

International Research Fellows Association's

RESEARCH JOURNEY

International E-Research Journal

Peer Reviewed, Referred & Indexed Journal

Issue - 299

Multidisciplinary Issue

Chief Editor -

Dr. Dhanraj T. Dhangar,
Assist. Prof. (Marathi)MGV's Arts & Commerce College,
Yeola, Dist – Nashik [M.S.] INDIA

Executive Editors :

Dr. Tejesh Beldar, Nashikroad (English)**Dr. Gajanan Wankhede,** Kinwat (Hindi)**Mrs. Bharati Sonawane,** Bhusawal (Marathi)**Dr. Rajay Pawar,** Goa (Konkani)



'RESEARCH JOURNEY' International E- Research Journal

Issue -299 : Multidisciplinary Issue

Impact Factor : 6.625 (SJIF)

Peer Reviewed Journal

E-ISSN :

2348-7143

July - 2022

July-2022

E-ISSN : 2348-7143

International Research Fellows Association's
RESEARCH JOURNEY

International E-Research Journal

Peer Reviewed, Referred & Indexed Journal

Issue-299

Multidisciplinary Issue

Chief Editor -

Dr. Dhanraj T. Dhangar,
Assist. Prof. (Marathi)
MGV's Arts & Commerce College,
Yeola, Dist - Nashik [M.S.] INDIA

Executive Editors :

Dr. Tejesh Beldar, Nashikroad (English)
Dr. Gajanan Wankhede, Kinwat (Hindi)
Mrs. Bharati Sonawane, Bhusawal (Marathi)
Dr. Rajay Pawar, Goa (Konkani)

Our Editors have reviewed papers with experts' committee, and they have checked the papers on their level best to stop furtive literature. Except it, the respective authors of the papers are responsible, answerable and accountable for their content, citation of sources and the accuracy of their references and bibliographies/references. Editor in chief or the Editorial Board cannot be held responsible for any lacks or possible violations of third parties' rights. Any legal issue related to it will be considered in Yeola, Nashik (MS) jurisdiction only.

- Chief & Executive Editor

SWATIDHAN INTERNATIONAL PUBLICATIONS

For Details Visit To : www.researchjourney.net

*Cover Photo : Biodiversity (Source - Internet)

© All rights reserved with the authors & publisher

Price : Rs. 1000/-

Editorial Board

Chief Editor -

Dr. Dhanraj T. Dhangar,

Assist. Prof. (Marathi)

MGV's Arts & Commerce College,

Yeola, Dist - Nashik [M.S.] INDIA

Executive Editors :

Dr. Tejesh Beldar, Nashikroad (English)

Dr. Gajanan Wankhede, Kinwat (Hindi)

Mrs. Bharati Sonawane, Bhusawal (Marathi)

Dr. Rajay Pawar, Goa (Konkani)

Co-Editors -

- ❖ Prof. Mohan S. - Dean faculty of Arts, Delhi University, **Delhi, India**
- ❖ Prof. Milena Brotaeva - Head, Classical East Department, Sofia University, **Sofia, Balgeria**
- ❖ Dr. R. S. Sarraju - Center for Translation Studies, University of Hydeabad, **Hydrabad, India**
- ❖ Mr. Tufail Ahmed Shaikh- King Abdul Aziz City for Science & Technology, Riyadh, **Saudi Arabia.**
- ❖ Dr. Anil Dongre - Head, Deptt. of Management, North Maharashtra University, Jalgaon [M.S.] **India**
- ❖ Dr. Shailendra Lende - R.T.M. Nagpur University, Nagpur [M.S.] **India**
- ❖ Dr. Dilip Pawar - BoS Member (SPPU), Dept. of Marathi, KTHM College, Nashik. [M.S.] **India**
- ❖ Dr. R. R. Kazi - North Maharashtra University, Jalgaon [M.S.] **India**
- ❖ Prof. Vinay Madgaonkar - Dept. of Marathi, Goa University, **Goa, India**
- ❖ Prof. Sushant Naik - Dept. of Konkani, Govt. College, Kepe, **Goa, India**
- ❖ Dr. G. Hareesh - Associate Professor, CSIBER, Kolhapur [M.S.] **India**
- ❖ Dr. Munaf Shaikh - N. M. University, Jalgaon & Visiting Faculty M. J. C. Jalgaon [M.S.] **India**
- ❖ Dr. Sanjay Kamble - BoS Member Hindi (Ch.SU, Kolhapur), T.K. Kolekar College, Nesari [M.S.] **India**
- ❖ Prof. Vijay Shirsath- Nanasahab Y. N. Chavhan College, Chalisgaon [M.S.] **India**
- ❖ Dr. P. K. Shewale - BoS Member (SPPU), MGV's LVH College, Panchavati-Nashik [M.S.] **India**
- ❖ Dr. Hitesh Brijwasi - Librarian, K.A.K.P. Com. & Sci. College, Jalgaon [M.S.] **India**
- ❖ Dr. Sandip Mali - Sant Muktabai Arts & Commerce College, Muktainagar [M.S.] **India**
- ❖ Prof. Dipak Patil - S.S.V.P.S.'s Arts, Sci. and Com. College, Shindhkheda [M.S.] **India**
- ❖ Prof. K. M. Waghmare - Librarian, Anandibai Raorane College, Sawantwadi [M.S.] **India**
- ❖ Prof. Vidya Surve-Borse- MGV's LVH Arts, Sci. & Com. College, Panchavati-Nashik [M.S.] **India**

Advisory Board -

- ❖ Dr. Marianna Kotic - Scientific-Cultural Institute, Mandala, **Trieste, Italy.**
- ❖ Dr. M.S. Pagare - Director, School of Languages Studies, North Maharashtra University, Jalgaon
- ❖ Dr. R. P. Singh - HoD, English & European Languages, University of Lucknow [U.P.] **India**
- ❖ Dr. S. M. Tadkodkar - Rtd. Professor & Head, Dept. of Marathi, Goa University, **Goa, India.**
- ❖ Dr. Pruthwiraj Taur - Chairman, BoS, Marathi, S.R.T. University, Nanded.
- ❖ Dr. N. V. Jayaraman - Director at SNS group of Technical Institutions, **Coimbatore**
- ❖ Dr. Bajarang Korde - Savitribai Phule Pune University **Pune, [M.S.] India**
- ❖ Dr. Leena Pandhare - Principal, NSPM's LBRD Arts & Commerce Mahila Mahavidyalaya, Nashik Road
- ❖ Dr. B. V. Game - Principal, MGV's Arts and Commerce College, Yeola, Dist. Nashik.

Review Committee -

- ❖ Dr. J. S. More - BoS Member (SPPU), Dept. of Hindi, K.J.Somaiyya College, Kopargaon
- ❖ Dr. S. B. Bhambar, BoS Member Ch.SU, Kolhapur, T.K. Kolekar College, Nesari
- ❖ Dr. Uttam V. Nile - BoS Member (NMU, Jalgaon) P.S.G.V.P. Mandals ACS College, Shahada
- ❖ Dr. K.T. Khairnar- BoS Member (SPPU), Dept. of Commerce, L.V.H. College, Panchavati
- ❖ Dr. Vandana Chaudhari KCE's College of Education, Jalgaon
- ❖ Dr. Sayyed Zakir Ali, HoD, Urdu & Arabic Languages, H. J. Thim College, Jalgaon
- ❖ Dr. Sanjay Dhondare - Dept. of Hindi, Abhay Womens College, Dhule
- ❖ Dr. Amol Kategaonkar - M.V.P.S.'s G.M.D. Arts, B.W. Commerce & Science College, Sinnar.

Published by -

© Mrs. Swati Dhanraj Sonawane, Director, Swatidhan International Publication, Yeola, Nashik

Email : swatidhanrajs@gmail.com Website : www.researchjourney.net Mobile : 9665398258

INDEX

No.	Title of the Paper	Author's Name	Page No.
01	Bio-Energy from Food Waste: A New Generation Bio-Fuel Yamuna, B. G., Prashanth Kumar, M. K., Mamata Khandappagol		05
02	Screening of High Yield Contributing Characters in Soybean (Glycinemax L.) B. F. Mundhe		12
03	Literature Review of Passiflora Edulis Linn	S. R. Raundal, K. B. Arangale	18
04	Review of Hylocereus Undatus Haworth. (Dragon Fruit): Medicinal Approach S. V. Jadhav, S. R. Raundal, K. B. Arangale		22
05	Selection of Physiologically and Genetically Superior F1progenies of Rice for Drought Tolerance Under Flooding And Moisture Condition R. Salomi, S. Bharathkumar, M. Rajeshwari and K. Raju		27
06	Prevalence of wilt Complex Incidence on Black Pepper in Karnataka, India Dr. N. Umashankar Kumar, Dr. N. G. Ravichandra, Dr. N. S. Pankaja		39
07	Synthesis of Zinc Oxidenano Particles Using Plant Leaf Extract of Asphodelus Macrocarpus. S. H. Sose, V. S. Sose		50
08	Green Synthesis of Indole Derivatives V. S. Sose, S. H. Sose		55
09	Silver Nanoparticles : A Review on Green Synthesis of Silver Nanoparticles by Using Plant Extract, Characterization and Their Antioxidant Activity by Different Methods Nida Shaikh, Rahimullah Shaikh		59
10	Algal Dominance in Contaminated Water Region of Godavari River Sayali Chavhan, Kajal Kankute, Umesh Dhuldhaj		66
11	Study on Food Biopreservative Application of Bacteriocin by Lactobacillus Pentosus B25 on Raw and Pasteurized Milk Dr. Bharti Ghude-Wadekar		77
12	Inorganic Phosphate Solubilizers and Siderophore Producing Rhizobacteria Isolated from Triticumaestivum (Wheat) for Sustainable Agriculture Kinjal Kavani, Dr. Neepa Pandhi		85
13	Importance of the Adequate Nutritional Diet and Environment for the Health Miss. Jaya Dabarase		90
14	Changing Perspective in Environment, Management, Humanities, Sciences and Technology Assi. Prof. Jyoti Hase		100
15	Studies on Fortification of Multigrain Noodles with Ginger Powder M. A. Patole		101
16	Development of Ragi Bar by Incorporating Amaranth (Rajgira) and Banana S. J. Ghadage		108
17	Biochemical Characterization of Lactic Acid Bacteria Isolated from Fruit Waste Ankita Suvagiya, Dr. Gira Mankad		114
18	Development of Supplementary Protein Based Cake from Composite Flour Ms. Swapnali Bhole		121
19	Studies on Zooplankton Diversity in Bennetura Dam, Murum Dist-Osmanabad (M.S.) K. H. Rajput		127
20	A Survey of Spiders Diversity in Three Agricultural Field Areas : The First Report of Tamil Nadu in India Kannadasan R., Senthil Kumar D.		131
21	Papaya Mealybug and its Management M. B. Gade, C. G. Gade, A.V. Kale		143
22	Effects of Air Pollution on Human Health : A Geographical Analysis Manisha		147
23	Psychological Well-Being of College Teachers in Relation to Their Professional Development Harpreet Kaur, Dr. Nameshkumar		153

24	Attitude Towards ICT of The Teachers of Higher Secondary School Sabuj Sau, Dr. Kedar Nath Dey	162
25	Examining Undergraduate Students' Attitudes and Motivation in Learning English as A Foreign Language (EFI) At Socotra College : A Case Study Ameer Ali Amer Ahmed, Yashwant Doke	172
26	A Study of Indian Ethos in the Select Novels of Amish Tripathi Swapnil Landage, U. D. Kambale	180
27	Cinematic Representations : Modes and Means Mahananda Dalvi	186
28	Exploration and Projection of Nakedness of Socio-Political And Administrative System in <i>Article 15</i> Film : A Review Dr. Gajanan Hivale	192
29	India's Indigenous Banking System Prof. Mansee Daga	198
30	Effect of Private Sector Organizational Culture on Performance of Female Employees Shivangi Awasthi, Ashok Shukla	201
31	Utilization and Availability of Resources in the VJTI Library Sapna Magre, Dr. Nilima Bankar	207
32	Survey of E-Resources in the University Library at Mahatma Phule Agricultural University Rahuri (M.S) P. B. Jadhav	217
33	Need of E-Resources in Academic Libraries Shubhangi Pawar , Dr. Nilima Bankar	223
34	A Critical Study on Tools and Techniques Contemplated for Empowering the Faculties Working in Educational Institution Mrs. Sathya , Dr. D. M. Navarasu	228
35	A Review on Synthesis and Characterization of Zno Nanoparticles Manisha Kadam, Miss. Ankita Kale, Miss. Swati Harkal	233
36	Antagonism of Microbial Flora Isolated from Garden Rhizospheric Soil Jotsana Pawade, Umesh Dhuldhaj	239
37	Synthesis, Characterization of Fe ₃ O ₄ @ SiO ₂ and it's Application for Removal of Methylene Blue Dye Sunil Gawali, D. V. Mane	248
38	A Study on Ethnobotanicalresources of Jaunsar Bawar Region of Garhwal, Uttarakhand Singh, S., Harashawaradhana., Singh, S. K , Guleri, S.	257
39	Study on Measuring The Effectiveness of Online Marketing on Integrated Marketing Communication : A Special Reference to Anand City Ms. Rina Dave & Dr. Ajay Soni	262
40	आधुनिक समाज में वृद्धो की सामाजिक एवं मानसिक स्थिती का समाजशास्त्रीय अध्ययन प्रियंका कुमारी	271
41	माध्यमिक शिक्षा में सूचना प्रौद्योगिकी कि भूमिका का समाजशास्त्रीय अध्ययन माया कुमारी	276
42	लोकविधी जागरण : एक विधिनाटय डॉ. निवृत्ती मिसाळ	281

Our Editors have reviewed papers with experts' committee, and they have checked the papers on their level best to stop furtive literature. Except it, the respective authors of the papers are responsible, answerable and accountable for their content, citation of sources and the accuracy of their references and bibliographies/references. Editor in chief or the Editorial Board cannot be held responsible for any lacks or possible violations of third parties' rights. Any legal issue related to it will be considered in Yeola, Nashik (MS) jurisdiction only.

- Chief & Executive Editor

Bio-Energy from Food Waste : A New Generation Bio-Fuel

Yamuna, B. G¹., Prashanth Kumar, M. K.² and Mamata Khandappagol³

Department Of Agronomy, College Of Agriculture, Chamarajanagara

Assistant Manager, ITC-ABD Ltd., Mysore

Department Of Genetics & Plant Breeding, College Of Agriculture, Chamarajanagara

^{1,3} University Of Agricultural Sciences, Bengaluru.

¹ Yamunabg.Gowda@Gmail.Com

² Prashanthmadhu7@Gmail.Com

³ Mamatakhandappagol@Gmail.Com

Abstract:

Food waste production worldwide is expected to increase by 33% within the next decade. Significant quantity of global food wastage throughout the value chain right from harvesting to storage, processing and consumption is overlooked due to rapid industrialization and population growth. To meet the escalating demand for fuel and at the same time slowing down the fast-depleting fossil fuel resources through conversion of food waste to bio-based liquid or gaseous fuels appears to be an attractive option. Biofuels are also called as agrofuels i.e., any fuel whose energy is obtained through a process of biological carbon fixation. There are several factors that decide the balance between biofuel and fossil fuel use around the world. Those factors are cost, availability, and food supply. Finding new uses for waste has renewed interests for the solution to the constraints of a resource system. Food waste is indeed an untapped resource with great potential for generating energy. Huge quantities of food waste is generated worldwide and currently its disposal is becoming a challenge. In future, this can contribute to resolve the waste disposal, energy scarcity and energy security problems which could contribute substantially to bio-based economy. Since food waste is considered zero cost material, conversion of food waste into biofuel will provide an innovative food valorisation strategy and it is possible to develop cost-effective commercial methods. By this, energy from food waste can emerge as the next-generation biofuels along with lignocellulose, non-food materials, algal biomass, and energy crops grown on marginal lands.

Keywords: Biofuels, food waste, fossil fuel, agrofuels, algal biomass, and energy crops.

Introduction:

Increasing demand for diesel fuel and growing concerns over global warming and crude oil shortage have advanced the development of renewable alternative fuels with low greenhouse gas emissions. Finding new uses for waste has renewed interests for the solution to the constraints of a resource system. Some one third of all food produced around the world for human consumption gets discarded uneaten, and environmentalists, energy analysts and entrepreneurs are beginning to take notice (Mathews, 2008; Dar *et al.*, 2019). The quantity of food loss and waste globally was put “at ~33% of food intended for consumption”. This was further broken down per regions around the world and per capital food waste at consumer level as 98-115 kg/year in the North-America and Europe and “6–11 kg/year in sub-Sahara Africa and South/Southeast Asia” (FAO, 2011). The current annual food waste stands at around 1.6 billion tonnes, which is worth around \$ 1.2 trillion loss. Out of this, nearly 50%–60% comes from post-consumption waste (leftover). Besides, food waste is causing serious environmental concerns as it contributes to the total global greenhouse gas emissions (Fateme and Yassir, 2021).

The ever-increasing food waste from households, retail establishments and food service industry totals 931 MMT annually globally (Mishra *et al.*, 2022). Most of these food wastes are lost along the food supply chain, which is almost all currently landfilled, incinerated or discarded in most of the cities and places, which causes the public health hazards and diseases like malaria, cholera, typhoid. Inadequate management of wastes like uncontrolled dumping bears several adverse consequences: It not only leads to polluting surface and groundwater through leachate and further promotes the breeding of flies, mosquitoes, rats and other disease bearing vectors (Rajashekhar *et al.*, 2019). Also, it emits unpleasant odour & methane which is a major greenhouse gas contributing to global warming. Reducing waste and better utilization of waste and losses in the value chain is among the means for international climate policy and for transformation to renewable energy. The production of food loss and waste often lead large amount of wastewater and solid waste (Valta *et al.*, 2017).

As petroleum based fuels are finite reserves, demand for biofuels is rapidly growing worldwide. In this context, popular biofuels that are commercially available in various countries are biodiesel, bioethanol and bio-oil. Food waste is indeed an untapped resource with great potential for generating energy. Food wastes is a well-known nonedible source which contain significant amount of lipids, carbohydrates, amino acids, and phosphates, which can be utilized as resources in the production of biofuel. Diverting even just a portion of this waste to so-called waste-to-energy (WTE) systems could free up large amounts of landfill space while powering our vehicles and heating our homes, and thus putting a significant dent in our collective carbon footprint. Perhaps that's why WTE is one of the fastest growing segments of the world's quickly diversifying energy sector. There is also general agreement in the literature that the current status of food waste recycling technologies require fine-tuning to make them economically viable (Sindhu *et al.*, 2019).

Food waste:

Food waste can be raw, cooked, edible and inedible parts generated during production, storage distribution, and consumption of food stuffs. In other words, food waste is the outcome of different food processing practices that have not been reused and are disposed of as waste. Food wastes is a well-known zero-value and non-consumable resource which contain significant amount of lipids, carbohydrates, amino acids, and phosphates, which can be utilized as resources in the production of biofuel (Pleissner *et al.*, 2013). Food wastes also contain wide variety of organic constituents including starches, proteins, oils, fats, nutrients, and natural acids. Carbohydrate, lipid and carbon containing materials present in food waste can be converted to bioethanol, biodiesel and biooil. Lipid extracted from food waste is converted to biodiesel in 95–97% yield. On the other hand, 92–96% bioethanol obtained by fermentation of food waste. Along this line, pyrolysis of food waste can be performed to obtain biooil and biochar.

Food and Agricultural Organization (FAO) defined food loss as, “food produced for human consumption but not eaten by human.” It went further to define food loss as “the decrease in the amount or value of food,” while food waste is considered as a component of food loss which is referred to as “the disposal or non-food use of food that was intended for consumption along the entire food production and distribution chain, that is, from production to consumer” (FAO, 2013).

Worldwide food loss statistics: Food loss can be attributed to the following main reasons (Dung *et al.*, 2014)

- a. Lack of proper planning in food management, as various sectors (e.g. manufacturers, hospitality, lodging, travel and tourism, recreation and wholesalers) try to satisfy consumer's requirements of high quality and quantity supplies.
- b. Inadequate production techniques, poor post-production management, lack of suitable infrastructure, processing and packaging.
- c. Lack of awareness at the communities and household levels on the impact of food waste on the environment.

Occasionally, food can also be lost due to the interruption of the supply chain by bad weather or natural disasters, such as hurricanes or floods. However, this is not significant when compared to the continuous loss in the household and hospitality sectors, especially in highly populated cities. More specifically, buffets in hotels and restaurants are major contributors to food wastes because in many cases the extra food cannot legally be reused nor donated without following strict health regulations (FoodPrint, 2021; Pirani and Arafat, 2016).

Sources of food waste:

Sources	Example
Residential	Homes, town house, apartments, societies etc...
Commercial	Office cafeteria, shopping malls, hotels, airports, restaurants etc....
Institutional	Gurdwara/Mandir, School, hospitals, prisons, hostels, etc...
Industrial	Lunchroom, cafeteria, kitchen wastes etc... (but not industrial process wastes)

Overview:

Rapid increase in global population and their food ingestion habit plays a major role in generation of food waste (FW). FW includes some part of cooked and uncooked plant waste, animal waste, leftover food and spoiled food etc. Conventionally these wastes are managed by incineration or landfill (Kannahet *al.*, 2020). These techniques demand high cost and it has own demerits. Incineration of FW results in emission of flue gas and pollutes the environment by ash waste. In case of landfill, the improper design pollutes the water source. Hence, there is a need to manage the generated FW using eco-friendly and economically viable techniques. The composition of the FW may differ based on the source of generation. Biofuel or value added products recovery from FW mainly depends on its biochemical composition (Anon., 2013).

Food waste has a significant potential to be employed as a raw material in the production of biofuel through various fermentation processes due to its organic- and nutrient-rich contents. The food waste characters and management have been extensively investigated, and valorization of food waste to biofuels is considered as the most promising strategy (Li and Yang, 2016). Apart from the management of food waste, this strategy can reduce dependency on crude oil, which has an opportunity to stabilize food prices as well as address society's behaviour toward food waste.

In this context, the valorization of food waste to different sorts of biofuels, for example, biodiesel, bioethanol, biohydrogen, bio-oil, biochar, and biomethane by employing well-structured and efficient valorization technologies can be an attractive and viable approach to counter the current global energy crisis and in establishing a sustainable bioeconomy (Dhiman

and Mukherjee, 2020). This type of food waste management not only resolves the serious pollution problem but also helps to reduce the dependency of the energy sector on fossil fuels (Luque and Clarke, 2013).

Also, by making use of a pair of simple chemical processes - hydrothermal liquefaction and anaerobic digestion - we could turn food waste into environmentally friendly biofuel. Hydrothermal liquefaction involves heating food waste under high pressure - essentially pressure-cooking it - to create an oil that can be refined into fuel (Karmee, 2016). Next, the watery food waste left over after the liquefaction undergoes anaerobic digestion, a process in which microbes break down the waste into biogas that is primarily composed of methane and carbon dioxide (Anon., 2017). A simple process flowchart of food waste conversion to energy is given in fig. 1.

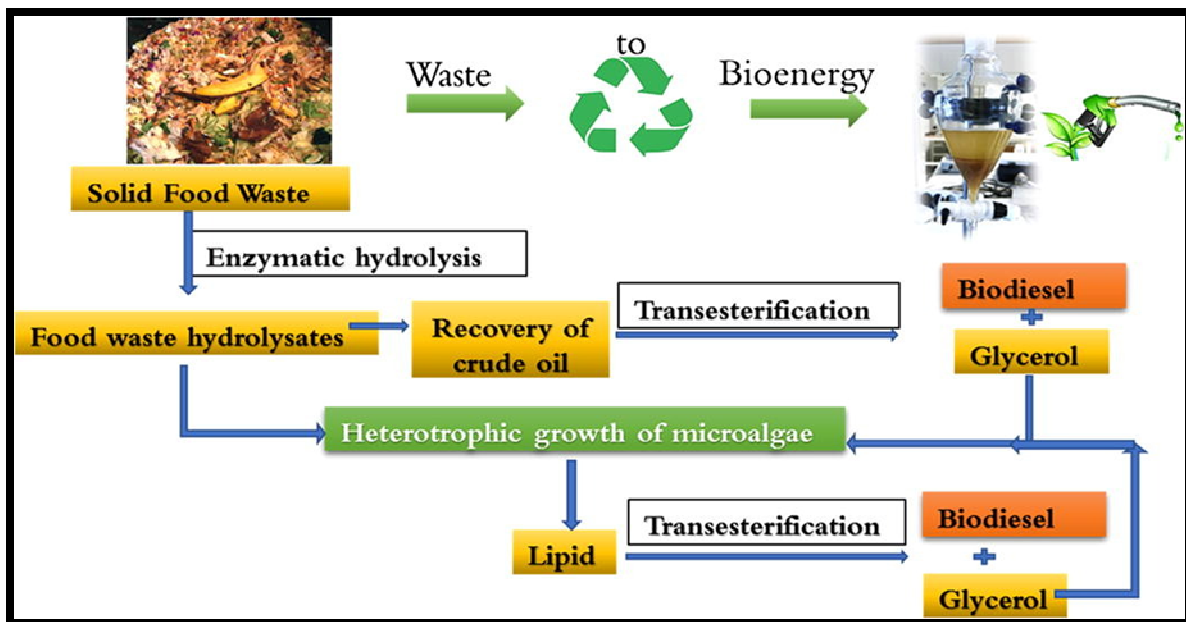


Fig.1: Process of conversion of food waste to energy

Source:Patel *et al.*(2019)

Currently there are some 800 industrial-scale waste to energy plants in more than three dozen countries around the world, and likely thousands of smaller systems at individual sites. Most employ anaerobic digesters, which make use of microorganisms to break down and convert organic waste into a fuel such as biogas, biodiesel or ethanol. With some 70 percent of food waste around the world still going into landfills, there is a lot of potential feedstock to keep this environmentally friendly carbon neutral fuel source coming (Isah and Ozbay, 2020). However, the implementation of modern food waste management technologies is hindered by the lack of standard processing procedures due to the regional diversity of the food waste characteristics. Besides, there are social and technical challenges associated with the lack of proper post-consumption food waste segregation mechanism at the industrial and community levels, as well as the lack of sufficient research on sustainability and life cycle assessment (LCA) of the food waste management options.

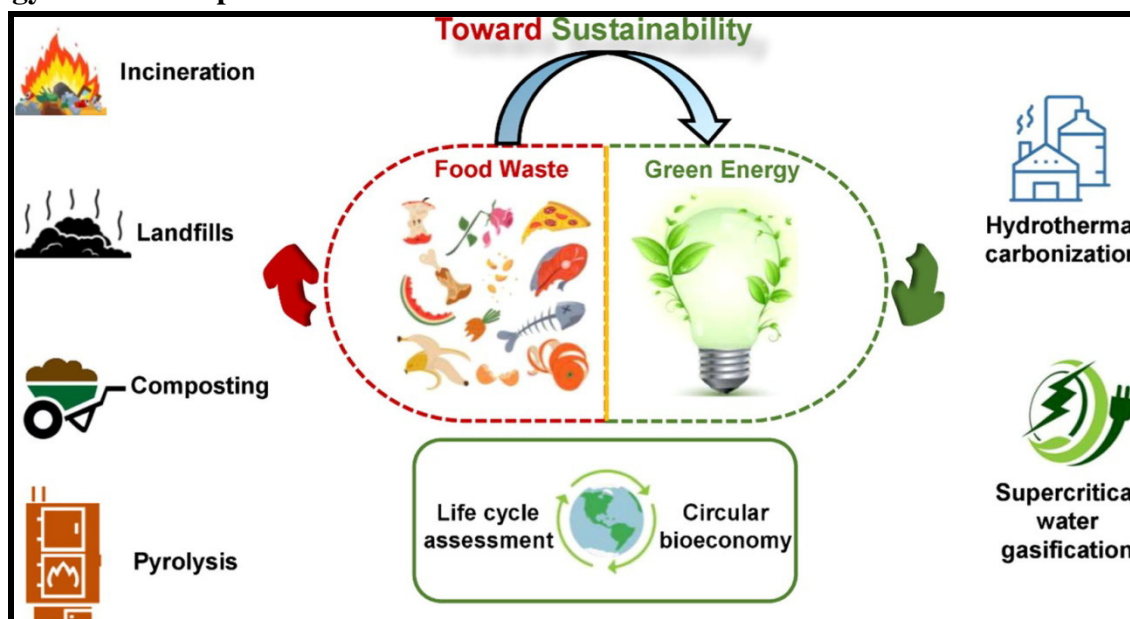
Environmental impact:

Waste to fuel energy recovery is virtually **carbon neutral**, since, by using the bio-oil obtained to power heat engines, the same amount of carbon dioxide is generated that was present in the initial biomass, in turn captured from the atmosphere by plants and fixed in organic matter during photosynthesis. There is thus no need to add additional carbon derived from fossil fuels to

this virtuous cycle. In other words, instead of being released into the atmosphere, the carbon is stored in the **bio-oil** and **biofuel**.

Food waste and spill can play a role as a solution for low carbon transport, assuming that the principles of waste hierarchy are followed. This means that energy use of food waste is the least preferable option after prevention, re-use and recycling. It is, however, more desirable solution than disposal without recovery. Also, waste-to-energy can be diversified and improved for better utilization.

Focusing on sustainability and life cycle assessment through conversion of food waste to energy: Pictorial representation



Source: Aditya *et al.* (2021)

Factors to be considered:

Factors involving in conversion of food wastes to energy involves, current situation of biofuel production, hypothetical barriers of the food waste feedstock, technology readiness and conversion, policies support, demand of the biofuels, community involvement and additional value creation in the economic sector (Hafidet *et al.*, 2021).

Meanwhile, extensive research in laboratory and pilot scale for biofuel production from food waste in constructing smart facilities integrating food waste processing and biofuel plant technology, metabolic pathway involved and the policy uncertainty impeding the investment in the large scale is to be foreseen.

Summary:

In the past decade, we have seen technological advancements in motor vehicles that run on renewable energy sources. The increasing threat of fossil fuel depletion coupled with the need to maintain renewable sources continues to push for the demand for biofuel. We live in a world where the global market for biofuels and renewable sources continues to grow in order to maintain the growing population. Our reliance on energy is a global necessity as our government attempts to mitigate the growing issue of climate change as a direct result of increased demand for automobile fuel. The most obvious benefit of replacing fossil fuels is the environmental impact it will have on carbon emissions. Since biofuels burn faster and cleaner

than fossil fuels, it will release greenhouse gases at a lower and slower rate. Secondly, the use of biofuels will allow the economy to reap its benefits.

Conclusion:

“Over the next 25 years, global energy demand will grow by 50 percent, while global oil supply dwindles at a rapid pace. Waste-to-energy is an obvious solution to meet the world’s burgeoning energy demand”. Biofuel Production, only one step on the path. The real message is not about fuel. Let us build a community that is concerned about mother earth. The problems of today will not be fixed by few people doing big things...they will be fixed by you and us doing small things with a new vision.

References:

- ADITHYA, S., ASHISH, K., PONNUSAMY, S. K., MUTHAMILSELVI, P., SIVASAMY, B. AND SIVARAMAN, P., 2021, Conversion of food waste to energy: A focus on sustainability and life cycle assessment. *Fuel*,**302**: 121069, ISSN 0016-2361. DOI:<https://doi.org/10.1016/j.fuel.2021.121069>
- ANONYMOUS, 2017, <https://www.nbcnews.com/mach/science/simple-way-we-might-turn-food-waste-green-energy-ncna827166>
- ANONYMOUS, 2013, Food Waste to energy. Earth talks - Scientific American. <https://www.scientificamerican.com/article/food-waste-to-energy/>
- DAR, R. F., YAQOOB, M., PARMAR, M. AND PHUTELA, U. G., 2019, Biofuels from Food Processing Wastes. In book: Microbial Fuel Cells: Materials and Applications, Publisher: Materials Research Forum LLC pp.249-288. DOI:[10.21741/9781644900116-10](https://doi.org/10.21741/9781644900116-10)
- DHIMAN, S. AND MUKHERJEE, G., 2021, Present scenario and future scope of food waste to biofuel production. *J. Food Process Eng.*,**44**:e13594. <https://doi.org/10.1111/jfpe.13594>
- DUNG, T.N.B., SEN, B., CHEN, C.C., KUMAR, G. AND LIN C.Y., 2014, Food waste to bioenergy via anaerobic processes. *Energy Procedia*, **61**: 307-312, [10.1016/j.egypro.2014.11.1113](https://doi.org/10.1016/j.egypro.2014.11.1113)
- FAO (2011). *Statistical Annual Crop Production Statistics*. Rome: Food and Agriculture Organization of the United Nations. [Google Scholar](#)
- FAO (2013). *Mitigation of Food Waste: Societal Costs and Benefits*. Rome: FAO. [Google Scholar](#)
- FATEMEH H. P. AND YASSIR T. M., 2021, A review of post-consumption food waste management and its potentials for biofuel production. *Energy Reports*,**7**: 7759-7784, ISSN 2352-4847. DOI: <https://doi.org/10.1016/j.egypr.2021.10.119>
- FOODPRINT, 2021, *Food Waste is a Massive Problem—Here’s Why* — FoodPrint. <https://foodprint.org/issues/the-problem-of-food-waste/Google Scholar>
- HAFID, H. S., OMAR, F. N., RAHMAN, N. A. AND WAKISAKA, M., 2021, Innovative conversion of food waste into biofuel in integrated waste management system, *Critical Reviews in Environmental Science and Technology*, DOI: [10.1080/10643389.2021.1923976](https://doi.org/10.1080/10643389.2021.1923976)
- ISAH, S. AND OZBAY, G., 2020, Valorization of Food Loss and Wastes: Feedstocks for Biofuels and Valuable Chemicals. *Frontiers in Sustainable Food Systems*, **4**. <https://doi.org/10.3389/fsufs.2020.00082>

- KANNAH, R. Y., MERRYLIN, J., POORNIMA DEVI, T., KAVITHA, S., SIVASHANMUGAM, P., GOPALAKRISHNAN KUMAR AND RAJESH BANU,J.,2020,Food waste valorization: Biofuels and value added product recovery. *Bioresource Technology Reports*,**11**.
- KARMEE, S. K., 2016, Liquid biofuels from food waste: Current trends, prospect and limitation. *Renewable and Sustainable Energy Reviews*, **53**:945-953.
- MATHEWS, J.A., 2008, Is growing biofuel crops a crime against humanity?.*Biofuels BioprodBioref.*,**2**(2): 97-99.
- LI, S., AND YANG, X.,2016, Biofuel production from food wastes. In Luque R, Lin CSK, Wilson K, Clark J (eds) *Handbook of biofuels production*, Woodhead Publishing, **Pp**: 617–653. DOI:[10.1016/B978-0-08-100455-5.00020-5](https://doi.org/10.1016/B978-0-08-100455-5.00020-5)
- LUQUE, R.AND CLARK, J.H., 2013, Valorisation of food residues: waste to wealth using green chemical technologies. *Sustainable Chem Process*, **1**:10.
- MISHRA, S., SINGH, P. K., MOHANTY, P., ADHYA, T., SARANGI,P. K., SRIVASTAVA, R. K., JENA, J., DAS, T.ANDHOTA, P. K., 2022, Green synthesis of biomethanol-managing food waste for carbon footprint and bioeconomy. *Biomass Conversion and Biorefinery*.**3**. DOI:[10.1007/s13399-021-02188-0](https://doi.org/10.1007/s13399-021-02188-0)
- PLEISSNER, D., LAM, W. C., SUN, Z. AND LIN, C. S. K., 2013, Food waste as nutrient source in heterotrophic microalgae cultivation. *Bioresour Technol.*,**137**: 139-146.
- PATEL, A., HRŮZOVÁ, K., ROVA, U., CHRISTAKOPOULOS, U. AND MATSAKAS, L.,2019, Sustainable biorefinery concept for biofuel production through holistic valorization of food waste.*Bioresource Technology*, **294**.
- PIRANI, S.I. AND ARAFAT, H.A., 2016, *Reduction of food waste generation in the hospitality industry. J. Cleaner Prod.*,**132**: 129-145. [10.1016/j.jclepro.2015.07.146](https://doi.org/10.1016/j.jclepro.2015.07.146)
- RAJASHEKHARA, K., NAGARAJA, V., DURAGAPPA, AND THIPPESWAMY, M., 2019, Production of Biofuel from Food Waste.*International Journal of Engineering Research & Technology*,**7**(7).
- SINDHU, R., GNANSOUNOU, E., REBELLO, S., BINOD, P., SUNITA V., INDU, S. T., RAMKUMAR, B. N. AND ASHOK P., 2019, Conversion of food and kitchen waste to value-added products. *Journal of Environmental Management*, **241**: 619-630. DOI: <https://doi.org/10.1016/j.jenvman.2019.02.053>
- VALTA, K., DAMALA, P., PANARETOU, V., ORLI, E., MOUSTAKAS, K., AND LOIZIDOU, M., 2017, Review and assessment of waste and wastewater treatment from fruits and vegetables processing industries in Greece.*Waste Biomass Valorization*,**8**: 1629–1648. [Google Scholar](https://scholar.google.com/citations?user=...)

Screening of High Yield Contributing Characters in Soybean (Glycine max L.)

B. F. Mundhe

Post Graduate Department of Botany

Padmashri Vikhe Patil College of Arts, Science and Commerce, Pravaranagar

A/p- Loni. KD, Tal-Rahata, Dist-Ahmednagar- 413713, M.S. India

Email- bfmundhe@gmail.com.

Abstract:

In the present investigation, attempts were made to Screening of high Yield Contributing Characters in soybean induce in variety of soybean (Glycine. max. L) JS-335 and DS-228 by employing physical (Gamma rays) and chemical (Ethyl Methane Sulphonate) Mutagens in M2 Generation. Ethyl Methane Sulphonate Gamma ray induces mutagenesis in soybean crop. In both varieties increasing and decreasing high yielding mutation were observed.

A wide spectrum of viable mutants with varying morphological traits could be observed in M2 generation of Soybean. The various types of viable mutants obtained in the Soybean M2 Generation were: - 1. The Branched 2. Tall 3. Dwarf with erect habit 4. Early maturing 5. High yielding 6. Late maturing 7. Short pod 8. Bold seeded 9. Large leaf 10. 4 seeded pod all the concentration of both the mutagens used succeeded in including the different type of viable mutants in Soybean. The frequency of viable mutants showed the highest values at the 0.15% (EMS) and 5KR concentration in varieties JS-335 and 0.20/(EMS) & 20KR concentration in varieties DS-228 respectively. The frequency of viable mutants ranged from 9.42% to 13.77% in EMS 8.00 to 12.45% in EMS and 11.50% in VEMS and 11.50% to 14.26% and 9.45 to 15.96% in GR treatment in Soybean.

Keywords: Ethyl Methane Sulphonate, Mutagenic frequency, spectrum, Gamma Rays.etc

Introduction:

Soybean has an important place in world's oilseed cultivation scenario, due to its high productivity, profitability and vital contribution towards maintaining soil fertility. The crop also has a prominent place as the world's most important seed legume, which contributes 25% to the global vegetable oil production, about two thirds of the world's protein concentrate for livestock feeding and is a valuable ingredient in formulated feeds for poultry and fish. About 85% of the world's soybeans are processed annually into soybean meal and oil. Approximately 98% of the soybean meal is crushed and further processed into animal feed with the balance used to make soy flour and proteins. Of the oil fraction, 95% is consumed as edible oil; the rest is used for industrial products such as fatty acids, soaps and biodiesel. The major soybean producing nations are the United States, Brazil and Argentina. The three countries dominate global production, accounting for 80% of the world's soybean supply Soybean contributes significantly to the Indian edible oil pool. Presently soybean contributes 43 % to the total oilseeds and 25% to the total oil production in the country. Currently, India ranks fourth in respect to production of soybean in the world. The crop helps earn valuable foreign exchange (Rs. 62000 millions in 2012-13) by way of soya meal exports. Soybean has largely been responsible in uplifting farmer's economic status in many pockets of the country. It usually fetches higher income to the farmers owing to the huge export market for soybean de-oiled cake. Agriculture in Maharashtra including allied activities, accounted for 12.4% of the Gross State Domestic Product at current prices in 2011-12 but its role

in State's economy is much wider as agriculture continues to be the main occupation of the state. Around 64.14% of the people are employed in agriculture and allied activities.

Materials And Methods:

Seeds of these soybean cultivars JS- 335 and DS-228 used in the present investigation were procured from Krishi vidnyan Kendra Baleshwar Taluka –Rahata, District Ahmednagar (Maharashtra) these two cultivar are widely cultivated in Maharashtra. To begin with pilot experiments were conducted to determine the lethal dose (LD_{50}), suitable concentration of the mutagens and duration of treatment for this cultivar of soybean. JS-335 and DS-228 variety of soybean were treated separately with chemical EMS and physical (Gamma radiation) from such experiments it was finally established that concentration of 0.05mM, 10, 15 and 20mM for duration of 12 hours are best suitable for mutagenic treatments for the cultivars of soybean for chemical mutagen treatments, seeds were presoaked in distilled water for 6 hours and subjected to freshly prepared mutagen solutions for 12 hrs. At $25 \pm 2^{\circ}C$ with intermediate shaking. The volume of mutagenic solutions was about 5 times to that of seeds. The seeds, treated with chemical mutagens were thoroughly washed under running tap water for an hour to terminate the reaction of the chemical. For physical mutagen treatment, dry seeds with a moisture content of 10-12% were irradiated with 5KR, 10KR, 15KR 20KR and 25KR from a CO^{60} source available in the department of Biophysics, Government institute of science, Aurangabad (M.S.India).

Every treatment was carried out for 200 seeds. The treated seeds along with control were sown in the field in randomized block design (RBD) in three replications at spacing of 25 cm in rows and 50 cm between rows to rise M_1 generation during Kharif season of 2020. The individually harvested M_1 plants were soon in the field to rise M_2 generation during Kharif season of 2021 in separate rows. The M_2 progeny was raised along with parental varieties (Control) following randomized block design with 3 replication. Each treatment comprised of 2020. M_1 plant progenies and each M_2 progeny row consisted of 10 to 25 plants in three replications. The cultural operation and application of FYM were done as per schedule.

Results and Discussion:

Mutation breeding is valuable supplement to the other method of plant breeding in the improvement of crop plants of new architecture, superior biochemical constitutions, suitable growth and development rhythms. Induced mutants have been directly released as new varieties worldwide in several crops. A number of crop varieties have been developed through mutagenesis in India in crop like wheat, rice, soybean, groundnut, cotton, jute, vegetable and ornamental crops. The important aspects of mutation breeding include enhancement of mutation frequency and the alteration of mutation spectrum, which would increase the probability of isolating mutants of economic interest. For the enhancement of mutation frequency and spectrum, the basic information regarding mutagenic sensitivity of the various genotypes, effectiveness of efficiency of physical and chemical mutagens becomes necessary.

Description of Mutants:

At maturity, the plant height in case JS-335 mutant was 67.96% cm. with s spreading habit and no. of branches were the productivity in terms of pod per plants in such mutants was slightly better than the control plants but in case of varieties DS-228 mutant was 61.24 with a spreading habit and no. of branches 6.20 having productivity in terms of pots per plant in such mutants was slightly better than the control plant. Similar result showed by Kaw and Memon

(1979). Kouda & Godoladze (1979) and Nawracala and Konieczny (1991) while Chen (1982) Halvankar (1987) and Harer (1990) observed good amount of heterosis for these characters

1. Tall Mutant: Tall mutants were recorded in both the cultivars of Soybean. At maturity the cultivar JS-335 attained the mean height 67.96 cm and another cultivar DS-228 attained the mean height 61.24 cm took almost similar number of days for maturity and no. of pod per plant as that of control in M₂ generation. The branching of plant result also similar to Rao et.al. (1978) Halvankar (1987), Root et.al. (1988) and Taware et.al. (1990).

2. Dwarf with erect habit: These mutants showed an erect habit which made easy them for harvesting the cultivar like DS-335 attained the height of 27.92 cm and having 4-6 branches and other cultivar DS-228 attained the height 27.46 and 3-6 branches. They had short stature and a non-spreading habit. They took comparatively lesser number of days for maturity and showed reduction in number of pod per plants. The dwarf's plant showed in treatment (T₁₀) i.e. 27.46. Similar result showed by Kawand Menon (1979) Kouda & Godoladze (1979) and Nawracala and Konieczny (1991) while Chen (1982) Halvankar (1987) and Harer (1990) observed good amount of neutrons reduced from these characters.

3. Early maturing: These mutants demonstrated a feature of early maturity of plants. In JS-335 mutant attained maturity in 90 to 100 days as against 105 to 115 days in control likewise the varieties DS-228 mutant attained maturity in 85 to 95 days against 90 to 105 days in control. They acquired flowering quite earlier. The productivity in terms of pods per plant was slightly less in mutant than the control plants.

4. High yielding: The Soybean, these mutants showed larger number of pod per plant. In varieties JS-335 an average pod numbers 68.53 and other varieties DS-228 the average pod number per plant was 64.02. Both cultivars with spreading habit. These mutants' revealed slight early flowering as compared with control Ala and Ala (1987b) reported increase in seed weight/plant in M₂ derived from Krapinkon treated with 0.25 dES, but reduced yield in M₃ was observed following 0.01% treated vacancies.

5. Late maturing: These late maturing mutant in Soybean took more number of days to reach maturity as compared with control. The cultivar like JS-335 mutant showed in maturity 105 to 115 days as compared with 100 to 105 days in control plants. The other varieties DS-228 mutant matured in 115 to 120 days as compared with 100 to 110 days in control. They had better height and more number of pods per plant (70 to 100) leading to better productivity.

6. Early Flowering: Flowering is character which plays significant role in altering the life cycle of any plant. The Soybean cultivar JS-335 some mutant's flowers early flowering character in that variety first flowering comes on 28th days from sowing.

7. Late Flowering: Late flowering is another support and mutant due to chemical and physical mutagen. The value of for day to flowering increase on the concentration increased in both varieties. In JS-335 variety the late flowering is obtained the treatment 15 KR & 20 KR was big flowers. But DS-228 variety the late flowering is obtained in treatment EMS-18 hr. 0.10 to 0.15% for 68 hours. So the late maturity is depends on the concentration of mutagen. Delay in flowering has been attributed to delay in germination. (Bianchi et.al. 1968) or slowness in growth of the plant (Iqbal 1972).

8. Short Pod: Pod is very valuable character of this crop. Short pod is reduces the crop yield and bring the crosses to farmer. In Soybean variety JS-335 treatment EMS-12 Hr. (0.10 & 0.15)

showed no. of short pod mutant but in variety DS-228 is showed the treatment EMS-18 hours (0.15 to 0.20%) had short pod i.e. one seed or two seeded.

9. Bold Seeded Mutant: Bold Seeded Mutant showed another supported character. In the Bold Seed gave light amount of protein and oil content. The Bold Seeded plant observed particularity in both varieties. In JS0-335 variety the treatment Gamma rays (15 & 12 KR) the no. of plant were bold seeded. But in variety DS-228 the EMS treatment 18 hr. (0.05%) and 0.10% showed the no. of Bold Seeded Mutant population.

10. Four Seeded Pod Mutant: Four Seeded character is another most valuable character in production of Soybean. It gives the higher yield as compared to the percent one. In variety JS-335 the treatment Gamma rays (10 KR & 14 KR) showed 4 seeded pod mutant. The frequency of that mutant was (0.05%) 5. The DS-228 variety no. of any change was observed pod Quantitative Characters in M2 generations no. of grain. In JS-335 variety in 10 KR & 15 KR.

(Control)

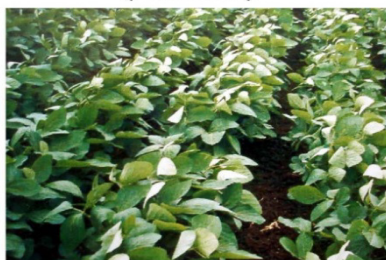


Fig 07: Field view JS-335

(Control)

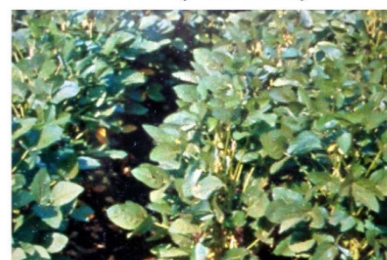


Fig 08: Field view DS-228

(0.15%EMS 12Hrs. JS-335)

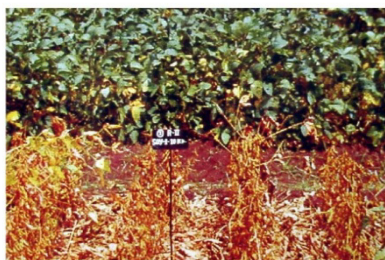


Fig 09: Early and late maturing mutant JS-335

(15KR DS-228)

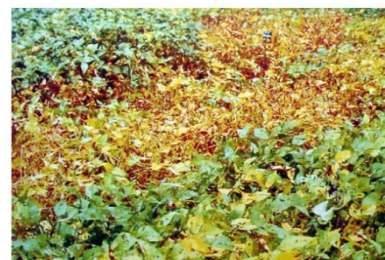


Fig 10: Early and late maturing mutant DS-228

(15kR JS-335)



Fig 11: Branched mutant JS-335

(20kR DS-228)



Fig 12: Branched mutant DS-228

(20 kR JS-335)



Fig 13: High yielding mutant

(0.15% EMS12 Hrs. DS-228)

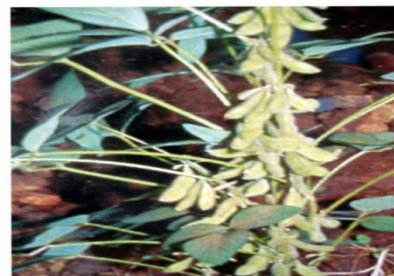


Fig 14: Dwarf with erect mutant

(0.15% EMS 12Hrs. DS-228)

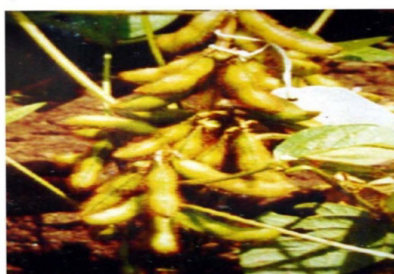


Fig 15: Bold seeded mutant

(15KR JS-335)

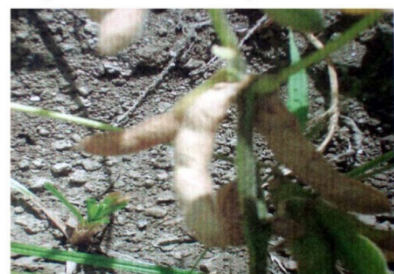


Fig 16: 4 Seeded mutant

(20kR JS-335)

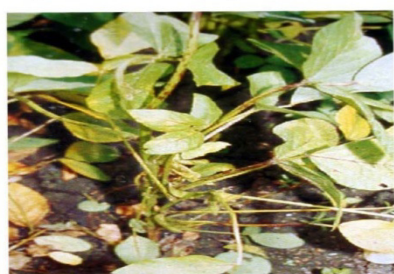


Fig 17: Sterile mutant

(20kR JS-335)



Fig 18: Tall mutant

Conclusion:

The investigation on “Gamma ray and Ethyl methane sulphonate (EMS) induced mutation studies in Soybean (*Glycine max* (L) Merrill)” of cultivar JS-335 and DS-228 was carried out with the objectives to study the micro and macro mutants were observed in both cultivars. The M2 generation was raised June, 2020 at Padmashri Vikhe Patil College, Pravaranagar (Loni). The observations were recorded on in both the cultivars of soybean. Both the cultivars JS-335 and DS-228 were Variable types of mutation were found, Early Flowering Mutants, Late Flowering variant, Plant Height Variant, Dwarf Mutant, High yielding variant, branched habitat mutant, Bold Seed Mutant, 4 Seeded Pod Mutants.

Acknowledgment:

The author is thankful to Head of Department of Botany, Padmashri Vikhe Patil College Pravaranagar, and Principal of P.V.P. College Pravaranagar who provided necessary facilities during research work.

References:

1. ALA, V. S. AND, A. Y. A. 1987a. *ReferativnyiZhurnal*. 10 :65-280.
2. ALA, V. S. AND Ala. A. Y. A. 1987b. *ReferativnyiZhurnal*. 12: 65.
3. BIANCHI A., MARCHESIS AND SORESSI G. P. 1963. Some results in radio genetical experiments with tomato varieties. *Rad. Bot.* 3: 333-343.
4. CHEN, R.Y. AND SUN, H. 1982. A diploid strain of wild soybean (*Glycine soja*) with four satellited chromosomes. In World Soybean Research Conf. III. Abst. 438.
5. HALVANKAR, G.B.1987, Karyotype and genetic studies in *Glycine max* (L) Merrill and related species. Unpublished Ph.D. thesis, University of Poona, Pune.
6. HARER. P.N. 1990. Inheritance of quantitative characters in Soybean. Unpublished thesis. Mahatma Phule Agril. Univ., Rahuri. (M.S.)
7. IQBAL J. (1972):Effects of acute gamma radiation on the survival, growth and radio sensitivity of apical meristem of *Capsicum annum* at different stages of seedling development. *Rad. Bot.*12:197-204.
8. KAW, R.N. AND P.M. MENON. 1979. Heterosis in a ten parental diallelcross in Soybean. *Indian J. Genet.*, 39:322-324.
9. KAW., R.N. AND P.M. MENON. 1981. Combining ability for development traits in Soybean. *Indian J. Genet.*, 41: 303-308.
10. KOUDA, T. AND G. GODOLADZE. 1979. Breeding performance of Soybean hybrids in the third generation from cross between geographically and ecologically distant forms. *Tr. NII Zemledeliya. Gruz SSR.*26:87-91.
11. NAWRACALA, J. AND G. KONIECZY. 1991. Heterosis effect in the cool climate of Weilkipoloska region of Poland. *Soybean Genetics Newsletter*, 18:159-164.
12. RAO, M.R.G., S.R. VISHWANATHA AND G. SHIVSHANKAR. 1978. Possibility of exploiting heterosis in Soybean (*Glycine max* (L) Merrill). *Current Res., Univ. Agric. Sci., Bangalore.* 7:149-150.
13. TAWARE, S.P., G.B. HALVANKAR, V.M. RAUT AND V.P.PATIL. 1990. Hybrid vigour in Soybean (*Glycine max* (L) Merrill). *Indian J. Agric. Sci.* 68(8): 545-546.

Literature Review of *Passiflora Edulis* Linn

S. R. Raundal and K. B. Arangale*

Postgraduate Department of Botany and Research Centre.

Mula Education Society's Arts, Commerce and Science College, Sonai. Tal. Newasa

Dist. Ahmednagar, Affiliated to Savitribai Phule Pune University, Pune, Maharashtra, India.

Corresponding Email Id: -samruddhiraundal@gmail.com,

kiranarangale@gmail.com

Abstract:

The plant *Passiflora edulis* is a perennial, climber under the family Passifloraceae. The plant is found in tropical regions of America and Asia, bearing purple-colored fruit of 4-5 cm in diameter and weighing 35-45 kg. It's having therapeutically active compounds used for treating diabetes, cancer, etc. The plant can bear 150-180 fruits per year. The farmers yield the highest number of production of fruits and earn the best profit in this crop cultivation. Therefore, it is very essential to know about the potential of this fruit by researching the growth and economic factors for the sake of increasing the cultivation and production of this fruit.

Keywords: *Passiflora edulis*, therapeutically, diabetes, cancer.

Introduction:

Passiflora edulis is commonly known as Passion fruit or *Passiflora* under the family of *Passiflora* ceae originated in Brazil and grown well up to 2000 m in height with an annual rainfall of 1000 mm to 2000 mm in the tropical and sub-tropical regions of America and Asia. In India, passion fruit is found in the states of Himachal Pradesh, Kerala, Manipur, Meghalaya, Mizoram, and Nagaland.

The plant is herbaceous, perennial, healthy and climber producing rounded or ovoid-shaped attractive fruit. It produces solitary flowers located in the leaf axils. The fruit is mostly having tough, soft dark purple-hued rind and faint white specks. Inside, it has orange-colored pulpy juice with 200 to 250 small brown-colored pitted seeds. (Thokchom and Mandal, 2017). It is also known as the climactic fruit, ripening takes place off the plant (Singh *et al.*, 2006). It is used in juice, jelly, and ice cream. It is a high-value plant having export potential because of the flavor of its juice (Patel *et al.*, 2014).

Biology and Ecology:

Genetics:

The chromosome number reported for *Passiflora edulis* is $2n=18$.

Reproduction Biology:

The *Passiflora edulis* opens in the spring season. The fruit is produced in the second year of the plant. *P. edulis* is known as the self-pollinated fruit having a dominant diploid ($2n$) sporophyte phase in its life cycle.

Physiology:

Passiflora edulis plants can reproduce within after the two years of their plantation.

Preferred Scientific Name:

Passiflora edulis

Other Scientific Names

- ❖ *Passiflora edulis*
- ❖ *Passifloraedulisflavicarpa*
- ❖ *Passiflora edulis Sims*
- ❖ *Passiflora ligularis*
- ❖ *Passiflora quadrangularis L.*
- ❖ *Passifloramaliformis*

International Common Names

- ❖ **India:** Krishna phal
- ❖ **Brazil:** Maracuja`
- ❖ **Spanish:** Maracuya`
- ❖ **Hawaiians:**Liliko`i
- ❖ **French:**Grenadille

Local Common Names

Grenadella, Grenadine, Passion flower, Purple granadilla, Purple passion fruit.

Taxonomic Classification of Passion Fruit

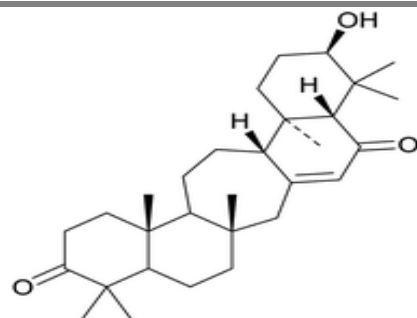
- ❖ **Domain:** Eukaryote
- ❖ **Kingdom:** Plantae
- ❖ **Sub-kingdom:** Tracheobionta
- ❖ **Superdivision:** Spermatophyta
- ❖ **Division:** Magnoliophyta
- ❖ **Class:** Magnaliopsida
- ❖ **Sub- class:** Dilleniidae
- ❖ **Order:** Malpighiales / Violales
- ❖ **Family:** Passifloraceae
- ❖ **Genus:** *Passiflora*
- ❖ **Species:** *edulis*

Cultivation Condition

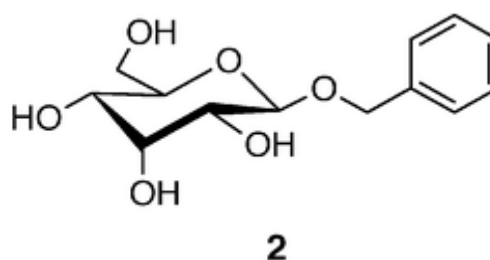
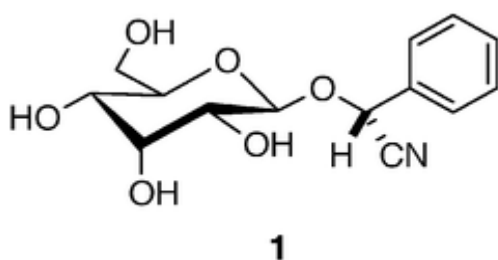
For the cultivation of *P. edulis*, the sub-tropical climatic condition is preferred. It requires an ideal temperature of 20° to 30° C and annual rainfall from 1000 mm to 2000 mm for its growth and flowering. The pH of the soil must be neutral. The propagation is done by seeds, cuttings, and grafting on immune rootstocks. The nutrition required for the fruit growth is N 150, P 100, and K 200 kg/ha. The nutrition must be applied in the splits after the fruit is harvested. There is Cross-pollination which takes place by the honeybees after the 1 to 2 hours of the anthesis, which takes place in the early morning. The fruit blooms in the early summer and is matured between 70-80 days of flowering. The yielding of the fruits starts after the 1 – 2 years of the plantation. The very healthy plant can produce a maximum of 150 – 180 fruits per year. (Thokchom and Mandal, 2017)

Chemical Composition

The plant *P. edulis* is reported to have chemical constituents like citric acid, malic acid, polyphenols, triterpenes, amino acids, flavonoids, and triterpenoids (Xu *et al.*, 2013; Zhang *et al.*, 2013; Yuan *et al.*, 2017; Hu *et al.*, 2018). It also contains benzylic β-D-allopyranosides **1** and **2**.



Triterpenoids



Uses

P. edulis is a medicinal plant, known as the good anxiolytic. It is very beneficial for health and balanced nutrition. Recently, more than 110 phytochemical constituents are found in the different parts of the plant, flavonoids and triterpenoids held the largest share. (He *et al.*,2020). This fruit species is sold in fresh fruit markets and then used in juice processing (Zas and John,2016). This plant consists of anticancer, antimicrobial, antidiabetic, antisedative, antioxidant properties, and various remedial measures for curing conditions like respiratory disorder called asthma. The plant parts also help in treating ulcers, and hemorrhoids, such as sedatives.

References:

- Alkamin E. K. and Girolami G.(1959). Pollination and fruit set in the yellow passion fruit. *Hawaii Agri. Stat. Tech. Bull.*, 59: pp.44.
- Anonymous(2014-15). Area and Production of Different Fruits in India, National Horticulture Board, India.
- Ayres, A. S. F. S. J., Santos, W. B., Junqueira-Ayres, D. D., Costa, G. M., Ramos, F. A., Castellanos, L.,(2017). Monoaminergic neurotransmission is mediating the antidepressant-like effects of *Passiflora edulis* Sims fo. *Edulis*. *Neurosci. Lett.* 660, 79–85.
- Chen, F. P., Xu, X. Y., Luo, Z., Chen, Y. L., Xu, Y. J., Xiao, G. S. (2018). Effect of high O₂ atmosphere packaging on postharvest quality of purple passion fruit (*Passiflora edulis* Sims). *J. Food Process. Preserv.* 42 (9), e13749.1–e13749.7.
- Chuyen, H. V., Eun, J. B. (2017). Marine carotenoids: Bioactivities and potential benefits to human health. *Crit. Rev. Food Sci. Nutr.* 57, 2600–2610.

- Dangdi Liang, Ahmed Fathy Yousef, Xiaoxia Wei, Muhammad Moaaz Ali, Weijun Yu, Liuqing Yang, Ralf Oelmüller, Faxing Chen (2021). Increasing the performance of Passion fruit (*Passiflora edulis*) seedlings by LED light regimes *Scientific Reports 11 (1), 1-13*.
- Daniela A Oliveira, Mariana Angonese, Carmen Gomes, Sandra RS Ferreira (2016). Valorization of passion fruit (*Passiflora edulis* sp.) by-products: Sustainable recovery and biological activities. *The Journal of Supercritical Fluids 111, 55-62*.
- He Xirui, Fei Luan, Yan Yang, Ze Wang, Zefeng Zhau, Jiacheng Fang, Min Wang, Manhua Zuo and Yongsheng Li. *Passiflora edulis: An Insight into current researches on phytochemistry and pharmacology*. *Front. Pharmacol.* 11:617.
- Humaira Rizwana, Fatimah Al Otibi and Nouf Al-malki (2019). Chemical composition, FTIR Studies and Antibacterial Activity of *Passiflora edulis f. edulis* (Fruit). *Journal of Pure Applied Microbiology* 13(4), 2489-2498,
- Kishore K. K., Pathak A., Yadav D. S., Bujarbaruah K.M., Bharali R and Shukla R. (2006), Passion Fruit. *Tech Bull.*, pp. 2-4.
- Lydia K Asande, Richard O Omwoyo, Richard O Oduor, Evans N Nyaboga (2020). A simple and fast Agrobacterium-mediated transformation system for passion fruit KPF4 (*Passiflora edulis f. edulis* × *Passiflora edulis f. flavicarpa*) *Plant methods* 16 (1), 1-12.
- Patel R. K., Akash Singh, Jai Prakash, Amit Nath and Bidyut C. Deka, (2014) Physio-biochemical changes during fruit growth, development and maturity in passion fruit genotypes. Division of Horticulture, ICAR Research Complex for NEH Region, Umiam 793 103, Meghalaya.
- Rocky Thokchom and Goutam Mandal (2017), Production Preference and Importance of Passion Fruit (*Passiflora edulis*) : A Review. *Journal of Agricultural Engineering and Food Technology* 4(1): 27-30.
- Singh A, Patel R. K., Babu K.D. and Bhuyan M. (2006) Flowering, fruiting and ripening physiology of passion fruit. *Env. Ecol.* 245:693-97.
- Souza P., Silva K., Soares T., Nunes O., Coelho M., Girardi E. (2018) Biometric, physiological and anatomical responses of *Passiflora spp.* T controlld water deficit. *Sci. Hort.* 229, 77-90.
- Thomas B., Vithiya B. S. M., Prasad, T. A. A., Mohamed, S. B., Magdalane, C. M., Kaviyarasu, K., (2019). Antioxidant and photocatalytic activity of aqueous leaf extract mediated green synthesis of Silver Nanoparticles using *Passiflora edulis f. flavicarpa*. *J. anosci. Nanotechnol.* 19, 2640-2648. doi:10.1166/jnn.2019.16025.
- Zas P. and John S. (2016) Diabetes and Medicinal Benefits of *Passiflora edulis*. *Int J. Food Sci Nutr Diet.* 5(2), 265-269.

Review of *Hylocereus Undatus* Haworth (Dragon Fruit) : Medicinal Approach

S. V. Jadhav, S. R. Raundal and K. B. Arangale *

Postgraduate Department of Botany and Research Center,

Mula Education Society's Arts, Commerce and Science College, Sonai. Tal. Newasa,

Dist. Ahmednagar, Affiliated to Savitribai Phule Pune University, Pune, Maharashtra, India.

Corresponding Email Id: jsnehal310@gmail.com, kiranarangale@gmail.com

Abstract:

Our environment is filled with a broad range of plants, many of which have therapeutic capabilities. The evolution of human culture has benefited greatly from the use of these therapeutic herbs. *Hylocereus Undatus* Haworth belongs to the family Cactaceae, it is frequently referred to as "dragon fruit" or "pitaya." It was initially used as an ornamental plant but later became a new fruit crop due to its market value and health advantages. It is becoming more and more well-known as a sugar fruit due to its high nutrient content and antioxidant properties. It helps in the prevention of cardiovascular diseases, and controlling blood sugar levels thus considered to be important fruit for diabetic patients. It plays a vital role in fighting against cough, asthma, wound healing, etc.

Keywords: *Hylocereus Undatus*, Asthma, Antioxidant, dragon fruit.

Introduction:

The sugared fruit known as dragon fruit, which was just recently introduced to India, is seen as a potential and lucrative fruit crop. Originating in Mexico and South America as a fruit crop. Since at least 100 years ago, it has been grown in Vietnam, then by the French. It is a long-day plant known as "Nobel Woman" or "Queen of the Night" because of its lovely night-blooming flower. The fruit is also known as Jesus in the Cradle, Night Blooming Cereus, Dragon fruit, Pithaya, Strawberry Pear, and Bell of the Night. Because of the bracts or scales on the fruit's skin, it is called a pitaya. Pitaya is a name that means "the scaly fruit." It has decorative significance because of the grandeur of its big (25 cm), creamy-white flowers that bloom at night. The biggest advantage of this crop is that once planted, it will grow for about 20 years, and 1 hectare could accommodate about 800 dragon fruit plants. It is being grown commercially in Israel, Vietnam, Taiwan, Nicaragua, Australia, the United States, and recently in India. (Perween *et al.*, 2018, Carrillo-Salazar, 2012, Hitendraprasad *et al.*, 2020)

Recently, dragon fruit farming was established in India, which is heavily reliant on imports of ordinary fruits and vegetables in India to satisfy their nutrient requirements. This fruit is also recognized for its antioxidant and antiproliferation capabilities with phenolic and polyphenolic substances (Tenore *et al.*, 2012, Wu, 2006, Nurliyana *et al.*, 2010)

Biology and Ecology

Genetics

It is a diploid species and the chromosome number reported for it is $2n=22$ (Tel-Zur *et al.*, 2004)

Reproduction Biology

Hylocereus Undatus Haworth is a hermaphroditic flower. They open at the Mexico nocturnal visitors include the nectar-feeding bats *Leptonycteris curasoe* and *Choeronycteris mexicana* which are the main pollinators of this species. (Kakade *et al.*, 2019).

Flowers are hermaphroditic; nevertheless, some pitaya species and cultivars self-incompatible. The extremely showy, edible, white flowers are very large, very fragrant, nocturnal, bell-formed, and maybe 3-4 inches long and 8-9 inches wide. Cream-colored stamens and lobed stigmas Normally, 3 to 5 spherical buttons form on the stem border; two to three of them can develop into flower buds in around 13 days. After 16-17 days, when anthesis occurs, the light green, cylindrical flower buds grow to be around 11 inches long. (Pushpakumara *et al.*, 2006, N'Guyen, 1996)

The dragon fruit itself has an oval shape, is 4 to 9 cm thick, and is 6 to 12 cm long. It is normally red in color and contains numerous bracteoles. Dragon fruit has a physical structure that is loaded with areola (protrusions) where the thorns develop, with 2 to 5 spines ranging in size from 1-3 cm in each areola. Dragon fruit contains extremely few seeds that are black in the flesh. Dragon fruit typically weighs between 150 to 600 g. Dragon fruit flesh is pink, white, red, or yellow in hue and tastes tart and sweet. Dragon fruit thrives in arid, tropical, and subtropical areas with temperatures reaching 40 degrees Celsius. Even in moist tropical settings, this dragon fruit plant will thrive, but at a higher risk. This dragon fruit will appear on plants with physical shapes, such as cacti, 30-50 days following the initial blossoming. This dragon fruit plant is often harvested 5-6 times each year. (Sonawane, 2017, Xu *et al.*, 2016)

Preferred Scientific Name

- ❖ *Hylocereus Undatus* Haworth

Other Scientific Names:

- ❖ *Cactus triangularis*
- ❖ *Cereus triangularis*
- ❖ *Cereus undatus*
- ❖ *Cereus tricostatus*
- ❖ *Hylocereus tricostat* (Mizrahi and Nerd, 1999)



International Common Names

- ❖ **English:** belle-of-the-night, dragon-fruit, moonlight cactus, night-blooming cereus, queen-of-the-night, red pitaya, strawberry-pear
- ❖ **French:** pitahaya rouge, pitaya
- ❖ **German:** Distelbirne
- ❖ **Spanish:** chacam, chak-wob, junco tapatio, pitahaya, pitahaya dulce, pitahaya orejona, reina de la noche, tasajo, zacamb.

Local Common Names

Dragon fruit, Pitaya, pitahaya, night-blooming cereus, strawberry pear, Belle of the night, Cinderella plant.

Taxonomic Classification of Dragon Fruit

- ❖ Domain: Eukaryota
- ❖ Kingdom: Plantae
- ❖ Subkingdom: Tracheobionta
- ❖ Superdivision: Spermatophyta
- ❖ Division: Magnoliopsida

- ❖ Subclass: Caryophyllidae
- ❖ Order: Caryophyllales
- ❖ Family: Cactaceae
- ❖ Subfamily: Cereoideae
- ❖ Genus: *Hylocereus*

Nutrients Composition in Dragon Fruits:

Particulars	Average value (g/100g edible portion)	Particulars	Average value (mg/100g edible portion)
Moisture	85.30	Vitamin C	3.0
Crude protein	1.10	Thiamin	0.028-0.043
Fat	0.57	Riboflavin	0.043-0.045
Glucose	5.70	Niacin	2.8
Fructose	3.20	Vitamin A	0.0111
Sucrose	Not detected	Calcium	10.2
Maltose	Not detected	Iron	3.37
Sorbitol	0.33	Magnesium	38.9
Carbohydrate	11.20	Phosphorus	27.5
crude fibre	1.34	Potassium	272.0
Ash	0.56	Sodium	8.9
Energy	67.70kcal	Zinc	0.35

Cultivation Technique of Dragon Fruit:

Cultivation of Dragon fruit already started in a different part of West Bengal with many success stories of the farmer from different regions. However, it was first successfully grown in Gujrat state. Many nurserymen started propagation for raising planting material of Dragon fruit. High density commercial plantings are possible with 1100–1350 plants per hectare. The full commercial production of a plant can take up to five years, at which point yields of 20 to 30 tons per hectare can be anticipated. *Hylocereus* is specifically designed to measure in tropical settings with little or no rain. After flowering, the cactus-like trees that bear dragon fruit set 30 to 50 days later and may normally go through 5 to 6 rounds of harvesting annually. It may be grown as a weed for free in many places, and some nations consider it an invasive cuckoo weed. (Pandya *et al.*, 2020).

Photochemistry:

Initial phytochemical analysis revealed the presence of alkaloids, saponins, terpenoids, oils, flavonoids, tannins, phenols, carbohydrates, coumarins, and proteins in the methanol and water extract of pitaya or dragon fruit seeds (Sushmitha *et al.*, 2018). Vitamin B1, B2, B3, and vitamin C, as well as protein, fat, carbohydrate, crude fiber, thiamin, niacin, pyridoxine, cobalamin, glucose, phenolic, betacyanins, polyphenol, carotene, phosphorus, iron, and Phyto-

albumin, are all abundant in *Hylocereus undatus* (Le Bellec *et al.*, 2006). It has a high concentration of Phyto-albumins, which are highly prized for their antioxidant effects. (Mahattanatawee *et al.*, 2006, Tenore *et al.*, 2012). Pitaya includes phenolic chemicals, alkaloids, tannins, flavonoids, steroids, proteins, and carbohydrates. (Mahdi *et al.*, 2018)

There are cholinesterase inhibitor alkaloids like donepezil, tacrine, rivastigmine, and quinacrine that can be used to treat Alzheimer's disease. Like phenylpropanoids, which are also contained in both extracts, coumarins have anti-inflammatory, antioxidant, anti-bacterial, anti-tubercular, anti-fungal, and anti-viral properties. Lupane glycine, betulinic acid, and oleanolic acid are examples of saponins that can be utilized to treat type 2 diabetes as well as chronic kidney disease. Omega-3 fatty acids, conjugated linoleic acids, phytosterols, and medium-chain triglycerides are present in the oil of pitaya seeds and are helpful in the treatment of obesity and bone health. (Joshi and Prabhakar, 2020)

Conclusion:

Dragon fruit owing to its rich nutrient contents and antioxidant properties is gaining popularity as a super fruit. The burgeoning population and the health concern people are showing interest in this fruit due to its medicinal property and health benefits. It requires very less water for growth and development. The fruit of *H. undatus* is a potentially useful source of complementary medicine that works as an antioxidant, anticancer, hypocholesterolemic, cardio-protective, antibacterial, and prebiotic agent. The fruit is made up of several different chemical components, including sugar, crude fiber, flavonoids, thiamin, niacin, pyridoxine, cobalamin, glucose, phenolics, betacyanins, polyphenols, carotene, phosphorus, iron, and Phyto-albumin.

References:

- Joshi M, Prabhakar B. (2020) Phytoconstituents and pharmaco-therapeutic benefits of pitaya: A wonder fruit. *J Food Biochem.* 44(7):1-15.
- Kakade, V, Dinesh, D., Singh, D., Bhatnagar,P.R., & kadam,D.(2019). Influence of length of cutting on root and shoot growth in Dragon Fruit. *Indian Journal of Agricultural Sciences*, 89(11),1895-99
- Le Bellec F, Vaillant F, Imbert, (2006) Pitahaya (*Hylocereus* spp.), a new fruit crop, a market with a future, *Fruits* 61(4), 237-50.
- Mahattanatawee K, Manthey JA, Luzio G, Talcott ST, Goodner K, Baldwin EA, (2006) Total antioxidant activity and fiber content of select Florida-grown tropical fruits, *J Agri Food Chem*, 54(19), 7355-63.
- Mahdi MA, Mohammed MT, Jassim AMN, Mohammed AI. (2018) Phytochemical content and antioxidant activity of *Hylocereus undatus* and study of toxicity and the ability of wound treatment. *Plant Arch.* 18(2):2672-80.
- Mizrahi, Y., Nerd.A.(1999): Climbing and columnar cacti: new arid land fruit crops. In: Janick,J.(ed). *Perspectives on new Crops and New Uses*. ASHS Press, Alexandria, VA, p. 358-36
- N'Guyen VK (1996) Floral induction study of Dragon fruit crop (*Hylocereus undatus*) by using chemicals, *Univ. Agric Forest., Fac. Agron., Ho Chi Minh-ville, Vietnam*, 54.
- Nurliyana, R. D., Syed Zahir, I., Mustapha Suleiman, K., Aisyah, M. R. & Kamarul Rahim, K. (2010) Antioxidant study of pulps and peels of dragon fruits: a comparative study. *Int. Food Res. J.* 17(2), 367–375

- Pandya Prutha Hitendraprasad, Karunakar Hegde, A R Shabaraya (2020) *Hylocereus undatus* (Dragon Fruit): A Brief Review Int. J. Pharm. Sci. Rev. Res., 60(1): 55-57
- Pushpakumara DKNG, Gunasena HPM, Kariyawasam M, (2006) Flowering and fruiting phenology, pollination agents and Breeding system in *Hylocereus* spp, (dragon fruit), Proc Peradeniya University Research Sessions, Sri Lanka, 11-15.
- Sonawane MS. (2017) Nutritive and medicinal value of dragon fruit. Asian J Hortic. 12(2):267-71.
- Sushmitha HS, Roy CL, Gogoi D, Velagala RD, Nagarathna A, Balasubramanian S, (2018) Phytochemical and Pharmacological Studies on *Hylocereus undatus* Seeds: An In Vitro Approach. World J Pharmacol Res. 7(14):986-1006.
- Tel-Zur, N., Abbo, S., Bar-Zvi, D. & Mizrahi, Y. (2004) Genetic relationships among *Hylocereus* and *Selenicereus* vine cacti (Cactaceae): Evidence from hybridization and cytological studies. *Ann. Bot.* **94**(4), 527–534
- Tenore, G. C., Novellino, E. & Basile, A. (2012) Nutraceutical potential and antioxidant benefits of red pitaya (*Hylocereus polyrhizus*) extracts. *J. Func. Foods* 4(1), 129–136.
- Wu, L. C. (2006) Antioxidant and antiproliferative activities of red pitaya. *Food Chem.* 95(2), 319–327.
- Xu L, Zhang Y, Wang L. (2016) Structure characteristics of a water-soluble polysaccharide purified from dragon fruit (*Hylocereus undatus*) pulp. *Carbohydr Polym.* 146:224-30.



Selection of Physiologically and Genetically Superior F_1 progenies of Rice for Drought Tolerance Under Flooding and Moisture Condition

R. Salomi¹, S. Bharathkumar¹, M. Rajeshwari² and K. Raju¹

¹Kandaswami Kandar's College, Velur - 638182, Namakkal (District), Tamil Nadu, INDIA.

²ArignarAnna Government Arts College, Namakkal - 637 002, Tamil Nadu, INDIA.

E. mail ID:bharathkumar76kkc@gmail.com

Abstract:

In this study, a number of 143 F_1 rice seeds derived from a cross between ADT37 and CR Dhan 801 were used for evaluating their performance to drought stress at seedling stage under flooding and moisture condition. More number of F_1 seedlings grown under moisture condition were noted to be tolerant to drought stress when compare to seedlings of flooding. The value of drought tolerance degree was high in F_1 seedlings of moisture condition. Heterosis percentage also was recorded as high in many F_1 seedlings for mid and better parent value under moisture condition. In genetic analysis, percentage of genetic (Vg) and phenotypic variation (Vp) was found to be high in tolerant seedlings of moisture condition. In case of genotypic (GCV) and phenotypic coefficient of variance (PCV) high percentage was registered in susceptible and tolerant seedlings of flooding and moisture condition, respectively. Heredity percentage was high in susceptible and moderate tolerant seedlings of flooding and moisture condition, respectively. In this study, it is found that more number of F_1 seedlings is associated with drought tolerance at physiological and genetical level under moisture condition when compare to flooding. These superior rice lines could be used for further drought improvement programme.

Keywords: ADT37, CR Dhan 801, Drought stress, Heterosis, Heredity, drought tolerance degree.

Introduction:

Rice crop (*Oryza sativa* L.) is cultivated in a wide range of varying environments worldwide and therefore, effect of variable rainfall is associated with impact of drought on rice production. Since rice is highly vulnerable to water stress, it accounts for several morphological changes such as plant height reduction, leaf rolling, leaf senescence, etc. at different growth stages in response to drought stress (Henry *et al.*, 2016; Kumar *et al.*, 2015). Potentially, the most critical stage of rice growth is at the time of seed germination and early seedling growth for water stress (Ahmad *et al.*, 2009). Nowadays more than 80 percent of available water is used only for irrigated agriculture sector worldwide. However, over the years, pressures are starting to mount demands from other stakeholders also for more water than the use of water in agriculture. This situation will affect the production of food, fodder and feed adversely. In many developing countries, global water resources are dwindling at an alarming rate recently. In Tamil Nadu state of India, the Cauvery delta areas face a cycle of drought and flood intensively and there was a report on decline in the overall rainfall between 1974 and 2014 in these areas. And, these areas have received only 168 mm instead of 1000 mm per year in 2016. Hence, only way to manage agricultural drought for increasing agricultural production is genetic improvement of crops for drought tolerance. Here, performance of F_1 rice lines derived from a cross (ADT 37 x CR Dhan 801) to drought stress at seedling stage was evaluated under flooding and moisture condition.

Materials and Methods:

Source of rice seeds

A small quantity of rice seeds of ADT 37 from Tamilnadu Rice Research Institute (TRRI), Aduthurai, Tamilnadu state and CR Dhan 801 rice seeds from National Rice Research Institute (NRRI), Cuttack, Odisha state were obtained.

Development of F₁ generation:

In the cross-pollination, a rice variety, ADT37 was used as female parent (recurrent parent) and CR Dhan 801 as male parent (donor). The male parent contains drought tolerant three quantitative trait locus (QTLs), DTY 1.1, 2.1 and 3.1. The F₁ generation was derived through cross-pollination by transferring anthers from male parent to female parent.

Experiment design and Evaluation for drought tolerance at seedling stage:

In this study, some amount seeds from F₁ generation were germinated along with both parental lines in cups and the seedlings were transferred to pots. Here, two types of experiments were conducted in Net house of college campus. In one experiment, seedlings of F₁ and parental lines were grown under flooding condition and in another experiment, these seedlings were grown under moisture condition in big plastic pots. At 30 days-old-seedlings stage, drought stress was imposed on seedlings by withholding water irrigation in both experiments for 15 days. After stress period, seedlings were re-irrigated and drought scoring was done according to IRRI standard scale for drought tolerance (IRRI, 1996) (0-Highly tolerance; 1-Tolerance; 3-Moderately tolerance; 5-Moderately susceptible; 7-Susceptible; 9-Highly susceptible).

Drought tolerant degree (DTD) :

DTD is defined as the mean of the ratios of green leaf length to total leaf length of the top three leaves in every plant after severe drought treatment. DTD values thus vary from zero to one. The green leaf length and the total leaf length of the first leaf are designated as F₁ and F₂, respectively. Similarly, the green leaf length and the total leaf length of the second leaf are separately designated as S₁ and S₂, and those of the third leaf as T₁ and T₂. The untreated control cultivars were handled in the same way to obtain their DTD values (Xiaofeng, et al., 2018). The DTD value of each material was calculated by the following formula:

$$X_j = \frac{1}{n}$$

$$N \sum_{i=1} [(F_1/F_2 + S_1/S_2 + T_1/T_2)/3]$$

$$\text{DTD value} = (X_I + X_{II} + X_{III})/3$$

Heterosis:

Study of Heterosis was done according to Turner (1953) for drought tolerance and grain yield characters as follows:

$$\text{Heterosis over mid parent (H1) } HMP(\%) = \frac{F_1 - MP}{MP} \times 100$$

$$\text{Heterosis over better parent (H2) } HBP(\%) = \frac{F_1 - BP}{BP} \times 100$$

Where, F_1 = mean of F_1 , MP = mean of the two parents and BP = mean of the better parent.

Heredity:

The GCV (Genotypic coefficient of variance) and PCV (Phenotypic coefficient of variance) values were computed as per Burton and De vane (1953).

