विशेषकर स्त्री समाज को हमारे सामने खोलती है । रांगेय राघव के 'कब तक पुकारूँ' के बाद अल्मा पहली बार उनसे हमारा परिचय करती है । सायद इससे पहले अमीर अली ठग (कोलकीडोसटेलर) ही इन अपराधी जनजतियों में से एक पर लिखा गया एक मात्र अध्ययन था - 1880 के आसपास । "

कबूतरा स्त्रियाँ ताकतवर होती हैं और उनके पुरुषों की तरह वह हथियार चलाने में माहिर और अचूक निशानेबाज होती हैं । कदमबाई, भूरी और अल्मा इस उपन्यास की सशक्त नारियाँ हैं जो जीवन की हर चुनौती का साहस से सामना करती है । साहस के बल पर विषम परिस्थियों में भी ये नारियाँ समाज के पन्ने पर एक नया इतिहास रचते हुये कबूतराओं की सामाजिक जीवन धारा को ही मोड़ देती है । आम नारी की तरह उनके दिल में कभी ममता का सागर हिलोरें मारता है और कभी संघर्ष और विद्रोह की ज्वाला धधकती है इनके सिने में ।

कदमबाई एक साहसी और संघर्षशील नारी है जो अपने पति जंगलिया के मारे जाने के बाद जीवन की चुनौतियों से संघर्ष करती रहती है । कबूतरा जनजाति दारू के धंधे से गुजारा करते हैं । इन दारू के ठेकों पर पुलिस निरंतर हमला करती रहती है । इन हमलों के कारण कबूतरा मर्द अक्सर या तो जेल में होते हैं या पुलिस से बचने के लिए जंगलों में छिप जाते हैं । हमलों में होने वाली मार काट और बरबादी से स्त्री ही सबसे जादा घायल होतीं हैं । हमलावरों के हाथ स्त्रियाँ और बच्चे ही चढ़ते हैं । जुल्मों से लुटती -पीटती ,उजड़ती - मरती स्त्रियों की वेदना से संवेदना रखने वाली कदमबाई अपने तबके के पुरुषों की कायरता और बुज़दिली को ललकरती है । हमलावरों से मुठभेड़ करने के बजाय भागते -छिपते हैं , या मारे गिराए जाते हैं । ऐसी स्थिति में कबूतरा स्त्रियों को सुरक्षा पाने हेतु दूसरे-तीसरे -चौथे मर्द करने पड़तें हैं ।

कबूतरा स्त्रियों की विडंबनाओं से त्रस्त कदमबाई सरमान मुखिया को त्याग कर मुक़ाबला करने के लिए, ताकतवर बनने के लिए चुनौती देते हुये इस प्रकार कहती है -"सदा मारे जाने की चिंता सताती रहती है । कभी लड़ने की बात भी तो सोचो । पुलिस आई ,सरक गए जंगल में । ठेकेदार आए ,भाग गए खेतों में । औरतें पीटती रही, लड़ती रहीं । तुम हाहाकार सुन कर भी जान बचाए सिमटे रहे । " (अल्मा कबूतरी ,पृ. 210-211)

विधवा कदमबाई इस उपन्यास की एक सशक्त पात्र है जो जीवन की विषमताओं से अकेले ही लड़ती रहती है । अपने बेटे को भी वह संघर्षशील बनाती है वो अपने डेरे के लोगों को कायरता छोड़ साहस जुटाने की राह दिखती है । उसके अपराधी मनसाराम को वह अपने तरीके से सजा देती है और समय आने पर अपना भी लेती है । कदमबाई की हिम्मत और हौसलों के आगे जवान बेटा राणा स्वयं को बहुत कमजोर और बौने रूप में देखता है। भूरी कबूतरी इस उपन्यास की एक बहादुर नारी है । जो अपने भाई के लिए न्याय पाने की कोशिश में अन्यायियों के हाथ अपने पति को बली चढ़ा देती है। फिर भी वो हिम्मत हारती नहीं है । वह लहूलुहान होती रहती अपनी दादी भूरी की तरह ही साहसी और संघर्षशील नारी है , जो प्र सरफरोसी का गीत गुनगुनाती है । अल्मा साहसी लड़की है जो पला संघर्ष में विश्वास रखती है । जीवन को वह अपनी शर्तों पर जीना अनेक जुल्म , यातनाएं और उत्पीड़न सहने के बावजूद अल्मा व पड़ती, जीवन की चुनौतियों से वह हार भी नहीं अपने नाम को सार्थक करने वाली अल्मा कबूतरायों की अंतहीन सं और हिन्दी साहित्य के पन्ने पर जड़ा कबूतरा नारी के संघर्ष,साहस का अनुपम गाथा है । अत: में कहना चाहती हूँ कि आज आधुनिक स्वतंत्रता की बात कहते हैं, पर क्या आज सच में स्वतंत्र है । मु जब तक हमारी मानसिकताएँ नहीं बदलेंगे तब तक हम कभी भी स्व सकते ।

हिन्दी और मराठी दलित आत्मकथाओं में स्त्री दशा

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मराठी दलित साहित्य में आत्मकथा विधा प्रमुख आधार के रूप में उभरती है। दलित आत्मकथाएँ अपने समाज के विभिन्न समुदायों के दु:ख दर्द - पीड़ाओं और यतनाओं के साथ -साथ उनकी आशा- आकांक्षाओं की भी साहित्यिक अभिव्यक्ति है। अन्य अर्थ में ये एक ही समाज के विभिन्न समुदायों का जीवंत दस्तावेज़ है। जीवन अनुभव अलग -अलग परंतु अनुभूति एक जैसी ही है।

दलित आत्मकथाकारों की अनुभूतियों में समानता इसलिए है कि सभी जातिप्रथा से समान रूप से कम या अधिक पीड़ित हैं। इन आत्मकथाओं में सामाजिक, राजनैतिक,आर्थिक परिवेश के साथ स्त्री दशा का चित्रण भी बहुत सुंदर ढंग से चित्रित किया है। सर्व प्रथम दलित महिलाओं के बारे में सोचनेवाले अगर कोई थे तो वे महात्मा फुले दंपति थे। फुले दंपति दलित समाज व दलित साहित्य दोनों के लिए आदर्श है। क्यूंकी उस समय दलित स्त्रियॉ कि स्थिति शोचनीय थी । इन स्थितियों में परिवर्तनकारी दौर तब शुरू हुआ जब भारतीय इतिहास में डॉ भीमराव अंबेडकर का जन्म हुआ। महिलाओं के मुद्धे, उनके अधिकार, उनके दु:खमय जीवन के बारे में किसी ने इतनी गंभीरता और मानवीय दृष्टिकोण से नहीं सोचा था जितना बाबा साहब ने अपने जीवनकाल में सोच रहे थे।

दलित महिलाओं के साथ अंदर बाहर हर जगह उत्पीड़न होता है। घर में घर के लोगों व्दारा और बाहर समाज के व्दारा वे खेत खलियानों में काम करती है । इन कार्य

स्थलों पर उनका शोषण होता है। दलित आत्मकथाकारों ने दलित स्त्री के यौन शोषण जैसे छेड - छाड़, बलात्कारों आदि को लेकर स्त्रियों के पक्ष में कलम उठाई है। एक दो आत्मकथाओं में दलित स्त्री दबंग या परिस्थितियों से डटकर मुकाबला करनेवाली है परंतु अधिकतर तो परिस्थितियों कि गुलाम,निरीह,अनपढ़,अबला है । इसके अलावा दलित स्त्री के अस्तित्व, न्यूनतम मजदूरी, शिक्षा उनके अपने समाज व्दारा छीनी गई अधिकारों तक को आत्मकथा का विषय बनाया गया है।

मोहनदास नेमिशराय ने 'अपने अपने पिंजरे' में लिखते है " जिस घर में बेटी पैदा हो जाती, उसका बाप अपना माथा पकड़कर बैठ जाथा था और माँ गुम-गुम सी होकर रह जाति थी। लड़कियाँ दु:ख, कलह अभाव,लड़ाई -झगड़ों का प्रतीक मानी जाती थी।" मोहनदासजी की अपनी और चचेरी बहने पढ़ने जाती थी। बस्ती के लोग तरह- तरह की बातें किया कराते थे। दलित वर्ग के लोग स्त्री शिक्षा के क्षेत्र में पिछड़े हुए थे। व्दीज जतियों का असली कहर दलित महिलाओं की इज्जत लूटने में टूटता है। इसमे स्त्रियों पर बलात्कार, अत्याचार,जुर्म होते थे।

'जुठन' में ओमप्रकाश वाल्मीकि की माँ का चरित्र दबंग एवं स्वाभिमानी स्त्री के रूप में चित्रित है। माँ सफाई कर्मचारी थी। उनकी निडरता त्यागी परिवार में आयोजित शादी के समय सामने आती है जब वे जुठन का टोकरा फेंक देती है और उसके बाद कभी इस परंपरा को जीवित नहीं रखती। माँ की ममता भाभियों का लाड़ प्यार बालक ओमप्रकाश को नई दिशा और मनुष्य के रूप में पहचान बनाए रखने में सहायक होता है। यहाँ दलित स्त्री अनपढ़ होते हुए भी चेतना संपन्न दिखाई देती है।

उसी प्रकार मराठी अत्मकथाओं में स्त्री की दशा को चित्रित किया गया है। अंबेडकर के विचारों का प्रभाव स्त्रियों पर भी पड़ा और उन्होंने शिक्षित होकर कुछ हद तक अपनी स्थिति में परिवर्तन लाने का प्रयास किया है। किन्तु दलित स्त्रियों की स्थिति में अभी भी सुधार नहीं आया है वह शोषण की सबसे ज्यादा शिकार हुई है। वह दलितों में भी दलित है। मराठी की दलित आत्मकथाओं में स्त्री दशा की कई कोण उभरकर आते है।
'तरल अंतराल' के लेखक शंकरराव खरात की माँ रोज सबेरे ही जंगल में जाकर लकड़ियाँ बीनकर उसे बाजार में बेचती और शाम को घर लोटती। लेकिन खरात के समाज की स्त्रियों

को सहारों की सुरक्षा पर ही निर्भर रहना पड़ता था। समाज की बहुत और उसकी पालतू का पर्याप्त अध्ययनकाल से अधिकारी पेशा एवं विशिष्ट कला के रूप में सम्मानित आया है।

अध्ययन सामाजिक से 'उद्योगपति' आदि से अलग विषय है। इसी कारण बिना अध्ययन किए पुलिस अपनी भर्ती और दक्षी को पेशाती उसके साथ दुर्व्यवहार करती है। आदि के कारण लगे हुए अध्ययनार पेशा की अनुपूर्ति सम्बन्धन आदि से अलग हटकर है जिसका विषय सार्वजनिक ढंग से सम्पूर्ण किया है।

इसी तरह 'अध्ययनकर्मों' में वरणपुरुषार्थ विधियों से दोनों का संक्षिप्त अध्ययन स्तर पर विवेचित किया है। देहात के अधिकारी, पेशेवर में होनों में बच्चा कर्तव्यपरायी दक्षिण दिशाओं के अध्ययनार किया है। उन्हें अपने रहोल की तरह उनका उपयोग किया है। दक्षिणों की अनुकिर्यां उनके व्यवहार के विपरीत होती है। इस तरह भर्ती का दोष को विवेचित किया है।

निष्कर्ष

इस तरह हिन्दी और मराठी दक्षिण अध्ययनकर्मों को देखने से यह पता चलता है कि दोनों विधा की दृष्टि से मराठी अध्ययनकर्ता अधिक समृद्ध है। इसके साथ साथ बोधन, अध्ययनार के क्षेत्र को भी दर्शाया है। हिन्दी अध्ययनकर्मों में दोनों के बोधन, उपदेशन को उपयोगन प्रस्तुत किया गया है।

स्त्रीवादीसमीक्षा (Feminist Criticism)

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सामाजिक जीवन और साहित्यिक विकास का रिश्ता व्यवहारात्मक है। समाज के बदलते साहित्य की परिकल्पना असंभव है उसी तरह साहित्य के बदलते

समाज की कल्पना असंभव है। साहित्य के माध्यम से समस्त सांस्कृतिक-एतिहासिक परिस्थितियों का अध्ययन एवं उसके विश्लेषण की प्रक्रिया का आज संकट है। इसी तरह स्त्री-पुरुष एक-दूसरे के पूरक हैं और एक-दूसरे से भिन्न एवं स्वायत्त भी है। सामाजिक विकास की प्रक्रिया में पुरुष ताकत पर कब्जा और हिंसा तथा की पुरुष ने स्त्री की अस्मिता एवं सत्ता को ही हजम कर लिया। स्त्री-पुरुष अलग-अलग हैं,इनकी परंपराएँ,मूल्यबोध,मर्यादाएँ और सपनों जीवन की लड़ाईयों के क्षेत्र भी अलग-अलग है।

सामाजिक जीवन में दोनों की अवस्था असमान और असंतुलित है। ऐतिहासिक विकास के क्रम में स्त्री की स्वायत्त पहचान का लोप हो गया और पहचान के नाम पर सिर्फ शरीर भर रह गया जो उसका नहीं था अपितु वह पुरुष का था। जीवन की संचालित करनेवाले संस्थान,कलाकर्म,शिक्षण,मूल्य और चिंतन सबके केंद्र पुरुष केन्द्रित हो गए,स्त्री हाशिए पर भी या निष्क्रिय थी।

औरत-जगत का पर्याय पुरुष था,स्त्री को ही प्रकृति का पर्याय बना दिया गया। लिंगभेदीय असमानता और स्त्री की वैधानिक अनुपस्थिति के माहौल को स्त्री ने अपने संघर्ष,डिटरमिनेशन और परिश्रम के प्रति गहरी आस्था के जरिए तोड़ा। स्त्री आज स्वतंत्र अस्मिता है,अनेक क्षेत्रों में असरदार दखल बढ़ा है,अनेक अधिकारों को उसने हासिल किया है। इसके बावजूद अनेक क्षेत्र ऐसे भी हैं जहाँ स्त्री की अस्मिता आज भी गायब है। ऐसे ही मुख्य क्षेत्रों में एक है स्त्री साहित्य।