Genotypic and phenotypic variances were calculated as follows:

$$\sigma^2 g = \frac{MS1 - MS2}{r}$$

r

$$\sigma^2 ph = \frac{MS1}{r}$$

r

where $\sigma^2 g$ is genotypic variance; $\sigma^2 ph$ is phenotypic variance; MS1 is mean square for the entries; MS2 is mean square for the residuals; and r is replication.

Genotypic coefficient of variance (GCV) and phenotypic coefficient of variance (PCV) were determined as follows:

$$GCV\% = \frac{\sqrt{\sigma^2 g}}{X} \times 100,$$

$$PCV\% = \frac{\sqrt{\sigma^2 ph}}{X} \times 100,$$

$$X \times 100,$$

$$X \times 100,$$

where GCV is genotypic coefficient of variance; PCV is phenotypic coefficient of variance; $\sigma^2 g$ is genotypic variance; $\sigma^2 ph$ is phenotypic variance; and X is sample mean. Heritability as per cent of mean was estimated following the method of Johnson *et al.* (1955).

Results:

Development of F₁ generation:

A number of 289F₁ seeds were derived through a cross between ADT37 and CR Dhan 801. Among them, a 50% of seeds were used for evaluating their performance under drought stress condition at seedling stage.

Drought tolerance Score:

In drought screening, seedlings of F₁ generation and parental lines grown under flooding and moisture condition showed a differential reaction to drought stress in the first three leaves of the plant (Table-1; Fig.1). Under flooding, 5.17% of F₁ plants was noted to score 9 (highly susceptible) followed by 15.51% to score 7 (susceptible), 34.48% to score 5 (moderately susceptible), 15.51% to score 3 (moderately tolerance), 22.41% to score 1 (tolerance) and 6.89% to score 0 (highly tolerance) 1st leaf from top of the plant among 54 F₁ plants. For 2nd leaf, 25.86% of F₁ plants to score 9, 27.58% to score 7, 31.03% to score 5, 8.62% to score 3, 3.44% to score 1 and 3.44% to score 0 were noted. For 3rd leaf, 84.48% F₁ plants accounted to score 9 followed by 0% to score 0 to score 5, 0% to score 3, 0% to score 1 and 0% to score 0. Under moisture condition, in 84 F₁ plants, 98.82%, 0%, 0%, 1.17%, 0% and 0% seedlings were registered to score 0, 1, 3, 5, 7 and 9, respectively, for 1st leaf. For 2nd leaf, 18.82%, 0%, 12.94%, 16.47%, 35.29%, and 16.47%, to score 0, 1, 3, 5, 7 and 9, respectively, For 3rd leaf, all 84 seedlings were grouped to score 9 (Fig.2).

DTD value for drought tolerance:

Drought score of F₁ seedlings and parental lines are interpreted with drought tolerance degree as shown in the Table-1. Under flooding condition, the DTD value in donor and recurrent parent was in the value of 0.31 and 0.62, respectively and the DTD value of F₁ population ranged from 0.10 to 0.74. Among 58 F₁ progenies, 68.96% and 13.79% F₁ progenies were more valuable than ADT37 and CR Dhan 801, respectively. Under moisture condition, the DTD value was 0.50 in ADT37 and 0.76 CR Dhan 801. In F₁ progenies, this value ranged from 0.33 to 0.72 and

among them, 42.85% progenies had higher value than ADT37, but no one to CR Dhan 801 (Table-1; Fig.3).

Heterosis:

Heterosis study conducted for drought tolerant and susceptible rice seedlings is mentioned in the Table-1. Under flooding, highest percent of heterosis for mid and better parent in F_1 population was 60.86 and 138.70, respectively and the lowest percent was -78.26 for mid parent and -67.74 for better parent. Under moisture condition, the maximum percent of mid-parent heterosis was 18.03 and the minimum percent was -63.93. In better parent heterosis, highest and lowest percent was registered to 44.0 and -56.0, respectively.

Heredity:

Data for the analysis of genetic variations in the F_1 population is given in the Table-2. In the present investigation for drought tolerance in the F_1 population of flooding, the percent of genetic variation (V_g) ranged from 0.23 to 5.26 and the highest and lowest variation was noted in between 0.0 and 0.10 and 0.31 and 0.40 DTD value, respectively. Under moisture condition, the percent of genetic variation (V_g) ranged from -2.04 to 16.95 in F_1 population and the highest and lowest variation was noted in between 0.71-0.80 and 0.41-0.50 DTD value, respectively. In the phenotypic variation (V_p) under flooding, the maximum and minimum percent was 7.64 and 0.63 between 0.01 and 0.10 and 0.31 and 0.40 DTD value, respectively. Under moisture condition, the maximum percent of phenotypic variation (V_p) of F_1 population was 18.33 in between 0.41 and 0.50 and minimum percent was 1.07 between 0.21 and 0.30 DTD value.

In case of GCV, highest percent in F_1 population under flooding was noted to 47.95 in between 0.0 and 0.10 DTD value and lowest percent was 0.0 in between 0.71 and 0.80 DTD value. Under moisture condition, highest and lowest percent of GCV was noted to 94.80 % and 0.0% in F_1 progenies having DTD value in the range of 0.21 - 0.30 and 0.71-0.80 value, respectively. The percentage of PCV was high (96.95%) in the range of 0.71-0.80 DTD values and low (18.42) in between 0.31 and 0.40 under flooding. Under moisture condition, maximum PCV percent was noted to 101.98 in F_1 plants with DTD value in the range of 0.21-0.30 and minimum percent was noted to 15.29 in between 0.41 and 0.50. In heredity study in F_1 population under flooding, high percentage was noted to 68.84 in F_1 plants having DTD values between 0.31-0.40 and low to -54.25 in plants with DTD values between 0.71 and 0.80. Under moisture condition, maximum heredity percent was noted to 92.19% in between 0.41-0.50 and minimum percent (17.75) in between 0.21 and 0.30 DTD value.

Discussion:

Drought scoring is one of the primary criteria for selection of drought tolerant rice genotypes (IRRI, 2014) and leaf rolling with tip drying is used for scoring drought tolerance as one of the acclimation responses of rice as well as a criterion for scoring drought tolerance (Kadioglu and Terzi, 2007). In this study, the performance of F_1 rice seedlings in response to drought stress was unique as well as similar under flooding and moisture condition. In the evaluation of three leaves, it was noticed that there was difference in the drought response among F_1 progenies grown under flooding and moisture condition in 1st and 2nd leaf compared to 3rd leaf. Here, more than 90 per cent of the F_1 progenies along with both parental lines have showed highly susceptible reaction to the 3rd leaf under both conditions. The impact of drought stress might be stronger in the older leaves when compared to young leaves and it was difficult to

identify number of tolerance plants in older leaf. Besides, we found the differential reactions of F₁ progenies to drought stress in 1st and 2nd leaf for flooding and moisture condition, respectively. In this case, the F₁ progenies could easily be grouped into highly tolerance, tolerance and moderately tolerance, susceptible and highly susceptible. Moreover, in this evaluation, we could select more number of highly tolerant plants from F₁ plants grown under moisture condition rather than flooding. In the DTD evaluation, F₁ progenies accounted for highly tolerant and susceptible reaction are correlated with high and low DTD value, respectively. For example, F₁ plant (#F₁-57) having lowest DTD value (0.10) is matched with score 7-9-9 (S-HS-HS) of 3 leaves and F₁ plant (#F₁-11) having highest DTD value (0.74) with score 1-3-7 (T-MT-S). Thus, it reveals that the lowest and highest DTD value correlates with plant susceptibility and tolerance, respectively. This result coincides with a previous study on screening of rice genotypes for drought tolerance (Xiaofeng, et al. 2017). In this study, more number of F₁ plants with high DTD value was noted under moisture condition when compare to flooding.

Heterosis is described as the superiority of an F₁ hybrid over its both parents. In this study, heterosis study was carried out for each F₁ plant and among 58 F₁ progenies under flooding, 36.20 % and 72.41 % of F₁ plants showed positive heterosis to mid-parent and better parent, respectively. Under moisture condition, 28.23 % and 48.23 % of F₁ plants among 85 F₁ plants accounted for positive heterosis to mid and better parent, respectively. Here, the positive percentage of heterosis was high for better parent rather than mid parent under both conditions. Positive heterosis indicates close relationship with drought stress tolerance when compare to negative heterosis. The number of F₁ plants with positive heterosis of both mid and better parents was higher under moisture condition rather than flooding condition. Moreover, it is observed that the negative and positive heterosis is associated with less and more DTD value, respectively.

In this study, percent of phenotypic variation is recorded to be more than that of genotypic variation under both conditions and the variation of V_g and V_p is noted to be higher in F₁ population grown under moisture condition than that of flooding condition. According to Adhikari, et al. (2018), high phenotypic values are associated with high genotypic variations and less environmental variations and low values are vice-versa. Here, high value of PCV and GCV is correlated with less DTD values under both conditions and high value for drought tolerance is associated with the wide variability for the trait. In a previous study, it is reported that the higher percentage of PCV is associated with the environment influence on the expression of character rather than genes, whereas the higher percent of GCV is a significant contribution of environment and genotypes for grain yield (Massaoudou, et al., 2018). The higher PCV versus GCV indicates a significant contribution of environment and genotypes by environment interaction in the expression of drought tolerance in both conditions. Similar results have been reported on cultivated sorghum by Bello et al. (2007) in Nigeria. The estimates of heritability reflect the values of phenotypic variations and therefore, low heritability helps to remove the ineffective rice line for a particular character. In this study, we found that F₁ progenies having more DTD value (0.41 and 0.60) have accounted for low heritability percentage (0.0-14) and high heritability (60-86%) was in plants having less DTD value (in between 0.0 and 0.40) under flooding. In case of moisture condition, the percent of heritability was high in plants having both more DTD values (0.31-0.70). The high heritability observed for drought tolerance character indicates the predominance of both additive and dominant gene effects in the inheritance of the character. High heritability is revealed the major role of additive gene action in the genetic

control of this trait. Similar results were also reported by Revathi, et al. 2016, Nandeshwari et al. (2010) and Adhikari, et al. (2018). In this study, the percentage of genetic inheritance is more or less similar in F₁ progenies having more and low DTD value under flooding whereas, under moisture condition it is high in F₁ progenies associated with more DTD value and vice-versa. The determination of the heritability is very important one than the coefficient of variation which is only associated with the extent of total variability present for a character (Lakshmana et al. 2009; Govindaraj, et al. 2011).

In the present study, these results reveal that rice seedlings grown under water limited (moisture) condition could able to improve its genetics in response to drought stress rather than seedlings in flood. In conclusion, most of the F₁ seedlings grown under flooding and moisture condition were susceptible and tolerant to drought stress, respectively. In case of DTD value, V_p, V_g, PCV, GCV and Heredity, F₁ seedlings grown under moisture condition have accounted for higher value rather than that of grown under flooding. This is one of the ways to selected superior rice line at early stage of rice growth and further molecular confirmation of selected seedlings may be utilized for future breeding program for development of drought tolerance lines.

Acknowledgement:

The authors are thankful to the Tamilnadu Rice Research Institute (TRRI), Aduthurai, Tamilnadu state, National Rice Research Institute (NRRI), Cuttack, Odisha state and KandaswamiKandar's College, Velur, Namakkal District, Tamilnadu for providing rice seeds and necessary facilities for conducting the present investigation.

References:

- Adhikari BN, Joshi BP, Shrestha J, Bhatta NR (2018) Genetic variability, heritability, genetic advance and correlation among yield and yield components of rice (*Oryza sativa* L.). *J Agric Nat Resour* 1(1):149-160
- Ahmad S., Ahmad R., Ashraf MY., Ashraf M., Waraich EA. 2009. Sunflower (*Helianthus Annuus* L.) response to drought stress at germination and seedling growth stages. *Pakistan Journal of Botany*, 41:647-54.
- Bello, D., A. M. Kadams, S. Y. Simon, and D. S. Mashi, (2007). Studies on genetic variability in cultivated sorghum (*Sorghum bicolor* L. Moench) cultivars of Adamawa State Nigeria," *American-Eurasian Journal Agricultural Environment Science*, vol. 2, no. 3, pp. 297–302.
- Burton G. W. and De vane E. H. 1953 Estimating heritability in tall Fescue (*Festuca aurundinacea*) from replicated clonal material. *Agron. J.* 45, 478–481.
- Govindaraj, M., Selvi, B., Rajarathinam, S. and Sumathi, P. "Genetic variability and heritability of grain yield components and grain mineral concentration in India's pearl millet (*Pennisetum glaucum* (L) R. Br.) accessions," *African Journal of Food, Agriculture, Nutrition and Development*, vol. 11, no. 3, 2011.
- Govindaraj, M., B. Selvi, S. Rajarathinam, and P. Sumathi, "Genetic variability and heritability of grain yield components and grain mineral concentration in India's pearl millet (*Pennisetum glaucum* (L) R. Br.) accessions (2011). *African Journal of Food, Agriculture, Nutrition and Development*, vol. 11, no. 3, 2011.

- Henry A., Wehler R., Grondin A., Franke R., Quintana M. 2016. Environmental and physiological effects on grouping of drought tolerant and susceptible rice varieties related to rice (*Oryza sativa*) root hydraulics under drought. *Annals of Botany*, 118(4): 711–724.
- International Rice Research Institute (IRRI). 1996. Standard Evaluation System for Rice. Los Banos, the Philippines: International Rice Research Institute.
- International Rice Research Institute (IRRI). 2014. Standard Evaluation System for Rice. 5th edn. Los Banos, the Philippines: International Rice Research Institute.
- Johnson H.W., Robinson H. F. and Comstock R. E. 1955 Estimates of genetic and environmental variability in soybean. *Agron. J.* 47, 314–318.
- Kadioglu A., Terzi R. 2007. A dehydration avoidance mechanism: Leaf rolling. *Botany Review*, 73(4): 290–302.
- Kumar R., Sreenu K., Singh N., Jain N., Singh NK., Rai V. 2015. Effect of drought stress on contrasting cultivars of rice. *International Journal of Tropical Agriculture*, 33(2): 1559–1564.
- Lakshmana, D., Biradar, B. D. and kumar, R. L. R (2009) Genetic variability studies for quantitative traits in a pool of restorers and maintainers lines of pearl millet (*Pennisetum glaucum* (L.)), *Karnataka Journal of Agricultural Science*, vol. 22, pp. 881-882, 2009.
- Massaoudou Hamidou, Abdoul Kader M. Souley, Issoufou Kapran, Oumarou Souleymane, Eric Yirenyi Danquah, Kwadwo Ofori, Vernon Gracen and Malick N. Ba (2018). Genetic variability and its implications on early generation sorghum lines selection for yield, yield contributing traits, and resistance to sorghum midge. *International Journal of Agronomy*, 1-10, <https://doi.org/10.1155/2018/1864797>
- Nandeshwar B. C., Pal S., Senapati B. K. and De D. K. 2010 Genetic variability and character association among biometrical traits in F₂ generation of some Rice crosses. *Electron. J. Plant Breed.* 1, 758–763.
- Revathi S., Sakthivel K., Manonmani S., Umadevi M., Ushakumari R. and Robin S. 2016 Genetics of wide compatible gene and variability studies in rice (*Oryza sativa* L.). *J. Genet.* 95, 463–467.
- Turner JM (1953) A study of heterosis in upland cotton II Combining ability and inbreeding effects. *Agron J* 43:487-490
- Xiaofeng Zu, Yanke Lu, Qianqian Wang, Peifeng Chu, Wei Miao, Huaqi Wang, Honggui La (2017). A new method for evaluating the drought tolerance of upland rice cultivars. *The crop journal*, 4 8 8 – 4 9 8. <http://dx.doi.org/10.1016/j.cj.2017.05.002> □

Table-1 shows the IRRI SES Score, DTD value and Heterosis for drought tolerance in F₁ population under flooding and moisture condition.

Geno type	Flooding				Heterosis		Geno type	Moisture				Heterosis	
	Leaf Position				MP	BP		Leaf Position				MP	BP
	1 st	2 nd	3 rd	DTD				1 st	2 nd	3 rd	DTD		
	Leaf	Leaf	Leaf					Leaf	Leaf	Leaf			
	score	score	score	Value				score	score	score	Value		
D	5	7	9	0.31			D	0	5	9	0.50		

RP	0	5	7	0.62			RP	0	0	5	0.76		
F ₁₋₁	7	7	9	0.27	41.30	-12.90	F ₁₋₅₉	0	5	9	0.51	-16.39	2
F ₁₋₂	3	9	9	0.37	19.56	19.35	F ₁₋₆₀	0	7	9	0.46	-24.59	-8
F ₁₋₃	5	5	9	0.46	0.0	48.38	F ₁₋₆₁	0	3	9	0.61	0	22
F ₁₋₄	1	7	9	0.48	4.34	54.83	F ₁₋₆₂	0	7	9	0.43	-29.50	-14
F ₁₋₅	3	7	9	0.44	-4.34	41.93	F ₁₋₆₃	0	7	9	0.43	-29.50	-14
F ₁₋₆	3	7	9	0.43	-6.52	38.70	F ₁₋₆₄	0	0	9	0.66	8.19	32
F ₁₋₇	5	7	9	0.37	19.56	19.35	F ₁₋₆₅	0	7	9	0.46	-24.59	-8
F ₁₋₈	5	7	9	0.27	41.30	-12.90	F ₁₋₆₆	0	5	9	0.56	-8.19	12
F ₁₋₉	1	3	7	0.69	50.00	122.58	F ₁₋₆₇	0	7	9	0.49	-19.67	-2
F ₁₋₁₀	5	5	9	0.34	26.08	9.67	F ₁₋₆₈	0	7	9	0.44	-27.86	-12
F ₁₋₁₁	1	3	7	0.74	60.86	138.70	F ₁₋₆₉	0	0	9	0.66	8.19	32
F ₁₋₁₂	5	5	7	0.53	15.21	70.96	F ₁₋₇₀	0	0	9	0.66	8.19	32
F ₁₋₁₃	1	7	9	0.47	2.17	51.61	F ₁₋₇₁	0	3	9	0.64	4.91	28
F ₁₋₁₄	1	5	7	0.71	54.34	129.03	F ₁₋₇₂	0	7	9	0.48	-21.31	-4
F ₁₋₁₅	5	5	9	0.41	10.86	32.25	F ₁₋₇₃	0	3	9	0.65	6.55	30
F ₁₋₁₆	1	5	9	0.52	13.04	67.74	F ₁₋₇₄	0	0	9	0.66	8.19	32
F ₁₋₁₇	1	7	7	0.63	36.95	103.22	F ₁₋₇₅	0	0	9	0.66	8.19	32
F ₁₋₁₈	5	5	9	0.38	17.39	22.58	F ₁₋₇₆	0	0	9	0.66	8.19	32
F ₁₋₁₉	1	7	9	0.45	-2.17	45.16	F ₁₋₇₇	0	9	9	0.33	-45.90	-34
F ₁₋₂₀	1	5	7	0.67	45.65	116.12	F ₁₋₇₈	0	5	9	0.52	-14.75	4
F ₁₋₂₁	1	5	9	0.59	28.26	90.32	F ₁₋₇₉	0	9	9	0.40	-34.42	-20
F ₁₋₂₂	0	5	7	0.70	52.17	125.80	F ₁₋₈₀	0	3	9	0.60	-1.63	20
F ₁₋₂₃	0	5	9	0.56	21.73	80.64	F ₁₋₈₁	0	5	9	0.50	-18.03	0
F ₁₋₂₄	0	5	9	0.52	13.04	67.74	F ₁₋₈₂	0	7	9	0.45	-26.22	-10
F ₁₋₂₅	5	5	9	0.41	10.86	32.25	F ₁₋₈₃	0	5	9	0.52	-14.75	4
F ₁₋₂₆	1	3	7	0.67	45.65	116.12	F ₁₋₈₄	0	7	9	0.41	-32.78	-18
F ₁₋₂₇	0	1	9	0.70	52.17	125.80	F ₁₋₈₅	0	7	9	0.46	-24.59	-8
F ₁₋₂₈	9	0	7	0.18	60.86	-41.93	F ₁₋₈₆	0	9	9	0.41	-32.78	-18
F ₁₋₂₉	3	9	9	0.35	23.91	12.90	F ₁₋₈₇	5	7	9	0.33	-45.90	-34
F ₁₋₃₀	9	1	9	0.34	26.08	9.67	F ₁₋₈₈	0	3	9	0.61	0	22
F ₁₋₃₁	3	5	9	0.51	10.86	64.51	F ₁₋₈₉	0	7	9	0.41	-32.78	-18
F ₁₋₃₂	7	9	9	0.13	71.73	-58.06	F ₁₋₉₀	0	5	9	0.57	-6.55	14
F ₁₋₃₃	7	7	9	0.23	50.00	-25.80	F ₁₋₉₁	0	7	9	0.44	-27.86	-12
F ₁₋₃₄	7	9	9	0.24	47.82	-22.58	F ₁₋₉₂	0	9	9	0.33	-45.90	-34

F ₁₋₃₅	3	9	9	0.32	30.43	3.22	F ₁₋₉₃	0	5	9	0.52	-14.75	4
F ₁₋₃₆	5	3	9	0.42	-8.69	35.48	F ₁₋₉₄	7	7	9	0.22	-63.93	-56
F ₁₋₃₇	5	7	9	0.39	15.21	25.80	F ₁₋₉₅	0	5	9	0.54	-11.47	8
F ₁₋₃₈	5	7	9	0.31	32.60	0.00	F ₁₋₉₆	0	0	9	0.66	8.19	32
F ₁₋₃₉	5	0	9	0.53	15.21	70.96	F ₁₋₉₇	0	9	9	0.40	-34.42	-20
F ₁₋₄₀	5	3	9	0.48	4.34	54.83	F ₁₋₉₈	0	7	9	0.47	-22.95	-6
F ₁₋₄₁	5	7	9	0.39	15.21	25.80	F ₁₋₉₉	0	7	9	0.47	-22.95	-6
F ₁₋₄₂	3	5	9	0.44	-4.34	41.93	F ₁₋₁₀₀	0	0	9	0.66	8.19	32
F ₁₋₄₃	5	9	9	0.16	65.21	-48.38	F ₁₋₁₀₁	0	3	9	0.58	-4.91	16
F ₁₋₄₄	3	7	9	0.40	13.04	29.03	F ₁₋₁₀₂	0	0	9	0.66	8.19	32
F ₁₋₄₅	7	9	9	0.21	54.34	-32.25	F ₁₋₁₀₃	0	3	9	0.65	6.55	30
F ₁₋₄₆	9	5	9	0.23	50.00	-25.80	F ₁₋₁₀₄	0	3	9	0.65	6.55	30
F ₁₋₄₇	5	7	9	0.32	30.43	3.22	F ₁₋₁₀₅	0	7	9	0.44	-27.86	-12
F ₁₋₄₈	7	9	9	0.20	56.52	-35.48	F ₁₋₁₀₆	0	0	9	0.72	18.03	44
F ₁₋₄₉	1	9	9	0.32	30.43	3.22	F ₁₋₁₀₇	0	5	9	0.50	-18.03	0
F ₁₋₅₀	1	7	9	0.50	8.69	61.29	F ₁₋₁₀₈	0	7	9	0.44	-27.86	-12
F ₁₋₅₁	7	9	9	0.14	69.56	-54.83	F ₁₋₁₀₉	0	7	9	0.44	-27.86	-12
F ₁₋₅₂	3	5	9	0.47	2.17	51.61	F ₁₋₁₁₀	0	5	9	0.55	-9.83	10
F ₁₋₅₃	5	5	9	0.38	17.39	22.58	F ₁₋₁₁₁	0	3	9	0.64	4.91	28
F ₁₋₅₄	5	9	9	0.27	41.30	-12.90	F ₁₋₁₁₂	0	0	9	0.66	8.19	32
F ₁₋₅₅	7	9	9	0.13	71.73	-58.06	F ₁₋₁₁₃	0	3	9	0.61	0	22
F ₁₋₅₆	5	9	9	0.18	60.86	-41.93	F ₁₋₁₁₄	0	0	9	0.66	8.19	32
F ₁₋₅₇	7	9	9	0.10	78.26	-67.74	F ₁₋₁₁₅	0	7	9	0.44	-27.86	-12
F ₁₋₅₈	5	9	9	0.22	52.17	-29.03	F ₁₋₁₁₆	0	9	9	0.35	-42.62	-30
-	-	-	-	-	-	-	F ₁₋₁₁₇	0	3	9	0.59	-3.27	18
-	-	-	-	-	-	-	F ₁₋₁₁₈	0	0	9	0.71	16.39	42
-	-	-	-	-	-	-	F ₁₋₁₁₉	0	0	9	0.66	8.19	32
-	-	-	-	-	-	-	F ₁₋₁₂₀	0	0	9	0.66	8.19	32
-	-	-	-	-	-	-	F ₁₋₁₂₁	0	7	9	0.45	-26.22	-10
-	-	-	-	-	-	-	F ₁₋₁₂₂	0	7	9	0.48	-21.31	-4
-	-	-	-	-	-	-	F ₁₋₁₂₃	0	5	9	0.51	-16.39	2
-	-	-	-	-	-	-	F ₁₋₁₂₄	0	7	9	0.42	-31.14	-16

-	-	-	-	-	F ₁₋₁₂₅	0	7	9	0.43	-29.50	-14
-	-	-	-	-	F ₁₋₁₂₆	0	9	9	0.37	-39.34	-26
-	-	-	-	-	F ₁₋₁₂₇	0	7	9	0.42	-31.14	-16
-	-	-	-	-	F ₁₋₁₂₈	0	5	9	0.53	-13.11	6
-	-	-	-	-	F ₁₋₁₂₉	0	9	9	0.33	-45.90	-34
-	-	-	-	-	F ₁₋₁₃₀	0	9	9	0.34	-44.26	-32
-	-	-	-	-	F ₁₋₁₃₁	0	9	9	0.38	-37.70	-24
-	-	-	-	-	F ₁₋₁₃₂	0	9	9	0.40	-34.42	-20
-	-	-	-	-	F ₁₋₁₃₃	0	7	9	0.46	-24.59	-8
-	-	-	-	-	F ₁₋₁₃₄	0	7	9	0.46	-24.59	-8
-	-	-	-	-	F ₁₋₁₃₅	0	5	9	0.51	-16.39	2
-	-	-	-	-	F ₁₋₁₃₆	0	5	9	0.51	-16.39	2
-	-	-	-	-	F ₁₋₁₃₇	0	7	9	0.42	-31.14	-16
-	-	-	-	-	F ₁₋₁₃₈	0	9	9	0.40	-34.42	-20
-	-	-	-	-	F ₁₋₁₃₉	0	9	9	0.37	-39.34	-26
-	-	-	-	-	F ₁₋₁₄₀	0	9	9	0.38	-37.70	-24
-	-	-	-	-	F ₁₋₁₄₁	0	7	9	0.46	-24.59	-8
-	-	-	-	-	F ₁₋₁₄₂	0	0	9	0.66	8.19	32
-	-	-	-	-	F ₁₋₁₄₃	0	7	9	0.48	-21.31	-4

Table-2 shows the percentage of genetic variations under flooding and moisture condition

Range of DTD value	Flooding				
	Vg %	Vp %	GCV %	PCV %	h ² %
0.0 - 0.10	0.23	0.63	47.95	79.37	36.50
0.11 - 0.20	2.45	3.57	22.36	26.99	68.62
0.21 - 0.30	2.67	4.21	20.42	25.64	56.29
0.31 - 0.40	5.26	7.64	15.28	18.42	68.84
0.41 - 0.50	4.13	7.05	15.63	20.42	58.58
0.51 - 0.60	1.13	4.89	15.18	31.59	26.58
0.61 - 0.70	0.85	4.91	15.36	56.93	17.31
0.71 - 0.80	2.04	3.76	0.0	96.95	-54.25
0.81 - 0.90	-	-	-	-	-
0.91 - 1.0	-	-	-	-	-
	Moisture				
0.0 - 0.10	-	-	-	-	-
0.11- 0.20	-	-	-	-	-
0.21 - 0.30	0.19	1.07	94.80	101.98	17.75
0.31 - 0.40	9.38	10.78	19.14	20.52	87.01
0.41 - 0.50	16.95	18.33	14.70	15.29	92.19
0.51 - 0.60	5.41	7.19	23.25	26.81	75.24
0.61 - 0.70	11.52	13.68	16.97	18.49	84.21
0.71 - 0.80	-2.04	3.76	0.0	96.05	54.25
0.81 - 0.90	-	-	-	-	-
0.91 - 1.0	-	-	-	-	-

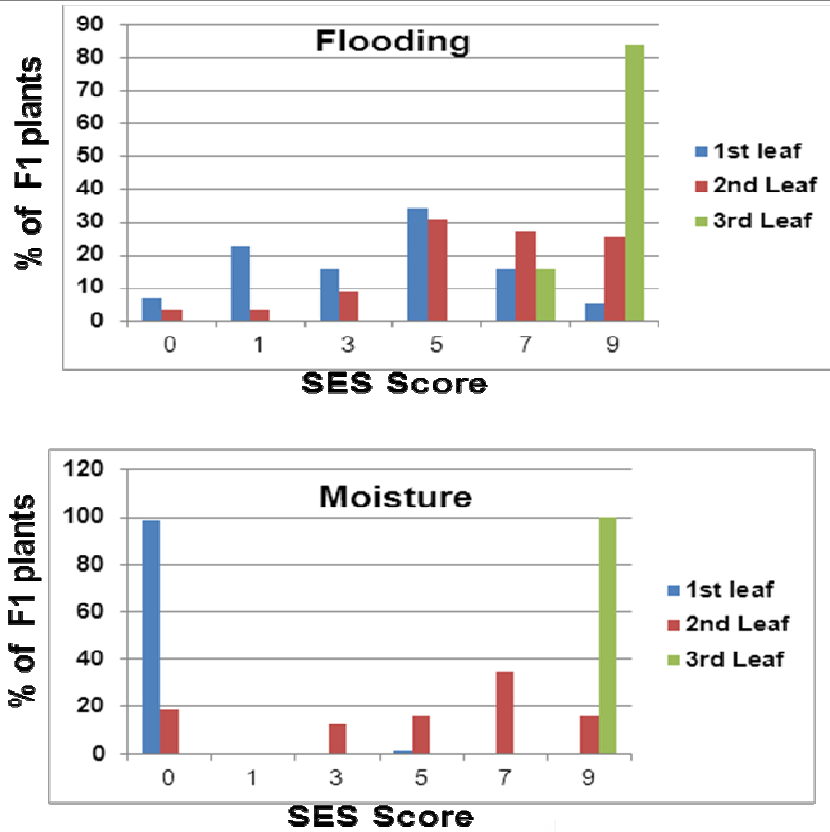


Fig.1 shows the percentage of F1 progenies with different drought score.

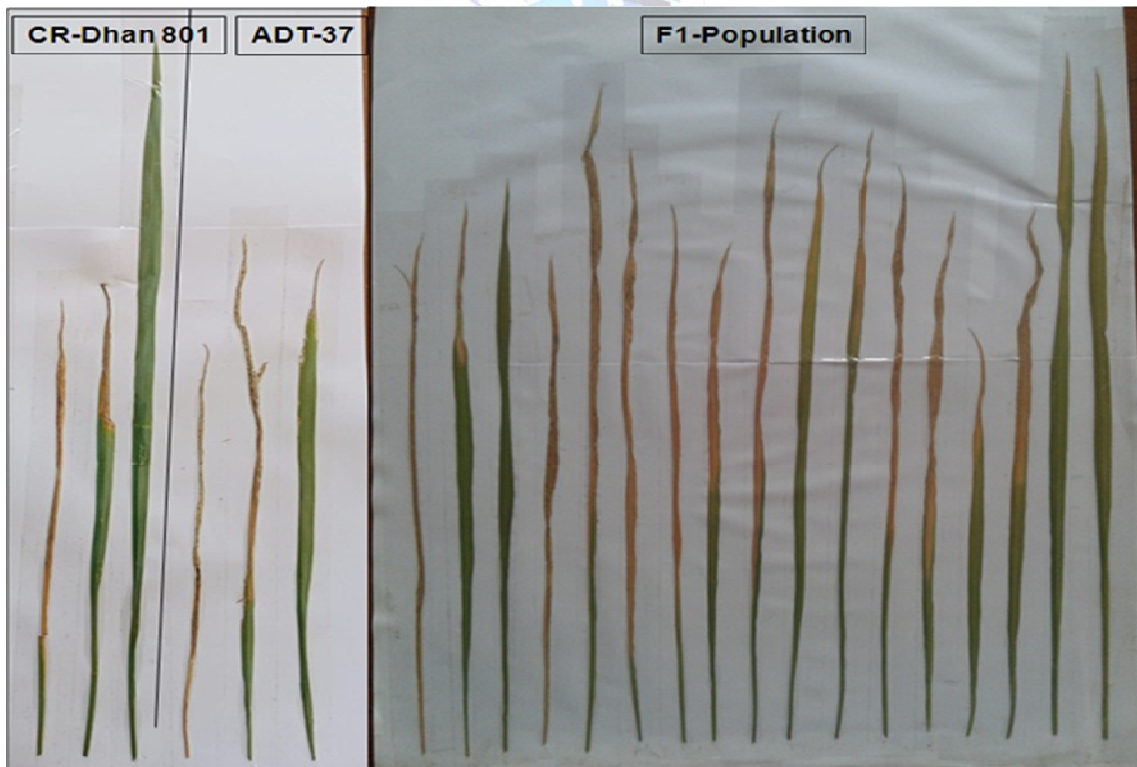


Fig.2 shows differential reactions of F1 progenies and parental lines Drought stress.

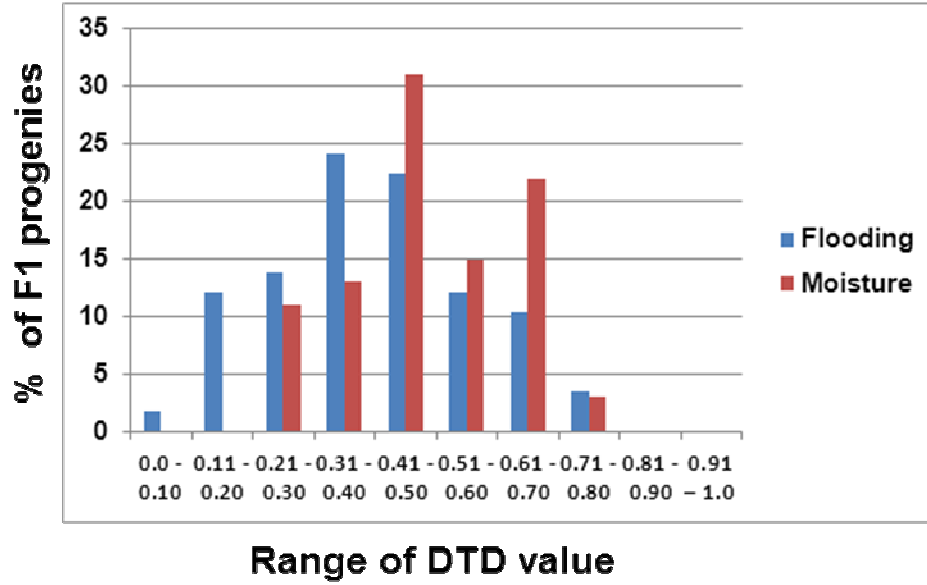


Fig.3 shows the percentage of F1 progenies with different DTD score



Prevalence of Wilt Complex Incidence on Black Pepper in Karnataka, India

*Dr. N. Umashankar Kumar, **Dr. N. G. Ravichandra and ***Dr. N. S. Pankaja

* Associate Professor, Department of Plant Pathology, College of Agriculture, Chamarajanagara

** Professor & Head, AICRP (Nematodes), UAS, GKVK, Bangalore

* Assistant Professor, Department of Plant Pathology, College of Agriculture, V.C.Farm, Mandya

E-mail.: umapathologist@gmail.com

Abstract:

An intensive roving survey was undertaken to know the occurrence of the burrowing nematode, of Radopholus similis and fungus, Phytophthora capsici associated with the wilt complex disease in black pepper in disease suspected pepper vine gardens of black pepper growing districts of malnad areas viz., Chickmagalur, Shimoga, Coorg, Uttara Kannada and Hassan districts of Karnataka during Kharif 2020-21. The wilt complex was noticed in all the locations surveyed with a range of 27.28 per cent to 35.23 per cent. In Chickmagalur district, maximum wilt complex incidence in Mudigere taluk (16.66 % to 63.40 %) followed by Koppa taluk (14.58 % to 51.50 %), N. R. Pura (16.05 % to 51.20 %) respectively, whereas lowest wilt complex incidence in Chickmagalur taluk as recorded (17.33 % to 43.50 %) followed by Sringeri (22.13 % to 48.50 %) respectively.

In Shivamogga district, maximum wilt complex incidence was recorded in Shikaripura (18.36 % to 45.68 %) followed by Hosanagara (19.63 % to 41.10 %) and Soraba (22.35 % to 40.25 %) respectively, whereas the lowest incidence was recorded in Bhadravathy (18.50 % to 34.50 %) followed by Thirthahalli (18.25 % to 35.50 %). The survey conducted in 270 locations from selected five districts viz., Chickmagalur, Coorg, Shivamogga, Hassan and Uttara Kannada during 2013-14. The wilt complex noticed in all locations surveyed, with a range of 16.05 % to 63.40 % in Chickmagalur district followed by Shivamogga (18.25 % to 45.68 %), Coorg (16.22 % to 44.50 %) and Uttara Kannada (20.68 % to 43.55 %), whereas least was noticed in Hassan district with a range of 16.18 per cent to 32.16 per cent. Maximum complex incidence was recorded in Bilimalligesara (33.86 %) followed by Kalluvally (32.23 %), Paniyur-2 (31.84 %), Paniyur-3 (31.05 %), Paniyur-1 (30.12 %), whereas lowest wilt complex incidence was recorded in Karimunda (17.41 %) followed by Karimalligesara (24.10 %) and Paniyur – 5 (27.19 %).

Key words: Wilt complex, Black pepper, Phytophthora capsici, Radopholus similis

Introduction:

Black pepper (*Piper nigrum* L.), (Family Piperaceae) known as the “King of Spices” has remained most precious and valuable spice in the world. It is also called as “Black gold” due its durability and value. It is playing a vital role in International trade. It is said that the European invaded India primarily for this very spice. Black pepper is native to India and is extensively cultivated in tropical regions. Currently, Vietnam is the world’s largest producer and exporter of black pepper, producing 34 per cent of the world’s demand (Anon., 2005).

In India, black pepper is being cultivated in an area of 118 million ha with a production of 45 million tonnes. In Karnataka, black pepper is cultivated in an area of 10,690 ha with a production of 12 million tonnes during 2014-15 (Anon., 2015).

The main objective of the survey is to get the information about the interaction of nematodes and pathogens in causing complex disease in black pepper growing areas of Karnataka.

Review Of Literature And Rationale:

Panniyur-1, Panniyur-3 and Panniyur-8 are hybrids evolved at the Pepper Research Station, Panniyur (Kerala Agricultural University). IISR Girimunda and IISR Malabar excel are the two hybrids released from ICAR-Indian Institute of Spices Research, Kozhikode, Kerala (Devasahayam et al., 2015).

Association of the burrowing nematode *R. similis* with the so called “yellow(s) disease” of black pepper plants was first reported in 1936 in Indonesia. This disease caused the loss of 22 million black pepper plants within 20 years in Bangka Island, Indonesia (Christie, 1959). Later, *R. similis* was also reported on black pepper plants in India, Sri Lanka, Malaysia and Thailand (Koshy et al., 2005).

In Kerala, more than 90 per cent of black pepper gardens were infested with root- knot nematode infestation (Ramana and Mohandas, 1987).

By keeping in view the above gaps in research, the present investigation was carried out to know the status of wilt complex in black pepper.

The foot rot or quick decline or quick wilt caused by *Phytophthora capsici* was a soil borne disease which attacks leaves, roots, branches and fruit spikes of black pepper and the fungus was spread by soil during cultivation operations in pepper gardens. The roots and collar regions were most adversely affected parts leading to rapid wilting and death of vines (Anandaraj et al., 1989).

Slow decline (slow wilt or yellows disease) caused up to 32 per cent crop loss in Indonesia (Sitepu and Kasim, 1991).

The root gall development and population build up of *M. incognita* was suppressed in black pepper on inoculation with *R. similis* in succession in sterile soil under pot culture conditions (Sheela and Venkitesan, 1981). Synergistic interaction has been noticed between *M. incognita* and *Fusarium* spp. too (Sheela and Venkitesan, 1993).

R. similis and *M. incognita* were considered to cause serious damage to black pepper crops (Koshy et al., 2005) with annual economic loss of 38.5 to 64.6 per cent.

In Vietnam, farmers were not very well aware of the occurrence of plant parasitic nematodes in their fields. They often confused with symptoms caused by nematodes with those caused by other plant pathogens, resulted in control measures not being applied properly or not being applied at all (Thuy, 2010).

Methodology:

Collection of soil and root samples

Soil and root samples from 5 to 10 spots were collected randomly with the aid of shovel in the root zone of standing black pepper crop. Later, a composite sample of 200 cc soil and 5 g roots were put in a polythene bag with proper labeling. Information pertaining to the crop, locality soil conditions etc., were also collected along with the samples as per Appendix – I. The soil and root samples were processed on the same day or kept in the refrigerator at 4°C for a couple of days.

Processing of soil samples and estimation of nematode population

Soil samples collected from the field were brought to the laboratory and stored in refrigerator at 4°C. Soil sample of 200 cc was washed thoroughly and processed using combined Cobb Sieving and Baermann's funnel technique (Ayoub, 1977). The total number of plants

showing foliar yellowing symptoms and defoliation were recorded by using the following scale (Mohandas and Ramana, 1991).

Foliar Yellowing Index (FYI): 1-4 scale

Sl. No.	Scale	Descriptions
1	1	No leaves showing yellowing
2	2	Up to 20 per cent of leaves showing yellowing
3	3	20-60 per cent leaves showing yellowing
4	4	More than 60 per cent leaves showing yellowing

Defoliation Index (DFI): 1-4 scale

Sl. No.	Scale	Descriptions
1	1	Less than 10 per cent defoliation
2	2	More than 10 per cent upto 30 per cent defoliation
3	3	More than 30 per cent upto 60 per cent defoliation
4	4	More than 60 per cent defoliation

While collecting soil and root samples lesion characters were also recorded. The wilt disease incidence in the fields was calculated by using following formula.

$$\text{Disease incidence (\%)} = \frac{\text{Number of plants infected}}{\text{Total Number of plants observed}} \times 100$$

Results And Discussion:

An extensive roving survey was carried out in selected black pepper growing areas in malnad districts during Kharif - 2020-21 to find out the incidence of nematode fungal wilt complex in black pepper. The soil and root samples were collected from all the places and were brought to the laboratory for analysis.

All the 135 soils and root samples were found positive for plant parasitic nematodes. A total of five major genera of plant parasitic nematodes were recorded from rhizosphere of black pepper plantations in five districts of malnad regions of Karnataka. The plant parasitic nematodes recorded during present study were Radopholus similis, Meloidogyne incognita, Pratylenchus coffeae, Helicotylenchus multicinctus, Rotylenchulus reniformis and other parasitic and free living nematodes (Table 1).

During survey, the highest nematode population of 1,23,798 per 200 cc soil and 5 g roots was recorded in Chickmagalur district followed by Shivamogga district with 1,07,560 nematodes per 200 cc soil and 5 g roots and Coorg district with 79,922 nematodes per 200 cc soil and 5 g roots. The lowest nematode population was recorded in Hassan district with 25,902 per 200 cc soil and 5 g roots followed by Uttara Kannada, which recorded 27,866 nematodes per 200 cc soil and 5 g roots.

During the survey, maximum wilt complex incidence was recorded in Chickmagalur district with 31.28 per cent followed by Coorg (30.94 %), Uttara Kannada (29.33 %) and Shivamogga (29.07 %) respectively, whereas least wilt complex incidence was recorded in Hassan district (25.77 %) (Table1).

In Chickmagalur district, five taluks were surveyed for nematode occurrence. Among them, Mudigere taluk recorded the highest number of nematode population of 805, 30 per 200 cc soil and 5 g roots followed by Chickmagalur with 27,598 nematodes per 200 cc soil and 5 g roots. Lowest nematode population was recorded in Koppa taluk with 310, 19 nematodes per 200

cc soil and 5 g roots followed by N. R. Pura taluk with 22, 140 nematodes per 200 cc soil and 5 g roots.

In Mudigere taluk, the highest nematode population per 200 cc soil was recorded in G. Hosally (6064) followed by Phalghuni (4745) and Banakal (4302). The lowest nematode population was recorded in Kunduru (2602) followed by Bettadamane (2602).

In Chickmagalur taluk, the highest nematode population (4134) was recorded in Kunduru followed by Attigere (3858) and Aldur (3848) per 200 cc of soil and 5g roots. The lowest nematode population was recorded in Vastare (2672) followed by Mavinakere (3012) per 200 cc soil and 5 g roots respectively.

In Koppa taluk, maximum wilt complex incidence was recorded in Addadda (51.50 %) with total nematode population of 4050 followed by Kagga (43.50 %) with 3444 nematodes per 200 cc soil and 5 g roots and least incidence was recorded in Belagola (14.58 %) followed by Gunavanthe (16.30 %) and Jayapura (18.53 %) with 1430 and 464nematodes per 200 cc soil and 5 g roots respectively.

Among the villages of Sringeri taluk, maximum wilt complex incidence was recorded in Heruru (48.50 %) followed by Kavadi (43.66 %) and Beguru (42.50 %). However, the lowest wilt complex incidence was recorded in Nemmaru village (18.79 %) followed by Hadi (22.13 %) respectively.

In Shivamogga district, 7 taluks were surveyed for the presence of plant parasitic nematodes. Highest nematode population was recorded in Soraba taluk (29971) followed by Thirthahalli (26628) per 200 cc soil and 5 g roots. The lowest nematode population was recorded in Bhadravathi (11142) followed by Shivamogga (13986) per 200 cc soil and 5 g roots respectively.

With respect to wilt complex incidence in Shivamogga district, maximum wilt complex incidence was recorded in Sagara taluk (40.10 %) followed by Shivamogga (30.41 %). The lowest wilt complex incidence was recorded in Thirthahalli (27.60 %) followed by Bhadravathi (27.80 %).

In Shivamogga taluk, highest number of plant parasitic nematodes was recorded in Aladahalli (2876) followed by Hitturu (2842) and the lowest was recorded in Gajanuru (918) followed by Ayanuru (1250) per 200 cc soil and 5 g roots respectively.

In Shivamogga taluk, maximum wilt complex incidence was recorded in Hitturu (39.80 %) followed by Lakshmpura (36.13 %) and the lowest wilt incidence was recorded in Gajanuru (18.64 %) followed by Anesara (22.05 %) respectively.

Table 1: Incidence of wilt complex in malnad regions of Karnataka

Location	Village name	Soil type	Cultivar	FYI	DFI	Wilt incidence (%)
Chickmagalur Mudigere	G.Hosally	Sandy loam	Panniyur 1	3	3	63.40
	Banakal	Sandy loam	Panniyur-1,2	3	2	40.10
	Bettadamane	Sandy loam	Panniyur2	3	1	33.92
	Gowdahally	Sandy	Panniyur 1	2	1	23.61
	Kalasa	Sandy loam	Panniyur 2	2	1	17.33

	Kenjige	Sandy loam	Panniyur 2	2	2	28.57
	Kunduru	Sandy loam	Panniyur 1	3	1	16.66
	Phalghuni	Sandy loam	Panniyur 2	3	3	59.00
	Mean					35.23
Chickmagalur	Aldur	Red Sandy	Panniyur 1	3	1	36.10
	Belawadi	Sandy loam	Panniyur 1	3	1	28.57
	Basagal	Sandy clay loam	Panniyur 2	2	3	34.63
	Bidare	Sandy loam	Panniyur 1	2	2	22.13
	Attigere	Sandy loam	Panniyur 2	3	3	43.50
	Vastare	Sandy clay loam	Panniyur 1	3	1	26.33
	Kunduru	Sandy loam	Panniyur 2	3	2	41.66
	Mavinakere	Sandy loam	Panniyur 5	2	1	17.33
	Mean					31.28
N.R.Pura	Aduvally	Sandy loam	Karimunda	3	1	16.66
	Badagabyly	Sandy loam	Panniyur 1	3	2	43.62
	Echikere	Sandy loam	Panniyur 2	2	1	22.13
	Shimse	Sandy loam	Panniyur 1	3	2	33.43
	Varkate	Sandy loam	Panniyur 1	2	1	17.86
	Gubbiga	Sandy loam	Panniyur 2	3	3	51.20
	Ballekoppa	Sandy loam	Panniyur 1	2	1	16.05
	Bannuru	Sandy loam	Panniyur 1	2	1	17.33
	Mean					27.28
Koppa	Addadda	Sandy loam	Panniyur 2	3	3	51.50
	Belagola	Sandy loam	Panniyur 2	2	1	14.58
	Gunavanthe	Red Sandy	Karimunda	1	1	16.30
	Jayapura	Red Sandy	Panniyur 1	2	2	18.53
	Kagga	Sandy	Karimalligesara	3	2	43.50

		loam					
	Nilavagilu	Red Sandy	Panniyur 2	2	1	21.60	
	Shanuvally	Sandy loam	Kari Malligesara	3	2	39.61	
	Situru	Sandy loam	Panniyur 1	3	2	36.85	
Mean						30.30	
Sringeri	Addagadde	Sandy clay	Panniyur 2	2	1	22.61	
	Beguru	Sandy loam	Panniyur 2	3	3	42.50	
	Hadi	Clay loam	Karimalligesara	2	1	22.13	
	Menase	Clay loam	Panniyur 1	2	2	22.80	
	Heruru	Sandy loam	Panniyur 1	3	3	48.50	
	Honnavally	Sandy loam	Bilimalligesara	2	3	36.66	
	Kavadi	Sandy loam	Panniyur 1	3	3	43.66	
	Nemmaru	Red Sandy	Panniyur 2	2	1	18.79	
Mean						30.23	
Shivamogga	Shivamogga	Aladahalli	Sandy loam	Panniyur 1	3	1	33.21
		Anesara	Sandy clay loam	Panniyur 1	2	1	22.05
		Arenakoppa	Sandy loam	Panniyur 2	3	1	36.13
		Ayanuru	Sandy loam	Kaluvalli, Panniyur-1	3	2	33.09
		Balenakoppa	Red sandy	Kaluvalli	2	1	24.05
		Gajanuru	Red Sandy	Karimalligesara	2	1	18.64
		Hitturu	Sandy loam	Bilmalligesara Panniyur 1	3	2	39.80
		Lakshmipura	Sandy loam	Panniyur 2	3	1	36.33
	Mean						30.41
	Hosanagara	Balur	Red Sandy	Panniyur 1	2	2	18.66
		Kalsae	Red sandy	Bilimalligesara	3	2	29.20
		Magodu	Red sandy	Kaluvalli Panniyur 1	3	2	24.80
		Nanjavally	Sandy loam	Panniyur-1	3	3	41.10
		Yadur	Sandy loam	Panniyur 1	3	2	36.00
		Begadally	Red sandy	Panniyur-1	2	1	19.63
Ginikallu		Sandy loam	Kaluvalli, Panniyur-1	3	3	39.80	
Malali		Red sandy		3	2	29.64	
Mean						29.85	
Shikaripura	Gogga	Sandy loam	Panniyur 1	3	2	32.33	
	Thogarasi	Red Sandy	Panniyur-2	3	1	18.65	
	Hittal	Red sandy	Panniyur 1	3	2	23.13	

		Annapura	Clay loam	Panniyur-2	2	1	19.63	
		Kaniy	Sandy clay	Panniyur 1	2	2	18.36	
		Jakkanahally	Sandy	Panniyur 1	3	2	26.31	
		Sampally	Sandy loam	Panniyur-1	3	3	45.68	
		Malla	Sandy loam	Panniyur-1	3	2	39.61	
Mean							27.96	
Bhadravathi	Anaveri	Sandy loam	Panniyur 1	2	1	33.70		
	Aradottilu	Sandy	Panniyur 5	2	2	29.80		
	Hallikere	Sandy loam	Kaluvalli	3	2	34.50		
	Matthighatta	Clay loam	Panniyur 1	3	1	22.50		
	Shanklipura	Red Sandy	Panniyur-1	2	1	18.50		
Mean							27.80	
Sagara	Adur	Clay loam	Kaluvalli Panniyur 2	3	2	32.86		
	Besur Gijaga	Red Sandy	Panniyur 1	3	1	22.66		
	Kalmane	Sandy clay loam	Panniyur 1	2	2	26.86		
	Heggodu	Sandy	Karimunda	2	1	18.36		
	Kippadi	Sandy loam	Panniyur 1	2	1	22.16		
	Udri	Sandy	Panniyur 1,2,3	2	2	21.50		
	Valur	Sandy loam	Panniyur 1	3	3	40.10		
	Hebbase	Sandy loam	Kaluvalli	3	2	38.50		
Mean							27.87	
Thirthahally	Alageri	Sandy loam	Kaluvalli Panniyur-1 Bilimalligesara	3	1	31.50		
	Alur	Sandy loam	Panniyur 1,2,	3	2	33.50		
	Demlapura	Sandy loam	Panniyur 1	2	2	29.36		
	Shiruru	Red Sandy	Karimunda	2	1	18.25		
	Yadehally	Red Sandy	Panniyur 1	2	1	21.50		
	Thalale	Sandy loam	Panniyur 1,3	3	2	31.75		
	Karadiga	Red Sandy	Panniyur 1	2	1	19.50		
	Kalavati	Sandy loam	Panniyur 5	3	2	35.50		
Mean							27.60	
Mean							32.00	
Coorg	Somavarpete	Abbimata	Sandy loam	Panniyur 1	3	2	38.25	
		Agalli	Sandy loam	Panniyur 1	3	1	32.50	
		Bettadahally	Sandy loam	Panniyur 3	3	2	33.86	
		Doddakodi	Sandy loam	Panniyur 1	2	2	28.65	
		Honnekodi	Red Sandy	Panniyur 1	2	1	25.50	
		Kirkodli	Sandy loam	Panniyur 1	3	3	44.50	
		Koothi	Sandy loam	Panniyur 2	3	2	38.50	
		Hulase	Sandy loam	Panniyur 1	3	2	39.25	
		Mean						
	Madike	Balemuri	Sandy loam	Panniyur 5	2	2	23.13	
Biligere		Red Sandy	Panniyur 1	2	1	16.22		

Veerajapete	Kakathuru	Clay loam	Panniyur 2	3	2	32.33	
	Kiggalu	Red Sandy	Panniyur 2	2	1	16.88	
	Made	Sandy loam	Panniyur 1	3	2	37.10	
	Palooru	Sandy loam	Panniyur 1	3	3	39.61	
	Sampaje	Sandy loam	Panniyur 2, 3	3	1	37.10	
	Yevakapadi	Sandy loam	Panniyur 1	3	1	32.16	
	Mean					29.31	
	Ammathi	Sandy loam	Panniyur 1	3	3	43.55	
	Beguru	Sandy loam	Panniyur 1	2	2	28.12	
	Huchinad	Red Sandy	Panniyur 2	3	1	24.05	
	Kadanur	Red Sandy	Panniyur 5	2	2	18.75	
	Yedur	Sandy loam	Panniyur 2	3	3	39.61	
	Nalkeri	Red Sandy	Panniyur 2	3	1	22.13	
Theralu	Sandy loam	Panniyur 1	3	1	32.16		
Yedur	Sandy clay loam	Panniyur 1	2	2	18.64		
Mean					28.37		
Hassan	Sakaleshpura	Balagodu	Sandy laom	Panniyur 1	2	2	28.57
		Devihally	Red Sandy	Panniyur 1	2	1	18.50
		Ibbadi	Sandy loam	Panniyur 1	2	3	32.16
		Igoor	Red Sandy	Karimunda Panniyur - 1	2	1	16.18
Mean					27.77		
Uttara kannada	Sirsi	Ajjibal	Sandy loam	Panniyur 1	2	2	29.33
		Heggar	Sandy loam	Panniyur 1	3	2	38.68
		Kalve	Sandy loam	Panniyur 1	3	3	43.55
		Kannalli	Sandy loam	Karimalligesara	3	2	39.61
		Belale	Red Sandy	Karimalligesara	2	1	20.68
	Mean					30.23	
	Siddapura	Akkunji	Sandy loam	Karimunda	3	2	36.13
		Begar	Red Sandy	Panniyur 1	2	2	18.28
		Hegge	Sandy loam	Panniyur 1	2	3	32.16
		Murur	Red sandy	Panniyur 5	3	1	22.13
Kastur		Sandy loam	Bilimalligesara	3	2	33.43	
Mean					28.43		

An extensive roving survey was carried out in black pepper growing regions of malnad districts during 2013 to find out the incidence of Radopholus similis and Phytophthora capsici wilt complex in black pepper. The data collected among the survey revealed that, incidence of wilt complex severity varied in different localities. The wilt complex was noticed in all the locations surveyed with a range of 27.28 per cent to 35.23 per cent.

In Chickmagalur district, maximum wilt complex incidence in Mudigere taluk (16.66 % to 63.40 %) followed by Koppa taluk (14.58 % to 51.50 %), N. R. Pura (16.05 % to 51.20 %) respectively, whereas the lowest wilt complex incidence in Chickmagalur taluk as recorded (17.33 % to 43.50 %) followed by Sringeri (22.13 % to 48.50 %) respectively.

The survey was conducted in 270 locations from selected five districts viz., Chickmagalur, Coorg, Shivamogga, Hassan and Uttara Kannada during 2013-14. The wilt complex was noticed in all the locations surveyed, with a range of 16.05 % to 63.40 % in Chickmagalur district followed by Shivamogga (18.25 % to 45.68 %), Coorg (16.22 % to 44.50 %) and Uttara

Kannada (20.68 % to 43.55 %), whereas the least was noticed in Hassan district with a range of 16.18 per cent to 32.16 per cent.

Maximum complex incidence was recorded in Bilimalligesara (33.86 %) followed by Kalluvally (32.23 %), Panniyur-2 (31.84 %), Panniyur-3 (31.05 %), Panniyur-1 (30.12 %), whereas the lowest wilt complex incidence was recorded in Karimunda (17.41 %) followed by Karimalligesara (24.10 %) and Panniyur – 5 (27.19 %).

The present findings are in confirmation with the reports of: Abraham Jose et al. (1996): Jahagirdar (1998): Koshy et al. (2005): Aravind et al. (2011) and Rashid and Eapen (2014).

Jahagirdar (1998) reported that, maximum wilt incidence (68.50 %) was recorded in Karalikoppa (64.40%) village of Shivamogga district followed by Neeranakki (64.40 %), Devarakoppa (62.30 %) of Sirsi and Gaddemane (61.30 %) of Mudigere taluk.

Plant-parasitic nematodes could also cause substantial damage to black pepper plants. Yellowing of the leaves of black pepper plants caused by *R. similis* and *Meloidogyne* spp. has been described. *R. similis* could cause “yellow(s) disease” and “slow wilt disease” of black pepper plants (Koshy et al., 2005).

Aravind et al. (2011) opined that, foot rot and slow decline diseases caused by *P. capsici* or *R. similis* pose major economic threat to black pepper production. The movement of pathogens and the consequent disease outbreak was largely due to latently infected plantlets and the contaminated nursery medium.

Slow decline disease of black pepper was mainly due to feeder root damage caused by *R. similis* and *M. incognita* either alone or in association with *Fusarium* spp. and *P. capsici*. There is a gradual reduction in the vigor and productivity of the vine which lead to death over a period of few years and hence called slow decline (Rashid and Eapen, 2014).

The present study brought about a detailed account on the incidence of wilt complex in major pepper growing areas of state, compared to earlier studies and helps to identify the hotspots of pepper wilt complex in Karnataka state and formulation of preventive management strategies.

The disease incidence varied from location to location, which might be due to cropping patterns, agronomic practices followed, environmental conditions and build up of inoculum. The higher disease incidence could be attributed to the use of susceptible cultivars from the infected field, apart from monocropping and mismanagement that has also aggravated the disease situation. Practicing improper management practices by farmers in the initial period of the crop also makes it difficult to manage the wilt complex.

In the present study, it has been observed that, farmers are spraying Bordeaux mixture by unscientific preparation, bad agronomic practices followed, not using any nematicides for control of nematodes and non judicious use of fertilizers and pesticides for other crops in the orchards. The efficacy of these fertilizers and pesticides might be lost in short durations because of heavy rainfall and hence, provides protection for a short period. These situations lead to the increased population of nematodes and causes considerable yield loss. This aggravated wilt complex might lead to severe loss to the black pepper growers.

The prophylactic management practices were not followed by farmers to manage *P. capsici* in black pepper in almost all the locations surveyed. The selection of infected vines, use of soil without proper sterilization for nurseries and planting of vines in infested soil might lead to the increased wilt incidence in the areas surveyed (Devasahayam et al., 2015).

Conclusion :

Black pepper is one of the most widely used spices, because of piperine content of 5-10 % in commercial white and black pepper. Among the different diseases affecting black pepper, burrowing nematode and wilt disease complex caused by *Radopholus similis* and *Phytophthora capsici* were observed in severe form. The information available on this disease complex as well as pathogens in Karnataka is very meager. Hence, studies were undertaken to survey study, pathogenicity, interaction studies, screening of popular varieties for resistance, various factors affecting disease development and management of wilt complex with suitable management practices.

Selected references:

- Abraham Jose, Anandaraj, M., Ramana, K. V. and Sarma, Y. R., 1996, A simple method for indexing *Phytophthora* foot rot disease of black pepper (*Piper nigrum* L.). *J. Spices and Aromatic Crops*, 5 (1):68-71.
- Anandaraj, M., Jose Abraham, Sarma, Y.R. and Balakrishnan, R., 1989, Incidence of foot rot disease of black pepper (*Piper nigrum* L.) in Kerala in relation to cultivation practices. *Indian J. Agric. Sci.*, 59: 751-753.
- Anandaraj, M., Ramana, K. V. and Sarma, Y. R., 1996, Sequential inoculation of *Phytophthora capsici*, *Radopholus similis* and *Meloidogyne incognita*, in causing slow decline of black pepper. *Indian Phytopathol.*, 49: 297-299.
- Anonymous, 2005, Area production and productivity of black pepper, www.icpnet.org.
- Anonymous, 2015, Area production and productivity of black pepper, www.icpnet.org.
- Aravind, R., Kumar, A., Dinu, A. and Eapen, S. J., 2011, Single tube duplex PCR for simultaneous detection of *Phytophthora capsici* and *Radopholus similis* infecting black pepper (*Piper nigrum*), *Indian Phytopathol.*, 64 (4): 353-357.
- Ayoub, S. M., 1977, Plant Nematology on agricultural training aid. Nema Aid publ., sacramento, Calif., 199 pp.
- Christie, J. R., 1959, Plant nematodes: their bionomics and control. University of Florida, Gainesville, Florida, USA, 256 p.
- Devasahayam, S., John Zachariah, T., Jayashree, E., Kandiannan, E., Prasanth, D., Santhosh, J. E., Sasikumar, B., Srinivasan V. and Suseela bhai, R., 2015, Black pepper : Extension Pamphlet, Indian institute of spice research, Kozhikode. pp. 27.
- Jahagirdar, S., 1998, Etiology and management of foot rot of black pepper (*Piper nigrum*). Ph.D. Thesis, Univ. Agric. Sci., Bangalore, pp.170.
- Koshy, P. K., Santhosh, J., Eapen, S. J. and Pandey, R., 2005, Nematode parasites of spices, condiments and medicinal plant. In: Plant parasitic nematode in subtropical and tropical agriculture (Luc, M., Sikora, R.A. and Bridge, J., eds). CAB International, Wallingford, UK: Pp. 751-792.
- Mohandas, C. and Ramana, K. V., 1983, Effect of different levels of *Meloidogyne incognita* on plant growth of two cultivars of black pepper (*Piper nigrum* L.) Abstracts of papers. Third Nematological Symposium Organized by Nematological Society of India, Himachal Pradesh Krishi Viswa Vidyalaya, Solan, Himachal Pradesh, India, Pp.9-10.
- Ramana, K.V. and Mohandas, C. 1987, Reaction of black pepper germplasm to the burrowing nematode (*Radopholus similis*). *J. Pl. Cr.*, 15: 65-66.

- Rashid P. and Eaphen, S.J., 2014, Nematodes: the hidden enemies of black pepper. Indian J. Are. Spi. Med. Pl., 16 (4): 38-40
- Sheela, M. S. and Venkitesan, T. S., 1993, Interaction between *Meloidogyne incognita* and the fungus *Fusarium* spp. on black pepper vine (*Piper nigrum* L.). Indian J. Nematol., 22: 184-188.
- Sitepu, D. and Kasim, R., 1991, Black pepper diseases in Indonesia and their control strategy. In: Sarma, Y. R and Premkumar, T (Eds.) Diseases of Black pepper (pp. 13-28). National Research Centre Spices, Calicut.
- Thuy, T. T. T., 2010, Incidence and effect of *Meloidogyne incognita* (Nematoda: Meloidogyninae) on black pepper plants in Vietnam. Ph. D. Thesis, Hanoi University of Agriculture, Vietnam, 156 pp.

Acknowledgement: Authors are thankful to University of Agricultural Sciences, GKVK, Bangalore for providing the facility to carryout survey work.



Synthesis of Zinc Oxide Nanoparticles Using Plant Leaf Extract of *Asphodelus Macrocarpus*.

S. H. Sose, V. S. Sose

Department of Chemistry

A.C.S College Sonai Dist-Ahamadnagar M.S

Email Id: vrushalisose@gmail.com

Abstract:

Modern science, Nanotechnology is an ablaze field for the researchers. Zinc oxide nanoparticles (ZnONPs) are known to be one of the most multifunctional inorganic nanoparticles with its application in Treatment of urinary tract infection. Nanoparticles were synthesized using *Asphodelus Macrocarpus* fresh leaf Extract and were characterized by UV-visible spectroscopy (UV-vis), X-ray diffractometer (XRD), Fourier Transform infrared spectroscopy (FT-IR), Scanning electron microscopy (SEM), Energy dispersive analysis of x-ray (EDAX), Atomic force microscopy (AFM). Therefore, the study reveals an efficient, eco-friendly and simple method for the green synthesis of multifunctional ZnO NPs using *Asphodelus Macrocarpus*. Urinary tract Infection causing microorganisms were isolated from the disease affected patient urine sample. The synthesized Nanoparticles have been tested against the pathogenic culture showed a very good zone of inhibition compared with plant extract. It indicates the biomedical capability of ZnO NPs.

INTRODUCTION:

Nanotechnology involves the use of materials having nanoscale dimension in the range of 1-100 nm. Operating with researchers to have much better understanding of biology. The green synthesis of nanoparticle has greatly reduced the use of physical and chemical methods. Various chemical methods have been proposed for the synthesis of zinc oxide nanoparticles, such as reaction of zinc with alcohol, vapour transport, hydrothermal synthesis, precipitation method [1-4].

This green synthesis method by the use of research is rapidly increasing due to less usage of chemical, eco-friendly nature and one-step synthesis of zinc oxide nanoparticles [5]. They also have potential application in the field of medicine like drug delivery, biological activities such as antimicrobial, antioxidant, etc., and diagnosis of diseases. Antimicrobial activity of ZnO NPs against various pathogens such as *B. subtilis*, *Salmonella*, *Listeria monocytogenes*, *Staphylococcus aureus* and *E. coli* using disc Diffusion method has been reported. Also reported similar results by *Punica granatum* mediated synthesized ZnO NPs. Some of the proposed mechanisms responsible for antibacterial activity of ZnO NPs include disruption of the cell membrane, oxidative stress induction and generation of reactive oxygen (ROS). It was reported that ZnO NP has showed high antibacterial activity against urinary infection disease. Further the antibacterial activity of the biologically synthesized ZnONP was evaluated against different pathogenic microorganisms. Our aim of the study is to synthesize ZnO NPs from the plant *Asphodelus Macrocarpus* and their antibacterial activity against pathogens causing urinary tract infections.

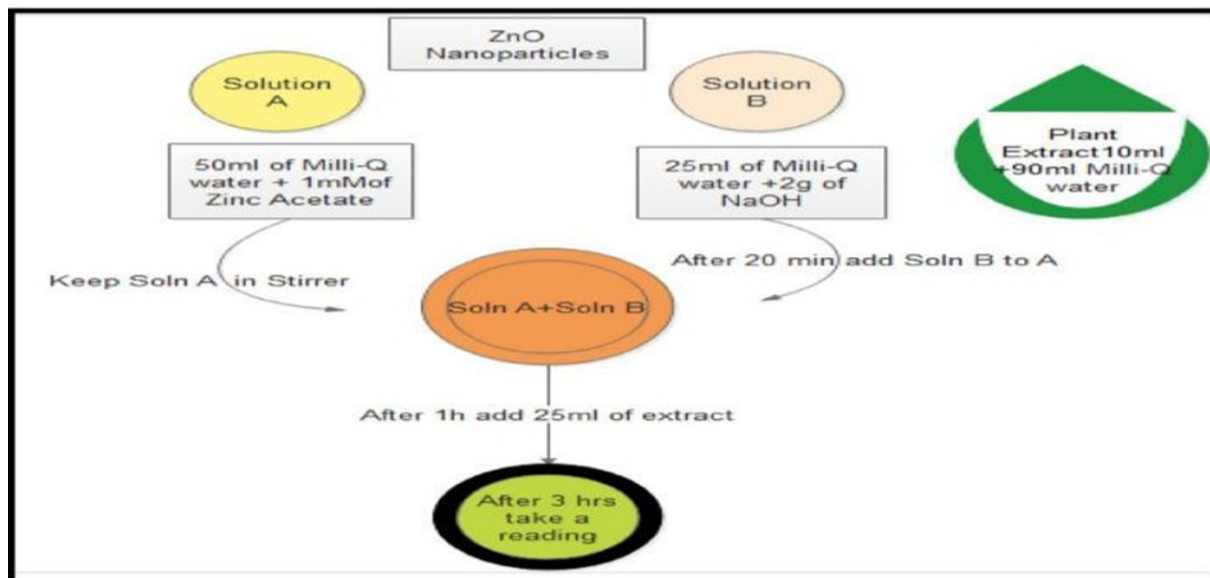


Fig.1) schematic representation of Synthesis of zinc oxide nanoparticles.

1) Plant collection:

The leaves of *Asphodelus Macrocarpus* are collected from natural source. It is medicinally important plant. Fresh green leaves and flowers are harvested during the month June to September.

2) Preparation of plant extract:

5 g of fresh leaves were washed with tap water followed by distilled water and then cut and soaked in a 250 ml beaker containing 100 ml distilled water. The solution was boiled at 70 degrees Celsius for 8 minutes. The leaf extract was allowed to cool to room temperature, filtered through Whatman number 2 filter paper and the filter was stored for further experimental use.

3) Synthesis of ZnO NPs:

1 mM of zinc acetate was dissolved in 50 ml distilled water and kept in a stirrer for 1 hour respectively [4]. Then 20 ml NaOH solution was slowly added into the zinc acetate solution and 25 ml of plant extract was added to the same. The colour of the reaction mixture was changed after 1 hour incubation time. The solution was left in a stirrer for 3 hours. Yellow colour appeared after the incubation time confirms the synthesis of zinc oxide nanoparticles. The precipitate was separated from the reaction solution by centrifugation at 8000 rpm at 60 degrees Celsius for 15 minutes and pellets were collected. Pellets were dried using a hot air oven at 80^o for 2 hours and preserved in an airtight bottle for further studies.

Application of zinc oxide nano particles

1) Zinc oxide NP used as a catalyst in Biginelli Reaction

Biginelli reaction is a multicomponent reaction. We used ZnONP's as a catalyst in Biginelli reaction. At room temperature, it gives product 3,4-dihydropyrimidine from the aldehyde and beta-dicarbonyl compound and urea.

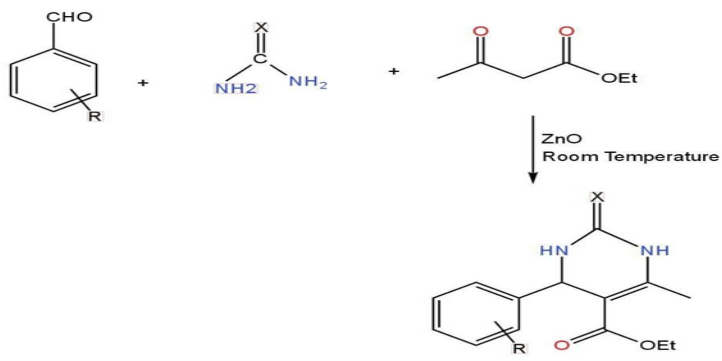
Dihydropyrimidines are heterocyclic units and widely used in natural and synthetic organic chemistry due to their wide spectrum of biological activity.

• General Procedure for Synthesis of 3,4-dihydropyrimidinone:

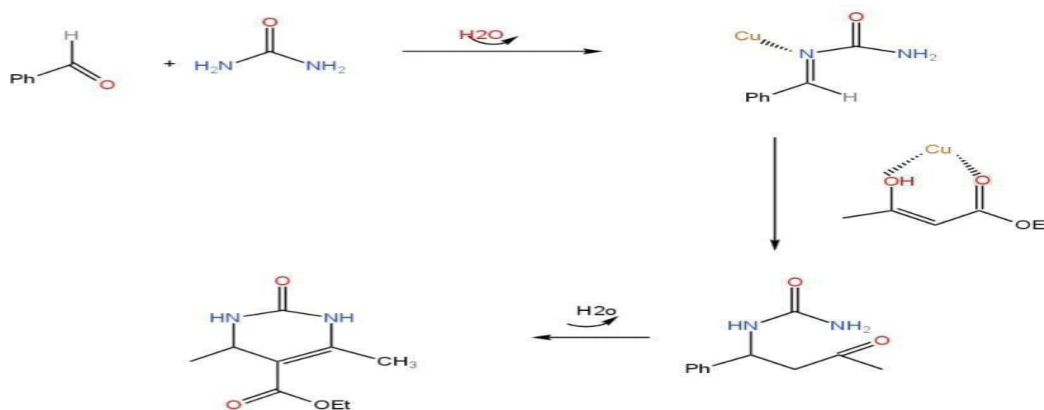
A mixture of benzaldehyde (1 ml), β -diketoester (ethyl acetoacetate) (1.24 ml) and urea (0.88 gm) was stirred for 30 minutes in the presence of 20 mg of highly dispersed

reaction mixture Zincnanoparticlesfromthepreviousexperiment. ThereactionwasMonitoredbythin layer chromatography using ethylacetate/hexane (2:3) as eluent. Themixturewasthen recrystallized. Recordthemp,tlc.

Reaction:



Mechanism:



Results:

1. Theresultleadstodownbytheexperimentcoppernanoparticleacts As catalysts for the synthesis of biologically active 3,4Dihydroquinolinone.
2. TheproductswereobtainedrapidlywithhighyieldatroomTemperature.
3. Theyieldsofthisreactionis85%.

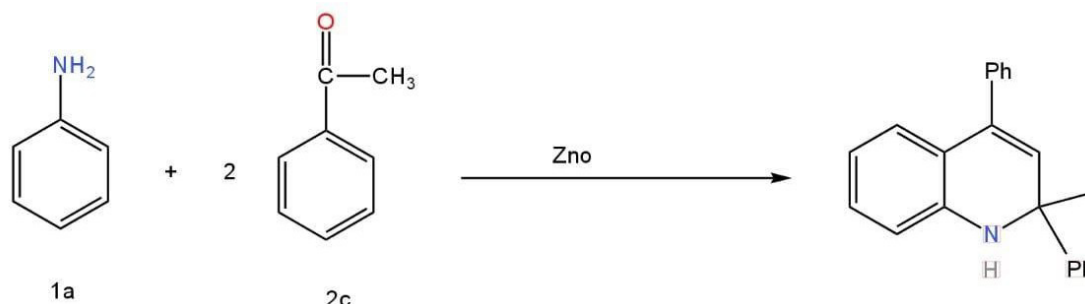
ZnONpsusedasCatalystinSynthesisofDihydroquinoline

Generalprocedure:

1 mol of aniline ,10 mol of ketone and 0.01 gm zno particle in 1 mlToluenewasheatedat80°Cfor6 hr.

Progress of reaction mixture monitored by TLC. After the completionof the reaction theCatalyst can be easily removed by filtrations. The filtrate was evaporated. Pure product is obtained.

Reaction:



Results:

The obtained products have BP 210°C and yield is about 84.50%.

Results and discussion:

Zinc oxide nanoparticles has attracted great attention because of their suspension optical properties. Visual colour change is the preliminary test for nanoparticle synthesis. The colour changes from half white to yellow represent the synthesis of ZnO Nps.

Conclusion:

The green synthesis of nanoparticle used in this experiment found to be eco-friendly, non-toxic and less usages of chemical compared to physical and chemical method.

The presence of phytochemicals in the leaf extract itself help in the synthesis of metal oxide nanoparticles by inducing oxidation and reduction reaction.

References:

1. H. Mirzaei, M. Darroudi, Zinc oxide nanoparticles: biological synthesis and Biomedical applications, *Ceram. Int.* 43 (2017) 907–914, doi:10.1016/j.ceramint.2016.10.051.
2. J. Pulit-Prociak, J. Chwastowski, A. Kucharski, M. Banach Functionalization of Textiles with silver and zinc oxide nanoparticles, *Appl. Surf. Sci.* 385 (2016) 543–553, doi:10.1016/j.apsusc.2016.05.167.
3. T.C. Taranath, B.N. Patil, *Limonia acidissima* L. leaf mediated synthesis of zinc Oxide nanoparticles: a potent tool against *Mycobacterium tuberculosis*, *Int. J. Mycobacteriol.* 5 (2016) 197–204, doi:10.1016/j.ijmyco.2016.03.004.
4. P. Jamdagni, P. Khatri, J.S. Rana, Green synthesis of zinc oxide nanoparticles Using flower extract of *Nyctanthes arbor-tristis* and their antifungal activity, *J. King Saud Univ.-Sci.* (2016), doi:10.1016/j.jksus.2016.10.002.
5. M. Sundrarajan, S. Ambika, K. Bharathi, Plant-extract mediated synthesis Of ZnO nanoparticles using *Pongamia pinnata* and their activity against Pathogenic bacteria, *Adv. Powder Technol.* 26 (2015) 1294–1299, doi:10.1016/j.Apt.2015.07.001.
6. P. Rajiv, S. Rajeshwari, R. Venkatesh, Bio-Fabrication of zinc oxide nanoparticles using leaf extract of *Parthenium hysterophorus* L. and its size-dependent Antifungal activity against plant fungal pathogens, *Spectrochimica Acta-Part A* 112 (2013) 384–387, doi:10.1016/j.saa.2013.04.072.

- 7.V. Anbukkarasi, R. Srinivasan, N. Elangovan, Antimicrobial activity of green synthesized zinc oxide nanoparticles from *Memblica officinalis*, *Int.J.Pharm.Sci.Rev.Res.*33 (2)(2015)110–115.
- 8.G.R. Navale, D.J. Late, S.S. Shinde, JSM Nanotechnology & antimicrobial activity of ZnO nanoparticles against pathogenic bacteria and fungi, *JSM*
- 8.S.Azizi, R.Mohamad, A.Bahadoran, S.Bayat, R.A.Rahim, A.Ariff, W.Z. Saad, Effect of annealing temperature on antimicrobial and structural properties of Bio-synthesized zinc oxide nanoparticles using flower extract of *Anchusa italica*, *J. Photochem. Photobiol. B* 161 (2016)441–449, doi:10.1016/j.jphotobiol.



Green Synthesis of Indole Derivatives

V. S. Sose & S. H. Sose

Department of Chemistry

A.C.S College Sonai, Dist-Ahamadnagar (M.S.)

Email Id: vrushalisose@gmail.com

Abstract:

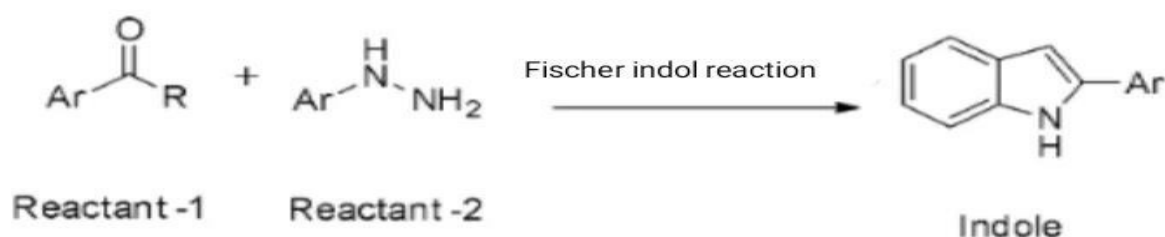
To synthesis of different substituted indole derivative possess a number of biological activities like antimicrobial, antioxidant, antimalarial etc. rather than conventional method the reagent hereby are replaced by Garlic & Ginger Juice. The formed compounds have been evaluated by physical methods like melting point, thin layer chromatography, elemental analysis and functional group analysis.

Keywords:Indole derivatives, aldehyde, antimicrobial, antioxidant, antimalarial

Introduction:

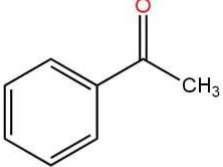
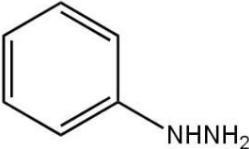
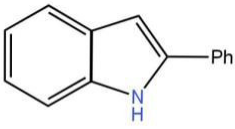
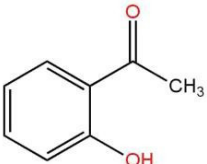
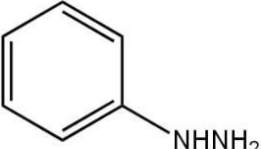
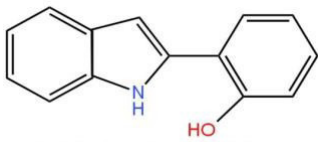
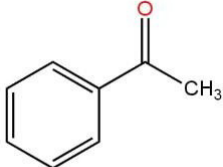
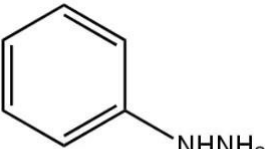
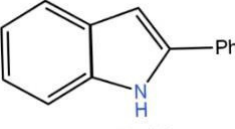
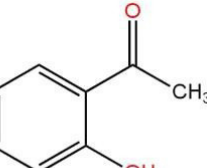
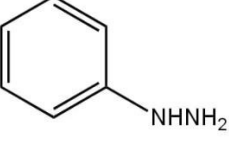
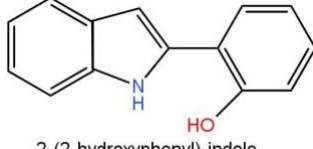
The indole ring system is present in many biologically active medicinal agents and natural products. The first synthesis of substituted indoles was conducted by Fischer and Jourdan as early as 1883, and since then the bicyclic heteroaromatic core has been the target of many synthetic approaches and reactivity studies. Indoles are also prominent structural elements in the neurotransmitter serotonin, the anti-inflammatory drug indomethacin and other molecules showing promise in the treatment of cardiovascular disease, erectile dysfunction, cancer and neurological conditions. Indole derivatives are prepared by conventional methods by reaction of various ketones with phenyl hydrazine in presence of acid and organic solvents. To minimize the use of hazardous chemicals, the same reactions are performed using Garlic & Ginger Juice

General Reaction-



Procedure

The reaction was carried out by mixing the phenyl hydrazine (1.6ml) .Add the Ketone(2ml) and Garlic or ginger juice (acid) (5ml) add to it. Then add ethanol (4.5ml), PPA (2ml) in a beaker. The mixture was stirred with the help of magnetic stirrer at R.T. 1hr stirrer the mixture. The Progress of reaction mixture was monitored by TLC. Crude product is obtained. Recrystallisation with ethanol. Pure product is obtained

	Reactant-1	Reactant-2	Catalyst	Product	Temp condition
A	 Acetophenone	 phenylhydrazine	Ginger	 2-Phenyl indole	R.T
B	 O Hydroxyacetophenone	 phenylhydrazine	Garlic	 2-(2-hydroxyphenyl)-indole	R.T
C	 Acetophenone	 phenylhydrazine	Ginger	 2-Phenyl indole	R.T
D	 O Hydroxyacetophenone	 phenylhydrazine	Garlic	 2-(2-hydroxyphenyl)-indole	R.T

Result Table:

The Melting Point, % of yield, molecular formula of synthesized compounds

Sr.No	Product	Yield	Sr.No
	2-phenylindol	75.70%	A
B	2-(2hydroxyphenyl)-indol	75.91%	B
C	2-phenylindol	5.10%	C
	2-(2hydroxyphenyl)-indol	5.79%	D

yield 75.79%. The synthesis of substituted indole derivatives A has high yield than other substituted indole derivatives B,C,D

Conclusion:

The indole ring system is present in many biologically active medicinal agents and natural products can be synthesized by using green catalyst

References:

1. Fischer and F. Jourdan, Ber. Dtsch. Chem. Ges., 1883, 16 2241–2245;
2. H. Pessoa-Mahana, C. González L., R. Araya- Maturana, Claudio Saitz B., C. David Pessoa-Mahana. J. Chil. Chem. Soc., 54, 2, 147-150(2009).
3. H. Pessoa-Mahana, M. González, M. González, C. David. Pessoa-Mahana, R. Araya- Maturana, N. Ron, C. Saitz. Arkivoc (xi), 316-325, (2009).
4. Hernán pessoa-mahana , ignacio cuevas m. , c. david pessoa-mahana . ramiro araya- maturana , iriux almodovar fajardo, and claudio saitz barría j.chil.chem.soc. vol.56 no.4 concepción dec. 2011, páges: 866-869
5. Norris, C. Bezze, S. Z. Franz and M. Stivanello, Org. Process Res. Dev., 2009, 13, 354–357; C. P. Ashcro□, P. Hellier,
6. P. M. Jackson and C. J. Moody, J. Chem. Soc., Perkin Trans. 1, 1990, 2156–2158. E. Vedejs and S. D. Monahan, J. Org. Chem., 1997, 62, 4763–4769.
7. S. Vangveravong, E. McElveen, M. Taylor, J. Xu, Z. Tu, R. R. Luedtke and R. H. Macha, Bioorg. Med. Chem. 14, 815-825, (2006).
8. T. Newhouse and P. S. Baran, J. Am. Chem. Soc., 2008, 130, 10886–10887.
9. Ueda, H. Sato, K. Matsumoto, K. Sugimoto, T. Fukuyama and H. Tokuyama Angew. Chem., Int. Ed., 2009, 48, 7600
10. Y. Murakami, Proc. Jpn. Acad., Ser. B, Phys. Biol. Sci., 2012, 88, 1–17.
11. Zu, B. W. Boal and N. K. Garg, J. Am. Chem. Soc., 2011, 133, 8877–8879

Silver Nanoparticles: A Review on Green Synthesis of Silver Nanoparticles by Using Plant Extract, Characterization and Their Antioxidant Activity by Different Methods

Nida S. Shaikh¹, Rahimullah S. Shaikh²

¹Department of Chemistry, Government Vidarbha Institute of Science and Humanities, Amravati- 444604, (M.S), India.

²Department of Chemistry, Institute of Science, Nagpur - 440001, (M.S.), India.

Corresponding author: E-mail:- nida.aafy@gmail.com

Abstract:

The idea of nanoparticles, which display singular and remarkably different properties from their bulk, was first introduced by nanotechnology. Particles with one or more dimensions and sizes between one and one hundred nanometers are known as nanoparticles. In the field of medical science and disease treatment, the environmentally friendly synthesis of silver nanoparticles has received considerable global attention. The green synthesis of silver nanoparticles using plant extracts is thought to be an alternative to the chemical method of synthesizing nanoparticles. The data obtained using the green method were analysed using a variety of methods, including UV-Vis., FT-IR, XRD, TEM, AFM, and DLS. This review focuses on the plant mediated silver nanoparticles, Characterization and their antioxidant activities using various methods.

Keywords:- Green synthesis, Silver nanoparticles, Plant extracts, Antioxidant activity.

1. Introduction:

With promising future developments, nanotechnology has a significant impact on current research and product development. Particles up to 100 nm in size are considered nanoparticles (Keerawelle & Thiripuranathar, 2019). The need to create environmentally safe nanoparticle synthesis protocols without the use of toxic chemicals is currently on the rise. As a result, scientists who study the synthesis and assembly of nanoparticles are now interested in biological systems (Sivaraj & Vanathi, 2017). Because the properties of the nanoparticles are different from those of their bulk (Flieger et al., 2021), they have a wide range of applications in various industries, including drug delivery targeting and biosensors (N. Kumar et al., 2018). One of the most recent applications of nanomaterials in the analytical chemistry area was the determination of antioxidant activity in metal nanoparticles (Vilela et al., 2014).

In general, either a "top down" or "bottom up" approach is used to produce and stabilise nanoparticles. In the "top down" strategy, bulk material is reduced in size using a variety of physical and chemical methods (Rajeshkumar & Bharath, 2017), whereas in the "bottom up" strategy, nanoparticles are created through the self-assembly of atoms into nuclei that then develop into nanoscale particles (Rafique et al., 2020).

The use of excess energy, various hazardous compounds that create biological hazards, heavy equipment, and other resources are required for the chemical and physical methods, which are frequently not eco-friendly or safely sound. Aside from these methods, plant-mediated AgNPs synthesis appears to be very fast, simple, non-toxic, and environmentally friendly. In contrast to other biological synthesis techniques, which involve difficult procedures such as maintaining microbiological cultures, the use of plant extracts in the synthesis of metal nanoparticles has more advantages (Hasan, 2014; Rajeshkumar & Bharath, 2017).

This review article summarises the publications based on the research done all over the world and focuses primarily on the study of plant mediated silver NP synthesis, characterization techniques, and the antioxidant activity of AgNPs by different methods.

2. Mechanism Of Plant Mediated Silver Nanoparticles:

Synthesis Of Silver Nanoparticles By Plants :

When compared to microbial synthesis, plant assisted synthesis of NPs is more effective in terms of yield. Numerous studies have been done on the green synthesis of AgNPs using various flora and fauna extracts. The majority of the literature review revealed that the researchers' first preference for synthesising silver nanoparticles from plants was leaf extract. In the process of creating AgNPs through plant-mediated synthesis, plant extractions are added to an aqueous AgNO_3 solution, where the Ag ions in the solution go through a reduction process to create Ag NPs. Many biochemicals and metabolites found in plants can act as reducing and stabilising agents in the synthesis of biogenic substances. Silver ions serve as electron acceptors, and the biomolecules found in plant extracts serve as reducing agents, allowing silver ions to be reduced to silver metal more easily (Ansari, 2018). Since it takes knowledge of the specific phytochemical required for the synthesis of stabilised NPs, phytochemical-mediated NP synthesis is a rare process (Journal et al., 2016; Shaikh et al 2020; Singh et al., 2020). The schematic diagram of synthesis of silver nanoparticles are shown below-

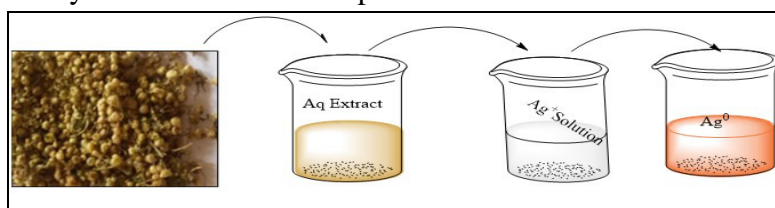


FIGURE 1. SYNTHESIS OF SILVER NANOPARTICLE BY PLANT EXTRACT

3. CHARACTERIZATION OF SILVER NANOPARTICLES:

Silver nanoparticles require sophisticated techniques for characterization because they are in the nanoscale dimension. It is crucial to characterise AgNPs in order to learn about their size, shape, morphology, structure, surface chemistry, surface charge, dispersity, and surface area. The following discussion covers several methods for characterization of silver nanoparticles.

3.1. Uv-Visible Spectrophotometry :

One of the most popular methods for characterising synthesised nanoparticles is UV-vis spectrophotometry, which is also used to check the stability and synthesis of AgNPs. Furthermore, UV-Vis spectrophotometry is concise, quick, sensitive, and selective for various kinds of nanoparticles. It involves calculating how much ultraviolet or visible light a constituent in solution has absorbed. In the UV-Visible range, UV-Vis measures the ratio, or function of ratio or the intensity of two light beams. The valence band and conduction band in AgNPs are very close to one another, allowing for free electron movement. AgNPs combined oscillation of its electrons in resonance with the incident light wave causes these electrons to produce a surface plasmon resonance (SPR) band (Elamawi et al.). The dielectric medium, morphology, shape, size, and chemical surroundings of synthesised nanoparticles are all factors that affect the absorption spectra of AgNPs. According to numerous studies, AgNPs produces absorption bands in the UV-Visible spectrum at wavelengths between 200 and 800 nm, and it is used to characterise nanoparticles with a range of 2-100 nm. (Joshi et al., 2018)

3.2. X-Ray Diffraction Analysis (Xrd):

To examine the crystal or polycrystalline structures, analytical methods like X-ray diffraction have been used (Bagherzade et al., 2017), and identify the different chemical species qualitatively, resolve chemical compounds quantitatively (Cabral et al., 2013), particle sizes and assess the degree of crystallinity (Dey et al., 2009), and so on. When an X-ray beam is projected onto a crystal and the incident beam is scattered by the atoms, diffraction patterns form. The scattered x-rays interact with one another. This interference could be observed by employing Bragg's Law to determine various properties of the crystal or polycrystalline material. As a result, XRD can be used to investigate the structural properties of a wide range of materials, including biomolecules, polymers, superconductors, glasses, and so on. Diffraction patterns are crucial for the analysis of these materials. Diffraction patterns that have been created may reflect the crystal's chemical and physical properties. Since measurements are typically made in Angstroms, crystallite size (information on unit cell dimensions), strain, and crystal structure can all be determined using X-ray diffraction as a primary characterization tool. The overall oxidation state of the particles as a function of time is used by XRD spectra to identify the crystalline nature of the silver nanoparticles (Vasireddy et al., 2012).

3.3. Transmission Electron Microscope (Tem):

A powerful and effective tool for characterising the nanoparticles is the transmission electron microscope (TEM). It is used to obtain quantitative measurements of the synthesised nanoparticles' size distribution, particle size, and morphology. A sample is interacted with by an electron beam in TEM, which creates an image on a photographic plate (Asoro et al., 2013). The ability of TEM to identify and measure the chemical and electronic structure of individual nanoparticles is unique. Compared to SEM, TEM has some advantages, including better spatial resolution and more analytical measurements of nanoparticles. (Ren et al., 2019)

3.4. Fourier Transform Infrared Spectroscopy (Ftir):

The surface chemistry of metal nanoparticles is studied using FTIR spectroscopy, and it is also used to determine whether biomolecules are involved in the synthesis of the nanoparticles (Kudle et al., 2013). Additionally, the catalytic interactions between an enzyme and its substrate have been examined using FTIR and the confirmation of functional molecules that have been covalently grafted onto silver (S. Kumar & Barth, 2010). A portion of the infrared radiation that is transmitted through a sample is absorbed by it while the remaining is transmitted through it. The resulting spectrum represents the absorption and transmission by generating a molecular fingerprint for the sample, which represents the identity of the sample. The investigation of the part played by biomolecules in the reduction of AgNO_3 to silver can be done easily, inexpensively, and non-invasively using FTIR (Rajeshkumar & Bharath, 2017).

3.5. Atomic Force Microscopy:

Atomic force microscopy is based on physical scanning of samples at the sub-micron level with an atomic scale probe tip and provides ultra-high resolution in particle size measurement (Shi et al., 2003). Samples are typically scanned in either contact or noncontact mode, depending on their properties. In contact mode, the topographical map is generated by tapping the probe on the surface across the sample, while in non-contact mode, the probe hovers over the conducting surface. One of the most significant advantages of AFM is its ability to image non-conducting samples without any special preparation. This capability enables imaging of delicate biological and polymeric nano and microstructures. Furthermore, provides the most

accurate description of size, size distribution, and real-world picture, which aids in understanding the effect of various biological conditions (Zur Mühlen et al., 1996).

3.6. Dynamiclight Scattering (DLS) Spectroscopy:

Another quick, simple, and nondestructive method for measuring particle size in the micrometre and nanometer regimes is dynamic light scattering (DLS). In this method, a monochromatic light source, such as a laser, is passed through a suspension of nanoparticles, which scatter light at various intensities due to Brownian motion, and size is calculated using the Stokes-Einstein relationship. It functions best with monodisperse nanoparticles and typically measures the hydrodynamic diameter of nanoparticles affected by the surfactant, stabilising, and capping agents as well as the presence of an electrical double layer adsorbed on the surface of nanoparticles. AgNPs zeta potential is also measured by the DLS, a large magnitude value denotes electrostatically stabilised nanoparticles (Dove Press, 2018; Dawadi et al., 2021).

4. Antioxidant Activity:

In addition to the numerous applications of AgNPs, an abundance of articles focusing on the silver nanoparticles antioxidant properties have been published over the past ten years. Here, we've compiled a list of recent techniques for determining the antioxidant capacity of silver nanoparticles as well as their methods of production. As can be seen, biosynthesis (especially using plant extract) has generated more publications than any other method of creating AgNPs, which may be explained by its simplicity, availability, and low cost.

1) Dpphassay

The purple stable free radical DPPH (2,2-diphenyl-1-picrylhydrazyl) reacts with a hydrogen donor. The existence of delocalized spare electrons on the whole molecule prevents dimerization and imparts colour to the DPPH molecule, with absorption maximum at roughly 520 nm in UV/Vis spectra. After reaction, the DPPH radical yields the reduced form DPPH (hydrazine form), resulting in a colour change from purple to pale yellow. The degree to which the purple colour fades is determined on the antioxidant concentration. The scavenging capability is often measured in organic solvents rather than aqueous media. (Devanathadesikan et al., 2020; Vilela et al., 2014).

2) Ferric Reducing Power Assay

In an acidic medium, the colourless Fe^{3+} -2,4,6-tripyridyl-s-triazine complex is reduced to the intensely blue Fe^{2+} -2,4,6-tripyridyl-s-triazine complex to perform the FRAP (ferric reducing antioxidant power). Increasing absorbances measured at 593 nm are used to calculate FRAP values. The FRAP methods have a number of drawbacks. Even without antioxidant properties, substances that have a lower redox potential than the Fe^{3+}/Fe^{2+} pair's redox potential may convert Fe^{3+} to Fe^{2+} and raise the FRAP value to produce falsely high results. However, not all antioxidants decrease Fe^{3+} quickly enough to be measured.

3) Hydroxyl Radical Scavenging Activity

This test is based on quantifying the breakdown product of 2-deoxyribose by condensation with TBA. The reaction mixture contained 2-deoxy-2-ribose (2.8 mM), KH_2PO_4 -KOH buffer (20 mM, pH 7.4), $FeCl_3$ (100 mM), EDTA (100 mM), H_2O_2 (1.0 mM), ascorbic acid (100 mM), and various amounts of the test sample or reference substance (0-200 g/ml). (Shete et al., 2014).

From the literature survey it is also clear that the most commonly used method of AgNPs antioxidant capacity determination is DPPH assay. Authors usually compare the antioxidant capacity of extract with that of prepared silver nanoparticles.

5. Conclusion:

Nanotechnology is improving our everyday lives by enhancing the performance and efficiency of everyday objects. It provides a clean environment by providing safer air and water, and clean renewable energy for a sustainable future. Nanotechnology has gained a wide attention where more investment is made for the research and development by top institutions, industries and organisations. Nanotechnology has established to be an advanced field of science where extensive research is carried out to implement the technology. It is being tested for various new applications to increase the efficiency and performance of the object or process and subsequently reduce the cost so that it is accessible for everyone. Because of their tunable properties, Ag NPs have long piqued the interest of researchers. Silver nanoparticles are typically produced by reducing silver salts with plant extract. Antioxidant properties of AgNPs. This action is caused by the presence of functional groups on the surface. Because of their high efficacy, non-toxicity, eco-friendliness, and low cost, AgNPs may be used as antioxidants in the future. As a result, our discovery will open up new avenues for the widespread production and application of these AgNPs in a variety of fields.

Acknowledgement:

Funding:

The authors did not receive support from any organization for the submitted work.

Competing Interests:

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interests in the subject matter or materials discussed in this manuscript.

References:

- Ansari, M. A. (2018). *One-Pot Facile Green Synthesis of Silver Nanoparticles Using Seed Extract of Phoenix dactylifera and Their Bactericidal Potential against MRSA*. 2018.
- Asoro, M. A., Kovar, D., & Ferreira, P. J. (2013). In situ transmission electron microscopy observations of sublimation in silver nanoparticles. *ACS Nano*, 7(9), 7844–7852. <https://doi.org/10.1021/nn402771j>
- Bagherzade, G., Tavakoli, M. M., & Namaei, M. H. (2017). Asian Pacific Journal of Tropical Biomedicine. *Asian Pacific Journal of Tropical Biomedicine*, 7(3), 227–233. <https://doi.org/10.1016/j.apjtb.2016.12.014>
- by Dove Press, published. (2018). *IJN-157958-green-synthesis-of-gold-and-silver-nanoparticles-from-cannab*. 3571–3591. <https://doi.org/10.2147/IJN.S157958>
- Cabral, M., Pedrosa, F., Margarido, F., & Nogueira, C. A. (2013). End-of-life Zn-MnO₂ batteries: Electrode materials characterization. *Environmental Technology (United Kingdom)*, 34(10), 1283–1295. <https://doi.org/10.1080/09593330.2012.745621>
- Dawadi, S., Katuwal, S., Gupta, A., Lamichhane, U., Thapa, R., Jaisi, S., Lamichhane, G., Bhattarai, D. P., & Parajuli, N. (2021). Characterization, and Applications. *Review Article Current Research on Silver Nanoparticles: Synthesis*. <https://doi.org/10.1155/2021/6687290>

- Devanathadesikan, V., Vijayaraghavan, P., Kim, Y., Kim, H., Al-ghamdi, A. A., Elshikh, M. S., Al-dosary, M. A., & Alsubaie, Q. D. (2020). Saudi Journal of Biological Sciences In vitro antioxidant and cytotoxic activities of polyherbal extracts from *Vetiveria zizanioides*, *Trichosanthes cucumerina*, and *Mollugo cerviana* on HeLa and MCF-7 cell lines. *Saudi Journal of Biological Sciences*, 27(6), 1475–1481. <https://doi.org/10.1016/j.sjbs.2020.04.005>
- Dey, A., Mukhopadhyay, A. K., Gangadharan, S., Sinha, M. K., & Basu, D. (2009). Characterization of microplasma sprayed hydroxyapatite coating. *Journal of Thermal Spray Technology*, 18(4), 578–592. <https://doi.org/10.1007/s11666-009-9386-2>
- Elamawi, R. M., Al-Harbi, R. E., & Hendi, A. A. (n.d.). *Biosynthesis and characterization of silver nanoparticles using Trichoderma longibrachiatum and their effect on phytopathogenic fungi*. <https://doi.org/10.1186/s41938-018-0028-1>
- Flieger, W., Flieger, J., Franus, W., Panek, R., & Szyma, M. (2021). *Green Synthesis of Silver Nanoparticles Using Natural Extracts with Proven Antioxidant Activity*.
- Hasan, S. (2014). A Review on Nanoparticles : Their Synthesis and Types. *Research Journal of Recent Sciences Res . J . Recent . Sci . Uttar Pradesh (Lucknow Campus)*, 4(February), 1–3.
- Joshi, N., Jain, N., Pathak, A., Singh, J., Prasad, R., & Prakash, C. (2018). Biosynthesis of silver nanoparticles using *Carissa carandas* berries and its potential antibacterial activities. *Journal of Sol-Gel Science and Technology*, 682–689. <https://doi.org/10.1007/s10971-018-4666-2>
- Journal, A. I., Rafique, M., Sadaf, I., Rafique, M. S., & Tahir, M. B. (2016). A review on green synthesis of silver nanoparticles and their applications. *Artificial Cells, Nanomedicine, and Biotechnology*, 0(0), 000. <https://doi.org/10.1080/21691401.2016.1241792>
- Keerawelle, B. I., & Thiripuranathar, G. (2019). *Journal of Chemical , Biological and Physical Sciences A review on plant mediated synthesis of silver nanoparticles and their antimicrobial activity against various pathogenic bacteria. September*. <https://doi.org/10.24214/jcbps.B.9.4.56183>.
- Kudle, K. R., Donda, M. R., Merugu, R., Kudle, M. R., & Rudra, M. P. P. (2013). *International research journal of pharmacy*. 4(6), 197–200. <https://doi.org/10.7897/2230-8407.04644>
- Kumar, N., Salar, R. K., Kumar, R., & Prasad, M. (2018). *Green Synthesis of Silver Nanoparticles and its Applications — A Review. January 2017*.
- Kumar, S., & Barth, A. (2010). Following enzyme activity with infrared spectroscopy. *Sensors*, 10(4), 2626–2637. <https://doi.org/10.3390/s100402626>
- Rafique, M., Tahir, R., Gillani, S. S. A., Tahir, M. B., Shakil, M., Abdellahi, M. O., Rafique, M., Tahir, R., Gillani, S. S. A., Tahir, M. B., & Shakil, M. (2020). Plant-mediated green synthesis of zinc oxide nanoparticles from *Syzygium Cumini* for seed germination and wastewater purification. *International Journal of Environmental Analytical Chemistry*, 00(00), 1–16. <https://doi.org/10.1080/03067319.2020.1715379>
- Rajeshkumar, S., & Bharath, L. V. (2017). Mechanism of plant-mediated synthesis of silver nanoparticles – A review on biomolecules involved , characterisation and antibacterial activity Chemico-Biological Interactions Mechanism of plant-mediated synthesis of silver nanoparticles e A review on bio. *Chemico-Biological Interactions*, 273(June), 219–227. <https://doi.org/10.1016/j.cbi.2017.06.019>
- Ren, Y. yu, Yang, H., Wang, T., & Wang, C. (2019). Bio-synthesis of silver nanoparticles with

- antibacterial activity. *Materials Chemistry and Physics*, 235(November 2016), 121746. <https://doi.org/10.1016/j.matchemphys.2019.121746>
- Shaikh, N. S., Shaikh, R. S., & Kashid, S. (2020). *Asian Journal of Nanoscience and Short Communication In vitro bio-synthesis of silver nanoparticles using flower extract of parasitic plant Cascuta reflexa and evaluation of its biological properties*. 3, 121–130. <https://doi.org/10.26655/AJNANOMAT.2020.2.4>
- Shete, C. C., Wadkar, S. S., Gaikwad, N. B., & Patil, K. S. (2014). Antioxidant activity and antibacterial screening of tubers of *amorphophallus konkanensis* and *amorphophallus bulbifer* (Araceae). *International Journal of Pharmacy and Pharmaceutical Sciences*, 6(11), 431–436.
- Shi, H. G., Farber, L., Michaels, J. N., Dickey, A., Thompson, K. C., Shelukar, S. D., Hurter, P. N., Reynolds, S. D., & Kaufman, M. J. (2003). Characterization of crystalline drug nanoparticles using atomic force microscopy and complementary techniques. *Pharmaceutical Research*, 20(3), 479–484. <https://doi.org/10.1023/A:1022676709565>
- Singh, A., Gautam, P. K., Verma, A., Singh, V., Shivapriya, P. M., Shivalkar, S., Sahoo, A. K., & Samanta, S. K. (2020). Green synthesis of metallic nanoparticles as effective alternatives to treat antibiotics resistant bacterial infections : A review. *Biotechnology Reports*, 25, e00427. <https://doi.org/10.1016/j.btre.2020.e00427>
- Sivaraj, R., & Vanathi, R. (2017). *ANTICANCER POTENTIAL OF GREEN SYNTHESIZED SILVER NANOPARTICLES : ANTICANCER POTENTIAL OF GREEN SYNTHESIZED SILVER NANOPARTICLES : A REVIEW*. August.
- Vasireddy, R., Paul, R., & Mitra, A. K. (2012). Green synthesis of silver nanoparticles and the study of optical properties. *Nanomaterials and Nanotechnology*, 2(1), 1–6. <https://doi.org/10.5772/52329>
- Vilela, D., González, M. C., & Escarpa, A. (2014). Nanoparticles as analytical tools for in-vitro antioxidant- capacity assessment and beyond. *Trends in Analytical Chemistry*. <https://doi.org/10.1016/j.trac.2014.07.017>
- Zur Mühlen, A., Zur Mühlen, E., Niehus, H., & Mehnert, W. (1996). Atomic force microscopy studies of Solid Lipid Nanoparticles. In *Pharmaceutical Research* (Vol. 13, Issue 9, pp. 1411–1416). <https://doi.org/10.1023/A:1016042504830>

Algal Dominance in Contaminated Water Region of Godavari River

Sayali Chavhan, KajalKankute, Umesh Pravin Dhuldhaj*

Department of Biotechnology, School of Life Sciences,
Swami Ramanand Teerth Marathwada University, Nanded 431606

*Corresponding author: umeshpd12@gmail.com

Abstract:

The Godavari River is running all over the city of Nanded, and we found that some of the sites of river which is directly come in contact with anthropogenic activity are highly contaminated. To find out the actual pathogens, its identifications and characterizations, we took some of the water samples from different locations of Godavari River. Green mat of algal bloom on running and stagnant water can be easily observed by just a single look from the bridge. Godavari river is full of water and it is evergreen whole year. We observed that, the zone or sites where these green mats of algal blooms are highly contaminated regions, it can be easily can recognized by its really bad odor.

*The sample taken from contaminated river site are analysed through several microbiological identifications test. In the present investigations we found that the collected samples were contaminated with *Bacillus megaterium*, *Escherichia coli*, *Klebsiella* and sometime presence of *Vibrio* also detected. Among all collected samples *B. megaterium* is most dominant bacterium species.*

Keywords: Pathogens, water-borne diseases, Godavari River

Introduction:

The microbial contaminations and pathogens responsible for human diseases are enormously present in River water which is stagnant. The water current which is continuously in flowing can carry everything along with the current. The water which is kept undisturbed for long time can be responsible for the growth of enormous pathogens responsible for several human diseases. Not only these causal organisms can grow but in such environment, the microbes which can able to secrete toxin also can be inhabited. The water present in such water body is not potable and responsible poisoning and diseases of pet animals.

The pathogens along with all sorts of microbes are the one of the important part of biotic factor of ecosystem. The microbial pathogens generated because of anthropogenic activity like faecal contaminations are considered to be the vital factor for the health of people drinking the river water (BayoumiHamuda&Patko, 2012). In developing countries contaminated water is the major cause of several diseases. Quality assurance of surface and ground water is could major issue in developing countries (Pekárová et al., 2009). The pathogenic microbes present in river water are the major issue with respect to public health and can be reason to have health protections with respect microbial contaminations in river water (Fey et al., 2004; Straub & Chandler, 2003; WHO, 2002).

Materials And Methods:

Media:

Different types of media were used for selective growth, enrichment culture, and indication of specific properties. Media preparation and sterilization were done according to the

protocol and standard recipe.

Sample collection:

Water samples were collected from different contaminated sites of Godavari River water body. The collected samples were serially diluted by microbiological techniques and spread and streaked on nutrient agar plates. Isolated colonies obtained were further purified and processed for biochemical analysis for their identifications. Initially the rough outline of microbes regarding their identity is to be done by colony characterizations like size, pigmentation, form, margin, elevation and texture (Cappuccino & Sherman, 2005).

Gram stain:

Gram staining was done to differentiate between two principal groups of bacteria: gram positive and gram negative.

Biochemical characterization of the bacteria:

Once we got the broad outline with respect to identifications of microbes we have gone through several biochemical characterization for the confirmation of bacteria. The biochemical tests performed were Triple sugar iron agar test, IMViC test (Indole production test, Methyl red test, Voges- Proskauer test, Citrate utilization test), MIU test (Motility test, Indole test and Urease test), Nitrate reduction test, Catalase test, Oxidase test, Casein hydrolysis test, Gelatin hydrolysis test, Starch hydrolysis, Blood agar, MacConkeys Agar and Mannitol Agar.

Species Diversity:

Diversity of species was calculated by richness and evenness of species by Shannon-Weiner index (Shannon and Weiner, 1963), species dominance was calculated by Simpson's index (Simpson, 1949) and Margalef (1958).

Results And Discussion:

For present investigation water samples were collected from Godavari Rivers and further analyzed for microbial contaminations (Table 1). Godavari River is very holly place and present near to Kaleshwar temple. Also we found water purifier plant over there to make potable water for nearby villages.

The samples were collected from different locations of Godavari river and co-ordinates for sampling sites are as follows:

Table 1: Sampling sites and its coordinates

Sample Code	Longitude	Latitude	No. of Microbes
S1 (Kaleshwar temple)	19 ⁰ 7'20.44	77 ⁰ 17'1.66	06
S2 (NaginaGhat)	19 ⁰ 8'37.4"	77 ⁰ 18'28.27"	06
S3 (GovardhanGhat)	19 ⁰ 8'39.62"	77 ⁰ 18'41.19"	04

Diversity indices were calculated manually and compared with standard software (Microsoft Excel), and we found that Berger Parker Index (37.5%), Shannon-Weiner (1.0822), and Simpson Dominance (34.4 %)(Table 2).

Table 2(a): Measurement of diversity indices from sampling sites with respect to one another

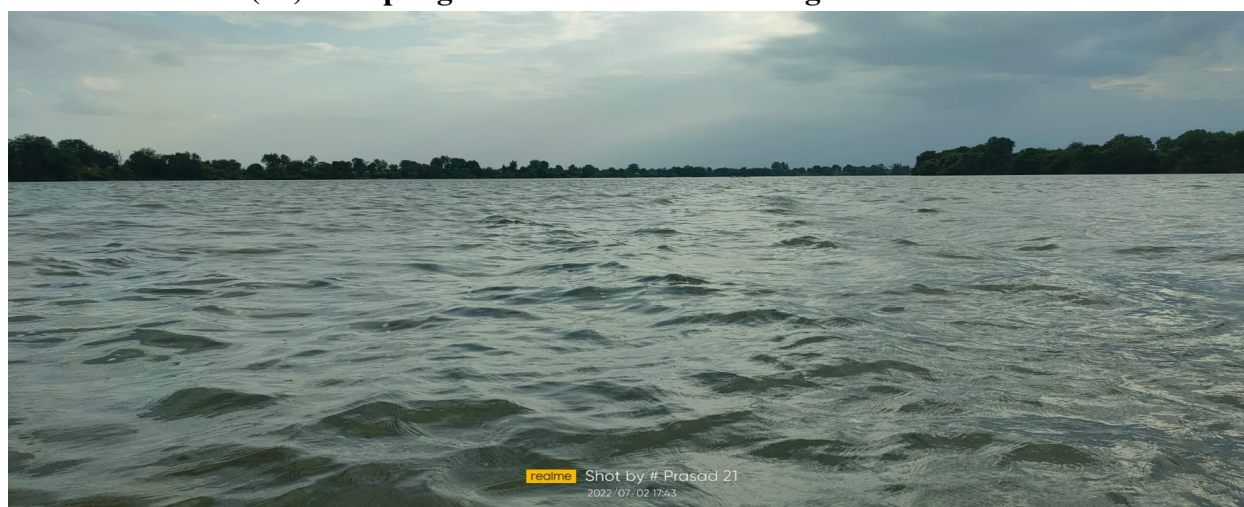
No	Category	Value	x	x ²	-x ln(x)
1	S-1	6	37.5%	0.141	0.368
2	S-2	6	37.5%	0.141	0.368

3	S-3	4	25.0%	0.062	0.347
R1	Simpson Dominance			0.3438	
R2	Shannon Entropy				1.0822

Table 2(b): Measurement of diversity indices from sampling sites with respect to one another

Diversity Indices	
Index	Value
Number of Sites N	3
Richness R	3
Berger Parker Index p_{imax}	37.5%
Shannon Entropy ¹⁾ H (nat)	1.0822
Shannon Entropy ¹⁾ H (bit)	1.5613
Number Eq. 1D (True Diversity)	3.0
Shannon Equitability $H/\ln N$	98.5%
Simpson Dominance SD	34.4%
SD (unbiased - finite samples)	30.0%
True Diversity 2D (Order 2)	2.9
Gini-Simpson Index $1-SD$	65.6%
Gini-Simpson Equitability	98.4%
¹⁾ sometimes referred to as Shannon-Weaver or Shannon-Wiener Index	

Location 1(S1): Sampling sites for microbial investigations of Godavari River



Location 2 (S2): Sampling sites for microbial investigations of Godavari River



Location 3 (S3): Sampling sites for microbial investigations of Godavari River



We have taken some water samples to find out contaminating microbes. The taken samples were serially diluted and spread on nutrient agar plates and we found that (See Fig. 1 and 2), numerous bacteria are there, which are responsible for water contaminations.

Table 3: Obtained isolates were tested for colony characteristics

Isolate No.	Isolate	Colour	Shape	Margin
1	SC1	White	Oval	Straight,entire
2	SC2	Creamy	Round	Entire, Smooth
3	SC3	White	Oval	Discontinues
4	SC4	Off White	Round	Smooth
5	SC5	White	Round	Smooth
6	SC6	Creamy	Irregular	Curled
7	SC7	Orange, milky	Round	Entire
8	SC8	White	Round	Continues
9	SC9	White	Irregular	Curled
10	SC10	Off, White	Circular	Entire
11	SC11	White	Round	Smooth
12	SC12	White	Round	Smooth
13	SC13	White	Irregular	Discontinues
14	SC14	White	Round	Entire
15	SC15	Creamy	Oval	Irregular
16	SC16	Milky	Oval	Rough

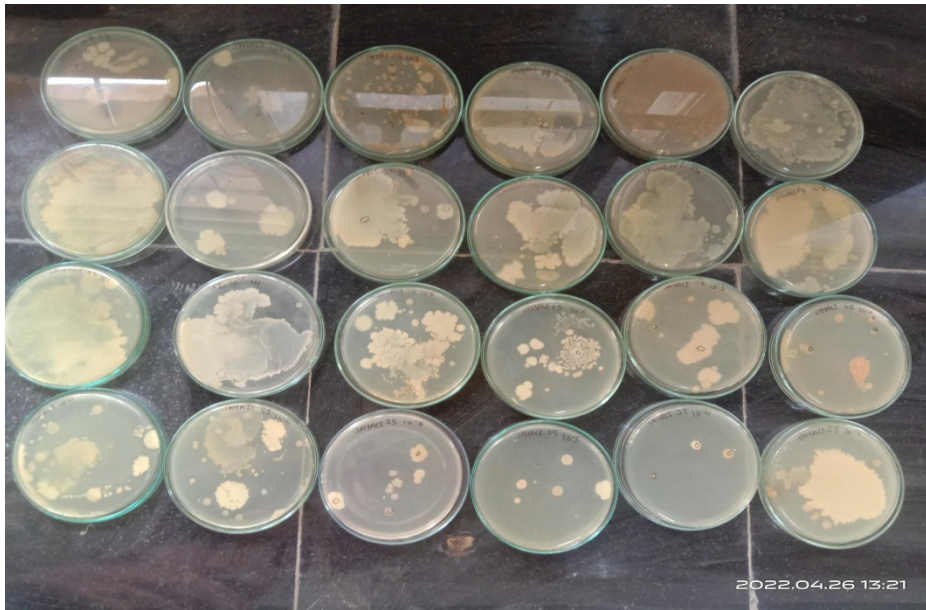


Figure 1: Bacterial colonies obtained after serial dilutions and spread plate techniques.

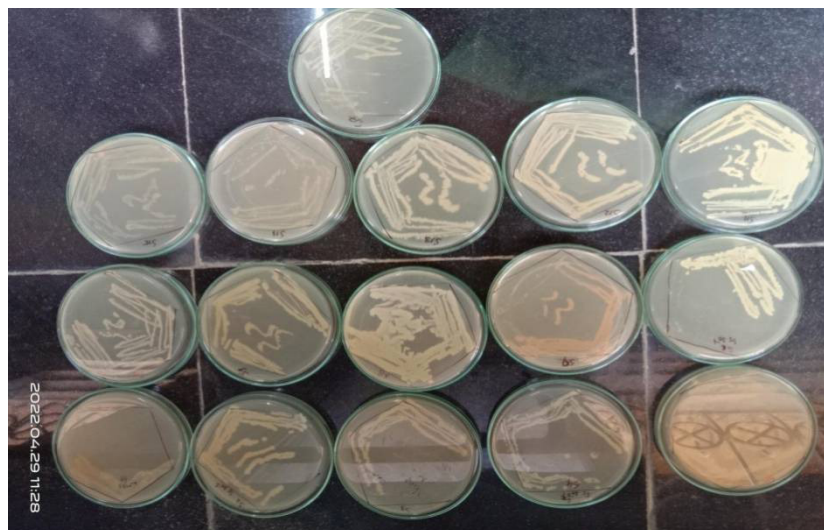


Figure 2: Bacterial colonies obtained after serial dilutions and streak plate techniques.



Figure 3: Isolates were tested for triple iron sugar test



Figure 4: Isolates tested for Voges-Proskaur test

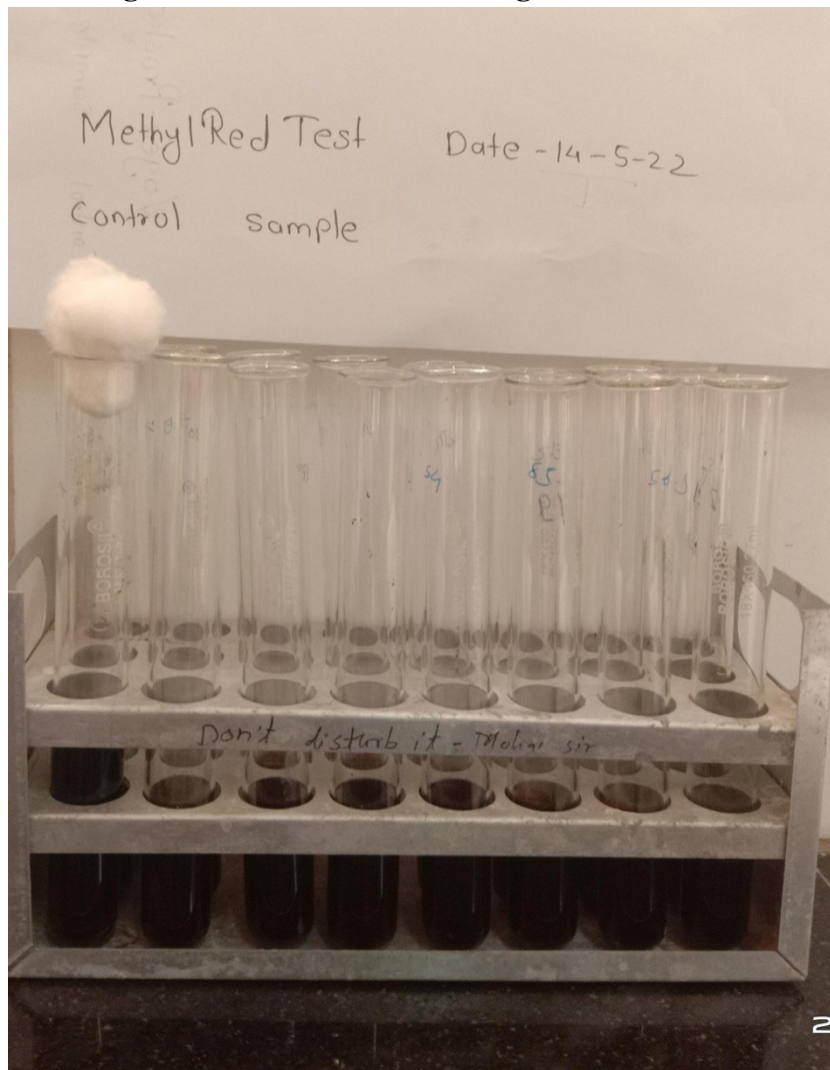


Figure 5: Bacteria tested for Methyl red test



Figure 6: Isolates tested for Indole test



Figure 7: Isolates tested for H₂S production

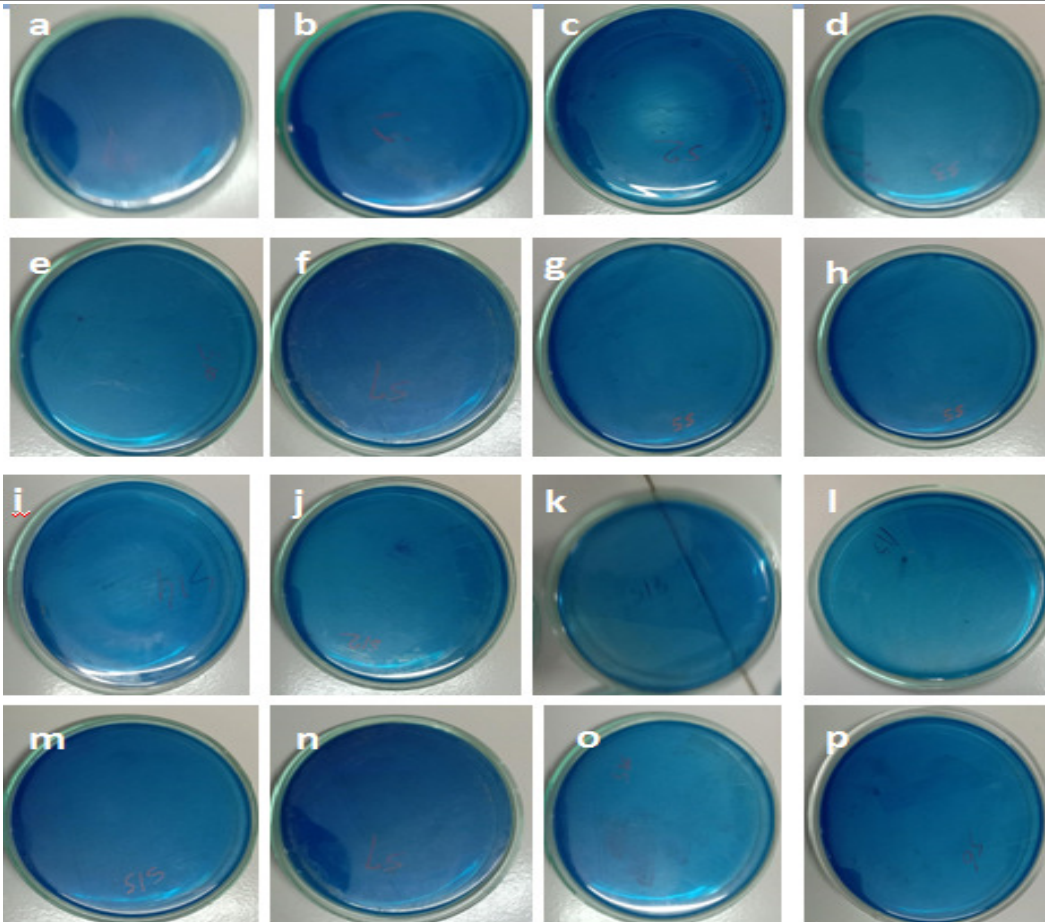


Figure 8: Isolates tested for Simmons Citrate Agar test

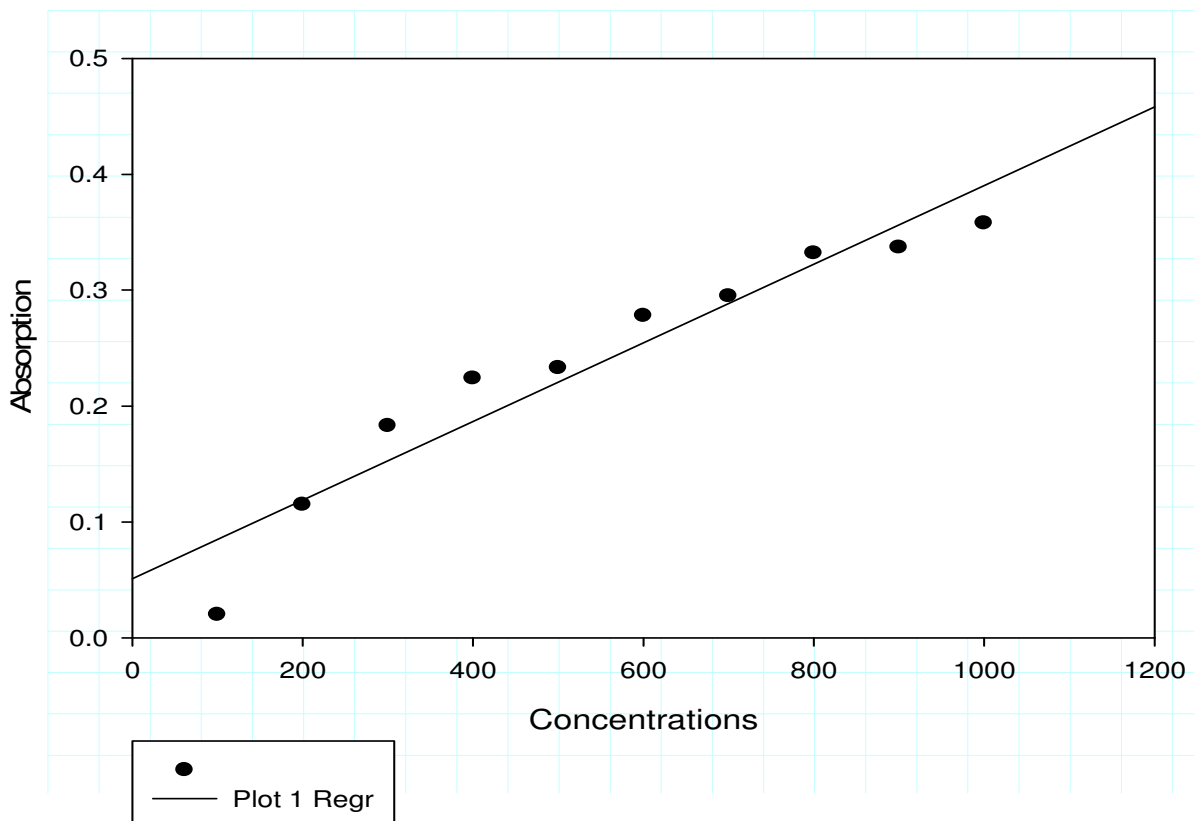


Figure 9: Standard graph for protein estimations by taking Bovine Serum albumin as standard.

The protein estimation has been done to find live microbial activity in water bodies. We found protein concentrations in collected samples are like 130 mg/L, 6.145 mg/L and 36.31 mg/L from S3, S2 and S1 samples respectively. From this data we can interpret that the sample S3 is having more microbial activity in comparison to others. As the efflux of sewage water is directly released over there, which makes it more contaminated.

In the present investigations we found that the collected samples were contaminated with *Klebsiella aerogenes*, *Escherichia coli* and *Proteus vulgaris*. Among all collected samples *Klebsiella aerogenes* most dominant bacterium species (Table 4).

Table 4 : Biochemical analysis of obtained isolates and identifications of microbes

Sr. No.	Isolates	GS	IT	MR	VP	SC	TSA	H ₂ S	Identified Microbes
1	SC1	-	+	+	-	-	+	-	<i>Escherichia coli</i>
2	SC2	-	+	+	-	-	+	-	<i>Escherichia coli</i>
3	SC3	-	+	+	-	-	+	+	<i>Proteus vulgaris</i>
4	SC4	-	+	+	-	-	+	-	<i>Klebsiella aerogenes</i>
5	SC5	-	+	+	-	-	+	-	<i>Escherichia coli</i>
6	SC6	-	+	+	-	-	+	-	<i>Klebsiella aerogenes</i>
7	SC7	-	+	+	-	-	+	-	<i>Escherichia coli</i>
8	SC8	-	+	-	-	-	+	+	<i>Proteus vulgaris</i>
9	SC9	-	+	+	-	-	+	-	<i>Escherichia coli</i>
10	SC10	-	+	+	-	-	+	-	<i>Escherichia coli</i>
11	SC11	-	+	+	-	-	+	-	<i>Klebsiella aerogenes</i>
12	SC12	-	+	+	-	-	+	+	<i>Proteus vulgaris</i>
13	SC13	-	+	+	-	-	+	-	<i>Klebsiella aerogenes</i>
14	SC14	-	+	+	-	-	+	-	<i>Klebsiella aerogenes</i>
15	SC15	-	+	+	-	-	+	-	<i>Klebsiella aerogenes</i>
16	SC16	-	+	+	-	-	+	-	<i>Klebsiella aerogenes</i>

GS: Gram Staining, IT: Indole test, MR: Methyl Red Test, VP: VogesProskaur Test, SC: Simmons Citrate Agar test, TSA: Triple iron sugar Test

The bacterial isolates detected in contaminated water samples are highly sensitive to plant extracts and blooming algal extracts. We made extractions of algal secondary metabolites, collected from locations of Godavari Rivers and found that the bacteria can easily prevented upto 15 fold activity. The microbes identified in present investigations are highly sensitive to algal toxins secreted during algal bloom formations (Fig. 10). During the antimicrobial assay we observed that the, region where algal contaminations is predominant, there were another microbial flora exist because of continuous secretions of algal toxins into river water. In assay we found multifold inhibitions of microbial flora because of algal extracts.

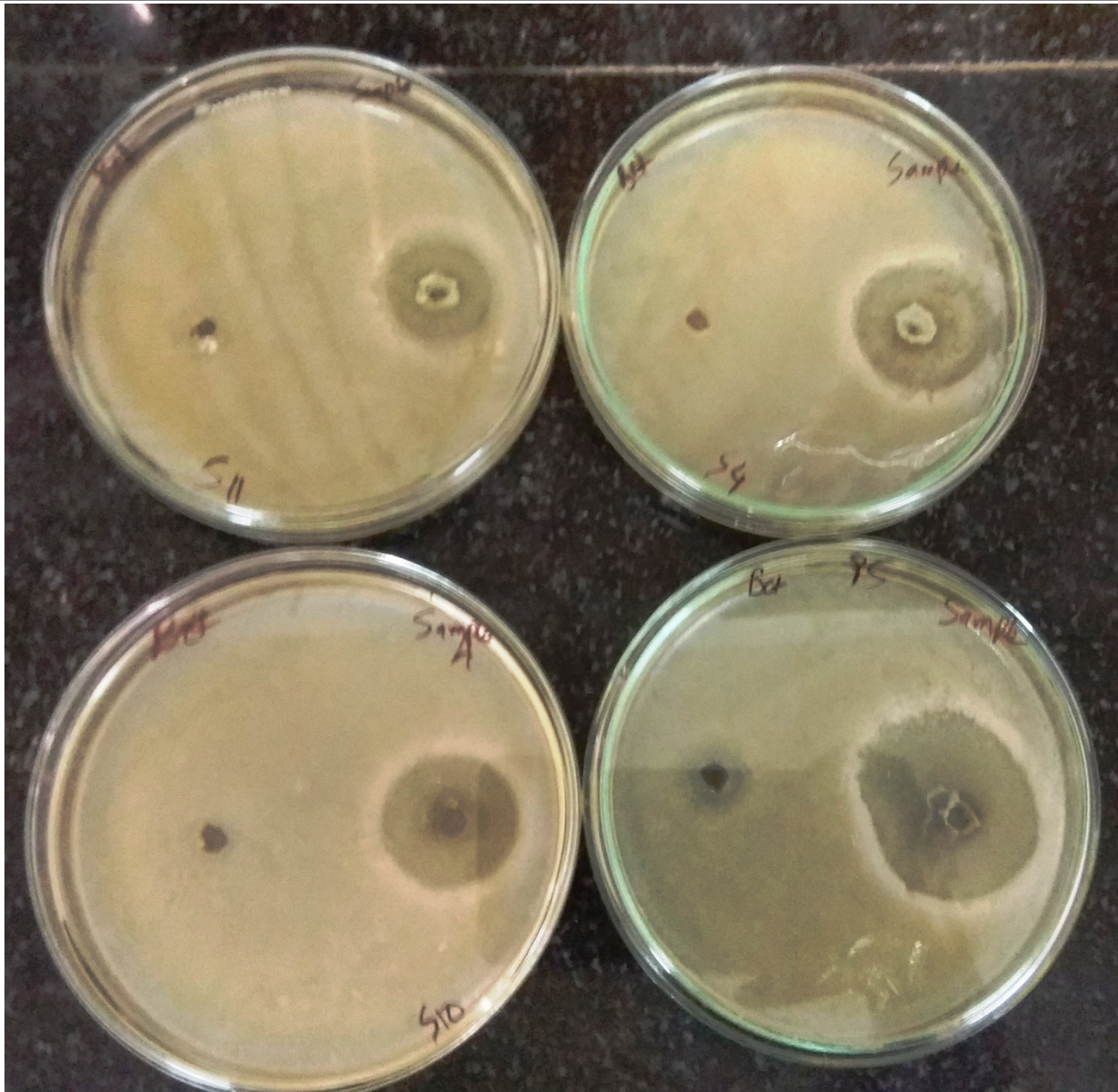


Figure 10: Growth inhibitions of bacterial isolates by toxins secreted by algal blooms.

Conclusion:

The contamination of microbial pathogens coming from drinking water which is taken from running river water current is the major concern of health issues of human beings and animals. In present investigations we observed microbes which are pathogenic as well toxic to animals. Here we have taken water from different locations and we observed some the water bodies contains faecal contamination in some of water bodies there is dominance of algal blooms responsible for secretions of algal toxins which are deadly poisonous and neurotoxic. The whole Nanded city is covered by Godavari River and efflux of anthropogenic activity is directly release into water bodies which results in the eutrophications and generations of algal blooms. The faecal contaminations are in some of locations are directly released into water body, we can detect by the presence of enteric bacteria.

References:

- BayoumiHamuda H. E. A. F., Patko I. (2012). Ecological monitoring of Danube water quality in Budapest region. *Am J Environ Sci* 8, 202–211 10.3844/ajessp.2012.202.211.
- Cappuccino JG, Sherman N. (2005). *Microbiology A Laboratory Manual* seventh edition. Menlo Park, California.
- Fey A., Eichler S., Flavier S., Christen R., Höfle M. G., Guzmán C. A. (2004). Establishment of a real-time PCR-based approach for accurate quantification of bacterial RNA targets in water, using *Salmonella* as a model organism. *Appl Environ Microbiol* 70, 3618–3623 10.1128/AEM.70.6.3618-3623.2004.
- Margalef, R., (1958). Information theory in ecology. *General Systems* 3, 36–71.
- Pekárová P., Onderka M., Pekár J., Rončák P., Miklánek P. (2009). Prediction of water quality in the Danube River under extreme hydrological and temperature conditions. *J HydrolHydromech* 57, 3–15 10.2478/v10098-009-0001-5.
- Shannon CI, Weiner W (1963) *The Mathematical Theory of Communication*. University of Illinois Press, Urbana, 111. USA.
- Simpson EM (1949) Measurement of diversity. *Nature* 163: 688.
- Straub T. M., Chandler D. P. (2003). Towards a unified system for detecting waterborne pathogens. *J Microbiol Methods* 53, 185–197 10.1016/S0167-7012(03)00023-X.
- WHO (2002). *The World Health Report 2002 – Reducing Risks, Promoting Healthy Life*. Geneva: World Health Organization.



Study on Food Biopreservative Application of Bacteriocin by *Lactobacillus Pentosus* B25 on Raw and Pasteurized Milk

Dr. Bharti Ghude-Wadekar

(bhartiwadekar@tsdemumbai.in)

Assistant Professor, Microbiology ID,

ZSCT's Thakur Shyamnarayan Degree College, Kandivali East, Mumbai

Abstract:

Bacteriocin is employed as a food preservative thanks to its medicine activity. It principally used for increase the period of time of food. It works as natural preservative similarly as mix with chemical preservatives. In study, we tend to use the 5% bacteriocin in raw milk and pasteurized milk. The raw milk extend their life up to eight days and pasteurized milk extending up to forty two days. The preservative activities of the bacteriocins tested on milk showed that the bacteriocin B25 had most reduction of microorganism population and thereby extending the period of time and enhancing the protection of food merchandise.

Keywords: Bacteriocin, Milk sample, Preservatives, MBRT Test

1. Introduction:

Lactobacillus species are primarily employed in the food trade in probiotics like Yakult and Vitagen, however also can be found in yoghurts and alternative hard dairy farm merchandise like cheese, wherever they're used as starter cultures. Daeschel, (1989) declared that in some food system carboxylic acid microorganism represent the dominant micro flora. The organisms are ready to manufacture antimicrobial compounds against competitive flora, as well as food borne spoilage and morbidic microorganism. The antimicrobial impact exerted by carboxylic acid microorganism is that the production of carboxylic acid and reduction of hydrogen ion concentration, and lactic acid, diacetyl, oxide, fatty acids, aldehydes and alternative compounds. Fuller, (1989) according that lactic acid microorganism are used as adjuncts in food to supply a good selection a health advantages. The establishment of the gut by probiotic microorganism prevents the expansion of harmful microorganism by competitive exclusion and by the assembly of matter viz., organic acids and antimicrobial compounds. Piard and Desmazeaud, (1991) had made antimicrobial compounds from the lactic acid microorganism, which may be classified as low mass compounds like oxide, greenhouse emission, diacetyl and high mass compounds like bacteriocins. Agar well diffusion methodology and neutral living thing culture filtrate obtained from isolates of *L. acidophilus*, *L. delbrueckii* spp. *bulgaricus*, *L. salivarius* and *Lactococcus lactis* spp. *lactis* from Dahi showed weak to moderate inhibition of *Staphylococcus aureus*, *Bacillus caryophylloide* dicot genus, *E. coli*, *Bacillus brevis*, *Bacillus circulans*, *Bacillus coagulans*, *Bacillus laterosporus*, *Bacillus*, and *P. aeruginosa* and according the potential of exploitation neutral living thing cellular filtrate of lactic acid microorganism within the bio preservation of foods. Yoneyama et al., (2004) showed that nisin and a few of the recently isolated novel bacteriocins were effective bio-preservatives in sure food systems during which focused bacteriocin preparations or the bacteriocin manufacturing strains had been used. The Lactic acid microorganism strains owe their antagonistic activity to either decrease within the hydrogen ion concentration or to bacteriocin production creating them ideal for cheese creating and preventing the expansion of *S. aureus*. In 2007, Vuyst and Leroy, according that bacteriocins

may be used as food additives and as an alternate to the addition of bacteriocins to foods, bacteriocins could also be made directly within the food as a results of starter culture or co-culture activity.

In present study, we tend to confirm the period of time of milk by exploitation bacteriocin that is made by true bacteria pentosus (B25) as a food preservative.

2. Materials And Methods:

The bio preservative potency of the bacteriocins B25 obtained from *L.pentosus* B25 made up our minds as represented by Joshi et al., protocol with slight modification. Every flask contained 50 ml raw milk and pasteurized milk, out of that one is management i.e. while not bacteriocin and one is sample i.e. with bacteriocin. for every sort 50 ml sample used and bacteriocin was side at 5ml and analysed for 2, 4, 6, eight and ten days (Raw milk) and most up to two months (Pasteurized milk). For raw milk, after every 1 day and for pasteurized milk, after every 6 days, the quality and stability of milk was studied with respect to (1) colony count (2) pH (3) Clotting test (4) Alcohol test (5) Acidity test (6) Resazurin test and (7) Methylene blue reductase test.

2.1 a Determination of colony count:

The residual activities were taken every 2 days interval and serially diluted at 10^{-6} were made and the plated on nutrient agar and was incubated at 37°C for 24 hours. The colony count was recorded and compared with the control (without bacteriocin).

2.2 b Quality control test of Milk:

2.2 b(i) pH Determination:

The pH of medium was determined using pH probe (Lab Serv, AcuStar⁺ V, pH/ Conductivity Meter).

2.2. b(ii) Clot on boiling (C.O.B) test:

The test is quick and simple. It is one of the old tests for too acid milk (pH<5.8) or abnormal milk (e.g. colostral or mastitis milk). If a milk sample fails in the test, the milk must contain many acid or rennet producing microorganisms or the milk has an abnormal high percentage of proteins like colostral milk. Such milk cannot stand the heat treatment in milk processing and must therefore be rejected. Boil a small amount of milk in a spoon, test tube or other suitable container. If there is clotting, coagulation or precipitation, the milk has failed the test.

2.3 The alcohol test:

The test is quick and simple. It is based on instability of the proteins when the levels of acid and/or rennet are increased and acted upon by the alcohol. Also increased levels of albumen (colostrum milk) and salt concentrates (mastitis) results in a positive test.

The test is carried out by mixing equal amounts of milk and 68% of ethanol solution in a small bottle or test tube. (68 % Ethanol solution is prepared from 68 mL 96% (absolute) alcohol and 28 ml distilled water). If the tested milk is of good quality, there will be no coagulation, clotting or precipitation, but it is necessary to look for small lumps. The first clotting due to acid development can first be seen at 0.21-0.23% Lactic acid. For routine testing 2 ml milk is mixed with 2 ml 68% alcohol.

2.4 Acidity test:

Bacteria that normally develop in raw milk produce more or less of lactic acid. In the acidity test the acid is neutralised with 0.1 N Sodium hydroxide and the amount of alkaline is

measured. From this, the percentage of lactic acid can be calculated. Fresh milk contains in this test also "natural acidity" which is due to the natural ability to resist pH changes. The natural acidity of milk is 0.16 - 0.18%. Figures higher than this signifies developed acidity due to the action of bacteria on milk sugar.

To 9 ml of the milk measured into the porcelain dish/conical flask, 1 ml Phenolphthalein is added and then slowly titrated again 0.1 N Sodium hydroxide present in the burette under continuous mixing, until a faint pink colour appears. The amount of ml of Sodium hydroxide solution required was noted and % lactic acid was estimated.

2.5 Resazurin test:

Resazurin test is the most widely used test for hygiene and the potential keeping quality of raw milk. Resazurin is a dye indicator. Under specified conditions Resazurin is dissolved in distilled boiled water. The Resazurin solution can later be used to test the microbial activity in a given milk sample. Resazurin can be carried out as 10 min test, 1 h test, 3 h test. The 10 min Resazurin test is useful and rapid, screening test used at the milk platform. The 1 h test and 3 h tests provide more accurate information about the milk quality, but after a fairly long time. They are usually carried out in the laboratory.

10 ml of milk and 1 ml of Resazurin was added in test tube, mixed the dye thoroughly and incubated in water bath and response was observed as change in colour and quality of milk was decided. Following table 1 has shown the reading and result of this test.

Table 1: Readings and Results (10 Minute Resazurin Test)

Resazurin Test	Colour	Grade of milk	Action
1	Blue	Excellent	Accept
2	Light blue	v. good	Accept
3	Purple	Good	Accept
4	Purple pink	Fair	Separate
5	Light pink	Poor	Separate
6	Pink	Bad	Reject
7	White	Very bad	Reject

2.6 Methylene blue reductase test:

Transfer 10 ml of each milk sample into appropriately labelled test tube. Add 1 ml of redox indicator, methylene blue to each test tube containing milk sample. Tighten the test tube mouth with stoppers. Gently invert the tubes at about four or five times to ensure proper mixing of the methylene blue solution. Keep the tubes in the water bath at 37°C. Note the incubation time. That is, the time elapsed for the colour to turn whitish appearance. Stabilize the tubes for 5 minutes.

Table 2: Result of Methylene blue reductase test

Sr. No.	Time in reduction	Quality of milk
1	Within 30 min	Very poor quality
2	Between 30 min and 2 h	Poor
3	Between 2 and 6 h	Fair
4	Between 6 and 8 h	Good
5	Not reduced in 8 h	Excellent

3. Result And Discussion

Application of bacteriocin as a Food bio preservative

3.a Application of bacteriocin as food bio preservative in Raw Milk:

Bacteriocin is employed as a food preservative thanks to its bactericide activity. It principally used for increase the period of time of food. It works as natural preservative likewise as mix with chemical preservatives. The milk extend their life up to eight days and milk extending up to forty two days (photoplate 1). The preservative activities of the bacteriocins tested on milk showed that the bacteriocin B25 had most reduction of microorganism population and thereby extending the period of time and enhancing the protection of food merchandise.

Table 3a, b represents the clotting formation, odour, clotting, colour modification in Resazurin take a look at, you look after carboxylic acid and thiazine enzyme take a look at of milk (photoplate two and 3). Figure one represents the colony count, hydrogen ion concentration and carboxylic acid concentration of milk.

Table 3a: Quality control studies of Raw Milk

Sr. No.	Coagulation Formation		Odour		Clot on Boiling test		Alcohol Test	
	C	S	C	S	C	S	C	S
1	No	No	N	N	-	-	-	-
2	No	No	N	N	-	-	-	-
3	No	No	Ab	N	+	-	+	-
4	Y	No	Ab	N	+	-	+	-
5	Y	No	Ab	N	+	-	+	-
6	Y	No	Aci	N	++	-	++	-
7	Y	No	H. Aci	N	++	+	++	+
8	Y	Yes	H. Aca	Ab	++	+	++	+

Legends: N-Normal, Ab.-Abnormal

Table 3b: Quality control studies of Raw Milk

Sr. No.	Resazurin Test		Lactic Acid Test (%)		MBRT Test (h) Reduction	
	C	S	C	S	C	S
1	Blue	Blue	0.58	0.58	8	8
2	Blue	Blue	0.58	0.58	8	8
3	Purple Pink	Blue	0.67	0.58	5	8
4	Light pink	Blue	0.95	0.67	1	8
5	Pink	Purple	1.165	0.67	1	5
6	Pink	Purple	1.506	0.81	½	5
7	White	Purple pink	1.963	0.83	½	5
8	White	Light pink	2.358	1.43	½	3

3.b Application of bacteriocin as a food bio-preservatives in Pasteurized Milk:

Table 4a, b represents the clotting formation, odour, clotting, colour modification in Resazurin take a look at, you look after carboxylic acid and thiazine enzyme take a look at of milk (Photoplate 1 and 2). Figure two represents the colony count, hydrogen ion concentration

and carboxylic acid concentration of milk. Similarly, the bacteriocin of *L.fermentum* had most reduction on microorganism population. These results additional disclosed that microorganism count drastically reduced in each the treated and untreated sample. (Joshi *et al.*, 2006). Combined impact of warmth and bacteriocin additionally extended storage lifetime of milk by suppressing growth of various microorganisms (Sharma *et al.*, 2008)). Similar work done by Cao-Hoang *et al.*, (2010); Mills *et al.*,(2011).

Table 4a: Quality control studies of Pasteurized Milk

Sr. No.	Coagulation Formation		Odour		Clot Boiling test		Alcohol Test	
	C	S	C	S	C	S	C	S
1(1)	No	No	Normal	Normal	-	-	-	-
2(6)	No	No	Normal	Normal	-	-	-	-
3(12)	No	No	Abnormal	Normal	+	-	+	-
4(18)	Yes	No	Abnormal	Normal	+	-	+	-
5(24)	Yes	No	Abnormal	Normal	+	-	+	-
6(30)	Yes	No	Acidic	Normal	++	-	++	-
7(36)	Yes	No	Highly acidic	Normal	++	+	++	+
8(42)	Yes	Yes	Highly acidic	Abnormal	++	+	++	+

Table 4b: Quality control studies of Pasteurized Milk

Sr. No.	Resazurin Test		Lactic Acid Test (%)		MBRT Test (h) Reduction	
	C	S	C	S	C	S
1(1)	Blue	Blue	0.58	0.58	8	8
2(6)	Blue	Blue	0.58	0.58	8	8
3(12)	Purple Pink	Blue	0.67	0.58	5	8
4(18)	Light pink	Blue	0.95	0.67	1	8
5(24)	Pink	Purple	1.165	0.67	1	5
6(30)	Pink	Purple	1.506	0.81	½	5
7(36)	White	Purple pink	1.963	0.83	½	5
8(42)	White	Light pink	2.358	1.43	½	3

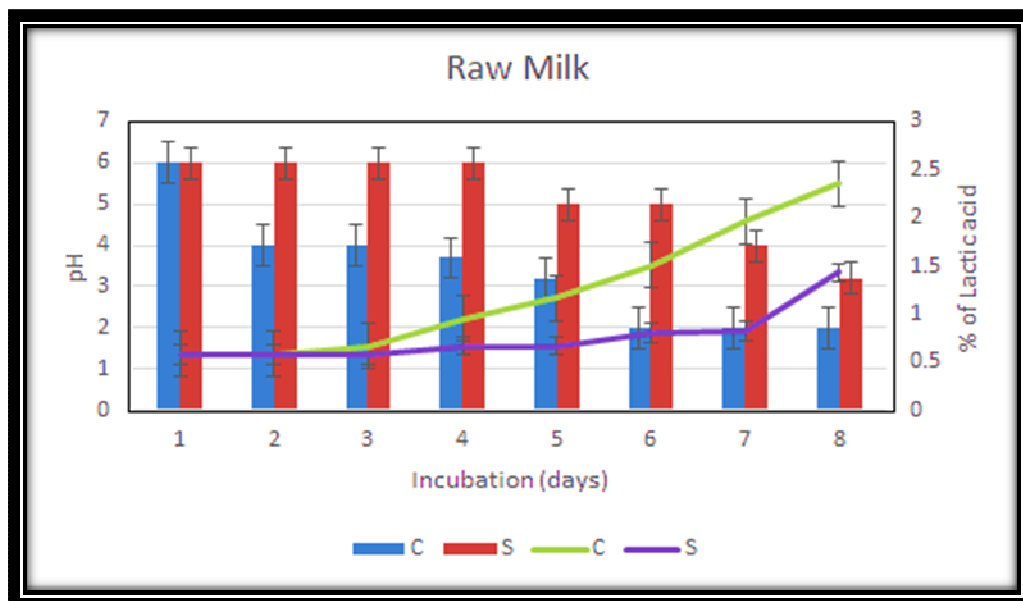


Fig. 1: pH and lactic acid concentration

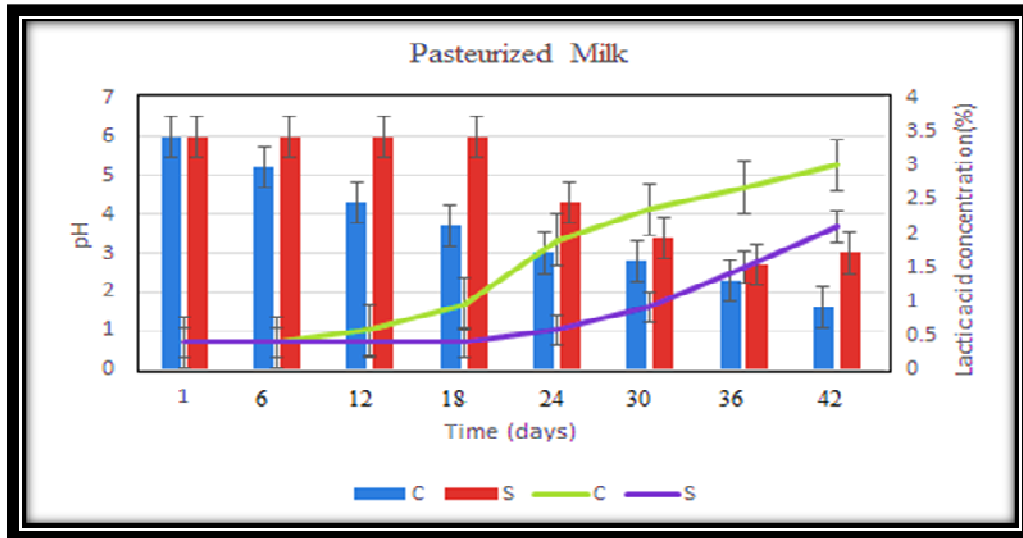
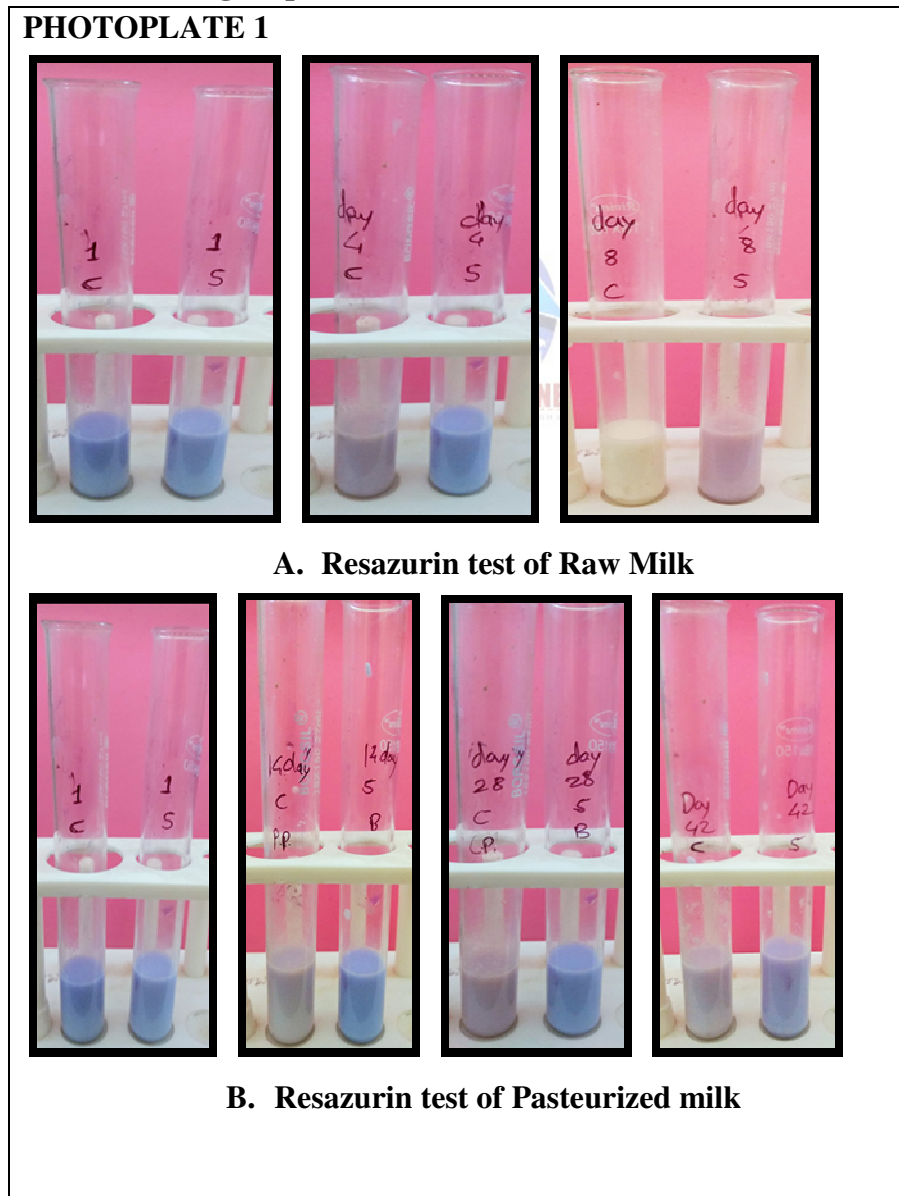
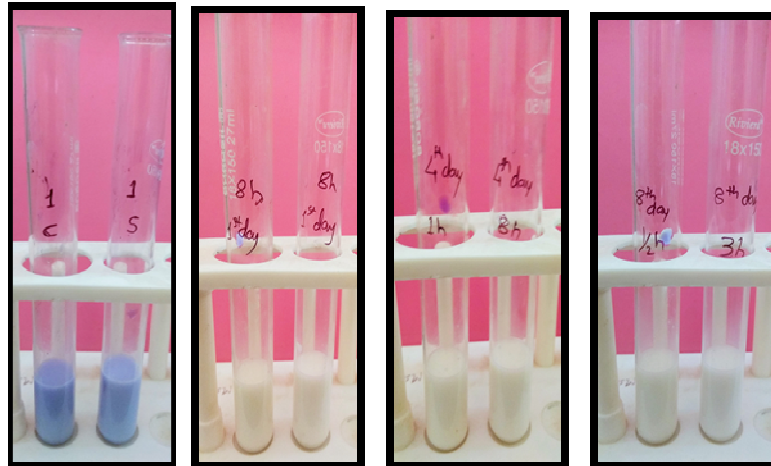


Fig. 2: pH and lactic acid concentration



PHOTOPLATE 2



A. Methylene Blue Reductase test of Raw milk –Blue colour reduced in white colour



B. Methylene Blue Reductase test of Pasteurized milk

4. Conclusion:

These bacteriocins have tolerance to wide environmental factors, it can be used as a bio preservative in food industries. Bacteriocin is employed as a food preservative thanks to its bactericide activity. It principally used for increase the period of time of food. It works as natural preservative likewise as mix with chemical preservatives. In this study, we tend to use the 5 % bacteriocin in raw milk and pasteurized milk. The milk extend their life up to eight days and milk extending up to forty two days. The preservative activities of the bacteriocins tested on milk showed that the bacteriocin B25 had most reduction of microorganism population and thereby extending the period of time and enhancing the protection of food merchandise.

5. References:

1. Daeschel, M.A. (1989). Antimicrobial substances from lactic acid bacteria for use as food preservative. Food technology.
2. Fuller, R. (1989). Probiotics in man and animals. Experientia 35, 406–407.

3. Joshi, V.K., Sharma, S., Rana, N.S. (2006). Production, purification, stability and efficacy of bacteriocin from isolates of natural lactic acid fermentation of vegetables. *Food TechnolBiotechnol.* 44, 435–439.
4. Mills, S., Serrano, L.M., Griffin, C. (2011). Inhibitory activity of *Lactobacillus plantarum* LMG P-26358 against *Listeria innocua* when used as an adjunct starter in the manufacture of cheese. *Microbial Cell Factories.* 10(1), article S7. DOI: 10.1186/1475-2859-10-S1-S7.
5. Piard, J.-C., and M. J. Desmazeaud. (1992). Inhibiting factors produced by lactic acid bacteria. Antibacterial substances and bacteriocins. *Lait* 72, 113–142
6. Sharma, N., Attri, A. and Gautam, N. (2008). Purification and characterization of bacteriocin like substance produced from *Bacillus lentus* with perspective of a New Biopreservative for food preservation. *Biological Science.* 52(4), 191-199
7. Yoneyama, H., Ando, T. and Katsumata, R. (2004). Bacteriocins produced by lactic acid bacteria and their use for food preservation. *Tohoku Journal of Agricultural Research.* 55, 1-2.



Inorganic Phosphate Solubilizers and Siderophore Producing Rhizobacteria Isolated from *Triticumaestivum* (Wheat) for Sustainable Agriculture

Kinjal H. Kavani*, Dr. Neepta D. Pandhi**

Junagadh agricultural university- Junagadh

Email: kinjalkavani.kk@gmail.com

M. and N. Virani Science College – Rajkot

ndpandhi@vsc.edu.in

Abstract:

The rhizosphere is the region of soil that is influenced by root secretions and associated soil microorganisms. Rhizobacteria are root associated bacteria that can have a detrimental, neutral or beneficial effect on plant growth. Here, an attempt has been made to screen and identify phosphate solubilizer and siderophore producing rhizobacteria from rhizospheric soil of wheat field. Samples were collected from rhizosphere of wheat field of different 6 region of Gujrat, India (Kutch, Jamnagar, Junagadh, GirSomnath, Amreli and organic farming field). 34 pure cultures were obtained in solid Nutrient Agar Media. Isolates were screened on Pikovskaya's agar plates for phosphate solubilization and chrome azurol S agar medium for siderophore production. The 14% isolates were able for Phosphate solubilization and 17% were positive for siderophore production. This study will facilitate accurate identification of the bacterial types that rhizospheric traits essential in synthesis of plant hormones, soil nutrient solubilization and help in fulfilment of the iron requirement of plants by causing its solubilization and chelation from organic or inorganic complexes present in soil and in sight an immunological response in the plants, thereby enhancing their capability to overcome diseases.

Introduction:

Cereals such as rice, wheat, chick pea and maize are the major grains that sustain humanity. Wheat grows in temperate climates and shows the staple food for 35% of the world's population and provides more calories and proteins, than any other crop. The population all around the world is on hike while the food production is entirely stagnant. Thus, to meet the increasing demand of the increasing population scientists are now target towards the techniques that can lead to increase in food production. Due to climate change, increased population pressure and adverse environmental impacts on agriculture fields are continually facing many detrimental effects, which finally lead to scarcity of food production. To overcome the situation, new mechanism must be developed to meet the increased food demands with sustainable food production that has the potentiality to provide adequate food nutrition without hampering the fields. One such mechanism that is used to meet the agricultural need is "Biofertilizer". Biofertilizers due to its renewable, cheap and environmentally safe nature has gained increasing popularity in the past one decade in the field of agriculture and food production. The use of chemical fertilizers and pesticides has caused enormous effect to the environment. Biofertilizers will help to solve such problems as increased salinity of soil and chemical run off from the agricultural field. It has been found to minimize the use of chemical fertilizers, improved soil fertility status and enhancing the crop production by their biological activity in the rhizosphere. Extensive research were carried out on the use of bacteria (Azotobacter, Azospirillum,

Rhizobium, phosphobacteria) and VAM fungi as biofertilizers to supplement nitrogen and phosphorus fertilizers.

Objectives:

The present study aims at isolating and characterization the phosphate solubilizing bacteria and siderophore producing bacteria from wheat field in order to improve the agronomic efficacy of Phosphate solubilizers.

Problem statement and Hypothesis:

This work has been taken up to carry out isolation and characterization of Rhizospheric bacteria from wheat field and to perform the comparative study of their phosphate solubilizing and iron chelating traits to help in better understanding of the mechanism of Plant – Rhizobacteria interaction.

We presume that this work will enable the researchers as well the farmers to appreciate the role of Rhizobacteria in the enhancement of plant growth and yield. This work would also throw light on the effect of various factors on the PGPR activities and to optimize the conditions for its best utilization.

Materials And Method:

Bacterial Isolation:

Sample sites

Different region of Gujarat on the bases of different soil types as mention below::

Sandy and saline soil type: Kutch region

Medium black and saline soil type: GirSomnath region

Mixed red and black soil type: Amreli region

Medium black, calcareous soil type: Junagadh region

Medium black, shallow soil type: Jamnagar region

Organic farming soil: Sudavad, (Junagadh) region

For isolation of rhizosphere bacteria, 1.0 gram of the soil was mixed in 9.0 ml of saline solution (0.9% NaCl) (w/v). The soil suspension was vortexed for five minutes to remove soil, stones, debris and dead bacterial cells. Soil suspension were serially diluted (10⁻¹ to 10⁻⁶) respectively. 100 µl of supernatant of each dilution of rhizospheric soil solution were transferred onto different prepared NA medium and incubated at the appropriate temperature. The purified bacteria cultures were identified based on their morphology and screened for different PGP traits [Gupta A, Meyer JM, et al, (2002)].

Characterization and identification of bacteria:

Preliminary identification of isolates was performed using morphological characterization. After 24 h of growth on N agar at 30°C, colonies of purified bacteria isolates were characterized for their following traits: size, shape, pigmentation, margin, elevation, opacity, consistency and Gram's nature by KOH string test.

Qualitative estimation of phosphate solubilization bacteria:

Qualitative estimation of Phosphate solubilization done by measuring the P solubilizing index (PSI). Bacterial isolates were screened in vitro for their phosphate solubilizing activity using Pikovaskaya's medium supplemented with Bromothymol Blue (BTB). The cultures were spot-inoculated on the Pikovskaya's with BTB medium plates and incubated at 30°C for 7 days.

The appearances of the clear zone around bacterial growth were indicated positive results for phosphate solubilization [ZawKoLatt, et al (2017)].

PSI calculated according formula $PSI = C+H/C$, (C= colony diameter; H= halozone diameter)

Quantitative estimation of phosphate solubilizing bacteria:

Quantitative estimation of P solubilization determined by Vanadomolybdate phosphoric method. Fresh colony was inoculated in Pikovakaya's broth and incubated in shaking condition at 120 rpm/min at 28°C for 7 days. Uninoculated broth medium served as a control. 2 ml of culture was taken and centrifuged at 10,000 rpm for 15 min. the content of soluble P was estimated by using molybdate blue method by spectrophotometer at 882 nm. The pH of medium also measured with a digital pH meter.