स्त्री-पुरुष का फर्क शारीरिक है,किन्तु इन दोनों की अस्मिता का निर्माण,हमारी-आपकी पहचान एवं सांस्कृतिक रूपों की पहचान का आधार शरीर नहीं है। कोई व्यक्ति स्त्री है या पुरुष है यह तो प्रकृति प्रदत्त चीज है। किन्तु उसकी लिंग के रूप में पहचान तो सांस्कृतिक व्यवस्थाओं के माध्यम से निर्मित किया जाता है। संस्कारों के बहाने स्त्री को अपनी पहचान मिलती है। स्त्री की पहचान जन्मजात न होकर सामाजिक -निर्मिति है। स्त्री की अस्मिता को तय करने वाला प्रमुख कारक है उसका पुरुष संदर्भ। पुरुष संदर्भ के कारण ही उसे पत्नी,माँ,बहन,बेटी या रखैल का दर्जा मिलता है। इसके अलावा

उसकी अस्मिता को पहचानने का अगर कोई और रूप सामने आता है तो समाज आज भी उस रूप में स्त्री को पहचानने से इनकार करता है।

लंबे संघर्ष के बाद स्त्री आज पहले से थोड़ी बेहतर स्थिति में पहुंची है। अभी सम्पूर्ण परिवेश स्त्री-विरोधी मानसिकता से ग्रस्त हुआ है। स्त्री से बातें करना,किसी का आपस में बात करना,स्त्री की समस्याओं पर बहस-मुबाहिसा आयोजित करना बेहद फूहड़तापूर्ण हो गया है। स्त्री- विरोधी परिवेश के कारण या तो हमारी मन मारना पड़ सकता है या उपहास का पात्र बनना पड़ेगा। स्त्री संवेदनशील विषय है, उस पर हमला करके उसे चुप कराना संभव नहीं है और न ही उपहास करके उसकी सामाजिक भूमिका एवं जरूरतों से आंखें चुराई जा सकती हैं। स्त्री कोई निष्क्रिय शरीर नहीं है और न वह गुलाम ही है बल्कि वह तो मालकिन है। हंसती - रोती,खिलखिलाती,पढ़ती-पढ़ाती,किसानी करती,मेहनत-मजदूरी करती,उत्पादन एवं पुनरूत्पादन करती साक्षात मानवी है। वह स्वतंत्र व्यक्ति है,उसकी स्वतंत्र इच्छाएँ हैं,स्वतंत्र सोच है,स्वतंत्र दृष्टि है,स्वतंत्र परंपरा है और स्वतंत्र साहित्य भी है जो मुख्य धारा में अभी तक शामिल नहीं किया गया।

लैटिन भाषा में स्त्री को 'फेमिना' कहते हैं। उसी से अंग्रेजी में शब्द 'फेमिनिज्म' (स्त्रीवाद बना) समतावादी और स्त्री- अधिकारवादी दृष्टियों से इस शब्द का प्रयोग पश्चिम में 19वीं सदी के उत्तरार्ध से होने लगा था। अब यह शब्द स्त्री-मुक्ति से जुड़ गया है।महिला सशक्तिकरण का मूल-मंत्र बन गया है। पश्चिम में एकेडेमिक सदी में इस शब्द का प्रयोग पुनरूत्थान-समीक्षा के अर्थ में उन्नीसवीं सदी के अंतिम दशक से मान्य है। वस्तुतः पश्चिम में बहुत पूर्व भारत में मीरा और अक्का जैसी महिलाओं ने स्त्रियों के वैशिष्ट्य और अधिकार का परिचय हजारों वर्ष पहले दिया था। किंतु उत्तर आधुनिकता के संदर्भ स्त्रीवादी समीक्षा (feminist criticism) ,स्त्रीवाद पाठ (Gyno Text) आदि पदबंध आज एक सिद्धांत के रूप में विकसित हुए हैं। स्त्रियों के अधिकारों का

समर्थन पूर्व और पश्चिम में प्राचीन काल से रहा है। बीसवीं सदी में जॉन स्टुअर्ट मिल, वर्जीनिया वुल्फ आदि रचनाकारों ने अपने लेखन में इस विचारधारा को बल प्रदान किया है। फ्रांसीसी और सीमोन बार्बे ने उत्तर संरचनावाद और उत्तर आधुनिकतावाद के एक रूप के रूप में भी 'स्त्रीवादी' चेतना को प्रस्तुत किया है।

समाज पुरुष प्रधान रहा है। फलतः स्त्रियाँ उपेक्षित रही हैं। वंचित और दमित रही हैं। यौन सुचिता,पवित्रता और अस्मिता के संदर्भ में स्त्रियों और दासों को मानवीकरण धारणा नहीं थी। मुक्तिबोध ईश्वर को धन्यवाद देते हुए लिखते हैं "प्रभु का शुक्र है कि मैं पुरुष पैदा हुआ,स्त्री नहीं।" स्त्री -स्वतंत्र न होने के कारण स्त्रियों का व्यक्तित्व विकृत होता गया और वे उपभोग की वस्तु बनकर रह गई। स्त्रीवाद स्त्रियों के दमन और शोषण के मूल कारणों का अध्ययन करता है और उनकी मुक्ति के के लिए नया परिप्रेक्ष्य प्रस्तुत करता है। यहाँ स्त्रियों के धर्म-दर्शन,राजनीति ,समाज,साहित्य आदि में भागीदारी और उनकी उपेक्षा,उनके वैयक्तिक शोषण (यौनि शोषण और यौनि-मुक्ति) से जुड़ा आंदोलन है।

स्त्री समाज के साथ ही साहित्य में भी उपेक्षित रही है। अब तक साहित्य-लेखन आस्वादन और समीक्षा पुरुषवादी दृष्टि से होती रही है। अतः अवश्यकता है कि साहित्य के पाठ को स्त्रीवादी दृष्टि से पढ़ा और समझा जाए। स्त्रीयों व्दारा रचित साहित्य स्त्रीवादी दृष्टि से विश्लेषित-विवेचित होना चाहिए। इसलिए स्त्रीवादी समीक्षा-दृष्टि समीक्षा के पूर्व निर्मित प्रतिमानों को अस्वीकार करती हैं।

स्त्री साहित्यकारों (मीरा,महादेवी,कृष्णा सोबती,मृदला गर्ग,शिवानी,उषा प्रियंवदा आदि) के लेखन में स्त्रीत्व का गुण रहेगा ही। शिल्प-संरचना-भाषा,बिम्ब प्रतीक और भाव या विचारधारा की दृष्टि से उनकी रचनाओं में एक विशिष्टता होगी जिसे स्त्रीवादी समीक्षक (गाइनो क्रिटिक)ही बेहतर ढंग से रेखांकित कर सकेगा। अतः स्त्री व्दारा रचित साहित्य को स्त्रीवादी विशिष्ट दृष्टिकोण से ही पढ़ना चाहिए। यहाँ एक सहज प्रशन उभरता है की 'स्त्रीत्व"आखिर कैसे रेखांकित किया जाए। मनोविज्ञान और शरीर विज्ञान के

आलोक में 'औरतपन'शारीरिक परिवर्तन के साथ ही भाव और मनोविकार परिवर्तन की एक प्रक्रिया है जो वय: संधि (puberty) से लड़कियों में शुरू होती है। इस परिवर्तन से उसके बोध और मनोविकारों,उसके भाव-संसार में एक भिन्न प्रकार की मन:स्थितियों का विकास होता है जो कालांतर में शील,सौंदर्य,शर्म,एकांकीपन असुरक्षा,यौन संबंध का आग्रह और गोपन आदि के रूप में परिवर्तित और प्रतिभासित होता है। अत: स्पष्ट है कि महिला रचनाकर व्दारा सर्जित साहित्य में भाषा-संरचना,हस्तलेख,बिम्ब प्रतिकादिमें पुरुष रचनाकर से भिन्नता होगी।

इतिहासकारों एवं आलोचकों ने एक सिरे से स्त्री लेखिकाओं एवं स्त्री साहित्य की उपेक्षा की है। इनके लिखे को पढ़ना तक जरूरी नहीं समझा गया।

स्त्री साहित्य की बड़े पैमाने पर मौजूदगी और साहित्येतिहास में उसकी अनुपस्थिति ने नए सिरे से साहित्येतिहास लिखने की जरूरत को पैदा किया है। स्त्री-पुरुष के अब तक के साहित्य को केंद्र में रखकर समग्रता में साहित्येतिहास का परिप्रेक्ष बनाया जाए तो अनेक पूर्व निश्चित धारणाएँ टूट सकती हैं।

इस संदर्भ में पुरुष साहित्य को जिस तरह अब तक पढ़ा गया और विश्लेषित किया गया ठीक उसी तरह स्त्री साहित्य को पढ़ नहीं जा सकता। स्त्री साहित्य की सैद्धांतिकी अलग है, इसी की रोशनी में स्त्री साहित्य जब पढ़ा जाएगा तो सही-सही मूल्यांकन की संभावनाएँ पैदा होंगी। स्त्री साहित्य के इतिहास का ढांचा तैयार करेंगे तो उसमें स्त्री साहित्य की अवधारणा,स्त्री की अनुभूति,स्त्री-अस्मिता,स्त्री सैंद्धांतिकी,स्त्री साहित्य की परंपरा,स्त्री साहित्य के उत्पादन एवं वितरण/क प्रक्रिया,लेखन,पठन एवं पाठक के साथ अंतसंबंध पर विचार करना होगा। साथ ही यह भी देखना होगा कि स्त्री साहित्य किस विचारधारा को अभिव्यक्त कर रहा है

मीडिया और स्त्री

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कर्नाटक विश्वविध्यालय धारवाड़

प्रस्तावना:

बीसवी शताब्दी के अंतिम दो दशकों से लेकर आज तक मीडिया ने अद्भुत एवं अव्दितीय कार्य एवं प्रगति की है। आधुनिक युग मीडिया का युग या पत्रकारिता का युग कहेंगे तो भूरा न होगा। क्योंकि मीडिया के प्रभाव से समग्र मानव जगत प्रभावित होकर समग्र समाज में एक जबरदस्त परिवर्तन दृष्टिगत हुआ। यह परिवर्तन कोई सामान्य न होकर एक सामाजिक क्रांति ही है। इसका श्रेय आज के जनसंचार माध्यम के प्रसारण को जाता है। मीडिया क्रांति से सामाजिक क्रांति का सूत्रपात होता है। आज का युग मीडिया पर अवलंबित है। क्योंकि आज हर क्षेत्र के बारे में जानकारी केवल मीडिया व्दारा ही पा सकते है। उसके बिना न चल सकता है, न चलाया जा सकता है।

विज्ञापन एवं मीडिया की आंतरिक हलचलों ने सबसे ज्यादा भारतीय स्त्री को प्रभावित किया है। मीडिया ने स्त्री की हाथों में एक आत्मविश्वास की मशाल थमा दी जिससे प्रेरित होकर भारतीय स्त्री मीडिया के क्षेत्र में कूद पड़ी है। अपनी पुरानी संस्कृति को भूलाकर सौंदर्य एवं मनोरंजन के लिए 'बोल्ड एवं ब्यूटीफूल' बन गई। आज शायद ही कोई क्षेत्र अछूता होगा जिसमें स्त्री की भूमिका न हो। स्त्री में पड़ी सुषुप्त सर्जनशीलता को बाहर निकालने का सराहनीय कार्य मीडिया ने किया है। इससे स्त्री के लिए सर्जनशीलता की अनेक नई दिशाएँ खोल दी है।

सांप्रत युग की समूची सांस्कृतिक चर्चा की जड़ में आबाद एवं आजाद हुई स्त्री की छवि ही देख सकते हैं। डॉ शमा खान ने डॉ सुधीश पचौरी का संदर्भ देते हुए इस तरह लिखते हैं कि - " मीडिया, खासकर इलेक्ट्रानिक मीडिया, इससे

जुड़े बाजार, बहुराष्ट्रीय निगमों और इस सबके पीछे ईश्वर कि तरह सर्वशक्तिमान एवं पूंजीवाद ने स्त्री कि गोपनीयता को उघाड़कर बेपर्दा कर दिया है। स्त्री उपमानों कि कैद से निकलकर नाना रूपों में साक्षात हमारे समक्ष उपस्थित होने लगी है। वह हर वक्त है, हर जगह है, लगभग उतनी ही होने को है जितनी कि पुरुष सर्वत्र उपलब्ध है। पुरुष जगत में इतनी 'स्त्री' और उसकी 'छवि' आने से हड़कंप है। "

भूमंडलीय समाज में मीडिया और स्त्री का संबंध आज ज्यादा प्रगाढ़ हुआ है। मीडिया में स्त्री के मुख्यत: दो रूप प्रस्तुत होते है। एक पूर्ण रूप से स्वच्छंद एवं बजारवाद के रंग में रंगा हुआ जिसमें पाठक को अपनी और खींचने के प्रयास में उत्तेजक एवं अर्द्ध नग्न स्त्रीयों को पेश किया जाता है और दूसरा भारतीय संस्कृति के अनुरूप घर, परिवार,संस्कार एवं संकृति बनाये रखनेवाला लोक लाज, सहिष्णु उदार एवं त्यागमय रूप। आज कि बाजारवादी संस्कृति ने स्त्री को ही खरीददार और स्त्री को ही प्रॉडक्ट बेचने का माध्यम बनाया है। विज्ञापन एवं मीडिया कर्मियों ने सौंदर्य स्पर्धा के नाम पर ग्लैमर माँडलों को तैयार कर एक तथाकथित सुंदर स्त्री की छवि तैयार की है। आज स्त्री, स्त्री न रहकर एक बाजारवाद की वस्तु बनकर रह गई। आज कल हर सामान्य स्त्री अपने आपको सीरियलों में दिखाई देनेवाली स्त्रीयों की तरह सुंदर दिखाई देना चाहती है। इसलिए हमेशा सौंदर्य साधनों का इस्तमाल करके नायिका और माँडलों की तरह दिखने की चाह रखती है। इस तरह एक नई जागरूक स्त्री के रूप में सामने आ रही है ? इसमें कोई शक नहीं है कि इस प्रकार मीडिया के माध्यम से यह जादुई मुस्कान, कंपनियों के माल के विज्ञापनों के साथ प्रस्तुत की जाती है। जिसमें स्त्री की भूमिका और प्रस्तुतीकरण सबसे महत्वपूर्ण, लुभावना तथा चकित कर देनेवाला होता है।