Siderophoreproduction:

Detection in plate culture

Siderophore production of each isolate was determined on Chrome Azurol S (CAS) medium following the (Schwyn&Neilands 1987). ME agar medium with Chromo Azurol S (CAS) (blue agar) was inoculated in the plate with 24 hr old bacteria and kept for incubation at 30oC for 72 hr. The blue colour of the medium to orange or presence of yellow to light orange halo surrounding the colony indicates the production of siderophore.

Quantitative estimation

MEB medium was prepared and used for siderophore production. 24 hr old culture of microorganisms were used to inoculate for 24 hr at 30oC with constant shaking at 120r.p.m. Following the inoculation, fermented broth was centrifuged (10,000 r.p.m. for 15 min) and cell free supernatant was subjected to detection and estimation of siderophore. Quantitative estimation was done by CAS – Shuttle assays^{31,32}. In which 0.5 mL of culture supernatant was mixed with 0.5 mL of CAS reagent and absorbance was measured at 630 nm against a reference consisting of 0.5 mL of uninoculated broth and 0.5 mL of CAS reagent. Siderophore content in the liquor were calculated by using following formula:

$$\% \text{Siderophore units} = \frac{A_r - A_s}{A_r} \times 100$$

Ar

Where Ar = Absorbance of reference at 630 nm (CAS reagent)

As = Absorbance of sample at 630 nm.

Results And Discussion:

Qualitative and Quantitative estimation of phosphate solubilizing bacteria:

The results observed in qualitative phosphate solubilizing capacity of isolates are presented in table 1. The clear zone surrounded the bacterial colony on Pikovaskaya's medium indicated positive result. There were 14% organisms were found as a phosphate solubilizers. Inorganic phosphate released by isolates in TCP broth during 3, 5 and 7 days shown in figure 1.

Table:1 Phosphate Solubilizing Index of isolates on TCP media during 3,5 and 7 DAI

Isolate code	DAI 3		DAI 5		DAI 7	
	ZOS (cm)	PSI	ZOS (cm)	PSI	ZOS (cm)	PSI
SW1	3	4.55	3.2	4.2	3.6	4.6
SW7	3.1	4.1	3.3	4.3	3.5	3.9
SW8	1.2	2.5	1.4	2.1	1.6	2.3
JUW1	3.2	4.2	3.6	4.0	3.8	4.1

JUW3	2.0	2.6	2.6	3.1	2.8	3.1
------	-----	-----	-----	-----	-----	-----

Key words: ZOS – zone of solubilization, PSI – phosphate solubilizing index

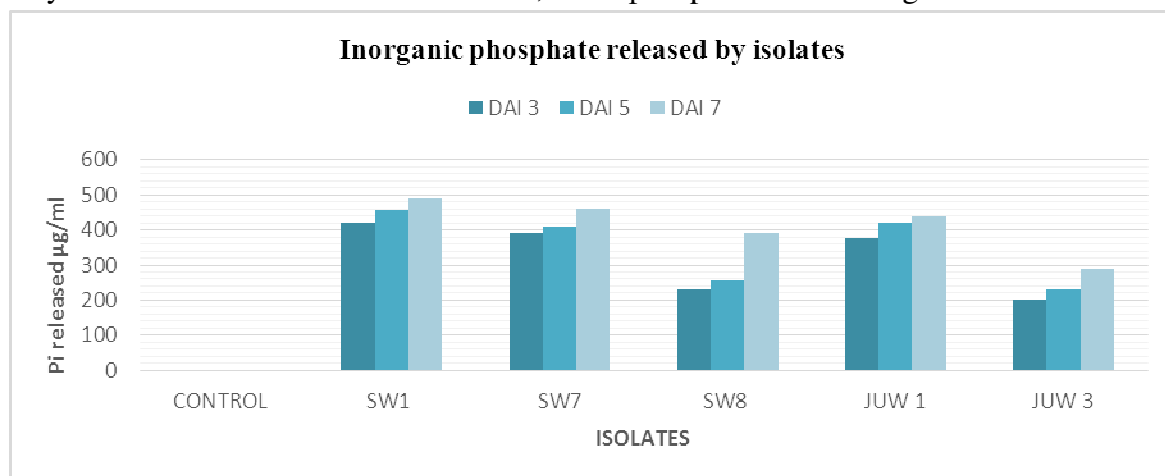


Fig.: 1 Inorganic phosphate released by isolates in TCP broth during 3,5 and 7 days

Siderophoreproduction:

The production of siderophore on CAS agar medium and siderophore unit is shown in table 2.formation of yellow colour zone around the bacterial colonies indicated production of siderophore by bacteria strain. There were 17% isolates positive for siderophore production.

Table 2: siderophore production by isolates:

Isolate code	Yellow zone	Siderophore unit
OW1	+	47.36
OW5	+	153.15
SW6	+	105.7
SW9	+	52.63
JUW 5	+	128.94
JUW 6	+	36.84

References:

1. Ajay Kumar, Amit Kumar, Shikha Devi, SandipPatil, ChandaniPayal, et al. (2012) Isolation, screening and characterization of bacteria from rhizospheric soils for different Plant Growth Promotion in vitro study. Rec Res Sci Techno 4(1): 1-5.
2. Bakker, P.A.H.M. et al. (1991). Development in Agriculturally Managed Forest Ecology. Elsevier Publishers, Amsterdam, pp. 217-230.
3. Banasmita Das, Haridip Kumar Sharma, GargeeKonwar, et al (2016). Screening and identification of traits in plant growth promoting rhizobacteria from rhizospheric soils of *Perseabombycina*. Journal of biotechnology and biochemistry, vol.2, 11-18.
4. Brick JM, Bostock RM, Silverstone SE (2004) Rapid in situ assay for indole acetic acid production by bacteria immobilized on the nitrocellulose membrane. Appl Environ Microbiol 57(2): 535-538.
5. Buyer, J.S. and Sikora, L.J. (1990). Pl. Soil, 129: 101-107. Dileepkumar, B.S. and Dube, H.C. (1993). Indian J. Microbiol., 33: 61-65.
6. Frankenberger, W.T.Jr. and Arshad, M. (1995). Microbial Production and Functions. Marcel Dekker, New York, pp. 503-518.

7. Gupta A, Meyer JM, Goel R (2002) Development of heavy metal-resistant mutants of phosphate solubilizing *Pseudomonas* sp. NBRI 4014 and their characterization,. *Currmicrobiol* 45(5); 323-327.
8. Gupta, Alka (1995). Ph.D. Thesis, Indian Agricultural Research Institute, New Delhi, pp. 150. King et al. (1954).
9. J. Lab. Clin. Med., 44: 301. Lemanceau, P. and Albouvette, C. (1993). *Biocontrol Sci. Technol.*, 3: 219-234.
10. Juanda JIH (2005) screening of soil bacteria for plant growth promoting activities in vitro. *J Agric sci.* 4; 27-31.
11. Linderman, R.G. (1992). *Mycorrhizae in Sustainable Agriculture*. American Society of Agronomy, USA, pp. 45-70.
12. Loper, J.E. and Buyer, J.S. (1991). *Molecular Pl. Microbe Interactions*, 4(1): 5-13.
13. Manoj Kumar, NipuntaTanoj, Saurabh Saran (2020) A Modified, Efficient and Sensitive pH Indicator Dye Method for the Screening of Acid-Producing *Acetobacter* Strains Having Potential Application in Bio-Cellulose Production, *ApplBiochemBiotechnol* 2020 Jun;191(2):631-636
14. Pikovskaya RE (1948) Mobilization of phosphorus in soil in concentration with vital activity of some microbial species. *Microbiology* 17: 362-337.
15. SavitaKerker, LaxmiRaiker, Anil Tiwari, ShanmugamMayilraj, Syed Dastager(2021). Biofilm associated Indol Acetic Acid producing bacteria and their impact in the proliferation of biofilm mats in solar salterns. *Biologia*, vol. 67(3); 454-460.
16. Singh AK, Varaprasad KS (2008). Criteria for identification and assessment of agrobiodiversity heritage sites: Evolving sustainable agriculture. *CurrSci* 94: 1131-1138
17. Torsvik V, Ovreas L (2002). Microbial diversity and function in soils: from genes to ecosystems. *CurrOpinMicrobiol* 5: 240-245
18. Tripura CB, Sashidhar B, Podile AR (2005). Transgenic mineral phosphate solubilizing bacteria for improved agricultural productivity. In: Satyanarayana T, Johri BN (Eds.) *Microbial Diversity Current Perspectives and Potential Applications*, New Delhi, India: I. K. International Pvt. Ltd, pp. 375-392
19. Trivedi MK, Patil S, Tallapragada RM (2013) Effect of biofield treatment on the physical and thermal characteristics of vanadium pentoxide powders. *J Mater SciEng* 11: 001.
20. Vessey JK (2003). Plant growth-promoting rhizobacteria as biofertilizers. *Plant Soil* 255:571-586
21. ZawKoLatt, Win ZawOo, San San Yu, et al (2017). Contribution of phosphate solubilizing activity to plants by *Pseudomonas* sp. Having antifungal activity. *International journal of biological sciences* Vol. 6(10). 1-7.

Importance of the Adequate Nutritional Diet and Environment for the Health

Miss. Jaya BhimraoDabarase

Assistant Professor

Women's College of Home Science and BCA, Loni

Tal. Rahata Dist.Ahmednagar413713

Contact E-mail:jayadabarase14@gmail.com

Abstract:

During the COVID Pandemic-19 situation Globally about locally serve and delivery food system are taken very consciously that transformation is necessary to order to ensure the serve and delivery of healthy, safe, and nutritious foods in both sustainable and equitable ways. Now a day people are being aware about intake of fresh healthy diet and fitness for improvement their immunity system. Food systems are complex entities that affect diets, human health, but healthy diet facilities and serve system increasing a range of other outcomes including economic growth, natural resource and environmental resiliency, and socio cultural factors. However, food systems contribute and these are vulnerable to ongoing climate and environmental changes that threaten their sustainability. Although there has been significantly focus on this topic in recent years, many gaps in our knowledge persist on the relation between environmental factors, available traditional food serve and now a recent delivery system and nutritional outcomes about the view of health. In this article, we summarize this emerging field and describe what innovative nurturing environment relation about nutritious diet, health and fitness. Survey research is needed in order to bring about food policy changes in the era of climate disruption and environmental degradation. As well as Environmental impacts of catering and in-house food consumption and impacts on sectoral and national levels; Use freezer. While there are plenty of benefits to eating fresh food, frozen foods can be just as nutritious. They also stay edible for much longer. A lot of seafood, for example, is frozen before it reaches your supermarket and then thawed and put on display. That means it will only stay fresh for a few days. By buying frozen seafood, we can extend the shelf life of the product considerably. Cooking and freezing food especially produce before it goes bad is a great way to avoid having to toss it. Fight climate change from preventing food and vegetables waste; if it is going to waste, we can use it naturally as a generic fertilizer in the farm and recent era in India utilized polyhouse system to the production of various vegetables and fruits. It is grown in adjustable adequate environment. Therefore it is fresh and edible as well as lot of nutrient content included in it. it is effective use to increasing the product. We can avoid of bad impact of greenhouses. We can best use it also in farm i.e. in the farmhouse or parsbag (Home garden) about view of multipurpose vegetable and fruits production it was to consumption of family or society. Preventing food waste is the most effective way to shrink its impact on the earth and planet. If we avoid producing food that we don't eat, we can save the land, water, and energy that would have been used to make it. And awareness is a good first step; according to Re-FED, educating consumers about food waste could prevent 7.41 million tons of greenhouse gas emissions. Benefits of Fruits and vegetables in Herbal house garden; greens spinach, green chili, cucumber, tomato, onion and fenugreek vegetable we can grow in house garden. They are purely organic. If you go through a lot of greens, it's a good idea to plant in home garden some in the summer to at least supplement your needs and reduce your food budget and prevent spoilage by picking just what you need from the

garden. Edible herbal fresh vegetables and fruits use healthy diet for our health and main aim of the research is to keep always healthy environmental free from pollution. The Main natural sources are being Extinct its reason growth of development and urbanization. It is dangerous for living microbial which is protecting always to the healthy environment. One third of the microbial will be extinct in the future. Its directly effect on environment such as many researcher found in their study. Climate changes impact on biodiversity; globally due to climate warming changes and the season has been also completely changed. Fastly increasing encroachment of the urbanization, for their breaking a lot of tree therefore biodiversity extinct and Increase in pollution. If there such situation has longer, then which cities are situated at the bank of the sea these will be under the sea water till 2050. It is dangerous pointer assembles for all human being. It is global climate warming influences.

Keywords: nurturing environment, sustainable nutritious diets, serve and delivery food systems, Anthropometric changes, climate disruption, COVID-19, fitness and health, healthy diet.

Topic: healthy diet, climate, adequate nutritious diet, food science and nutrition and nurturing environment.

Issue Section: affect of environment about food, nutritional diet on the health and fitness.

Introduction:

About the view of scientifically and clinical nutrition to be beneficial impactful into the healthy environment, it is essential to consider how the broader food system affects diets, nutrition, and health outcomes of populations. Healthy and nutritious diet has boost the immunity power and beneficial to health and fitness during the COVID-19 pandemic as well as considerable always other situation. There is considerable debate on how foods serve and delivery systems can be better positioned to provide safe and healthy diets and support human health in a way that is environmentally sustainable and resilient to climate change, as well as other disruptions and shocks.

- 1) The many researcher embarks are being focus on Clinical Nutrition (CN) into the view of improvement health and fitness from increasing the immunity power.
- 2) It is only including about essential content in that relationship between food intake systems and dietary, nutritional, and environmental outcomes. Food systems for intake diet involve the production, processing, packaging, distribution, marketing, purchasing, consumption, and waste of food as well as another view of environmentally beneficial its importance about health and fitness.
- 3) There were remain many research questions and gaps in the knowledge of evidence on how are available healthy fresh food by serve and deliver to the people via the healthy environment systems so that they benefit both human nutrition and health while protecting ecological resources, supporting livelihoods and affordable foods, and upholding social, cultural, and ethical values. This article will summarize this emerging field, and describe what new science, research, and evidences are needed to bring about food policy changes in the era of climate disruption and environmental degradation.

Impacts of climate and environmental change on nutritious diet, health and fitness:

Climate and environmental changes and will continue to affect human health globally on a vast scale in future. As climate change progresses, the environmental conditions needed for optimal human health will come under threat, including clean air, drinkable water, low pathogen

exposure, and the ability to produce, raise, harvest, and gather crops, animals, seafood, and wild foods in sufficient and safe quantities and/or qualities. Climate change introduces instability into the food processing and its supply, raises prices of food, and ultimately reduces access to nutrient-dense and healthy foods for certain populations; for example, rising sea temperatures are affecting marine life and threatening fish populations, a major source of protein, essential fatty acids, and Omega-3 and micro nutrients for many around the world. The impacts of lost biomass from the oceans are expected to dis-proportionally affect countries in the global South. Some models suggest that changes in food availability due to climate change, specifically reduced availability of fruit and vegetables, are estimated to result in an additional 529,000 deaths by 2050 (20). As well as increasing temperature due to climate changes being prevalence the diseases such like anemia, hypochondria, dehydration etc.

Climate change will likely affect the nutritional status of globally populations, but it will continue to have a disproportionate impact on poor and marginalized populations, widening existing equity gaps in nutrition and health outcomes. Climate change has the potential to increase the prevalence of under nutrition by affecting the immediate, underlying, and basic causes outlined in UNICEF's conceptual framework for maternal and child nutrition. Examples at each level include facilitating optimal conditions for infectious diseases; reducing household food security; and altering livelihoods, particularly of those in the agricultural sector. Nutritionally vulnerable populations, including pregnant and lactating women, infants, and small children, are likely to be the most affected by these trends; the International Food Policy Research Institute's IMPACT model predicts that under conditions with limited intervention to mitigate climate change, there will be an additional 4.8 million undernourished children by 2050. As well as due to increasing the temperature of sea water also its increasing range therefore many city can be sink under the water and create the serious problem of living.

Environmental inputs and food system processes:

Thus far most research on the relation between food systems and nutrition has been focused only on the agricultural production and consumer dietary intake. However, a host of other activities exist between the farm and the fork that affect nutrition and health, which some have referred to as the “missing middle” of the food supply chain (71). Issues such as food processing and packaging, post harvest loss along the supply chain, and food distribution mechanisms all have an important bearing on nutrition and health outcomes.

Most research on the impact of climate change on the nutrient content of crops has been focused on staple crops; to date, very few studies have examined how climate change may influence changes in the production and consumption of non-staple food groups (20, 72). More research is needed on how different kinds of crops particularly those that are nutrient-dense such as fruits, vegetables, cereals and legumes will fare in a +2°C world. Understanding how nutrient content may differ in food grown under various climate change conditions will be vitally important for policies and interventions designed to promote diet quality and reduce the prevalence of micro-nutrient deficiencies. Similarly, there is a need to better understand the relation between climate and food production more widely spread. For example, how is climate resilience in agriculture affected by the scale of food production, the extent of trade, or the amount of biodiversity? Main focus is on less grain production. it has been major effects on the people globally of many country, as well as cause of victim dead to hungry as a lack amount of food. In many country's children are increasing the prevalence of malnutrition. Significantly

increasing the food price due to less grain production therefore purchasing power also reduced. It's depend upon only climate changes where less range rain season, there are create such situation. Many poor countries peoples are living in this situation.

We need more research on policies and interventions that incentivize healthy and sustainable diet both from the view point of consumer choice and from the standpoint of agricultural and food supply chain practices.

The harmful impacts of our diets on the health:

On the earth are alarming and increasing. According to our new estimates, global food demand is now creating more than a third (35%) of all greenhouse emissions and using substantial and rising amounts of environmental resources. Compared to 2010, the environmental impacts of food demand increased by as much as 14%, with animal-source foods responsible for the majority of greenhouse gas emissions and land use. Northern American diets have the greatest environmental impact while African and Asian diets have the least. However, no region is on track to meet the set of Sustainable Development Goals aimed at limiting the health and environmental burdens related to diets and the food system. For example, all regions have diets that, if globally adopted, create impacts that are above sustainable levels if we want to limit global warming to less than 2 degree Celsius. Every region needs large-scale dietary changes to achieve healthy and sustainable diets that tackle malnutrition in all its forms while preserving earth health.

Food Consumption Diversity and its impact on health:

Indian cuisine varies widely across the country according to the region, culture and tradition, characterized by the use of different spices, vegetables, grains, fruits and a variety of animal source foods.

Analyzing all the foods that are consumed in the country is not feasible due to the prohibitive cost involved and thus it is essential to prioritize foods for compositional analysis. One method to set priorities is the 'key foods approach' which is defined as those foods that contribute upto 75% of the nutrients intake by the population. The method combines food consumption data with its nutrient composition, and ranking the foods by applying a scoring system to identify the key foods that contribute significantly to the diet in terms of their nutrients. Therefore, all foods analyzed were selected using the key foods principle for constructing the IFCT 2017.

Lack of progress means unacceptable levels of malnutrition persist. Worldwide, 149.2 million children under 5 years of age are stunted, 45.4 million are wasted and 38.9 million are overweight. Over 40% of all men and women (2.2 billion people) are now overweight or obese. The effects of the Covid-19 pandemic are knocking us further off course. An estimated additional 155 million people are being pushed into extreme poverty globally, as a result of the pandemic, and people who are obese or have other diet-related chronic diseases are more vulnerable to Covid-19. This certainly adds to the challenge of meeting global nutrition targets. The financial costs of addressing poor diets and malnutrition have risen while resources are falling, but the costs of inaction are far greater.

These additional costs would be much larger still if they also included nutrition-sensitive needs and meeting all global nutrition targets, including for obesity and diet-related NCDs. The cost of meeting the SDG 2 targets by 2030 would also be substantial: approximately US\$39–50

billion annually to meet both nutrition-specific and nutrition-sensitive needs. At the same time, the total economic gains to society of investing in nutrition could reach US\$5.7 trillion a year by 2030 and US\$10.5 trillion a year by 2050. Nutrition for Growth (N4G) tracking highlights challenges in delivering commitments and measuring progress.

While there is positive progress towards realizing N4G[3] commitments made in 2013 and 2017, countries are struggling to meet financial and impact goals. We find from the 2020 reporting that over two thirds of donors and civil society organizations reported having reached or being on track to reach their financial commitments. The majority of donor (63%) and civil society (76%) non-financial commitment goals were also on track or had been reached. Only 42% of country financial commitment goals had been reached or were on course, while 41% of country impact commitment goals were on course, with none reported to have been met. Covid-19 has exacerbated challenges, with reporting that progress on 43% of country commitment goals has been severely or highly affected by the pandemic, primarily due to diversion of resources. It is clear that efforts to meet commitments must be intensified, particularly those relating to financing and impact by country stakeholders.

Three actions needed to speed up progress:

There needs to be a step-change in efforts and financial investments to end poor diets and malnutrition, and gain the high social and economic returns we know are possible.

Poor diets and malnutrition can and should be addressed holistically and sustainably to create a healthy future for all.

Better data, greater accountability and systematic monitoring are key to identifying the progress needed and ensuring we stay on track.

India is 'on course' to meet three targets for maternal, infant and young child nutrition (MIYCN)

No progress has been made towards achieving the target of reducing anaemia among women of reproductive age, with 53.0% of women aged 15 to 49 years now affected.

Meanwhile, there is insufficient data to assess the progress that India has made towards achieving the low birth weight target, nor is there adequate prevalence data.

India is 'on course' to meet the target for stunting, but 34.7% of children under 5 years of age are still affected, which is higher than the average for the Asia region (21.8%).

India has made no progress towards achieving the target for wasting, with 17.3% of children less than 5 years of age affected, which is higher than the average for the Asia region (8.9%).

The prevalence of overweight children under 5 years of age is 1.6% and India is 'on course' to prevent from increasing.

India has shown limited progress towards achieving the diet-related non-communicable disease (NCD) targets. The country has shown no progress towards achieving the target for obesity, with an estimated 6.2% of adult (aged 18 years and over) women and 3.5% of adult men living with obesity. India's obesity prevalence is lower than the regional average of 10.3% for women and 7.5% for men. At the same time, diabetes is estimated to affect 9.0% of adult women and 10.2% of adult men.

Food lost and Waste:

Inedible portions include pits, cores, and some seeds and peels that are discarded at the consumer level, and consumer waste includes edible portions of food that are discarded for any

reason, including spoilage, blemishes, spillage, distaste for leftover food, and lack of knowledge about food selection strategies, food preparation, or storage options. The details of this procedure are described elsewhere and depicted in Supplemental its influences on the environment. Finding about the waste foods that in higher income group people has been more than lower income group.

Per-capita amount (grams) of food retail loss, inedible portions, consumer waste, and consumed food were estimated separately, and were summed to estimate Total Food Demand for each food group. The relationship between the amount of Total Food Demand (by loss/waste category and food group) and quintiles of diet quality (HEI-2015 and AHEI-2010) was assessed using simple linear regression models to test for trend, and additional models were adjusted for age (continuous) and sex (male/female). Diet quality estimates were energy adjusted using the density method, where food intake was standardized per 1000 kcal (HEI-2015) or per 1849 kcal (AHEI-2010), as discussed above. Standardized procedures and variables provided by NCHS were used to account for the multistage probability sampling design of NHANES. The relationship between the amount of agricultural resources (agricultural land, fertilizer nutrients, pesticides, and irrigation water) used to produce Total Food Demand and quintiles of diet quality (HEI-2015 and AHEI-2010) was assessed using simple linear regression models to test for trend. Statistical significance was set at $P < 0.05$ for all assessments. SAS 9.4 (SAS Institute; Cary, NC) was used to estimate population-ratio HEI-2015 scores using the modified code and macros provided by the National Cancer Institute (discussed above).

Environmental impacts of catering and in-house food consumption and impacts on sectoral and national levels:

Use your freezer. While there are plenty of benefits to eating fresh food, frozen foods can be just as nutritious. They also stay edible for much longer. A lot of seafood, for example, is frozen before it reaches your supermarket and then thawed and put on display. That means it will only stay fresh for a few days. By buying frozen seafood, you can extend the shelf life of the product considerably. Cooking and freezing food especially produce before it goes bad is a great way to avoid having to toss it.

Fight climate change from preventing food and vegetables waste:

If it is going to waste, we can use it naturally as a generic fertilizer in the farm it is effective use to increasing the product. We can avoid of bad impact of greenhouses. We can best use it also in farm i.e. in the farmhouse multipurpose vegetable and fruits production was to consumption of family or society. Preventing food waste is the most effective way to shrink its impact on the earth and planet. If we avoid producing food that we don't eat, we can save the land, water, and energy that would have been used to make it. And awareness is a good first step; according to Re-FED, educating consumers about food waste could prevent 7.41 million tons of greenhouse gas emissions.

Veggies and harbas you can re-grow with absolutely for safe health: If you like idea of high payoff and low effort, you can almost use this at-home garden requires zero soil, almost no maintenance, and won't cost you a dime. That's because many of the vegetables you eat will re-grow if you put their ends in water. Yes, the bits you normally toss in the trash can be easily transformed into more food. Here, farmer and plant specialists are to provide knowledge by us do this plan actually implement. From it's we can achieved a lot of nutritious essential micro-nutrients which is beneficial to increase the capacity of our body function and as well as boost in

the immunity power. Micro- minerals are the ones you need more of think potassium, calcium, and magnesium. Trace minerals are the ones you need smaller amounts of things like zinc, selenium, iron, copper, and fluoride. Minerals are elements that (in addition to making rocks) build your body parts and help your body carry out internal processes necessary to life. Minerals help your body do what it needs to do, from heart health to hormone production.

The following minerals are essential for human health which in riches quantity in herbal vegetables and fruits: Calcium, phosphorus, potassium, sodium, chloride, magnesium, iron, zinc, iodine, chromium, copper, fluoride, molybdenum, manganese, and selenium. The Main natural sources are being Extinct its reason growth of development and urbanization. It is dangerous for living microbial which is protecting always to the healthy environment. One third of the microbial will be extinct in the future such have on it of the research

Climate changes impact on biodiversity:

Globally due to climate changes the warm increasing. And the season has been also completely changed. Fastly increasing encroachment of the urbanization, for it largely being break the tree, and biodiversity extinct therefore in pollution also increase. Many city which are located at the Bank of the sea also will being under the sea water.

The World Health Organization (WHO) estimates that, in 2012, 12.6 million deaths globally, representing 23% of all deaths, were attributable to the environment (WHO, 2016). When accounting for premature mortality and disability, the fraction of the global burden of disease due to the environment was 22% (95% confidence interval (CI) 13–32%) (WHO, 2016). In children aged below 5 years, up to 26% (95% CI: 16–38%) of all deaths could be prevented if environmental risks were removed. Environmental factors might play a role in more than 80% of major diseases and injuries around the world and are among the biggest killers. Diseases with the largest environmental contribution in children under the age of 5 years include lower respiratory infections (32%), diarrhoeal diseases (22%), neonatal conditions (15%) and parasitic and vector-borne diseases (12%) (WHO, 2017). There are three important categories of infectious diseases sensitive to climate change: (i) water-borne diseases; (ii) food-borne diseases; and (iii) vector-borne diseases (Cissé et al., 2018). Human exposure to water-borne infections occurs by contact with contaminated drinking water, recreational water or food. Water-and food-borne diseases are linked to the ingestion of pathogens via contaminated water or food, while vector-borne diseases are linked to the infections transmitted by arthropods, such as mosquitoes. Climate change related health effects also present a huge inequity dimension, as the risks are linked to the environmental systems and the social conditions (McMichael, 2013).

Food-borne diseases In 2007, the World Health Organization (WHO) established the Food-borne Disease Burden Epidemiology Reference Group (FERG), in order to estimate the global burden of food-borne diseases (WHO, 2015c). The report estimated that 31 selected hazards with food-borne diseases resulted in over 600 million illnesses and 420,000 deaths worldwide. Moreover, it was estimated that the 31 selected hazards induced 33 million DALYs in 2010; and 40% of the food-borne disease burden was among children under 5 years of age. The highest burden per population of food-borne diseases was observed in Africa, and unsafe water used for the cleaning and processing of food was one of the main drivers. Food-borne diseases occur through the ingestion of foodstuffs (including water) contaminated with microorganisms or chemicals. The risks of contamination exist in the food chain, from food production to consumption (“farm to fork”), and involve the pollution of water, soil or air. The

estimation of food-borne disease burden is complicated because most of the hazards causing food-borne diseases are not transmitted solely by food (Hald et al., 2016)

Water-borne diseases; In LMICs, the burden of diarrhoeal diseases is estimated at 842,000 deaths per year, including 361,000 in children under the age of 5 years (WHO, 2015b). Water-borne disease outbreaks, particularly infectious intestinal diseases, have been attributed to various pathogens, as highlighted in Table 1 (e.g. bacteria, protozoa, viruses and parasites) and drinking water system characteristics (Bless et al., 2016; Ligon and Bartram, 2016). Lack of basic hygiene and sanitation and failing infrastructure also remain as two of the greatest challenges in the global fight against water-borne disease (Ford and Hamner, 2015). Climate change is likely to exacerbate in LMICs the risks for diarrhoeal diseases and other water-borne diseases in the future (IPCC, 2018). Water-borne disease outbreaks, particularly infectious intestinal diseases, have been attributed to various pathogens, bacteria, protozoa, viruses and parasites) and drinking water system characteristics (Bless et al., 2016; Ligon and Bartram, 2016). Lack of basic hygiene and sanitation and failing infrastructure also remain as two of the greatest challenges in the global fight against water-borne disease (Ford and Hamner, 2015).

Climate change and health challenges:

The IPCC's recent special report on 1.5°C states that human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8 °C–1.2°C (IPCC, 2018). Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate (high confidence). The consequent increased severity and number of extreme climatic conditions will be accompanied by changes in microbial communities and species interaction (Walker, 2018).

The impact of climate change on diarrheal disease is projected to be higher in Asia and Africa. In 2030, sub-Saharan Africa is projected to have the greatest burden of mortality impacts attributable to climate change, while in the 2050, it is likely to have shifted to Southeast Asia. The rationale of inadequate WASH conditions for children may lead to intestinal parasitic infections; intestinal parasitic infections may hamper children's nutritional status and benefits from school gardens, the research team implemented school gardens and integrated educational, nutritional and WASH with the assumption that these will reduce infectious diseases among children. Education and promotion of nutritional knowledge and dietary diversity for school children globally. Health parasitic treatments and or iron supplement of infected and anaemic school children (Nepal, Bhutan)

Conclusion:

These findings have implications for the development of sustainable dietary guidelines, which requires balancing population-level nutritional needs with the environmental impacts of food choices. Effect of inadequate diet consumption to convert into malnutrition and other related diseases. Environment effects were significant for all food groups as well as dominated for snacks, dairy and starches. These finding endorse the view of health professional that the home environment is the main determinant of human liking for energy-dense food implicated in excessive weight gain but suggest the parents are also correct by identifying innate differences in liking particularly for nutrient dense foods that parents and health educators try to encourage.

References:

- Acheson, 2009 D.W.K. Acheson Food and waterborne illnesses.

- M. Schaechter (Ed.), Encyclopedia of Microbiology (third ed.), Academic Press, Oxford (2009), pp. 365-381 ArticleDownloadPDFGoogle Scholar Beer et al., 2015.
- Beer, K.D., Gargano, J.W., Roberts, V.A., Reses, H.E., Hill, V.R., Garrison, L.E., Kutty, P.R., Hilborn, E.D., Wade, T.J., Fullerton, K.E., Yoder, J.S., 2015. Outbreaks Associated With Environmental and Undetermined Water Exposures, United States, 2011–2012. Google Scholar.
- Benedict et al., 2015 Benedict, K.M., Reses, H., Vigar, M., Roth, D.M., Roberts, V.A., Mattioli, M., Cooley, L.A., Hilborn, E.D., Wade, T.J., Fullerton, K.E., Yoder, J.S., Hill, V.R., 2015. Surveillance for Waterborne Disease Outbreaks Associated with Drinking Water, United States, 2013–2014. Google Scholar.
- Bless et al., 2016 P.J. Bless, J. Muela Ribera, C. Schmutz, A. Zeller, D. Mausezahl Acute gastroenteritis and campylobacteriosis in swiss primary care: the viewpoint of general practitioners PLoS One, 11 (9) (2016), Article e0161650.
- Dennis and Fisher, 2018 S. Dennis, D. Fisher Climate change and infectious diseases: the next 50 years Ann. Acad. Med. Singapore, 47 (10) (2018), pp. 401-404 View Record in Scopus Google Scholar.
- Aleksandrowicz L, Green R, Joy EJ, Smith P, Haines A. The impacts of dietary change on greenhouse gas emissions, land use, water use, and health: A systematic review. PLoS ONE. 2016;11(11):e0165797. [PMC free article] [PubMed].
- Bacon L, Krpan D. (Not) eating for the environment: The impact of restaurant menu design on vegetarian food choice. Appetite. 2018;25:190–200. doi: 10.1016/j.appet.2018.02.006. [PubMed].
- Bajželj B, Richards KS, Allwood JM, Smith P, Dennis JS, Curmi E, Gilligan CA. Importance of food-demand management for climate mitigation. Nature Climate Change. 2014;4:924–929.
- Barrett J, Glen P, Wiedmann T, Scott K, Lenzen M, Roelich K, Le Quéré C. Consumption-based GHG emission accounting: A U.K. case study. Climate Policy. 2013;13(4):451–470.
- Beauman C, Cannon G, Elmadfa I, Glasauer P, Hoffmann I, Keller M, Krawinkel M, Lang T, Leitzmann C, Lotsch B, Margetts B. The Giessen Declaration. Public Health Nutrition. 2005;8(6A):783–786.
- Bennetzen EH, Smith P, Porter JR. Decoupling of greenhouse gas emissions from global agricultural production: 1970–2050. Global Change Biology. 2016;22(2):763–781. [PubMed].
- Blackstone NT, El-Abbadi NH, McCabe MS, Griffin TS, Nelson ME. Linking sustainability to the healthy eating patterns of the Dietary Guidelines for Americans: A modeling study. Lancet Planet Health. 2018;2(8):e344–e352. [PubMed].
- Boehm R, Wilde PE, VerPloeg M, Costello C, Cash SB. A comprehensive life cycle assessment of greenhouse gas emissions from U.S. household food choice. Food Policy. 2018;79:67–76. doi: 10.1016/j.foodpol.2018.05.004.
- Bruinsma J. The resource outlook to 2050: By how much do land, water and crop yields need to increase by 2050? Conference paper in How to Feed the World in 2050. Proceedings of a Technical Meeting of Experts; Rome, Italy. June 24–26, 2009; Rome, Italy: FAO; 2009. [September 25, 2018]. <http://www.fao.org/docrep/012/ak542e/ak542e00.htm>.
- Bryngelsson D, Wirsenius S, Hedenus F, Sonesson U. How can the EU climate targets be met? A combined analysis of technological and demand-side changes in food and agriculture. Food Policy. 2016;56:152–164. doi: 10.1016/j.foodpol.2015.12.012.
- CNBC. Home food delivery is surging thanks to ease of online ordering, new study shows. 2017. [December 6, 2018]. <https://www.cnbc.com/2017/07/12/home-food-delivery-is-surging-thanks-to-ease-of-online-ordering-new-study-shows.html>.

- Drewnowski A, Fulgoni V III. Nutrient profiling of foods: Creating a nutrient-rich food index. *Nutrition Reviews*. 2008;66(1):23–39. [PubMed].
- Drewnowski A, Popkin BM. The nutrition transition: New trends in the global diet. *Nutrition Reviews*. 2009;55(2):31–43. [PubMed].
- EPA (U.S. Environmental Protection Agency). Global anthropogenic non-CO2 greenhouse gas emissions: 1990-2030. Washington, DC: Office of Atmospheric Programs, Climate Change Division, EPA; 2012. [September 18, 2018]. https://www.epa.gov/sites/production/files/2016-05/documents/epa_global_nonco2_projections_dec2012.pdf.
- EPA. U.S. greenhouse gas inventory report: 1990-2014. 2017. [December 21, 2018]. <https://www.epa.gov/ghgemissions/us-greenhouse-gas-inventory-report-1990-2014>.
- Fanzo J, Downs S, Marshall QE, de Pee S, Bloem MW, de Pee S, Taren D, Bloem MW. Nutrition and health in a developing world. 3rd ed. New York: Springer International Publishing; 2017. Value chain focus on food and nutrition security; pp. 753–770.
- FAO (Food and Agriculture Organization). Livestock's long shadow: Environmental issues and options. Rome, Italy: FAO; 2006. [September 12, 2018]. <http://www.fao.org/docrep/010/a0701e/a0701e.pdf>.
- FAO. The state of the world's land and water resources for food and agriculture: Managing systems at risk. Rome, Italy: FAO; 2011. [September 18, 2018]. <http://www.fao.org/docrep/017/i1688e/i1688e>.
- FAO. Save food: Global initiative on food loss and waste reduction. Rome, Italy: FAO; 2012a. [January 4, 2019]. <http://www.fao.org/save-food/resources/keyfindings/en>.
- FAO. Sustainable diets and biodiversity: Directions and solutions for policy, research and action; Proceedings of the International Scientific Symposium, Biodiversity and Sustainable Diets United Against Hunger, November 2010; Rome, Italy. 2012b. [September 3, 2018]. <http://www.fao.org/docrep/016/i3004e/i3004e.pdf>.
- FAO. The state of food and agriculture 2013. Rome, Italy: FAO; 2013a. [September 10, 2018]. <http://www.fao.org/docrep/018/i3300e/i3300e.pdf>.
- Graziose MM, Ang IYH. Factors related to fruit and vegetable consumption at lunch among elementary students: A scoping review. *Preventing Chronic Disease*. 2018;15:E55. doi: 10.5888/pcd15.170373. [PMC free article] [PubMed].
- Hallström E, Carlsson-Kanyama A, Börjesson P. Environmental impact of dietary change: A systematic review. *Journal of Cleaner Production*. 2015;91(15):1–11.
- Heller MC, Keoleian GA. Greenhouse gas emission estimates of the U.S. diet: Aligning nutritional recommendations with environmental concerns; Proceedings of the 9th International Conference LCA of Food; San Francisco. October 8-10. 2014b.

Changing Perspective in Environment, Management, Humanities, Sciences and Technology

Assi. Prof. Jyoti Dashrath Hase

Department of English

Abstract :

In the past quarter century, number of changes in environment in the context of changing perspective in environment management, Humanities, Science and Technology also important role of government. environmental management and its relationship to human development are in a period of dramatic change. In this context societies are now beginning to have serious discussion about 'sustainable development', but there is still a great deal of confusion over what this means and how to achieve it.

Introduction:

The present paper focus on how 'changing perspective in environment, management ,humanities ,science and technology 'in this title each and every concepts important role itself. In term of environment can be defined as a sum total of all the living elements and non-living elements and their effects that influence human life. which means each concept interrelated.

Key terms: Environment, Management, Humanities, Science, Technology, Meteorology, etc.

Methodology: Present paper depend upon secondary sources related to articles, research journals, website and research paper.

Objectives:

1. To study environment, management, humanities, science and technology.
2. To aware about concept of changing perspective of environment and its role.

“Environment management refers to the management of an organizations environment programs in a comprehensive systematic planned and documented manner. It includes the organizational structure, planning and resources for developing, implementing and maintaining policy for environmental protection”. Recently, corporation have been confronted with a number of global environment challenges such as global warming, acid rain, waste management, pollution, prevention environment management supports sustainable development and also extend from local to global level.

In terms of science and technology also various changes occur such a concept meteorology means the science that studies the inter-relationships between the various components of the earth and climate is meteorology includes the study of storms, clouds, rainfall, thunder, lightning, etc. depending upon each other and human important role all perspectives as positive or negative way.

Conclusion:

This paper discusses about changing perspective environment, management, humanities, science and technology.

References :

1. Sciencedirect.com (journal)Michal E. Colby
2. World Bank Publication, 1990.
3. R Buchanan- Design Issues, 2004- JSTOR
4. <https://ncert.nic.in>

Studies on Fortification of Multigrain Noodles with Ginger Powder

M. A. Patole

Department of B.Voc Food Processing

MES's Arts, Commerce and Science College Sonai, Tal- Newasa, Dist-Ahmednagar,
Maharashtra, India

Email- mrudula.patole@gmail.com

Abstract:

Macaroni products like noodles, pasta, spaghetti, vermicelli and other similar products are highly consumed in India. Noodles are made generally up of refined wheat flour or wheat flour (high gluten content) which is harmful to health. Noodles may be round, flat which are made from unleavened dough which are rolled flat and cut, stretched or extruded with machine or with hand and cut into long strips or strings. They can be further refrigerated for short term or dried and stored for future use. Noodles are usually cooked in boiling water, sometimes with cooking oil or salt added. Multigrain Noodles were made from Wheat Flour, oats flour, semolina flour and ginger powder through simple hand process. Cooking quality, nutritional values and sensory analysis were studied. Compared with Maida noodles, oats are a rich source of fibre (Beta-glucan), ginger contains gingerol which has various medicinal properties and semolina is a rich source of protein, folic acid, and is gluten free. Multigrain noodles formulation was developed to supplement growing children, adults, people fighting with diseases like obesity, diabetes, heart problems, etc.

Keywords: Multigrain noodles, Beta-glucan, gingerol, nutrition, ginger powder

1. Introduction:

Noodles are one of the most important staple foods consumed in many Asian countries. They are typically made from unleavened wheat dough by stretching, extruding, rolling and cutting them into various shapes (Niu & Hou, 2020). Noodles fortification as an effective public health intervention and improve its nutritional properties. Quality factors important for noodles are color, flavor, and texture, cooking quality, rehydration rates during final preparation, and the presence or absence of rancid taste after extended storage (Gulia *et al.*, 2013) Instant noodles are widely consumed throughout the world and it is a fast-growing sector of the noodle industry. Noodles can be classified into various types like fresh raw noodles, dried noodle, parboiled noodle, frozen noodle, steamed noodle and instant noodle. Worldwide, China ranks first in the consumption of noodles followed by Indonesia, Japan, and Vietnam. Due to the increasing popularity of noodles, the introduction of noodles made from whole grains can be an effective way to promote high-fiber food consumption and increase health benefits for people throughout the world. At present, some types of commercial whole grain noodles are available

Wheat is one of the major cereal grains and a staple food for mankind. It is an important source of carbohydrates and the leading source of vegetal protein in human food. The demand for wheat has been increasing due to the unique viscoelastic properties of gluten proteins and the industrialization processes that facilitate the production of flour-based foods. When eaten as whole grain, wheat is a source of multiple nutrients and dietary fibre. Whole wheat products are some of the most important whole grain foods due to the high yield and consumption of wheat in the world. Oats are grown in temperate regions and can be planted either in autumn or in spring. Oats are normally crushed into oatmeal or ground into oat flour. Oatmeal is usually eaten as

porridge and can be used in baked goods such as oatcakes, oatmeal cookies and oat bread. Semolina is a popular type of flour. You'll find it in many common and often comforting foods: pasta, couscous, bulgur, noodles, and lots of desserts and breads. In some parts of South Asia, semolina is known as sooji. Developed noodles as a protein–fibre-rich complementary food might offer the substantial potential to overcome the nutritional deficiency among school children through their inclusion in Mid-day Meal scheme of Government of India. Moreover, these noodles are developed particularly for primary and upper primary school children that rely on the gluten-enriched diets such as Roti-sabji, Dal-roti, Dal-poori to fulfil their protein and energy requirements; therefore, gluten incorporation can be taken as an advantage to improve the final product quality without having any adverse effect on the targeted consumers. (Rani *et.al.*, 2019)

Wheat is rich in carbohydrates especially in dietary fibre, fat, protein, vitamin and some minerals. Rice, rice is reaching in natural inflammatory and gluten-free grain, it improves nervous system health, it is a good source of energy, prevents obesity, rice can be used for skincare, rice flour is rich in calcium and it makes good food for bone health. Rice flour is rich in chlorine, calcium, niacin and sodium. Ginger powder helps to smooth a bad stomach, helps to reduce cancer risk, ginger powder contains protein, crude fibre, fat and ash, it also contains carotene and ascorbic acid (Ingale *et.al.*, 2019).

2. Materials And Methods:

2.1 Ingredients- Wheat Flour, Oats Flour, semolina Flour, Ginger Powder, Water, Salt, oil was purchased from the local market.

2.2 Equipment's Used-

Weighing Balance- Electronic weighing balance is used for weighing raw materials

Grinder- Oats, semolina and sorghum are converted into flour with help of high-speed grinders.

Sieve- A sieve with appropriate mesh size is used to separate out foreign materials from the flour.

Kneader- Different formulated flours are mixed and kneaded and tight dough is obtained.

Dough Roller- After aging, the dough is converted into sheet using roller to achieve uniform thickness.

Rolling pin- to press and flatten the dough

Refrigerator- Noodles are short-term stored in refrigerator for instant cooking and consumption. The temperature maintained is 4°C.

2.3 Methodology For Preparation Of Noodles:

1. Selection of ingredients- Select good quality raw materials and then clean them. They include Wheat Flour, Oats Flour, Semolina Flour, Water, Salt, oil, etc.
2. Weighing- Weighing of ingredients is done according to the formulation done on weighing balance.
3. Grinding- Raw materials like oats, semolina is converted into flour by using grinder.
4. Sieving- High quality sieve of appropriate mesh size is used for removal of foreign materials
5. Kneading- The Multigrain flour (100g) are mixed are kneaded in a dough kneader until the texture of dough is rough.
6. Aging- The dough is placed under the muslin cloth for about 25 to 30 minutes. After resting the dough is slightly kneaded with sprinkling of little flour. This maturation of dough is done 2-3 times for about 15-20 minutes until the texture becomes soft.

7. Pressing- After 30 minutes the dough is pressed and flattened by use of rolling pin and again folded and kept under muslin cloth for 15 minutes at room temperature
8. Rolling- the dough is spread on a plane surface and rolled with the help of dough roller to achieve uniform thickness.
9. Folding- Noodles are prepared hand so the sheet is folded one over the other.
10. Cutting- Folded portion is cut into small size with the help of knife, or the noodles are cut with the help of measuring scale
11. Refrigeration- The noodles are separated in a bowl and little amount of flour is sprinkled. Then they are kept in refrigerator until further use at 4°C or dried in tray drier at 70°C

2.4 Cooking Quality Evaluation Of Noodles:

The cooking qualities of the dried noodles were evaluated with respect to cooking time, cooking loss and water uptake (Gatade and Sahoo, 2015).

1. **Cooking time:** Optimal cooking time was evaluated by observing the time of disappearance of the core of the noodle strand during cooking (every 20 sec) by squeezing the noodles between two transparent glass slides.
2. **Cooking loss:** The cooking loss was determined by measuring the amount of solid substance lost to cooking water. 10 gm sample of noodles was placed into 100 ml of boiling water in a 500 ml beaker. Cooking water was collected in a pre-weighed glass dish and was placed in a hot air oven at 105°C and evaporated to dryness. The dry residue was weighed and reported as a percentage.
3. **Water uptake:** The water uptake was calculated by getting the difference between weight of cooked noodles and weight of dried noodles. The cooked noodles were placed on filter paper for 5 min before weighing, to blot the excess adhered water.

2.5 Chemical Analysis Of Noodles:

1. **Moisture Content-** Moisture content of the multigrain noodles was determined using the hot air oven method (AOAC, 2000).
2. **Protein Content-** Crude protein was estimated using the micro Kjeldahl method (Pelican Equipment's)
3. **Fat Content-** Fat content was estimated using soxhplus (Pelican equipment's).
4. **Crude Fibre Content-** Crude fibre was estimated using fibroplus (Pelican Equipment's)
5. **Ash Content-** The ash fraction contains all the mineral elements but it allows to nitrogen-free-extract (by difference) from dry matter. It is determined using Muffle furnace.
6. **Carbohydrate Content-** Carbohydrates are calculated on the basis of determination of the remaining four parameters.
7. **Iron Content-** Oats is a rich source of Iron. Spectrophotometric measurement of the Iron Content of multigrain noodles was introduced in accordance with the AOAC protocol.

2.6 Sensory Evaluation By Nine Point Hedonic Scale:

The sensory characteristics of Cookies were determined using a taste panel consisting of members from MES's Arts, Commerce and Science College, Sonai, Ahmednagar. The sensory characteristics of the products were evaluated by using nine-point hedonic scale. A nine-point hedonic scale was used for sensory evaluation of Multigrain noodles.

2.7 Statistical Analysis :

All analytical tests and experimental analyses were carried out in triplicates and expressed as mean values, coefficient of variance (CV) and standard deviation.

3.Result And Discussion:

3.1 Chemical analysis of Raw materials

Chemical properties were analysed to check the quality of raw materials. The nutritional composition of Sorghum flour, oats flour and wheat flour are mentioned below in **table no. 3.1**. As sorghum is rich in protein content, oats in fibre content, it is analysed using various instruments to get idea about nutritional contents such as protein content, fat content, fibre content, Ash and carbohydrate. The major nutrient found in Oats is Fibre and Protein. The major nutrient found in Semolina is protein.

Sr. No.	Semolina Flour	Oats Flour	Wheat Flour
Protein	13 %	5 %	11 %
Fat	1.5 %	2 %	0.5 %
Fibre	6.3 %	12%	0.5 %
Ash	1.2 %	9 %	1.5 %
Carbohydrate	70 %	72 %	75 %

Table No. 3.1 Nutritional Analysis of Raw Materials

3.2 Chemical analysis and cooking quality of multigrain noodles

The information regarding chemical composition of multigrain noodles emerges from the **Table No.3.2 and Fig No. 3.2** and results found that moisture content was 6.99 %, total carbohydrate 70.56 %, protein 14.6 %, crude fat 3 %, crude fibre 5.02 %, ash 1.45 %. It could be visualized from the give result that noodles found rich source of carbohydrate and protein along with dietary fibre. As incorporated noodles are rich source of dietary fibres it encompasses various health benefits. Cooking time of incorporated noodles was 6.30 min which was slightly higher than control sample (6.03 min). The cooking loss was 1.25 g which was also quite more than control sample (1.2 g). Water uptake was also determined and founds 10.5 g which was also higher than control sample (10.2 g). The reason behind increase in this cooking quality parameter may be due to increase in protein concentration of noodles, which directly effects on textural and ultimately cooking quality of noodles

Sr. No.	Parameter	Value
1	Protein	14.6 %
2	Fat	3 %
3	Fibre	5.02 %
4	Carbohydrate	70.56 %
5	Ash	1.45 %
6	Moisture Content	6.99 %
7	Cooking Time	6.30
8	Cooking Loss	1.25g
9	Water Uptake	10.5g

Table No. 3.2 Parameters of formulated noodles



Fig No.3.2 Boiled Noodles

3.3 Formulation of Multigrain

The ingredients like semolina, oats, wheat flour are the rich source of dietary fibre, minerals (potassium, magnesium), protein, Iron etc. The raw material is converted into flour using grinder

These formulations are made on the basis of few trails in making the dough and observing its colour, appearance, texture. The formulation N₃ (with 10:65:20:05 proportion) (**Fig No. 3.3**) was selected based on taste, colour and texture. The quantity of as shown in **Table No. 3.3**

Sr. No.	Wheat Flour	Semolina Flour	Oats Flour	Ginger Powder
N ₀	100	00	00	00
N ₁	10	45	40	05
N ₂	10	55	30	05
N ₃	10	65	20	05
N ₄	10	75	10	05

Table No. 3.3 Formulation of Noodles



Fig No.3.3 N₃ Formulated Noodles

3.4 Sensory Evaluation Of Noodles:

The sensory characteristics of noodles was determined using a taste panel consisting of members from Department of MES's Arts, Commerce and Science College, Sonai, Ahmednagar. The sensory characteristics of the products were evaluated by semi-trained panel using nine-point hedonic scale. A nine-point hedonic scale was used for sensory evaluation of Noodles. The acceptability statements and their marks given in **Table No. 3.4**

Mean acceptability scores obtained by the sensory evaluation of Noodles with content of iron, protein, carbohydrate as a source of sorghum and oats are given in **table. No 3.4** Regarding the colour attributes the highest score 8.6 is obtained by N₃ followed by N₀, N₂, N₁ and N₄ where scores are 8.5, 8.0, 7.6 and 7.5. The texture attributes were found to be maximum in N₃ with score of 8.7 followed by N₀, N₄, N₁ and N₂ having score of 8.6, 7.8, 7.7 and 7.6. Regarding the flavour attributes the lowest for N₁, N₂, N₄ and N₀ samples with scores 7.2, 7.4, 7.5 and 8.3 compared to N₃ with the highest score of 8.4. The taste attributes have the highest score is 8.5 obtained by N₃ sample followed by N₀, N₂, N₁ and N₄ with scores of 8.4, 8.2, 7.1 and 7.0 respectively. The overall scores of N₃Noodles sample were found to be slightly higher 8.55 than the N₀ sample with the score of 8.45 and the lowest was obtained by N₁, N₄ and N₂ with score of 7.4, 7.45 and 7.8 in noodles samples.

Sample	Parameters				
	Colour	Texture	Flavour	Taste	Overall acceptability
N ₀	8.5	8.6	8.3	8.4	8.45
N ₁	7.6	7.7	7.2	7.1	7.4
N ₂	8.0	7.6	7.4	8.2	7.8
N ₃	8.6	8.7	8.4	8.5	8.55
N ₄	7.5	7.8	7.5	7.0	7.45
Std. Dev.	0.50	0.52	0.55	0.73	0.54
Mean	8.04	8.08	7.76	7.84	7.93
CV%	6.21	6.43	7.0	9.3	6.8

Table No. 3.4 Sensory/Organoleptic Evaluation of Noodles

4. Conclusion :

Multigrain noodles were prepared using addition of semolina and oats. The organoleptic score of N₃sample was better than N₀, N₁, N₂, N₄ samples.Semolina and oats were found to increase the fibre, protein content and decrease amount of gluten of the formulated product

Reference:

- Ranganna S (1986) Handbook of analysis and quality control for fruit and vegetable products (2nd edn). Tata McGraw Hill Publication Co Ltd, New Delhi. 14.
- Gatade AA, Sahoo AK (2015) Effect of additives and steaming on quality of air-dried noodles. *Journal of Food Science & Technology*, 13: 197-215.
- Pakhare K.N., Dagadkhair A.C., Udachan I.S., and Andhale R.A. (2016). Studies on Preparation and Quality of Nutritious Noodles by Incorporation of Defatted Rice Bran and Soy Flour. *Journal of Food Processing &Technology*, Vol-7, Issue- 10

- Betz J., Naumova N., Burmistrova O., Burmistrova E., Rodionova I., and Naumova O. (2020). The use of Multigrain Raw Materials in the Formulation of Pasta from Wheat Baking Flour. *Bulgarian Journal of Agricultural Science*, 20 (No 6), 1315-1322.
- Jing Q.I., Yingvo L.Y.U., Yuanhui W., Jie C., and Panfeng H. (2018) Formula and Quality Study of Multigrain Noodles. *Grain and Oil Science and Technology*, 1(4), 157-162.
- Rani S., Singh R., Kamble D.B., Upadhyay A., and Kaur B.P. (2019). Structural Quality Evaluation of Soy Enriched Functional Noodles. *Food Science*, 32. 100465.
- Gulia N, Dhaka V, Khatkar BS (2014) Instant noodles: Processing, quality and nutritional aspects. *Food Science and Nutrition*, 54: 1386-1399.
- Okoye JI, Nkwocha AC, Ogbonnaya AE (2008) Production, Proximate Composition and Consumer Acceptability of Biscuits from Wheat/Soybean Flour Blends. *Continent Journal of Food Science Technology* 2: 6-13.
- Lee SJ, Kim JJ, Moon HI, Ahn JK, Chun SC, et al. (2008) Analysis of Isoflavones and Phenolic Compounds in Korean Soybean [Glycine max (L.) Merrill] Seeds of Different Seed Weights. *J Agri Food Chem* 56: 2751-2758.
- Anonymous (2011) WINA (World instant noodle association): Expanding market.
- Kim SG (1996) Instant noodles, pasta and Noodle Technology. *American Association of Cereal Chemistry*, St. Paul MN
- Ingale, S. H., Chavan, V. V., Watsar, S. S., & Wankhade, P. R. (2019). A review on formulated weaning food, using home appliances and cost efficient. *Journal of Emerging Technologies and Innovative Research*, 6(4), 40-46.
- Niu M. & Hou G.G. (2020) Whole Grain Noodles, *Asian Noodle Manufacturing Ingredient, Technology and Quality*, Chapter 6, 95-123.
- Benhur D.R., Bhargavi G., Kalpana K., Vishala A.D., Ganapathy K.N. & Patil J.V. (2015). Development and standardization of Sorghum Pasta using extrusion technology, *Journal of Food Science and Technology*, 52(10), 6828-6833.
- Singh P., Singh R., Jha A., Rasane P. & Gautam A.K. (2013) Optimization of a process for high fibre and high Protein Biscuit. *Journal of Food Science and Technology*, 52(3), 1394-1403.

Development of Ragi Bar by Incorporating Amaranth (Rajgira) and Banana

S. J. Ghadage

Department of B.Voc food Processing MES' Arts, Commerce and Science College Sonai Tal-

Newasa, Dist-Ahmednagar

Email ID -sonalighadage2807@gmail.com

Abstract:

Nutritious healthy ragi bar is ready to eat food product with high in energy value. these ragi bar is rich source of vitamins and minerals. Amaranth is rich nutrient cereal consumed since long time ago. Today, Amaranth keeps being included in human diet because of its nutraceutical value such as high-quality protein including several essential amino acids, unsaturated oils as omega-3 and omega-6, dietary fiber, calcium, phenolic compound, vitamins and minerals. Banana is also good source of iron, which is incorporated in the ragi bar. Honey and jaggery play the role of good sweetening agent which is good for children's and diabetic patients also. Sesame seeds also added in bar which have many potential health benefits. Eleusine coracana is commonly known as ragi which is rich in proteins, fibers, minerals, and antioxidants. It is commonly consumed in the form of food such as roti, paratha, mudda, kheer, etc. Ragi also helps to control the blood sugar level. Ragi, amaranth, banana, honey, jaggery mix together, dough is prepared and boiled at 60-70° C for 5-10 minutes. The incorporation of amaranth and banana in ragi bar shows a positive result in terms of nutrient content, taste, colour, appearance and shows considerable changes in physicochemical properties of the ragi bar.

Key Words: -Ragi, Amaranth, banana, formulation, nutrition.

I. Introduction:

Edible ragi bar is concentrated food product with good nutritive value. These are high calorie food and are rich source of minerals and vitamins. It is made up of high calorie ingredients.[1] While the amaranth and banana pulp incorporated ragi bar have a good impact because of their nutrient content. Amaranth is rich nutrient cereal. Amaranth can be considered as a "super food" because it is a gluten-free pseudo cereal that besides being a relevant source of vegetable protein, provide to the human diet, a balanced content of essential amino acids, significant amount of calcium, dietary fiber omega-3, omega-6, vitamins, minerals and antioxidants.[2,3] Bananas are among the most important food crops on the planet. They come from the family of plants called *Musa* that are native to Southeast Asia and grown in many of the warmer area of the world. Bananas are a healthy source of fiber, potassium, vitamin B6, vitamin C, and various antioxidants and phytonutrients. It contains a good amount of carbohydrate, fibers, vitamins and minerals. It contains anti-inflammatory compounds and antioxidant that regulate immune responses and significant decrease in the heart disease risk.[4] Finger millet is commonly known as Ragi. It helps to control the blood glucose level in diabetic patients.[5,6] Honey and jaggery is used as sweetening agent which have more nutritional content as compared to regular table sugar. Honey gets its sweetness from the monosaccharide's fructose and glucose, and has about the same relative sweetness as sucrose. [7,8] Sesame seeds also added in bar which have many potential health benefits and have been used in folk medicine for thousands of years.

They may protect against heart diseases, diabetic and arthritis.[10]The main purpose of study is to develop value added bar by incorporating amaranth and banana pulp in ragi bar. This combination of ingredients that increase the nutrient value of bar and also help the utilize the nutrient of amaranth as an easy way.

II. Materials And Methodology

Ragi flour, amaranth, banana, Jaggery, sesame seeds and honey are used to make the nutritious ragi bar. The all ingredients were purchased from local market and were taken to laboratory for processing. The entire process took place at Department of B.Voc food processing, ACS college Sonai, Tal-Newasa, Ahmednagar.

A Preparation of ragi flour:

Eleusine coracana(Ragi) were purchased from the local market and cleaned it well to sure that no any soil particle or any other waste material in that. Ragi were grinded into a fine powder.[5,6]

Table.1. Nutritional content of *Eleusine coracana*(Ragi) per100 gm

Nutrient	Energy
Carbohydrate(g)	72.6
Fats(g)	1.5
Protein(g)	7.7
Iron (mg)	6.3
Fiber (g)	3.6
Minerals(g)	2.5
Calcium(mg)	348
Phosphorous(mg)	280

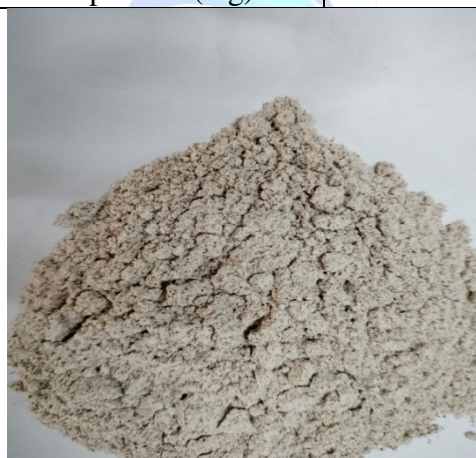


Fig.1. Ragi flour

B Preparation of amaranth flour:

Amaranth were purchased from the local market and cleaned it well. Amaranth were grinded into a fine powder. [2,3]

Table.2. Nutritional content of Amaranth per100 gm

Nutrient	Energy
Carbohydrate(g)	6.5
Fats(g)	0.5
Protein(g)	3.5
Iron (mg)	3.9
Fiber (g)	1.3
Calcium(mg)	267
Potassium(mg)	411



Fig.2. Amaranth



Fig.3. Amaranth flour

C Preparation of banana pulp:

Bananas were washed and remove the unwanted portions, cut into small pieces and mashed it properly.[4]



Fig.4. Banana pulp

D Preparation of bar:

Ragi flour was taken in a pan and dry roast it on medium heat. Also, dry roast the amaranth flour separately and allow cool it in properly. Mix the ragi flour and amaranth flour in

a pan after cooling. Add the banana pulp in the mixture and it is mix well until the required consistency is achieved. It is heated and added the grinded Jaggery and boiled at 60-70°C for 5-10 minutes. Honey was added in the mixture for better taste and sensory property. Also, the sesame seeds are added in mixture. The mixture is mixed thoroughly and poured into aluminium trays which were smeared with ghee or butter. The trays are covered and then tried for 48 hours in room temperature. Finally, the bar was cut into different shapes using a cutter, pack into small polyethylene pouches and stored at room temperature.



Fig.5. Sesame seed

Table.3. Composition of ingredients

Ingredients	T1	T2	T3	T4	T5
Ragiflour(g)	100	90	80	70	60
Amaranth flour(g)	0	10	20	30	40
Banana Pulp(g)	0	10	20	30	40
Jaggery(g)	25	25	25	25	25
Sesame seed(g)	5	5	5	5	5
Honey(ml)	5	5	5	5	5

E Sensory evaluation :

The study of sensory evaluation was carried out by evaluating five major sensory attributes such as taste, appearance, texture, aroma and overall acceptability using nine-point hedonic scales. Twenty-five members including student and staffs from the department were used for study.

F Biochemical physical analysis

The moisture content, crude protein, crude fiber, fat and ash content of the bar were determined using various methods.[8]

Moisture content: To determine moisture content of the ragi bar by weighing a known amount of sample and dried in hot air oven at 105-125° C.

Ash content: To detect the ash content of the ragi bar, a known amount of sample was powdered and taken in a crucible and then burnt in a muffle furnace. By using this method, the ash content of prepared bar was calculated.

Nutrient content: The protein analysis of the ragi bar were determined by Kjeldhal method. The sample are first digested and the released nitrogen is converted into protein content with a conversion factor of 6.28.

- To determine the carbohydrate content in prepared ragi bar the Anthrone method is used.[11]

- Fat content in the produced bar is determined using solvent extraction gravimetric method.
- To determine vitamin C content of the bar the 2,6 dichloro indophenol method was used.

Physical Properties: The randomly five bar was selected and weight(g), thickness(cm) and diameter(cm) of selected bar were calculated. The spread ratio of the bar was obtained by dividing diameter(cm) of the bar by thickness(cm).

Shelf-life study: The prepared bar was packed and sealed in polyethylene pouches. The changes in water activity, sensory attributes such as colour, texture and overall acceptance were evaluated at an interval of one month upto 3 years.

III.Result And Discussion:

The incorporation of amaranth powder and banana pulp in ragi bar showed enhanced nutrition content, colour, texture and flavour.

The sensory evaluation of bar done and result are shown in Table 4. It is shown that bar have higher level of sensory properties in T4 Sample.



Table.4. Sensory evaluation of ragi bar enhanced with amaranth powder and banana pulp.

Samples	Appearance	Taste	Aroma	Texture	Overall acceptability
T1	7.10	6.95	8.01	7.50	8.00
T2	7.06	7.22	8.13	8.19	7.11
T3	7.16	7.56	7.05	8.07	8.04
T4	8.50	8.20	8.10	8.25	8.10
T5	8.10	8.07	7.18	7.24	7.41
Mean	7.58	7.6	7.6	7.85	7.73

The nutritional content of the prepared bar was determined using different methods and the results are shown in Table 5. This analysis showed that the ragi bar incorporated with amaranth powder and banana pulp have more much essential nutrients than the usual ragi bar(T1).

Table.5. Biochemical analysis of prepared bar

Parameters	T1	T2	T3	T4	T5
Moisture%	10.58	10.60	11.02	11.32	11.44
Protein%	12.14	14.28	16.97	18.48	20.65
Carbohydrate%	69.92	71.32	73.83	74.71	75.29
Fat%	2.21	2.36	3.62	3.99	4.41
Vitamin-C%	0	0.02	0.18	1.02	1.24
Ash%	1.56	1.98	2.33	2.74	3.42

IV. Conclusion:

The nutritional value of the ragi bar is considerably enhanced due to incorporation of amaranth powder and banana pulp, also changes in physiochemical properties of bar. The result show that with increasing addition of amaranth powder and banana pulp within the ragi bar recipes, increase the fat, protein and the dietary fiber in the bar. It is concluded from the study that amaranth powder and banana pulp are successfully incorporated in ragi bar to yield bar of rich nutrition and with sensory attributes.

References:

- [1]. Amerine M & Pangborn, Rose & Roessler, E. (1965). In Principles of Sensory Evaluation of Foods.
- [2]. Maurya N.K. & Dr. Pratibha Arya (2018) Amaranthus grain nutritional benefits: A Review. Journal of Pharmacognosy and Phytochemistry 7(2):2258-2262.
- [3]. Wong, James (9 February 2020) Amaranth tastes as good as it looks *The Guardian*.
- [4]. Morton, J. 1987. Banana. P. 29-46. In: Fruits of warm climates. Julia F. Morton, Miami, FL.
- [5]. Suneetha W, Jessie & Devi, K.B. & Maheswari, K. Uma. (2018) Development and Evaluation of Finger millet based ragi ball (ragimudda) mix.
- [6]. Gull, Amir & Jan, Romee & Nayik, Gulzar & Prasad, Kamlesh & Kumar, Pradyuman. (2014). Significance of Finger Millet in Nutrition, Health and Value-added Products: A Review Journal of Environmental Science, Computer Science and Engineering & Technology. 03.1601-1608.2
- [7] Crane E (1990). Honey from honeybees and other insects. *Ethology Ecology & Evolution*. 3(sup-1):100-105
- [8] Kalra, J.I.S; Das Gupta, P. (1986) *Prashad Cooking with Indian Masters* 2015-09-13
- [9] D. Ray Langham Phenology of Sesame, American Sesame Growers Association. 2011-06-28
- [10]. AOAC, Official method of analysis. 17th Ed. The Association: Washington, DC, 2000.
- [11]. David T. Plummer (1990) An Introduction to Practical Biochemistry, 179 Third Edition

Biochemical Characterization of Lactic Acid Bacteria Isolated from Fruit Waste

Ankita Suvagiya^{*}, Dr. Gira P. Mankad^{**}

^{*} Juangadh Agriculture University, Junagadh

^{**} M.V.M. Home Science and Science College, Rajkot

E. mail Id- giramankad@gmail.com

ankitamicro1627@gmail.com

Abstract:

Waste to affluence is a common inclination in the world today. This work reports the utilization of fruit waste for production of lactic acid using acid bacteria. Peels of mango, orange, charry, peach and banana were used. The organisms used for fermentation were isolated from spoilt of mango, orange, charry, peach and banana and identified using biochemical tools. These organisms were grown using different growth factors over a period of three days with initial pH of 6.0. Growth factors were then diverse in order to optimize the yield of lactic acid. A total of twenty-four LAB isolated from fruits waste samples on modified de Man, Rogosa and Sharp (MRS), catalase negative and Gram positive were considered as LAB. The isolates were identified with species of morphology and biochemical analysis. It can be concluded that isolated LAB from different fruits sources have benefit consumers. Isolated was used for the production of lactic acid. The results of this study showed that lactic acid can be produced using of mango, orange, charry, peach and banana waste.

Key word: Lactic acid bacteria, lactic acid, fruit waste

Introduction :

Fruit based industry produces a large volume of solid and liquid waste. These poses increasing disposal and pollution problems (high BOD or COD) and represents loss of valuable biomass and nutrients (Mridul & Preethi, 2014). Disposal of wastes from fruit-canning industries has been a problem due to high transportation costs and limited availability of landfills, as these byproducts carry no commercial value, they are often discharged in places they ought not to be disposed (Pradeep et al., 2014). This particularly occurs where there is a lack of legislation and their enforcement on waste disposal (Omojasola et al., 2009). These wastes directly affect environmental agencies and municipalities because food waste is a primary source of methane gas in landfills (Gunders, 2012). Reutilizing fruit-waste to develop new products has received much attention lately. Organic waste treatment processes (Purkayastha, 2012) and anaerobic digestion processes (Shin et al., 2010; Dai et al., 2013; Bernstad et al., 2013) are two promising technologies used in this regard. Presently, the main use of such domestic food waste is the production of valuable compounds by the controlled break down of the waste by microorganisms (Rounsefellet al., 2013). Lactic acid has gained importance for its application in food, feed, chemical, pharmaceutical and beverage industries (Ray & Swain, 2011). Most important application of lactic acid is its use for the manufacture of biodegradable and biocompatible polylactate polymers (Khalaf, 2001). Microbial sources including many bacteria such as *Carnobacterium*, *Enterococcus*, *Lactobacillus*, *Lactococcus*, *Leuconostoc*, *Streptococcus*, *Clostridium* and *Weissella* have been reported to produce lactic acid (Bogaert & Coscach, 2000). Due to the importance of this organic acid, there are ongoing research efforts related to its

production (Hofvendahl & Hahn- Hägerdal, 2000). Variations in temperature, pH, carbon sources and nitrogen sources affect lactic acid production (Pavezzietal., 2008; Jörissenetal., 2015). The present study was undertaken to screen out the potential LAB isolates producing bacteriocins from spoiled fruits.

Material And Methods:

Sample collection:

Spoiled fruit waste (mango, orange, charray, peach and banana), were collected from dump yard of a local market (Motibag, market), region of Gujarat, India. All the samples were transported to the Department of Microbiology, JunagadhagricultureUniversity, and under safe conditions, where further studies were performed.

Isolation of Lactic Acid Bacteria: -

The collected samples were subjected to tenfold normal saline serial dilution. The lactic acid bacteria were isolated on MRS (pH 6.8 ± 0.02) medium and incubated at 37°C for 24hrs. The plates were observed for appearance of colonies and number of colonies produced on each plate. The lactic acid bacteria were maintained freshly throughout the experimental work. Bacteria were purified by streak plate method on MRS agar and incubated at 37°C for 24hrs and transferred to MRS agar slants and then maintained in refrigerator at 4°C till further analysis.

Identification of Isolated strains: -

The different pure cultures so obtained were characterized for their colony morphology and subjected to Gram staining, oxidase test, catalase test, carbohydrates fermentation test according to Holt *et al.* (7) Only Gram positive, non-motile, rod shaped bacteria, showing phenotypic characters similar to *Lactobacillus* species on MRS agar media were selected for further experiments. The isolated bacterial strains were maintained properly through regular sub-culturing on MRS media. The fresh cultures were used throughout the experiments. The identification of potent isolates up to species level was done based on the characteristics of *Lactobacillus* as described in Bergey's Manual of Systematic Bacteriology (Kandler, O. and N. Weis, eds. Regular Nonsporing Gram-Positive Rods. Bergey's Manual of Systematic Bacteriology. 2nd ed. Vol. IV.2005, Springer. 1208-1231.). The cultures were subjected to a battery of biochemical tests which included fermentation of different carbon sources, acid and gas production from glucose, catalase test, temperature tolerance, Salt tolerance test etc.

Antibiotic sensitivity test: -

The antibiotic susceptibility of isolated LAB was assessed using antibiotic discs diffusion method on MRS agar plates. Broth cultures of LAB was prepared using MRS and adjusted to 0.5 McFarland standards. The freshly grown overnight isolated *Lactobacillus Spp.* cultures were spread on MRS agar plates. The antibiotic discs were placed on the surface of MRS agar plates and the plates were incubated at 37°C for 24 to 48hrs. Antibiotic susceptibility pattern was assessed using, Amphotericin(AMP), Amikacin(AK), Chloramphenicol(C), Gentamicin(GEN), Streptomycin(S), Tetracycline(TE), Kanamycin(K), Co-Trimoxazole(COT).

Antimicrobial test by Agar well diffusion Method: -

The agar well diffusion method was used to determine the antimicrobial property of the LAB isolates. The selected LAB isolates were inoculated from slants to fresh 250 ml MRS broth and incubated at 37°C for 24-48 hrs. The culture broth of each isolate was centrifuged separately

at 10,000 × g for 30 minutes. The supernatant was collected after centrifugation and passed through 0.2 µm sterile syringe filter.

A 24 hr culture of the pathogens such as *E. coli*, *Pseudomonas*, *B. subtilis* and *S.typhi* grown at 37°C was suspended in saline. A lawn of the indicator strain was made by spreading the cell suspension over the surface of nutrient agar plates with a sterile cotton swab. The plates were allowed to dry and a sterile cork borer of diameter (5 mm) was used to make uniform wells in the agar. Each well was filled with 50 µl culture free filtrate obtained from the LAB isolates. After incubation at 37°C for 48 hrs, the plates were observed for a zone of inhibition (ZOI) around the well. Results were considered positive if the diameter (mm) of the ZOI was greater than 1mm.

Result And Discussion:

Isolation and identification of LAB: -

All the microbial colonies on MRS agar plates were morphologically characterized (**Table 1**) based on their colony characteristics obtained along with their Gram reaction and microscopic examination. Isolates showing phenotypic characters similar to *Lactobacillus* species on MRS agar media on the basis of above morphological and biochemical features were selected for further experiments. The isolate showing similar morphology and staining characteristic were followed by biochemical tests and sugar utilization tests (**Table 2, 3 and 4**) and some of them confirmed as *Lactobacillus spp.*

Isolated	Size(mm)	Color	Elevation	Cultural Characters	Cell Morph.	Gram Staining	Endospore Staining
MG1	1	CreamyWhite	Convex	Moist,Regular	CC	+Ve	-Ve
MG2	1-2	White	Convex	Moist,Regular	SR	+Ve	-Ve
MG3	1-2	CreamyWhite	Convex	Moist,Regular	Cc	+Ve	-Ve
OG1	1	Greywhite	Convex	Moist,Regular	Cc	+Ve	-Ve
OG2	1-2	Creamywhite	Convex	MoistRegular	Cc	+Ve	-Ve
OG3	1-2	Creamywhite	Convex	MoistRegular	Cc	+Ve	-Ve
OG4	1	CreamyWhite	Convex	Moist,Regular	CC	+Ve	-Ve
OG5	1	White	Convex	Moist,Regular	SR	+Ve	-Ve
OG6	1-2	CreamyWhite	Convex	Moist,Regular	Cc	+Ve	-Ve
PC1	1	Greywhite	Convex	Moist,Regular	Cc	+Ve	-Ve
PC2	1	Creamywhite	Convex	MoistRegular	Cc	+Ve	-Ve
PC3	1-2	Creamywhite	Convex	MoistRegular	Cc	+Ve	-Ve
PC4	1	CreamyWhite	Convex	Moist,Regular	CC	+Ve	-Ve
CH1	1-2	White	Convex	Moist,Regular	SR	+Ve	-Ve
CH2	1-2	CreamyWhite	Convex	Moist,Regular	Cc	+Ve	-Ve
CH3	1-2	Greywhite	Convex	Moist,Regular	Cc	+Ve	-Ve
CH4	1-2	Creamywhite	Convex	MoistRegular	Cc	+Ve	-Ve
BA1	1	Creamywhite	Convex	MoistRegular	Cc	+Ve	-Ve
BA2	1	CreamyWhite	Convex	MoistRegular	Cc	+Ve	-Ve
BA3	1	White	Convex	MoistRegular	Cc	+Ve	-Ve
BA4	1	CreamyWhite	Convex	MoistRegular	SR	+Ve	-Ve

Table1: -Morphological Characteristics of Lactic Acid Bacteria.

*SR: Straight Rods; Cc: Cocci; +Ve: Positive; -Ve: Negative

Figure1: -



Isolation of Pure Culture from MRS Plate.

Figure2: - Gram Staining of LAB.

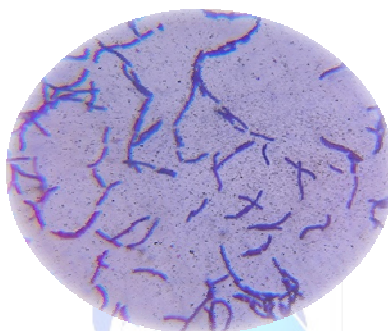


Table2: - Biochemical Characterization Test of Lactic Acid Bacteria

Isolated	Catalase test	Oxidative test	Temperature test	NaCl tolerance test	Bile salt test
MG1	-Ve	-Ve	+	++	+
MG2	-Ve	-Ve	++	+	++
MG3	-Ve	-Ve	+	+++	++
OG1	-Ve	-Ve	++	++	++
OG2	-Ve	-Ve	+++	+	+++
OG3	-Ve	-Ve	++	++	++
OG4	-Ve	-Ve	+	+++	+
OG5	-Ve	-Ve	++	+	+
OG6	-Ve	-Ve	+++	+	+++
PC1	-Ve	-Ve	+++	++	+++
PC2	-Ve	-Ve	++	+	+
PC3	-Ve	-Ve	++	++	++
PC4	-Ve	-Ve	++	++	++
CH1	-Ve	-Ve	+	+	+
CH2	-Ve	-Ve	++	+	++
CH3	-Ve	-Ve	+++	++	+++
CH4	-Ve	-Ve	++	+++	++
BA1	-Ve	-Ve	++	+++	++
BA2	-Ve	-Ve	+++	+	+++
BA3	-Ve	-Ve	+	++	+

BA4	-Ve	-Ve	++	++	++
-----	-----	-----	----	----	----

+ve: positive, -ve negative

Table3: -Phenotypic characterization of Lactic Acid Bacteria by Sugar Utilization

Isolated	Arabinose	Lactose	Glucose	Fructose	Galactose	Rhamnose	Maltose	Raffinose
MG1	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
MG2	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
MG3	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
OG1	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
OG2	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
OG3	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
OG4	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
OG5	+ve	+ve	-ve	+ve	+ve	+ve	+ve	+ve
OG6	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
PC1	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
PC2	+ve	+ve	+ve	+ve	+ve	+ve	-ve	+ve
PC3	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
PC4	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
CH1	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
CH2	+ve	+ve	+ve	+ve	-ve	+ve	+ve	+ve
CH3	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
CH4	+ve	+ve	+ve	-ve	+ve	+ve	+ve	+ve
BA1	-ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
BA2	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
BA3	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
BA4	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve

+ve: positive, -ve negative

Table4: -Gas Production by Lactic Acid Bacteria by Sugar Utilization.

Isolated	Arabinose	Lactose	Glucose	Fructose	Galactose	Rhamnose	Maltose	Raffinose
MG1	+ve	+ve	+ve	+ve	-ve	+ve	+ve	+ve
MG2	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
MG3	-ve	+ve	+ve	+ve	+ve	+ve	-ve	+ve
OG1	+ve	+ve	+ve	+ve	+ve	+ve	+ve	-ve
OG2	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
OG3	+ve	-ve	+ve	+ve	+ve	+ve	+ve	+ve
OG4	+ve	+ve	-ve	+ve	+ve	+ve	+ve	+ve
OG5	+ve	+ve	-ve	+ve	+ve	+ve	+ve	+ve
OG6	-ve	+ve	+ve	-ve	+ve	+ve	+ve	+ve
PC1	+ve	+ve	+ve	+ve	-ve	+ve	+ve	+ve
PC2	+ve	+ve	+ve	+ve	+ve	+ve	-ve	+ve
PC3	+ve	+ve	+ve	+ve	+ve	+ve	+ve	-ve
PC4	-ve	-ve	+ve	+ve	+ve	-ve	+ve	+ve
CH1	+ve	+ve	-ve	+ve	+ve	+ve	+ve	+ve
CH2	+ve	+ve	+ve	+ve	-ve	+ve	+ve	+ve
CH3	+ve	+ve	+ve	-ve	+ve	+ve	+ve	+ve
CH4	+ve	+ve	+ve	-ve	+ve	+ve	+ve	+ve
BA1	-ve	+ve	+ve	+ve	+ve	+ve	-ve	+ve
BA2	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve
BA3	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve

BA4	+ve	+ve	+ve	+ve	+ve	+ve	+ve	-ve
-----	-----	-----	-----	-----	-----	-----	-----	-----

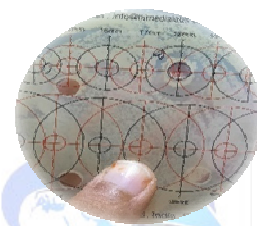
+ve: positive, -ve negative

After performing all the tests strains labeled as were identified as *Lactobacillus spp* respectively and these strains were used in further experiments.

Determination of the antimicrobial activity of selected LAB by agar well diffusion Method:-

The agar well diffusion method was used to assess the antimicrobial activity of the selected LAB isolated from fruit waste. Their antimicrobial properties were tested against major food-borne pathogenic bacteria namely *E. coli*, *Pseudomonas*, *B. subtilis* and *S.typhi* were taken from MTCC. Results show that the spectrum of inhibition was different for the isolates tested. **figure3** gives the results for the antimicrobial activity of the isolates in terms of diameter of the zone of inhibition (ZOI). A diameter >1mm around the well was considered as a positive result. Among all the isolated *lactobacillus spp.* was found to be showing potent antimicrobial activity against most of the pathogenic organisms.

figure3: - Antimicrobial Activity of Lactic Acid Bacteria.



Antibiotic susceptibility Test: -

The overnight grown culture of isolates of the selected LAB isolated from fruit waste (*Lactobacillus spp*) were inoculated. Their growth were checked after 48hrs of incubation at 37°C. **figure 4** shows that the isolates were resistance to Ampicillin (Amp). Some of the isolates showed resistance to other antibiotics. The isolates were found resistant to cell wall synthesis inhibitor i.e. Penicillin, Vancomycin and protein synthesis inhibitor Gentamicin, Streptomycin but sensitive to tetracycline at higher concentration 200µg/ml and above.

The results of antibiotic susceptibility test with streptomycin different from the observation made by Kim *et al* (8). Hoque *et al* (7) found that the *Lactobacillus spp.* is sensitive to Cd, E, Gen, B, C, E, S Amx, Te, Met, and resistant to trimethoprim (Tr), ampicillin (Amp). It is possibly because of β lactamase presence in the isolate which is known to cause antibiotic resistance towards penicillin and other cell wall synthesis inhibitory compounds. Similar results were also observed by Coppola *et al.* (9), Lira *et al.* (10), Caro *et al.* (11) and Hlebaet *al* (12) where they examined antibiotic resistance of bacteria isolated from various food samples have argued that the results of antibiotic resistance vary from study to study.

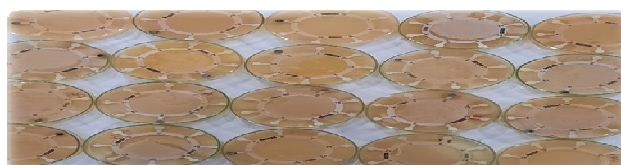


Figure-4 antibiotic susceptibility test

Conclusion:

The present study was aimed to isolate and characterize LAB bacteria from different fruit waste. Since there is substantial demand for natural food products which can be used for as probiotic food supplements to enrich nutritionally rich diet as well as cure to diseases these as they are very much diversified in gaining importance. As this probiotic impart beneficial properties without any genetic or molecular changes in the health of consumers which is an attractive solution for diseases management through the diet. In general, it is believed that Probiotics help keep up the balance between harmful and beneficial bacteria in the gut thus maintaining a healthy digestive system. The study is extremely promising, that underscores the important role of *Lactobacillus* strains.

Acknowledgement:

I express my deep sense of gratitude and indebtedness to **Dr. Giramankad**, Assistant Professor, Department of Microbiology, M.V.M. science and home science college, Rajkot-Gujarat, for giving me opportunity to carry out my project and for allowing me to do my project work under his supervision. I also thank well-wishers Mr. Vishal Goswami for their moral support and encouragement. I acknowledge with appreciation the indispensable aid to Dr. Jalpa Maghodiya (Assistant professor at Noble university) for assistance and encouragement.

References:

1. **Meera, N.S. and Charitha Devi, M. 2012.** Partial characterization and optimization of parameters for bacteriocin production by probiotic Lactic acid bacteria. *J. Microbiol. Biotech. Res.* 2 (2):357-365.
2. **Schleifer, K.H. and Ludwig, W. 1995.** Phylogenetic relationships of lactic acid bacteria. In: *The Genera of Lactic Acid Bacteria*, B. J. B. Wood, W. H. Holzapfel (Eds.), Blackie Academic & Professional, Glasgow. pp. 1-18.
3. **Collins, J.K., Thjorton, G. and Sullivan, G.O. 1998.** Selection of probiotic strains for human application. *Int Dairy J* 8, 487-490.
4. **Isolauri E, Kirjavainen PV and Salminen S.** Probiotics: a role in the treatment of intestinal infection and inflammation? *Gut*. 2002; 50: 54-59.
5. **Dicks LMT and Botes M.** Probiotic lactic acid bacteria in gastro-intestinal tract: health benefits, safety and mode of action. *Beneficial Microbes*. 2010; 1: 11-29.
6. **Ouwehand, A.c., Salminen, S., Tolkko, S., Roberts, P.,** colonic tissue: new model for characterizing adhesion of lactic acid bacteria. *Clin Diag Lab Immuno* 9, 184-186.
7. **Gill H, Prasad J, Smart J and Gopal PK.** Selection and characterization of *Lactobacillus* and *Bifidobacterium* strains for use as probiotic, *Int Dairy J*. 1998; 8: 993-1002.
8. **Fuller R. Probiotics: The Scientific Basis.** Vol. 1. Chapman and Hall, US; 1992
9. **Saavedra JM.** Clinical Applications of Probiotic Agents. *Am J Clin Nutr.* 2001; 73: 1157S-1151S
10. **Medina M, Collins AG, Silberman JD and Sogin ML.** Evaluating hypotheses of basal animal phylogeny using complete sequences of large and small subunit rRNA. *PNAS*. 2001; 98: 9707-12.

Development of Supplementary Protein Based Cake from Composite Flour

Ms. Swapnali S. Bhole

Department of Agricultural Engineering

Maharashtra Institute of Technology (Autonomous) Dist.: Aurangabad Maharashtra

Email Id: swapnali.s.bhole@gmail.com

Abstract:

Baking industry is considered as one of the major segments of food processing in India. Baked products are gaining popularity because of their availability, ready to eat convenience and reasonably good shelf life. Cake is one of the most common bakery products consumed by people in the world. Supplementation of foods is current because of increasing nutritional awareness consumers need to eat high quality and healthy foods – known as functional foods, which contain ingredients that provide additional health benefits beyond the basic nutritional requirements is therefore the trend is to produce specially bakery products need from whole grain flour and other functional ingredients known as health foods. Walnut seed flour has a good potential for use as a functional ingredient agent in bakery products because of its high water absorption capacity, solubility, bulk density and rapid viscosity characteristics. Ragi has best quality protein along with the presents of essential amino acids, vitamin A, Vitamin B and phosphorous. Green gram contains approximately 23.86-27% protein, 1.15%fat, 62.62%carbohydrates, 16.3% fiber, 6.60% total sugars, 9.05%water. This shows that the composite flour is rich in protein and fat and can serve as a protein supplement. The main objective of this research is to formulations of cakes prepared from three different proportions (T_1 , T_2 , T_3) of wheat, ragi, walnut, green gram flour are given in other ingredients like butter, milk, egg, baking powder, vennila essence were added to each of these formulations of cake preparation. The developed product was analysis of chemical, and sensory evaluation by nine point hedonic scale. In T_2 sample wheat 60%, ragi 20%, walnut 10%, green gram 10%, and nutritious cake has high increase carbohydrate compared T_0 sample it has carbohydrate 28%, protein 8.17%, fat 1.8%, fiber 2.37%, ash 1.56%. The result revealed that the sample T_2 which contain more acceptable in terms of chemical and sensory evaluation of developed product.

Key Words: Cake, walnut, green gram, wheat, ragi

Introduction:

Baking industry is considered as one of the major segments of food processing in India. Baked product are gaining popularity because of their availability, ready to eat convenience and reasonably good shelf life. (Vijay Kumar et al., 2013). Cake is the form of food that is usually sweet and often baked. It supplies body building protein fats and carbohydrates. Cake is normal prepared with refined wheat flour, sweetening agent (sugar). Binding agent, egg ,fat and vanaspati , liquid flavor and some form of leavening agent such as yeast or baking powder. (Dasai et al.,2010). Bakery products are widely consumed and are becoming a major component of the international food market (Kotsianis et al., 2002). Cake is one of the most common bakery products consumed by people in the world. Nowadays, cake manufacturers face a major problem of lipid oxidation this limits the shelf life of their products (Lean and Mohamed, 1999). Bakery products such as cakes particularly those with high lipid content tend to become rancid after prolonged storage owing to the oxidation of polyunsaturated fatty acids (Ray and Husain, 2002;

Smith et al., 2004). Foods containing higher content of polyunsaturated fatty acids are more prone to oxidation (van Aardt et al., 2004).

Supplementation of foods is current because of increasing nutritional awareness among consumers. Supplementation with legumes, cereals and pulses is one way to meet the needs for protein particularly baked foods. Recently, consumers awareness of the need to eat high quality and healthy foods – known as functional foods, which contain ingredients that provide additional health benefits beyond the basic nutritional requirements is therefore the trend is to produce specially bakery products need from whole grain flour and other functional ingredients known as health foods (Jideani and Onwnbali 2009).

Walnut flour has a high amount of protein and essential fatty acid which has a made it serve as a supplement or modifier for other food products. Finger millet (Ragi, Eleusinian coracana) is an important staple food in the eastern and central Africa as well as some parts of India [Majum et al.,2006]. It is rich in protein, iron, calcium, phosphorous, Fibre and vitamin content. The calcium content higher than all the foods grains.Ragi has best quality protein along with the presents of essential amino acids vitamin A, Vitamin B and phosphorous (Gopalan et al.,2004). Green gram contains approximately 23.86-27% protein, 1.15%fat, 62.62%carbohydrates, 16.3% fiber, 6.60% total sugars, 9.05%water. Composite flours have been used extensively in the production of baked goods. In facts several attempts have been made to produce cake from different type of composite flours. In countries where malnutrition poses a serious problem especially among children, composite flours which have better nutritional quality would be highly desirable.(L.C.okpala.,2013).

The development and consumption of such functional foods not only improves the nutritional status of the general population but also helps those suffering degenerative disease associated with today's changing life style and environment. The need for strategic development and use of inexpensive local resources in the production of popular foods such as cakes has been promoted by organization such as the food and agricultural organization (FAO).

This is similar to the earlier finding where protein content of snacks reduced with supplementation with starch based products for wheat flour. (M.O.Oluwamukomi,2011).The formulations of cakes prepared from different proportions of wheat, ragi, walnut, green gram flour are given in other ingredients like butter, milk, egg, baking powder ,vennila essence were added to each of these formulations of cake preparation. Cake samples were prepared by following the procedure. (Singh et al .,2006). The wheat flour, ragi flour, green gram, walnuts supplemented cakes were subjected to proximate analysis such as moisture, protein, fat, fiber and ash content. The principal parts of wheat flour are gluten and starch. Cakes are flour confections they are mostly prepared from wheat flour and other essential ingredients. The consumption of cakes prepared from wheat flour has become very popular is most developing countries of the tropics especially among children and adolescent. (M.A idowu et al.,1996). Walnut flour has a high amount of protein and essential fatty acid which has made it serve as a result of tack of several essential nutrients in the food products.

Cake flour is finely wheat flour made from soft wheat. It has very low protein content between 8% and 10% making it suitable for soft texture cakes the higher protein content of other flour could make the cake dough. Highly sifted cake flour may require different volume amounts in recipes than all purpose. Walnut seed flour has a good potential for use as a functional ingredient agent in bakery products because of its high water absorption capacity, solubility, bulk

density and rapid viscosity characteristics (Nide at.,2010). This shows that the flour is rich in protein and fat and can serve as a protein supplement. The oil from the walnut could serve as a protein supplement. The oil from the nut could serve as a source of energy for seedlings and for the formulation of wood varnish vulcanized oil. (Ajaiyeoba, 2006)

The current study was carried out to study the nutrition rich cake made from wheat flour fortified with powdered Ragi powdered, green gram powdered and walnut. Formulation and developed of nutritious cake product from local and readily available raw material have received a lot of attention in many developing countries due to malnutrition which has been known as a major problem especially to infants as a result of lack of several essential nutrients in the food product.

Materials And Methods:

Raw Materials:

The raw material (Wheat, Ragi, Walnut, Green gram) and minor ingredient (sugar, milk powder, GMS, Vanilla powder, Baking powder) which is used in this study was purchased from local market.

Method:

Preparation of composite flour:

Different composite flour sample were prepared by combining 100%, 80%, 60%, 40% wheat flour, 0%, 10%, 20%, 30% Ragi flour, 0%, 5%, 10%, 15% walnut flour and green gram flour respectively (table 1) showing blends of wheat flour, Ragi flour, walnut flour, and green gram flour used in composite flour formulation.

Sample Trial	Wheat Flour (%)	Ragi Flour (%)	Walnut Flour (%)	Green gram flour (%)
T1	80	10	5	5
T2	60	20	10	10
T3	40	30	15	15

Table No. 1. Composite flour formulation

Methodology:

Not only wheat flour but also other flour types have been investigating for developing cakes of lower cost and better quality in terms of consumer acceptance (Tanya singh et al., 2016). The detailed formulation as per mentioned Table No.1 for the preparation of flour like (wheat flour, ragi, walnut, green gram), eggs, butter, sugar, were the raw material was properly measured according to the ratio required in cake. The wheat, ragi, walnut, green gram were sieved through fine sieves to avoid the dirt and unwanted particles. Meanwhile the oven is preheated at 200°C for 20 min. The weighed sugar and melted butter were beaten properly using beater for 10min. It was further processed by addition of weighed flour and baking powder and again proper beating was done for 10min. The batter obtained was poured in greased baking mould and even setting was done using spreader. After the setting of batter it was baked in preheated oven at 150-180°C for 20min.

Physicochemical Analysis:

Moisture, Fat, Protein, Ash, Fiber and were determined in cake.

Moisture content: Moisture content was determined using the method described in AOAC, 2005. 10 g sample was dried in hot air oven at 105°C ±1°C in pre-weight dishes till constant

weight. The dried sample was transferred to desiccators with dishes and cooled to room temperature. The dish was then weighed and moisture content in per cent was calculated from loss of weight.

Ash: 5g of ground sample was taken in a preweighed silica crucible and charred over the heater to make it smoke free. The crucible with the sample was ignited at 600°C for 3 hours in a muffle furnace. When muffle furnace was slightly cooled, the crucible with ash was taken out, kept in desiccators to cool and constant weight was taken. The difference between the weight of the silica crucible as empty and with ash was the amount of total ash. The percent ash was calculated (AOAC , 2005)

Crude fat and crude protein: Crude fat and crude protein were determined according to the method given in AOAC (2005).

Crude fiber: Two gram of sample was put into 250 mL conical flask and 1.25% Sulfuric acid solution was added. The sample was heated about 30 min and was filtered using vacuum filter and washed until traces of acid was undetected using pH paper. The Whatman paper 5B which pore size 125 micrometer was placed in the Buchner flask. After that the acid extracted was transferred into 250 mL conical flask and 1.25% NaOH solution was added. Digest the contents for half an hour, filter and wash free of alkali using hot distilled water. The residue was transferred to crucibles, weighed, dried in oven overnight at 105°C, and then placed in a muffle furnace at 600 °C for 3 hrs. The loss in weight after ignition represents the crude fiber in the sample (AOAC 2005).

Quality evaluation of prepared cakes

Crude protein, moisture content, fiber content, and external (outer appearance), total phenolic contents of the product were evaluated.

Evaluation Of Organoleptic Properties Of Prepared Cakes:

Four different formulation of cake flour (Table. 01) and prepared cake were subjected to evaluate sensory properties. Thus, Prepared cakes were served for 15 trained panelists and evaluated for external appearance, internal appearance, colour, aroma, taste, texture and overall acceptability using 5 point Hedonic scale (5-like extremely, 4-like moderately, 3-neither like nor dislike, 2-dislike moderately, 1-dislike extremely). The selected best formula was tested for physicochemical characteristics and its storability of cake product.

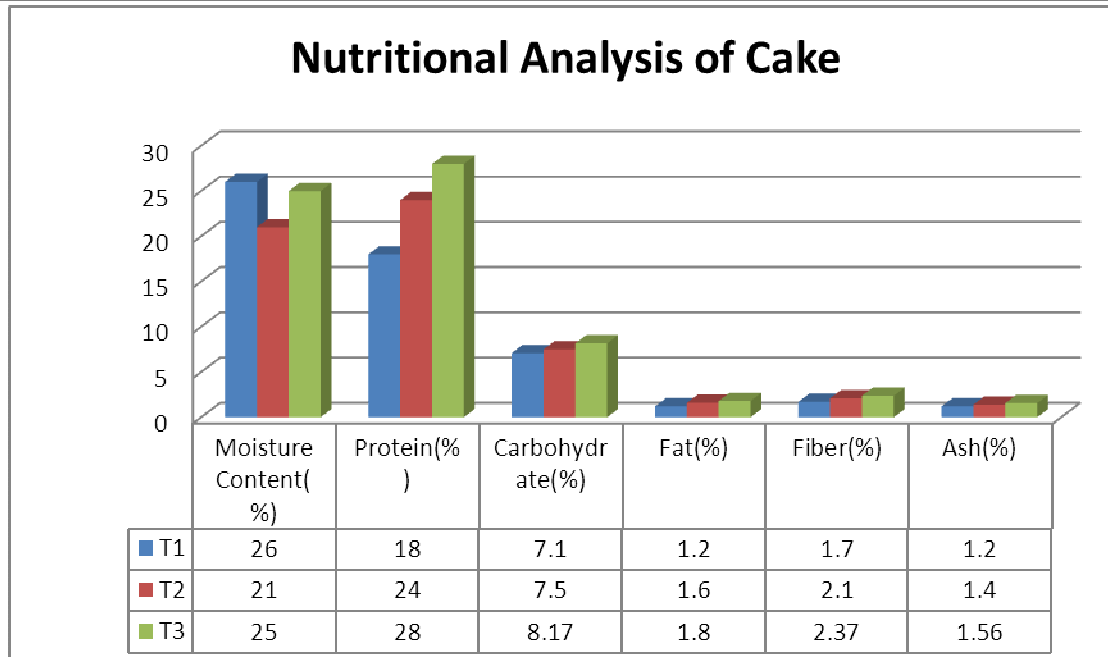
Result And Discussion:

Chemical Analysis Of Ready To Bake Cake:

The data obtained from the proximate analysis of three different flour formulated cake are given in the Table 02. Slight increase in moisture content was observed in all treatments. Moisture contents of different cake flour formulation were in the range of 9-11% and lowest moisture level was recorded by mixture (T2). The total protein, carbohydrate, fat, fiber and ash content of formulated sample T2 was higher value as compare to T1& T2.(Table No.2). Result revealed that sample formulation (T2) was higher acceptable result as per sensory evaluation panelist.

Nutritional Analysis Of Cake:

Composition	T1	T2	T3
Moisture Content(%)	26	21	25
Protein(%)	18	24	28
Carbohydrate(%)	7.1	7.5	8.17
Fat(%)	1.2	1.6	1.8
Fiber(%)	1.7	2.1	2.37
Ash(%)	1.2	1.4	1.56



Conclusion:

Supplementation of foods is current because of increasing nutritional awareness among consumers. Supplementation with legumes, cereals and pulses is one way to meet the needs for protein particularly baked foods. Recently, consumers’ awareness of the need to eat high quality and healthy foods – known as functional foods, which contain ingredients that provide additional health benefits beyond the basic nutritional requirements are therefore the trend, is to produce specially bakery products need from whole grain flour and other functional ingredients known as health foods. So, main research focuses on the development of healthy cake in the incorporation of composite flour in three different proportions. The result conclude that sample T₂ contains wheat 60%, ragi 20%, walnut 10%, green gram 10%, and other ingredient was prepared nutritious cake has high increase carbohydrate compared T₀ sample it has carbohydrate 28%, protein 8.17%, fat 1.8%, fiber 2.37%, ash 1.56%. The result revealed that the sample T₂ which contain more acceptable in terms of chemical and sensory evaluation of developed product.

References:

1. Vijayakumar, M, Chappalwar, Dayanand ,P,Bobde H,Stefi,M,John.,(2013).Quality characteristics of cookies prepared from oats and finger millet based composite flour international Journal of engineering science and technology 2250-3498,vol.3,No 4.
2. S.Desai, A., (2012).Deveolpment of nutrient rich models by supplementation with malted ragi flour.international food research Journal 19(1):44-45.
3. Jideani v, onwnubali F(2009). Optimization of wheat-sprouted soyabean flour bread using response surface methodology, Afr. J. Biotechnol 8(22);6364-6373
4. L.c. okpala and E.C..okoli, “Development of cake made with cocoyam, fermented sorghm and germinated pigeon pea flour is blends using response surface method “Journal of food science and technology,vol.,pp.38-49,2013
5. S.U, Okorie and E.N.Oh yeneke, “production and quality evaluation of baked cake from blend of sweet potatoes and wheat flour natural and applied sciences,vol.3,no2,171-177,2012.

6. Vijayakumar, M, Chappalwar, Dayanand ,P,Bobde H,Stefti,M,John.,(2013).Quality characteristics of cookies prepared from oats and finger millet based composite flour international Journal of engineering science and technology 2250-3498,vol.3,No 4.
7. Whitely PR (1970) development of high protein cake from green gram flour manufactures applied science publisher Ltd.,London,U.K
8. Okaka, J.C., and M.I.Isieh, 1997. Development and quality evaluation of cowpeawheat biscuit Nigeria
9. Singh,G.,S.Sehgal and A.Kawatra, 2006. Sensory and nutritional evaluation of cake development from balanced and malted pearl millet.J. Food sci. Technol.,43(5):505- 508.
10. Ranganna, S.,1986. Handbook of analysis and quality control for fruit and vegetable products. Tata McGraw hill pub.co.Ltd., New delhi.
11. Ndie EC,Nnamani cv, Oselebe Ho (2010).Some physicochemical characteristics of defatted flours derive from African walnut (*Tetracarpidium conoforum*);an underutilized legume, park.J.Nutr.,9(a);909-911
12. H.D.Mepba,I. Eboh, and S.U.Nwaojigwa, “Chemical composition, functional and baking properties of wheat-plantain composite flour, “African journal of food Agriculture nutrition and development vol.7,no.1,pp.1684-5374,2007.
13. R.A.Raji,Effect of pre-treatment on sweet potato flour for coolies production [M.S.thesis], university of Agriculture, Abeokuta, Nigeria.2010.
14. Henry P, Miquelle D, Sugimoto T, McCullough DR, Caccone A, Russello MA. In situ population structure and ex situ representation of the endangered Amur tiger. Mol Ecol. 2009; 18: 3173–3184. pmid:19555412
15. BHATTACHARYA, K.; RAHA, S. Deteriorative changes of maize, groundnut and soybean seeds by fungi in storage. Mycopathologia. 155(3):135-141, 2002.
16. Graybosch, R. A., Peterson, C. J., Baenziger, P. S. and Shelton, D. R. 1995. Environmental modification of hard red winter wheat flour protein composition. Journal of Cereal Science, 22(1), 45-51
17. Ptitchkina, N.M., Novokreschonova, L.V., Piskunova G.V. and Morris, E.R. (1998). Large enhancements in loaf volume and organoleptic acceptability of wheat bread by small additions of pumpkinpowder: possible role of acetylated pectin in stabilizing the cell structure. Food Hydrocolloid 12:333-337

Studies on Zooplankton Diversity in Bennetura Dam, Murum, Dist-Osmanabad (M.S.)

K. H. Rajput

Head, Dept. of Zoology,

Shri Madhavrao Patil Mahavidyalaya, Murum

Abstract :

Zooplankton study was carried out in Bennetura dam, Murum Dist-Osmanabad (M.S.) from February, 2021 to January, 2022. The Bennetura dam is situated in the heart of Murum city. During the studies total numbers of Zooplanktons were counted. The different species of Zooplankton were also identified. The Zooplankton in water body belongs to four main taxonomic groups such as Rotifers, Copepod, Ostracoda and Cladocera, out of which Rotifer was dominated. About 21 Zooplankton species were recorded out of which 12 Rotifera species, 3 Copepoda species, 2 Ostracoda species and 4 Cladocera species were found the Rotifera branchionar was dominated among Zooplankton in the Bennetura dam.

Keywords: Zooplanktons diversity, Seasonal population density, Bennetura dam, Murum

Introduction :

Zooplanktons are the most fascinating groups of micro-organisms found in aquatic body. The zooplankton in water body belongs to four main taxonomic groups such as Rotifers, Copepod, Ostracoda and Cladocera are dominant represented groups of crustacean in fresh water habitat. They are abundant in the shallow areas but only few species abundant in the open water. They play vital role as primary consumers. The occurrence and abundance of Zooplankton in a water body depends upon it, productivity which in turn is influenced by physic chemical parameters and the level of nutrients. Zooplankton, occupies an intermediate position in food web, many of them feed on algae and bacteria and in turn are fed by numerous invertebrates and fishes. The literature on zooplankton and biological indicators of water quality has been renewed by many workers such as Mahajan (1981), than and Seshagiri Rao (1981) and Arova (1987) have pointed out to rotifer species indicating clean, polluted and heavily polluted water. Zooplankton has been used as an indicator for monitoring the water quality tropic status and pollution level. The zooplanktons which play a role of converting phytoplankton in food suitable for fish and aquatic animals. They can also play an important role in indicating the presence or absence of certain species of fishes or in determining the population densities. Zooplankton has been a subject of study in India and several workers have worked in it, such as Ganpati (1943), Jyoti and Sehgal (1979), Sharma and Patanik (1985), Chandrashekar and Kodarkar (1996) Pulle (2000), Narsimha Rao and Jaya Raju (2001), Pawar and Madlapure (2002), Dhimdhime and Ambore (2003), Patil et. Al (2005) Madhusudhan et. Al. (2005).

The paper deals with studies on zooplankton diversity in Bennetura Dam, Murum qualitative and quantitative analysis of zooplankton diversity were carried out.

**Table no. Monthly Variation in Zooplankton in Number Per list 2021-2022
at Station A**

Sr. No	Components	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Total
1	Rotifera	7	10	9	12	14	5	2	6	7	10	8	8	98
2	Copepoda	5	6	10	8	4	2	1	3	6	8	10	10	73
3	Ostvacodes	5	4	4	2	1	6	12	7	10	6	6	4	67
4	Claducera	4	4	5	3	2	8	10	4	10	8	6	5	69
	Total	21	24	28	25	21	21	25	20	33	32	30	27	307

**Table no. Monthly Variation in Zooplankton in Number Per list 2021-2022
at Station B**

Sr. No	Component	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Total
1	Rotifera	6	10	11	12	11	6	3	6	7	10	10	8	99
2	Copepoda	4	6	11	8	5	2	1	2	4	8	10	10	70
3	Ostvacodes	5	4	4	2	1	6	10	8	10	6	6	4	62
4	Claducera	4	4	3	2	1	8	12	4	10	8	5	5	66
	Total	19	24	28	24	18	22	25	20	31	32	31	27	297

**Table no. Monthly Variation in Zooplankton in Number Per list 2021-2022
at Station C**

Sr. No	Component	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Total
1	Rotifera	4	7	6	11	6	7	4	4	7	10	8	8	82
2	Copepoda	3	6	10	8	1	2	1	3	10	10	10	6	70
3	Ostvacodes	4	2	5	2	8	5	8	10	10	4	4	4	66
4	Claducera	8	2	4	1	2	4	4	4	4	10	10	10	63
	Total	19	17	15	22	17	18	17	21	31	34	32	28	281

Materials And Methods:

Water sample and zooplankton samples were collected from Bennetura dam, Murum water body for a period of one year. From February, 2021 to January, 2022, at selecting three stations. Station A, Station B, Station C. the plankton net of mesh size 30 mm was swept through subsurface and samples were transferred to 100 ml capacity plastic bottles. The samples were preserved using 4 % formalin solution, standard key and other literature was used for identification of different species Torapi (1980), APHA(1989), Pennak (1989). The number of planktons per litre was determined using Sedgwick Valter cell by taking 1 ml of approximately diluted samples and the observation was represented number of zooplankton per liter.

Result And Discussion :

The total number of Zooplankton and monthly average of Zooplankton number per litre were recorded in table and illustrated in the figure. I. it was noted that the total number of zooplanktons varied from 20 to 33 number per litre at station A, 18 to 32 number per litre at station B and 17 to 34 number per sites at station C during the year 2021-2022 i.e. Feb, 2021 to Jan, 2022 Kumar (1996) recovered zooplankton at mangev 17 to 137 per Liter in Ganga River in Bihar, M. Baburao (1997) found the domination of zooplankton over phytoplankton in Himayatnagas Lake Hyderabad. Pawar and Madlapure (2002) recorded 28 genera of zooplankton from Sirur dam near Mukhed in Nanded district. Sirsat and Ambore (2004) studies the zooplanktons form fresh water pond at Dharmapuri in Beed district, Maharashtra.

A. Rotifera :

The monthly average and total number of rotifers varied from 2 to 14 number per lit. at station A, 3 to 12 number per lit. at station B and 4 to 11 number per lit. at Station C. Rotifera is one of the oldest group and a minor phylum of invertebrates are commonly termed as “Wheel” animalcules because of their characteristic wheel organ or corona that bears of their close resemblance to a pair of revolving wheels. The rotifers are being considered as the most important soft bodied invertebrates (Hulchinson), (1967). Most of the rotifers are primary consumers feeding on various sized phytoplankton's some of them feed on detritus element and bacteria, while few are raptorial predators (Edmondson) 1965. Rotifers constitute nutritious food item to fish.

B. Copepoda :

The monthly average and total number of copepods varied from 01 to 10 number per lit. at station A and 01 to 11 per lit. at station B and again 01 to 10 number per lit. at station C. Allan (1976) observed that there is inverse relationship between high population of rotifers and Cladocera low population of copepod during winter may be due to the feeding pressure of stocked fish on the latter and if copepod are removed than there is sudden increase in the population of rotifer and Cladocera. Usha Choubey 1997 found high density of copepods during October water temperature and availability of food organism effect the copepod population.

C. Ostracoda :

The monthly average and total number of ostracode varied from 01 to 12 number per lit. at station A, 01 to 10 number per lit. at station B and 01 to 11 at station C per lit. Ostracode species are bivalve and have shape like small seeds Ostracodes are green coloured species, like with algae while grey coloured species, live with ooze. The abundance of these provides good food for aquatic organisms. Water temp. and availability of food organisms may effect the ostracoda population. Tohapi, 1980 found the highest population of ostracoda during monsoon. Might be due to abundance of fine detritus to which omnivorous organisms feed over during monsoon from they natural benthic habital and bacteria mould and algae as food. Ostracoda population was found to be maximum while other zooplanktons were minimum during monsoon may be due to dilution effect (Bais and Agarwal, 1995).

D. Claducera :

The monthly average and total number of claducera varied from 02 to 10 number per lit. at station A and 02 to 08 per lit. at station B and again 01 to 10 number per lit. at station C. The Claducera components of zooplankton play important role in the benthic throphodynamic. Most of claducerans are primary consumers and feed on microscopic algae and fine particulate matter in the detritus. Thus influencing cycling of matter and energy in the benthos. Usha Choubey, 1997 found the density of claducerans is high in the month of June and low in December. Temperature and availability food may affect their numbers.

List of zooplankton species.

Rotifera :

Asplanchna sp, Asplanchna interme, Branchionas duragae, B. forficula, B. pallas, Angularis, B. calyciflorus, B. calyciflorus vandoreas, B. rubens, Filina borg, F. terminals, F.longiseta, Keratella bory, Keratella quadrata.

Copepoda : Argulus foliaceus, Cyclops, Mesocyclops sps, Microcyclops Phyllodiopionus sps.

Cladocera : Alonarectangula vichavdi sars, Ceriodaphnia, Laticaudata, Leriiodaphnia, Cornula, Moina, Moina brachiatae juvina, Moina micrura.

Ostracoda : Cypris, stenocypris, strandesia.

References :

- 1) **APHA (1998)**, "Standard method for the examination of waste water" American Public Health Association, Washington D.C.:874.
- 2) **Anwar Mohd Khan (1992)**, "Physicochemical characteristics of Vishnupuri dam special reference to plankton. Ph.D. thesis", Marathwada University, Aurangabad.
- 3) **Buttish S. K. (1992)**, "Fresh water zooplankton of India", Oxford and IBH publishing Co. Ltd. New Delhi.
- 4) **Berzins B and Pejler B 1989** b., "Rotifer occupancy in relation to tropic degree". Hydrobiologia 182:171-180.
- 5) **Chandramohan. P. (1963)**, "Studies on zooplankton of the Godavari estuary Ph.D. Thesis", Andhra University 271 pp.
- 6) **Dhanpati M.V.S. (2000)**, "Taxonomic notes on the rotifers from India (from 1889-2000) Pub", Indian Association of Aquatic Biologists (IAAB) Hyderabad A. P. PP 178.
- 7) **Greenberg A. R. 1994**, "Palmerton of the Sacramento River Ecology" 45:42, 49, 3, 61, 7, 1, 7, 2.
- 8) **Haque N. Khan, A. A., Fatima M. nad Barbhugan S. I. (1988)**, "Impact of some ecological parameters on rotifers population in Tropical perennial Pond". Environmental and Ecology, 6(4) 998-100.
- 9) **Khan. M. A. and I Seshagiri Rao (1981)**, "Zooplankton in Evolution of pollution" Cent. Ed. Prev. cent poll Osmania University, Hederabad 121-133.
- 10) **Michael R. G. (1968)**, "Studies on the zooplankton of A Tropical fish pond", Hydrobiology 32 : 47-68.
- 11) **Nayar C. K. G. (1970)**, "Studies on the Rotifer population of the ponds at Pilani Rajasthan", J. Zool. Soc. India 2 : 21:34
- 12) **Pawar S. K., V. R. Madlapure and J. S. Pulle (2003)**, "Study of 200 plankton immunity of Sivur dam water, near Mukhed in Nanded district (M.S.) India" Biol. 18(2) 37-40.
- 13) **Pendse D. C., Yogesh Shastri and Barhate (2001)**, "Hydrobiological study of percolation tank of village" Dasane Ecol. Env. and sons 6 (1) 93-97.
- 14) **Reddy Ranga (1992)**, "Zooplankton of fish ponds". Hydrobiology 231: 125-129.
- 15) **Saxena D. N., Vengayil D. T. and Kulkarni N. (1986)**, "Zooplankton of temporary water pool of Gwalior M. P. India", J. Zool. Soc. India 37(1-2), 7-16.
- 16) **Shadecek V. (1983)**, "Rotifera as indicator of water quality", Hydrobiologia 100-169-220.

A Survey of Spiders Diversity in Three Agricultural Field Areas : The First Report of Tamil Nadu in India

Kannadasan R* and Senthil Kumar D.

Department of Zoology, Kandaswami Kandari's College, Paramathi Velur, Namakkal Dt.,
Tamil Nadu, India

Email: kannan198312@gmail.com

Abstract:

The present article deals with the fauna diversity of the spiders in Agricultural areas. A total of 19 species under 9 genera were recorded in Anichampalayam site-I (S-I), Nanjai Edayar site-II (S-II), and Pandamangalam site-III (S-III), Namakkal District, Tamil Nadu in India. Maximum 32% of spider species were recorded in Araneidae, followed by Tetragnathidae, Salticidae, Sparassidae, Oxyopidae, Clubionidae, Gnaphosidae, Hersiliidae and Lycosidae. A very high number of spider species was found in site III (504), followed by site II (404), and site I (376). An extensive survey for these spiders is required in almost 3 sites particularly in those where these jumping spiders are either not recorded. Despite the spiders are the most diverse group of predators and is crucial to the health of terrestrial ecosystems, none of the species recorded in India is listed in IUCN Red List.

Keywords: spider, diversity, agriculture field, species abundance, species richness.

1. Introduction:

Rice (*Oryza sativa*) is an essential food source for more than 50% of the world population with an annual yield of more than 700 tons roughly (Center Africa Rice, 2011; Seck et al., 2012). India, China, Thailand, Bangladesh, Philippines, Pakistan, Indonesia, USA and Vietnam are among the major rice producers (Mehmood et al., 2021). Oerke, 2006; Xie and Yang, 2018 and Savary et al., 2019 reported that from the past years, the productivity of rice at the global level is at risk due to different crop diseases and pest infestations. Insect pests of rice cause a loss of 200 million tons every year (Nasiruddin and Roy, 2012; Singh and Singh, 2017). Synthetic pesticides are extensively used to control the outbreak of pests (Karunamoorthi and Mohammed, 2012; Weng and Black, 2015). Their unnecessary use of pesticides causes negative impacts on human health, environment and agriculture production by rigorously damaging the flora and fauna (Houbraken et al., 2016; Rosic et al., 2020). John and Shaike (2015) reported that the natural balance between pests and predators has been greatly disturbed due to the careless use of pesticides which are accountable for the non-target killing of natural enemies.

Spiders are the natural predators present abundantly in the rice ecosystem and limit the population of other insect pests (Maloney et al., 2003; Thomson and Hoffmann, 2010; Radermacher et al., 2020). They are tremendous predators due to wasteful killing, high reproductive rate, functional and numerical response and their capacity to survive under conditions of food shortage (Nyffeler and Birkhofer, 2017; Michalko et al., 2019). Tyagi et al. (2019) testified that accurate identification of spiders is needed to differentiate the native spider fauna from the invasive ones by creating a barcode reference library. Different diagnostic characters like eye and epigynal patterns are used for species-level identification (Barrett and Hebert, 2005). Morphology based identification is quite difficult due to the unavailability of literature and time consumption (Ball and Armstrong, 2006). Robinson et al., 2009 and Hamilton

et al., 2011 investigated that the absence of clear distinguishing characters and sexual dimorphism dare the authenticity of phenological identification of spiders. So, there is a critical need to introduce quick, economical and undisputed approaches to investigate the spiders taxonomically (Hebert and Gregory, 2005; Fontaneto et al., 2009; Iftikhar et al., 2016).

The current study aimed to document the undescribed fauna of spiders from the Namakkal District of Tamil Nadu in India.

2. Materials And Methods:

2.1. Collection of spiders:

Live spiders were sampled from different agricultural fields across the Namakkal district including Anichampalayam site-I (S-I), Nanjai Edayar site-II (S-II) and Pandamangalam site-III (S-III), Tamil Nadu, India. The sample collection was done from 2019 to 2020 during the rabi season using different sampling techniques like visual search and sweep netting (Robinson et al., 2009; Tyagi et al., 2019).

2.2. Sampling sites:

Three sampling sites were used for the study namely S-I (Latitude- 11.1006° N; Longitude- 78.0213° E), S-II (11.0980° N; 78.0345° E) and S-III (11.1028° N; 78.9653° E). There were minor variations in the agronomic practices at all sampling sites. These sampling sites were monoculture rice fields surrounded by grassy strips/bunds (Fig. 1).

2.3. Storage and preservation:

Insects were collected in plastic jars (4×6 inches) containing 75% ethanol. Collected specimens were brought to the laboratory in the Department of Zoology, Kandaswami Kandar's College, Paramathi Veir, Namakkal District of Tamil Nadu. After washing with alcohol spiders were transferred to clean glass vials (20 ml) with the help of forceps for morphological study containing Odd man's solution (70% ethanol, 15% glacial acetic acid and 15% glycerol).

2.4. Data analysis:

Calculations of spider diversity and dominance were based on adult individuals only. The collected data were subjected to Diversity Index (Species richness [S], Evenness and Shannon Index) by PAST statistical software. To find out the relationships between spiders and different abiotic and biotic factors, correlation analysis was performed. Because the data were not normally distributed (Kolmogorov-Smimov test), Spearman's rank correlation method requires at least seven pairs of observations (Fowler et al., 1998), only the most abundant spider species were included in the analysis. The relationships were analyzed between individual spider species or spider diversity indices and different vegetation and non-vegetation variables. The statistical significance of the correlation analysis was checked by comparing coefficient r_s with the obtained p value. PCA was performed by Palaeontological Statistics (PAST) version 3.06

3. Results and Discussion:

3.1. Percentage composition of spider groups:

In the present investigation, 1079 spiders were identified from the selected agriculture area and they are representing 19 species that belong to 9 families. Out of the total catch, 148 spiders were immature and identified up to the genus level due to the unavailability of keys for juvenile identification. However, the remaining 1136 specimens were mature. Several diversity indices were used in the present study to measure the spider species diversity. The percentage composition of spider diversity in the agriculture field was calculated, maximum of 32% of

spider species were recorded in Araneidae, followed by Tetragnathidae (16%), Salticidae (11%), Sparassidae (11%), Oxyopidae (10%), Clubionidae (5%), Gnaphosidae (5%), Hersiliidae (5%) and Lycosidae (5%) and they were shown in Fig. 2. Site III showed total species of 504, followed by site II 404 species and site I 376 species in the total number of species 1284 (Table 1).

Araneidae family was found to be the 6 species such as *A. catenulata* (Fig. 4a), *A. anasuja* (Fig. 4b), *A. picta* (Fig. 4c), *A. ventricosus* (Fig. 4d), *A. diadematus* (Fig. 4e) and *N. crucifera* (Fig. 4f) abundant followed by Tetragnathidae family 3 species (*T. elongate*, *T. guatemalensis* and *T. laboriosa*) (Fig. 5 a, b, c), Salticidae family 2 species (*T. dimidiata*, *T. elegans*) (Fig. 6a, b) and Sparassidae family 2 species (*H. venatoria*, *O. millet*) (Fig. 7a, b), Oxyopidae family 2 species (*P. viridans*, *O. macilentus*) (Fig. 8a, b), Clubionidae family (*C. terrestris*) (Fig. 9), Gnaphosidae family (*S. montanus*) (Fig. 10), Hersiliidae family (*H. caudate*) (Fig. 11) and Lycosidae family (*H. aspersa*) (Fig. 12).

3.2. Ecological Indices (Diversity indices):

In the present investigation, various diversity index parameter was studied for the spider diversity which was noted in the 3 different agriculture sites. According to the observation, Richness varies from 16 to 18, True Diversity ranges from 12.5 to 14, Shannon Entropy observed from 2.6268 to 2.7382 and Simpson Dominance range from 7.20% to 8.00%. During this study, compared to all the study areas a maximum species richness was observed in Site III (Table 2).

3.3. Dominance Plot and Group average in the study area:

The percentage dominance of the spider community was plotted based on their rank individually and cumulatively. The highest number of species was found in site III at this Pandamangalam (Fig. 3).

3.4. The principal component analysis (PCA):

In the present investigation, the principal component analysis was employed to study variables of spider diversity among selected agriculture sites and the results were represented using a biplot. In the present study, species variables were developed using three principal components. The result showed the influence of different spider species diversity with three selected study sites (Site I, II and III). Angular distance and length of the arrows indicated the positive and negative correlation with the variables assemblage. Figure demonstrated that site III influences greater diversity of spiders than Site I and II (Fig. 13 and 14).

4. Discussion:

Generally, spiders are considered ingenious predators and they can regulate the huge number of pests and they play a major role in the paddy field pest management. Few works related to spider diversity in paddy plantations were recorded including Pathak and Saha (1998); Ambalagan and Narayanasamy (1999); Bambaradeniya and Edirisinghe (2001); Bambaradeniya et al. (2004); Patel et al. (2004); Vijaykumar (2004). During the current study we compared the authenticity identification of spiders from three village sites, Namakkal district of Tamil Nadu in India with eye patterns approaches reference library for spider fauna of Tamil Nadu, India.

The result obtained from the present investigation was confirmed that paddy crops served as a reservoir for the spider species. About 1079 spiders were identified from the selected agriculture area and they are representing 19 species that belong to 9 families. Ashfaq et al. (2019) reported nearly 38 distinguished morphospecies of spiders. One of the difficultly faced

during this study was the accuracy of the morphological examination. Nearly 148 spiders were immature and identification key was not available for those spiders and deprivation of diagnostic characters of juvenile spiders could be the possible reasons for the present less accuracy of morphological evaluation. Another important factor that plays a role in spider diversity was habitat complexity and this reason was also stated in many research findings (Dobel et al., 1990; Gunnarsson, 1990). Paddy field ecosystems were generally very simple and relatively few substrates were required for web building and hunting and added to it the complexity of increased time as the plants grow and this could be a reason spider species abundance in the present study. According to Stokmane and Spungis (2014), diversity indices suggested that the grass-dwelling spider community consists of few abundant species and numerous rare species. In another study, Ambalagan and Narayanasamy (1999) concluded that both spider abundance and richness is linked to the various phase of rice growth. Spungis (2005) was the one reported Latvia spider species in the year 2004 and this was followed by Cera et al., (2010). In the present study, Araneidae was noted as a dominant family in the selected study area and this was correlated with the finding of Manju et al. (2005) and Shegokar (2012). According to the observation of Tiwari and Singh (2021), only 3 species of spiders are distributed widely; *Dendrolycosa gitae* (11 Indian states, 1 Union territory), *Nilus albocinctus* (8 Indian states, 1 Union Territories), and *Perenethis venusta* L. (8 Indian states). In another study, family of Araneidae constituting 4 species from 3 genera in Mannavan Shola Forest, in Kerala. The increased spider population belongs to Araneidae and Tetragnathidae (orb-web spiders) could be due to mixed vegetation of the forest, which provides enough space to build webs of different sizes and protection from predators (Sudhikumar et al., 2005). Further, vegetation structure has been hypothesized to influence spiders diversity, but this impact may present in Specific subgroups or guilds within spiders (Rodrigues et al., 2014). Nevertheless, there were quite a lot of associations between spiders and individual plant species. The DCA showed quite a similar pattern-some of the individual plant species were fairly important for spider communities. These reports partly support research by other authors (Uetz, 1991; Pozzi et al., 1998; Jimenez-Valverde and Lobo, 2007; Hore and Uniyal, 2008) who have found that vegetation structure is one of the major habitats features explaining spider species composition.

In addition, Araneidae population showed consistent increasing trends among the populations of immature and adults from January to August (Tahir et al., 2009). In Estonia, the investigation surveyed different mire types (including fens, transitional mires and bogs) but these data are quite old materials that were collected by a sweep net from 1947 to 1976 (Vilbaste, 1980). A total of 32 species were discovered from a limited area of Pune University (Wankhade et al., 2012), and out of the 252 genera from the Indian region (Manju et al., 2005), 38 genera are observed in Sellappampatty village. Similar spider genera were recorded in the other Indian spider studies viz., 33 genera in Andaman and Nicobar Islands, 41 genera in Sikkim, 47 genera in Calcutta, 40 genera and 51 species in Mangalavanam, Kerala, India (Tikader, 1977; Tikader et al., 1981; Sebastian et al., 2005).

5. Conclusion:

Further study will focus on some other sampling periods and growing seasons to evaluate the spider diversity of Tamil Nadu. In addition, our sampling method was restricted only to eyes patterns of spiders, other collection methods are required to be used in future studies to obtain a more complex overview of the spider fauna of the studied habitats. The present study may be

considered more like an eyes pattern in morphological studies, and the topic deserves future investigations because there is still a lot to learn about spider fauna.

6. Acknowledgements:

Authors are gratefully acknowledged to the Associate Professor and Head, Department of Zoology, Kandaswami Kandar's College, Paramathi Velur, Namakkal District, Tamil Nadu in India.

7. References:

- [1]. Ambalagan G and Narayanasamy P. Population Fluctuation of Spiders In The Rice Ecosystem Of Tamil Nadu. *Entomon-Trivadrum* 1999; 24 (1): 91-95.
- [2]. Ashfaq M, Blagoev G, Tahir HM, Khan AM, Mukhtar MK, Akhtar S, Butt A, Mansoor S. and Hebert PDN. Assembling a DNA barcode reference library for the spiders (Arachnida: Araneae) of Pakistan 2019; *PLoS One*, 14: 5. <https://doi.org/10.1371/journal.pone.0217086>.
- [3]. Ball SL and Armstrong KF. DNA barcodes for insect pest identification: A test case with tussock moths (Lepidoptera: Lymantriidae). *Can. J. For. Res* 2006; 36: 337-350. <https://doi.org/10.1139/x05-276>.
- [4]. Bamdaradeniya CNB, Edirisinghe JP. The Ecological Role Of Spiders In The Rice Fields Of Sri Lanka. *Biodiversity* 2001; 2 (4): 3-10.
- [5]. Bambaradeniya CNB, Edirisinghe JP, De Silva DN, Gunatilleke CVS, Ranawana KB, Wijekoon S. Biodiversity Associated With An Irrigated Rice Agro-Ecosystem In Sri Lanka. *Biodiversity And Conservation* 2004; 13: 1715-1753.
- [6]. Barrett RDH. and Hebert PDN. Identifying spiders through DNA barcodes. *Can. J. Zool* 2005; 83: 481-491. <https://doi.org/10.1139/z05-024>.
- [7]. Center Africa Rice. Boosting Africa's rice sector: A research for development strategy 2011– 2020. Cotonou, Benin; 2011
- [8]. Cera I, Spunġis V, Melecis V. Occurrence of grass-dwelling spiders in habitats of Lake Engure Nature Park. *Environ Exp Biol* 2010; 8:59–69.
- [9]. Fontaneto D, Kaya M, Herniou EA and Barraclough TG. Extreme levels of hidden diversity in microscopic animals (Rotifera) revealed by DNA taxonomy. *Mol. Phylogen. Evol* 2009; 53: 182-189. <https://doi.org/10.1016/j.ympev.2009.04.011>.
- [10]. Fowler J, Cohen L, Jarvis P. *Practical statistics for field biology*. Wiley, New York; 1998.
- [11]. Hamilton CA, Formanowicz DR and Bond JE. Species delimitation and phylogeography of *Aphonopelma hentzi* (Araneae, Mygalomorphae, Theraphosidae): Cryptic diversity in North American tarantulas 2011; *PLoS One*, 6: e26207. <https://doi.org/10.1371/journal.pone.0026207>.
- [12]. Hebert PDN. and Gregory TR.. The promise of DNA barcoding for taxonomy. *Syst. Biol.* 2005; 54: 852859. <https://doi.org/10.1080/10635150500354886>.
- [13]. Hore U, Uniyal VP. Influence of space, vegetation structure, and microclimate on spider (Araneae) species composition in Terai Conservation Area, India. *Eur Arachnol* (2008) ; 14:71–77.
- [14]. Houbraken M, Bauweraerts I, Fevery D, Van Labeke MC and Spanoghe P. Pesticide knowledge and practice among horticultural workers in the LâmĐôngregion, Vietnam: A case study of chrysanthemum and strawberries. *Sci. Total Environ* 2016; 550: 1001-1009. <https://doi.org/10.1016/j.scitotenv.2016.01.183>.

[15]. Iftikhar R, Ashfaq M, Rasool A and Hebert PDN. DNA barcode analysis of thrips (Thysanoptera) diversity in Pakistan reveals cryptic species complexes 2016; PLoS One, 11: e0146014. <https://doi.org/10.1371/journal.pone.0146014>.

[16]. Jimenez-Valverde A, Lobo JM. Determinants of local spider (Araneidae and Thomisidae) species richness on a regional scale: climate and altitude vs. habitat structure. Ecol Entomol 2007; 32:113– 122

[17]. Karunamoorthi K and Mohammed M. Knowledge and practices of farmers with reference to pesticide management: implications on human health. Arch. Environ. Occup. Hlth 2012; 67: 109-116. <https://doi.org/10.1080/19338244.2011.598891>.

[18]. Magurran AE. Measuring biological diversity. Blackwell Publishing, Oxford; 2004.

[19]. Maloney D, Drummond FA and Alord R. Spider predation in agroecosystems: Can spiders effectively control pest population. MAFES Tech. Bull 2003; 190: 1-32.

[20]. Manju Siliwal, Sanjay Molur and Biswas BK. Indian Spiders (Arachnida: Araneae): Updated Checklist. Zoos' Print journal 2005; 20(10): 1999-2049.

Table 1. Check list of spider species in three different sites of Namakkal district during 2020 to 2021

Family	Species	Site I	Site II	Site III	Total
		No. of Sp.	No. of Sp.	No. of Sp.	
Araneidae	<i>Argiope catenulate</i>	+ (14)	+++ (53)	++ (32)	99
	<i>Argiope anasuja</i>	++ (20)	++ (24)	+++ (49)	93
	<i>Argiope picta</i>	+++ (46)	+++ (41)	+++ (40)	127
	<i>Araneus ventricosus</i>	+++ (42)	++ (23)	+++ (45)	110
	<i>Araneus diadematus</i>	++ (27)	++ (30)	++ + (52)	109
	<i>Neoscona crucifera</i>	++ (23)	+++ (41)	++ (27)	91
Clubionidae	<i>Clubiona terrestris</i>	++ (18)	+ (6)	++ (16)	40
Gnaphosidae	<i>Sergiolus montanus</i>	+ (8)	-	+++ (41)	49
Hersiliidae	<i>Hersilia caudate</i>	+ (5)	++ (18)	+ (8)	31
Lycosidae	<i>Hogna aspersa</i>	++ (36)	+ (13)	++ (32)	81
Oxyopidae	<i>Peuceitia viridans</i>	+ (9)	++ (16)	++ (17)	42
	<i>Oxyopes macilentus</i>	++ (16)	+++ (36)	-	52
Salticidae	<i>Telamonia dimidiata</i>	+++ (45)	-	+ (10)	55
	<i>Telamonia elegans</i>	++ (21)	-	+++ (48)	69
Sparassidae	<i>Heteropoda venatoria</i>	-	+++ (37)	++ (15)	52
	<i>Olios millet</i>	-	++ (18)	++ (16)	34
	<i>Tetragnatha elongata</i>	++ (13)	+++ (31)	+ (10)	54
Tetragnathidae	<i>Tetragnatha</i>	+ (6)	+ (8)	+++ (36)	50
	<i>guatemala lensis</i>				
	<i>Tetragnatha laboriosa</i>	++ (27)	+ (9)	+ (10)	46
					1284

+++ = highly presence, ++ = normal presence, + = low presence, - = absence,

Table 2. Diversity index of spider diversity

Index	Site 1	Site 2	Site 3	Total
Number of Classes N	19	19	19	19
Richness R	17	16	18	19
Berger Parker Index p_{imax}	13.30	13.10	10.30	9.90%
	%	%	%	
Shannon Entropy ¹ H (nat)	2.6727	2.6268	2.7382	2.8597
Shannon Entropy ¹ H (bit)	3.8559	3.7897	3.9504	4.1256
Number Eq. ¹ D (True Diversity)	14.5	13.8	15.5	17.5
Shannon Equitability	90.80	89.20	93.00	97.10
$H/\ln N$	%	%	%	%
Simpson Dominance SD	7.80%	8.00%	7.20%	6.20%
SD (unbiased - finite samples)	7.50%	7.80%	7.00%	6.10%
True Diversity ² D (Order 2)	12.8	12.5	14	16.2
Gini-Simpson Index $1-SD$	92.20	92.00	92.80	93.80
	%	%	%	%
Gini-Simpson Equitability	97.30	97.10	98.00	99.00
	%	%	%	%

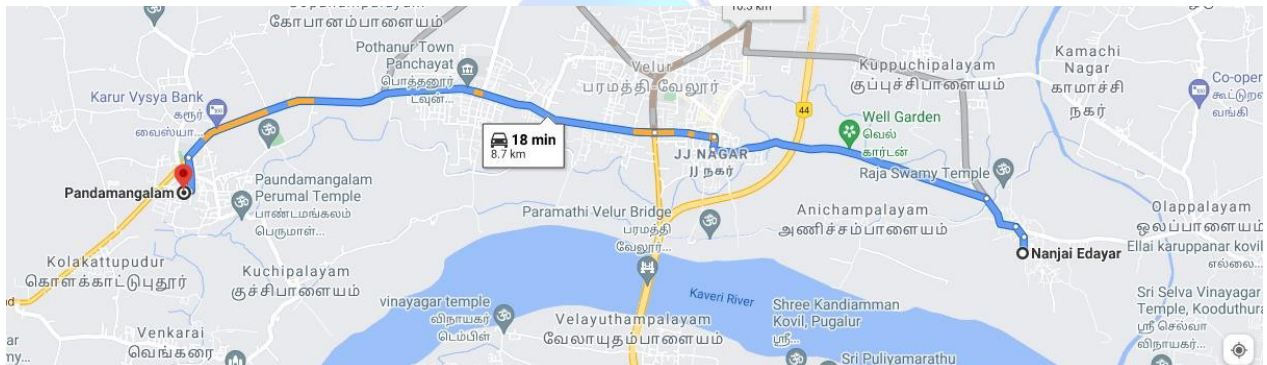


Fig. 1. Selected Study Area for Spiders diversity

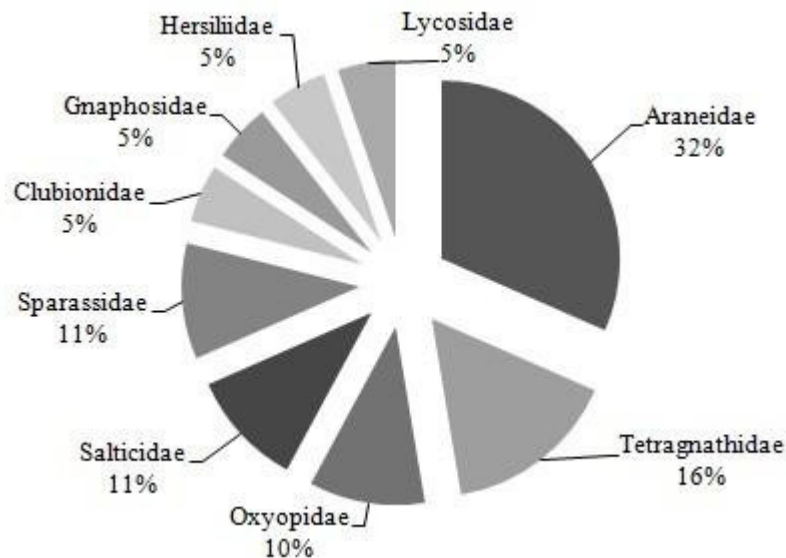


Fig. 2. Percentage composition of the different classes of Spiders – Pie chart

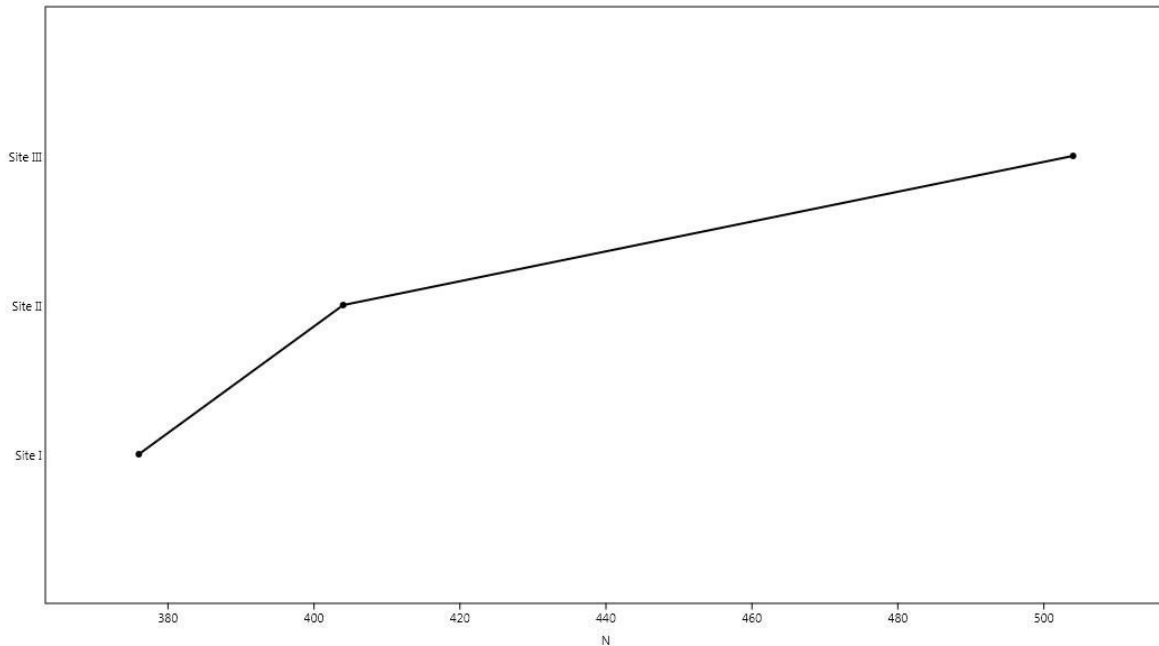


Fig. 3. Dominance Plot in all the selected study areas



Fig 4. Araneidae family *A. catenulata* (Fig. 4a), *A. anasuja* (Fig. 4b), *A. picta* (Fig. 4c), *A. ventricosus* (Fig. 4d), *A. diadematus* (Fig. 4e) and *N. crucifera* (Fig. 4f)

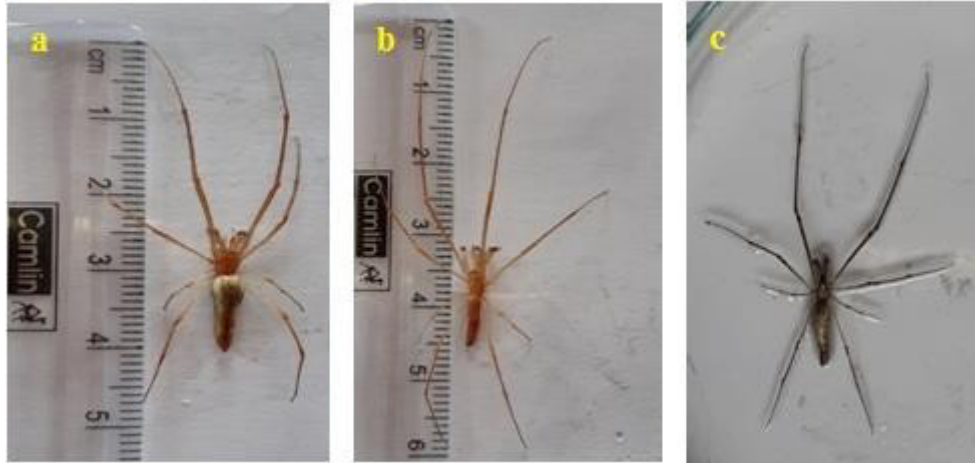


Fig 5. Tetragnathidae family - *T. elongate* (Fig 5a), *T. guatemalensis* (Fig 5b) and *T. laboriosa* (Fig 5c)



Fig. 6. Salticidae family *T. dimidiata* (Fig 6a), *T. elegans* (Fig 6b)

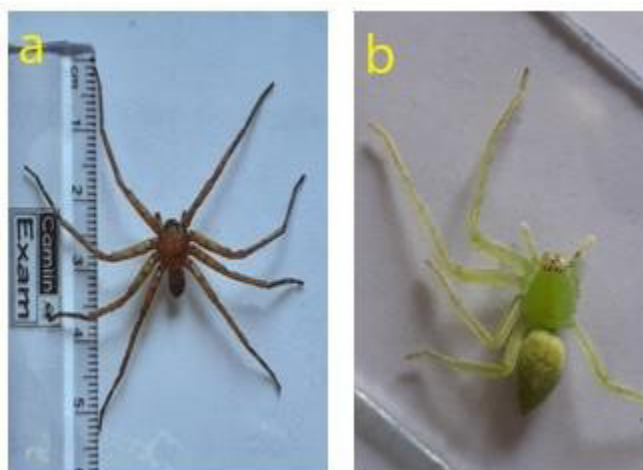


Fig. 7. Sparassidae family *H. venatoria* (Fig 7a), *O. millet* (Fig 7b)



Fig. 8. Oxyopidae family *P. viridans* (Fig 8a), *O. macilentus* (Fig 8b)



Fig. 9. Clubionidae family (*C. terrestris*)



Fig. 10. Gnaphosidae family (*S. montanus*)



Fig. 11. Hersiliidae family (*H. caudate*)



Fig. 12. Lycosidae family (*H. aspersa*)

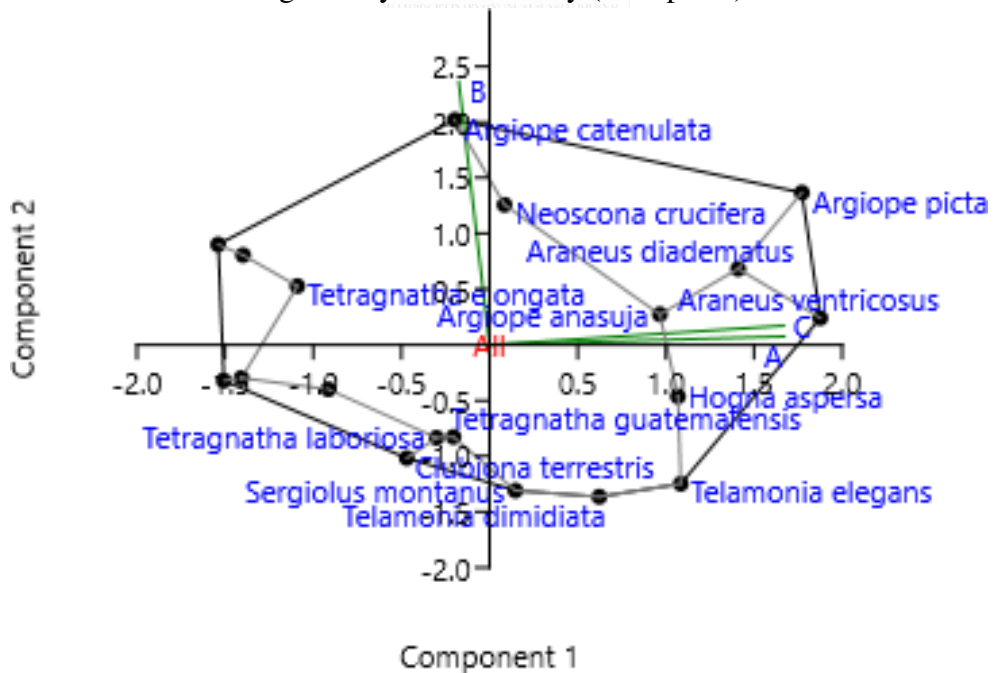


Fig. 13. The principal component plot of Sites I and II

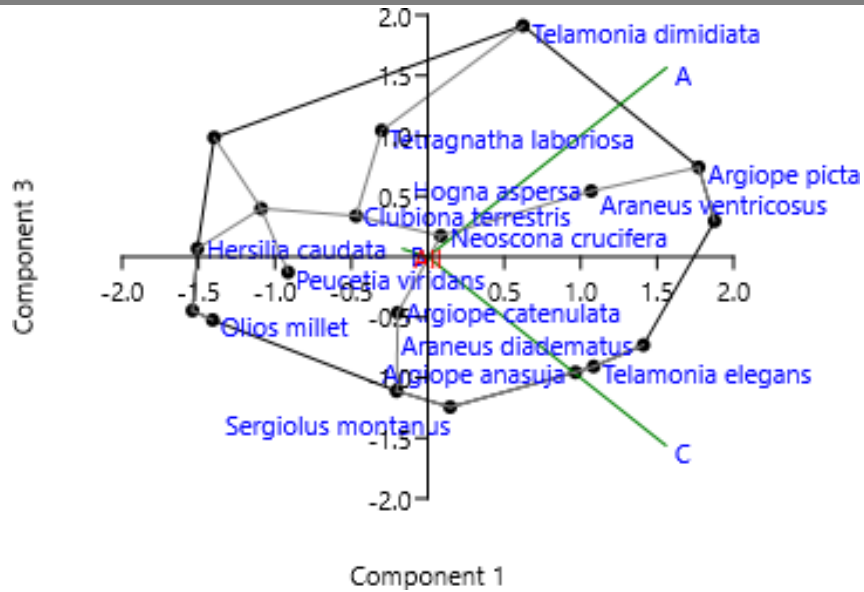


Fig. 14. The principal component plot of sites I and III



Papaya Mealybug and its Management

M. B. Gade¹ C. G. Gade² A. V. Kale³

¹ Assistant Professor, Department of Zoology, Mula Education Society's, Arts, Commerce and Science College, Sonai Tal. Newasa, Dist. Ahmednagar

² Department of Zoology, New Arts, Commerce & Science College, Ahmednagar

³ Assistant Professor, Department of Zoology, Mula Education Society's, Arts, commerce and science college, Maka Tal. Newasa Dist. Ahmednagar 414501

affiliated with Savitribai Phule Pune University, Pune. (M.S.) India.

Email Id: manishagade684@gmail.com

gadechaitrali41@gmail.com

adinathkale00@gmail.com

Abstract:

A survey was conducted in the village Baragaon Nandur, from Ahmednagar District, Maharashtra 413705, India. A total number of 2 Papaya farms were visited with each farms having more than 20 plants. The papaya mealy bug, *Paracoccus marginatus* Williams and *Granara de willink* (Hemiptera : Pseudococcidae), is recorded from the oriental region for the first time, where it was found in Indonesia (java) and India (Tamil Nadu) in 2008. Papaya mealybug is a polyphagous pest that damages many tropical crops. A native of central America, it spread to the Caribbean region and South America in the 1990s; since then it has been accidentally introduced to some islands in the Pacific region. The distribution, host range and characteristics of the mealybug are summarized. It's host range includes more than 60 species of plants including Papaya, Hibiscus, range in vegetables, fruits, flowers, ornamental crops and weeds. It includes agricultural and horticultural crops, trees in Tamil Nadu state of India during 2009-2010. In present investigation was conducted during the spring season. The plant was diagnosed the mealybug. During June-July period it was observed in Papaya plant. In Baragaon Nandur, Maharashtra 413705, India it was observed that white colour mealybug are spread all over the plant. The controlling of mealybugs the chemical controls method are more effective and fast method.

Keywords: Mealybug, *Paracoccus marginatus*, Baragaon nandur, polyphagus

Introduction:

Papaya mealy bug (*Paracoccus marginatus*) causes severe economic damage in cassava yield.[2] The mealy bugs are white to pink in colour and measure 3-4 mm in length. Adult females are oval and somewhat round, dark green to almost black in appearance. mature female lays eggs in an egg sac of white wax, usually clusters on the twigs, branches of the host plant.[8] Reasons faster spread of mealy bug – A white wax and flour- like substance around the body of the pest is the reason for not able to control this pest easily. This pest spread rapidly due to lack of natural enemies of these pests and it is a foreign originated insect. Also, reproduction of this mealy bug is 15 times a year. An insect lays between 500 and 600 eggs a year. The population is growing at a higher level, thus causing great damage.

They are found in colonies. It was causing the harm to the Papaya plant as well as hibiscus plant. It is small polyphagus sucking insect with pest status that attacks several genera

of host plants.[7] The infection of Papaya adversely affects on the plant growth and leaf yield as well as fruit quality.[9]

The Papaya mealybug feeds on the sap of plants by inserting its stylets into the epidermis of the leaf, as well as into the fruit and stem. In doing so, it injects a toxic substances into the leaves. [6] The result is chlorosis, plant stunting, leaf deformation, early leaf and fruit drop, a heavy build-up of honeydew, and death. Papaya mealy bug has only been recorded feeding on areas of host plant that are above ground, namely the leaves and fruit.[4]Ecologically occurring predators of mealybugs include lady beetles, green and brown lacewings, spiders. Also keep ants out of mealybug- infested areas and plants because ants protects mealybugs from their natural enemies. [11]

Materials And Method:

A survey was conducted in the village Baragaon Nandur, Maharashtra 413705, India. A total number of 2 Papaya farms were visited with each farms having more than 20 plants. In present investigation was conducted during the spring season. The plant was diagnosed the mealy bug. During June-July period it was observed in Papaya plant white colour mealy bug are spread all over the plant. They are found in colonies.

Management:

- a. **Chemical control-** A numbers of chemical are available to control mealybugs, although none are currently registered specifically for control of Papaya mealybug.[3] Active ingredients in registered pesticide formulations include Acephate, Carbaryl, Chlorpyrifos, Diazinon, Dimethoate, Malathion. It also including soap water& detergent spray effective to control the mealy bug.[10]

Products to control mealy bugs on Papaya:

Molecule	Dosage per litre of water	Trade name
Imidomethaxom	5 gm	Imidan or Caper
Dimethoate	gm	Imidor
Impyradifurone	ml	Imivanto

Table 1.Sprays

Molecule	Dosage per plant	Trade name
Imartap Hydrochloride 4 % G	10-30 gm/Plant	Imaldan 4G
5 % Granular formulation of Carbofuran	15-50 gm/Plant	Imiradan 3G

Table 2.To apply under the infested tree on the soil

b. Cultural and Mechanical Control:

- Sticky bands or a band of insecticide or alkathene sheet applied to around the trunk of papaya plants.
- These method is useful for to preventing movement of crawlers and ants. The already present ant colonies are destroyed.
- To proper sanitize farm equipment before using uninfected crops and sanitize the equipment tools use 1% bleach solution or high pressure water to clean the tools.
- When infection of papaya mealybugs are less they may be picked off by the hand.
- To avoid flood irrigation to prevent spread the mealybug to other plants.[12]

Result And Discussion:

Investigation conducted at spring season. The white mealy bugs are observed in period of June- July at Baragaon Nandur, Maharashtra 413705. The controlling of Papaya mealy bugs are used the three methods I.e. chemical control, Cultural and Mechanical controls. In a chemical controls includes the active ingredients pesticides i.e. Acephate, Carbaryl, Chlorpyrifos, Diazinon, Dimethoate, Malathion, etc are spread. In a cultural and mechanical controls also used many methods i.e. sticky band, destroy colony, hand picking, etc. [1] When the infestation are more than the chemical control is more suitable as compare to cultural and mechanical method. The chemical control are very fast and more effective method and less damage to crops. The cultural and mechanical method are slow and less effective. It prevents only to spread the mealybugs to other host plant.[5]



Figure: 1 Papaya fruit infestation and damage caused by the Papaya mealy bug, *Paracoccus marginatus* Williams and Granara de Willink



Figure :2 Papaya leaf deformation caused by the Papaya mealy bug, *Paracoccus marginatus* Williams and Granara de Willink.

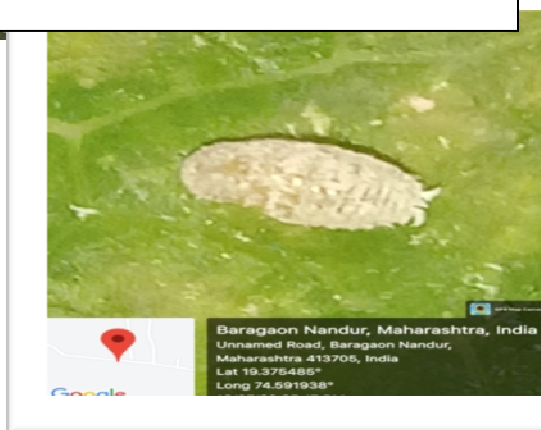


Figure 3: Nymphs and adults of
Paracoccus marginatus



Figure 4: After treatment with chemical,
Mechanical & Cultural method

Conclusion:

The present research paper investigates the papaya mealybugs at spring season period of June- July. It was observed that white colour mealybug are spread over the plant of papaya. The controlling of mealybugs was done using three methods. Out of them the chemical control method is very effective method as compared to cultural and mechanical method.

References:

1. Biswas, M.J.H., Khan, M.A.M., Ahmed, K.S., 2015. Control Strategies of Papaya Mealybug, *Paracoccus marginatus* Williams and Willink in the Laboratory Condition. *Int. J. Appl. Sci. Biotechnol.* 3, 687. <https://doi.org/10.3126/ijasbt.v3i4.13979>.
2. CABI *Paracoccus marginatus* (papaya mealybug). <https://www.cabi.org/isc/datasheet/39201> (Accessed in Dec 2019).
3. Goergen, G., Umeh, V., 2014. Classical Biological Control of Papaya Mealybug in West Africa 2–4. Gullan, P.J., Cranston, P.S., 2010. *The Insects an Outline of Entomology*, 4th ed. Wiley-Blackwell, West Sussex, U.K.
4. Mulwa J, Optipa M. and Wasilwa L. (2019). Papaya Mealybug (*Paracoccus marginatus*). KARO E-Mimea Plant clinic factsheet KALRO/CHP factsheet No.300. www.Kalro.OrgRoltsch, W.J.
5. Krishnan, J.U., George, M., Ajesh, G., Jr, J., Nr, L., 2016. A review on *Paracoccus marginatus* willams, papaya mealy bug (Hemiptera: Pseudococcidae). *J. Entomol. Zool. Stud.* 4, 528-533.
6. Walker, A., Hoy, M., Meyerdirk, D., 2018. Papaya mealybug, *Paracoccus marginatus* Williams and Granara de willink (Insecta: Hemiptera: Pseudococcidae). *Biol. Control* 1-7.
7. Miller, D.R., and G.L. Miller and Gillian W. watson, 2002. Invasive species of mealybugs (Hemiptera: Pseudococcidae) and their threat to U.S. Agriculture. *Proceedings of Entomological society of Washington* 104(4): 825-836.
8. Miller, D.R., and G.L. Miller, 2002. Redescription of *Paracoccus marginatus* Williams and Granara de Wilink (Hemiptera: Pseudococcidae) including descriptions of the immature stages and adult male. *Proceedings of Entomological society of Washington* 104(1):1-23.
9. N Sakthivel, S.M.H. Qadri , R. Balakrishna, M.V. Kirsur, S. M. Helen. Management strategies of papaya mealybug infesting mulberry, Technical Bulletin, January 2012, regional Sericultural research Station, central Silk Board, Alikkuttai, Salem, India. 2002. pp 4.
10. R.C. Saxena. Atifeedants in tropical pest management. *Insect Sci. Appl.* Vol.8 Pp.731-736. 1987.
11. Mastoi, M.I., Adam, N.A., Muhamad, R., Ghani, I.A., 2014. Survey of Papaya Mealybug, *Paracoccus marginatus* (Hemiptera: Pseudococcidae) and its natural enemies in Penninsular Malaysia. *Pak. J. Agril. Engg., Vet. Sci.*, 30, 172-186.
12. Walker, A., Hoy, M., Meyerdirk, D., 2018. Papaya Mealybugs, *Paracoccus marginatus* Williams and Granara de Willink (Insecta: Hemiptera: Pseudococcidae). *Biol. Control* 1-7.

Effects of Air Pollution on Human Health : A Geographical Analysis

Manisha

Research Scholar

Department of Geography

Baba Mastnath University, Rohtak, Haryana

e-mail- manishaantildahiya742@gmail.com

Abstract:-

Pollution occurs when contaminants are introduced into the natural environment, causing negative changes. Anything introduced into the atmosphere by humans that has a negative impact on the environment is considered air pollution. When chemicals or biological matter that can harm humans or other living things are released into the atmosphere, it is known as air pollution. Carbon dioxide, carbon monoxide, sulphur dioxide, and small particles pollute the air as a result of the combustion of various materials, particularly coal. These pollutants harm people by causing illness, but they also harm the environment by contributing to global warming. The lungs are the most affected by the major air pollutants. The eyes, nose, and throat are irritated by sulphur dioxide. When breathed, it can lead to serious lung conditions such as asthma, bronchitis, emphysema, and lung cancer. Nitrogen dioxide causes emphysema by damaging lung tissue and restricting airways. It also causes the development of ozone, which may eat holes in lung tissue, exacerbate asthma, and put patients at risk for respiratory illness. Carbon monoxide, which is odourless and undetectable, can cause heart and central nervous system damage, as well as headaches, dizziness, convulsions, and death.

Many contaminants are significant contributors to human illnesses. Air pollutants such as nitrogen oxide, sulphur dioxide, volatile organic compounds (VOCs), dioxins, and polycyclic aromatic hydrocarbons (PAHs) are all dangerous to people. When breathed in at high concentrations, carbon monoxide can cause immediate poisoning. Natural catastrophes and climate change caused by pollution have an impact on the geographic spread of many infectious illnesses. Only public awareness combined with a multidisciplinary approach by scientific specialists will be able to handle this problem; national and international organisations must address the threat's rise and suggest long-term remedies. The current article focuses on effects of air pollution on human health in India.

Keywords : Air pollution, pollution, Pollutants, Human health, Carbon dioxide.

Introduction:-

Chemicals, particles, or biological substances that harm other living things like food crops or the environment are referred to as air pollutants. Air pollution also refers to the release of substances into the atmosphere that cause human discomfort, sickness, or death. In order for life to exist on Earth, the atmosphere, a dynamic natural gaseous system, must be maintained. Long acknowledged as a danger to human health, the stratospheric ozone hole is caused by air pollution. According to the 2008 Blacksmith Institute World's Worst Polluted Places study, indoor air pollution and poor urban air quality are two of the most dangerous toxic pollution issues in the world. Air pollution is the term for the noxious gases and tiny solid and liquid particles (particulates) in the air that are present in high enough quantities to pose a threat to human health. Transportation engines, the production of power and heat, industrial activities, and the burning of solid waste are the main contributors of air pollution. Nitrogen oxides, gaseous

hydrocarbons, carbon monoxide, as well as significant amounts of particulates, primarily lead, are the main pollutants produced by the burning of gasoline and other hydrocarbon fuels in cars, trucks, and jet aircraft. Nitrogen oxides and hydrocarbons react in the presence of sunshine to generate a second category of pollutants known as photochemical oxidants, which includes ozone and the eye-stinging peroxyacetyl nitrate (PAN). Nitrogen dioxide, a vile-smelling brown gas, is created when nitrogen oxides combine with oxygen in the air. In cities like Delhi, where traffic is the major source of air pollution, nitrogen dioxide gives the air a brown colour that combines with other pollutants and water vapour in the atmosphere to form brown smog.

Pollutants: An air pollutant is a material in the atmosphere that has the potential to harm both people and the environment. The three different types of pollutants are solid particles, liquid droplets, and gases. They might also be created by nature or by humans. Primary and secondary pollutants can both be categorised. Primary pollutants are often discharged directly from a process, such as sulphur dioxide produced from industries, carbon monoxide gas from car exhaust, or volcanic ash. Direct emissions of secondary pollutants do not occur. Instead, they develop in the air as a result of interactions between basic pollutants. One of the several secondary pollutants that contribute to photochemical smog is ground level ozone, which serves as an excellent illustration of a secondary pollutant. Some pollutants can be both primary and secondary, which means they can both be produced directly from other primary pollutants and discharged themselves.

Pollutant categories:

The burning of fossil fuels, which are used to produce energy and power vehicles, is mostly to blame for the change in the composition of the atmosphere. Numerous air pollutants have been identified, each with unique chemical make-ups, reaction characteristics, emission patterns, environmental permanence, capacity for long-distance or short-distance transport, and potential effects on human and/or animal health. However, they do have some things in common, and they fall into one of four categories:

- 1) Gaseous pollutants
- 2) Persistent organic pollutants
- 3) Heavy metals
- 4) Particulate Matter

Gaseous pollutants-

the principal cause of gaseous pollutants, which greatly alter the composition of the atmosphere, is the burning of fossil fuels. Nitrogen oxides are released as NO, which combines quickly with ozone or other airborne radicals to generate NO₂. Mobile and stationary combustion sources are the principal anthropogenic sources of pollution. On the other hand, incomplete combustion results in the production of CO. The main source of it is also the road system. The so-called volatile organic compounds are a significant class of substances that fuel combustion, particularly processes for energy generation and road transportation, which are the main source of emissions (VOCs). This group of substances contains chemical species with an organic character, including benzene. Despite the fact that the majority of gaseous pollutants are breathed and primarily have an adverse effect on the respiratory system, they can also cause cancer and haematological issues (CO, benzene).

persistent organic pollutants-

a harmful class of chemicals is composed of persistent organic pollutants. They last in the environment for a very long time, and as they ascend the food chain, their impacts become more pronounced (bio-magnification). Pesticides, as well as dioxins, furans, and PCBs, are among them. When materials containing chlorine (such plastics) are burnt, incomplete combustion and other processes can produce dioxins. Dioxins are airborne pollutants that deposit on soil and water but do not pollute groundwater supplies because they are water insoluble. Most dioxins in plants come from air and dust or pesticides and enter the food chain.

Heavy metals-

basic metal elements including lead, mercury, cadmium, silver, nickel, vanadium, chromium, and manganese are examples of heavy metals. They may penetrate water and the human food supply and are naturally occurring parts of the earth's crust that cannot be damaged or degraded. They can also be carried by air. Additionally, they are released into the environment via a number of sources, such as industrial plants, waste water discharges, and combustion. Due to their propensity to bio-accumulate in the human body, most heavy metals are hazardous. When a chemical's concentration in a biological organism rises over time relative to its concentration in the environment, this is referred to as bio-accumulation.

Particulate matter the term "particulate matter" (PM) refers to a class of air pollutants made up of complex and variable combinations of particles floating in the air that we breathe. These particles range in size and composition and are created by a wide range of anthropogenic and natural processes (Poschl, 2005). Factories, power plants, waste incinerators, automobiles, construction activities, fires, and naturally occurring windblown dust are major causes of particle pollution. The size of the particles varies (PM_{2.5} and PM₁₀ for aerodynamic diameter smaller than 2.5 mm and 10 mm, respectively), and different categories have been established: ultrafine particles with an aerodynamic diameter smaller than 0.1 mm, fine particles with an aerodynamic diameter between 1 mm and 1 millimetre, and coarse particles with an aerodynamic diameter greater than 1 mm. In terms of mortality as well as cardiovascular and pulmonary impacts, there is compelling evidence that ultra-fine and tiny particles are more dangerous than bigger ones (coarse particles).

Routes of exposure:-

Dermal contact is a very insignificant way for humans to be exposed to various air contaminants, with inhalation and ingestion being the main routes. Ingestion is frequently the main route of pollutant intake since air pollution greatly adds to the contamination of food and water (Thron, 1996). Pollutants may be absorbed through the gastrointestinal and respiratory tracts, and several hazardous chemicals can be discovered in the bloodstream and deposit in various tissues. Excretion helps with elimination to some extent.