प्राचीनकाल में स्त्री परिवार और परंपरागत सामाजिक बेड़िया में जकड़ी हुई थी। उस समय अपने आपको परतंत्र एवं शोषित समझती थी। इसकी तुलना में आज स्त्री मुक्त एवं स्वतंत्र है। यह बाजारवाद का एक छल है, मरीचिकाओं

का इंद्रजाल है, जिसमें आधुनिकता के विकास के नाम पर स्त्री को सोने की बेड़ियों में जकड़ दिया गया है। अर्थात जाने अनजाने में स्ट्रे घरेलु गुलामी से मुक्त होकर बाजारवाद के गुलामी में कैद होकर मानसिक,शारीरिक एवं आर्थिक रूप से शोषित हो रही है।

आज स्त्री मीडिया के हर क्षेत्र में कार्य रत है। उदा पत्रकार, ऐंकर, समाचार वाचन, विज्ञापन, सीरियल, संपादक आदि। हर स्त्री मीडिया में जाने के बाद और भी सुंदर दिखने के लिए लगातार कोशिश करती रहती है। क्योंकि पाठक वर्ग का ध्यान आकर्षित करना चाहती है। लेकिन जब तक देह साथ देगा तब तक वह ऊँचाइयों पर बनी रह सकती है, उधर देह स्त्री का साथ छोड़ देता है तो दूसरी प्रतिस्पर्धा आगे निकाल जाती है।

आज स्त्री को विज्ञापन में एक हथियार के रूप में इस्तमाल कर रहें हैं। वह अपने आपको ग्लैमर के दुनिया में खोती जा रही है। इसलिए कहते है कि
"अब भी न सम्भलेंगी तो मिट जाएँगी खुद ही
दास्ताँ तक भी न होगी हमारी दस्तानो में ।"

निष्कर्ष:

अंत में यह कह सकते है कि मीडिया में स्त्री उपभोग की वस्तु बनकर रह गई है। स्त्री मीडिया के माया जल में फँसती जा रही है। इस जाल से बाहर निकलकर अपनी मानवीय गरिमा और अधिकारों को समझकर सामाजिक, सांस्कृतिक व आर्थिक उन्नति के लिए कार्य करें साथ में दूसरों को प्रेरित करना चाहिए

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उद्यमशील महिला तथा मानसिक आरोग्य

उद्यमेंन हीं सिध्यंते
कार्याणि न मनोरथै:
न ही सुक्तश्यू : सिंहस्य :
प्रविशति वने मृगाह :॥

उपर्युक्त श्लोक का तात्पर्य है - कोई भी काम हो तो उद्योग करने से अथवा प्रयत्न करने से होते है। सिर्फ सोचते रहने से होते नहीं है अगर कोई सिंह सोता ही रहा तो उसके पेट भरने के लिए कोई प्राणि उसके मुह में कोई प्रवेश करता नहीं है अर्थात सिंह को भी प्रयत्न करना काम करना पेट भरने के लिए अनिवार्य है।

उद्यमशीलता आधुनिक युग का वरदान कहीं जाती है। इसका अर्थ यह नहीं है कि प्राचीन काल में उद्यमशीलता का कोई महत्व ही नहीं है। अतिप्राचीन काल में ही एक परिवार को अपनी अस्तित्व के लिए उद्यमशील रहना अवश्यक था। रहनेके लिए कुटिर बनना पेट भरने के लिए खेती भाडी करना साथ साथ ईज्जत के लिए कपड़े तैयार करना उस जामाने के उद्यम हैं।

आधुनिक युग में जनसंख्या का विस्तार हो चुका है। साहसी प्रवृत्ति से देश विदेशों में संपर्क बढ़ चूका है। वैज्ञानिकता के झोर पकड़े से आज दुनिया एक ग्राम बन चुकी है। इतना विस्तृत जन समुदाय के लिए हर एक को उद्यमशील बनना आवश्यक हो चुका है ।

उद्यमशीलता सामाजिक कार्य है। समाज में अधिक सुविधाओं को बढ़ाने के लिए हम अग्रसर है। एक जमाने में आटा पीसना, लकडीयों को इकट्ठा करना, रसोई पकाने

की क्रिया वगैरह में लीन रहते थे। लेकिन आज हर एक काम के लिए कई तरह की मशीनें आचुकी है। आठा पीसने के लिए किसी को भी चक्की के सामने बैठने की आवश्यकता नहीं है। विद्युत्त उत्पादन से हम हरेक काम विद्युत चालित यंत्रों से करालेते है। फिर भी सहूलितियों को बढ़ाने में उद्यमशीलता अपना महत्व पा लेती है। आज हम देखते है की उद्यमशीलता स्त्री - पुरूष दोनों के लिए अनुवार्य बन चुका है। हरेक कार्य को प्रयत्न को उद्यम कहा जाता है। लेकिन आज उद्यम शब्द का प्रयोग कुच खास विषयों पर ही हो रहा है।

उद्यम के कई रूप है। उद्यमों को स्थापित करनेवाले भी उद्यमि कहे जाते है। उद्यम में काम कर रहे है। मजदूरों को उद्यमी कहते है। इन दोनों का यहीं राष्ट्र कार्य भी है। उद्यम शब्द की व्याप्ति केवल उत्पादकता तक ही है केवल वस्तुओं का उत्पादन करना, बेचना लाभ पाना मजदूर लोगों को भरण पोषण करना यहीं मार्ग हो चुके है।

उत्पादकता केवल भौतिक वस्तुओं तक सीमित नहीं है। अध्यापक व अध्यापकी स्नातकों के मन में ज्ञान का बीज भोलतक उत्पादन करती है। चिकित्सालय में वैद्यकीय काम करके लोगों के जान बजाते है वे भी उद्यमी ही कहलाते तो कोई गलती नहीं है। उद्यम का रूप बदल सकता है लेकिन तत्व बदलता नहीं हैं। एक दृष्टी से देखा जाय कोई भी व्याक्ति कुछ काम करके उसका निश्चित फल पालेता है वह उद्यामी है। भारत देश को जादी मिली लेकिन भारतवासियों को सांत्वना नहीं मिली। गरीबी, भूखमारी, अकाल, अनारोग्य वगैरह कई कुरूपों के बीच भारत कराह रहा था। जो भी विषय दिन ढलते ही समस्या को हल नहीं कर सकते अतः उस दिन के प्रधानी पं.जवाहरलाल नेहरू प्रधान मंत्री के विचारों में भारत के हितचिंतक तथा वैज्ञानिक विचारवादी एकत्र होकर पंचवार्षिक योजनाओं को सिद्ध किया गया। आर्थिक सुधार लाने में केवल कृषि ही नहीं बल्कि अनेकाने उद्यमी खड़े हो गये बडे कारखाने स्थापित किये गये साथ साथ कुटीर उद्योगों को बढ़ावा दिया गया। पशु संगोपन भी उद्यमशीलता का एक अंग बन गया। सिमेंट की संस्कृति भारत भर में फैल गयी आज हम देखते है जहाँ देखो वहाँ सिमेंट के आलिशान महल खड़े हो गये घर बनाने का कार्य भी एक उद्यम होगया। पुराने सड़कों की रिपेरी, नयी सड़के बनाने की कामगारी नदीनलों पर ब्रिज खड़े किये जाने लगे। इनके बीच पर्यावरण की ओर भी ध्यान दिया गया। आजादी से पहले की घोषणा - " जै जवान के साथ जै किसान " भी जुड़ गया। आज तक दसों पंचवार्षिक योजनायें जारी हैं

उनके जारिए भारतकी उद्यमशीलता में चारचांद लग गये। आज हम कह सकते है उद्यमशीलता की दृष्टि से पाश्चिम के देशों के साथ भारत भी स्पर्धा कर सकता है।

उद्यमशीलता के बारे में बहुत कुछ कहाँ गया है अब हम देखें की इसमें महिलाओं का पात्र कितना है। उद्यम का अर्थ व्याप्ति विस्तार से हम देखते है तो वैदिक काल में भी महिलाएँ उद्यमशील ही थी। उनका बड़ा ऊँचा दर्जा था। महिलाओं के बारे में बड़ा गौरव था। कहा जाता है "यत्र नार्यास्तु पूज्यंते रमंते पत्र देवताः " हिन्दी अनुवाद यत्र नारियाँ पूजित होती तत्र वास है देवों का पुत्री, माता, भार्य, बन परिमार्जित करती भावों का अर्थात जहाँ नारी का सम्मान है वह देवता प्रत्यक्ष रहते है। माता के रूप में, पत्नी के रूप meMमें तथा पुत्रि के रूप में जनमान को साफ रखनेवाली शक्ति नारी को है। काव्य मीमांसा शाख में भी प्रभु सम्मित, मित्र सम्मित से कांता सम्मिन से सर्वश्रेष्ट है वहीं काव्य है जो कांता सम्मित है। तब गार्गेयी, मैत्रेयी, कात्यायिनि, सुलभा, सावित्री ऐसे की नारिमणियों के नाम आते है। सर्वतंत्र स्वतंत्र होकर जीवन यापन करती थी। पुरूषों के समकक्ष स्थापित थी। वेदकाल में यहाँ तक आधार है नारीयाँ वेद मंत्रों को सीखती थी, यज्ञ याग करती थी, कराती थी, गृहस्थि चलाने में संतान के पालन पोषण में कभी पीछे नहीं हठनेवाली थी उस समय के अनुसार हरेक कार्य में पुरूष के साथ भी रहती थी, पुरूष के संरक्षक भी बनती थी कई वीर रानियों को राजमाताओं को उस समय हम देखते है माता जीजाबाई तथा शंकराचार्य की माता उदाहरण के रूप में है।

मध्यकाल में नारि की स्थिति शोचनीय हो गयी बाहरी आक्रमण से तथा अंधविश्वासों के कारण तथा भोग लालसा की तीव्रता से नारी एक भोग की वस्तु बन गयी तभी बाल बाल विवाह जैसी कुरितियों को हम देखते है। किसी भी स्थिति में विधवा विवाह को अवकाश नहीं था। इससे नारी जगत के बीच एक तरह की शून्य मनस्कता भर गयी। इसमें परदेशों के सम्पर्क का भी थोडा बहुत कारण है। क्योंकी पश्चिम की देशों में नारी केवल भोग की वस्तु ठहरा गयी थी। अंग्रेज, फ्रेंच, पोर्तुगाली वगैरहों के आने से भारत में भी यह दुष्परिणाम फैल गया। तभी कहाँ गया है कि - """""""""""""""" अबला जीवन है तुम्हारी यहीं कहानी आँचल में है दूध और आँखो मे है पानी अर्थत अपना दुध पिलाकर सम्पूर्ण संतानों को पालनेवाली श्रीमाता की आँखो में पानी ही पानी भर गया अर्थत होने पर भी दुःख से मुक्त नहीं हुई। इस समय उद्यमशीलता तथा नारी विचार करे तो नारी को कोई अवकाश नहीं था क्यों कि समाज में उनको शिक्षण से दूर रखा। शिक्षण से वंचित नारी पुरूष की कठपुतली बन गयी उस जमाने में दहेज प्रथा,

सति प्रथा आदिकुरितियों से नारी शोषित ही नहीं जर्जरित हो गयी इसका एक दूसरा परिणाम हुआ बहुपत्नित्व ज्यादा प्रचलित भी हो गया इसका एक दूसरा एक विकृता रूप वैश्या पद्धति भी समाज में फैल गयी। एक समय की देवदासी एक वेश्या baबनायी गयी। हमेशा - "" जब चिराग बुझने लगता है, तब एक बार फिर से बढ़क उठता है, जब मरीज दम तोड़ने लगता है तब एक बार निरोगी बनकर चलने फिरने लगता है।" अर्थात विकृतियाँ भी जब आसमान तक पहुँच जाती है तब सुकृति आने की सूचना है।

अंदाज २२ वीं सदी में नारी जगत फिर से जागृत अवस्था को पहुँच चुका गाँधीजी विवेकानंद परम हंस वगैरह महानुभावों की प्रेरण से नारी जगत प्राचीन महत्ता को वापस पाने में सन्नद्ध हो गया। सतीप्रथा को कानून रोक दि गयी। जिसका यश मिलना चाहिए राजाराम मोहनराय लार्डबेंटिंक को समाज में ऐसी एक जागृती पैदा होगयी जिससे बालविवादों की संख्या धरती गयी। शारदा आक्ट नामक कानून जारी किया गया जिससे चौदह वर्ष से वहले लड़कियों का विवाह करना अपराध है। वहीं आगे चलकर २८ वर्ष तक बढ़ाया गया। नारी संरक्षण के लिए समाज गतिबद्ध हो गया। नारी जगत को शिक्षण क्षेत्र में प्रवेश कराया गया सुशिक्ष शिक्षण क्षेत्र में प्रवेश कराया गया सुशिक्ष नारी अनेकाने उद्योगों में लग गयी। औपचारिक तथा अनौपचारिक उद्योगी महिलाओं की संख्या बढ़ गयी इससे समाज में नारी जगत में एक प्रकाश स्थिर हो गया कस्तुरबा, कमला नेहरू, सरोजिनि नायडु वगैरहों नें सिद्ध किया की नारी कभी अबला नहीं है तभी से जारी सबलीकरण की ओर सबका ध्यान गया। पुरूष प्रधानता धरती गयी इसका यह अर्थ नहीं है कि स्त्री तथा पुरूष जगत एक दूसरे के शत्रु बन गये। दोनों समझदारी की पटरियों पर चलनेवाली रेल गाड़ी बन गयी। पिता बेटियों को भाई बहनों को, पति पत्नि को खूब पढ़ाने में और उद्योग दिलाने में अग्रसर हो गये। उद्यमशीलता तथा नारी जगत में जो यश मिल चुका है वह कल्पनातीत है।

२९ वीं सदी के आरम्भ में नारी अपनी खोयी प्रतिष्टा प्राप्त करने को तत्पर है। 'स्वामी विवेकानन्द' ने कहा है, नारी जब अपनी बेड़ियाँ, एवं कड़ियों को तोड़ने लगेगी तो विश्व की कोई ताकत उसे नहीं रोक सकेगी। सच है आज नारी उन क्षेत्रों में भी 'प्रवेश कर चुकी है। चिनमें पहले सिर्फ पुरूषों का ही वर्चस्व था। विमान सेवा क्षेत्र में पुरूष का हमेशा वर्चस्व रहा है, किन्तु आज इस क्षेत्र में नारी का प्रवेश हो चुका है। अंतरिक्ष विज्ञान के क्षेत्र में भी अब तक पुरूषों का वर्चस्व था। किन्तु भारतीय मूल की स्व० कल्पना चावला का अन्तरिक्ष क्षेत्र में स्वर्णिम योगदान भुलाया नहीं जा सकता।

शोध एवं अनुसंधान क्षेत्र में भी नारी आज पिछे नहीं है। विज्ञान एवं अनुसंधान के क्षेत्र में महत्वपूर्ण योगदान हेतु ९ महिलाओं को नोबेल पुरस्कार दिया जा चुका है।

१. मैरी क्यूरी (१९९६ रेडियम की खोज)
२. आयनर गेलियट(१९६५ रसायन)
२. मेरिया सियोपार साधर (१९६३ भौतिकी)
४. डोर्थी सी होटसीग (१९६४ रसायन)
५. जारी.डी.कोरी (१९६७ चिकित्सा)
६. रासलीन यलोव(१९७७)
७. बारबरा मैग्लिटॉक (१९८३)
९. रीमा लेवी मंतल सिनी (१९६८)
९. जटरडी पी.एलिप्पन (१९८८)

सेना अन्तरिक्ष, विज्ञान, अनुसंधान के अलावा साहित्य क्षेत्र में भी नारी का योगदान अविस्मरणीय है। साहित्य में उल्लेखनीय योगदान के लिए अनेक नारियाँ नोबेल पुरस्कार पा चुकी हैं। इसके अलावा साहित्य के क्षेत्र में भारत का सर्वश्रेष्ट पुरस्कार ज्ञानपीठ सन १९७६ में सुश्री 'आश पूर्णा देवी' सन १९८१ में 'अमृता प्रीतम' सन १९८२ में महादेवी वर्मा, एवं सन १९९६ में 'महाश्वेता देवी' प्राप्त कर चुकी हैं।

विश्व आज आतंकवाद, कट्टरता, अंधविश्वास से जकड गया है। धार्मिक संकीर्णता के दौर में जून १९९० में 'इंग्लैण्ड' के एक चर्च में सुश्री पेत्री डोमीसन को महिला विशप बनाना स्वागतेय है। राजनीति के क्षेत्र में भी आज नारी ने पुरूषों का वर्चस्व तोड़ा है। आज विश्व के तकरीबन हर मुल्क में नारी राजनीति में आ चुकी है। विश्व की संसदों में नारी का प्रतिशत ११ है। इसमें ७.१ प्रतिशत संसदीय अध्यक्षा है। १०.७ प्रतिशत महिला संसद हैं। अमेरिकी संसद में १०.९ प्रतिशत एवं ब्रिटन की संसद में ९.५ प्रतिशत महिला राजनीति में आ चुकी हैं। पाकिस्तान एवं बंगलादेश जैसे कट्टरवादी मुल्कों में भी प्रधानमंत्री एवं राष्ट्रपति महिलाएँ बनी हैं एवं बनती रहती हैं। राजनीति के अलावा औद्योगिक, प्रबन्धन, पुलिस अन्वेषण आदि क्षेत्रों में नारी का प्रवेश स्वागतेय है।

सनँ १९९७ की यू०एन०डी०पी० को एक रिपोर्ट के अनुसार औद्योगिक एवं प्रबंधन क्षेत्र में महिलाओं का प्रतिशत २७.४ है। विभिन्न देशों में यह प्रतिशत निम्नलिखित है : -

१.	अमेरिका	४२.२
२.	कनाड़ा	४०
३.	सिंगापुर, मलेशिया, थाईलैण्ड, चीन	२२ से ३५ प्रतिशत
४.	भारत	२.५
५.	पाकिस्तान	३.५

६. बंगलादेश ५

आज विश्व की १० प्रमुख मल्टीनेशनलँ कम्पनियों में प्रबन्धन प्रमुख महिलाएँ है। पुलिस एवं अन्वेषण क्षेत्र में भारत की प्रथम महिला आई०पी०एस० अधिकारी सुश्री किरण बेदी का नाम अग्रणी है।

विश्व में तेजी से बदलती परिस्थितियों के दौर में आज नारी को नई चुनौतियों से जूझना है। किन्तु इतना सच है कि २१ वीं में 'वैश्वीकरण' एवं 'बुमण्डलीकरण की प्रक्रिया में नारी ही हर हालत में पुरूष को सहयोग दे सकती है, क्योंकि -

"नारी सृष्टि की सृजक है, जनती है,
अनेकता में एकता की संवाहक है,
दया, करूणा, प्रेम शांति, ममता की परिचायक है।"

२१ वी सदी में नारी की भूमिका अधिक चुनौतिपूर्ण हो गयी है। बढ़ते आतंकवाद, हिंसा, लूटमार, अश्लीलता बना दिया है। उपभोक्तावादी संस्कृति एवं पश्चिमी अंधानुकरण एवं उदारीकरण ने नारी को भोग की वस्तु के रूप में प्रचारित किया है। नारी गरिमा, सम्मान को आहत किया है इसके सम्मनीय रूप का गौरव खण्डित किया है। लेकिन इस में सक्षम है। नारी को यह फैसला स्वयं करना है, कि वह सम्मान के साथ तरक्की करना चाहती है, या असम्मान के साथा। उसे हर समय यह ध्यान रहना चाहिए कि प्रतिष्टा प्रथम है, पैसा बाद में।

अब तक उद्यमशीलता तथा नारी जगत के बारे में बहुत कुछ चर्चा की गयी है। हमें यह भी सोचना चाहिए की उद्यमशील महिला तथा मानसिक स्वास्थ्य को अक्षुण्ण रखने में किस तरह के विचारों को धारण करना चाहिए। अबला सबला हो गयी फिर भी पुरूष का धैर्य तथा साहस सम्पूर्ण रूप से उनमें जागृत नहीं हुए है। महिला खासकर ज्यादा भावुक होती है कभी-कभी विशेष रीति से क्षमाकरने से भी नष्ट उठाती है। दैहिक दृष्टि से वह स्वस्थ है बहुत बडी विचक्षणमति है फिर भी कभी-कभी मानसिक समतोलन खो देती है। उद्योग में लग गयी तो उस अवधी में अपना सबकुछ भूलना चाहिए। लेकिन कभी-कभी घर की चिंता उनसे दूर हठती ही नहीं है। कठिन प्रसंगों में घबराजाना सहज है। लेकिन सामान्य स्थिति में भी चिन्ता में डूबी रहनेवाली महिलाओं को हम देखते है।

- दो बच्चों को स्कूल भेजकर स्वयं उद्योग के लिए चलिजाती है लेकिन सोचने लगती है कि अगर उन बच्चों कुछ होगये तो क्या करूँ ।
- पति महाशय अपने काम से छुट्टी लेकर अस्फताल में है उनकी देखभाल करने के बाद स्वयं उद्योग में जानेवाली महिला अनावश्यक सोचती है कि कुछ होगये तो मैं क्या करू। ऐसे विचारों से उनकों मुक्त करना चाहिए तो परिवारवाले तथा सहृद्योगी उन से धैर्य की बाते करते रहना।
- एक महिला जो प्रतिदिन सुबह से श्याम तक थकान महसूस कर रही है तो वह एक ही कारण है अपने परिवार का सुख। अगर वहीं परीवार उसे काम से लौटने

पर जो निरिक्षा से आयी रहती है, तब वह थाने य अपमान की बातें सुनना या मारपीठ इस तरह का नीच बर्ताव का वातारण पैदा होगये तो, उस महिला का जो प्यार परिवार पर रहता है तो वह मानसिक रूप में बदलकर क्रोध से जो कुछ करती है उस महिला को पता ही नहीं चलता की वह क्रोध से भयानक निर्धार अपना लेती है। जैसे - घर से कहीं दूर चले जाना, आत्महत्या करना, या पति से विवाह विच्चेदन लेना, और पर पुरूष पर नजर डालना या संबंध रखना इसलिए वह उद्योगी महिला अपने जीवन में आनेवाले घटनाओं को पूर्ण रूप मे विचार करके सहानुभूति और प्यार से उस क्षण को सुलझाना चाहिए। कभीभी क्रोध की तरफ हमें मुड़ना नहीं चाहिए। यह सच है की महिलाओं के अधिकार पुरूष के बराबर है।

- जो महोलाएँ हर तरह के संबंधों का निर्वाह करते हुए सामान्य पारिवारिक जीवन निर्वाह करती है और भाषणों में संबंधों के विखंडन करने की शिक्षा देने हुए स्त्री स्वतंत्रता की बात करती है। उनकी बात अलग है। जो विद्रोह या परिवर्तन की उस पराकाष्टा तक पहुंच गए कि वे अपने उदाहरण से उस चिंगारी को दिलों में प्रस्थापित कर सकें ।
- दूसरी बात है कि - आत्महत्या कर लेने को अनुचित या स्त्री की मानसिक गुलामी का प्रतीक मान लेना कितना सही है, यह बात परिपक्वता के प्रति शंका उत्पन्न करती है। इसका कारण है आज तो अनेक आत्महत्याएँ इस तरह की घटनाओं को लेकर होती हैं।
- हवाई ज़हाज में उडनेवालि रूपश्री को कभी न सोचना चाहिए की वर्तमान के आसपास में कितनी दुर्धठनाएँ हुई अगर यह सोचे तो उद्यमशीलता के लिए अनई है तब एक मात्र विचार रहना चाहिए कि - " वहीं होता जो मंजूरे खुदा " । यहीं भावना मानसिक स्थिरता को खायं रख सकता है।
- अतृप्तता मानसिक शत्रु है इतना कुछ पाचुकी हूँ और कुछ पाने के लिए मैं क्या करू, तथा न मिले तो कैसे, यह चाहे वेतन के लिए चाहे संभावन के लिए ये विचार आने लगे तो कम में डिलापन आजयेगा । अतः उद्योग, स्वीकार करने से पहले चर्चा करनी चाहिए की मुझे इतना मिलना ही चाहिए।
- किसी भी उदयोगशील महिला अपने उदयोग में लगे तो उन्नत अधिकारियों से

भाय नितांत बना रहता है। तब उस महिला को सोचना चाहिए की गलती के बगैर तो कॉई कुछ कहते ही नहीं अगर गलती होने पर भी आगे के कार्य के लिए मार्गदर्शन के रूप में कुछ बाते सुनना असाध्य नहीं होना चाहिए ।

- अध्यापक वर्गों के लिए कभी-कभी डर पैदा होता है अगर कोई बुद्धिमान छात्र, छात्रा प्रश्न करे तो त्तुर न मिले तो मैं क्या करूँ उस अध्यापकी को मालूम रहना चाहिए की कोई सर्वज्ञ नहीं है छात्र से साफ कहना चाहिए की मैं योड़ा स अध्ययन करके बोलूँगी यह कदापि भी बे इज्जती नहीं है।
- यके मांदे घर लौटनेपर परिवार में उद्योगी महिला को सात्वना तथा सहकार मिलना चाहिए। अशिक्षित परिवार होतो उनको समझाना चाहिए की हाथ से करनेवाले कामों की अपेक्षा मन से करनेवाले काम को ज्यादा थकान गहसूस होता है।

फूल बनकर क्या जीना
एक दिन मुरझा जाओगे
और दफना दिए जाओगे।
जीना है तो पत्थर बनके जि
कभी मूर्ति बन गए तो
भगवान कहला ओगे ॥

पर्यावरण प्रदूषण - एक चुनौती पर्यावरण का महत्व

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मो: ८०५०९७०४३४

पर्यावरण का अर्थ है हमारे चारों ओर का वह वातावरण है जिसमें रहकर जीने के लिए हम सांस लेते हैं| शरीर के तापमान को संतुलित रखने के लिए पानी का उपयोग तथा शरीर को स्वास्थ रखने के लिए भोजन के रूप में खादय पदार्थों का उपयोग करते हैं जो इस पर्यावरण में उपजते और उत्पन्न होते हैं| जब यह व्यवस्था दूषित होती है तो मानव सहित प्राणी-पक्षियों पर तक इसका घातक परिणाम होने लगता है| लेकिन यह भी उतना ही सच है कि, हम ही इस प्राकृतिक व्यवस्था को नष्ट करके सारे जीव और जगत को सर्वनाश की ओर पहुँचा रहे हैं|

आज की स्थिति में पर्यावरण इतना अत्यधिक दूषित हो चुका है कि सांस लेना भी कठिन लगने लगा है। कटते वन, फैलते रेगिस्तानों, अशुद्ध एवं विषैला जल, दूषित वायुमण्डल हमारे दूषित पर्यावरण का परिणाम हैं। विकास के साथ-साथ हमारा विनाश भी बढ़ता जा रहा है। इसका स्पष्ट कारण यही है कि हम उस पर्यावरण की रक्षा नहीं कर पा रहे हैं। जिसका सीधा संबंध हमारे जीवन से जुडा है।

आज पृथ्वी, पानी और वायु में विष घुल गया है। संसार की आबादी तेजी से बढ़ती जा रही है। पर्यावरण प्रदूषण भी उतनी तेजी से बढ़ता जा रहा है। हमें अभी से पर्यावरण, प्रदूषण को नष्ट करने के लिए ठोस कदम उठाने होंगे।

हमें धुल, धुआं, दुर्गन्ध और शोर पर काबू पाना होगा। जिन-जिन यंत्रो अवर वाहनों से पैदा होते है उनको नियंत्रण में रखना होगा। वायुमण्डल में आग, गैस, गंध, परमाणु के कण और रेडियो धर्मी पदार्थ तेजी से जमा होने लगेंगे तो इस वायु में हम कितने दिन तक जी सकेंगे कह नहीं सकते।