Health effects:-

Sporadic air pollution occurrences, such as the famous London fog of 1952, and a number of short and long terms epidemiological studies looked at the consequences of changes in air quality on human health. According to (Brunekreef M. Kampa, E. Castanas / Environmental Pollution 151 (2008) 362e367 363 and Holgate, 2002), air pollution is linked to higher mortality and hospital admissions. The varying chemical makeup of air pollutants, the quantity and duration of exposure, and the fact that people are more likely to be exposed to pollutant mixes than single compounds can all have various effects on human health. The impacts on human health might vary from nausea to breathing difficulties to skin irritation to

cancer. They also include birth disorders, severe developmental delays in children, and decreased immune system function, which can lead to a variety of illnesses. Furthermore, there are a number of risk variables, including age, nutritional status, and predisposing diseases. Acute, chronic, non-cancerous, and malignant health impacts can be separated. The cardiovascular and breathing systems are the most impacted systems, according to epidemiological and animal model studies. However, the function of a variety of other organs can also be affected.

1) Effects of air pollutants on different organs and systems:-

Effects On Respiratory System:-

According to several studies, all kinds of air pollution can harm the airways when present in high concentrations. Long-term exposure to lower pollutant concentrations, on the other hand, has similar consequences. Increased levels of sulphur dioxide, nitrogen oxides and certain heavy metals such as arsenic, nickel, or vanadium are usually associated with symptoms such as nose and throat irritation, followed by bronchoconstriction and dyspnoea, especially in asthmatic individuals. Particulate particles that penetrate the alveolar epithelium, as well as ozone, cause lung inflammation (Ghio and Huang, 2004). Pollutant-induced inflammation will aggravate the condition of people with lung lesions or illnesses. Furthermore, air pollutants such nitrogen oxides make people more susceptible to respiratory diseases (Chauhan et al. 1998). Finally, prolonged exposure to ozone and certain heavy metals impairs lung function with the latter also causing asthma, emphysema, and lung cancer. Mice exposed to nitrogen dioxide also developed emphysema-like lesions (Wegmann et al., 2005).

Effects On Cardiovascular System:-

Carbon monoxide binds to haemoglobin, altering its structure and lowering its oxygen-transfer capacity (Badman and Jaffe, 1996). Reduced oxygen availability can influence the performance of several organs (particularly those that consume a lot of oxygen, such as the brain and heart), resulting in poor concentration, sluggish reflexes, and disorientation. Apart from airway inflammation, particulate matter causes systemic inflammatory changes that impact blood coagulation. Air pollution can clog (cardiac) blood arteries, causing angina or even myocardial infarction, by irritating the lungs and causing alterations in blood clotting. Heavy metal contamination (particularly mercury, nickel, and arsenic) has been linked to symptoms such as tachycardia, high blood pressure, and anaemia due to an inhibitory influence on haematopoiesis (Huang and Ghio, 2006). Finally, epidemiologic studies have connected dioxin exposure to an increased risk of death from ischemic heart disease, and heavy metals have been proven to raise triglyceride levels in mice.

Effects On Nervous System:-

Heavy metals (lead, mercury, and arsenic) and dioxins have the greatest impact on the neurological system. After exposure to arsenic, lead, or mercury, neurotoxicity has been documented, with symptoms including memory loss, sleep difficulties, rage, exhaustion, hand tremors, impaired vision, and slurred speech. Lead exposure, in particular, damages the dopamine system, glutamate system, and N-methyl-D-Aspartate (NMDA) receptor complex, all of which are involved in memory activities. Mercury is also linked to several types of brain tumours. Children's mental development is harmed by dioxins because they slow down nerve conduction velocity.

Effects On Urinary System:-

Heavy metals can cause kidney damage, which starts with tubular dysfunction and increased excretion of low molecular weight proteins, and continues to a lower glomerular

filtration rate (GFR). In addition, they increase the risk of stone formation or nephrocalcinosis and renal cancer (Boffetta et al., 1993; Vamvakas et al., 1993).

Effects On Digestive System:-

Dioxins cause liver cell damage (Kimbrough et al., 1977), as evidenced by an increase in the levels of certain enzymes in the blood, as well as gastrointestinal and liver cancer (Mandal, 2005).

2) Pregnancy And Exposure:-

It's also worth noting that air contaminants might have an impact on a growing foetus. Heavy metal exposure during pregnancy, particularly lead exposure, increases the chance of spontaneous abortion and stunted foetal development (pre-term delivery, low birth weight). There is also evidence that parental lead exposure causes prenatal abnormalities and lesions of the developing nervous system, producing significant impairment in the motor and cognitive functions of newborns. (Garza et al., 2006). Dioxins were also discovered to be passed from the mother to the foetus through the placenta. They function as endocrine disruptors, affecting the foetal nervous system's growth and development. (Wang et al., 2004). TCDD is a developmental toxin in all of the animals studied in this regard.

Conclusion:-

The detrimental impacts of several (air) contaminants on human health are discussed in this succinct summary. As demonstrated, severe dysfunctions of many organs are seen. The key finding is that, in light of people being exposed to a wider range of contaminants, dietary treatments high in foods derived from plants may protect against or lessen their effects on various organs. Numerous epidemiological studies on the positive impact of a Mediterranean-style diet on human health confirm this result.

References:-

- Badman, D.G., Jaffe, E.R., 1996. Blood and air pollution: state of knowledge and research needs. *Otolaryngol. Head Neck Surg.* 114, 205.
- Boffetta, P., Merler, E., Vainio, H., 1993. Carcinogenicity of mercury and mercury compounds. *Scand. J. Work Environ Health* 19, 1.
- Brunekreef, B., Holgate, S.T., 2002. Air pollution and health. *Lancet* 360, 1233.
- Chauhan, A.J., Krishna, M.T., Frew, A.J., Holgate, S.T., 1998. Exposure to nitrogen dioxide (NO₂) and respiratory disease risk. *Rev. Environ. Health* 13, 73.
- Garza, A., Vega, R., Soto, E., 2006. Cellular mechanisms of lead neurotoxicity. *Med. Sci. Monit.* 12, RA57.
- Gehring, U., Wijga, A. H., Brauer, M., Fischer, P., de Jongste, J. C., Kerkhof, M., Brunekreef, B. Traffic-related air pollution and the development of asthma and allergies during the first 8 years of life. *American journal of respiratory and critical care medicine*, 181(6), 2010, 596-603.
- Ghio, A.J., Huang, Y.C., 2004. Exposure to concentrated ambient particles (CAPs): a review. *Inhal. Toxicol.* 16, 53.
- Huang, Y.C., Ghio, A.J., 2006. Vascular effects of ambient pollutant particles and metals. *Curr. Vasc. Pharmacol.* 4, 199.
- Kimbrough, R.D., Carter, C.D., Liddle, J.A., Cline, R.E., 1977. Epidemiology and pathology of a tetrachlorodibenzodioxin poisoning episode. *Arch. Environ. Health* 32, 77.

- Mandal, P.K., 2005. Dioxin: a review of its environmental effects and its aryl hydrocarbon receptor biology. *J. Comp. Physiol.* 175, 221.
- Poschl, U., 2005, Atmospheric aerosols: composition, transformation, climate and health effects, *Angew. Chem. Int. Ed. Engl.* 44, 7520.
- Thron, R.W., 1996. Direct and indirect exposure to air pollution. *Otolaryngol. Head Neck Surg.* 114, 281.
- Vamvakas, S., Bittner, D., Koster, U., 1993. Enhanced expression of the protooncogenes c-myc and c-fos in normal and malignant renal growth. *Toxicol.Lett.*67, 161.
- Wang, S.L., Lin, C.Y., Guo, Y.L., Lin, L.Y., Chou, W.L., Chang, L.W., 2004. Infant exposure to polychlorinated dibenzo-p-dioxins, dibenzofurans and biphenyls (PCDD/Fs, PCBs) correlation between prenatal and postnatal exposure. *Chemosphere* 54, 1459.
- Wegmann, M., Fehrenbach, A., Heimann, S., Fehrenbach, H., Renz, H., Garn, H., Herz, U., 2005. NO₂-induced airway inflammation is associated with progressive airflow limitation and development of emphysema-like lesions in C57bl/6 mice. *Exp. Toxicol. Pathol.*56, 341.



Psychological Well-Being of College Teachers in Relation to Their Professional Development

Harpreet Kaur*

Dr. Nameshkumar**

Research Scholar, Department of Education, CT University Ludhiana, Punjab (India)

Professor, Department of Education, CT University Ludhiana Punjab, (India)

Abstract:

The purpose of conducting this study was to find out the Psychological well-being of college teachers in relation to their professional development. A sample of 150 women college teachers (75 humanities and 75 science stream) from Ludhiana district was selected through Stratified Random sampling technique. Psychological Well-being Scale developed by D.S. Sisodia and Pooja Choudhary (2019) and Professional Development scale by Butia (2014) was used for data collection. Mean, SD and t-test were used to compare the psychological well-being and professional development of humanities and science stream of women college teachers. The findings of the study revealed that i) there is no significant difference in the psychological well being of humanities and science women college teachers. ii) Significant difference was found in the professional development of humanities and science women college teachers. Humanities and science Stream of women college teachers were found to possess higher level of psychological well being as compared to professional development.

Keyword: Psychological well being, Professional development, College teachers

1. Introduction:

Education is the most powerful weapon which helps the pupils to become good human beings. The quality of citizens depend more upon the quality of their teachers as compare to their quality of education. Teacher's personality, character qualities, well-being, attitudes, teaching efficiencies and life style creating effective teaching learning situations and helps to contribute in society. The quality of education and the standard of achievement are inseparably inter-related with the quality of teachers. The success of the learner mainly depends on the ability of the teacher.

Teacher is the weapon for every contribution and invention. Our whole education system is controlled by teacher. The nation's well-being depends upon teacher's well-being. Teachers play the important role for transmission and spreading the knowledge and intellectual power in every human being. Naturally, they are the heart and soul of education system. The best teacher is not only imparts the whole educational modules allotted to him/her in the best and most efficient manner but also ensures the best possible academic performance and an effective development of the personalities of the learner's .

A teacher will be able to function effectively if he/she has a balanced personality and a sound mental state, thus well-being of teachers is important for their effective functioning. Ryff (1989) operationally defined psychological well-being as self-acceptance and personal growth. High psychological well-being is about feeling happy and doing well. High self- efficacy is related to high self-esteem, positive well-being and better physical condition, regulation of stress and recovery from diseases (Bandura, 1997; Bisschop, Knegsman, Beekman, & Deeg, 2004; Kuijer & de Ridder, 2003).

On the other hand, professional development practices for experienced teachers are generally viewed as part of the continuum of learning of teachers throughout their careers. Within the framework of professional development, teachers change, improve in the professional field, as well as change, improve, and complement their pedagogical competences and behaviour, and change as a person.

1.1 Psychological well-being

The term Well-being is mostly used for specific variety of goodness, Well-being requires cooperation between mind and body. It understands a sense of relief to reduce the pressures in person's life. Well-being is not only physical well-being rather it includes all aspects of a man. For example, living in good environment, being of worth for world, being able to cope with life, enjoying life, etc. Well-being is one of the most important goals which individuals as well as societies strive for. Well-being can be specified in two ways: first by specifying the „what“ and second by spelling out the criteria of wellness. Psychological well-being includes individual's relationship with life goals, if he is aware of his potential, the quality of his relationship with others, and what he feels about his own life (Ryff and Keyes, 1995).

Psychological well-being takes an important part in personality and development theories both theoretically and practically. Psychological wellbeing, which guides clinical studies that will help advisors to make their advisees reach their goals, informs about the goals and purposes regarding psychology consulting.

(Myers et al., 2003) Well-being is a way of life. Especially in terms of life ideally inclined to health and wellness; unifying body, mind, and soul; individually full of purposeful attitude and aim to live life more fully; and a functional life in all social, personal, and environmental aspects Carr (2004) defines subjective well-being as “a positive psychological state characterized by a high level of satisfaction with life, a high level of positive affect and low level of negative affect”.

Huppert (2009), “Psychological well-being is about lives going well. It is the combination of feeling good and functioning effectively.”

Psychological well-being is defined as “.....a dynamic state, in which the individual is able to develop their potential, work productively and creatively, build strong and positive relationships with others and contribute to their community”(Foresight Mental Capital and Well Being Project 2010)

Psychological Well-being is an effort to be peaceful and enjoy life, connect to life, establish satisfying relationships with others, aim for a purpose and make life valuable. In addition, an individual's satisfaction with his /her life refers to having positive feelings about the future and continuing the life functionally (Seligman, 2011).

Marks (2012) explained well-being (as cited in Dodge, Daly, Huyton and Sanders, 2012) well-being is not a beach you go and lie on. It's a sort of dynamic dance and there's movement in that all the time and actually it's the functionality of that movement which actually is true levels of well-being.

The concept of well-being has a multidimensional constitution, it could be a representation of positive feelings, individuals experience as well as aspects of life characterized by optimal functioning and flourishing (Fredrickson and Losada, 2005). It has been asserted that it is practical to assume that the concept of health is comparable to the concept of well-being (Essen and Martensson, 2014).

Psychological well-being is attained by achieving a state of balance affected by both challenging and rewarding life events. Researchers also have found that the absence of distress doesn't necessarily indicate a person has high psychological well-being. People with high psychological well-being report feeling capable, well-supported, and satisfied with life. People with higher psychological well-being are more likely to live healthier and longer lives. They are also more likely to enjoy a better quality of life. Better psychological well-being also is associated with fewer social problems.

1.1.1 Six-factor Model of Psychological Well-being

The Six-factor Model of Psychological Well-being is a theory developed by Carol Ryff in 1989 which determines six factors which contribute to an individual's psychological well-being, contentment and happiness. The following are the factors of psychological well-being:

1. Self-acceptance
2. Personal growth
3. Purpose in life
4. Environmental mastery
5. Autonomy
6. Positive relations with others

1. Self-acceptance- Self-acceptance requires the maintenance of esteem for one's self while facing complex and sometimes unpleasant personal aspects of the self. In addition, individuals accumulate a past and have the capacity to recall and remember themselves through time.

2. Personal growth- Personal growth is the ability and desire to enhance existing skills and talents and to seek opportunities for further personal development. Healthy individuals are open to experience and have the capacity to identify challenges in a variety of circumstances.

3. Purpose in life- Purpose in life captures the adult's perception of having direction in life, even when the world offers none or provides unsatisfactory alternatives. Healthy individuals see their daily lives as fulfilling a direction and purpose and therefore they view their personal lives as meaningful.

4. Environmental mastery- Environmental mastery is the active engagement of the environment to mould it to meet one's needs and wants. Healthy individuals recognize personal needs and desires and permitted to take an active role in getting what they need from their environment.

5. Autonomy- Autonomy measures the degree to which people seek self-determination and personal authority in a society that at times requires obedience and compliance. However, healthy individuals seek to understand their own values and ideals.

6. Positive relations with others- consists of the ability to cultivate warm, intimate relationships with others. It also includes the presence of satisfying social contacts and relations.

1.1.2 Role of teachers

Teachers' expectations determine the understanding of their own role, as the sense of efficiency in the work that teachers experience can also depend on how they see themselves as professionals.

Beijaard (1995) stated that a teacher's professional identity is composed of three factors: the subject they teach, their relationship with pupils, and their role or role conception. The latter is built in relation to the object and the relation with pupils and therefore cannot be considered independently of the other two factors.

1.1.3 Importance of teachers well being

Psychological well-being consists of positive relationships with others, personal mastery, autonomy, a feeling of purpose and meaning in life, and personal growth and development. Teachers who feel heard and valued for their ideas, have opportunities to collaborate and feel supported by colleagues feel a greater sense of well-being within the workplace. Teachers who feel secure to explore innovative teaching practices are able to provide students with deeper learning experiences in ways that promote their curiosity and creativity.

- Teacher well-being help to ensure teachers can flourish, this can promote better classroom climates
- Teacher wellbeing enable high quality teaching that leads to success for students.
- Teacher wellbeing is also linked to student wellbeing.
- Teacher wellbeing is an important first step in wellbeing programs to promote student well-being.

Grenville-Cleave and Boniwell (2012) found that teachers rated their wellbeing significantly lower than other professional occupations such as health, social work, finance and human resources.

Acton and Glasgow (2015), teacher wellbeing is defined as “an individual sense of personal professional fulfilment, satisfaction, purposefulness and happiness, constructed in a collaborative process with colleagues and students”.

1.2 Professional development

Professional development may be used in reference to a wide variety of specialized training, formal education, or advanced professional learning intended to help administrators, teachers, and other educators improve their professional knowledge, competence, skill, and effectiveness. Professional development as a way to generate changes in teaching practices and improve student achievement (Lawless & Pellegrino, 2007). It refers to instructors developing and improving their skills to better meet the needs of their students. It is the set of tools, resources, and training sessions for educators to improve their teaching quality and effectiveness. Professional development covers a variety of topics and addresses a number of issues present in a particular school or district. The activities in which teachers participate will vary depending on personal preference, personal interests, and professional history (Day, 1999).

Researches in the area of Professional development revealed that teachers were satisfied with the professional development activities that they attended (Michael Bosley 2004) and *valued professional development experiences for improvement of teaching strategies* (Nugent, 2007) **resulting in development of positive attitudes** (Parua, 2012 ; Henning and Mitchell, 2002).

Guskey (2003) concluded that professional development, which aids in deepening a teacher's understanding of the content and how students learn the specific content, are critical components of successful professional development. A change in classroom practices is related to professional development activities which include opportunities for active learning (Birman et al., 2000).

Causton-Theoharis and Theoharis (2008) documented how student learning improved after policies, procedures, curriculum, and instruction were shifted to support all learners. The noted challenge for teacher professional development is to provide the opportunity for teachers to deepen their understanding of the learning process and continuously develop instructional approaches that support learning.

1.2.1 The Relationship between Psychological Well-Being and professional development.

Psychological well-being is the first step in protecting teacher's mental health and providing them an environment that helps flourish their professional development. It is also crucial for good teacher-student interactions, which in turn, may affect student self-efficacy, social abilities and with also with mental health. *Professional development* is the set of tools, resources, and training sessions for educators to improve their teaching quality and effectiveness. These resources allow instructors to further their knowledge in their subject area and allows for mentorship and the opportunity to learn new teaching techniques. The goal of professional development is to keep you up-to-date on current trends as well as help you develop new skills for the purpose of advancement in the field. Those who take part in workshops or leadership sessions develop and enhance specialized skills including technical, quantitative and analytical skills.

Turner, Barling, and Zacharatos (2002) concluded that there is a positive correlation between supportive relations in schools and the well-being of teachers. The well-being of a teacher will be positively affected if he/she has positive interactions with students and is able to fulfil the students' basic needs for care and attention (Spilt et al., 2011). Furthermore, teachers who have a positive cultural impression of their work environments and of their own profession have fewer mental health concerns (**Bentea, 2015; Wong & Zhang, 2014**).

2. Literature Review:

2.1 Studies related to Psychological Well Being:

Razia (2016) assessed the level of emotional intelligence and well-being of pupil teachers. For the purpose of conducting the study, sample comprising 120 pupil teachers (B Ed students) was selected from the department of Education of Aligarh Muslim University and two private colleges in Aligarh. It was found that male and female pupil teachers were similar in their emotional intelligence but difference exists in relation to well-being. The study further brought into light that emotional intelligence had positive and significant relationship with overall well-being of pupil teachers.

Zaki (2016) conducted a study of psychological well-being. This paper attempted to explain the promotion of awareness of psychological well-being in beginning teachers as well as in-service teachers for their optimal functioning in teaching. This paper also explains relationship between psychological well-being and self-determination theory which involves human motivation, very useful for effective teaching. In the end author suggests to facilitate psychological well-being of teachers in teacher education programs.

Gangadharan (2017) investigated the psychological well-being among teaching and nonteaching employees. The findings of the study revealed significant difference in the dimensions of autonomy, personal growth and purpose in life. The overall psychological well-being of teaching staff was higher than the non-teaching employees. On the whole, the present study concluded that, women in the teaching profession had the highest psychological well-being scores as compared to other women employees, in relation to their working conditions and nature of job.

Lamba & Som. (2020) conducted in this study on the psychological well-being and mental health problems in college teachers and school teachers. Samples of 160 school teachers were taken from Delhi NCR. The study reported that the male school teachers have a better psychological well-being and they have a less mental health problem which indicates that if an individual have

a less mental health problems then they have better psychological well-being and are more satisfied with their lives. These findings can be used in Indian context and thus essential steps can be taken to educate the people to make their lives better.

2.2 Studies related to Professional development:

Duta (2012) conducted research on 68 university teachers to determine their professional development methods necessary for continuous learning training. His research findings concluded that professional development of teachers enhances the quality of education by stressing pedagogical training of teachers. He further emphasized that excellent pedagogical training of teachers leads towards quality outputs in teaching- learning process.

Cabaroglu's (2014) study indicates to the positive relationship between teacher efficacies and professional development. The researcher reported on the study that investigated the impact of the participation in an action research on the English language teacher candidates in Turkey. The objective of the action research was to support teacher candidates to enhance 25 their instructional practice and to use an inquiry-based approach to learning. The results showed that the participants demonstrated growth in teaching efficacies, increased self-awareness, improved problem-solving skills and enhanced autonomous learning.

Macheng (2016) conducted research on junior secondary schools of Botswana. The research was conducted on fourteen (14) participants. The data was gathered by using survey questionnaires and interviews. The purpose of the research was to understand the importance of continuous professional development as a critical phenomenon to deal with the gaps in training of teachers from time and changes. The findings of the study indicated that lack of structures or programs in junior secondary schools facilitate teacher professional development and growth.

Kaur & Bhullar (2019) investigated the study is to develop an understanding of relationship between professional development and job satisfaction of teacher educators. A sample of 120 teacher educators from colleges of education with 50 teacher educators working in government and government aided colleges and 70 teacher educators working in private college was drawn from 12 randomly selected colleges of education of Punjab state. A significant positive relationship was found between professional development and job satisfaction of teacher educators working in both government and private sectors.

3. Justification of the study:

Teachers play an important part in the teaching – learning process. A teacher influences a student to a great extent. The challenges faced by a teacher in a globalized world are difficult to manage. It is essential that teachers have a balance between their life and work and therefore need to possess higher psychological well-being. The foundation of building a healthy and sound society is layered to greater extent by educating the youngsters of that society. Thus, teachers are the architects in building healthy nation. They do give the shape for growing individuals and prepare them to be useful to the society in various ways of life, thus teachers have been rendering a valuable service to the nation.

Psychological well-being is an important aspect for effective performance in any organization, as it determines the internal feelings to persuade the external actions. Low psychological well-being is obvious to effect any domain of our life may it be academic or work life. The best teacher is one who possesses good psychological well-being and who is fully satisfied with his/her occupation. Ryff (1989) operationally defined psychological well-being as

self-acceptance and personal growth. High psychological well-being is about feeling happy and doing well. High self- efficacy is related to high self-esteem, positive well-being and better physical condition, regulation of stress and recovery from diseases (Bandura, 1997; Bisschop, Knegsman, Beekman, &Deeg, 2004; Kuijer& de Ridder, 2003).

Progress of any nation depends largely on Psychological well-being of its students. All intellectual creative, educational, social and cultural advancement are possible if the individual of the nation do possess well-being. Due to advancement in every field, life of teachers has become more challenging, complicated and tough. If at all we expect the teachers to contribute significantly, it is essential that they should have higher work motivation, professionally developed, self-efficacy, commitment etc. The role of a teacher does not limit itself to imparting knowledge alone, but in broadening the national outlook enhancing a sense of efficacy and competency among the future citizens, and preparing individuals for the right type of profession.

3. Objectives

1. To study the Psychological well-being of humanities and science college teachers.
2. To study the Professional development of humanities and science college teachers.

4. Hypothesis

1. There exists no significant difference between Psychological well-being of humanities and science college teachers.
2. There exists no significant difference between Professional development of humanities and science college teachers.

6. Methodology

6.1 Method and Procedure

The descriptive method of educational analysis for the completion of the present paper is followed in the context of the study.

Sample

Representative samples of 150 women college teachers from Ludhiana district were chosen for the present analysis. Out of which, 75 Women college teachers from humanities stream and 75 Women College teachers from science stream.

6.2 Tools for data collection

1. Psychological Well-being Scale developed by D.S. Sisodia and PoojaChoudhary (2019).
2. Professional Development scale by Butia (2014).

Statistical Techniques

Mean, SD and t-test has been computed for analyzing the present data.

7. Result And Discussion:

The psychological well being scale was achieved on selected sample teachers and t- value was computed to measure professional development among women college teachers. The analysis of information is offered as per the hypothesis.

Hypothesis 1:-

There exists no significant difference between psychological well being of humanities and science women college teachers.

Table No.1.Psychological well being of humanities and science women college teachers.

Gender	N	Mean	S.D.	t- value	Level of significance
Humanities	75	97.74	8.59	1.045	Not significant at 0.01 & 0.05 level
Science	75	105.55	9.81		

The result is 1.045 less than the table value (2.58) at the 0.01 level and (1.96) at the 0.05 level of importance in table no. 1, the measured t-value. The outcome indicates that there is no significant between humanities and science women college teachers in psychological well being. Hence, at all stages of significance, the null hypothesis is accepted.

Hypothesis 2:-

There exists no significant difference between professional development of humanities and science women college teachers.

Table No.1. Professional development of humanities and science women college teachers.

Gender	N	Mean	S.D.	t-value	Level of significance
Humanities	75	242.11	34.53	4.789	Significant at 0.01 & 0.05 level
Science	75	211.17	32.34		

The consequence of the measured t- values in table no. 2 is 4.789 higher than the table value (2.58) at the level of 0.01 and (1.96) at the level of importance (0.05). The outcome reveals that there is a significant difference in the professional development of humanities and science women college teachers . Hence, at all degrees of importance, the null hypothesis is rejected.

Conclusion:

Progress of any nation depends largely on Psychological well-being of its students. All intellectual creative, educational, social and cultural advancement are possible if the individual of the nation do possess well-being. Due to advancement in every field, life of teachers has become more challenging, complicated and tough. If at all we expect the teachers to contribute significantly, it is essential that they should have higher work motivation, professionally developed, self-efficacy, commitment etc. Professional development is the means by which participants gain knowledge and acquire new skills. It refers to the continued training and education of an individual in regards to his or her career.

References :

- Chaudhari, P.S. & Parikh, P (2019). Psychological Well-being among Primary and Higher Secondary School Teachers, *International Journal of Indian Psychology*, 7(3), 136-141.
- Cherkowski, S., & Walker, K. (2018). *Teacher wellbeing: Noticing, nurturing, sustaining and flourishing in schools*. Ontario, Canada: Word & Deed Publishing.
- Duta, N. V. (2012). Professional development of the university teacher–inventory of methods necessary for continuing training. *Procedia-Social and Behavioral Sciences*, 33, 1003-1007.
- Gangadharan, P. (2017). Psychological Well-being among teaching and non-teaching employees: A Comparative study. *International Journal of Applied Research*, 3(5), 513-516.
- Garet, M., Porter, A., Desmone, L., Birman, B. & Yoon, K. (2001). What makes professional development effective? Results from a national sample of teachers. *American Education Research Journal*, 38 (4), 915- 945

- Kaur, M. & Bhullar, M. (2019). Professional Development of Teacher Educators in Relation to Job Satisfaction , *Journal of Advances and Scholarly Researches in Allied education*, 16(6), 1000-1004.
- Zaki, S. (2018). Enhancing Teacher Effectiveness Through Psychological Well- Being: A Key to Improve Quality of Teachers, *International Journal of Research in Social Sciences*, 8 (7).



Attitude Towards ICT of The Teachers of Higher Secondary School

Sabuj Sau¹ & Dr. Kedar Nath Dey²

¹ Ph.D Research Scholar, Department of Education, Bankura University, 722155, -²Assistant professor, swami D D K Mahavidyalaya, Bhora - Birsingha Road, Bhora, West Bengal 722157,

Email – sausabuj@gmail.com,

Kdey975@gmail.com

Abstract:

Information and communication technologies (ICT) have become one of the most significant aspects of human life, and they have had an impact on all facets of school operations, including administration, time management, the delivery of lessons, project work, evaluation, and the examination system, among others. It makes teaching-learning more interesting and goal oriented. It can significantly develop interest and curiosity among the learners. It can also save the time of teachers and students which is very important in this present time, considering time-management an important aspect of education as the efforts, time, and resources of the schools can be used effectively. In the current research, the attitudes of teachers in upper secondary schools in the Paschim Medinipur area about the use of ICT in education were examined.

Keywords: Attitude, Information and Communication Technology, Rural, Urban

Introduction:

'The ICT Policy in School Education seeks to prepare young to engage creatively in the creation, maintenance, and expansion of a knowledge society, resulting in overall socio-economic development of the country and worldwide competitiveness. The National Policy for ICT in School Education was published by the Ministry of Human Resource Development in 2009.

Information and communication technology (ICT) has been shown to have the ability to better institutional administration, increase student learning, and improve instruction. Recognizing the effects of new technologies on the workplace and daily life requires the use of information and communication technology as a tool for increasing students' understanding of instructors' instructions and as a catalyst for expanding access to excellent education in structured settings. The ICT Policy in School Education project is motivated by the enormous potential of ICT for expanding reach and raising educational standards. According to the National Centre for Technology in Education (NCTE-2000), ICT is an interdisciplinary field that focuses on giving students the resources they need to enhance and alter their learning experiences.

Since teachers are members of a recognised profession, deliberate efforts should be made to help them develop a positive attitude about their line of work. The way a teacher fulfils his professional obligations and plays his position might be used to gauge attitude. Positive attitude has been shown to make teaching more fulfilling and rewarding. In the classroom, a teacher has a significant influence on student conduct. While spending the majority of his time with his pupils, a teacher's attitudes, behaviours, emotions, preferences, and etiquette have a significant impact on the way that the students behave. The characteristics of the technology itself are one of the key elements influencing people's views regarding a new technology (Rogers, 1995). Rogers

highlighted the following key characteristics of technology: relative advantage, compatibility, complexity, observability, and trialability. Therefore, a new technology will spread more widely if prospective users believe it offers an advantage over earlier breakthroughs, is consistent with current practises, is simple to comprehend and apply, exhibits visible outcomes, and can be tested in small doses before acceptance. Technology creates new opportunities for information gathering and knowledge manipulation. This covers the manipulation of media and instructional techniques as well as environmental management inasmuch as it affects learning. It supports data storage, e-learning, e-content creation, webcasting, timetable management testing, and other activities. The two types of contact that new technology increases are student-student and student-teacher interaction. Numerous studies have been conducted over the last 20 years to determine the value of technology in education. The ICT literate population is prioritised in the National Policy on Information and Communication Technology in School Education (2012) in order for all ICT resources to be employed in the teaching and learning process (Pan, 2014). In terms of expressing the information, ICT is essential. Slide, LCD, and OHP projectors are used. Here, knowledge may be shown graphically with the aid of voice and video, making it simple for students to understand. Additionally, the student enjoys watching the lesson and may not forget what they have learnt. While watching the lesson, the learner also remains more engaged. It saves time and allows for the straightforward representation of a lot of information. ICT paves the path for the efficient delivery of specific knowledge to the learner in a short amount of time. ICT is mostly used to keep classes interesting and help students comprehend (Prabhu, 2013). Technology and multimedia alter thought processes, which has a disastrous impact on the transition from memorization practise to problem solving.

It has been anticipated that integrating ICT into education would allow the new technology instruments to completely transform the outdated educational system (Albrini, 2006). Initiatives, projects, and consequences relating to the integration of information and communication technologies (ICT) into education during the last 20 years have encouraged teachers to acquire the essential knowledge and abilities for integrating ICT into their classroom. ICT is "not just the foundation of the Information Age, but also a key catalyst and instrument for inducing educational changes that transform our students into productive knowledge workers," according to Pelgrum (2001). ICT is essential to the educational systems of information societies. To ensure that both instructors and students acquire the information and abilities required in this digital era, the stakeholders in these nations' educational policies rethink and reconstruct their educational systems using new educational paradigms like constructivist theory. As a result, the majority of nations worldwide are concentrating on methods to incorporate ICT into learning and teaching in order to raise the calibre of education by placing an emphasis on competencies like critical thinking, decision-making, handling of dynamic situations, working as a member of a team, and effectively communicating (Anderson & Weert, 2002). By involving students in the process, new technologies are seen as a cognitive tool that has the ability to promote inquiry-based learning, reinforce conceptual learning, and develop active and creative learning. These technologies have the ability to alter the dynamics of the classroom and encourage innovative teaching methods if utilised wisely. The stakeholders in educational policy in today's information societies are redesigning and reconstructing their educational systems based on new educational paradigms like constructivist theory to ensure that both instructors and students get the knowledge and skills required in this digital era.

Objectives of the Study:

The major objectives of this study are:

- To study the differences between male and female higher secondary school teachers in their attitude towards the use of ICT in teaching learning process.
- To study the differences between urban and rural area higher secondary school teachers in their attitude towards use of ICT.
- To study the differences between government and private higher secondary school teachers in their attitude towards the use of ICT in teaching.
- To study the attitude of higher secondary school teacher towards the use of ICT on basis of teacher's age group.

Hypotheses of the Study:

In this study, the following null hypotheses were framed:

H01: There is no significant difference between the attitudes of male and female higher secondary school teachers towards the use of ICT.

H02: There is no significant difference between the attitudes of rural and urban higher secondary school teachers towards the use of ICT.

H03: There is no significant difference in the attitude of higher secondary teachers towards the use of ICT of Government and private school teachers.

H04: There is no significant difference in the attitude among higher secondary school teachers categorized on the basis of age.

Delimitation of the Study:

- The study was delimited to only one major variable i.e. teachers' attitude towards ICT only.
- The study was also delimited to 100 samples only.
- One of the major delimitation is, the data was collected from three government aided schools and two private schools only.
- The study was also delimited to Paschim Medinipur district, West Bengal, India demographic area only.

Methodology: Survey method is adopted for the present study.

Research Design:

This is a descriptive survey type field study on the attitude of higher secondary school teachers towards the uses of ICT from paschim Medinipur, West Bengal. Quantitative approach is used in this study as the assessments consists numerical analysis and measurements. Data is collected through self-made questionnaire.

Sample:

The sample consists of 100 teachers who teach at higher secondary level in Paschim Medinipur district was selected for the study.

Sampling Techniques:

In this study, probability sampling techniques, particularly random sampling is being used in order to collect the data.

Tools:

Tools are devices used to collect appropriate data for the study. Teachers are indicated to answer their level of attitude towards the use of ICT in teaching in a five point scale going from

strongly disagree, disagree, neutral, agree, and strongly agree. The ICT Questionnaire has 25 items covering the various dimensions of ICT usage in teaching.

Variable:

Major Variable:

Attitude towards the use of ICT.

Categorical Variable

- Gender
- Location of School
- Types of School
- Age level

Analysis and Interpretation:

The aim of the analysis is to find out the attitude of higher secondary school teachers towards use of ICT in teaching.

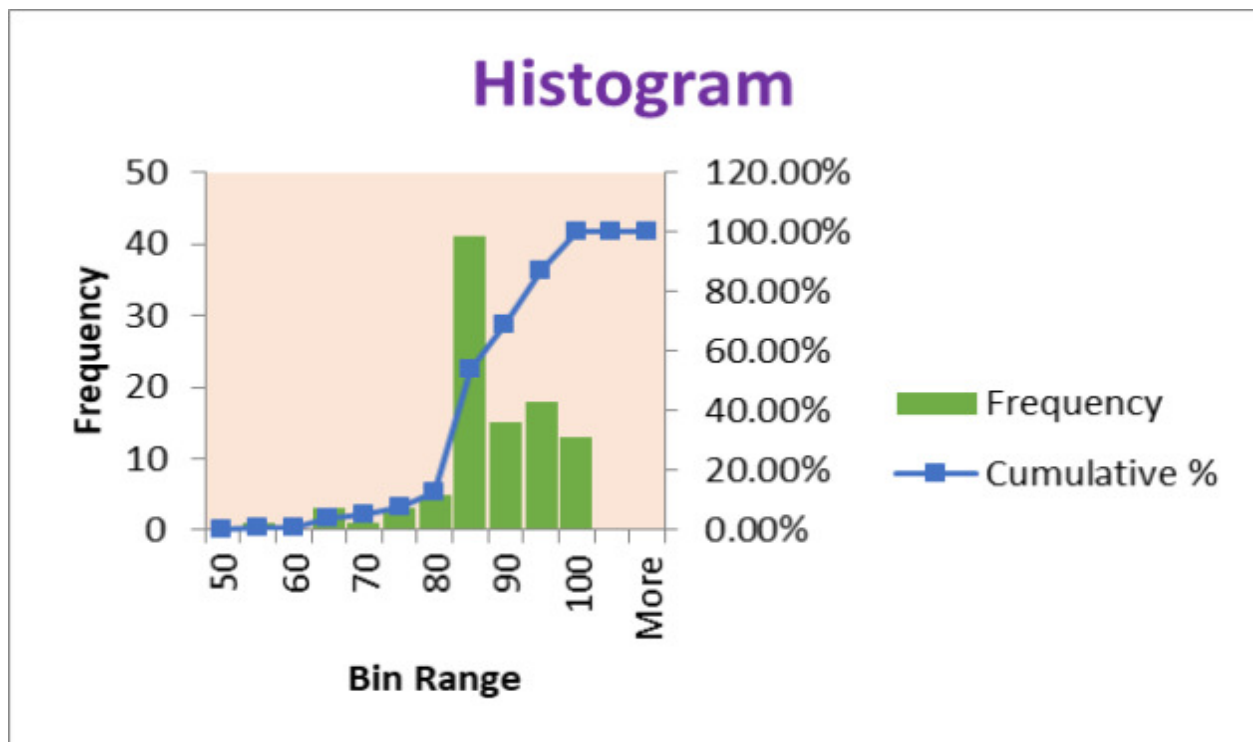


Fig:1 Histogram of collected data

From, **Fig.1**we found, attitude of school teachers towards the use of ICT, the nature of the Histogram is tends to like Normal Probability Curve (NPC). So we can use inferential statistics like Mean, Standard Deviation, t-test, ANOVA here for further analysis.

Table 1: Descriptive Statistics and t-test of the Attitude of Higher Secondary School Teachers towards the use of ICT with respect to gender:

Variable	N	Mean (M)	S.D	t-Value cal	'P' Value	Remarks	Hypothesis
Female	45	85.95	5.37	1.98	0.75	t-test significance at 0.05 level	Ho1 is accepted
Male	55	85.43	9.64				

Figure 2: Mean and S.D. scores of Attitude of Higher Secondary School Teachers towards the Use of ICT According to Gender

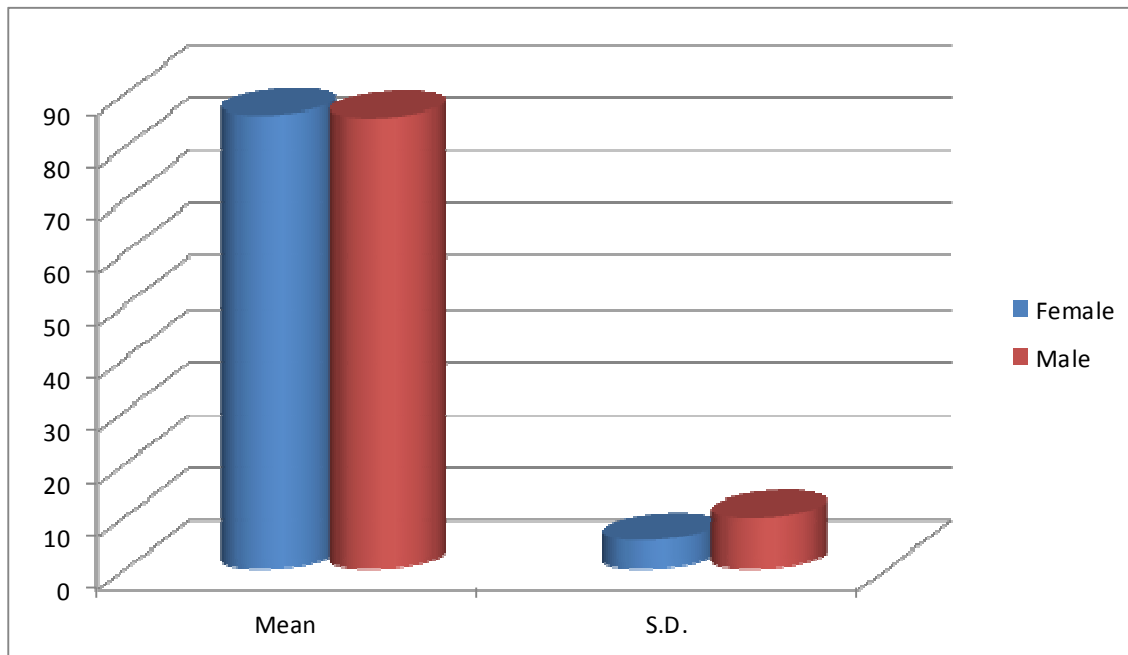


Fig. 2: Mean and Standard Deviation of attitude towards the use of ICT relation to Gender

From, **Fig. 2** it is observed that mean score of attitude towards the use of ICT of female higher secondary school teacher is (85.95) slightly higher than the mean score of attitude towards the use of ICT of male Higher secondary teacher (85.43).

From, **Table 1**, it reveals that P-value=0.75 ($p > 0.05$) for the attitude toward the use of ICT between female and male higher secondary school teachers is higher than 0.05. It means that there is no significance difference between the attitude towards the use of ICT of male and female higher secondary school teachers. Thus, **Ho1** is accepted.

Table 2: Descriptive statistics and t-test of higher secondary school teachers' Attitude towards the use of ICT with respect to location of School:

Variable	N	Mean (N)	S.D	t-Value cal	'P' Value	Remarks	Hypothesis
Rural	46	85.09	8.25	1.98	0.54	t-test is not significant at 0.05 level	Ho2 is accepted
Urban	54	86.09	8.23				

Figure 3: Mean and S.D. Scores of Attitude of Higher Secondary School Teachers towards the Use of ICT According to Location

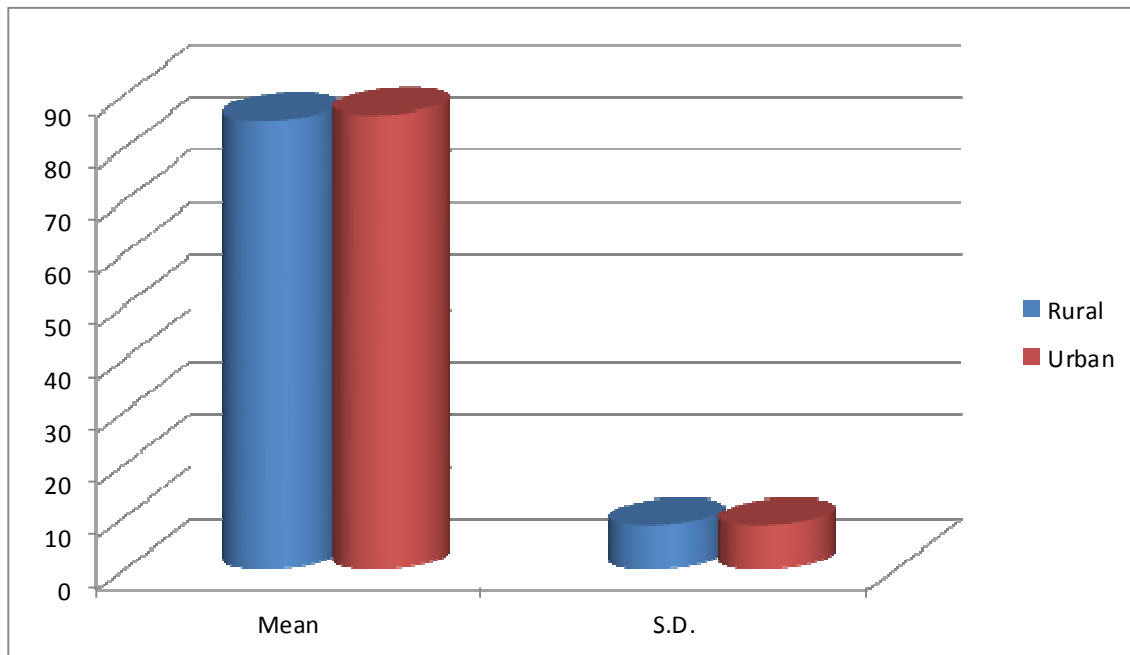


Fig. 3 Mean and standard deviation of Attitude toward the use of ICT in relation to location of School

From, **Fig. 3** we observed that the mean score of attitude towards the use of ICT of rural higher secondary school teachers (85.09) is less than the mean score of attitude towards the use of ICT of urban higher secondary school teachers (86.09). It may therefore be concluded that, the attitude of urban and rural teachers towards the use of ICT remains almost identical.

Table 2 reveals that $p\text{-value}=0.54$ ($p>0.05$) of attitude towards the use of ICT between rural and urban higher secondary school teachers which is more than 0.05. It means that there is no significance difference in attitude towards the use of ICT between rural and urban secondary school teachers. Thus, **Ho2** is accepted.

Table 3: Descriptive statistics and t-test of higher secondary school teachers' Attitude towards the use of ICT with respect to types of school:

Variable	N	Mean (M)	S.D	t-Value cal	'p' Value	Remarks	Hypothesis
Govt. School Teachers	81	84.97	9.04	1.98	0.233	t-test is not significant at 0.05 level	Ho3 accepted
Private School Teachers	19	87.09	5.86				

Figure 4: Mean and S.D. Scores of Attitude of Higher Secondary Schools Teachers towards the Use of ICT According to Types of Schools

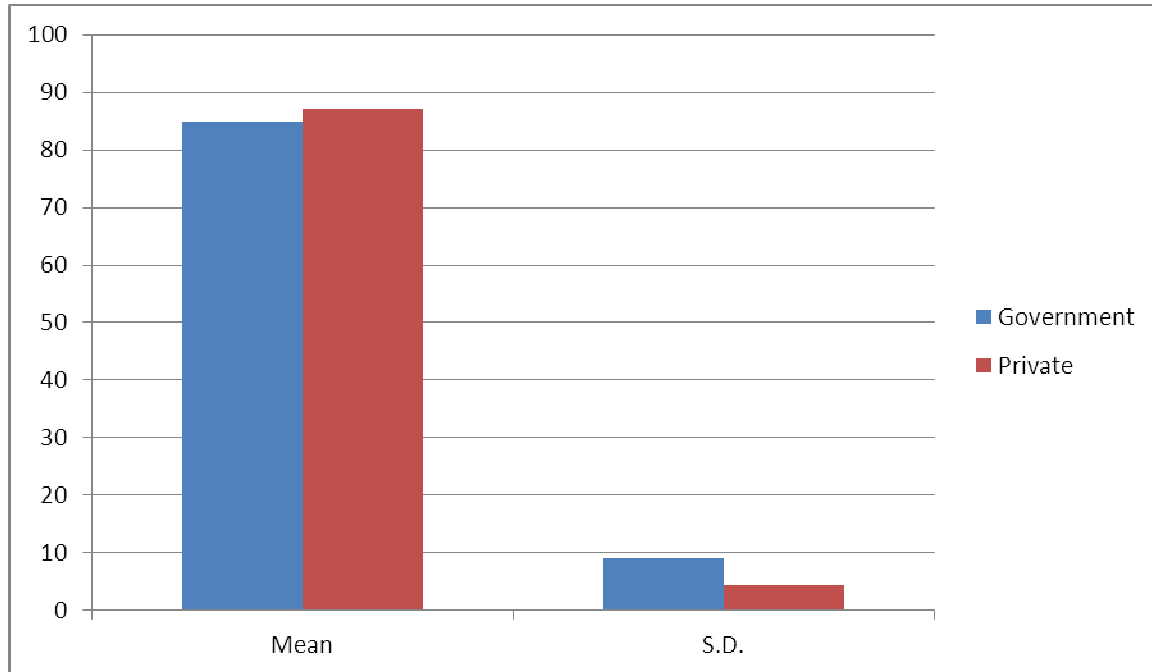


Fig. 4 Mean and Standard Deviation of Attitude toward the use of ICT in relation to types of school:

From, **Fig. 4** we observed that the mean score of attitude towards the use of ICT of rural higher secondary school teachers (85.09) is less than the mean score of attitude towards the use of ICT of urban higher secondary school teachers (86.09). It may therefore be concluded that, the attitude of urban and rural higher secondary school teachers towards the use of ICT remains almost identical.

From, **Table 3** reveals that $p\text{-value}=0.233$ ($p>0.05$) of attitude towards the use of ICT between govt. and private higher secondary school teachers" which is more than 0.05. It means that there is no significance difference in attitude towards the use of ICT between govt. and private school teachers. Thus, **Ho3** is accepted.

Table 4: Descriptive statistics and ANOVA single factor of higher secondary school teachers' Attitude towards the use of ICT among different Age groups:

Variable (Age group)	Mean	S.D	Degrees of Freedom	'P' Value	Remarks	Hypothesis
21-30years	87.25	6.00	99	0.34	'P' value not significant at 0.05significanc e level	Ho4 accepted
31-40Years	84.28	9.35				
41-50Years	84.36	10.56				
51-60years	87.63	4.84				

Figure 5: Mean and S.D. of Higher Secondary School Teachers Attitude towards the Use of ICT According to different age groups

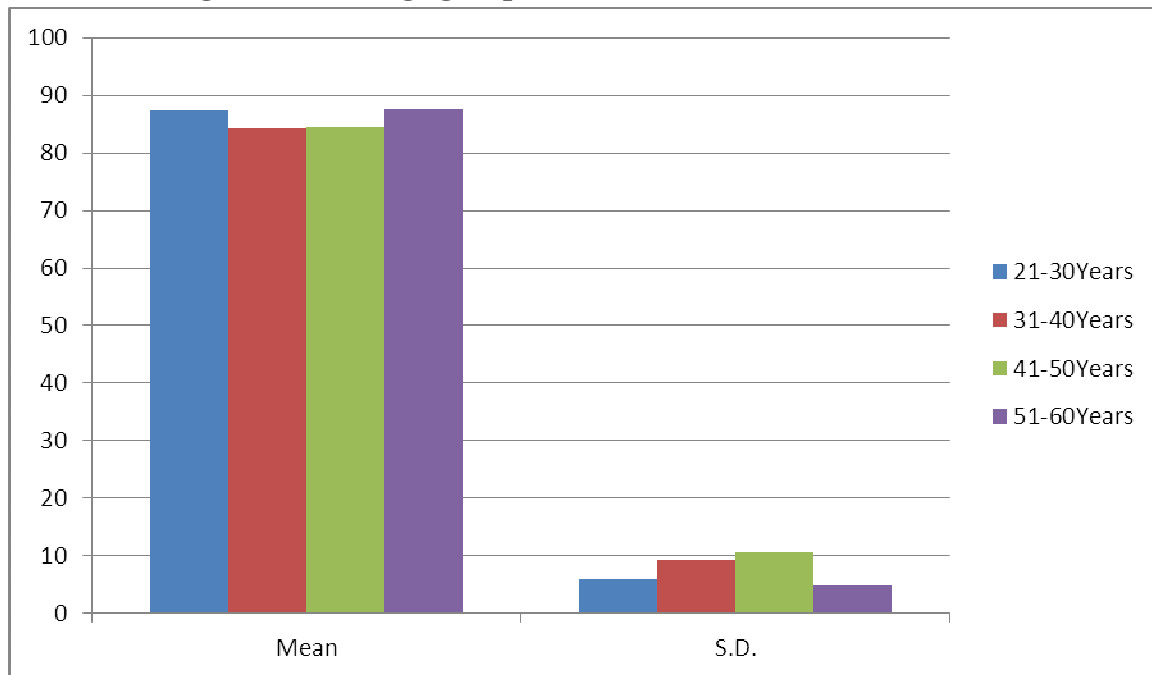


Fig. 5 Mean and standard deviation of teachers' attitude towards the use of ICT in relation to different age groups:

From, Fig. 5 we observed that the mean score of attitude towards the use of ICT of 51-60 years age group teacher (87.63) is highest and the mean score of attitude towards the use of ICT of 31-40 years (84.28) is lowest among the four age groups of higher secondary school teachers. It may therefore be concluded that 51-60 years age group of higher secondary school teachers have more positive attitude towards the use of ICT in comparison to 31-40 years age group of higher secondary school teachers.

Table 4 reveals that $p\text{-value}=0.34$ ($p>0.05$) of teachers' attitude toward the use of ICT among different age groups (21-30 years, 31-40 years, 41-50 years and 51-60 years) of higher secondary school teachers which is more than 0.05. It means that there is no significance difference of teachers' attitude toward the use of ICT among different age groups of higher secondary school teachers. Thus, **Ho4** is accepted.

We learned from the data analysis that most instructors were supportive of the usage of ICT in the classroom. Gender has little impact on the attitudes of upper secondary school teachers on the use of ICT in the classroom since attitudes between male and female instructors stay essentially the same and are unaffected by gender.

It may be inferred that locality does not bring about a change in the attitude of teachers towards the use of ICT since the attitudes of rural and urban teachers continue to be practically same and there is no location difference in the attitudes of teachers towards the use of ICT. types of schools (public, private, and aided) Instructors' attitudes were compared intelligently, and the results showed that there is no significant difference between the means of the two groups of teachers. The similarity in teachers' attitudes toward ICT may be due to their greater understanding of ICT, their desire to stay current on new developments, and the intense rivalry that exists between government/aided and private schools. According to the aforementioned

findings, private school instructors have a somewhat better attitude than government school teachers.

We may conclude from our current research that there are no significant differences in the attitudes of teachers who are categorized according to age groups about the usage of ICT. Teachers who fall into one of the four groups have a mostly consistent approach. It is abundantly obvious from the data that a teacher's age has no bearing on how they feel about using ICT. Finally, it can be said that the majority of instructors in upper secondary schools had a favorable attitude toward using ICT. Therefore, it is important to raise instructors' awareness of the potential advantages of ICT integration. They should be given additional opportunities to improve their ICT abilities and encouraged to utilize ICT in the classroom.

Conclusions:

So, we can conclude that the attitude towards the use of ICT only depends on the human nature whether he or she shows positivity towards its uses and not depend on the persons' gender, experience, age or the person belongs from rural or urban area. Mainly adaptation of human being is the main factor of ICT uses.

Recommendations:

From our study, it manifested that major portion of the Higher secondary school teachers in Paschim Medinipur district had a positive attitude towards the use of ICT in their teaching skill. Teachers' attitude can also be enhancing by proper awareness of dynamic convenience of ICT integration. Hence, there should be taken more awareness programs for the teachers of ICT integration. It should encourage teachers to use ICT in classrooms and be provided with more opportunity to enhance their ICT skills.

Crucial factors like self-interest of teachers, attitude of school authority and sufficient training influenced teachers considerably in using ICT. So by taking proper awareness programs for the teachers and authority, ICT can be integrate successfully.

Though most of the schools in Paschim Medinipur had minimum ICT facilities, but lots of teachers and authority still did not know how to use the available facilities effectively. So it is very important to take proper training and supportive programme to impacting teachers to use ICT in their teaching skill. And finally we can suggest that throughout the country, there should be a definite and identical Govt. ICT policy for the Higher secondary school.

Reference:

- Abraham, J. and Wadhvani, R. (2013). ICT Integration in In-service Teacher Education Programmes. *International Journal of Information and Computation Technology*. 3(9), 901-908.
- Allport, G. W. (1935). Attitudes. In C. M. Murchison (Ed.), *Handbook of Social Psychology*. Winchester, MA: Clark University Press.
- Arthi, S. & Tamilselvi, B. (2016). A study of the attitude towards ICT among B.Ed. student teachers in Namakkal District. *International Journal of Multidisciplinary Research and Development*. 3 (8), 81-84.
- Aydin, M. K., Semerci, A. & Gurol, M. (2016). Teachers' attitude towards ICT use in secondary schools: A scale development study. *International Conference on Cognition and Exploratory Learning in Digital Age*, 357-377.

- Celik, H. and Bindak, R. (2005). Examination of computer attitudes among teachers employed in primary schools in terms of different variables. *Inonu University Journal of Faculty of Education*, 10(6), 27-38
- Cox, M. (1999). A Study of the Factors which Support or Prevent Teachers from Using ICT in Classroom. <http://www.becta.edu.uk> (retrieved on 10.11.17)
- Dixit, M. & Kaur, M (2015). Attitude of Teachers Trainees towards ICT Teaching. *International Journal of Pure and Applied Researches*. 1 (1).
- Gardner, R. C. (1985). *Social Psychology and Second Language Learning. The Role of Attitudes and Motivation*. London: Edward Arnold.
- Guha, S.(2000). Are we technically prepared? <http://www.becta.edu.uk> (retrieved on 10.11.17)
- Mahat, S. Jamsandekar, P.P. &Nalavade, K.M. (2012). A Study of Teachers Attitudes towards ICT Teaching process. *International Journal of Information Technology and Knowledge Management*. 6 (1), 93-97.
- Mehra,V. and Newa, D. (2009). School teachers' Attitude towards Information and Communication Technology. *Edutracks*, 6(8), 25-36.
- Ndibalema, P. (2014). Teachers" Attitude towards use of Information and Communication Technology.*International Journal of Education and Research*, 2(2), 1-6.
- Ravindranath, M. J. (1993). Computers in DIETS: A few suggestions for their effective use.*Journal of Indian education*, 3(19), 10.
- Sanchez, A.- B., Marcos J.- J. M., Gonzalez, M. and Lin, H. G. (2012). In service teachers" attitude towards the uses of ICT in class room. *Procedia - Social and Behavioral Sciences* 46, 1358 – 1364.
- Sarngi, D. (2003). Integrating ICT in Teacher Education Experience from a DIET, Orissa. *ICT in Education*, 61-66.
- Veen, W. (1993). The role of beliefs in the use of information technology: implications for teacher education, or teaching the right thing at the right time. *Journal of Information Technology for Teacher Education*, 2(2), 139–153.

Examining Undergraduate Students' Attitudes and Motivation in Learning English as A Foreign Language (EFL) At Socotra College : A Case Study

Ameer Ali Amer Ahmed*

Department of English, Hadramout University, Yemen

Department of English, Dr.BabasahebAmbedkarMarathwada University, Aurangabad, India

Yashwant A. Doke**

Department of English, OsmanabadDr.BabasahebAmbedkarMarathwada University,
Aurangabad, India

Corresponding Author: ameer123.aa702@gmail.com

Abstract:

The present research paper aims to investigate undergraduate students' attitudes and motivation toward learning English as a Foreign Language while studying at Hadramout University's English Department College of Education Socotra. The objective of the current paper is to find out the undergraduate students' attitudes and motivation toward learning English as a F.L. studying in the English Department College of Education Socotra, Hadramout University. To achieve the objective, the quantitative descriptive-analytical approach can be used to analyze the questionnaire that was answered by students of four levels. The researcher distributed 72 questionnaires, while 60 respondents were retrieved with a percentage of 83.3%, and 12 questionnaires were not responded to. Moreover, SPSS 23 used descriptive statistics and simple regression to analyze the research data and questions. The study found out the undergraduate students' attitudes toward learning English, as a F.L. studying in the English Department College of Education Socotra is high. As well as the results indicate that there is students' motivation toward learning English as a foreign language, with a high rate. There is a clear focus on the undergraduate students' motivation toward learning English as a foreign language lies in family. Thereby the research's outcome recommends that there should provide feedback, workshops, and training courses in English as a F.L. to raise awareness and the capabilities of the students' and teachers' attitudes and motivation in Socotra Island because of its direct impact on the students' attitudes and motivation.

Keywords: Attitude; Motivation;(F.L.) Foreign Language,etc.

1. Introduction:

It is known is that language considered the main medium of communication among people all over the world. To convey their emotions, experiences, attitudes, and interests, humans need a medium that is language. In this regard, English is one of the major languages that havewide-spreading globally. English has many forms of use as a native language, second language, and foreign language.

In the Arab world, English is being taught and learned as a F.L. Throughout the education system of the learning process,the subject of English is one of the compulsory courses in several countries' educational curricula.In Yemen, English is being taught and learned as a foreign language, so the students at different levels of education have points of view, attitudes, motivations, and drives that can lead them to study English properly.

In the present research article, much attention was drawn to analyzing and studying undergraduate students' attitudes and motivation in the Faculty of Education Socotra, Hadramout

University. The researcher has investigated the four levels of education in the English department at the faculty during the current academic year 2021/2022, the first semester. Though the researcher distributed 72 questionnaires, 60 respondents were retrieved with a percentage of 83.3%, and 12 questionnaires were not responded to. Further, SPSS 23 used descriptive statistics and simple regression to analyze the research data and questions. The study found out that the undergraduate students' attitudes toward learning English, as a F.L. studying in the English Department College of education Socotra is high. As well as the results indicate that there is students' motivation toward teaching English as a F.L, with high rate. Consequently, the study examined these issues carefully; revealed the reasons and challenges that stand behind these issues as well as found the results, and provided recommendations and further studies to overcome this dilemma.

1.1 Statement Of The Problem:

Motivation and attitudes of language learners are considered a central area of research in the field of second language acquisition, and foreign language acquisition. Further, several researchers from various countries have investigated this topic in various contexts (ESL, EFL). However, limited Yemeni research has been conducted to look into these concerns among Yemeni students, particularly among EFL learners. So learning English as a foreign language is intrinsically tied to a desire to achieve a certain goal. Consequently, the attitudes and motivations of students to learn English differ dramatically from one student to another. Thus, the research problem can be formulated with the following questions:

1. What are the undergraduate students' attitudes toward learning English as a F.L?
2. What are the undergraduate students' motivations for learning English as a F.L?

1.2 Objectives Of The Study:

The objective of the research paper is to examine the undergraduate students' attitudes and motivation toward learning English as a F.L studying in the English Department College of education Socotra, Hadramout University.

1.3 Significance Of The Study:

The research in the area of teaching in the field of foreign language learning has been linked to formal instruction in many recent studies. Attitudes and motivation, according to Margaret et al. (2003) and Dornyei (2003), are important factors. In the classroom, you can affect the average and progress of foreign/second language learning. Anderson (2001) asserts that the behaviors influenced by this social context are the most important determinants of formal language learning performance in the classroom. This research article highlights the attitudes and motivation of undergraduate students in learning English as a F.L in the English Department College of education Socotra.

1.4 Hypothesis Of The Study :

Based on the study problem, objectives as well as study questions, and in light of the research model, a hypothesis of the present research has been established to answer the research problem. The hypothesis has been formulated as the following:

1. There are no undergraduate students' attitudes toward learning English as a F.L.
2. There are no undergraduate students' motivations for learning English as a F.L.

2. Theoretical Framework

Attitudes:

According to Likert, as stated by Gardner (1980), the term attitude refers to “an inference which is made on the basis of a complex of beliefs about the attitude object” (p. 267). Gardner showed up later and expanded on Likert's concept, identifying attitude as “the sum total of a man's instincts and feelings, prejudice or bias, preconceived notions, fears, threats, and convictions about any specified topic” (Gardner, 1980, p.267). When Gardner (1985) defined motivation, he included attitude as one of the most significant components. “The combination of effort plus desire to achieve the goal of learning the language plus favorable attitudes toward learning the language” (p. 10).

So Gardner (1985) asserted that a learner's level of success in the second language (L2) learning is inextricably linked to predictors of attitudes toward language. In other words, students with positive attitudes learn the target language more effectively than students with negative attitudes. Positive attitudes have the potential to accelerate the learning process. Gardner (1985) emphasized that a learner's belief or opinion shapes his or her evaluative response to certain referents, objects, persons, and situations. Based on the definitions mentioned above, it is clear that the structure of attitude mirrors the learner's "feelings," "beliefs," and "disposition." Furthermore, the intensity or strength of an attitude differs from one learning situation to another. Though language attitude is an important concept because it plays a prominent role in language learning and teaching. Oller (1979) pretends that "Attitudes are merely one of the types of factors that give rise to motivation which eventually results in the attainment of proficiency in a second language"(p.138). Brown (1987) described the attitude as a construction formed early in childhood as a consequence of one's interaction with both culture and his family and community's opinions toward that culture. Baker (1992) adds to the work of Likert, Gardner, and Brown by stating that attitude is “a hypothetical construct used to explain the direction and persistence of human behavior” (p. 10).

Wenden (1991) suggested a more comprehensive definition of the term ‘Attitudes’. He confirms that attitude is made up consisting of three key components: cognitive, assistive, and behavioral components. Individuals' views and ideas about a certain thing are referred to as the cognitive component, whilst their thoughts and emotions toward that thing are referred to as the evaluative component. Finally, the behavioral component relates to a person's attitude that causes them to behave in a certain way. From the perspective of Triandis (1971), that attitude is defined as "to think about," "to feel about," and "to react toward," implying that it is made up of three constituents: behavioral, cognitive, and effective. The first component, the cognitive component, is characterized by one's views on a social object or phenomenon. These beliefs may have been formed based on illogical thoughts, but those who hold this attitude believe it is a form of reality. Due to the experience that one has with a given state, the amount of these beliefs vary from one learner to the next (Triandis, 1971). In terms of the affective component, it refers to the learner's level of passion for the language as a desirable or unpleasant, positive or unpleasant language. In terms of the behavioral component, the learner's readiness to act toward the attitude object has been defined. It can take two forms: either it expresses itself clearly in the learner's everyday conduct, or it expresses itself indirectly through verbal and nonverbal expressions. This aspect of attitude allows us to recognize the thoughts that learners have about a particular language.

Motivation:

Motivation, according to researchers, is a powerful engine that leads to success in learning as 2nd L, or F.L. In the study of a second or foreign language, motivation has been identified as an important topic of research. Researchers have had difficulty agreeing on the precise definition of motivation, though, as a result of the complexity of the concept (Dörnyei, 1998). In fact, according to Guilloteaux and Dörnyei (2008), all motivational definitions “attempt to explain nothing less than why humans behave and think as they do.” (p. 55).

In terms of learning a 2nd L, Dörnyei, and Ott? (1998) can be defined motivation as “the dynamically changing cumulative arousal in a person that initiates, directs, coordinates, amplifies, terminates, and evaluates the cognitive and motor processes whereby initial wishes and desires are selected, prioritized, operationalized and (successfully or unsuccessfully) acted out” (p. 65).

Motivation is thought to be at least as important as language aptitude in determining second language achievement in second/foreign language learning. Danzka and Kapil (1991) believe that "Motivation is a psychological concept in human behavior that describes a predisposition to reward a particular behavior to satisfy a specific need" (p.61).

The significance of motivation in improving second/foreign language learning cannot be overstated. Different schools of thought have taken different approaches to the concept of motivation. For example, motivation is as Brown, (2000) referred to "very simply the anticipation of reward from a behaviouristic standpoint" (P.160). As we researchers defined Motivation refers to a person's desire and readiness to do something, and it is a key factor in how engaged and active they are in learning an (L2) or a (FL).

Research Methodology

The society of the study is the undergraduate students of the English department at Socotra College of education; that have been selected to represent the sample are four levels (first, second, third, and fourth). From each level, a random sample was selected. The targeted respondents in each level of the English department were the students per level. The total number of the sample selection stands at 72 (responses 60, no responses 7, and 5 not valid). The valid sample of this study is 60 responses - yielded (83.3%). The methodology that used in this study is the descriptive analytical approach to analyze a questionnaire Data analysis was performed using (SPSS 23) technique was used to analyze questionnaires and to detect the undergraduate students' attitudes and motivation toward learning English as a F.L. The primary data was collected by using the questionnaire.

Data Analysis And Interpretation Of Results

The Characteristics Of The Study Sample

Table.1.the Characteristics of the Study Sample

NO	Variable	Category	Frequency	Percentage %
1	Gender	Male	20	33.3
		Female	40	66.7
		Total	60	100%
2	Age	20-25	59	98.3
		26-30	1	1.7
		Total	60	100%
3	Level	First Level	16	26.7
		Second Level	15	25.0
		Third Level	13	21.7
		Fourth Level	16	26.7
		Total	60	100%

Source: Researcher preparation based on the outputs of SPSS.

The age of the study sample was (98.3%) were 20-25 years and (1.7%) of respondents were 26-30 years. This indicates that a large part of the study sample has attitudes and motivation toward learning English as a foreign language. The percentage of the level students was 26.7% at the first and the fourth level, while 25 % at the second level and 21.7 % at the third level. This indicates that the study sample is distributed between the four levels, with a suitability percentage.

1.5 The Undergraduate Students' Attitudes Toward Learning English As A Foreign Language

Table.2. the Result of the Undergraduate Students' Attitudes toward Learning English as a F.L.

No. QU	Items	Mean	St. deviation	Relative importance %	Rank	The degree rate
1	The English language is more useful than my first language	3.00	1.042	60	6	High
2	I think the English language is an easier language to learn	3.60	.942	72	5	High
3	In my country, people who speak English are more respected than those who do not.	2.87	1.321	57.4	7	High
4	I am interested to speak English very well	4.20	.659	84	2	Very High
5	I enjoyed learning English	4.37	.736	87.4	1	Very High
6	I like English films	3.65	.936	73	4	High
7	I feel excited when hearing English spoken	3.90	.933	78	3	High
The General Mean of the Students' Attitudes		3.65	.469	73	1	High

Source: Researcher preparation based on the outputs of SPSS.

Table (2) shows that the domain of the undergraduate students' attitudes toward learning English as a foreign language studying in the English department college of education Socotra, Hadrout University is relatively high, within an arithmetical mean of 3.69, and a standard deviation of .469. The average of the paragraph that states, "I enjoyed learning English" is 4.37, and relative importance (87.4%) with a very high level of application. Followed by a paragraph that states, "I am interested to speak English very well." Within an average (4.20), very high application level and relative importance (84%) and standard deviation (.736) and (0.656), respectively. The results indicate that the undergraduate students' attitudes toward teaching English as a foreign language that studying in the English department, college of education Socotra is high and that the Department of College of education Socotra pays attention to this domain according to the undergraduate students' attitudes toward learning English as a foreign language. The results also indicated that the opinion of the study sample that people who speak English are not more respected than those who do not. Moreover, they agreed that the English language is not more useful than their first language; the reason it was getting a medium level of application.

1.6 The Undergraduate students' Motivation To Learn English As A Foreign Language

Table.3. the Result of the Undergraduate Students' Motivation to Learn English as a Foreign Language

No. QU	Items	Mean	St. deviation	Relative importance %	Rank	The degree rate
1	I study English because it will help me get a job easily	4.00	1.042	80	3	Very High
2	I learn English because I have a desire to know all aspects of English	3.55	1.032	71	8	High
3	I learn English because it is a university requirement	3.33	1.115	66.6	10	High
4	I learn English because I want to continue my Education	3.82	.930	76.4	6	High
5	My family tries to help me to learn English	4.17	.886	83.4	1	Very High
6	Studying English is important because it will allow me to be more at ease with people who speak English	4.02	1.172	80.4	2	Very High
7	English is not an important goal in my life	2.78	1.379	55.6	12	Medium
8	I learn English because it is an international language	4.00	.991	80	3	Very High
9	Learning the English language is important for my Personal development	3.92	1.169	78.4	4	High
10	I stud English because it will help me to travel to different countries without difficulties	3.90	1.130	78	5	High
11	I study English because I would like to make international business	3.17	1.092	63.4	11	High
12	I study English because it will widen my horizons	3.45	.999	69	9	High
13	I study English because it will enable me to get to know various cultures	3.73	.972	74.6	7	High
The General Mean of the Students' Motivation		3.48	.331	69.6	2	High

Source: Researcher preparation based on the outputs of SPSS.

Table (3) shows that the overall domain for the Students' Motivation is high, with an overall average of 3.48, and relative importance (69.6%). This means that most of the respondents have a high approval rate for this variable. It has a standard deviation obtained of 0.331, which indicates that there are consistency and harmony between the views of respondents on the paragraphs of the variable. The results indicate that the undergraduate students' motivation toward learning English as a F.L lies in family, it allows them to be more at ease with people who speak English, to get a job easily, and because it is an international language. In addition, the results indicate that the undergraduate students' have not motivation toward learning English as a F.L lies in English is not an important goal in their life; they study English because they would not like to make international business, and they did not learn English because it is a university requirement.

2. Conclusion:

The current study concluded that the undergraduate students' attitudes toward teaching English, as a F.L studying in the English Department College of Education Socotra is high, with

a rate of 73%. There is a clear focus on the undergraduate students' attitudes toward learning English as a foreign language because they are interested in speaking English fluently as well as their enjoyment in learning it. Moreover, the results indicate that there is students' motivation toward learning English as a foreign language, with a high rate. There is a clear focus on the undergraduate students' motivation toward learning English as a foreign language lies in family, it allows them to be more at ease with people who speak English, to get a job easily, and because it is an international language. The research recommends that the department college of education Socotra, Hadramout University should held language conferences, symposiums, lectures, provide feedback, workshops, and training courses in English as a foreign language to raise awareness and the capabilities of the students' and teachers' attitudes and motivation in Socotra because its direct impact on the students' attitudes and motivation.

6. Acknowledgements:

I would like to start by thanking Almighty Allah for many things. He bestowed me, among which is completing this research paper. I acknowledge many people who stood by me during this study. I would like to thank the academic staff and Dean of the college of education Socotra Hadramout University, and all teachers and students of the English department, who supported me and helped me to carry out this research by answering the questionnaire paragraphs seriously. As well as the teachers who distributed the questionnaire believed in and allowed me to collect data. I also thank all my family members who believed in me and supported me all the time. Special thanks are due to all my friends within and outside Aurangabad who also supported me and encouraged me during my study. Very special thanks to my Ph.d. supervisor, Dr. Yashwant A. Doke.

References:

- Anderson, N. J. (2001). Developing metacognitive skills in foreign language learners. : Selected Papers from the Tenth International Symposium on English Teaching, 1-7. Taipei: English Teachers" Association.
- Anderson, N. J. (2001). Developing metacognitive skills in foreign language learners. : Selected Papers from the Tenth International Symposium on English Teaching, 1-7. Taipei: English Teachers" Association.
- Baker, C. (1992). *Attitudes and language*. Clevedon: Multilingual Matters.
- Brown, H. D. (1987). *Principles of language learning and teaching*. Englewood Cliffs, NJ: Prentice Hall.
- Dörnyei, Z., & Ottó, I. (1998). Motivation in action: A process model of L2 motivation. In *Working Papers in Applied Linguistics*, 4, 43-69.
- Dörnyei, Z., ed. (2003) *Attitudes, orientations, and motivations in language learning*. Oxford: Blackwell.
- E.L. Dejnozka, D.E. Kapel, C.S. Gifford and M.B. Kapel, *American Educator' Encyclopedia (Revised Edition)*, (1991), Greenwood Press.
- Gardner, R. C. (1980). On the validity of affective variables in second language acquisition: Conceptual and statistical considerations. *Language Learning*, 30(2), 255-270.
- Gardner, R. C. (1985). *Social psychology and second language learning: The role of attitudes and motivation*. London: Edward Arnold Publishers, Ltd.

- Guilloteaux, M. J., &Dörnyei, Z. (2008). Motivating language learners:A classroom oriented investigation of the effects of motivational strategies on student motivation. *TESOL Quarterly*, 42(1), 55-77.
- H.D. Brown, (2000). *Principles of Language Learning and Teaching*, New Jersey: Prentice Hall.
- J.W. Oller. (1979), *Language Tests at School*, London: Longman.
- Masgoret, A., Bernaus, M., & Gardner, R.C. (2001).Examining the role of attitudes and motivation outside.
- Of the formal classroom: a test of the mini-AMTB for children. In Z. Dörnyei and R. Schmidt (Eds.).
- R.C. Gardner and W.E. Lambert. (1972). *Attitudes and Motivation in Second- Language Learning*, Rowley, Mass: Newbury House.
- R.C. Gardner. (1983). Learning another language: A true social psychological experiment, *Journal of Language and Social Psychology*, 2(1983), 219-240.
- Triandis, H. C. (1971). *Attitude and Attitude Change (Foundations of Social Psychology)*. New Jersey: John Wileys& Sons Inc.
- Wenden, A. (1991). *Learner strategies for learner autonomy*. London: Prentice Hall.



A Study of Indian Ethos in the Select Novels of Amish Tripathi

Swapnil Shivaji Landage* & Kambale U.D.**

* Department of English

Arts Commerce and Science College, Ashoknagar, Shrirampur.

**Department of English

Mula Education Society's Shri Dnyaneshwar College, Newasa.

Email id: landageess@gmail.com

takshak32007@gmail.com

Abstract:

The present research paper is a Theoretical, Analytical and Evaluative study of Indian Ethos with reference to theselected novels of Amish Tripathi. He is famous for the Shiva Trilogy which focuses on a man's journey and how his legend turned him into a God. After this successful trilogy he came with the another trilogy called Ramchandra Series which contains 1) Ram: Scion of Ikshvaku 2) Sita:Warrior of Mithila 3) Ravan:Enemy of Aryavarta.This Ramchandra Series explores the life of Ram,his band of brothers and his wife Sita, as they lead India out of the darkness of chaos and into the light. Amish believes that the Hindu gods were not mythical beings or a figment of rich imagination. According to him they were creatures of flesh and blood, like you and me and they achieved Godhood through their karma, their deeds. He also believes that their blood runs in our veins as they were our ancestors. Amish thinks that the words Vishnu and Mahadev are not individual names. They are in fact titles,given to persons who are the greatest of leaders, who become God-like.Amish Tripathi's novels are not only about captivating AdventuresMyth,History and use of symbols but also they touch the issues,Honesty,Goodwill,Sacrifice and above all family value

Key Words: representation, edutainment, morals, beliefs

Introduction :

Before we go through the Indian ethos, it is really important to understand what is ethos? Ethos can be simply defined as a set of beliefs, ideas, and philosophy. Ethos is all about social behavior and relationship of a person or group. The word ethos is derived from the Greek word, 'ethikos' which means civilized, viewing honest temperament, accustomed place, morality, showing moral character. Ethos is a Greek word meaning, 'character' that is used to describe the guiding beliefs, morals and ideals that characterize community, nation or ideology. The Greek also use this word to refer the power of music, to influence emotions feelings, thoughts, behaviors and even morals.

Cambridge Advanced Learner's Dictionary Defines ethos as a set of beliefs, ideas and others about social behavior and relationship of a person or group. Whereas Oxford Advanced Learner's Dictionary Defines ethos as the moral ideas and attitudes that belong to particular group of society. According to Oxford Concise English Dictionary ethos is the characteristic spirit of a culture or community as it is reflected in its attitudes and aspirations.

Oxford English Dictionary Defines ethos as a means of habitual character disposition and tendency of a set of people or race. In simple words, ethos stands for human society that embodies a certain culture or system based on human and other natural values of life. In short, ethos is the disposition of character or set of fundamental values particular to a specific person,

people, culture or movement. It is associated with the geographical locations, languages, race, religion and culture of a nation.

When it comes to Indian ethos, it is all about what can be termed as National Ethos. Indian ethos refers to the principles of self-management and governance of society, entity assisting by wisdom as revealed and brought forth by great scriptures like Vedas, Upanishads as The Geeta, The Mahabharata, The Bible and The Quran. This wisdom evolved through the old practices of Indian history, philosophers and religious groups and It is now found to execute for self-management and good governance of a stormy society and business environment or even a politically divided world. Alexander the Great, Tsang Hi from the China, Abdul Razzak from Iran came to India and observes the exceptional importance of the Indian ethos in its social institutions, religious structures, moral framework and peculiarities of food ornaments and garments.

The Vedic culture is prominently reflected in Hinduism, the scriptures like Vedas and Upanishads as the Puranas and the Bhagavad-Gita have impressed life style of majority of the people in India. Due to intermingling of many cultures for centuries after centuries the Indian society is identified as unity in diversity. It is the amalgamation of complex customs and traditions representing different religious identities, there are a multitude of beliefs and convictions, they are interlinked features of an integrated diverse society. The Indian Constitution celebrates tolerance towards various religious identities along with their linguistic differences. People living in India as a whole explore various cultures, languages and customs. Muslims, Sikhs, Jains, Christians and Zoroastrians also reside amicably in India exploring their own identities. Such complex structure of society, philosophy, religions and languages has led to the creation of Indian ethos. The crux of Indian ethos lies in its oral literature and legacy of folk lyrics. Stories have been transforming from generations to generations. Some of the oral literature was preserved in a written form in the languages like Pali, Prakrit and Sanskrit etc. Through this evaluative research work we will understand the articulation of the Indian Culture, Communication, Religious concepts, Family values, Moral values, Identity and most important of all Philosophy.

Rationale and Significance of the Study:

Since the research work attempts to study the Representation of Indian ethos as an articulation of Culture, Communication, Religion, Identity and Philosophy. The purpose of human life as enshrined in the opposition as for the good of all. There was an apple philosophy behind this which stated that the whole world is one family one understanding, underlying Idea behind this may require scholarly rigor and erudition given the deep philosophical essence of the Vedic text, there are simplistic explanations that makes sense. Kabir the famous saint of India for instance can be read to get insightful fractions of Indian ethos in his simple and early style. Famous and often repeated quote of Kabir is, "saiitnadijiye, ja meinkutumbamaye, main bhikhukhanarahoon, sadhu nabhukhajaaye" translating this in English becomes, ' O God, give me that much so that I can take care of my family; I do not remain hungry, nor the person who comes to me for or alms.

In the Hindi popular title song of Bollywood hit of the 1950's, JisDesh Mein Ganga Bahtihai, this idea was beautifully and melodiously brought out, translating those lines in English becomes, 'We Indians love our guests more than ourselves and we do not crave for more, rather enjoy with little'. The Indian ethos has always valued Parmartha for the good of others. The

richness and the depth of this ethos is gradually being lost as we are becoming too preoccupied with self-interest under the influence of alien values and cultures that do not hold humanity on the same pedestal as Indian ethos. Indian ethos always been talked about and practiced as well.

Objectives:

1. To study Amish Tripathi's Ramchandra Series as a representation of Indian Ethos.
2. To examine Ramchandra Series as an articulation of Indian Culture.
3. To study Ramchandra Series as an articulation of Religion.
4. To examine Ramchandra Series as an articulation of Indian Tradition.
5. To study Ramchandra Series as an articulation of Indian Philosophy.
6. To understand the issues of unawareness about the ancient Indian Culture and Tradition.
7. To analyze the works in the light of educational, social and literary perspective.
8. To interpret the selected Novels as a modern take on the epic.
9. To present the need and importance of rethinking the epics as a need of time.
10. To explain how colonization of education system led to unawareness of Indian heritage.

Hypothesis

- Amish Tripathi uses myth, history and symbols to present Indian Philosophy and Religion.
- Amish uses fantasy and imagination to execute Indian culture and Tradition.
- It has been seen that these novels are nothing but modern take on the epic Ramayana.
- It has been observed that studying of these novels can surely constitute the solid and enduring foundation of long and magnificent Indian culture and civilization.
- Ramchandra Series is an articulation of Indian ethos as Culture, Religion, Tradition and Philosophy.

Methodology of the research:

The analytical framework for the study undertaken in this research would be based on theorizations of ethos, features and aspects of Indian ethos, the need and importance of Indian ethos. This thesis would enquire that how the Indian ethos has been analyzed in Indian English literature. For the study of Indian ethos in Amish Tripathi's novels theoretical method would be used as original books would be the primary source of the Information about religious and cultural aspects for the better understanding of the texts.

The methodology for this study will be Analytical, Evaluative, Interpretative and Theoretical. Library method will be supplemented for the understanding of the concept Indian ethos with online articles and books available related to this topic would be studied as well.

Scope and Limitations:

There is always scope for research in every genre of literature, so is in this topic as well. This proposed work offers an opportunity to the researcher for an interesting and unique investigation of Indian ethos as representation of culture, religion, identity and philosophy. These selected novels of Amish Tripathi are a modern take or representation of the epic Ramayana which not only deals with myth, history and philosophy but also honesty, morality, family values, culture, religion and sacrifice. With this topic there is scope to present the need and importance of Indian ethos in the age of globalization. This research can strengthen the positive view about learning our Indian heritage that leads to wisdom, liberalism, pluralism and

knowledge. It helps to understand the quality of writing any work of literature in modern style which can connect to the common people easily.

Talking about the limitation the study will only focus to Indian ethos with reference to the selected novels of Amish Tripathi. Indian ethos is a vast concept, so it is not possible to touch every aspect of it. Because of this the researcher would fix some rubrics like, Culture, Religion, Communication, Identity, Morality, Philosophy etc. So this study would be limited to these aspects only and not all.

Review Of Related Literature:

Indian Ethos employed by the scholar's, historians and anthropologist to illustrate the major principles that portray society, nation, community or philosophy. The Use of this word in rhetoric is closely associated with the Greek terminology used by Aristotle in his concept of three artistic proofs or modes of persuasion. Aristotle described three artistic proofs 1) Useful skills and practical wisdom 2) Virtue and goodwill and last but not least 3) Good will towards the audience.