प्रदूषण के स्त्रोत:-

1. धुल, धुआं और दुर्गंध फैलानेवाले साधन कोयला, अनिल, पैट्रोल इत्यादि।
2. बारूद से चलनेवाले शस्त्र तथा आतिशबाजी, बंदूक, पिस्तौल आदि।
3. परमाणु-शक्ति से चलनेवाले कारखानें तथा परमाणु, बिजलिघर, परमाणु-विस्फोट और परिक्षण।
4. विभिन्न प्रकार के रासायनिक पदार्थ, रासायनिक खादय तथा कीटनाशक औषधियॉ बननेवाले कारखाने।
5. इन सबका घातक प्रभाव मानव पर, जानवरों पर वनस्पति पर और संपूर्ण पर्यावरण पर पड़ रहा है। आज कोई भी वस्तु एसी नहीं है जिसमें विष या मिलावट मौजुद न हो। हर चीज में जहर घुला हुआ है। यह जहर पानी, भोजन और सॉसो के साथ हमारे बदन में जा रहा है। तरह-तरह की घातक बीमारिया पैदा कर रहा है। हम सब जहर पी रहे है। कोई भी घर आज रोग से खाली नहीं है, आज अस्पताल रोगियों के जंगल बन गये है। इसकी जानकारी आम आदमी तक पहुँचाना जरूरी है, जनचेतना भी पैदा करना है।

पर्यावरण प्रदूषण का अंत दो तरह के उपायों से हो सकता है।

1. प्रदूषण का निराकरण।
2. प्रदूषण की रोखथाम करना।

पहला इलाज करना है दूसरा गंदे नालों को तालाबों और नदियों में नहीं जाने देना। तालाबों में गन्दी चीजें जाने से रोकना। सरकार द्वारा बड़े पैमाने पर परियोजनाएँ बनाना और नदियों, तालाबों को साफ करना अभियान के स्तर पर।

शोर पैदा करनेवाले यंत्रों पर काबू रखना। पठाके और आतिशबाजी नहीं छोडना आदि। पर्यावरण प्रदूषित करनेवालों को दण्ड देना इत्यादि।

दूसरा उपया है बचाव करना। अर्थात ऐसे कदम उठाये जाये कि प्रदूषण पैदा ही न हो या कम पैदा हो। जैसे परमाणु-परीक्षण पर रोक लगाना, परमाणु-बिजलीघर नहीं लगनाा। गैस बनानेवाले कारखानों में गैस रिसने से रोकने का पक्का प्रबंध करना। व्यक्तिगत स्तर पर हर घर को सदा साफ सुथरा रखना। जंगल काटने पर कानूनी रोक लगाना। अधिकाधिक नए पेड-पौधे लगाना, बाग बगीचे बढ़ाना इत्यादि।

आज इसी महत्व को जानते हुए पर्यावरण के महत्व के बारे में प्राथमिक स्तर की शिक्षा से लेकर स्नातक तक की शिक्षा पाठ्क्रम में इसको एक अनिवार्य विषय के रूप में पढ़ाकर लोगों में जागृति पैदा करने का काम किया जा रहा है। पोस्टर और नुक्कड नाटकों, समचार पत्रों, फिल्मों में विज्ञापन द्वारा पर्यावरण शिक्षा देनी चाहिए। सरकार को पर्यावरण संरक्षण के लिए अभियान के तौर कार्य करना चाहिए।

वायू प्रदूषण जल प्रदूषण और ध्वनि प्रदूषण पर हमें रोकथाम करना बहुत जरूरी है। वरना आनेवाले विनाश के हम स्वयं उत्तरदायि होंगे।

पृथ्वी के पर्यावरण को सबसे ज्यादा नुकसान बंमों की परिक्षण से हो रहा है। परमाणु बम को बले ही हम किसी गहरे समुद्र में अथवा निर्जन जमीन पर गहराई में परिक्षण क्यों न करें उससे पर्यावरण में जहरीलपान आता ही है। समुद्र में समुद्र जीवों का नाश होता है और पानी जहरीला होने पर जब गर्मी पाकर भाप बनकर बरसता है, तब बारिश का पानी उस क्षेत्र को वहाँ

के जीवन तथा वनस्पति को हानी पहुंचाता है। बीमारियों को जन्म देता है, अन्न, फल-सब्जी में जहरीलेपन का असर पड़ता है, जहॉ ऐसी बारीश होती है या होगी।

हमारे देश में अति प्राचीन काल से पवित्रता, शुद्धि, स्वच्छता को जीवन के हर क्षेत्र में व्यापक महत्व दिया गया है। घर आंगन को गोबर से पोतकर और पानी से धोकर अथवा पोंछा लगाकर शुद्ध, स्वच्छ रखा जाता था।

प्रदूषण न केवल हमारे पर्यावरण पर बल्कि सारे भूमण्डल और आकाश को भी अशुद्ध बनाता है। चांद, मंगल तथा शुक्र पर घर बसाकर रहने की बजाय पृथ्वी को भरपूर संवारने की जरूरत है। पृथ्वी पर हजारों, लाखों वर्ग किलोमीटर जमीन उबड़-खाबड़ और निर्जन पडी है। हम परमाणु शक्ति के सदुपयोग से उसे उर्वरा तथा उर पर मानव बस्तियों का निर्माण कर सकते हैं। हरियाली पैदा करके पृथ्वी के पर्यावरण को सुधार सकते हैं।

अरबों की धनराशी खर्च करके बननेवाले कृत्रिम गृह, यान धरती के मनुष्यों को घर भोजन तथा कपडे, स्वास्थ्य शिक्षा आदि जीवन के लिए जरूरी चीजों नहीं दिला सकते। तरक्की के नाम पर मानव समुदाय के कल्याण को नकारा नहीं जा सकता है।

पशु जगत की अनदेखी, वनस्पति जगत से लापरवाही और जमीन से दुराव क्या हमारे लिए घातक नहीं? भटकनेवाली बात नहीं? केवल पर्यावरण को बचाने का प्रश्न नहीं है बल्कि करोड़ो वर्षों से विकसित मानवता तथा मानव समाज की संस्कृति-सभ्यता को बचाना भी जरूरी है। यदि हम अपनी ही हरकतों से विकास को विनाश में परिवर्तित कर देंगे तो किसी और को अथवा प्रकृति को उलाहना देना व्यर्थ होगा।

स्त्री विमर्श के विविध पक्ष

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होने का आरोप भी लगाया गया जबकि भारत की परिस्थिति स्त्री के अधिकारों के प्रति उर्बर भूमि तैयार करती है। वैसे भी कोई भी विचार कहीं भी जन्म ले, फर्क नहीं पड़ता यदि वह विचार हमारी सामाजिक परिस्थितियों के अनुकूल है तो इस परिप्रेक्ष्य में देखे तो स्त्री के अधिकारों की लड़ाई देशी लड़ाई प्रतीत होती है। जो विद्वान स्त्री-विमर्श को पश्चिम के देन मानते हैं वे यह भूल जाते हैं कि पश्चिम में स्त्री आन्दोलन को साम्राज्यवाद से संघर्ष नहीं करना पड़ा जबकि भारत के स्त्री आंदोलन को समाज्यवाद से संघर्ष करना पड़ा | स्वतन्त्रता के बाद साम्रज्यवाद से संघर्ष की प्रकि्या में जो महिला संगठन आये उनके पास आजाद हिन्दुस्तान का सपना भी था।

स्त्रियों की माँगों एवं अधिकारों को लेकर संघर्ष करने एवं कुर्बानियाँ देने का जज़्बा भी था। अतः स्त्री अधिकारों पर बात करते समय यह तथ्य हमेशा ध्यान में रखना चाहिए कि भारतीय स्त्री-विमर्श विदेश से आयातित नहीं है। यदि आयातित होने का आरोप स्त्री-विमर्श पर लगाया जा सकता है तो फिर हिन्दी साहित्य की प्रगतिवादी विचारधारा (1936) पूरी की पूरी विदेशी (पेरिस) से आयातित है। (1935 ई. में पेरिस में विश्व के लेखकों की एक संस्था बनी 'प्रोग्रेसिव आर्ट ऐसोशियशन' जिसका उद्देश्य जनवादी ताकतों को संगठित करना था । भारत में इसी लक्ष्य को लेकर 1936 में 'प्रगतिशील लेखक संघ' की स्थापना हुई।

प्रगतिशील आन्दोलन हमारे देश की परिस्थिति के अनुकूल था यहीं बात स्त्री-विमर्श के विषय में भी सही बैठती है क्योंकि हमारे देश ने अपने परिवेश एवं परिस्थितियों के अनुकूल उसे ग्रहण किया, इस लिए इसे हम अपने देश की उपज़ मानते हैं। स्त्री आन्दोलन एवं स्त्री साहित्य इस लिए पैदा हुआ क्योंकि हमारे समाज में स्त्रियाँ है और उनकी समस्याएं भी। जब स्त्रियाँ होगी तो उनका साहित्य भी होगा, संगठन भी होगा और अधिकार भी होगे।

स्त्री शोषण के कुछ भी कारण रहे हो, सामाजिक, राजनीतिक, आर्थिक, मनोवैज्ञानिक, भाषायी, सभी एक-दूसरे से पृथक होते हुए भी भाषा के माध्यम से एकजुट हुए। भाषा के माध्यम से एक- दूसरे को जाना और समझा। पुरुषों ने जिस संदर्भ में उसे बांधना चाह बांधा, मसलन स्त्रियों की कोटियाँ बना डाली, जैसे स्त्री अबला है या फिर काली है, दुर्गा है यानि कमजोर या फिर ताकतवर। दूसरा मत है कि स्त्री-पुरुष समान हैं शिव और शक्ति की तरह, एक सिक्के के दो पहलू की तरह, गाड़ी के दो पहियों की तरह। यह सब कहने और सुनने में अच्छा लगता है किन्तु स्त्रियों की स्थिति जस की तस बनी हुई है। स्त्रियों ने अपनी बात कहना तो सीख लिया है किन्तु वर्चस्ववादी सत्ता इसे स्वीकार नहीं पा रही है या कहे जो स्वीकार्य है उसका दायरा बहुत सीमित है।

स्त्री-विमर्श के अन्तर्गत अनुभववाद की महत्ता सर्वस्वीकृत है। लेखिकाओं में अनुभव व अनुभूति की महत्ता को

सर्वप्रथम महादेवी वर्मा ने रेखांकित किया। महादेवी वर्मा ने 'काव्य-कला' शीर्षक निबन्ध में लिखा है कि – "अपने विषय पर केन्द्रित होकर उसे जीवन की गहराई तक ले जाना अनुभूति का लक्ष्य रहता है इसी से हमारी व्यक्तिगत अनुभूति जितनी निकट और तीव्र होगी, दूसरे का अनुभूत सत्य हमारे समीप उतना ही असंदिग्ध होकर आ सकेगा।" इन अखण्ड अनुभूतियों के पीछे हमारे मन में एक व्यापक संवेदनात्मक धरातल रहता है काव्य इसी को स्पर्श कर संवेदनीयता प्राप्त करता है। हिन्दी साहित्य में स्त्री साहित्य की एक बहुत बड़ी खूबी है कि वहाँ अनुभूति को प्रमुखता देते हुए भी यथार्थ से अपना रिश्ता नहीं तोड़ता। स्त्री कविता की ओर क्यों उन्मुख हुई इस प्रश्न का जवाब देते हुए 'दूसरे सप्तक' की कवियत्री शकुन्तला माथुर कहती हैं- "नारी का सुख उसी घर गृहस्थी तक सीमित है यह मैं नहीं मानती। ग्रहस्थी के साज-संवार के बाद भी वह पूरा संतोष नहीं कर पाती, उसे लगता है जैसे वह अपूर्ण है।उसकी सांसारिक एवं व्यवहारिक

सुख-साधना की पूर्ति होने पर भी वह एक सामाजिक अभाव महसूस करती है और वह है मानसिक विकास का। घर में रहकर वह अपनी प्रत्येक इच्छा पूर्ति करती है किन्तु फिर भी मानसिक क्षेत्र में पैर फैलाने का अवसर उसे घर की चारदीवारों में प्राप्त नहीं हो पाता। इसीलिए सब प्रकार का सुख होते हुए भी इस अभाव की पूर्ति उसे काव्य में मिली .....काव्य का माध्यम मैंने इसीलिेए अनायास अपना लिया और इसे अपनाकर मुझे इतना सुख मिला कि मेरे शेष अभावों की पूर्ति हो गई।"(दूसरा सप्तक सं अज्ञेय पृ.44)

यह शकुन्तला माथुर का अनुभव में लिपटा हुआ यथार्थ है। स्त्री के इसी अनुभव की प्रमाणिकता के बारे में महादेवी वर्मा 'श्रृंखला की कड़ियाँ' में बहुत पहले कह चुकी हैं- "पुरुष के द्वारा नारी चित्रण अधिक आदर्श बन सकता है

परन्तु अधिक सत्य नहीं, विकृति के अधिक निकट पहुँच सकता है किन्तु यथार्थ के अधिक समीप नहीं। पुरुष के लिए नारीत्व अनुमान है, नारी के लिए अनुभव, अतः अपने जीवन का जैसा सजीव चित्र वह हमें

दे सकेगी वैसा पुरुष बहुत साधना के उपरान्त भी शायद ही दे सके।"(श्रृंखला की कड़ियाँ. पृ.66)

भले ही महादेवी वर्मा ने स्त्री क्षेत्र को पुरुषों के लिए वर्जित क्षेत्र नहीं माना, मानना भी नहीं चाहिए क्योंकि लेखक स्वतन्त्र होता है। उसे प्रत्येक विषय पर लेखनी चलाने का अधिकार है किन्तु अब सौंदर्य के प्रतिमान बदल चुके हैं।

आज सौंदर्य सुरा और सुराही, कटि और कामिनी से बाहर निकलकर अनुभवजगत के खुरदरेपन से टकराने लगा है और

यह यथार्थपरक खुरदरापन उभरता है 'स्वानुभूति से', 'अनुभूव की प्रमाणिकता' से। आदर्श का इस समय कोई

मूल्य नहीं। अब स्त्री को अपने मन-मुताबिक सजी-संवरी गुड़िया बनाकर ड्राईंग रुम सजाने का समय नहीं रहा। अब उस

गुड़िया ने बोलना सीख लिया है, सिर्फ बोलना ही नहीं, प्रश्न करना भी सीख लिया है।

ऐसा कहकर तथाकथित कुछ पुरुषों की ईमानदारी पर शक नहीं करना चाहते। स्त्रियों की समस्याओं को कुछ पुरुषों ने

बेहतर ढंग से समझा है और वाणी भी दी है। उदाहरण के तौर पर- आचार्य महावीर प्रसाद द्विवेदी और रघुवीर सहाय।

किन्तु पुरुष चाहे कितने ही ईमानदार हो उनकी भूमिका 'हमदर्द' से अधिक नहीं हो सकती। स्त्री देह के बारे में बोलाना आसान है खासकर पुरुष होकर बोलना और भी आसान है किन्तु उसकी देह के बारे में उसकी तरह बोलना आसान नहीं। स्त्री के प्रति पुरुष का अनुभव चुकि देह और आत्मा के दमन से शुरु होता है इसलिए अनुभव की एकान्वित संभव नहीं इसीलिए पुरुष की भूमिका विपक्ष में खड़े होने की हो जाती है।

स्त्री-विमर्श की सशक्त हस्ताक्षर मृदुला गर्ग ने स्त्री की तीन छवियों को रेखांकित किया है- 1.देवी,

2.प्रेयसी, 3.ग्रहणी। इन तीनों रुपों में बंधने के बाद भी स्त्री का शोषण होता है। मृदुला गर्ग कहती हैं- "जैसे ही चित्रण पुरुष से हटकर स्त्री पर आता है। साहित्यिक विरासत और स्त्री की मादा छवि उन पर हावी हो जाता है। वह उसका वर्ग, परिवेश, काम, पेशा, सब भूल जाते हैं और याद रहता है केवल यौन-उत्पीडन और यौन शोषण..... समस्या है तो शील की, शील की रक्षा और शील पर आक्रमण की।"(स्त्रीवादी साहित्य विमर्श, जगदीश्वर चतुर्वेदी पृ.189) स्त्री साहित्य के अन्तर्गत स्त्री रचनाकारों के दो मत देखे जा सकते हैं। एक वर्ग ऐसी लेखिकाओं का है जो 'स्वतन्त्र महिला लेखन'

या 'स्त्रीदृष्टि' नाम से वर्गीकरण को स्वीकार नहीं करती। पितृसत्तात्मक या वर्चस्ववादी नजरिये का ही यह प्रभाव है कि स्त्री अपने को स्वतन्त्र देखने की सामर्थ्य पैदा नहीं कर पा रही है। जबकि यह सही है कि स्त्री की चेतना या दृष्टि पुरुष से स्वतन्त्र ही नहीं भिन्न भी है। लेकिन कुछ प्रतिष्ठित लेखिकाएं अपने आपको स्त्री लेखिका की कोटि में रखे जाने का विरोध करती हैं जैसे महाश्वेता देवी, निर्मला जैन, मृदुला गर्ग इत्यादि। जबकि स्त्री की स्वतन्त्र दृष्टि होती है, संस्कृति होती है, इतिहास दृष्टि और इतिहासबोध होता है तथा स्त्री की अनुभूतियाँ पुरुष से एकदम पृथक होती हैं और स्त्री को यह भिन्नता सामाजिक, सांस्कृतिक परिस्थितियों की देन है।

इसके विपरित स्त्री रचनाकारों का एक वर्ग ऐसा भी है जो स्त्री-पुरुष की भिन्न-भिन्न दृष्टियों की ओर ध्यान खीचता है। स्त्री समालोचक प्रभा खेतान स्त्री एवं पुरुष के बीच दृष्टिकोणगत अन्तर को स्वीकार करती है। वे अपने निबन्ध 'नारी का आत्मसंघर्ष' में लिखती हैं- "स्त्री लेखन और पुरुष लेखन में फर्क होता है और रहेगा.....क्योंकि स्त्री और पुरुष आज भी इस पितृसत्तात्मक समाज में जैविक, आर्थिक, सामाजिक धरातल पर भिन्न है।"(हंस-जून 1994 पृ.65)

पितृसत्तात्मक समाज अपने वर्चस्ववादी मूल्यों से बाहर नहीं आना चाह रहा है, यही वजह है कि प्रतिरोध का साहित्य(स्त्री साहित्य) और वर्चस्ववादी साहित्य (पुरुष साहित्य) एक दूसरे के साथ नहीं,एक दूसरे के सामने खड़ा दिखाई दे रहा है। जब तक इस पुरुषोचित दुराग्रह की दीवार गिराई नहीं जायेगी तब तक यह वैमनस्य चलता ही रहेगा। इस वैमनस्यता के चलते स्त्री साहित्यकारों पर अनेक दोषारोपण भी किये जाते रहे हैं जैसे- भाषा में साहित्यिकता का अभाव, स्त्रियों की भाषा को चूल्हा-चौंका की भाषा कहकर हवा में उड़ाने की कोशिश की जाती रही है। यहाँ एक बात कह देना आवश्यक जान पड़ता है कि भाषा अनुभव जगत का अनुसरण करती है, जिसका अनुभव संसार जैसा होगा, विचारों के साथ-साथ शब्द, बिम्ब, प्रतीक, उपमा भी वही से आयेगे। स्त्रियों की भाषा पर जनानेपन का आरोप भी लगाया जाता है। पुरुष भाषा और स्त्री भाषा के विषय में 'हीथ' कहते हैं- "पुरुषों का स्त्रीत्ववाद अन्ततः एक मर्दाना काम ही है। स्त्री देह के रुप में स्त्री का अनुभव करना,पुरुष के रुप में अनुभव करने से भिन्न अनुभव होता है। किसी कृति को स्त्री के रुप में पढ़ना भी एक अलग पहचान को बनाता है। स्त्रीत्ववाद स्त्री के इन्ही एकान्तिक अनुभवों को पुरुष लिंगी भाषा से भिन्न भाषा में अभिव्यक्ति का पैरोकार है। अब तक की उपलब्ध भाषा पुरुष की भाषा है जिसमें स्त्री की तरह सोचा या अभिव्यक्त नहीं किया जा सकता है। स्त्री के लेखन को स्त्री-विमर्श के रुप में स्थापित करने में वे विशेषांक उल्लेखनीय हैं जिनमें सिर्फ स्त्री लेखन ही स्थान पा सकी हैं।"

मैं एक बात कहना चाहूँगी कि भाषा जनानी या मर्दानी नहीं होती, भाषा परिस्थिति विशेष के अनुरुप भाव ग्रहण करती है। और जितने भी आरोप है सब पुरुष वर्चस्वता के चलते हैं। जब तक यह बात नहीं समझी जायेगी कि लेखक-लेखक होता है नर या मादा नहीं तब तक यह विवाद चलता रहेगा। प्रभा खेतान वर्चस्ववादी पुरुष मानसिकता के विषय में दो टूक कहती हैं- "साहित्य में पुरुष मूल्यों की वर्चस्वता ने कभी लेखन का सहज विकास अवरुध्द ही हुआ है। जबकि साहित्य वह क्षेत्र है जहाँ हम सबसे अधिक

मानवीय मूल्यों की बात करते हैं, सहयोग और साझेदारी की कामना करते है, जीवन की त्रासदी को व्यक्त करने वाला लेखक स्त्री के प्रति जाने अनजाने अपने पुरुषोचित दुराग्रहो से मुक्त नहीं हो पाता।" (हंस-जून 1994-पृ.सं 66-67)

स्त्री लेखन एवं स्त्री-विमर्श के साथ एक प्रश्न और जोरों से सामने आया-'स्त्री देह की मुक्ति' आखिर किस तरह की मुक्ति ? इस देह की मुक्ति से स्त्री का कौन सा भला होने वाला है? और जो लोग इस मुक्ति की बात कर रहे हैं शायद उनका अवश्य कुछ भला होने वाला हो। पूर्वी भारत में एक कहावत है- "खरबूजा चाहे चाकू पर गिरे या चाकू खरबूजे पर अन्ततः कटना खरबूजे को ही है।"
और स्त्री उसी खरबूजे के समान है जिसे दोनों परिस्थितियों में कटना ही कटना है और पुरुष चाकू के समान...

देह की मुक्ति का प्रश्न बड़ा जटिल प्रश्न है जिसके कह देने मात्र से समाधान नहीं खोजा जा सकता। स्त्री आखिर किस तरह अपनी ही देह से मुक्त हो सकती है और फिर स्त्री देह की कुछ भिन्न बुनावट भी है जैसे- 'प्रजनन क्षमता' जो देह से जुड़ा हुआ सवाल है जिससे अनेक सवाल खड़े हो जाते हैं- जैसे गर्भधारण, प्रसव बच्चे, पालन-पोषण और फिर हमारी पितृसत्तात्मक सोच के चलते पिता के नाम की भी समस्या खैर, यह बहस का दूसरा विषय है जिस पर गंभीरता से सोचने की जरुरत है।

देह की मुक्ति की अपेक्षा स्त्री की मुक्ति की बात हम कह सकते हैं। यहाँ भी एक प्रश्न खड़ा होता है कि 'स्त्री की मुक्ति' से क्या तात्पर्य है? क्या पुरुषोचित गुणों को स्वीकार कर लेना स्त्री मुक्ति है? कदापि नहीं है। स्त्री की अपनी प्राकृतिक विशेषताएं हैं, परन्तु सामाजिक मानदंडों ने जो शर्मनाक स्थिति पैदा की है वे स्त्री को मात्र स्त्रीत्व के बंधन में बाधते हैं। स्त्री के खोल से बाहर कर मनुष्यत्व की दिशा में अग्रसर होना स्त्री मुक्ति है। स्त्री का मनुष्य के रुप में प्रकाशित हो सकना, अपनी सम्पूर्णता में जी सकना, मनुष्य जाति के बचे रहने की शर्त है। स्त्री मुक्ति का प्रश्न दरअसल स्त्री अस्मिता का प्रश्न है। स्त्री की अस्मिता की लड़ाई आधी दुनिया को मनुष्य का दर्जा दिलाने की लड़ाई है।

उपर्युक्त विवेचन के आधार पर यही कहा जा सकता है कि स्त्री की अपनी स्वतन्त्र दृष्टि है, होनी भी चाहिए। जब तक हम अपने आपको, अपनी समस्याओं को और उन समस्याओं से जूझने की शक्ति को अपने अन्दर महसूस नहीं करते तब तक हमारी अपनी कोई समझ, विचारधारा, दृष्टिकोण या पहचान नहीं होगी |

स्त्रीविमर्श

स्त्री ☙ डॉ. मिलन एस. कांबळे
प्राध्यापिका
श्रीमती पीलू होमी ईरानी महिला महाविद्यालय, गुलबर्गा
मो: ९४४९५०६६५५

स्त्री आधार शक्ति का अवतार है। समाज का अभिन्न अंग है। भारतीय नारी ने वस्तुतः यह महत्ता अपने असीम त्याग, अपने पतिवृत धर्म, अपनी दया और दानशीलता, सेवाभाव के

कारण प्राप्त की है। आज स्त्री का कार्यक्षेत्र घर तक ही सीमित न होकर सामाजिक भी बन गया है। आज स्त्री अपने को पुरुष के समक्ष समझती है। आधुनिक स्त्री शिक्षित आत्मनिर्भर होते हुए भी अपने लिए अलग अस्तित्व की खोज कर रही है। बदलते सामाजिक परिवेश के अनुकूल वह अपने को बदलने की कोशिश कर रही है।

हमारी भारतीय समाज में आदिकाल से ही पुरुष, नारी, शक्ति स्वरूप देवी की पूजा-अर्चना 'या देवी सर्वभूतेषु' रे मंत्रोच्चारण से करते आ रहे हैं; लेकिन जब किसी औरत के मान-मर्यादा की बात आती है, तब वे विदक जाते हैं। इस दोहरेपन का श्रेय बहुत हद तक हमारे 'मनुस्मृति' और अन्य उस तरह के शास्त्रों को जाता है जिसमें नारी को घर की सजावट और पुरुषों के मन बहलाने का खिलौना माना गया है। अन्यथा पॉचाली दॉव पर नहीं लगती, सत्य हरिश्चंद्र अपने दान की दक्षिणा चुकाने अपनी स्त्री, शव्या को नहीं बेचते, राम द्वारा सीता की अग्नि-परीक्षा नहीं ली जाती। हमारे शास्त्रों में इस तरह की कहानियॉ या किस्सों से यह साफ जाहिर होता है कि उस समय हमारा समाज कितना मनुवादी था।

आधुनिक परिवेश में नारी शिक्षित होकर ज्ञानर्जन तो कर रही है। पारिवारिक व परंपरागत मूल्यों को अपनाने के कारणवह बाहर निकलकर पुरुषों के समकार्यक्षेत्र में आगे बढने में अपने को असमर्थ मानती है। सदा किसी डर के कारण वह अपने आप कुंठित है। पर अनावश्यक डर सदा खतरनाक है। नारी को निडर व आत्मविश्वास के साथ आगे बढना चाहिए। तभी वह अपने लक्ष्य तक पहुँच पायेगी। सुरेंद्र वर्मा के 'मुझे चांद चाहिए' उपन्यास में वर्षा के पिता नौकरी करना परंपरा के खिलाफ मानकर उसकी शादी कराना चाहते है तो वर्षा कहती है- "वंश में किसी लडकी ने नौकरी नहीं की। वह आगे भी न करे, यह जरूरी नहीं है। मैं ब्याह नहीं करूँगी भले चाहे मारो, चाहे कूटो।"

आधुनिक नारी किसी पर निर्भर रहना नहीं चाहती है। समाज में जो परंपरागत रूप है जैसे पिता, पति या पुत्र के द्वारा बताये गये रास्ते पर ही जाना उसे पसंद नही आता है। वह अपने एक अलग अस्तित्व की पहचान हेतु तडपती है।

शिक्षा के बलभूत स्त्री आत्मनिर्भर बन रही है पर परंपरागत मान्यताएँ एवं मूल्यों को धीरे-धीरे नकार रही है। पहले स्त्री कभी अपने अलग अस्तित्व के बारे में सोचती तक नहीं। पारिवारिक अस्तित्व में उसका भी व्यक्तित्व मिला हुआ था। पर आज स्त्री पारिवारिक कर्तव्य को निभाते हुए भी अपनी अलग पहचान के लिए तडप रही है।