According to TS Eliot ethos is the spirit which motivates ideas and customs. in 1940 he wrote the general methods of the people they have to govern determines the behavior of politicians (T.S. Eliot, P-25) Similarly the historian Orlando Figes wrote in 1996 that in Soviet Russia of the 1920 the ethos of the Communist party dominated every aspect of public life.

Indian writers who celebrate Indian ethos and trying to project through the novels like ram Mehta in Inside the Haveli and Kamala Markandaya in her novels. Amitav Ghosh, Shashi Tharoor and Amish Tripathi etc. are some of them. Perhaps the most well-known writer of mythology is Dr Devdutt Pattanaik who is famous for mixing traditional ideas with modern world.

His works are well researched and showing the age-old tales in new light for instance, Myth= Mithya, Jaya: An illustrated retelling of the Mahabharata and Sita: An illustrated retelling of the Ramayana. Kavita Kane is Indian women author who is a favorite among women readers. she wrote about the forgotten female characters of great Indian epics and retells the tales through the point of view of women for instance, Karna's wife: The outcast queen, Sita's sister; Menaka's choice and Lanka's princess etc. Chitra Banerjee Divya Kumari who is a professor of creative writing at university of Houston retells the story of the Mahabharata from Draupadi's point of view in her novel, 'A Palace of Illusions'. Ashok Banker is an Indian author and screenwriter, famous for crime thrillers, essays, literary criticism, fiction and mythological retellings. His works on Ramayana series contains eight volumes, an imaginative retelling of the ancient Sanskrit epic poem. His Krishna series also contains eight parts and the Mahabharata series six parts which are quite famous.

Ethos in India, has a specific understanding and impact and territory covers different geographical areas, languages, culture, religion, tradition, society and philosophy.

Plan of Research: This work researcher wishes to divide into five chapters as below,

Chapter 1. This would be an introduction to the Indian ethos, Meaning, Features, Need, History, Relevance, Principles Practiced by Indian Philosophers, Elements, Role of Indian Ethos in the age of globalization, rationale and Significance of the Study, hypothesis, aims and objectives, research methodology, review of related literature, scope and limitations of the study

Chapter 2. This chapter will be about the articulation of Indian ethos through which the researcher wishes to evaluate the novel Ram – Scion of Ikshvaku by Amish Tripathi. This is first

book on Ramchandra series published in the year 2015. As the title of the novel suggests it is from the point of view of Ram. It also refers to the Ram Rajya: The perfect world, but Perfection has a price and Ram did pay that price. It has been observed that Ram loves his country, even when his countrymen torment him. He stands alone for the love. It has been seen that he and his brothers share the unbreakable bond which is missing totally in the age of globalization. Ram knows that his father's ways of ruling are not efficient, but as an ideal son he refuses to rebel against Dashrath. Ram needs to regain back his interpreted name among his people. Ram stays idealistic, Bharat grows up to be practical and real, Sita's strong will, Lakshman's unconditional love and support for his elder brother Ram. Hanuman's selfless devotion.

Chapter 3. This chapter will be about the representation of Indian ethos through which the researcher wishes to evaluate the novel Seeta-Warrior of Mitthilaby Amish Tripathi. This is the second book on Ramchandra series published in the year 2017. This book is from the perspective of Sita. Amish depicts Sita as a brave princess with beauty and brains. Sita is shown to be blessed with a multifaceted personality. She comes across as a mature girl. This novel showcases her governance skills and her caring relationship with her family is quite heartwarming. Hanuman and Jatayu are portrayed as brothers to Sita protecting her from every adversity that comes her way. This is the story of Sita who willingly follows her husband into exile and after being kidnapped by Raavan accepts rejection by her husband on her return. It was the idea of guru Vishwamitra to groom Sita into becoming the Vishnu, whose duty to lead country's Dharma.

Chapter 4. This chapter will be about rethinking of Indian ethos through which the researcher wishes to evaluate the novel Ravana: Enemy of Aryavartaby Amish Tripathi. This is the Third book on Ramchandra series published in the year 2019. Through this novel Amish tries to present the biggest villain ever Raavan in totally different light. Raavan is the synonym to the word devil. Amish gives this character an edgy personality so as to make him an interesting project. Raavan is an intelligent, sharp as legend has it all. The bond he shares with all his brothers and specially with Kumbhakarna is the surprise package of the book. A picture of a well-intentioned, intelligent, brave warrior who seems to be in thrall to his complex elder brother. And this is why readers quite liked the link to Kumbhakarna's legendary tendency to sleep the hours of the day away.

Chapter 5. This chapter discusses the conclusion arises from the previous chapters and discusses the similarities and differences of these three books from the Ramchandra series by Amish Tripathi. It also talks about the limitation of the work providing some suggestions for further research.

Conclusion:

Thus, revisiting our Indian heritage with the study of Indian ethos in the select novels of Amish Tripathi is an enriching experience. The everlasting appeal of these treatises still influences to a great extent of cultural life and behavior pattern of Indians. We are the only country that has such rich heritage which has been showcased in Amish Tripathi's novels.

Bibliography:

Primary Sources:

- 1) Tripathi, Amish. Ram: Scion of Ikshvaku. New Delhi: Westland Ltd. 2016

- 2) Tripathi, Amish. Sita: Warrior of Mithila. New Delhi: Westland Ltd.2017
- 3) Tripathi, Amish. Raavan: Enemy of Aryavarta. New Delhi: Westland Ltd.2019

Secondary Sources:

- 1) NaikM.K,"A History of Indian English Literature,SahityaAkadami Publisher,1956.
- 2) Abrams, M.H., "A Glossary of Literary Terms", India: Prism Books Pvt. Ltd., 1993.
- 3) Nair,B.K,Raja,K.C.R,andBalchandra S,'Ethics,Indian Ethos and Management,2nd ed.
- 4) AgravalTushar,chandarkarNidhi,'Indian Ethos in Management,Himalaya Publishing House.
- 5) KhandelwalN.M,'Indian Ethos and Values for Managers,Himalaya Publishing House
- 6) Oxford Advanced Learner's Dictionary, Oxford university press, 2005.
- 7) KadamMansingh,"The novels of Amitabh Ghosh Shashi Tharoor, Upamanyu Chatterjee and RohintonMistry, Thematicstudy,ABS Publication,Varanasi,2013.
- 8) MittapalliRajeshwar,Piero Paolo Piciuccio,ed.by,"Studies in Indian writing in English", Atlantic Publication,2001.
- 9) Agrawal Deepali,"Indian writing in English", Swastik Publications, New Delhi,2013.
- 10) Sarkar Dipti,"Postcolonial women writers", Ritu Publications, Jaipur,2014.



Cinematic Representations : Modes and Means

Mahananda C. Dalvi

Associate Professor

Dept. of English

Dr. (Sow) I.B.P. Mahila College, Aurangabad

nandinisingh@ gmail.com

Abstract-

The visual mode always offers choices that the written narrative may not. The multiple agencies of cinematic representations of gender masculine or feminine gain greater freedom in the choice of different outlooks. The camera eye, narrator, spoken dialogues, body language, facial expressions, the high, middle, and low light angle of the camera as well as the silence and spaces are to be called the multiple agencies or the modes of expressions. It is fascinating to critically discover the psychological relationship between a life on the screen and the actual life of one in society. Philosophical observation proves that a film always comprises several components within itself. We may list down several concepts which must be combined to form it (cinema/ film) e.g. perception, representation, signification, adaptation, evolution, identification, figuration, and interpretation. These all factors together complete to form the art called 'cinema.'

The present paper will focus on the technical modes which are used to make a film as a complete or sole object. The present research article will explain the role of the camera and different angles of Film/ Cinema interpretations. Certain keywords will be analyzed and discussed as per the need for discourse. Representation of social reality when comes from life to pages and from pages to screen, it goes through different techniques. As we will study critically the high, middle, front & back camera lights too to gain the proper effect of any theme. Every film is based on raw structure and that structure makes a solid framework for any level of the film. Under the title of films, we have to list down such commercial films, realistic films, and films based on psychology which are art or parallel films. Every cinematic presentation always prepares a discourse. That may be a discourse of social issues and gender realities etc.

Keywords- Perception, representation, signification, adaptation, evolution, identification figuration, and interpretation.

Introduction:

A heap of people is watching a film/ cinema in a theatre, but very few are concerned with a message. A little group of people has paid attention to the technicalities of film production. Very often 'the focused spectator' (of any film) is constructing and regenerating in their subconscious mind the diversified imaginative persona of someone. Most audiences feel very happy to watch the Actors and Actresses on the screen, for us they are role models and idols to be guided psychologically and emotionally. Recently the field of research in Literature or literary studies allows us to view things differently. It allows us to look for the unconscious reflection of social reality, the underline power structures, the frames which melt into each other, the repetitive narrative patterns, and the dialogues which use myth and history. It juxtaposes all techniques simultaneously by the way of the medium. There is no possible way that a compartment of literature can hold them aloof from the cinematic medium, especially when the film has never shown any hesitation in appropriating literature for its purpose.

Let us focus on the very first concept of cinematic art i.e. 'the perception'. The question arises in our mind that is 'what is perception?'

According to the dictionary, 'Perception', is the act or power of perceiving an object and point to recognise it through a combination of sensors. (Kirkpatrick, 1991, page number 997)

One can simply take the example of a book e.g. - the book in front of you is there on the table in reality. It has physical reality no doubt you can touch it, smell and behold it through your eyes. It means you can feel the book, going for reading the contents and contemplate it for a better understanding. You can hold the text in your hand and try to touch its cover. You were in process of objectification, the process of thinking. It means the book has become a symbol of presentation in your mind. If you are a thorough reading and you are reading a book line by line, you may be able to communicate your thoughts about the book to someone else. It means if the book is not physically present before you, but you are trying to perceive the book mentally and try to describe it in the manner in which you have perceived the interpretation of that book. It is one level of perception. Secondly, you may be asked by someone what did you learn from the book? Then you will communicate some lines from the book and try to formulate exactly what you feel about it. It is to be called another level of perception. According to Gestalt's theory, perception always implicates the advocacy of cultural attributes and the addition of a few social codes into visual life to create a semblance between a few incidents from the real and the cinematic portrayal of human life. It means people are always inclined to see the film as an integral part of everyday life.

Then 'Representation' is another medium of cinematic performances. The word, representation was first time used by the Greek philosopher Aristotle in his theory of Memesis. In the theory of Memesis, the performer tends to imitate, to copy the actual life in the contemporary society which belongs to a different class, culture, creed, etc. Now let's differentiate between the physical reality and the psychological one. Let's assume that the presence of a book is a physical reality which is something present in front of you, i.e. book. But if someone will ask you, 'what is a book?' Then in your mind, there would be an existence of a book that will take shape which is the psychological reality. The psychological reality and the perceived understanding of an object may vary from person to person. According to Christian Metz, a Film Theorist the concept of Representation in cinematic perception has its limitations. As per the search for mass audience representations, the cinematic perception tends to be rhetorical and melodramatic. Especially the dialogues which tend to use sign, footprints, symbols, myths, and inferences that are easily recognized and gains compatibility with a complete resonance.

The 'adaptation' is another medium of a cinematic representation of any context. The word adaptation suggests multiple interpretative styles of film adaptations. Seemingly it sounds enough simple but it is unfolding and somewhat complex meaning when we are seeking real-life examples in society. For example, Sigmund Freud explains many of his dreams such as suppose, if someone is planning to visit the YCMU, Headquarter in Nasik from his or her home town to collect the grade sheet of PG Diploma in Psychology. He or she has to plan the trip well in advance. When that person will reach there, he/ she will realize that several administrative procedures are yet to be completed to obtain the grade sheet and He will have to stay in Nasik for another day. What will come to his mind immediately that is interesting? 'Where would I stay and 'What would I eat'. It means the adjustments and readjustments need to manage several

times. It is to be called the phenomenon of adjusting oneself to one's immediate environment that is adaptation.

In the world of cinema, such a similar process happens. We can mention any short story or fable or folk tale that is being adapted for a film. The story undergoes several changes through the process of adaptation, transformation, and translation which has become a necessary process to fit the matter in which it will be produced. Jean Mitry, a Film Theorist said, when a story from a different language is adapted, and modified as a plot (of the film), it has become a necessary aspect of filmmaking and it can be varied according to the language and culture in which film is being made. E.g. Sharad Chantra's Chattarjee's Bengali novel "Devdas" has been adapted into a film by the male director and the role of Paro and Chandramukhi is equally portrayed in comparison to Devdas that is they are portrayed as powerful gorgeous, emotionally vulnerable characters. Even Mahasheta Devi's text 'Ruddali' was adapted into a film in 1933 by a female director Kalpna Lajmi, as a female director with an impartial sincerity she did justice to the portrayal of the faithful profession as a mourner. Kalpana Lajmi has shown the powerful portrayal of a woman in commercial cinema.

Then 'Identification', the story of the sub-conscious mind popularised the medium of observation study to understand the cinematic form of art. Hugo Musterburg, a Film Theorist focuses on the proper communication of a spectator and a film producer. In order to understand any film as an art, it is important to study the dialogue of a producer/director with the spectator and see what they have in mind. The proper identification of a spectator with a film director processes the film towards success. E.g. the inter-caste marriages began to be shown in the 1930s and 1940s Films of Boll woodlike 'Achhut Kanya (1936) where we see a Brahmin boy and an untouchable girl get married on their own choice.

The last concept of cinematic representation is the 'interpretation'. 'Interpretation' is an indivisible part of film analysis is as it focuses on the context of a film. The interpretation always focus on the other new aspect which may not be immediately visible but when you watch a film, one must observe that every individual has his/her own way of thinking which is monitored by the norms of society in which it lives.

Merleau Ponty, a Film Theorist points towards the way of representation as the way a film portrays the scene of a food habit which suggests interpretations of different kinds depending upon its cultural context and social surrounding. Interpretation is called a basic technique to understand the film. It is interesting to know how the emotional movements of the film are shown through different cameraangles; sometimes the focus of a camera is on facial expressions particularly a deep angel shot at the time of death scene is shown from a high angel camera. Rape scenes of a woman have always been signified through symbolic musical background. The technique of interpretations works through the properties of the (actual) scene such as bird fluttering, thunderstorms, violent waves, and lighting on the rocks, and on the sea sides. The medium of representation and interpretation is the basic medium that can give proper justice to the response of the Spectator.

There are many ways to study and analyze the Film. Many Film Theorists projected semiotic and psychoanalytical modes of film studies. Let us focus on the semiotic and psychoanalytical angle of study.

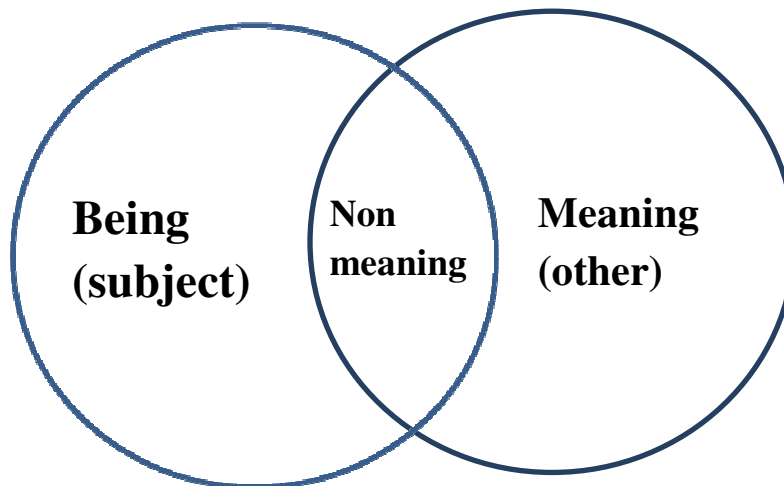
The semiotic theory is related to the theory of signs. As we know Ferdinand de Saussure is to be called the pioneer of Semiotic theory which creates a scientific base for the study of signs

in a language. We are familiar now with the concepts of perceptions, significations, and identification which can be examined from the semiotic perspective. In order to explain the semiotic angle of a cinematic study in performing art, it will be explained with an example of a tree. When someone pounced or 'uttered' the word 'tree', at once image of a tree appears in one's mind. Your single thought shape at the objectification of an image of a tree could be different from the image of a tree that someone thought of. Because we already read about it in a book, in a poem with an exemplification of an image of the tree one can access any example of any scene from any film where a song is being shown on the screen. You can observe that most of the time the Hero and the Heroine of any film go to a different location with different costumes, at an alternate shot which may be drastic from the preceding scene of the film. If someone listens to the song apart from the film, it will not be interesting. But if the same song is sung by a Hero, now you can see it has a meaning. If someone sings the same song somewhere, where it is not necessary for that particular context. If you like any particular song, you may repeat it until it will not be replaced by another song now if it comes at the comparative level with other people who have watched that particular film with you, might not surely like that same song. So, there is a basic bottom-line difference between watching a film and listening to a song. So there will be a difference between two things watching a film and listening to a song. Such differences always create stereotypical images of Heroes and Heroines. Again you might like a particular Hero because of his dressing senses or because of a typical style of presentation.

Cinematic art always uses different semiotic forms to create meaning for the entire film or cinema. Cinematic art establishes certain techniques which may not be suitable for the scenario of a particular society. Therefore certain films have to be defined as fixed parameters that indicate a utopian understanding of the life of a diversified cultural country like India. The semiotic approach of study draws our attention towards the domain of the particular parole because it studies the permissibility and impermissibility of that system. Sometimes films portray things as it is which might not be accepted by your society and culture. E.g. widow's remarriage in 'Kati Patang' (1970) and 'Prem Rog' (1982), the inter-religious marriage in 'Bombay' (1995) or 'Pinjar' (2003), and pre-marital pregnancy shown in 'Aradhana' (1969) and 'Julie' (1975). The angle of semiotic study has been efficiently tackled in 'Amar Prem' (1972) and 'Ram Teri Ganga Maili' (1985) problem of prostitution has been intelligently shown in both above films by the technique of semiotic study.

The second mode to study is psychoanalytical. In psychoanalytical mode, the fundamental issues are thoroughly focused on from all angles of study. The study of Sigmund Freud, Jacques Lacan, Levi- Straus, Mitchell Foucault, Julia Kristeva, and others have prepared the strong grounds for the technical, psychological, and socio-linguistically study of films. Lacan has developed particular philosophy of meaning, through the theory of 'Vel of alienation. According to Jacques Lacan, Psychoanalytical Theory. Signifies the psychology of choosing one over the other which always resulted in deprivation. E. g. selection of money and life. If someone inclines to choose wealth instead of money life itself deprives them of something and similarly, if someone chooses life, deprivation of money will be in priority. Jacques Lacan elaborates on the mode of Semiotic and Psychoanalytical way of interpretation through the following Venn diagram. Where the meaning and the necessary essence of life are like the choice between money and life. Thus the individual has become nonmeaning. One can observe the difference; e. g. if

someone chooses the 'being as a subject' then the meaning of other objects becomes, non-meaning. (Lapsley & Westlake, 1988. P. 72)



Source: (Lapsley & Westlake, 1988. P. 72)

The above sources of being (subject), non-meaning, and meaning are shown to be adapted into cinematic art. It means when a subject utters something, that will convey proper meaning to everybody. It is observed that everyone doesn't interpret the word in the way someone inclines to utter it, and that becomes the nonmeaning of that utterance. We can take an example with the above reference suppose the Hero tells the heroine, 'I didn't expect this from you, and one might interpret the statement differently from someone else in the audience. Similarly, when someone tends to generalize certain gender issues, which you may have heard and tend to differ with generalizations. E. g., the issue of child trafficking might sound irrelevant to people who are not at all aware of the stark reality of life. Another example of a bitter truth of society i. e. the concept of marital rape sounds somewhat illogical and unbelievable to few one. There are many other problems and gender issues are yet to be discussed in our day-to-day life. Those social problems find objectification through cinematic art. One might say film always brings those shaded issues into the light and questions our beliefs through various interpretations based on cinematic art.

The above observations underline the two art forms i. e. the 'verbal' and 'visual' are not only parallel but both are interactive, interdependent, and reciprocal. The verbal and visual are the two diverse mediums that affect the reader and viewer's relationship which seems very complex. The disparities between the two at the same time focus on similar areas.

References:-

1. Sarkar, Tanika, and Urvashi Butalia, eds Women and the Hindu Right, New Delhi: Kali for Women, 1995.

2. Nandy Ashis. *The Secret Politics of Our Desire*: Oxford University Press. 1998
3. Mulvey, Laura. "Visual Pleasure and Narrative Cinema," *Film Theory and Criticism* Ed. Leo Breauy and Marshall Cohen. 5thEd. New York: Oxford University Press, 1999.
4. Dandley, Andrew. 2008. *Concepts of Film Theory*. Oxford New York: Oxford University Press, 1st Published in 1984.
5. Monaco, James. 2009. *How to Read a Film: Movies, Media and Beyond*. Oxford University Press, 1st Published in 1977.
6. Stam, Robert and Miller, Toby (eds.) 2000. *Film and Theory. An Anthology* Massachusetts, Oxford: Blackwell Publishers.
7. (Jain Jasbir and Sudha Rai, ' *Films and Feminism,*' essay in *Indian cinema*, page 10, Edtd 2007, Rawat Pub. www.books.com)
8. (kirckPatrick, 1991, page number 997)
9. <http://en.wikipedia.org/wiki/auteurtheory>
10. <http://en.wikipedia.org/wiki/phallogocentrism>



Exploration and Projection of Nakedness of Socio-Political and Administrative System in *Article 15* Film : A Review

Dr. Gajanan T. Hivale

Assistant Professor

Department of Humanities and Social Sciences

National Institute of Technology, Ponda, Goa.

E-mail: dr.gajananhivale@gmail.com

Abstract:

Article 15 through the lights on Dalit stereotypes that are represented in the movie. The research paper discusses projection and exploration of nakedness of socio-political and administrative systems depicted in the movie, the research paper also lays emphasis on themes revolving around 'Brahminic Heroes', 'Dalit Victims and Dalit Protest Silenced' and 'Interlinkage of Gender and Caste Violence'. In the movie, Brahminic/ Savarna heroes are presented with certain visual cues and cultural markers. This includes certain privilege, fairness, well-dressed, confident, handsome, articulate and upper-class characters. AyanRanjan checks all these stereotypes. He is portrayed as an ideal for the audience and a saviour for his Dalit counterparts. However, his cultural cluelessness makes him caste-blind. He has achieved this privilege due to caste-hegemony which does not look at other spaces. The character is not just Brahminic but urban Brahminic. The movie depicts that caste space only exists in rural India which is clearly flawed. While the movie tries to interrogate it when Aditi hints to Ayan how even their mothers used to have separate sets of utensils for people from lower castes but it never addresses caste in urban spaces. Through analysis, we will discuss the depiction of a stereotypical Brahminic hero. Dalits are portrayed as dark-skinned, unhygienic, skinny, powerless characters who are dependent upon the social elites for justice. In the film, the Dalit community lives in the conditions of helplessness, abject poverty, performs filthy jobs and faces daily violence and social ostracization. Even the law enforcement is seen harassing them. Very little resistance by Dalits is shown. Even when it is shut down through upper caste violence. This serves them to the cycle of voiceless subjects who do not have any agency. And once again an upper caste Brahmin man becomes a saviour. While Dalit community in general is shown to be victimized, the body of a Dalit women is depicted as a point of exploitation, sexual and economic. The movie portrays the bodies of young Dalit girls to be used for upper caste violence. The framing of a brutal gang rape and murder of two Dalit teenage girls who are later hanged on a tree just because they asked for a raise of Rs. 3 in the film expose the interlinkage of sexuality and gender with caste. Although, the movie gives a clear sense of closure to the case but in reality, the story remains unsolved.

Keywords: Film, Article 15, Casteism, Humiliation and Representation

Introduction:

Article 15 is a film directed by AnubhavSinha, released in 2019 that revolves around the evident caste discrimination that is witnessed in everyday life in many cities and villages of Uttar Pradesh. AyushmannKhurana plays AyanRanjan, an upper class, urban, educated, entitled police officer who is fortified from, if not entirely well versed with the incongruous ground realities of

the country - to have little or be completely ignorant of caste based discrimination owing to their own privileged position in the profoundly unfair world.

The film is named after Article 15 of the Constitution of India, which prohibits discrimination on the basis of religion, race, caste, sex or birthplace. While not based on one specific event, the film is inspired by multiple real-life cases involving crimes driven by caste-based discrimination, including the 2014 Badaun gang rape allegations and 2016 Una flogging incident.

Casteism is intertwined with the reservation. But there is another storyline that people miss. The issue of casteism and Brahmanical control. The film Article 15 brings to our notice the reality of the society we live in. A society that oversees the binary standards and falseness its members proliferate.

Set in rural Uttar Pradesh, India - Article 15 looks at the shuddering truth of casteism and its concerns. The film is roughly based upon the Badayun gang rape, which took the country by a storm. In this movie, two Dalit minors were brutally gang-raped and then hung from a tree in the same village they were from - for the world to see. This is allegedly done to instil fear in the hearts of those who belonged to the same caste as them.

The story begins with Ayan slipping into a Bob Dylan's song "How many roads must a man walk down before you call him a man?" and taking in the rural beauty of countryside India, moments after which he is made aware of the discrimination that the people of the village follow when his fellow officer tells him, "This is a Pasi village, they are from lower caste. They breed pigs. We don't drink the water they touch". It is soon witnessed that the caste system severely comes in the way of justice when Ayan investigates the disappearance of three girls from a small village, revealing a history of caste-based tyranny along the way.

Despite the fact that observing the discussions between Ayan Ranjan and two other officers (played by Manoj Pahwa and Kumud Mishra) we see the arrogant dismissal of caste talk, referring to the people as "these people", much to annoyance of Ayan as he demands, "Who are 'these' people?". Ayan's character makes us see that the stigma of caste and preconceptions is too deep-rooted in our lives to vanish with individual political correctness and the absence of biases of a few who are far removed from the 'wild west' as Ayan calls it.

Article 15 expresses the story of an enquiry into the rape and murder of two Dalit girls & a search for the third one. The film moves around the issue of the gangrape and how its origins lie deeply deep-rooted in Casteism and Brahmin Control predominant in the town.

From the outside, the rural administrative system in India appears well-established. Village panchayats and police offices are manageable and ears of the law for ideally anyone. But when you look deep inside the heart of this system, it is not as modest as we are made to believe. When Ayan Ranjan arrives at Laalgaon, he instantly notices the division between groups of people when his request for a bottle of water generates tension among the local police officers, because, according to them, the upper cast are not supposed to even touch the Dalits. India's history is a witness of countless such beliefs among the rural police. Some consider in the caste system; some are enforced to. Local villagers struggle to bind with the police and report anything.

we observe the sluggish nature of police. All want to stay in their own ease, and never move a force. That ends up resulting in FIRs not being filed and investigations just...abandoned. The poor in this country suffer especially. In the movie, we see Gaura and the villagers implore

the police to investigate the three missing girls. As usual, they are turned down. "It's always like this with them" they say, as they continue drinking their whisky. When two of the girls are found dead the next morning, it's already too late. The film takes this moment to force our protagonist to start taking some steps. Regrettably, at this point we face another mess in the rural police system. Political pressure. Most of the officers work only to file cases, and these files never see the light of day again, because someone forced them to shut it down. Villagers with connections high up exploit these connections, getting away with anything and everything. We see Manoj Pahwa's character Brahmaddatt Singh absolutely tremble with fear when Ayan mentions that he wishes to speak to AnshuNaharia, local contractor and son of local minister RampalNaharia. Police wages are so scant in villages that most of the earnings for a police officer usually comes from looking the other way for powerful people in the village. And usually when an officer even remotely uneasiness these people, it ends up with the officer dead. That is what Brahmaddatta was so fearful of. He felt if anything happens, Ayaan would promptly leave Laalgaon, but he and the other officers would feel the wrath of these politicians.

But even then, it's not just fear that drives Brahmaddatt. He has a lust for power. He likes to be in control of his actions. He frantically tries to halt Ayan in his tracks, because he knows he is a part of the gang rape under investigation. When power is handed to people who are not worthy of it, they get gluttonous. In contrast, KishanJatav also tried to stop Ayan, but for a very different reason. Being a Dalit, he knew the lengths to which the higher castes in the village went, to ensure Dalits stay in and know their places. Bhramadatt and Jatav are two sides of the same coin. Their hopes and dreams are completely opposite, yet the pair walk the same path.

Article 15discloses every aspect of a system which has been influenced by a handful of people for periods. The faces change but the robe of power remains the same. In the film, the rapists include dominant local contractor AnshuNaharia, the Jat bodyguard of AyanNihal Singh and the local Brahmin SHO (policeman in charge of a police station). The entire administrative machinery is out to hush up the case and the father of the girls is framed in their murder but overall it's the system who is responsible for the gang-rape and murder of these two girls.

Exploration of Nakedness of Socio-Political System

Encouraged by the 2014's Badaungangrape and murder case, the film features AyushmannKhurrana as an honest IPS officer, who examines the rape and murder of two Dalit girls, both minor, who are found hanging on a tree in a fictional village of Lalgaoon in Uttar Pradesh. The London-return officer is seen dealing with the strong presence of caste discrimination and societal differencesimpending over the village. At one point he even tells his partner Aditi that it's like 'The Wild West. The movie is meant to open the audience's eyes from what they have always been sheltered from. There is a scene where a man is lowered into a blocked manhole. He is then seen emerging with sludge all over him. Though the scene has no dialogues but it is powerful enough to make the viewers feel uncomfortable and showcase the division and hypocrisy in the society. The film also subtly indicates caste privilege when Ayan asks his fellows which caste they belong to. Ayan is constantly reminded that he should not interfere in the caste dynamics of the village and disturb the balance that holds the social hierarchy. Another interesting aspect is the portrayal of an alternative hero Nishad, who is a fugitive. His intelligence gets redirected to fight against the system. The short-lived character leads the audience thinking if the character's destiny would have been different if he was not born in ainferior caste family.

The representation of a Brahminical savior and of a Dalit victim is clearly represented in 'Article 15' as well. The IPS officer, who earlier was unaware about caste discrimination becomes the rescuer for the Dalits. His dialogue "I will unness it" further claims this, while Dalits, who have been instigating a persistent fight in contradiction of caste atrocities have little agency or proclamation. The movie does not place Dalit characters and their experience at the centre. It represents that Brahmins are the liberators and the Dalits community cannot fight for themselves. A Brahmin saviour is seen as the one who solves the case, detains the criminals as well as finds the missing girls. While others are seen folding their hands in gratefulness. Dalit characters are carved in such a way who are first torn apart first by the murder of girls and then by the false cases against the deceased girl's fathers.

In the film, Dalit women are presented in limited resisting capacities and lack agency. Dalit women are represented as victims at different concentrations in the film. Gaura, who is in search for her missing cousin or Doctor Malti Ram, who is initially stopped and cajoled into not releasing the exact postmortem report of the bodies. Two Dalit girls- Shanu and Mamatha are viciously gangraped and murdered and later hanged on a tree. These girls were beleaguered just because they demanded a hike of three rupees, in their daily wages. The frame where the bodies of two girls are seen hanging on a tree with a chilling background score depicts the horrific violence wreaked on Dalit women by superior caste men. It is a remarkable example of how rape is used as a weapon of vengeance to castigate and silence women when they dare to complain. While Dalit women have been actively involved in anti-caste and anti-untouchability movement, the absence of Dalit women's voice from the narrative makes the viewer believe that they are mere victims and nothing more than that.

The film additionally inspects why fundamental revolutionists act the way they do, through Nishaad. He is part of a revolutionary group that resorts to brutal acts to be heard and to speed up the process of justice. Although looked at by law implementation with an angry eye, the audience quickly goes on to love him- witnessing his situation and viewing the world through his glasses. The story also discloses how political parties inconsiderately use people like Nishaad to fulfil their conspiratorial drives.

Projection of Social systems in 'Article 15'

The film mainly focuses on three themes- Construction of Brahminical Saviour; Representation of Dalit Identity and Caste and Patriarchy. Each theme aims to dissect how caste dictates everyday life in Indian society.

The concept of 'Brahminical Saviour' which arises from the concept of 'White Saviour Complex' manifests that escaping poverty or ignorance can only happen through a saviour's intelligence. Caste which continues to be a stable structure in India has managed to survive over thousand years. Caste is not just a social stratification that underlies hierarchy, difference, endogamy and division of labour in Indian society. But, it also forms an ideology and practice supporting inequality and oppression. Low-caste social reformers like Mahatma Phule and Ambedkar were the first to introduce values of freedom, equality and fraternity. It was Ambedkar who enriched these in the Indian constitution. It is only recently that 'intellectual elites' have started to pay attention to the role of Dalit assertion. However, when people of privilege interact with a marginalized community much of the focus is on what one person can do to help those in need rather than what the Dalit community itself has been performing.

'Article 15' projects a world of 'Saviour' and 'Victim', where the generous Brahmin is trying to uplift the helpless Dalits. Dalit men are seen tied to a jeep and flogged in the street and then there is a sight of a bare bodied man emerging from the sewer. These are a few instances where Dalits are seen in a piteous sight but the audience is never allowed to enter into the subjectivity of the sufferer. There are a large number of Dalit characters in the film however, only three Dalit characters have substantial dialogues. The invisibility of these characters is ensured by subtracting their voices.

Conclusion:

It has been observed that the reformation and eradication of the discrimination based on caste is become political issue for the collection of votes which are reminisced only during the time of election and then nippily disremembered. The film forces you re-shift and refocus on our perception of what is important. In India where the media is busy with animosity propaganda and low rated entertainment news to keep us busy in frolics and stuffs, this film comes as a breath of fresh air. It is one of the foulest veracity checks of recent times. The ending of the film projects that the system of supremacy is built on blood, sweat, and blubbing of the oppressed. The film projects the upper caste people are supporting in the eradication of the casteism and gains the sympathy from the lower caste people as the upper caste people are the reformers or omniscient for them. But it may be happened as there is no representation of the lower caste people in the film industry. The sufferings of the lower caste people can be represented very well by the protagonist from the lower caste people.

In short, the lower caste people are not born for the humiliation and comforts of the higher caste people. They are also human being. They should not be treated inhumanly. The film focuses on the social issues and while watching movie, we also become part of the same. We feel awkward at the end of the movie and forces us what has been done by us to eradicate the casteism. The constitution has given protection to the lower caste people with Article 15, but it is not implemented properly. Therefore, by representing the recent issues of the society, the film has captured our attention and create awareness among us. Thereby, the movie must be appreciated and extolled.

References:

1. Article 15 (film) - Wikipedia 21 May 2022.
2. Article 15 Watch Article 15 | Netflix August 2019.
3. <https://www.thoughtco.com/who-are-the-dalits-195320> Who are the Dalits? February 4, 2020.
4. <https://www.thehindu.com/opinion/op-ed/New-voices-but-not-enough-noise/article14015881.ece> SEPTEMBER 23, 2016.
5. Movie Review: Article 15 | Reuters JUNE 28, 2019.
6. Article 15 movie review: A topical, intelligent and compelling affair (deccanchronicle.com) JUNE 26, 2019.
7. <https://metro.co.uk/2019/03/06/what-is-a-white-saviour-complex-8793979/> March 06, 2019.
8. Article 15: Some Misleading Facts but Genuine Representation of Caste Politics (criticaledges.com) 17 March 2020.
9. <https://www.news18.com/news/movies/heres-what-ayushmann-khurranas-article-15-doesnt-tell-you-about-caste-in-india-2212141.html> , February 21, 2020.

10. The Representation of the Dalit Body in Popular Hindi Cinema. 2011
https://www.academia.edu/25943972/The_Representation_of_the_Dalit_Body_in_Popular_Hindi_Cinema ,February 20,2020.
11. https://roundtableindia.co.in/index.php?option=com_content&view=article&id=9680:article-critique-on-article-15-unravelling-the-brahmin-saviourcomplex&catid=119:feature&Itemid=132 February20, 2020.
12. <https://indianexpress.com/article/india/india-others/badaun-gangrape-and-murder-how-the-incident-unfolded/> March 23, 2020.
13. <https://intpolicydigest.org/2020/01/15/the-position-of-dalit-women-in-indian-society/> March 21, 2020.
14. https://roundtableindia.co.in/index.php?option=com_content&view=article&id=9677:article-15-and-the-casteless-brahmin&catid=119:feature&Itemid=132 April 30,2020.



India's Indigenous Banking System

Asst. Prof. Mansee Navalkishor Daga

Department of Management,

NSSR's Arts, Commerce College, Parli Vaijnath. Dist. Beed (MS)

Abstract :

Indigenous banking is one of the oldest forms of banking that existed in India from the mediaeval period until the first half of the nineteenth century. The indigenous banking system is a monetary system in which local entities function as bankers by offering financial services such as loans and accepting deposits. It entails a private form and an individual performing fundamental banking operations such as accepting public deposits and lending money. Prior to the arrival of foreign banks and commercial banks, it was the only type of banking available in India. This further collapsed after the emergence of cooperative and commercial banks in the late 1990s.

The financial system of India is dominated by nationalized banks. The banking industry's success is undoubtedly more directly tied to the economy than any other sector. The objective of this paper is to examine all private loans and money transactions made up to the nineteenth century i.e. indigenous banking and weigh their benefits and drawbacks.

Keyword: Indigenous Banks, Banking System, Security, Hundis

Introduction:

Indigenous banking system falls under the purview of unorganized banking therefore there is no direct control of Government and law over indigenous banker.

Indigenous bankers are of three types-

1. Those whose main business is banking.
2. Those who combine their banking business with trading commission business and
3. Those who are mainly traders and commission agents but who do a little banking business also.

In India, a group of indigenous bankers known as Shroffs participated in fundamental banking operations. The actual number of such bankers is unknown since they are not registered under any company act or subject to any government regulation, but it is estimated that there are between 3 lakh and 4 lakh of them.

There are several communities in India who engage in indigenous banking, and they go by different names in different parts of the nation. Let's take a closer look at a couple of these financial communities:

1. The vaishya: Vaishya performs banking business in whole country and are considered as prominent money lender.
2. The Jain's: Jain's among the richest community in India and at some places they are also known as sarakas or sarakas.
3. The Kshatriyas : in Kshatriyas we have two banking class of Punjab Khatri and Arora.
4. The Multanis and Rehtis: The Multanis were from Sind and Rehtis also known as Bohras were from Gujrat.

5. The pathans: They came to India from afganistan for trade and performed money lending activities.
6. The Chettiars : The Chettiars also known as Nagarathas are well known indigenous bankers from southern India. Among all the Chettiars Nattukottai chettis are the most prominent bankers.
7. The marwaris : The marwaris who come from Marwar region of Rajputana are merchant and banker caste.
8. The Mahajans: The Mahajans belongs to Maharashtra.

Functions Of Indigenous Bankers:

The main job of an indigenous banker was to receive public deposits and provide loans. Hundis is the main feature of their function. Prior to the advent of the new modern monetary instrument, hundis were regarded as one of the most important and lucrative instruments for indigenous bankers.

There are two kinds of Hundis:

- Darshaniaur hundi or sight Hundi which is payable on demand and
- Muddati hundi which is payable after a certain period of time.

Indigenous bankers also provide Remittance services.

In numerous cases, documentation has been discovered that indigenous bankers also functioned as state financiers.

2. In the 14th century it is found that Multaniyas so help Delhi Kingdom with funding.
3. In the rain of Firoz Shah (1351 – 88), the bankers of sarsuti, Ninety kos (180 miles) from Delhi land to the state large sum of money which were used for payments to the army.
4. Soldiers at Delhi where paid by cash orders (itlaq) on outlying places, these were discounted in Delhi by financiers who made a regular business of it, and earned a good income
5. Early days of East India company indigenous Bank we also found lending money for tradeand Commerce to the company.

During the reign of the East India Company, indigenous bankers also worked as a company agency raising donations and taxes from the inhabitants of the Bengal region.

The indigenous banking system in India declined as the British reign and dominance in India proceeded due to the introduction of new financial systems by the British.

As the British reign and dominance in India progressed the indigenous banking system in the country come to decline by the introduction of new financial system by British.

Shortcomings Comings Of Indigenous Banking System:

1. High rate of interest: indigenous bankers charge their customers a rate of interest that is far higher than the standard rate of interest. It also varies from individual to person. Interest rates might range from 2% to 5% each month.
2. Unregulated system: indigenous banking system is not regulated by reserve Bank of Indiaor any government or authorities which results in no record of their financial activities and as they are not registered under any law, the reserve Bank of India have made sincereefforts to bring this system under its win but have failed to achieve success. Policies were s suggested by The banking commission, 1972 in its report to bring this

under the control of commercial banks and encourage cooperation between them. The number of indigenous banker operating in the country is unknown.

3. Exploitation of customer: indigenous banker have no leash of law so they charge very highrate of interest to the customer which lead to the exploitation of people which majorly includes people from poor financial background and rural community. Few attempts were made by the government to improve the situation (e.g. The Maharashtra money -lending (regulation) act, 2014) but the results were not fruitful. This majorly has results in the suicide of the customers who are not able to pay their debt.
4. Improper banking function: indigenous bankers sometime combine and non-banking activities.
5. Low capital: the amount of capital invested in the business comes from the personal saving of the banker and their families. This amount is not sufficient for huge loans and other banking functions.
6. Unproductive loans: The loans distributed by indigenous banker are usually for unproductive activities as they do not pay attention to the purpose for which the loan is taken the sole purpose of lending is to earn revenue.

Relevance Of The Study:

The government's and RBI's financial inclusion policies have far-reaching consequences for India's banking industry. However, this sort of banking is still common in the country's rural and tribal areas. In India, the agricultural sector and small companies continue to rely on local bankers for funding.

Conclusion:

People continue to do business with indigenous bankers in the nation due to the ease with which funds can be obtained in a short period of time and the lack of legal requirements. Because the country's banks are insufficient to satisfy the needs of the current population, indigenous bankers play an important role in bridging the gap and delivering monies to the people.

It can be seen that this sort of banking cannot be abolished from the Indian financial system, but the government and the RBI may work together to make the country's unorganized banking systems more dependable. They were immensely popular with dealers, businesspeople, farmers, and regular people. By extending loans, issuing, purchasing, and selling hundis, and producing finance bills and trade bills, indigenous bankers provide financial and remittance services to traders and small enterprises.

References:

- Estsuzo Horie, (1941)Indigenous Banking in India, Chosabu, the Yokohama Specie Bank,
Guda, O.P. (2014), " Ways of achievements the competitive advantages of banks", Journal of Applied Management and Investments, Vol. 1
IIBP (2021), Principles and Practices of Banking, Indian Institute of Banking and Finance
India Banking Commission (1971), Report of the Study Group on Indigenous Bankers, The Commission.
Jain Chandra Lakshmi (1929, Indigenous Banking in India, etc.,, Macmillian & Company.
Krishnan V. (1959) Indigenous Banking in South India, Bombay State Co-operative Union
Rastogi S and Saxena P (2013), " An Analysis of Public and Private Sector Banks Performance using CAMEL Model", Journal of Applied Management and Investments Vol.2
Sayed, N.S. and Sayed, G. (2013), "Indian Banking Sector: Measurement and Analysis of Market Value Added", Journal of Applied Management and Investments, Vol.2 No. 3

Effect of Private Sector Organizational Culture on Performance of Female Employees

Shivangi Awasthi^{1*} Ashok Shukla²

¹Research Scholar, ² Head, Business management and Entrepreneurship

Dr. R M L A University, Ayodhya

*shivangiawasthi89@gmail.com

Abstract:

This article describes the definition and measurement of private sector organizational culture and its impact on employees' performance through the analysis of existing studies and empirical models related to organizational culture and performance. The results show the relationship and impact of organizational culture on employee performance as a whole. However, the extent of this impact depends on the sub-elements of the organizational culture: change management, goal achievement, and so on. The relationship between organizational culture and innovation has been the subject of various studies in recent years. The numerous cultural variables studied have led to the fragmented notions of innovation culture. In addition, management practices require a foundational structure for deciding which culture to implement for innovation and assessing whether a particular culture is an effective and efficient coordination tool. The motive of this text is to discover the factors of organizational way of life in groups imposing innovation and to try to gift its model. After evaluation of huge literature, it's miles discovered that organizational way of life has deep effect at the sort of businesses process, personnel and its performance. This additionally describes the special dimensions of the way of life. When employees are engaged and share the same norms and values as organizations, they can increase performance to achieve the organization's overall goals. Managers and leaders are encouraged to develop a strong culture within the organization to improve overall employee and organizational performance.

Keywords-Impact, Organization Culture, Organization Performance, Employee Performance.

Introduction:

The culture of the workplace is a very powerful force, consciously and consciously nurtured and passed on to new employees. This is a common thread that brings your organization together. Cultural rules and traditions are very important to any organization and have a significant impact on employees and the organization as a whole. The culture of an organization is defined by the sharing of beliefs and values shared by all members of that organization. These shared beliefs, values, ethics, symbols, and actions guide employees in making decisions at the subconscious level. The organizational culture is widespread and powerful. For organizations, businesses, and businesses, it is a force of change or a clear obstacle to it. For employees, it's either the glue that connects people to the organization or the one that repels them. Today's organizations are increasingly faced with the challenge of changing their corporate culture to support the way they do their jobs. Organizational subculture performs a totally vital position in an organization. This is a recognized indicator that helps you understand the stability your organization is expressing in terms of incentives, encouragement, and satisfaction for your employees' work. However, organizations provide employees with a

strong, rigorous, flexible, supportive, and career-focused work environment to attract, manage, and retain a valuable and competent workforce. We are aware that we need to provide it. This is only possible with a good organizational culture that encourages such activities in the work environment. As the world changes rapidly, so do the ways businesses, investments, and organizations work. Therefore, organizations have revolutionized the traditional dictatorial structure and are now moving towards adopting more democratic norms, delegating responsibilities to lower levels and encouraging the participation of all sectors. Organizational culture, employee performance, and job satisfaction are interrelated, and in order for an organization to achieve its goals efficiently and effectively, organizational culture, and employee performance and job satisfaction. Great attention should be paid to other indicators of degree. Gender inequality is a phenomenon where individuals are differentiated on different grounds like recruitment, pay, policies, re-launching process, gender biasness, etc.

Many companies have put their efforts in the up-gradation of policies for promoting equality at work place. But none of these have changes the scenario, the facts that women still occupy a place where they are hired with low pay scale, no re-launching, less policies of promotion etc. Women are continuously pushing through these barriers and more of them are choosing the professions like technology and engineering. But all of their efforts are put in vein as they still get less recognition and awards they deserve.

Review Of Literature:

Employees are seen as part of an organization that are involved in the organization day-to-day actions to ensure that the organization continue to survive or exist (Abdullahi et al., 2020). Wambugu (2014) asserts that employees are an essential component of an organization and that the success of the organization depends on employee performance (EP). It cannot be overstated that workers are the main thrust of every organization since they manage any other factors that keeps it running. Employees must be proactive, responsive, hard-working and diligent to ensure that they are always completely ahead of their competitors (Ramly, 2018). Along with that, the overall performance of an organization is highly dependent on PE level through employee engagement (EE) (Ganyang, 2019). Therefore, EP can be considered as an activity in which an employee can effectively perform the task assigned to him with the proper use of available resources (Mkamburi and Kamaara, 2017). Various organizational researchers have studied the effect of demographic traits on person and organizational outcomes. There is adequate studies analyzing the impact of age and gender on person's process pleasure and organizational tradition. Gender problems can also additionally arise in HR policies, fee, merchandising, etc.

Gender discrimination in selection-making practices referring to HR problems arises from gender inequalities in broader organizational systems and practices, together with: HR policies, strategy, structure, management, organizational climate, and culture. Besides, the stages of sexism of selection makers' in corporations can also additionally have an effect on their possibility of creating gender-biased choices approximately HR practices (Stamarski, Hing, 2015). Agentic girls, who behave in an assertive, task-orientated fashion, are much less likable and much less hireable than similar agentic male candidates are (Heilman and Okimoto, 2007; Rudman and Phelan, 2008; Rudman et al., 2012). Besides, there's discrimination in opposition to pregnant females after they follow for jobs (Hebl et al., 2007; Morgan et al., 2013). Further, mothers are advocated for merchandising much less than females who aren't mother or males without or with children (Heilman and Okimoto, 2008). Women and specifically mothers are

probably held to stricter requirements within the administrative center as compared to guys (Correll et al., 2007). Women obtain fewer possibilities at paintings, as compared with men, ensuing of their under-illustration at better stages of control and management inside corporations (Eagly and Carli, 2007). Managers supply females fewer difficult roles and less education possibilities, as compared with males (King et al., 2012). Men are much more likely to accept key management assignments (e.g., De Pater et al., 2010). Men also are much more likely than females to be considered as powerful leaders while occupying roles which are described in masculine terms, together with within the military (Paustian-Underdahl, Walker, and Woehr, 2014) or in company management positions.

Women are barely much more likely than men to be visible as powerful leaders in female-ruled industries like training and social paintings (Paustian-Underdahl et al., 2014). Managers price females as having much less merchandising capability than males (Roth et al., 2012). Thus, males have a quicker ascent in organizational hierarchies than females (Blau and DeVaro, 2007). Other studies confirmed that women and men produced gaps in gender fee of their rankings of fairness (Auspurg, Hinz, and Sauer, 2017).

Cohen and Huffman (2007) of their have a look at advice that the presence of high-fame girl managers has a miles large effect on gender salary inequality. The merchandising of girls into control positions can also additionally gain all girls, however best if girl managers attain quite high-fame positions.

The have a look at of Plickert and Sterling (2017) suggests that paintings schedules drastically range via way of means of gender, parental position, and revel in of administrative center discrimination. Gender requirements of leaders limitation girls' get entry to better positions and the impact of gender will increase while there are marital relationships (Yang, Aldrich, 2014).

Research Objectives:

- To have a look at private quarter enterprise subculture.
- To have a look at the connection among organizational subculture and organizational performance.
- To study impact of organizational culture on female employees' performance.

Scope:

The main aim of the study is to find out the moderating effect of organization culture , gender perception and career satisfaction. The struggles and ways in which women have tackled their problems are often not very explicit.

Major Findings, And:

Thus, the major findings from the above study are discussed as follows:

1. In order to clear up gender inequality within the workplaces, the maximum green component to do can be the installment of written guidelines of gender equality promotions. These policies must ensure that men and women have equal rights and equal pay for the same work. Policies must ensure equality at all levels of human development: recruitment, hiring, training, promotion, compensation and reward.
2. These policies should make it possible to balance personal and professional lives of employees. Moreover, the maximum critical aspect is that those rules have to encompass the prohibition of

any form of harassment, in particular sexual harassment. And within the end, the rules have to have a system for reporting gender discrimination instances without effects or fear.

3. These types of policies are a good step towards solving many problems in workplaces. But the state should adopt a law, which will force organizations to set up such policies, as many organizations will not follow the necessary steps if it is not mandatory.

Some people will never encounter inequalities at work.

Gender inequality is directly related to economic development, social performance, national development, life standards etc. Recent studies have been discussed only when equal at work, which they can achieve:

- High economic growth
- Better business performance
- High reputation in global business
- Highly capable and qualified candidates
- GDP level increases

Suggestions:

Gender equality in the private organizations can be achieved through following ways:

- **Equal pay for equal work:** There should be no discrimination in the payment criteria for the work done by the employees i.e. men and women. The work done by both the genders is equal in all respects. The pay should depend on the type and job structure to promote transparency. Remuneration act must be considered to determine the proper pay structure.
- **Appropriate training programs should be initiated within the organization:** The organization should strive to promote equal development of employees regardless of gender. The organization should introduce an appropriate training program and seminars to update the knowledge of the organization's human resources. These leads to the growth of organization, human capital and economic growth of country.
- **Re-launching of women staff:** The organization must promote equality by giving equal opportunity to both the genders. This aims to encourage women to continue their quest for excellence. The organizations must launch come back programs which creates a balance at work place.
- **Equal leadership roles for male and female staff:** it has been commonly mistaken that men have more leadership qualities than women. Women also thrive to support oriented roles. This leads to create gender discrimination at work place.
- **Appropriate schooling packages have to be initiated in the agency:** The agency have to attempt to sell identical improvement of personnel irrespective of gender. The agency have to introduce the correct schooling application and seminars to replace the information of the agency`s human resources.
- **Equal opportunity to get recruited for any position:** In an organization all the genders must get equal opportunity to get recruited.

Conclusion:

Now it is high time, we should tear gender equality at workplace. One of the biggest reasons why women lack prestigious positions at workplace is lack of support after marriage professionally and domestically.

In an organization the mechanism should be sell to cope with gender equality. India currently is going through demanding situations of cultural diversity, social stereotypes and there may be a want to take collective moves toward the established order of parity in gender roles and ladies at workplace. Our countries women and girls are very much powerful community leaders so this gender inequality must be vanished for proper development of nation.

Directions For Future Research:

This study is based on private sector organizational culture and its impact on performance of female employees. A comparable examine may be performed for public sector organizational culture. The modern examine did now no longer recall the mixed impact of age and gender. Therefore, the findings of the examiner can best be generalized after an extra rigorous studies at the effect of organizational tradition values on employees' process satisfaction.

References:

1. Abdullahi, M.S., Raman, K. and Solarin, S.A. (2020). Talent management practices on employee performance among academic staff of Malaysian private universities: employee engagement as a mediator. *Journal of Applied Research in Higher Education*. In press.
2. Ramly, M. (2018). The Effect of Organization Culture, Knowledge Sharing and Employee Engagement on Employee Work Innovation. *International Journal of Scientific Research and Management*, Vol. 6(1), pp. 57-68.
3. Wambugu, L. W. (2014). Effects of Organizational Culture on Employee Performance (Case Study of Wartsila-Kipevu Ii Power Plant). *European Journal of Business and Management*, Vol. 6(32), pp. 80-92.
4. Ganyang, G.M.T. (2019). The Impact of Organization culture and Work Environment on Employee Engagement and its Implication on Employee Performance of the Automotive Industry in Jakarta, Indonesia. *Archives of Business Research*, Vol. 7(9), pp. 64-70.
5. Mkamburi, M. and Kamaara, D.M. (2017). Influence of Talent Management on Employee Performance at the United Nations: A Case of World Food Programme. *The Strategic Journal of Business and Change Management*, Vol. 2(3), pp. 28-48.
6. Auspurg, Katrin, Hinz, Thomas, Sauer, Carsten (2017). Why Should Women Get Less? Evidence on the Gender Pay Gap from Multifactorial Survey Experiments. *American Sociological Review* 2017, 82(1), 179- 210. DOI: 10.1177/0003122416683393.
7. Blau, F. D., and DeVaro, J. (2007). New evidence on gender differences in promotion rates: an empirical analysis of a sample of new hires. *Ind. Relat.* 46, 511-550. doi: 10.1111/j.1468-232X.2007.00479.x.
8. Cohen, P. N., Huffman, M. L. (2007). Working for the Woman? Female Managers and the Gender Wage Gap. *American Sociological Review*, 72, 681-704. DOI: 10.1177/000312240707200502.
9. Correll, S., Stephen, B., and In Paik (2007). Getting a Job: Is There a Motherhood Penalty? *American Journal of Sociology*, 112, 1297-1339.
10. Eagly, A.H., and Carli, L.L. (2007). *Through the Labyrinth: The Truth about How Women become Leaders*. Boston, MA: Harvard Business School Publishing.

11. Heilman, M., and Okimoto, T. G. (2007). Why are women penalized for success at male tasks? The implied communality deficit. *Journal of Applied Psychology*, 92, 81-92. doi: 10.1037/0021-9010.92.1.81.
12. Heilman, M., and Okimoto, T. G. (2008). Motherhood: a potential source of bias in employment decisions. *Journal of Applied Psychology*, 93, 189-198. doi: 10.1037/0021-9010.93.1.189.
13. Hebl, M. R., King, E. B., Glick, P., Singletary, S. L., and Kazama, S. (2007). Hostile and benevolent reactions toward pregnant women: Complementary interpersonal punishments and rewards that maintain traditional roles. *Journal of Applied Psychology*, 92(6), Nov 2007, 1499-1511.
14. King, E. B., Botsford, W., Hebl, M. R., Kazama, S., Dawson, J. F., and Perkins, A. (2012). Benevolent sexism at work: gender differences in the distribution of challenging developmental experiences. *J. Manag.*, 38, 1835-1866. doi:10.1177/0149206310365902.
15. Morgan, W. B., Walker, S. S., Hebl, M. R., and King, E. B. (2013). A field experiment: reducing interpersonal discrimination toward pregnant job applicants. *Journal of Applied Psychology*, 98, 799-809. doi: 10.1037/a0034040.
16. Paustian-Underdahl, Samantha C., Lisa Slattery Walker, and David J. Woehr (2014). Gender and Perceptions of Leadership Effectiveness: A Meta-Analysis of Contextual Moderators. *Journal of Applied Psychology*, 99(6), 1129-1145.
17. Plickert, Gabriele, Sterling, Joyce (2017). Gender Still Matters: Effects of Workplace Discrimination on Employment Schedules of Young Professionals, *Laws* 2017, 6(4), 28; Available at: <https://doi.org/10.3390/laws6040028>.
18. Starnowski, Cailin S., Hing, Leanne S. Son (2015). Gender inequalities in the workplace: the effects of organizational structures, processes, practices, and decision makers' sexism. *Front. Psychol.*, 16 September 2015 | <https://doi.org/10.3389/fpsyg.2015.01400>.
19. Yang, Tiantian, Aldrich, Howard E. (2014). Who's the Boss? Explaining Gender Inequality in Entrepreneurial Teams. *American Sociological Review*, 79(2), 303-327. DOI: 10.1177/0003122414524207.

Utilization and Availability of Resources in the VJTI Library

Sapna R. Magre* and Dr. Nilima R. Bankar**

1. Department of Library and Information Science, Dr. B.A.M.U. Aurangabad (MS)

2. Librarian (Associate Professor) Shri Muktanand College, Gangapur, A'bad Dr. B.A.M.U. Aurangabad (MS)

E-mail: sapnamagre1994@gmail.com

E-mail: nilima.r.bankar@gmail.com

Abstract:

The present research paper aims to investigate how students at Veermata Jijabai Technological Institute in Mumbai use library information resources. A descriptive survey method was used in this study, with a questionnaire used as a data collection tool. A questionnaire was distributed to 60 library users at random from the VJTI Library, and 52 copies are completed and returned. The frequency counts and simple percentages are used to analyze the research questionnaires. It was concluded that 'for the proficient and effective use of the library for teaching, learning, and research, the academic institution must provide a live library of updated library resources to meet the information needs of library users.' It was suggested that library or university administration implement library literacy education to teach users how to properly manage the library. This will entice more users who are unaware of the library's resources. Finally, Board Display Services should be sufficiently expanded to reflect the available resources to users, thus representing all library resources.

Keywords: Library Resources, VJTI Library, Availability, Awareness and Utilization

Introduction:

Library in general consists of a wide range of collections of books pertaining to different subjects. The resources mainly consist of books, magazines, and other resources including microforms, audio recordings, video recordings, electronic resources, etc. Library users visit the library to obtain sufficient, significant, and up-to-date information in print and non-printed forms for effective teaching, learning, and research that meets their information needs and enable them to make important decisions. However, they can obtain this information through research, which includes the search for new ideas, facts, and information through scientific and methodological research. Academic libraries are those established in colleges such as polytechnics, universities, and colleges of education, among others. Its primary function is to provide resources and information services to help the parent education and research program achieve its overall goals.

Academic libraries are those established in colleges such as polytechnics, universities, and colleges of education, among others. Its primary function is to provide resources and information services to help the parent education and research program achieve its overall goals.

Definition of Library Resources:

In general, the term "resource" refers to the source of supply. Library resources have been identified as materials that enable libraries to effectively provide resources to clients such as books and other media. It also includes everything required to provide the client with the requested information service. Books, manuscripts, periodicals, government publications, brochures, catalogs, reports, files, microfilm, microfiche, and microcards are examples of library resources, according to Kent and Lancour. The amount of time that library resources and services

are used in teaching, learning, and research is referred to as resource and information service use. Library statistics, which are compiled daily by library staff, generally reflect the extent to which library resources are used in university libraries.

Veermata Jijabai Technological Institute, Mumbai:

VJTI Mumbai (est. in 1887 as Victoria Jubilee Technical Institute) has pioneered India's Engineering education, research, and training ecosystem. Pre-independence, VJTI had been instrumental in driving industrial growth throughout united India. Post-independence, VJTI played a pivotal role in setting up IITs and RECs in India and strengthened the technical excellence of the country. In 1997, VJTI changed its name to Veermata Jijabai Technological Institute to honor the mother of Chhatrapati Shivaji Maharaj. Located in South Mumbai, the heart of Mumbai, VJTI is an autonomous institution owned by Maharashtra State Government. The institute offers programs in engineering and technology at the diploma, degree, post-graduate and doctoral levels. VJTI is known for its high-quality teaching, collaborative research, industry connections, and strong alumni network.

VJTI Mumbai is an autonomous institution owned by Govt. of Maharashtra and affiliated with Mumbai University. After autonomy (2004), VJTI has a separate Board of Governors, where the Chairman (Leading Industrialist) is nominated by Govt. of Maharashtra. Director is responsible for the overall administration of the institute along with the team of Dy. Director, Deans, HoDs, and Registrar. Diploma section is managed by Dean Diploma. The National Institutional Ranking Framework (NIRF) – approved by the Ministry of HRD, Govt. of India (Ministry of Education) – outlines a methodology to rank institutions across the country. The parameters broadly cover Teaching, Learning, and Resources – TLR (30% weightage), Research and Professional Practices – RP (30%), Graduation Outcomes – GO (20%), Outreach and Inclusivity – OI (10%), and Peer Perception – PR (10%). Currently, VJTI ranks 82nd in the Engineering Discipline.

The VJTI Library is the primary source of information for the community during its studies. The Library is divided into two levels. VJTI Library Resources are a valuable research resource for current VJTI students, faculty, staff, and researchers who have a valid VJTI ID CARD. Services vary according to staffing levels. Students with disabilities and/or specific learning difficulties can receive additional assistance.

Objectives:

1. To observe the awareness of Library resources by student and faculty community.
2. To know the frequency of users using resources among students.
3. To study the purpose of utilization of resources by the community.
4. To investigate the student's problems.
5. To ascertain the degree of satisfaction with Library resources.
6. To suggest ways to access the resources.
7. To broaden the community's access to these resources.

Scope And Methodology:

This research study employed a questionnaire-based survey method. For data analysis, the data is thoroughly checked and analyzed. The paper's scope is limited to engineering students from seven departments, and the study was limited to students from Veermata Jijabai Technological Institute in Mumbai. A questionnaire is distributed to 60 library users at random

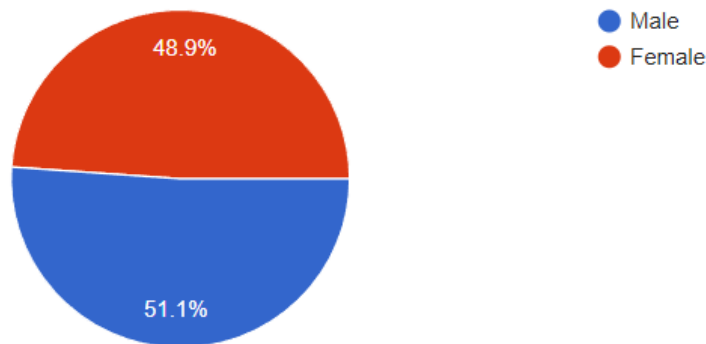
from the VJTI Library, and 52 copies are responded and returned. The frequency counts and simple percentages are used to analyze the research questionnaires.

Data Analysis And Results:

The study is conducted at the VJTI College campus in Mumbai during the period 2022. This study was undertaken to investigate the library information resources with special reference to library resources that are available in the central library used by the student community at Veermata Jijabai Technological Institute, Mumbai.

Table1: Gender-wise Respondents

Sr. No	Response	No. of respondents	%
1	Male	23	51.10
2	Female	22	48.90
Total		45	100

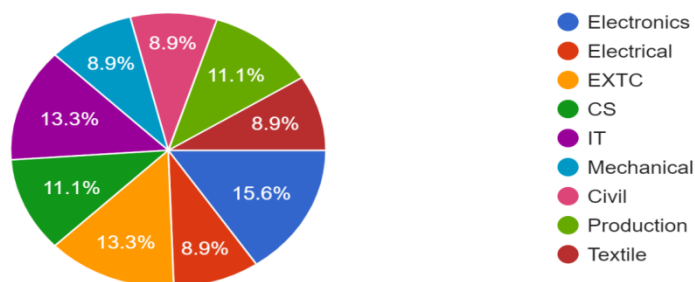


According to the above table (Table 1), the number of respondents was nearly equal, with 48.90% female respondents and 51.10% male respondents.

Table2: Distribution of Questionnaires

Sr. No	Departments	Questionnaire Distributed	%	Questionnaire Received	%
1	Electronics	10	15.6	7	7.77
2	Electrical	10	8.9	4	4.44
3	EXTC	10	13.3	6	6.67
4	CS	10	11.1	5	5.56
5	IT	10	13.3	6	6.67
6	Mechanical	10	8.9	4	4.44

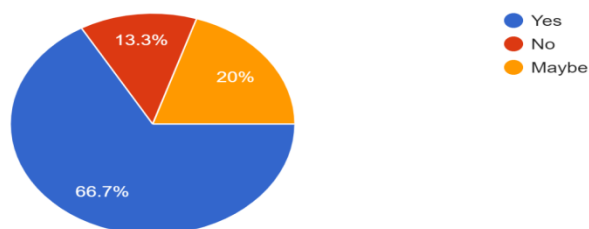
7	Civil	10	8.9	4	4.44
8	Production	10	11.1	5	5.56
9	Textile	10	8.9	4	4.44
Total		90	100	45	50



It is discovered that the majority of respondents 7 (15.6 percent) from the Electronics Branch are interested in filling the questionnaire, whereas only 4 (8.90 percent) from the branches Mechanical, Civil, Electrical, and Textile are interested, and 45 are returned duly filled in by the user's community, yielding an overall response rate of 50.00 percent.

Table3: Awareness about library resources

Sr. No	Description	No. of Respondents	%
1	Aware	30	66.7
2	Slightly Aware	9	20
3	Not Aware	6	13.3
Total		45	100



It is revealed that Table no. 3, clearly indicates that out of 45 respondents 66.70 % were well aware of library resources and it was followed by 20.00 % of respondents were slightly aware of it and only 13.30 % of respondents had no idea about the use of library resources.

Table4: Frequency of using library resources

Sr. No.	Frequency	No. of Respondents	%
1	Daily	8	17.8
2	Once in Two Days	6	15.6
3	Once in Week	10	22.2
4	Occasionally	13	28.9
5	Never	7	15.6
Total		45	100

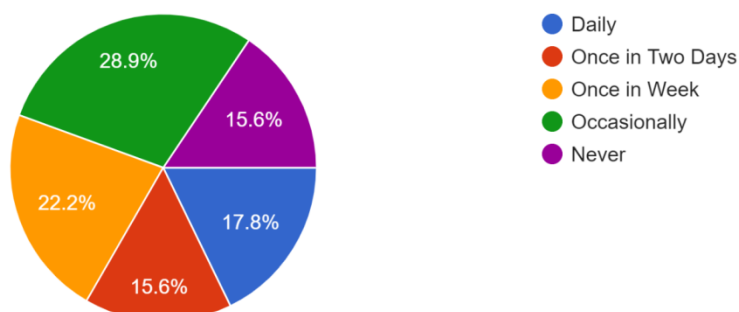
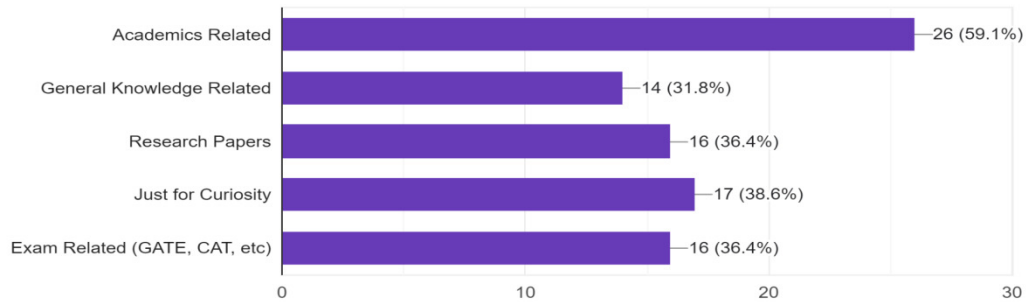


Table 4 shows that 28.90 percent of respondents use library resources occasionally, while 17.80 percent have never used any library resources.

Table5: Subjects for which you use these resources

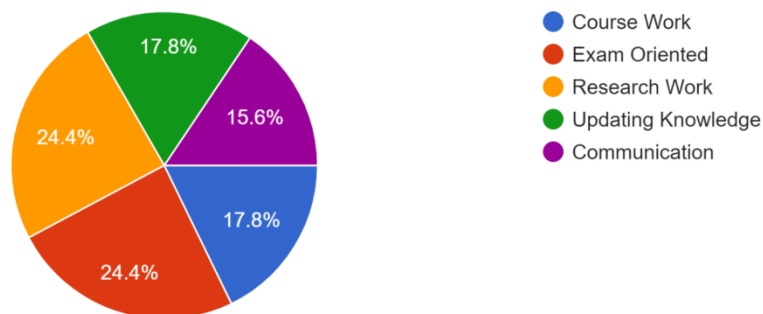
Sr. No.	Purpose	No. of Respondents	%
1	Academics Related	26	59.1
2	General Knowledge	14	31.8
3	Research Papers	16	36.4
4	Just for Curiosity	17	38.6
5	Exam Related (GATE, CAT, etc)	16	36.4
Total		86	



The graph above depicts the distribution of subjects for which respondents use library resources. It shows that the majority of respondents use the library for academic-related readings. It is followed by respondents who visit the library solely to learn new things about technology. The majority of respondents chose General Knowledge resources.

Table6: Purpose for using Library resources

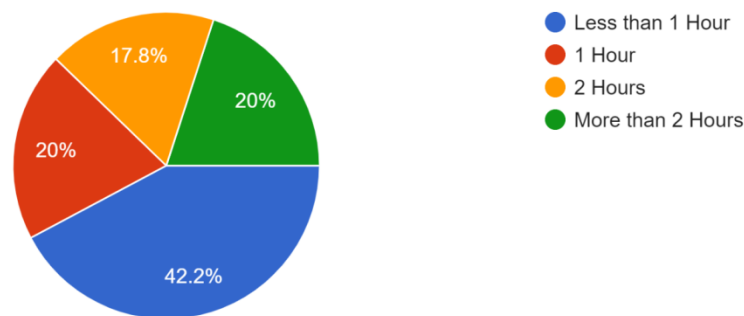
Sr. No.	Purpose	No. of Respondents	%
1	Course Work	8	17.8
2	Exam Oriented	11	24.4
3	Research Work	11	24.4
4	Updating Knowledge	8	17.8
5	Communication	7	15.6
Total		45	100



The pie chart above illustrates the reason for which these resources are used. We discovered that the majority of respondents used the library for exam preparation or research purposes. A significant number of respondents also use the library for Course Work, Soft Skills Development, and knowledge enhancement.

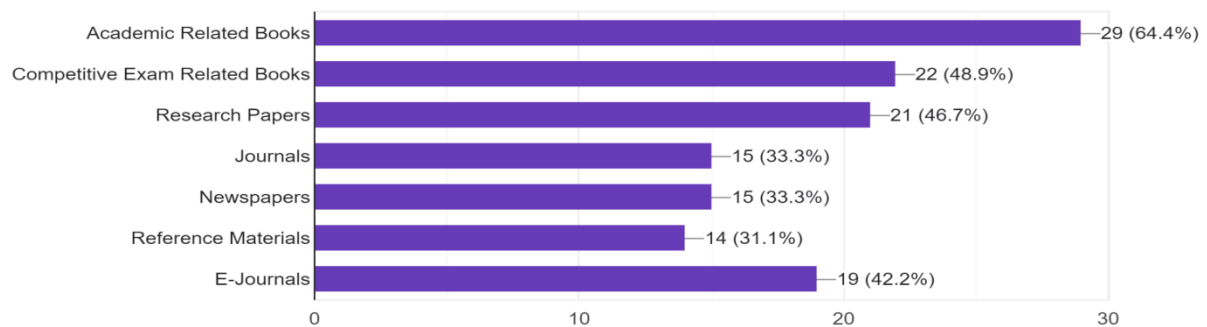
Table7: Time usually spent using library resources

Sr. No.	Purpose	No. of Respondents	%
1	Less than 1 Hour	19	42.2
2	1 Hour	9	20
3	2 Hours	8	17.8
4	More than 2 Hours	9	20
Total		45	100



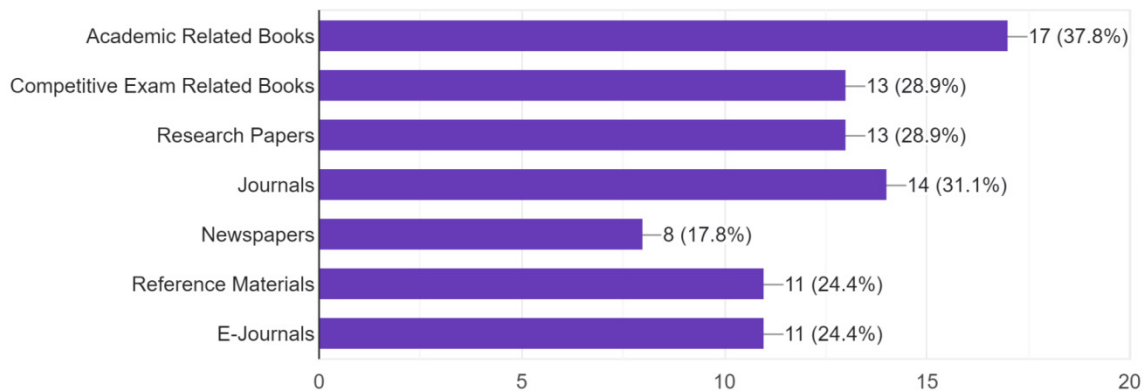
The graph above depicts the number of time users spends accessing library resources. We can conclude from this that the majority of respondents use library resources for less than an hour, while the minority uses library resources for more than two hours.

Awareness of Library Resources



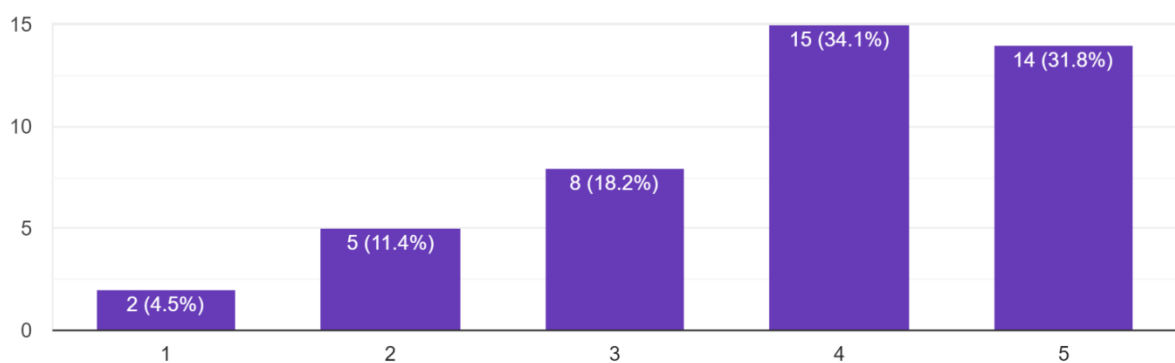
The bar chart above demonstrates the respondents' knowledge of various types of library resources. We can see that 64.40 percent of respondents are aware of the academic resources available in the library, whereas 31.10 percent are aware that the library resources also include Reference Materials.

Utilization of Library Resources



The bar chart above characterizes the respondents' use of various types of library resources. We can see that 37.80 percent of respondents use academic resources available in the library, while 17.80 percent use newspapers, which corresponds to the least amount of resources used by the respondents.

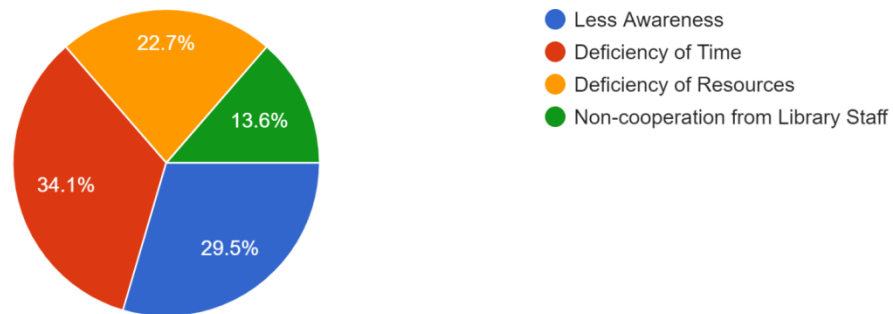
Satisfaction of the respondents



The above figure rates the satisfaction level of respondents on a scale of 1-5. The majority of respondents were well satisfied with the library resources.

Table8: Problems faced while accessing resources

Sr. No.	Problem	No. of Respondents	%
1	Less Awareness	13	29.5
2	Deficiency of Time	15	34.1
3	Deficiency of Resources	10	22.7
4	Non-cooperation from Library staff	6	13.6
Total		45	100



The chart above depicts the issues that respondents encountered while using library resources. It demonstrates that most respondents do not fully utilize the library's resources due to a lack of time. Some respondents also claim that the staff is not supportive.

Findings:

The number of respondents are nearly equal, with 48.90% female respondents and 51.10% male respondents. It is discovered that the majority of respondents 7 (15.6 percent) from the Electronics Branch are interested in filling the questionnaire, whereas only 4 (8.90 percent) from the branches Mechanical, Civil, Electrical, and Textile are interested, and 45 are returned duly filled in by the user's community. Out of 45 respondents, 66.70 % are well aware of library resources and it is followed by 20.00 % of respondents who are slightly aware of it and only 13.30 % of respondents have no idea about the use of library resources. The majority of 28.90 percent of respondents use library resources occasionally, while 17.80 percent have never used any library resources. The majority of respondents use the library for academic-related readings. It is followed by respondents who visit the library solely to learn new things about technology. The majority of respondents choose General Knowledge resources. The majority of respondents have used the library for exam preparation or research purposes. A significant number of respondents also use the library for Course Work, Soft Skills Development, and knowledge enhancement. The majority of respondents use library resources for less than an hour, while the minority uses library resources for more than two hours. The majority of 64.40 percent of respondents are aware of the academic resources available in the library, whereas 31.10 percent are aware that the library resources also include Reference Materials. The majority of 37.80 percent of respondents use academic resources available in the library, while 17.80 percent use newspapers, which corresponds to the least amount of resources used by the respondents. The Respondents seem to be satisfied with the overall experience. Most respondents do not fully utilize the library's resources due to a lack of time. Some respondents also claim that the staff is uncooperative. But overall it is observed that the most of the users are using library sources.

Conclusion:

Based on the study, the following three suggestions are made. Firstly, the awareness about the variety of resources available in the library should be given to all the faculty, staff and students. If possible the library should increase the number of working hours.

So that users get maximum utilization of this service. Secondly, the College must introduce a user education program about library resources. Finally, the library staff ought to create awareness and usage of resources and help the students in accessing them with ease. As a result, the findings indicate the usage and awareness of library resources that are available in the

Central Library. From the above study, the majority of the respondents are well aware of library resources and only a few respondents have no idea about the use of library resources. Many problems are facing the students even though the majority of respondents are fully satisfied with the accessibility of library resources.

References:

1. A.T. Francis. Evaluation of Use of Consortium of e-Resources in Agriculture in Context of Kerala Agricultural University. DESIDOC Journal of Library & Information Technology, 32 (1), 2012, 38-44.
2. O.Q. Ganiyu, E.A. Edale, and A.I. Oluwafemi, A study of Availability and Utilization of Library Electronic Resources by Undergraduate Students in Private Universities in Ogun State, Nigeria. International Journal of Library and Information Science
3. M. Jamil, R, Tariq, S. Jamil, Library Resources: Utilization by Teachers and Students. Bulletin of Education and Research, 35(2), 2013, 19-35.
4. <https://www.researchgate.net/publication/326301126_AWARENESS_AND_UTILIZATION_OF_LIBRARY_RESOURCES_BY_LIBRARY_USERS_OF_NIMS_UNIVERSITY_CENTRAL_LIBRARY_JAIPUR_INDIA> accessed on 07th March, 2022.
5. <<https://docs.google.com/spreadsheets/d/14xhafbfRFNXnDg0Wo8SB3zdeP61ocrk8JquheDEytjs/edit?usp=sharing>>



Survey of E-Resources in the University Library at Mahatma Phule Agricultural University Rahuri (M.S)

P. B. Jadhav

Department of Library and Information Science

New Arts, Commerce and Science College, Ahmednagar.

Contact Email Id: prasadj408@gmail.com

Abstract:

This paper shows the study of use of electronic information resources, its impact on the collection of print and electronic resources, and user awareness and issues where users are using these resources. The survey was organized in the academic year 2021-22 at Mahatma Phule Agricultural University Rahuri (M.S). A total of 108 professors, readers and librarians were selected and their responses were obtained with the help of questionnaires. The findings show that users were using e-resources; awareness of e-resources inspires users to make maximum use of such resources; and users are progressively using departments and homes to access information. This paper presents an overview of these resources, describes a few advantages and disadvantages and gives addresses of few web sites.

Keywords: Mahatma Phule Agricultural University, Electronic information resources, E-Resources.

1. Introduction:

After choosing a topic to complete the research, it is necessary to keep a record of a research by defining its scope, objectives, needs from a business point of view and research methodology etc. As the horizons of knowledge in human history began to expand, more reading material became available. The world books is an important creation of man. A library is needed to collect and manage written knowledge of such informative books. Perpetual any other man-made things or not external cultures becomes old and absolute and disappear. The age of darkness begins for a while but then new castes, tribes and their cultures emerge. The books of the world, however, become the witnesses of all this and become external. The collection of written knowledge means the library is needed to manage and preserve it.

An electronic resource is defined as a resource which requires computer access or any electronic product that delivers a collection of data, be it referring to full text bases, electronic journals, image collections, other multimedia products and numerical, graphical or time based, as a commercially available title that has been published with an aim to being marketed. The value and use of information resources, particularly e-resources, have increased with the time. Therefore, there is essential to make study on the different condition of e-resources and the issues relating to the use of resources by users, more particularly by the faculty of academic institution. The present study is an attempt to analyse the use of e-resources by the faculty members, readers and librarians of Mahatma Phule Agricultural University and out the problems and constraints faced by the users in accessing the e-resources with some purposeful suggestions for its development.[1]

Need of E- resources:

E- resources enable the librarian to provide better service to the user community. The few considerable points are mentioned below;

1. To get access to an information source by the more than one users.
2. E- resources can be searched quickly.
3. These can be found easily by the users.
4. Amount of times spent on the E- resources use.
5. Know different types E-resources commonly used by respondents.
6. To collect, store, organize information in digital form.[6]

Types of E-resources:

Sr. No.	Types of E-resources	Description
1.	E- Book	E-books is the many formats competing for prime , including Adobe PDF, Microsoft reader and I pad
2.	E- Journal	An e-journal is very important part of every library collection. E-journals are one application of information technology.
3.	E- Newspaper	An E- Newspaper is also known as online newspaper or web newspaper that exists on the World Wide Web or internet.
4.	E- Magazines	An E-magazines is very important part of every library collection.
5.	Full text databases	Today's there are number of databases available on the network. They are either free or with charges.
6.	Reference database	These are many Dictionaries, Almanacs, and Encyclopaedias, which are available on internet in electronic format.
7.	Image collection	Due to adventure of E-images facility this type of database is developed.
8.	Multimedia products	These types of database are included images, video's , audios and text etc.
9.	E-Thesis	These database are contained with PhD thesis and dissertation published through e- format.
10.	E- clipping	The main objective of E-clipping is retrospective search and comprehensive analysis of new items.
11.	Statistical database	These database contain the numerical data useful for the mass community.

Research Objective:

The following objectives have been set for the present research and the research accordingly will be done.