स्त्री का क्षेत्र पहले सीमित था। विवाह के पूर्व मॉ का घर, विवाह के पश्चात ससुराल इन दोनों जगहों ही स्त्री का कार्यक्षेत्र था। इसमें वह अपने को संतुष्ट एवं सुरक्षित मानती थी।

स्वतंत्रता के बाद शिक्षा, तकनीकी विकास के कारण स्त्री के विचार में काफी परिवर्तन आया है। विवाह के पश्चात स्त्री सिर्फ घरेलू काम में पडी रहना पसंद नहीं करती।

परवर्ती ब्राम्हण साहित्य में भी कहा गया स्त्रीयॉं अपने पति और पुत्र की निगरानी में ही सुरक्षित रह सकती है। ठीक यही बात बौद्ध साहित्य में स्त्रीयों की मूल, भूमिका, पति की विश्वासी सेवीका थी। इस तरह स्त्री जाती की पीडा और वेदना कभी कम न थी, आज भी नहीं है। जब कि हम २१ शताब्दी में प्रवेश का दावा करते हैं। जहॉं खाने, पीने उठने बैठने, हर काम में आधुनिकता झलकती है, फिर भी आज स्त्रियॉं, पुरुषों का उत्पीड़न झेलती हैं। ऊँची-ऊँची दीवारों के भीतर, घरों में हर चीज के रहते हुए, सन्नाटे के साये में खामोश जीती हैं। उन्हें बच्चों और पति के फैलाव के अलावा और कुछ सोचने का अधिकार नहीं मिला है। उनकी पीडा, आकाश की तरह है, जिसका कोई ओर-छोर नहीं होता। फिर भी अपने पति को खुश रखने के लिए, झुठी मुस्कान को लिहाफ की तरह ओढकर पति के सामने खडी रहती है। अपनी भावनात्मक उजाडपन को, महसूस करने के बावजूद आंॅखों के आँसू को टपकने नहीं देती, बल्कि उसे पी जाती है। अपने जीवन की लक्ष्यहीन त्रासदी को भली भॉंति जानती हुई भी अपने बेजान कॅपकपाती पहचान को बनाये रखने की नाकामयाब कोशिश में लगी रहती है। खुद को टुकडे-टुकडे में बॉटते देख मन-ही-मन बिफरती रहती है, लेेकिन किसी भी हाल इसका मुकाबला करने की कोशिश नहीं करती। पंखहीन पक्षी की तरह छटपटा कर रही जाती है। परिवार के सभी सदस्यों को अपनी सेवा से खुशी देनेवाली नारी, भीतर कितनी अकेली है, परिवार का कोई सदस्य, जानने तक का जुर्रत नहीं करता।

शायद पुरुषों को यह समझ अभी तक नहीं आई या आई भी तो मानने के लिए तैयार नहीं है, कि जब तक स्त्रियों को समाज में उचित मान-सम्मान और पुरुषों के बराबर का दर्जा नहीं मिलेगा, स्त्री, शिक्षा और आर्थिक उत्थान से दूर रहेगी और जब तक यह नहीं होगा, तब तक हमारा समाज पिछडा रहेगा। खुशी की बात हैं कि आजकल पुरुषों के द्वारा भी, कविता, कहानी के जरिए स्त्रियों की दयनीय अवस्था को महसूस करने की कवायद शुरु हो चुकी है। जिस दिन स्त्री-पुरुष के बीच की अधिकारिक भिन्नता मिटेगी, बेटियों को भी बेटे की तरह पिता के धन में बराबर का हिस्सा मिलना शुरु होगा। उसी दिन पालकी और अर्थीवाली कहावत खत्म हो जायेगी।

"शरण के विचार उल्लेखनीय है, नारी मनुष्य की सबसे बडी शक्ति है। वह उसके अधुरे जीवन की पुरक होती है। उसे पाकर सभी अभाव स्वयमेव भर जाते है। वह उसके अंधकारमय जीवन को आलोक भर देती है। यदि वह न हो, तो मनुष्य का जीवन शुष्क हो जाता है।"

हिन्दी साहित्य मे नारी चरित्र के विविध आयाम रीतिकाल तक

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हिन्दी साहित्य मे स्त्री विमर्श 1960 के बाद शुगबुगाने लगता है पर ऐसा नहीं की इससे पहले स्त्री का साहित्य से कोई सरोकार ही नहीं रहा,आदिकाल से ही उपलब्ध रचनाओ मे हम देखते हैं की स्त्री कहीं न कहीं आधार या आलम्ब रूप मे हिन्दी साहित्य मे बनी रही ये बात और है की आज की तरह इतने व्यापक स्तर पर एक दो नामों के अलावा (आंडाल, मीरा, बावरिसाहिबा) उसकी वेदना सवेदना को स्वम स्त्री द्वारा ही दर्शाया नहीं गया था क्यूँ की हमारा विपुल साहित्य पुरुषों द्वारा रचा गया साहित्य है और जहां भी जिस भी तरह उन्होने स्त्री चरित्र को दर्शाया है वहाँ उनकी पुरुषवादी दृष्टि ही कहीं न कहीं हावी रहती है चाहे वह उनके आदर्श रूप का बखान करते करते उससे देवी बना दे या उसे विकास मार्ग मे बाधक दिखाये या भले ही उसकी सुंदरता का बखान करे ।ऐसा लगता है की चार पाँच साँचे बना के रख दिये गए हो और हर कोई एक साँचा ले रहा है। कुछ गिने चुने लोग दो तीन साँचे भी ले ले रहे पर कोई भी स्त्री को पूरी तरह नहीं देख रहा न हीं साहित्य मे दिखा रहा ।

अब एक सरसरी निगाह डाली जाए तो जिनका नाम जप के हिन्दी साहित्य अपनी महानता स्थापित करता है वह भी स्त्री पर एकांगी दृष्टि ही डालते हैं। सबसे पहले आदिकाल मे देखें तो वहाँ स्त्री साहित्य मे सिर्फ आश्रयदाताओं की नायिका ही बनी रही ,आगे विद्यापति भी भक्ति,नीति और श्रिंगार पर पद तो रचते है परंतु स्त्री के विषये मे वो वयः संधि,प्रणयकेली, नखशिख वर्णन,सद्दयह स्नाता आदि यही तक उनकी दृष्टि रमी है ।

भक्ति काल मे सुर तुलसी जायसी और कबीर ने भक्ति की जो धारा बहाई है उससे भक्तिकाल तो हिन्दी साहित्य का स्वर्ण यूग हुआ पर सुर को छोड़ कर किसी ने भी स्त्री को पूर्ण रूप मे नहीं देखा ,सुर के साहित्य मे जहा स्वच्छ रूप से मनोवैज्ञानिक दृष्टिकोण से गोपियों और राधा का वरणान किया गया है वह पुरे रीतिकाल तक किसी भी साहित्यकार की रचना मे नहीं दिखता एक प्रेमिका का प्रेमी जब किसी अन्य स्त्री से बात करता है तो उसे होने वाली इर्ष्या ,प्रेमी के छोड़ के चले जाने और कोई खोज खबर न लेने पर दिये जाने वाला उपालंभ , खरी खोटी सुनना और फिर भी अनन्य प्रेम होने के कारण अपने प्रेम मार्ग से डिगने वाले को तर्क दे कर उसे ही धराशायी कर देना(उद्धव को) यह सब शुद्ध

मानवीय धरातल पर घटित होने वाली स्वाभाविक बातें हैं जबकि कबीर तुलसी जायसी मे ऐसा नहीं मिलता ।

कबीर जो की नितांत फक्कड़ स्वभाव के व्यक्ति हैं ,वो या तो चीजों को स्वीकार करते ये या एक सिरे से नकार देते हैं चाहें वो जाति हो,धर्म हो,परिवार हो या ईश्वर का ही कोई स्वरूप क्यों न हो पर स्त्री के मामले मे उनकी भी स्वार्थी दृष्टि ही दिखती है क्यूँ की एक ओर तो वो नारी को नरक का द्वार कह रहे ,नारी को तीन सुख नस्ट करने वाली कह रहे (नारी नासावे तीन सुख..... भगती,मुकती,ज्ञान)कंचन कामिनी से बचने को कह रहे और दूसरी ओर अपने निराकार राम से मिलने केलिए वो खुद को स्त्री रूप मे ढालने की बात करते हैं :

"दुलहिन गवाहु मंगलाचार

हमी घर आए हो राजा राम भरतार "

इसके अतिरिक्त जहा ईश्वर से तादात्म्य की बात आती है वहाँ उनke स्त्री होने की लालसा ध्वनित होती है :

"लाली मेरे लाल की , जीत देखूँ उत लाल।

लाली देखन मई गई , मई भी हो गई लाल ॥"

ये कैसी दोहरी मानसिकता है की जो बुरा हो तो तेरा अच्छा हो तो मेरा । इसी तरह जायसी भी पद्मावत मे या तो पद्मावती के रूप का बखण करते है या वर्ष भर नागमती से वियोग करवाते हैं और तुलसी के लिए भी सीता अच्छी है क्यों की वो पत्नी धर्म का पालन करती हैं और यह पत्नी धर्म भी पुरुषो के बनाए समाज की मर्यादा है। तुलसी का पक्षपात वहीं नज़र आ जाता है जब राम के पक्ष मे वो दलित केवट को देखते है तो उन्हे दलित अच्छा लगता है पर मंथरा के संधर्भ मे वह इस हद तक बुरे संबोधनों का प्रयोग करते हैं की आज घर घर मे धार्मिक ग्रंथ के रूप मे पहुँच चुके उनकी rachana की पात्र को घर फोड़ने वाली किसी स्त्री को वही सं◌बोहित कर दिया जाता है की अमुक तो मंथरा है ....अगर तुलसी इतने ही सहृदयी और समन्वय वाले थे तो वह डाकिनी , पापिन, नागिन,घर फोरनी जैसे तमाम शब्द मंथरा के लिए न कहते और कैकेयी के मुख से यह न कहलवाते की

"लूले लंगड़े कने कुबड़े इन लोगों का तो काम ही है कुचल चलना उसमे स्त्री और उसमे भी दासी ये तो आर भी जादा है। "

और

"ढ़ोल गवानर शूद्र पशु नारी ,सकल ताड़ना के अधिकारी "

यह बात कहने वाले किसी भी ओर से समन्वयवादी और धार्मिक ग्रंथ के रचनाकार नहीं जान पड़ते पर ऐसा है तो यह भी पुरुषों द्वारा बनाया गया है जिसने तुलसी को इतनी महानता दे दी है चाहे वह आचार्य राम चंद्र शुक्ल हो या हजारी प्रशाद द्विवेदी सरीखे अन्य आलोचक ।

रीतिकाल मे तो स्त्री स्त्री न रहकर वस्तु मात्र रह गई । नायक-नायिका भेद ,प्रेम निरूपण ,विभिन्न शारीरिक चेसटाए आदि सिर्फ यही सब साहित्य का विषय बना ।स्त्री मे तो जैसे और कुछ देखा ही नहीं गया सिवा उसके शरीर के । स्त्री के शरीर का वरर्ण कर रीतिकालीन कवियों ने अपना भरण-पोषण किया एक दूसरी दशीत से यदि सोचा जाये तो यह बहुत ही ग्घृणास्पद बात भी होती है ।केशव तो यहाँ तक कह बैठते हैं की सब कुछ होते हुए भी आभूषण बिना स्त्री आकर्षण विहीन है :

" जदपि सुजात सुलछनी ,सुबरन सरस सुवृत्त।

भूसन बिणु न बिराजही ,कविता बनिता मित्र॥"

इस प्रकार हम देखते हैं की रीतिकाल तक स्त्रियों को एक दो साँचे मे ही देखा गया वह भी वहीं तक जहा तक किपुरुषों की दृष्टि जाती है स्त्री मे या तो वो सिर्फ सुंदरता देखते हैं या प्रेम या सिर्फ उसे विलाप करने की कोई वस्तु । आधुनिक युग मे यह सोच बदलती हा और कई हद तक स्त्री को स्त्री की सोच से देखने का प्रयश किया गया जिसने स्त्री विमर्श मे अपना आश्रय पाया और अब स्त्री साहित्य ही नि बलकि सामाजिक स्टार पर भी अपने अस्तित्व के लिए लड़ रह है,सफल हो रही है और आगे आने वाली अपनिनाई पीढ़ी को भी एक नई दिशा दिखा रही है ।

आधुनिक महिला उपन्यासकार: चिंतन के आयाम

मंजू देवी (शोध छात्रा)
हिन्दी विभाग
कर्नाटक केन्द्रीय विश्वविद्यालय
गुलबर्गा

स्वतंत्रता के बाद भारतीय समाज में नारी अपने स्वतंत्र अस्तित्व के लिए चिंतित और जागृत होने लगी। आज के परिवेश में स्त्री पुरुष दोनों ही अपने स्वतंत्र व्यक्तित्व का विकास करना चाहते हैं। पुरुषों की भाँति स्त्री भी समाज में अपनी स्वायत्ता स्थापित करना चाहती हैं। आज रूढ़िवादी सामाजिक संस्कारो के प्रति नारी जागृत हो रही है। आत्माभिव्यक्ति की आकांछा और समाज में अपनी अस्मिता उसके लिए महत्वपूर्ण हो गयी है।

साहित्य में आरंभिक काल से ही नारी,केंद्र में रही है। साहित्य की सभी विधाओं में नारी को महत्वपूर्ण स्थान दिया जाता रहा है। दूसरे शब्दो में कहा जा सकता है कि साहित्य और नारी का संबंध अटूट है। साहित्य में उपन्यास विधा अपने उदभव काल से ही नारी को उसके सहजरूप में चित्रित करता रहा है। राजनीतिक,सामाजिक और धार्मिक संघर्षों के मध्य अपने अस्तित्व रक्षा में प्रयत्नरत नारी जीवन के विविध रूप उपन्यासों में दिखाई देता है। नारी जीवन एवं नारी के मनोभावों का रहस्योदघाटन साहित्य का प्रमुख विषय पहले भी था और आज भी है।

हिन्दी उपन्यास में नारी कि स्थिति सदैव युग सापेक्ष रही है। युगीन परिस्थितियों के अनुकूल ही नारी को हिन्दी उपन्यासों में चित्रित किया गया। प्रत्यक युग के उपन्यासों में सामयिक समस्याओं को प्रस्तुत करने का सर्वाधिक प्रयास हुआ। हिन्दी उपन्यास साहित्य के आरंभिक दौर में पुरुष लेखको ने भी नारी और नारी समस्या को अपने उपन्यास का विषय बनाया। हिन्दी उपन्यास विधा की धुरी प्रेमचंद के योगदान को इस क्षेत्र में अनदेखा नहीं किया जा सकता। प्रेमचंद पूर्व भी नारी समस्या को उदघाटित करने का प्रयास किया गया। हिन्दी के प्रथम उपन्यास "परीक्षा गुरु" में नारी का सनातनी रूप प्रस्तुत है। इसमे वेश्यावृत्ति के उन्मूलन के प्रयास किए गये। साथ ही विधवाओं के पुनर्वास कि भी कल्पनाएं कि जाने लगी।

ब्रहम समाज की स्थापना से विधवा विवाह के प्रति समाज में नई चेतना अवश्य दिखाई देने लगी। किन्तु प्रारम्भ में नारी जाती स्वंय इसके पक्ष में नहीं थी। जाहिर है किसी रूढ़िग्रस्त मान्यता का यूँ टूट कर बिखर जाना या अचानक परिवर्तित हो जाना यूँ तो सांगीव न रहा होगा। सागी ओर से इसके लिए एक मूहीम छेड़ने की आवश्यकता पड़ने लगी। सामाजिक संस्थायें,धार्मिक अनुष्ठानों साहित्यिक विचारकों को आदि सभी उत्थानवादी चिंतको की जिम्मेदारी रही की वो नारियों पर हो रहे अमानवीय व्यवहारों से उन्हे बाहर निकालने की पूर ज़ोर कोशिश करें । विधवा विवाह,बाल विवाह,दहेज प्रथा की प्रताड़ना आदि भयानक समस्याएँ

जो नारियों से जुड़ी थी उन रागों को उपन्यास विधा ने यथार्थ रूप में चित्रित किया। और यह प्रक्रिया निरंतर जारी है।

21वी सदी में भारतीय नारी का जीवन अनेक चुनौतियों से भरा है। स्वाधीन भारत में नारी प्रगति के अनेक स्वर्णिम अध्याय रचे गए है।इसी के संदर्भ में हिन्दी उपन्यास लेखन में लेखिकाओं का आगमन महत्वपूर्ण घटना है। लेखिकाओं ने नारी की विभिन्न समस्याओं को बड़ी बेबाकी से उठाया है। इन्होंने नारी पीड़ा,उसके पतन और पुनरोत्थान को अपनी रचनाओ का उपजीव्य बनाया है। महिला उपन्यासकारो के स्पर्श से नारी विषयक चित्रण अधिक विस्तृत बन गया। आज सर्वाधिक महिला रचनाकारो की भीड़ है जिसमे नई पुरानी और मध्यम पीढ़ी की रचनाकार साधनारत है। शिवानी,मालती जोशी,मृदुला गर्गप्रभा खेतान,शशि प्रभा शास्त्री,नासिरा शर्मा,मन्नु भण्डारी,उषा प्रियम्वदा,कृष्णा सोबती,मृणाल पाण्डेयमधु

कांकरिया,ममता कलिया,गीतांजली श्री,आदि प्रमुख उपन्यासकारो के साथ कुसुम अंसल,महरुन्नीसा परवेज़,उषा यादव,आदि रचनाकारो की लंबी शृंखला है।

साहित्य का केन्द्रीय विषय रही नारी सालोत्तरी युग में साहित्य लेखन के क्षेत्र में अपना अस्तित्व सिद्ध करने में सफल रही है। इन्होने अपने अनुभव कलात्मकता ,यथार्थता,संवेदनशीलता,सशक्तता और प्रभावात्मकता के साथ उपन्यासों के द्वारा पाठक के सामने रखा है। इन साहित्यकारो ने विधवा,परित्यक्ता,दहेज की मारी,शराबी,वेश्यागामी व्यभिचारी,पति की पीड़ा झेलती,ससुराल की सताई नारियो को अपनी रचनाओ का विषय बनाया। लेखिकाओं के द्वारा नारी की रीतिकालिन भोग्या की छवि धीरे धीरे बदलने लगी। सच तो यह है लगभग डेढ़ सौ वर्षों की यात्रा में नारी के रूप को निखारने में साहित्यकारो का श्रेष्ठ योगदान रहा है।

महिला उपन्यासकारो का आरंभीक यानि स्वाधिनता पूर्व का विषय भारतीय समाज की कुरीतियो का निराकारण ,और नारी का त्याग बलिदान तथा प्रेम इनके मुख्य विषय रहे हों पर अब स्त्री सशक्तिकरण इनका प्रमुख विषय बन गया है। हिन्दी कथा लेखन के क्षेत्र में महिलयों का लेखन बाद महिला से माना जाता है पर उपन्यास लेखन की दृष्टि से शैल कुमारी देवी(उमा सुन्दरी),रुकमणि देवी(मेम और साहब),यशोदा देवी(कमला कुसुम)आदि नाम भी उल्लेखनीय रहे है। समय परिवर्तन के साथ साथ नारी चिंतन में भी परिवर्तन हुआ। नारी की इसी परिवर्तित मानसिकता को स्पष्ट करते हुए महिला उपन्यासकार दीप्ति खंडेलवाल कहती है-"मैं कामायनी की श्रद्धा नहीं इड़ा हूँ,भावना नहीं प्रज्ञा हूँ,मात्र स्पंदनमयी नहीं तर्कमयी भी हूँ मात्र समर्पिता नहीं अधिकारमयी हूँ। (महिला उपन्यासकारो की नारीप्रधानो एवं पीड़ा के आयाम-डॉ.हरीशंकर दुबे -पृ.71) जब स्वाधीन भारत की नारी

जागरूक हुई तो उसे अभिव्यक्ति देने वाली महिला उपन्यासकारो ने भी अपने दायित्व के प्रति अधिक सजगता दिखाई।

आधुनिक महिला उपन्यासकारो ने नारी के सभी पक्षो पर चिंता व्यक्त की और बड़ी से लेकर छोटी से छोटी समस्या को भी अविव्यक्ति दी। इन्होने ग्रामीण स्त्री से लेकर नगरीय एवं महनगरीय समाज में रह रही स्त्रीयों की कुंठा एवं पीड़ा को अपने उपन्यासों में चित्रित किया। नारी विमर्श की प्रखर चिंतक और उपन्यासकार प्रभा खेतान का चर्चित उपन्यास छिन्नमस्ता स्त्री शोषण,उत्पीड़न और संघर्ष का जीवन्त दस्तावेज़ जान पड़ता है। प्रभा जी ने इस उपन्यास के माध्यम से स्त्री के प्रत्यक वर्ग की पीड़ा को निम्न पंक्तियो में व्यक्त किया है। "औरत कहॉ नहीं रोती?सड़क पर झाड़ू लगाते हुएखेतो में काम करते हुए,हाड़-मांस की बनी ये औरतें अपने अपने तरीके से ज़िंदगी जीने की कोशिश में छटपटाती ये औरतें। हजारो सालो से इनके ये आँसू बहते आ रहे है। (छिन्नमस्ता-प्रभा खेतान पृ-189)

आधुनिक लेखिकाओं ने प्रत्येक महिला को उत्पीड़न की स्थिति में एक ही वर्ग में परिभाषित किया। इन लेखिकाओं ने समाज के सामने बड़ी सुख सुविधाओं में पली बड़ी महिलाये हो या चार दीवारी में तीन वक़्त की रोटी को तरसती महिलाये इन सभी के जीवन की ज़िन्दा तस्वीर को उजागर करने का श्रेष्ठ कार्य किया है इन महिला उपन्यासकारो ने।इन उपन्यासकारो ने अपने उपन्यास के द्वारा यह बताने की कोशिश की कि स्त्री केवल जीते जाने कि वस्तु नहीं बल्कि उसमे भी जीत लेने का विराट साहस और अदम्य क्षमता है। इनके उपन्यासों में स्त्री उत्पीड़न के नित्य नवीन रूप सामने आते रहे है। कभी स्त्री के हृदयमें झांकने कि कोशिश नहीं कि गई स्त्री क्या चाहती है?इसके लिये सायद ही सोचा गया हो।स्त्री को हमेशा आवश्यकतापूर्ति कि वस्तु समझा जाता रहा है। उषा प्रियंबदा का उपन्यास 'पचपन खंभे लाल दीवारें' इन्ही आवश्यकतापूर्ति पर आधारित उपन्यास जान

पड़ता है। इस उपन्यास कि नायिका सुषमा जो एक काम काजी लड़की है। उसकी स्थिति कुछ ऐसी बन जाती है कि अंत में वह खुद ही सोचने पर मजबूर हो जाती है कि "पिता बारात में उसकी शादी जल्दी नहीं करगा चाहते क्योंकि ऐसा होने पर उनके घर का सारा गणित बिगड जायेगा।न भाई पढ़ पाएंगे और ना ही बहिनों का विवाह हो पाएगा।" (नारी उत्पीड़न के नये रूप-डॉ.सरोज अग्रवाल पृ.95)

स्त्रीवादी साहित्य ने रूढ परम्परा वादी दृष्टि से बाहर निकल कर स्त्री समाज को कुछ अन्य महत्वपूर्ण सवालो से भी अवगत कराया जैसेःस्त्री बहन-बेटी,पत्नी-प्रेयसी,माँ होने का अर्थ ही है,उनका किसी का होना।पर क्या स्त्री कि कोई स्वतंत्र पहचान नहीं हो सकती क्या यही स्त्री का पूरा परिचय है?स्वयं में वह कुछ भी नहीं है?बचपन में पिता का घर और शादी के बाद पति का घर ही उसका घर मान लिया जाता है,नारी का अपना घर कहाँ है?वह समाज में कब तक अपने पिता और पति के नाम से जानी जायेगी। कब उसे समाज उसके नाम और अस्तित्व के साथ अपनाएगा। आदि कई सारे सवालो को उठाती हैं आधुनिक महिला उपन्यासकर।

डार से बिछुड़ी: (कृष्णा सोबती ,1960),मायापुरी: (शिवानी ,1961), आपका बंटी: (मन्नू भण्डारी,1971),उसका घर: (महरुन्निसा परवेज़,1972), चौदह फेरे: (शिवानी,1972),अनारो: (मंजूल भगत,1977) गोपनीय: (मालती जोशी,1978),कुमारिकाएं: (कृष्णा अग्निहोत्री,1978) अपनी अपनी यात्रा; (कुरुग अंराल,1981),ठीकरे कि गंगनी: (नासिरा शर्मा,1989),माई: (गीतांजलि श्री,1992),छिन्नमस्ता: (प्रभा खेतान,1992), चाक,इदन्नमम : (मैत्रेयी पुष्पा)
आदि ऐसे ही उपन्यास हैं जो स्त्री के यथार्थ दशा का दस्तावेज़ हैं। इन सभी उपन्यासों कि नायिकाएँ अपने आप में एक सशक्त चरित्र हैं जिनमें अपने उत्पीडन कि स्थिति को बदल कर अपनी अस्मिता को स्थापित करने की क्षमता बखूबी देखने को मिलती है।

मेरा यह कहना गलत नहीं होगा कि ये महिला उपन्यासकार अपने लेखन के द्वारा स्त्री समाज को एक नई दिशा और सोच प्रदान कर रही हैं। अततः मै डॉ.सरोज अग्रवाल के शब्दो को व्यक्त करना चाहूंगी कि अब अपने मस्तिष्क कि खिड़कियों को खोलकर स्त्रीयों को रखना होगा। पुरानी परम्पराओ और रूढ़ियो का त्याग करना होगा ताकि वह अपना विकास कर सके।(नारी उत्पीड़न के नये रूप-डॉ.सरोज अग्रवाल,पृ.250)

"स्त्री कि चिंता आत्म निर्भरता,आत्म सम्पन्नता के लिये होनी चाहिए न कि सामाजिक स्थिति के अभिशाप को एक बचाओ कि तरह प्रयोग करके करुणा बटोरने कि आत्मनिर्भरता होने पर सामाजिक स्तर पर उसकी भूमिका स्वतः सुदृढ़ हो जाती है और वह उन मर्यादाओ को अपने आप लांघ जाति है जो एक पराधीन मानसिकता के कारण पनपती रही है।"(नारी उत्पीड़न के नये रूप-डॉ.सरोज अग्रवाल,पृ.258)

ISSN 2250 - 3978 LILAVATI (PRINT)
LILAVATI-6

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VOTE OF THANKS

It is my privilege to propose Vote of Thanks to this august gathering here.

We are thankful to Smt. Lalithamma Lingaraju, President, Z.P & Chairperson, 6th NWSC

We are thankful to Dr. Meera Kaushal for having inaugurated and Dr. Vaidehi Ganeshan for delivering the Inaugural Address, Dr. Pushpalatha for Introducing about SVAK and Dr. K. S. Ramaa for Introducing Matru Vedike for the Delegates

In thank profuselly Dr. H S. Savithri and Dr. N. Valarmathi for having accepted our invitatino and received the Marie Curie Mahila Vijnana Purskara and C. V. Raman Mahila Vijnana Puraskara for 2013.

I thank allt he Panalisht for having participated

I thank allt he chairpersona and co-chairperson of all the technical sessions.

I thank Prof. K. I. Vasu who is the instrumental for thie historic event,

I thank LVD College Chairman Shrim P. G. Sukhani, Secretary, M. Nagaraj, Principal, Dr. S. M. Khened, Vice Principal, Dr. A. Amare Gowda, all the Teaching and non teaching staff adn active students of LVD and other sister institutions for having this event a grand success.

I thank the cultural Committee and all the students who made the evening memorable exhibiting of their talent through variety of cultural programs. And Transport Committee & Accommodation Committee

I thank all the sponsors

I thank allt he participants who particiapted more in no and made this function a grand success.

I thank all the members who supported us with Transport, Flowers, Sound System and other equipments.

I thank Press- Media People for give wide publicty for this histroic event.

I thank one and all who have supported this event directly and indirectley

I thank one and all

Dr. Y. S. GAYATHRI
Treasurer, SVAK & Working Chairperson, Matru Vedike