1. Collecting information on E-resources in the library.
2. To get information about the use of E-resources in the library.
3. Obstacles to the availability and use of E-resources in the library to study.
4. Suggesting solutions related to E-resources. Research has been done in accordance with the above objectives.

Descriptive research methods:

Descriptive research methods are all the research in which a circumstance, a society, a social organization or a case is reviewed and described in the analysis. Descriptive research method has been used for the presented research. Descriptive research is related to fact-finding. An in depth study of the current state of a social phenomenon, work, undertaking or plan is done to objectively treat its pros and cons. Here are 4 features of descriptive research method.[7]

1. Objectively collected information.
2. Technique formula analysis of the collected information.
3. Medicines
4. A background of ambition that has benefited therapists.

Descriptive research methods include the three types of research described by Gopal, philosophy and library research. This research methods use a wide range of surveying information collection techniques. Often these are fact-finding surveys. Descriptive research methods are widely used in the social sciences.

Modification mechanism:

1. Questionnaire
2. Interview
3. Inspection
4. Survey
5. The Questionnaire technique is an important tool along with the observation, interviewing technique to get the information required for your social research work from the various information scattered around. Questionnaire is a pre-arranged list of questions. To study a specific problem, a series of questions were created to get information about the problem from the concerned called.[8]

2. Materials And Methods:

This study is based on questionnaire method. A structured questionnaire was designed to collect data from the faculty members, librarian, readers of Mahatma Phule Agricultural University, Rahuri (M.S). A total of 108 faculty members, librarian and readers were selected and their responses were obtained with the help of questionnaires.

3. Result And Discussion:

Analysis of Data:

Out of 150 questionnaire only 108 (72%) responded with the filled in questionnaire. The questionnaire were edited where necessary. Thus in all the cases the total number of respondents was 108. The data collected through the questionnaire was survey, classified and sequential for better understanding and accuracy. Certain factors like whether the data collected are correct or incorrect, statistically true or not etc. judged using some statistical methods.

1. Sex ratio

Sex ratio is the ratio of males and females in a population. The primary sex ratio is the ratio at the time of appreciation, secondary sex ratio is the ratio at time of birth, and tertiary sex ratio is the ratio of mature organisms.

Sr. No	Gender	No. of Respondents	Percentage
1.	Male	89	82.40
2.	Female	19	17.59
	Total	108	100.00

Table No. 1 Sex Ratio

2. Computer knowledge of faculty members and readers

Knowledge on computer has become necessity for all profession. Realizing this, the present study attempted to certain the Knowledge of computers of faculty members and readers. This study shows that all the respondents were computer educated, which is a healthy sign for any organization.[2]

Sr. No	Extend	No. of Respondents	Percentage
1.	Excellent	70	64.82
2.	Good	30	27.78
3.	Fair	04	3.70
4.	satisfactory	04	3.70
	Total	108	100.00

Table No. 2 Computer knowledge of faculty members and readers

3. Frequency of Internet use

Internet has become an important tool for teaching and research. Literature on all the fields of knowledge is available on internet, which is very useful for faculty members, librarian and readers to enrich their knowledge. [4]Regarding frequency of Internet use by the respondents table 3

Sr. No	Frequency	No. of Respondents	Percentage
1.	Daily	82	75.92
2.	Weekly	13	12.03
3.	Monthly	05	4.63
4.	As when required	08	7.42
	Total	108	100.00

Table No.3 Frequency of Internet use

4. Purpose of Internet use

Internet use has both advantages and disadvantages. Its depends upon the purpose of use. If it is properly used, it helps to increase knowledge and keeps oneself level of the latest developments.[3]

Sr. No	Purpose	No. of Respondents	Percentage
1.	E -mail/charting	78	40.21
2.	Entertainment	18	9.28
3.	Study and Research	98	50.52
	Total	194	100.00

Table No. 4 Purpose of Internet use

5. Awareness on E-resource

Electronic resources along with print resources have become an integral part of a library collection. Also, remarkable shifts of choice from print resources to E-resources have taken place by users for information. [5]But it is fact that use of E-resources is not satisfactory in most of the libraries, the main reason is the lack of awareness among the users. The present study attempts to highlight on this matter in the following tables.

Sr. No	Response	No. of Respondents	Percentage
1.	Yes	90	83.34
2.	No	18	16.66
	Total	108	100.00

Table No. 5 Awareness on E-resource

The result implies towards a positive sign regarding use of E-resources by faculty, readers and librarians of New Arts, Commerce and Science College Ahmednagar.

6. Types of E- resources frequently used

Sr. No	E-Resources	No. of Respondents	Percentage
1.	- database	90	31.25
2.	-journals	75	26.04
3.	-articles	40	13.89
4.	-books	20	6.95
5.	-magazine	25	8.68
6.	-these/dissertation	30	10.41
7.	ll	08	2.78
	total	288	100.00

Table No. 6 Types of E- resources frequently used

7. Purpose of using E-resources

Sr. No	Purpose	No. of Respondents	Percentage
1.	udy of teaching	90	48.12
2.	research work	50	26.73
3.	aper writing for publication seminar/workshop	25	13.36
4.	resentation	12	6.41
5.	ll	10	5.34
	total	187	100.00

Table No. 7 Purpose of using E-resources

8. Reasons of dissatisfaction on available E- resources

The study of investigates about the reason of dissatisfaction on available E-resources by the faculty, readers and librarian.

Sr. No	Reasons	No. of Respondents	Percentage
1.	frastructure is not good e- resources are not as per	60	55.56
2.	eed	23	21.29
3.	brary time is not suitable	16	14.81
4.	ooperative	09	8.34
	total	108	100.00

Table No. 8 Reasons of dissatisfaction on available E- resources

9. Advantages of accessing E-resources

Reveals the multiple opinions regarding the advantages of accessing these resources.

Sr. No	Advantages	No. of Respondents	Percentage
1.	ess time in searching	88	32.84
2.	multaneous usage	22	8.21
3.	asy accessibility	89	33.21
4.	ownloading facility	50	18.66
5.	uthor can be directly through E- mail	19	7.09
	total	268	100.00

Table No. 9 Advantages of accessing E-resources

4. Conclusion:

The study reveals that the faculty, readers and librarian of Mahatma Phule Agricultural University, Rahuri are using the available e-resources satisfactorily. At the same time the library of New Arts, Commerce and Science College Ahmednagar is playing an important role in promotion, assistance and guidance in accessing the E-resources. The use of E-resources is helpful to ensure exhaustive and pointed information. The E- resources provide themselves various search options to the user and library manages. E- resources are useful for libraries as well as each and every users of the society. The developments in the information and Communication Technology services are available in the present made wonderful changes in the library operation.

5. References :

1. Researcher: Pathade Kalyani Ramesh, subject: Study of free library journals on library science on the internet. Study centre: New Arts, Commerce and Science College Ahmednagar. Y.C.M., Nashik2010-2011.
2. Researcher: Raut Dattatraya Vilas, Subject: A study of the use of electronic devices in the library of the college of Engineering, Ahmednagar. Y.C.M.,Nashik 2012-2013.
3. Researcher : Nafed Sangita Gopalrao, Subject: A study on the use of internet in the library of the college of Arts, Commerce and Science in Kopergaon taluka. Y.C.M ., Nashik2007-2008.
4. Researcher: Giri Balasaheb Suman, Subject: Study on the use of internet by college teachers in Ahmednagar city. Y.C.M.,Nashik2010-2011.
5. Researcher: Kalhapure Vrushali Sunil , subject: Study of E-resources in the library at Mahatma Phule Agricultural University Rahuri and Y.C.M., Nashik2016-2017.
6. Researcher: Dhongade Ganesh Nagnath. Subject: Library of Engineering College, Ahmednagar District, Y.C.M., Nashik 2010-2011.
7. Researcher: Khandare RekhaBabu. Subject: A study of Dada Patil College Karjat library. Y.C.M., Nashik2016-2017.
8. Researcher: Kadam Amol Ramesh. Subject: A study of Radhabai Kale College Ahmednagar library. Y.C.M., Nashik2009-2010.

Need of E-Resources in Academic Libraries

Shubhangi Raosaheb Pawar

Research Student

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

Email Id:- shubhavi1527@gmail.com

Dr. Nilima R. Bankar

Research Guide

Librarian (Associate Professor),

Muktananad College, Gangapur,

Dist.- Aurangabad

nilima.r.bankar@gmail.com

Abstract:

New technologies have always been of interest for libraries both for the potential of increasing the quality of service and for improving efficiency of operations. At present libraries of all kinds whether public, research academic or special libraries are overwhelmingly looking forward to adopt new technologies mostly use of e-resources due to its potential for cost savings in operations and the management of collections and Patrons. E- Resources are digital objects containing electronic representation of books, journals and other form of reading materials and they are converted into a digitized form in order to be read by a computer. Many Library resources are now available electronically and can be access via the web. You can get the information you want, when you need it, 24 hours a day, 7 days a week.

Keywords : Library Automation, E resources, Academic Library.

1. Introduction:

The development of computer and network technology is changing the education pattern and transforming the teaching and learning process from the traditional physical environment to the digital environment. Modern academic libraries, a conglomeration of printed books and journals as well as electronic resources (e- resources) where both forms of documents can be stored, retrieved and delivered as and when required. The library should have good number of Resources for teaching, learning and Research work. E- Resources offer creative possibilities for expanding access as well as changing learning, teaching and research work. Contents of EResources can be accessible, at any place regardless of time, to be read at personal computers. Ebooks would never to go out of print, and new editions can be easily created.

2. Library Automation:

The main purpose of library automation is to improve the efficiency of library and to provide optimum user services. To provide E-Resources to users, the automation of library is most important. The automated library system is always ready to handling large volumes of documents and of providing effective and timely information services to faculty, researchers and students in achieving their main goals.

The present Indian libraries are in transitional stage from traditional to modern. The Indian Library has moved from palm leaves, manuscripts etc. to CD-ROMs and digital books.

Library Automation useful for:

- Faster communication and information retrieval, research results, new innovations are

communicated speedily to the end users, Dissemination of information in within less time, Email, data transfer etc

- Access to large amount of Information resources accurately, efficiently and with up to date Information at their places. Access to Electronic publications, Information on floppies, CDROMs excise easily possible.
- Identification and loans of the print and non-print materials are easily tackled through bar code technologies.
- Library operation such as – circulation, acquisition, serial control, cataloguing, documentation, information retrieval resources-sharing, library management, library budget and finance control.
- Provide networking and liaison with the other libraries which helps to the resources sharing among the library and information centers. Most of the integrated library automation systems are now providing web enabled online catalogue [Web OPAC].

3. E-Resources:

An E-Resource means electronic resource, which are available in electronic/digital form. The e-resources are very useful in academic libraries. This is most important part related to eresources. The quality has replaced the quantity of library collection during the present days. The quality has direct link with the types of library collection as it depends upon the requirement of the users. An e-database is an organized collection of large information, of a particular subject or various subject areas. The information of an e-database can be searched and retrieved electronically. Contents include journal articles, newspapers articles, books reviews and conference proceedings, etc. e-databases usually updated on a daily, weekly, monthly or quarterly, half yearly or yearly basis. Full text databases contain the whole content of an article such as citation information, text, illustrations, diagrams, charts and tables. Bibliographic databases only contain citation information of an article, such as author name, journal title, publication date and page numbers.

Types of E-Resources:

3.1 E- Books

E-book is a book-length publication in digital form, consisting of text, images, or both, readable on computers or other electronic devices, although sometimes defined as "an electronic version of a printed book"(WIKIPAEDIA, 2008). An electronic book is a text and image-based publication in digital form produced on published by and readable on computers, other digital devises. E-books are usually read on dedicated hardware devices known as e-Readers or e-book devices. E-books are very useful tool for academic teachers, students etc Many users now read the books on Mobile phone by use of e-book reader software. E-books are preferred by the users for their features like changeable font size, make citation, links to other relevant sites, searching, sending to other users etc. E-books can be transferred from library catalogue to users e-book readers for a fixed loan period and after which it is automatically taken back.

3.2 E-Journals

An electronic journal, provides research papers review articles, scholarly communication, issued periodically in electronic form by use automation. E-journals may be defined very broadly as any journals, magazine, e-zine, webzine, newsletters or any type of electronic serial publication, which is available over the internet. E-journals are mostly useful tool for researchers. E-journals have an impact not only on libraries but on authors and publishers too.

Hence, now-a-days majority of the users expect up to-date and timely information from library and information centers. Information from journals can easily, quickly, pin-pointedly and remotely be retrieved, provided the journals are available in electronic format. Academic and other special libraries cannot reject e-journals in their collections. It is the duty of librarian and library staff to provide access to the published knowledge to their users irrespective of the origin or e-resource.

Another type of online journals, whose full-text are available in the web for viewing and downloading free of charge, called open access articles. Open Access Articles means online access without access charge to individuals and libraries. A large number of important full text articles are available free of charges in the personal or institutional websites of few eminent personalities.

3.3 Aggregator

An aggregator is a database, collection of electronic publications, most commonly a searchable collection of electronic journals. It provides access to a large number of e-journals from a range of different publishers. Aggregator has come as a big solution to the librarians as there is no need of contacting each and every publisher for making their publication available for use. It has made it possible to present electronic content as a simplified access to a range of publishers and purchasing of a large collection, allow libraries to quickly address the information needs of their patrons.

3.4 Consortia

With the Information explosion, it is becoming difficult for the librarian to satisfy the increasing information need of the users. Due to economic reason no library is in a position to acquire all such information in print or other form. Due to cost effectiveness, librarians are coming together in the form of consortia for resources sharing. In India, CSIR Consortia, FORSA, IIM Library Consortia, INDEST Consortium and UGC-info net e journal consortium are some of the consortia serving the various kinds of institution in the country.

3.5 E-Reference Sources

Now various vendors and publishers are providing various reference sources in electronic form through their databases and web sites such as dictionaries yearbook, encyclopedia' sets. Some of them are dictionaries online (WWW.dictionaries.com, www.dic.leo.org); yearbooks online (www.uja.org); directories online (www.people.yahoo.com). Etc Wikipedia's a new form of reference source which does not have its printed counterparts. Lots of information are available in the Wikipedia and the most interesting thing is that new information can be added by the user and the information available can also be altered.

3.6 E-Thesis and Dissertation

E-Thesis and Dissertation are now very useful tool to collect large data for specific subject. This is a very useful service for users or mostly researchers. It reduces the duplication of research works and gives assistance for the selection of the research area to the users of the libraries. As these can be searched subject wise, it reduces the labor of the reference staff a lot.

4. Selection Of E-Resources:

Selection is not a new term to librarian, staff and users as they have been doing it since long back the libraries started acquiring printed material. However libraries are now focusing to take e-resources information technology approaching towards the e-resources rather than printed material as technology developed.

The selection process should be done in relevant with the demands of the users, committee, focus group, users recommendation etc. Apart from this, it should taken into consideration the following steps:

- 1) to identify library needs;
- 2) to identify content and scope of the e-resources;
- 3) to evaluate quality of that particular resource and search capabilities;
- 4) to estimate the cost;
- 5) to check either subscription based or web based when acquiring ;
- 6) to evaluate the systems and technical support;
- 7) to review licensing agreements;
- 8) to evaluate application software and installation , updated sporadically or in regular schedule; and
- 9) to check the facilities for educational support and training

5. Need And Importance Of Library Consortia Based Resource:

Sharing:

The word 'consortia' was originated from the Latin in early 19th century in the sense of partnership. Advanced learners Dictionary describes consortium as 'a group of people' countries. Companies etc. who are working together on a particular project. Information is a national resource and it is necessary for national development. Consortia can become an excellent way in the process of collection, digitizing organizing and making accessible the electronic resources.

The trend today is forming library consortia for sharing of electronic resources. E-publishing has brought a revolution in journals publication ;subscription access and journals online has led to a new and still evolving, form of co-operation among libraries and information centers; every individual library now subscribes to a smaller number of journals, usually those most relevant o their organization.

5. Conclusion:

The library/Information centre is considered to be the backbone of any research organization as it provides its user the literature and information through electronic sources and services in order to carry out their academic activity. It took many years for digital libraries to reach the present state but the Librarian's goal of the fully integrated online digital gateways. Although a library already has a particular journal in print form, but most often, for the sake of integrity and rendering effective value-added services to the users, the library is compelled to subscribe the online access of the same journal for the same period.

In Indian scenario the digitization programmes are in their initial stages and much needs to be done to prepare a long term strategy to sustain these efforts and preserve the digital resources for future use.

References :

1. Ramaiah, C. (2013). Electronic resource management. Allied Publication.
2. Prasher R.G. (2003) "Indian Libraries in IT Environment", Medallion Press, Ludhiana, 2003, P.23-32.

3. Kanamadi S.& Kumbar B.D.(2007) Building e-resources collection through consortia at management institutes in Mumbai: A survey” Information Studies, Vol. 13, Issue 3, P.139 to 162.
4. Krishnamurthy M (2007) “Consortia-based resource sharing and accessing e-journals” Information Studies, Volume : 13, Issue : 3, P 171to177.
5. Patkar Vivek,(2010) “Innovations in Library Practices: Prospects and Challenges” Information Studies, Volume : 16, Issue : 2, P 85to102.
6. Arunachalam S.: India’s march towards open access, science and development network. 2004.
7. Prabha Krishnan : Library automation: A prerequisite fire modern library Management in Government, Vol.33 No.3, Oct.-Dec. 2001.
8. Khamkar, R. D. (2014). E-Resources : An Overview. Parameters and Perspectives of LIS Education (pp. 238-239). Kolhapur: ABS Publication.
9. Raz aM. Masoom, Arora R. L. (2004). Digitization preservation and management of rare materials in modern library system.,IASLIC Bulletin 2004; 49 (2): P. 89-92.



A Critical Study on Tools and Techniques Contemplated for Empowering the Faculties working in Educational Institution

1. Mrs. Sathya

Research Scholar, Bharathiar University ,Coimbatore ,Tamil Nadu & Assistant Professor & HOD (I/C) in SNMV Institute of Management ,Coimbatore.Email:sathymba36@gmail.com

2. Dr. D. M. Navarasu

3. Professor Department of Management Sciences Hindustan Institute of Technology ,Coimbatore 641032.

Abstract :

The Study is to know about the techniques and tools that are used for empowering faculties working in Educational Institution. The Teaching is the noblest among all the profession around. The faculties from teaching fraternity should be knowledgeable to possess some good set of skill, qualifications and feel empowered, which would further be an obvious reflection on the student who are our future generation of our country. So the Study is to critically evaluate the techniques and tool used for empowering the faculty .An empowering emphasizes on autonomy, proper communication, individual participation for academic excellence, rewarding them on achievements and feedback on their performance. Which in turn builds one's Self-esteem and energizes them for perform better and move with upward trend in their career and further motivation in conduction of class and organizing several programs like Seminar, Conference, Workshop's for the well being of the student's Community.

The Questionnaire consisting of 20 statements was used for collection of data and was distributed among 250 faculties working Self finance Arts and Science College. Convenience Sampling techniques were used for this study. Data was analyzed by using Excel & SPSS package by using techniques of Simple Percentage Analysis, ANOVA, Chi-square, Correlation, and F-test.

Objectives Of The Study:

- ❖ To Know the Demographical Profile of the Faculty Working in Self Finance Arts and Science college.
- ❖ To Study the Tools and Techniques used for Empowering faculties Working in Educational Institution
- ❖ To Know the type of faculty training program offered by the institution
- ❖ To Understand the level of job satisfaction of the faculty by empowerment

Statement Of The Problem:

Teaching is very noble as well a challenging profession. The job of the faculty is really a challenging their dealing is not with machine or working on techniques the dealings with a social being. The faculty has to feel empowered to get satisfies with their job. So, the current study is targeted to know the tools and techniques contemplated to empower the faculties working in Self Finance Arts and Science College

Descriptive Research:

The Type of research used in this project is Descriptive in nature. The Main goal of this type is to describe the data and characteristics about what is being studied. Descriptive research is the exploration of the existing certain phenomena. The design of the present project is

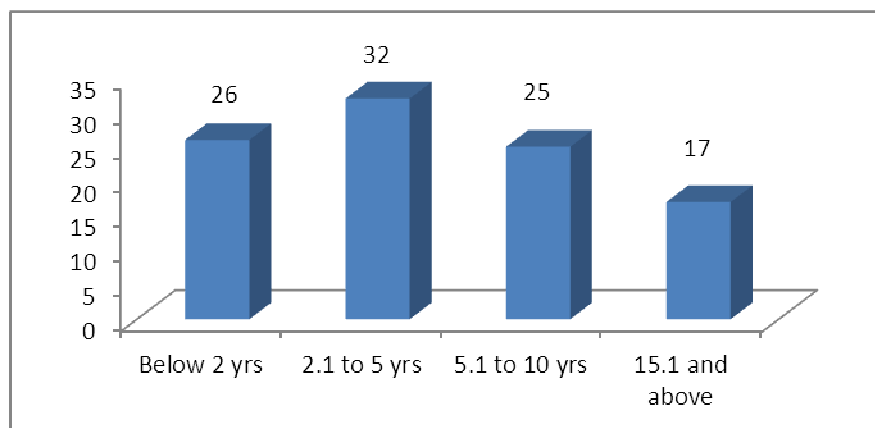
descriptive type of conclusive one.

Statistical Tools For Analysis:

The Data was analyzed through Simple Percentage, Chi-square, ANOVA and Correlation was used for the study

Interpretation:

From the above table it is interpreted that 26 % of the respondents are having below 2 years of experience, 32% of the respondents are having 2.5 to 5 years of experience, 25% of the respondents are having 5 to 10 years of experience, 17% of the respondents are having above 10 years of experience.



Chi-Square Analysis Between Gender And Accepting & Appreciating Faculties Suggestions

NULL HYPOTHESIS (H₀): H₀: There is no significant association between gender and accepting & appreciating faculties suggestions.

ALTERNATIVE HYPOTHESIS (H₁)

H₁: There is Significant association between Gender and accepting & appreciating faculty's suggestions

LEVEL OF SIGNIFICANCE $\alpha=0.05$

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.646 ^a	12	.097
Likelihood Ratio	21.732	12	.041
Linear-by-Linear Association	4.954	1	.026
N of Valid Cases	110		

Interpretation:

From the above table the calculated value is (0.097) which is greater than the level of significant (0.05) [0.097 > 0.05]. Therefore we accept the Null Hypothesis {H₀} and reject the

Alternative Hypothesis {H₁}. Hence there is no significant association between Gender and accepting & appreciating faculty's suggestions

Chi-Square Analysis Between Educational Qualification And Motivation To Attend Training, Conference And Fdps:

NULL HYPOTHESIS (H₀)

H₀: There is no significant association between Educational qualification and motivation to attend training, conference and FDP

ALTERNATIVE HYPOTHESIS (H₁)

H₁: There is significant association between educational qualification and motivation to attend training, conference and FDP

LEVEL OF SIGNIFICANCE $\alpha=0.05$

Chi-Square Tests

	Value	D.f	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.646 ^a	12	.027
Likelihood Ratio	21.732	12	.041
Linear-by-Linear Association	4.954	1	.026
N of Valid Cases	110		

a. 13 cells (65.0%) have expected count less than 5. The minimum expected count is .33.

Interpretation:

From the above table the calculated value is (0.024) which is lesser than the level of significant (0.05) [0.084 > 0.05]. Therefore we reject the Null Hypothesis {H₀} and accept the Alternative Hypothesis {H₁}. Hence there is significant no association between educational qualification and motivation to attend training, conference and FDP

ANOVA

AGE AND AUTONOMY, EMPOWERMENT MOTIVATE THE EMPLOYEE

NULL HYPOTHESIS (H₀)

H₀ There is no variation between the age and feeling motivated due to Autonomy, Empowerment

ALTERNATIVE HYPOTHESIS (H₁)

H₁ There is a Variation between the Age and feeling motivated due to Autonomy, Empowerment

Age And Autonomyand Empowerment Motivate The Employee

	Sum of Squares	D.f	Mean Square	F	Sig.
Between Groups	11.419	3	3.806	3.267	.024
Within Groups	123.499	106	1.165		
Total	134.918	109			

Interpretation:

From the above table it is interpreted that the calculated table value is (.024) which is lesser than the level of significant (0.05) [0.024 < 0.05]. Therefore we reject the null hypothesis {H₀} and accept the alternative hypothesis {H₁}. Hence there is variation between the age factor and Autonomy and empowerment motivate the employee.

ANOVA

GENDER AND NUMBER OF CONFERENCES ATTENDED BY THE FACULTY IN A YEAR

NULL HYPOTHESIS (H₀)

H₀ There is no variation between the Gender and Number of Conferences attended by the faculty in a year

ALTERNATIVE HYPOTHESIS (H₁)

H₁ There is variation between Gender and Number of Conferences attended by the faculty in a year

Gender And Number of Conferences Attended By Faculty in A Year

	Sum of Squares	D.f	Mean Square	F	Sig.
Between Groups	11.419	3	3.806	3.267	.004
Within Groups	123.499	106	1.165		
Total	134.918	109			

Interpretation:

From the above table it is interpreted that the calculated table value is (.004) which is lesser than the level of significant (0.05) [0.004 < 0.05]. Therefore we reject the null hypothesis {H₀} and accept the alternative hypothesis {H₁}. Hence there is a variation between the gender and number of conferences attended by the faculty in a year.

Findings

- ❖ Majority 58% of the respondents belongs to Male category
- ❖ 26% of the respondents are in the age of 36- 40yrs.
- ❖ Majority of the respondents are having below 2-5 years of experience.
- ❖ There is no significant association between Gender and accepting & appreciating faculty's suggestions
- ❖ There is no significant association between educational qualification and motivation to attend training, conference and FDP
- ❖ There is no variation between the age factor and Autonomy and empowerment motivate the employee.
- ❖ There is a variation between the gender and number of conferences attended by the faculty in a year

- ❖ There is a positive Correlation relationship between Age and Monthly Income. When the age of the person increase Monthly Income also increase
- ❖ There is Positive Correlation relationship between Experience and Monthly Income. When the Experience of the person increase Monthly Income also Increases

Suggestions:

- ❖ Faculties can be involved in joined decision making process which gives them an Autonomy and Empowerment to work
- ❖ The organization should have to consider their salary & statutory benefits. Which serves as a biggest motivation for the employee
- ❖ The organization should train up the employee which gives them more empowerment
- ❖ The Educational institution must recognize and appreciated the employee's contribution. Which would helps the employee to achieve greater avenue
- ❖ Institution can support the professional learning community for the faculty

Conclusion:

Inspiration and commitment of employees to their work is regarded with high esteem in organizations. This is because inspiration and commitment play a very significant role in determining the performance of employees. The level of commitment and inspiration of employees in organizations are functions of employee motivation and it will help to do better performance in their work. Since the role that motivation plays in an organization is unquestionable, its application becomes the challenge since the concept is quite complex. In order to motivate employees in a company or organization, it is imperative that the needs of employees are identified. Many theorists have come up to highlight the needs of employees at work place. Maslow list the needs of employees in an organization in a given hierarchy which include security needs, social needs, psychological needs, esteem needs and self actualization needs. More than all the above mentioned need employees of all the business irrespective of their position are expected to get more empowered .Empowerment is not just giving them autonomy to work but to give them a space to communicate, reward them in all their achievement and to give sufficient training whenever an need arise.

A Review on Synthesis and Characterization of ZnO Nanoparticles

Manisha B. Kadam¹, Miss. Ankita S. Kale², Miss. Swati Harkal³

¹²³ Department of Chemistry, Arts, Commerce & Science College, Sonai

¹ manishakd27@gmail.com, ² kaleankita192@gmail.com, ³swatiharkal95@gmail.com

Abstract:

All research paper I have studied in during 6 month and finalized these review paper. Zinc oxide is an inorganic compound and usually appears as a white powder. It also called a multifunctional material because of to its unique physical and chemical properties. Zinc oxide nanoparticles were successfully synthesized by a sol-gel method, precipitation method, green leaf extract, and microwave method, wet chemical and hydrothermal method. Different compositions of zinc oxides nano composites were characterized using X-Ray Diffractometer and Photoluminescence Spectrofluorophotometer studies. The X-ray diffraction studies reveals that the synthesized ZnO nanoparticles have wurtzite structure and the particle size varies from 20 to 30 nm. The ZnO nanoparticles were prepared by two different methods where the size of the particles formed were found to be 320 nm and 559 nm studied by the particle size analyzer. The XRD patterns of these sample revealed that the required phase is present with a little amount of impurities. The particle size measurement which was done by particle analyzer was supported by the XRD Scherer's formula. Crystalline oxide powders, combined with other materials, provide possibilities for obtaining improved chemical, mechanical, optical or electrical properties.

Keywords: Nanoparticles, zinc oxide (ZnO), synthesis, characterization

1. Introduction:

Nano means one-billionth, thus nanotechnology deals with materials measured in a billionth of a meter. A nanometer is 1/80,000 the diameter of a human hair or approximately ten hydrogen atoms wide. Nanotechnology is the science of very small things. But nanotechnology is not just involved with small things. Nanotechnology is a multi-disciplinary science. It includes knowledge from biology, chemistry, physics and other disciplines. Nano technology as the manipulation or self-assembly of individual atoms, molecules or molecular clusters into structures to create materials devices with new or vastly different properties

Zinc oxide is an inorganic compound with the formula ZnO. It usually appears as a white powder, nearly insoluble in water. The powder is widely used as an additive into numerous materials and products including plastics, ceramics, glass, cement, rubber (e.g. car tyres), lubricants, paints, ointments, adhesives, sealants, pigments, foods (source of Zn nutrient), batteries, ferrites, fire retardants, etc. ZnO is present in the Earth crust as a mineral zincite; however, most ZnO used commercially is produced synthetically.

Zinc oxide, with its unique physical and chemical properties, such as high chemical stability, high electrochemical coupling coefficient, broad range of radiation absorption and high photo stability, is a multifunctional material. In materials science, zinc oxide is classified as a semiconductor in group II-VI, whose covalence is on the boundary between ionic and covalent semiconductors. A broad energy band (3.37 eV), high bond energy (60 meV) and high thermal and mechanical stability at room temperature make it attractive for potential use in electronics, optoelectronics and laser technology.

Methodology:

1. ZnO Nanoparticles synthesis by Precipitation method:

Zinc sulfate (1.5 mol/l) and ammonium bicarbonate (2.5 mol/l) were prepared in distilled water and 100 ml ZnSO₄ solution was added to 126 ml NH₄HCO₃ solution while stirring and the reaction mixture was kept at 45 °C. The slurry of basic zinc carbonate (BZC) in the form of a white precipitate was obtained. It was then filtered, washed and dried. Finally zinc oxide nanoparticle was prepared by calcining the precipitate at 500 °C for 1 hour. In this process, the reaction of Zn ions and ammonium acid carbonate proceeds according to the equation 1.



The complex formed decomposes upon calcining to ZnO according to the equation 2.



1. ZnO Nanoparticles synthesis by Green method:

Janjalet *et al.* (2017) reported that zinc oxide nanoparticles were prepared by leaf extract of guava plant. For Preparation of leaf extract of guava plant: The leaves of guava (10 mg) were thoroughly washed, dried and then boiled in 100ml distilled water for 15 min. The resultant extract was cooled, filtered using Whatman No. 1 filter paper and used as the extract solutions. In this method, 0.02 M solution of zinc acetate (50ml) was taken and 2ml leaves extract was added drop-wise and the resulting mixture was stirred for 10 minutes. The pH of the mixture was maintained at 12 by adding 1M NaOH drop-wise and the solution was stirred continuously for 2 hr. A pale white precipitate resulted which is washed by distilled water 2-3 times followed by ethanol, filtered and dried at 500C overnight in oven. Pale white powder of zinc oxide nanoparticles was store for characterization. *Coriandrumsativum* leaf was used for the synthesis and characterization of ZnO nanoparticles prepared by green and chemical technique. The average size was found to be 66 nm in green synthesis method while the size was 81nm in the chemical method. The ZnO nanoparticles prepared from *Coriandrum* leaf extract were expected to have more extensive application in biotechnology, sensors, medical, catalysis, optical devices, DNA labeling, drug delivery and water remediation (Gnanasangeetha and Thambavani, 2013) [14]. The antibacterial activity towards human bacterial and plant pathogens showed good sensitivity towards the green synthesized ZnO-NPs at all concentrations. The size of the particles ranged from 100 to 200 nm. The study indicated that the *C. procera* ZnO nanoparticles had strong antimicrobial activity against the tested human and plant bacterial pathogens along with the fungal pathogens (Poovizhi and Krishnaveni, 2015) [22].

Balaet *et al.* (2015) [4] reported the synthesis of Zinc oxide nanoparticles from the leaf extract of *Hibiscus subdariffa*. The synthesized ZnO nanoparticles had potential anti-bacterial agents which have been studied on *Escherichia coli* and *Staphylococcus aureus*. The Zinc oxide nanoparticles were synthesized from the leaf extract of Tanners cassia (*Cassia auriculata*). The synthesized Zinc oxide nanoparticles were confirmed by SEM, UV- Vis Spectrophotometer and FTIR. The SEM studies revealed that the synthesized ZnO-NPs were spherical in shape (Ramesh *et al.*, 2014a) [23]. The Zinc oxide nanoparticles were synthesized with the leaf extract of green tea (*Camellia sinensis*). The whole plant body of *Brassica oleracea* had possessed aphrodisiac activities, and it had a significant role in maintaining maleness. The nanoparticles showed antibacterial activity against both Gram-positive and negative bacteria. The antibacterial

activities increased as the concentration of Zinc oxide nanoparticles increased. The synthesized Zinc nanoparticles were applied on *Arachishypogaea*L (peanut) pot-culture to estimate soil microbial population, soil exo-enzyme activities and physiological growth parameters of the peanut plants. Zinc nanoparticles applied to the peanut pot-culture exhibited good soil microbial and enzyme activities by showing significant variations compared to the control and enhanced the physiological growth parameters of peanut plants (Sindhuraet al., 2015) [32].

The Zinc oxide nanoparticles were synthesized with the leaf extract of *Aloe vera*. The particles were a hexagonal shape with an average size of 22.18 nm. Photodegradation and antibacterial activity of the nanoparticles were studied. The antibacterial studies of synthesized nanoparticles showed sensitivity to both Gram positive and Gram negative bacteria (Varghese and George, 2015) [38]. The green synthesis of Zinc oxide nanoparticles by using peel extract of *Punicagranatum*. The flower extract of *Trifoliumpratense* was used for the synthesis of Zinc oxide nanoparticles. The synthesized ZnO nanoparticles were agglomerated with a particle size ranging from below 100 to 190 nm. ZnO nanoparticles synthesized from *T. pratense* flower extract showed effective antibacterial activity against all tested strains (Dobrucka and Dugaszewska, 2015) [12]. The Synthesis of Zinc oxide nanoparticles with the milky latex extract of *Calotropisprocera*. The morphology of ZnO NPs embedded in *calotropis* matrix with little agglomeration having sizes about 5 nm throughout the carbon coated copper grid, and average particle size was in the range of 5-40 nm (Ravindraet al., 2011) [27].

2. ZnO Nanoparticles synthesis by Wet chemical method:

The Synthesis of zinc oxide nanoparticles by wet chemical method using zinc nitrate and sodium hydroxides precursors and soluble starch as stabilizing agent. Different concentrations of soluble starch (0.1%), were dissolved in 500 ml of distilled water by using microwave oven. Zinc nitrate, 14.874 g (0.1 M), was added in the above solution. Then the solution was kept under constant stirring using magnetic stirrer to completely dissolve the zinc nitrate for one hour. After complete dissolution of zinc nitrate, 0.2 M of sodium hydroxide solution was added under constant stirring, drop by drop touching the walls of the vessel. The reaction was allowed to proceed for 2 h after complete addition of sodium hydroxide. After the completion of reaction, the solution was allowed to settle for overnight and the supernatant solution was then discarded carefully. The remaining solution was centrifuged at 10,000 rpm for 10 min and the supernatant was discarded. Thus obtained nanoparticles were washed three times using distilled water. Washing was carried out to remove the byproducts and the excessive starch that were bound with the nanoparticles. After washing, the nanoparticles were dried at 80°C for overnight. During drying, complete conversion of $Zn(OH)_2$ into ZnO takes place. Sivakumaret al. (2011) worked on biosynthesis of silver nanoparticles from $AgNO_3$ solution and using *Calotrophis gigantean* leaf. In biosynthesis method *Calotrophis gigantean* leaf acted as a reducing agent. Vafaeet al. (2007) [37] worked on synthesis and characterization of zinc oxide nanoparticles using sol-gel method. By using this method they synthesized spherical shape ZnO nanoparticles. They utilized first time triethanolamine (TEA) as a surfactant. Yiamsawaset al. (2009) [41] prepared zinc oxide nanostructures by using solvothermal method. They utilized PVP, ethanol, and zinc acetate dehydrate. This entire chemical treated in sealed polypropylene vessel heated in autoclave.

Result & Observation:

1. According to Awwadet *al.*, 2014, the antibacterial activity towards human bacterial and plant pathogens showed good sensitivity towards the green synthesized ZnO-NPs at all concentrations. The synthesis of Zinc oxide nanoparticles was reported with the leaf extract of *Oleauropea*. The average size of particles was found to be 500 nm and the thicknesses was about 20 nm by SEM studies. FT-IR analysis of aqueous *Oleauropea* leaf extract indicated the presence of phytoconstituents such as amines, aldehydes, phenols and alcohols which were the surface active molecules stabilizing the Zinc oxide nanosheets.

According to Bhumi *et al.*, 2014, the synthesized ZnO-NPs were evaluated for the antibacterial activity against *Bacillus thuringiensis*, *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The highest antimicrobial activity was observed against *Pseudomonas aeruginosa* followed by *Staphylococcus aureus* (Bhumi and Savithramma, 2014) [5]. The synthesis of Zinc oxide nanoparticles with the leaf extract of *Adhatodavasica*. The synthesized ZnO-NPs were found to be discoid in shape with an average size of 19 - 60 nm. Phytochemicals present in the plant were responsible for the quick reduction of Zn⁺ ion to metallic Zinc Oxide nanoparticles.

According to Sindhura *et al.*, 2015, The particles were spherical and sheet shape. The experimental results showed that the diameters of prepared nanoparticles in the solution had sizes between 1 and 100 nm. The whole plant body of *Brassica oleracea* had possessed aphrodisiac activities, and it had a significant role in maintaining maleness. The nanoparticles showed antibacterial activity against both Gram-positive and negative bacteria. The antibacterial activities increased as the concentration of Zinc oxide nanoparticles increased

2. According to Raut and Thorat 2015 studied on preparation, characterization and application of zinc oxide nanoparticles by leaves extract solution and boiled upto 600-80 0C by using a stirrer-heater. When temperature of solution reached at 60 0C then 5 grams of Zn(NO₃)₂ were as added to the solution. The mixture was then boiled upto reduce to a deep yellow coloured paste. This paste then collected in a ceramic crucible. This paste heated in an air heated furnace at 300 0C for 120 min. A light yellow coloured powder was prepared and this was carefully collected. The powder was mashed in a mortar-pestle so as to get a finer nature for characterization.

Conclusion:

Zinc oxide is a multifunctional material because of its many interesting properties (piezo- and pyroelectric), a wide range ~ 1100 ~ of UV absorption, and high photostability, biocompatibility and biodegradability. ZnO can also be obtained with a variety of particle structures, which determine its use in new materials and potential applications in a wide range of fields of technology. Zinc oxide nanoparticles were synthesized by different methods such as wet chemical method, sol-gel method, green leaf extract method and UV. The crystallite size of the prepared zinc oxide nanoparticles varies from 25-30 nm. All the prepared nanoparticles showed wurtzite structure.

Acknowledgement:

I express my sincere thanks to my Guide teacher, Dr. Dandwate, Department of Zoology, ACS College, Sonai, for his esteemed guide incessant support, inspiration and constructive criticism throughout my Review paper. I convey my thanks to my Collogues, Miss. Ankita Kale

for their help. Finally, I would also express my deep sense of gratitude to my parents and family members for their encouragement and support throughout, which always inspired me.

References:

1. Awwad AM, Ahmad AL. (2014) Green synthesis, characterization and optical properties of Zinc oxide nanosheets using *Oleaeuro pea* leaf extract. *Advances in Material Letter*. 5(9):520-524.
2. Bala N, Basu R *et al.* (2015) Green synthesis of Zinc oxide nanoparticles using *Hibiscus subdariffa* leaf extract: effect of temperature on synthesis, anti-bacterial activity and anti-diabetic activity. *RSC Advances*. 5(7):4993–5003.
3. Bhumi G, Savithamma N. (2014) Biological Synthesis of Zinc oxide Nanoparticles from *Catharanthus roseus*(L.) *G. Don*. Leaf extract and validation for antibacterial activity. *International Journal of Drug Development Research*. 6(1):208-214.
4. Bhumi G, Savithamma N. (2014) Screening of Zinc oxide nanoparticles for cell proliferation synthesized through *Adhatodavasicanees*. *International Journal of Drug Development Research*. 6(2):97-104.
5. Cheetham AK, Mellot CF. (1997) *In-situ* Studies of the Sol-Gel Synthesis of Materials. *Chemistry Materials*. 9:2269-2279.
6. Dobrucka R, Dugaszevska J. (2015) Biosynthesis and antibacterial activity of ZnO nanoparticles using *Trifolium pratense* flower extract. *Saudi Journal of Biological Sciences*. 4:1-7.
7. Gnanasangeetha D, Thambavani SD. (2014) Facile and eco-friendly method for the synthesis of Zinc oxide nanoparticles using *Azadirachta* and *Emblica*. *International Journal of Pharmaceutical Science and Research*. 5(7):2866-2873.
8. Poovizhi J, Krishnaveni B. (2015) Synthesis, characterization and antimicrobial activity of Zinc oxide nanoparticles synthesized from *Calotropis procera*. *International Journal of Pharmaceutical Science and Drug Research*. 7(5):425-431.
9. R. Lide (editor), *CRC Handbook of Chemistry and Physics*, CRC Press, New York, 73rd edition.
10. Raut S, Thakre R. (2014) Green synthesis of Zinc oxide nanoparticles using *Ocimum tenuiflorum* leaves. *International Journal of Science and Research*. 4(5):1225-1228.
11. Gnanasangeetha D, Thambavani SD. (2015) One pot synthesis of Zinc oxide nanoparticles via chemical and green method. *Research Journal of Material Science*. 1(7):1-8. 15.
12. Gnanasangeetha D, Thambavani SD. (2015) Facile and ecofriendly method for the synthesis of Zinc oxide nanoparticles using *Azadirachta* and *Emblica*. *International Journal of Pharmaceutical Science and Research*. 5(7):2866-2873.
13. Tokumoto MS, Briois V. (2003) Catalysis and Temperature Dependence on the Formation of ZnO Nanoparticles and of Zinc Acetate Derivatives Prepared by the Sol-Gel Route. *Journal of Physical Chemical Biology*.; 107:568-574.
14. Vafae M, Ghamsari J. (2007) Preparation and characterization of ZnO nanoparticles by a novel sol-gel route. *Journal of Materials Letters*. 61:3265-3268.

15. Varghese E, George M. (2015) Green synthesis of Zinc oxide nanoparticles. International Journal of Advances Research and Science Engineering. 4(1):307-314.
16. Vidya C, Jain A et al. (2013) Green synthesis of ZnO nanoparticles by *Calotropis gigantea*. International Journal of Current Engineering Technology.1:118- 120.
17. Yi R, Liu X.(2008) Selective synthesis and characterization of flower-like ZnO microstructures via a facile hydrothermal route. Materials Science and Engineering. 153:25-30.
18. Yiamsawas D, Boonpavanitchakul K, Kangwansupamonkon W. Preparation of ZnO
19. N. A. Spaldin, (2004) "Search for Ferromagnetism in transition-metal-doped piezoelectric ZnO," Phys. Rev. B 69: 125 201.
20. S. J. Pearton, T. Steiner,(2004) "Recent advances in processing of ZnO," J. Vac. Sci. Technol. B 22: 932.



Antagonism of Microbial Flora Isolated from Garden Rhizospheric Soil

Jotsana Pawade, Umesh Pravin Dhuldhaj*

Department of Biotechnology, School of Life Sciences, Swami Ramanand Teerth Marathwada University, Nanded 431606.

*Corresponding author: umeshpd12@gmail.com

Abstract:

The microbes can have capacity inhibit the growth of other microbes for their own survival. The strategy of the microbes which makes them fittest for extreme conditions is its capacity to secrete some of the metabolites responsible for inhibitions of growth of other microbes we can say antibiosis. The phenomenon of these microbes helps to survive them in extreme conditions. For this purpose we have taken garden soil for the investigations and from this soil samples microbial flora were isolated and purified.

*The isolated microbial cultures were tested against each other and we found very significant result. Initially we speeded soil samples after dilutions on agar plates we observed around 10 fungal cultures on PDA plates. Further among 10 cultures we got three pure cultures showing positive antagonistic activity against each other. We further calculate activity of antibiosis and we found in multifold inhibitions. From microscopy under light microscope we found that the green spore mat appear similar to *Penicillium digitatum*, black fungal spore mat similar to *Aspergillus niger*, while brown fungal spore mat appears to be as blood fungi also known as *Tinea versicolor*.*

Keywords: Antagonism, Rhizosphere, fungal culture

Introduction:

The microbes or pathogens are one of the members of natural soil flora. These microbes are present normally in rhizosphere, which helps crop plant to prevent their predators (George et al., 2002; Reynolds and Barrett, 2003; Gerba and Smith, 2005; Arnone and Walling, 2007). The microbes are important biotic factor of ecosystem and govern distinct functional traits with respect to ecological principles. For the microbes, it is better to compete with other microbes for food and nutrients for their own survival. For the maintenance of microbial communities, microbes start secreting some biomolecules which makes unfavorable conditions for the survival of other microbes like that of antibiosis (Garcia-Bayona and Comstock, 2018). The fittest microbes create interference competition, which harms other microbes.

This phenomenon helps in maintenance of plant health, crop productivity and preservations of functions of ecosystems. Microbes to microbes or organisms to organism there are several interactions within the same community like synergistic and mutualistic in which one organisms helps in the survival of other organisms. Other interactions involved antagonistic or parasitism where one organism is benefitted while one is harmed. These characteristics of microbes exploited in biocontrol of plant pathogens. This effect of antagonism can enhance the biocontrol of plant pathogens or disease causal organisms which helps in the integrations of green farming. Microbes to adapt the characteristics of antagonisms need to have several interactions with other microbes like pathogens. The microbes possessing the characteristics of antagonisms also have the capability to detoxify, can repressed the genes of biocontrol, can actively efflux biomolecules like antibiotics and have antibiotic resistance too (Duffy et.al. 2003).

Materials and Methods:

To find the mechanisms of antagonism in soil micro flora, we have taken soil sample rhizosphere of garden plants and try to effect of antibiosis. The secondary metabolites or chemicals secreted by plants or microbes prevents attack some of the pathogenic microbes or animals. Soil samples were collected from different locations of garden rhizosphere soil. The collected samples were serially diluted and further inoculated on agar plates by spread/streak plate techniques. During the isolation we got numerous fungal and bacterial species and we observed more zone of inhibitions around fungal species so further we have taken these fungal species on Potato Dextrose Agar plates. These isolated species were thought to be secreting extracellular biomolecules which are responsible for antibiosis, hence we have mass cultivated isolated fungal species and extracellular biomolecules were collected by removing biomass through centrifugations. The collected extracellular extract further tested for antimicrobial activity against each other and other bacteria.

Media:

Different types of media were used for selective growth, enrichment culture, and indication of specific properties. Media preparation and sterilization were done according to the protocol and standard recipe.

Sample collection:

Soil samples were collected from nearby rhizosphere sites of School of Life Sciences, Campus and from collected sample numerous fungi were isolated and identified.

Assessment of increase in fold area:

The increase in fold area was assessed by calculating the mean surface area of the inhibition zone of each fungal extract along with distil water as the solvent by using the formula $(B^2 - A^2)/A^2$, where B is extract in solvent, A is pure solvent (water).

Results and Discussion:

The rhizosphere soil samples were taken from different locations or sites of School of Life Sciences (Fig. 1). Soil samples taken were serial diluted and spread on agar plates for their isolations. During isolations we observed several fungal species are showing antagonistic properties. Further such microbes we purified and tested for antimicrobial properties and we found positive results for the same and found enhanced antimicrobial activity with respect to the solvents.

Figure 1: Collection of rhizosphere soil from different sites of School of Life Sciences.

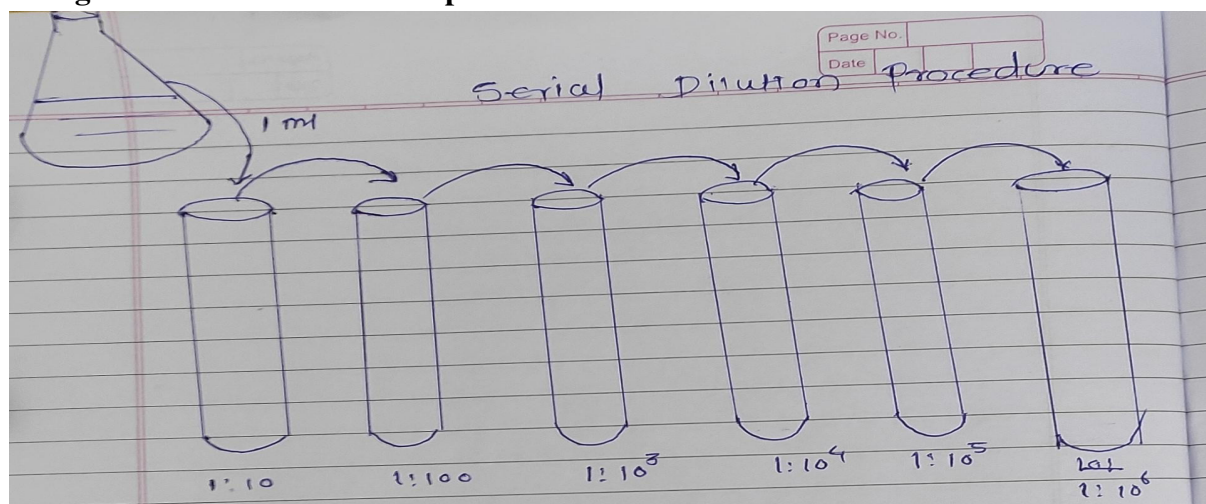


Figure 2: Serial dilutions of collected soil samples in saline water.

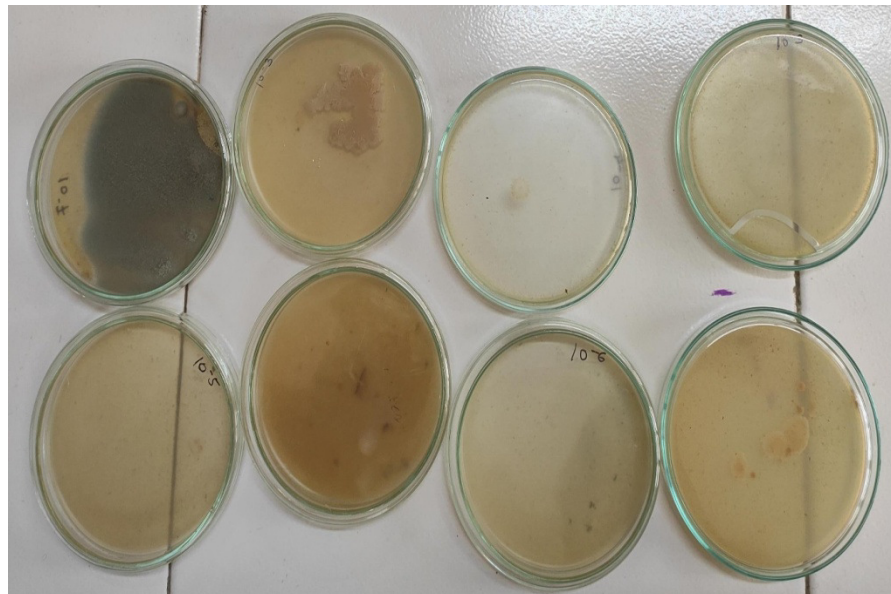


Figure 3 Cultures obtained after serial dilutions and further isolated it.

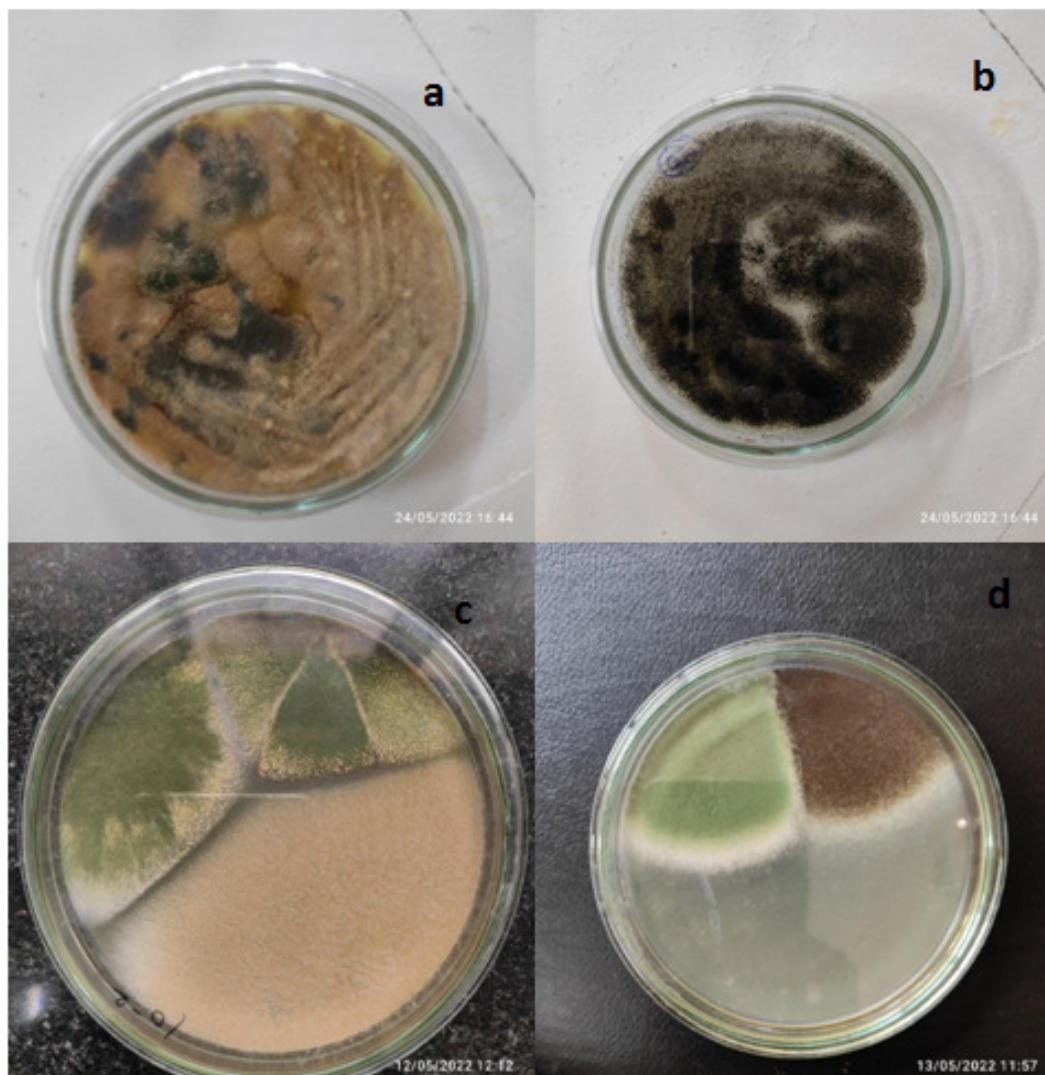


Figure 4: a, b: isolation of fungi from soil samples, c & d fungal cultures had shown antagonism.

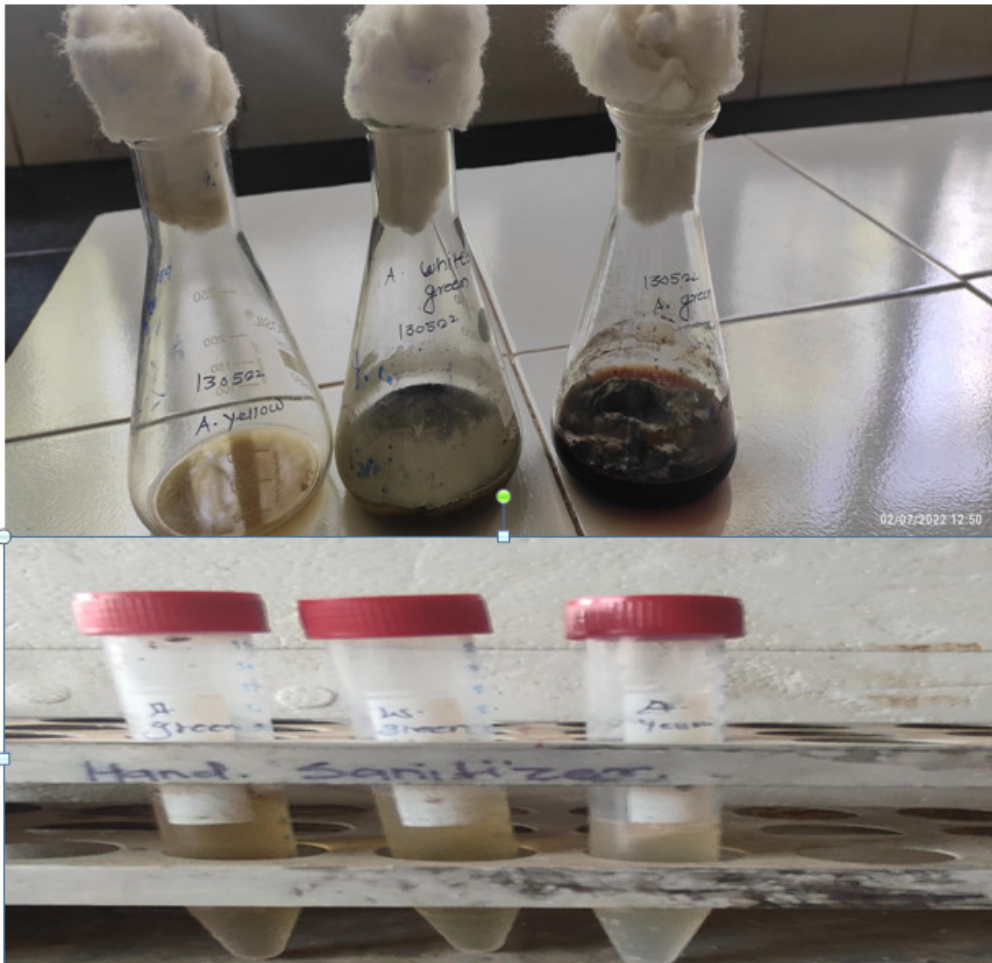


Figure 5: Purified fungal cultures, isolated from soil samples.

Table 1: Antimicrobial or antagonism shown by experimental fungi in fold activity

Sample	Experimental fungi	Control	Fold activity
1	12	08	1.25
2	09	07	0.65
3	11	07	1.46
4	12	09	0.49
5	10	06	1.49
6	12	07	1.93
7	13	06	1.69
8	13	07	2.44
9	09	06	1.25
10	10	07	1.04
11	12	06	3
12	13	06	3.69
13	13	08	1.64
14	13	09	1.64

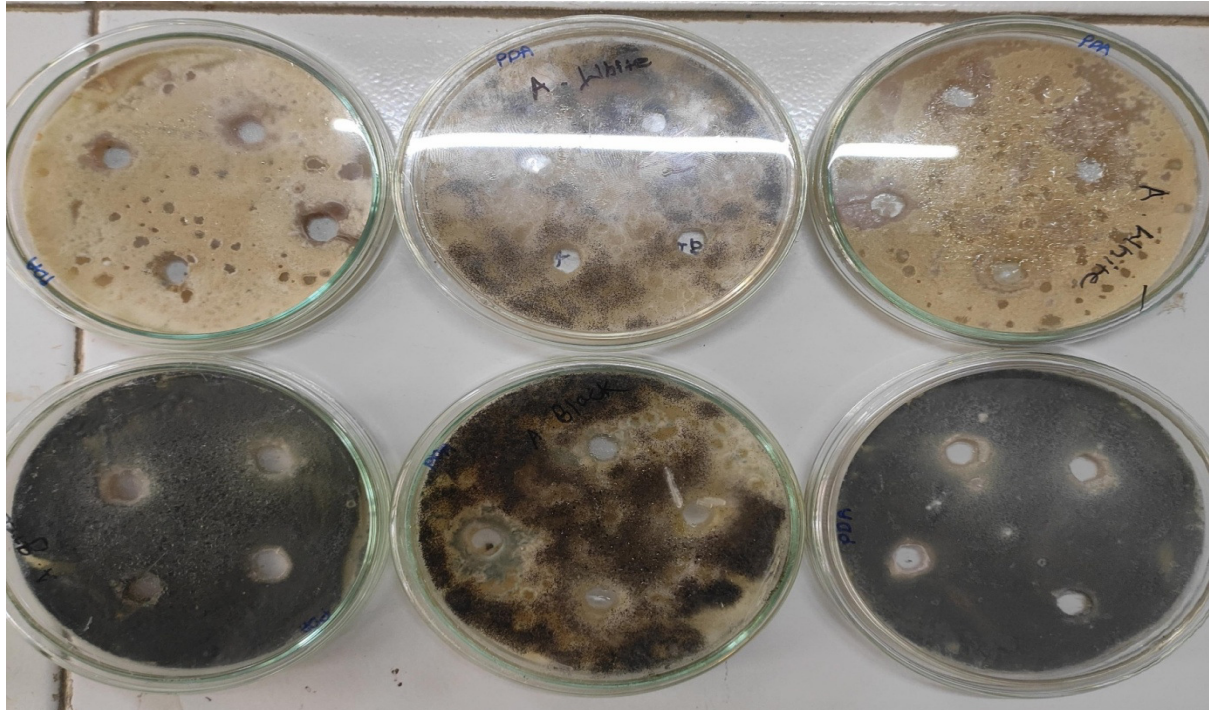


Figure 6 : Antimicrobial activity shown by isolated fungal cultures

The fungal spores or cultures isolated from soil samples were tested against each other to find antimicrobial or antagonism. In this experiment we detected very significant results and we observed clear zone between to fungal mat. Further these cultures when tested for antimicrobial activity we found multifold inhibition activity against fungi and bacteria (Table 1). In this investigation, we are particularly looking some of the compounds which are responsible for growth inhibitions of plant pathogens. We can see with modern agriculture, we are exploiting farm field for production enough amount food as the population day by day increasing. To get higher yield, we are using synthetic fertilizers, to prevent loss of crop yield by pathogens and pest we are applying enormous of biopesticides. After the use of these synthetic materials, they are not easily degraded or we can say their half time is very long, so can face its remnant and products on farm field. These remnants and products after some time makes fertile farm land into sterile one, where we cannot take any sort of crop or food.

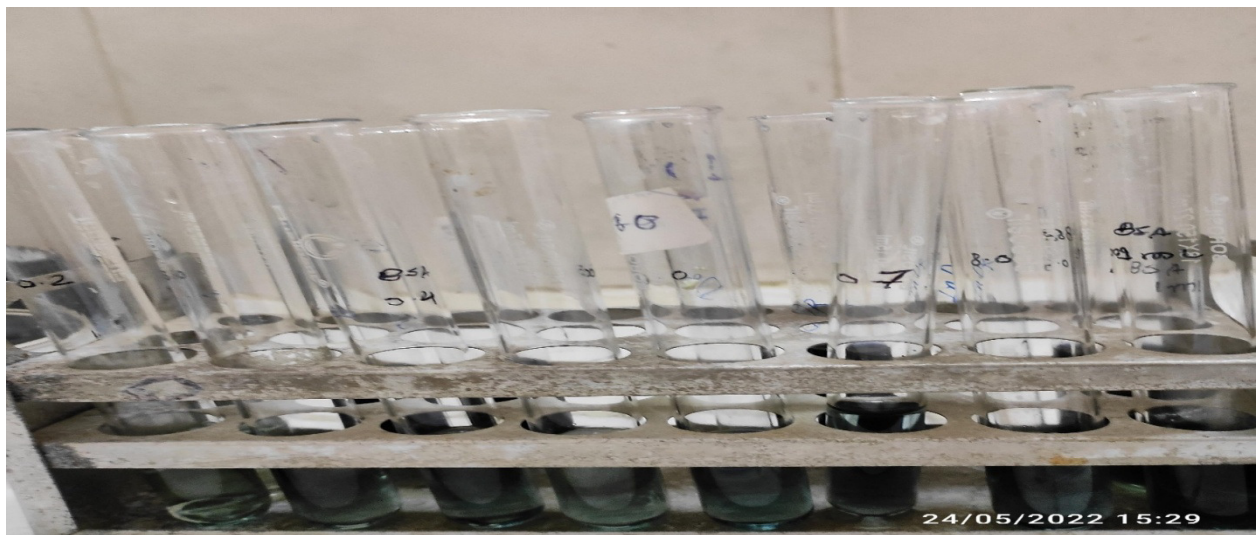


Figure 7: Protein estimation in purified fungal cultures

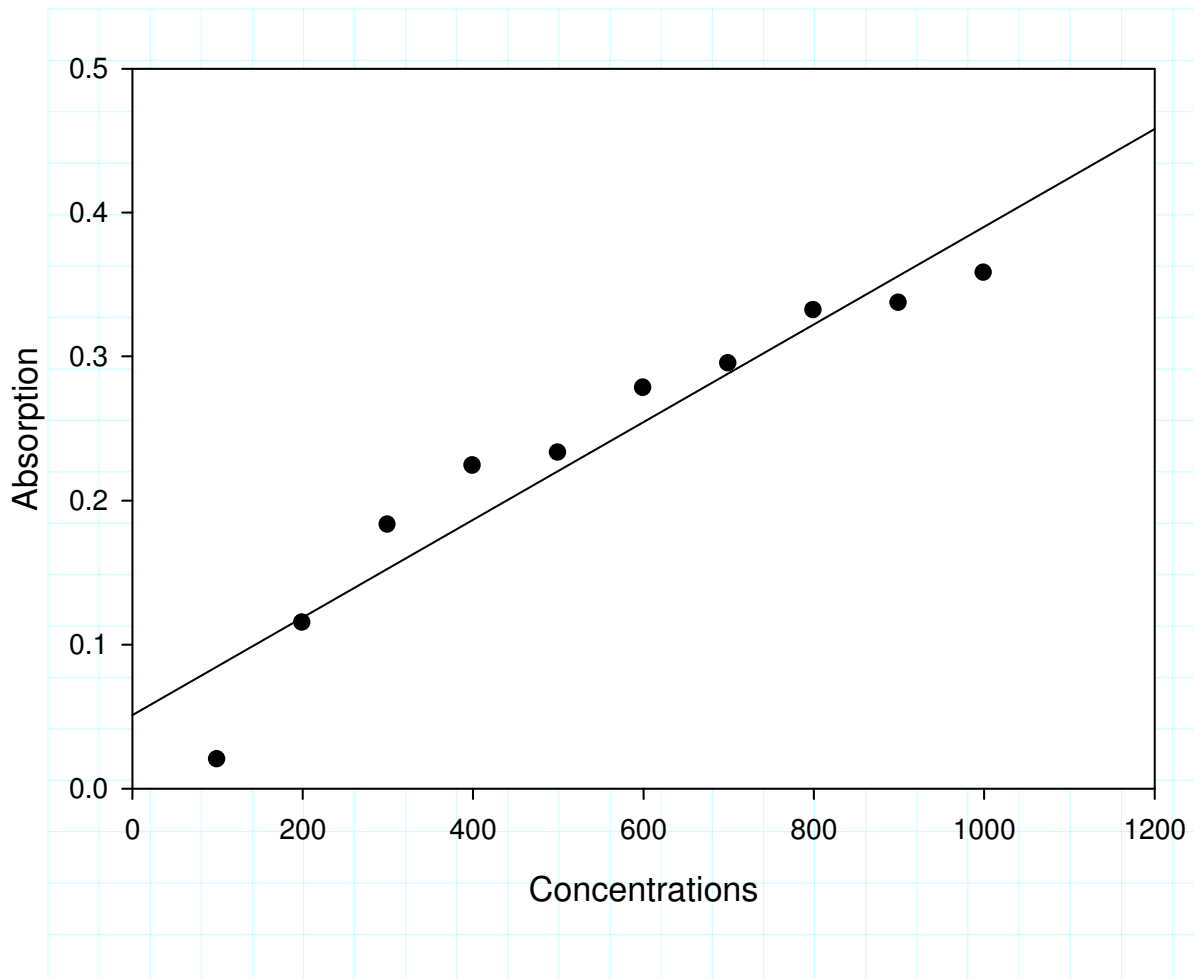
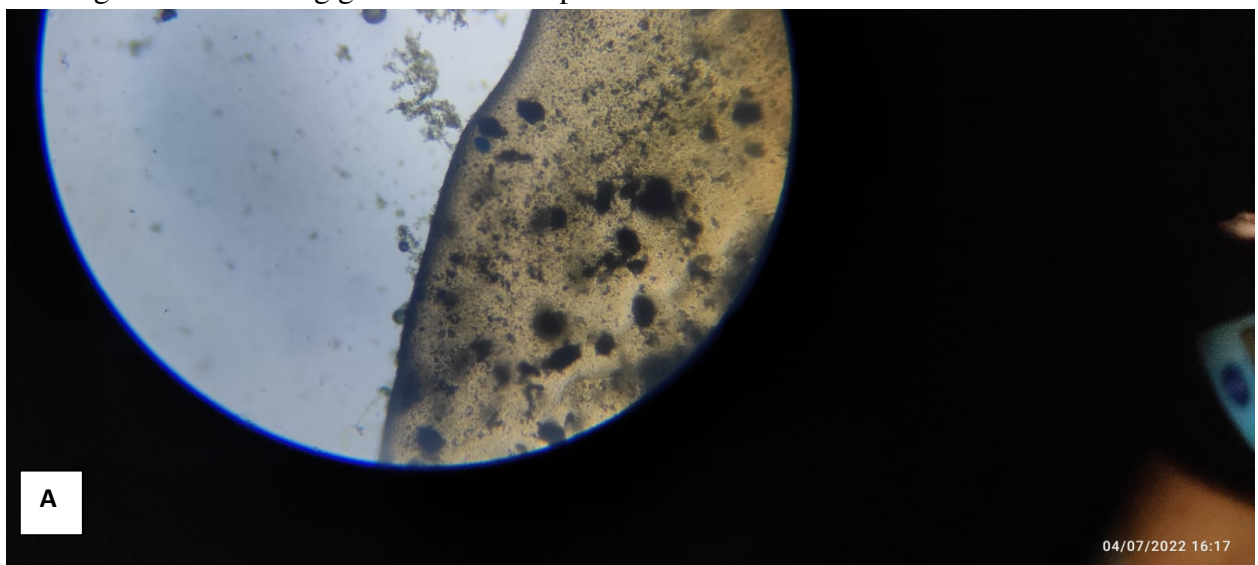


Figure 8: Standard graph for protein estimations

In present investigations we have estimated protein samples by taking bovine serum albumin as the standard protein. And we have found that the microbes or fungi having higher antimicrobial or antagonism are having good contents of protein.



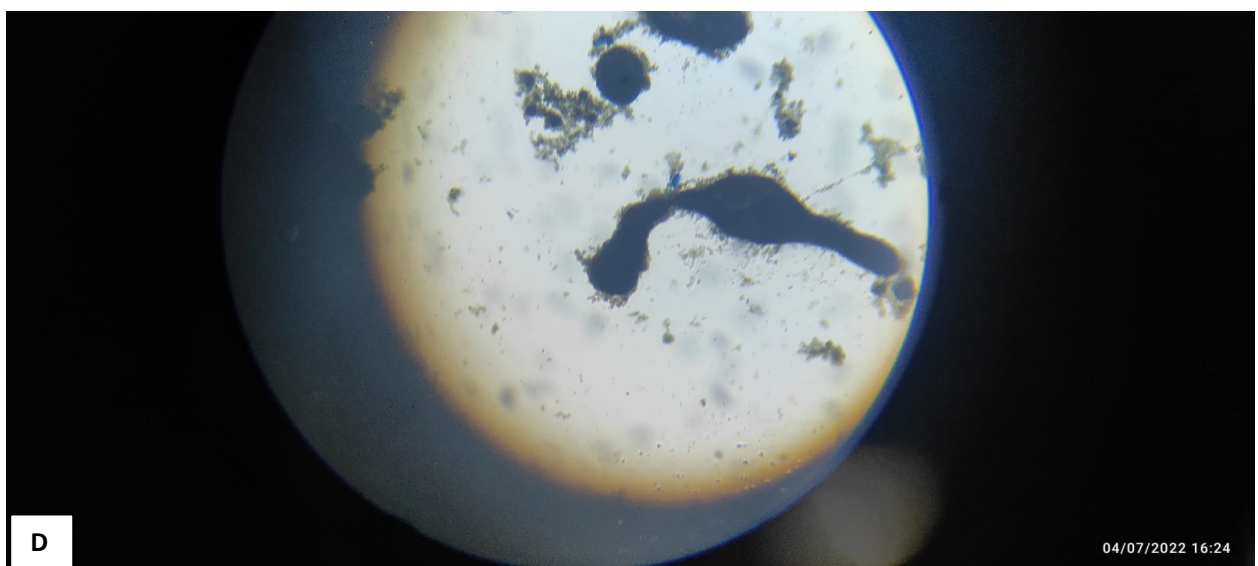
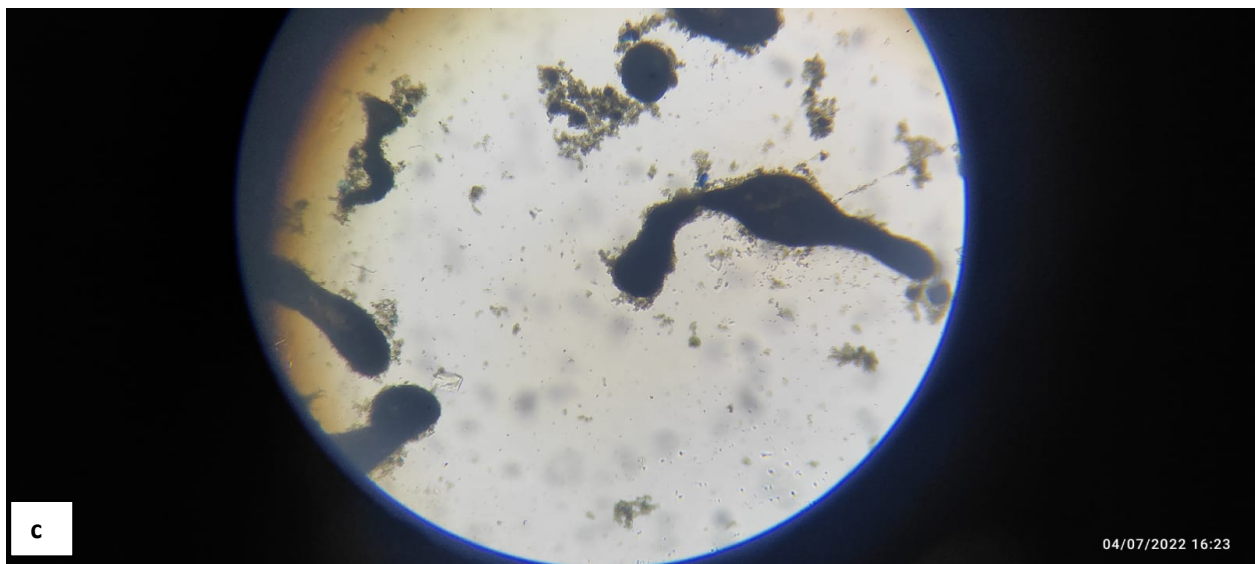
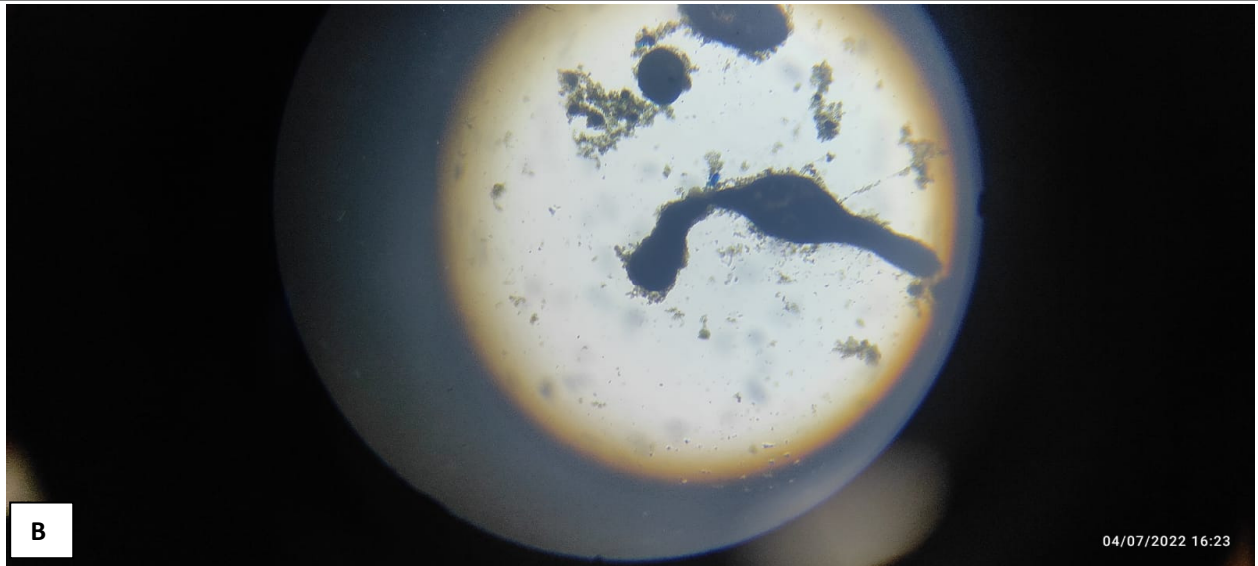


Figure 9: (A-D) Microscopic identifications of fungal spores isolated from soil samples.

From microscopy under light microscope we found that the green spore mat appear similar to *Penicillium digitatum*, black fungal spore mat similar to *Aspergillus niger*, while brown fungal spore mat appears to be as blood fungi also known as *Tinea versicolor*.

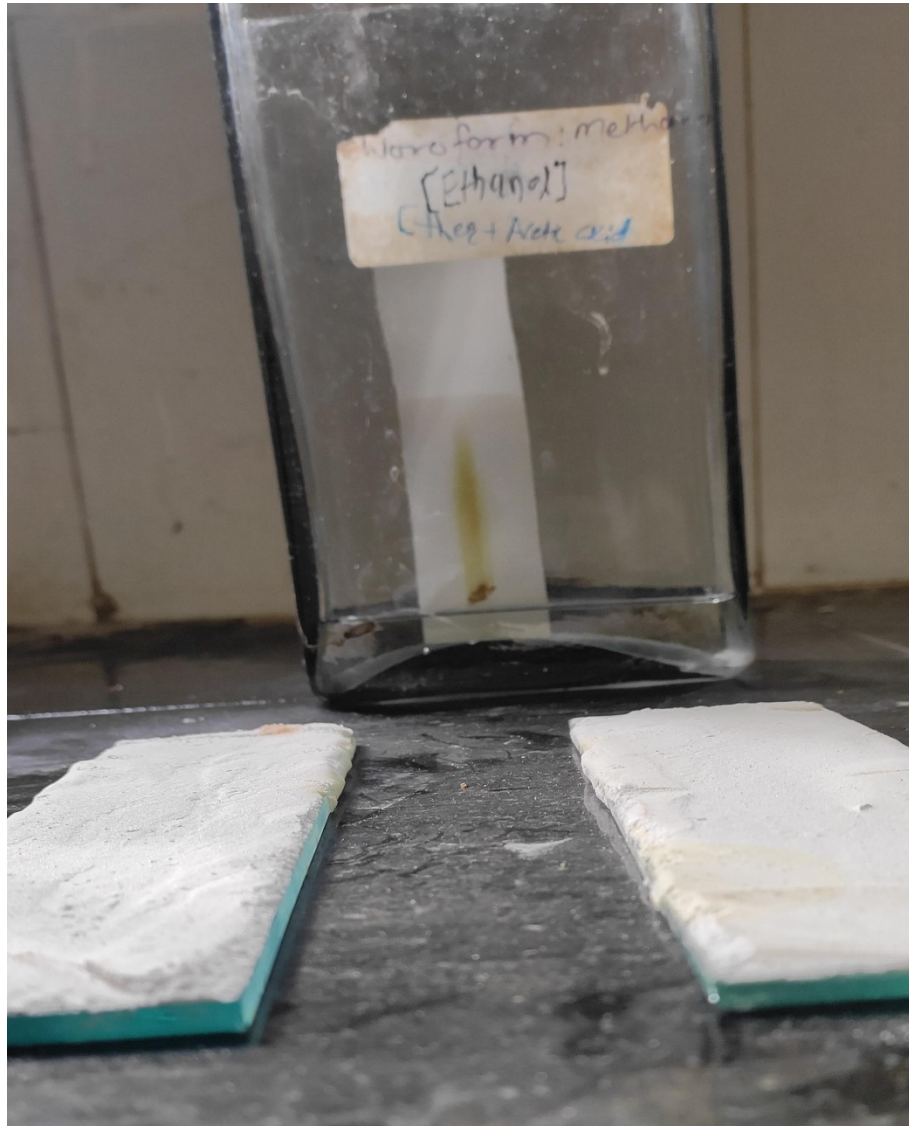


Figure 9: Extracellular components obtained from purified fungi were characterized by Thin Layer Chromatography.

Conclusion:

In the presence on sort of organisms, other organisms cannot be able to survive is supposed to antibiosis. This sort of phenomenon also called as antagonism. Here we can use this sort of phenomenon for the increment in crop yield and for formulations of biopesticides. We can see, if you use such microbes through which we can prevent the growth of pathogenic microbes.

References:

- Arnone, R. D., and Walling, J. P. (2007). Waterborne pathogens in urban watersheds. *J. Water Health* 5, 149–162. doi: 10.2166/wh.2006.001.
- Duffy, B., Schouten, A., and Raaijmakers, J.M. (2003) Pathogen Self Defense: Mechanism To Counteract Microbial Antagonism, *Annual Review of Phytopathology*,

41:501-538

<https://doi.org/10.1146/annurev.phyto.41.052002.095606>.

- Garcia-Bayona L., and Comstock L.E. (2018). Bacterial antagonism in host-associated microbial communities, *Science*, 361(6408):2456, DOI: 10.1126/science.aat2456.
- George, I., Crop, P., and Servais, P. (2002). Fecal coliform removal in wastewater treatment plants studied by plate counts and enzymatic methods. *Water Res.* 36, 2607–2617. doi: 10.1016/S0043-1354(01)00475-4.
- Gerba, C. P., and Smith, J. E. (2005). Sources of pathogenic microorganisms and their fate during land application of wastes. *J. Environ. Qual.* 34, 42–48. doi: 10.2134/jeq2005.0042.
- Reynolds, J. H., and Barrett, M. H. (2003). A review of the effects of sewer leakage on groundwater quality. *Water Environ. J.* 17, 34–38. doi: 10.1111/j.1747-6593.2003.tb00428.x.



Synthesis, Characterization of $Fe_3O_4@SiO_2$ And it's Application for Removal of Methylene Blue Dye

Sunil Gawali¹, D.V. Mane*

Faculty of Chemistry, Sundarro More Art's, Commerce and Science College Poladpur, Raigad (M.S.) 414303, India.¹

School of Architecture, science & Technology, Yashwantrao Chavan Maharashtra open University, Nahik*

E-mail id- spgawali1986@gmail.com

Abstract-

In this study, we successfully synthesized core shell structured $Fe_3O_4@SiO_2$ nanocomposites by microwave assisted solvothermal method using sodium silicate (Na_2SiO_3), which is more suitable than the conventional silane precursor TEOS (tetraethyl orthosilicate). In the process of surface coating of particle to form a core-shell structure with Fe_3O_4 , the Na_2SiO_3 was neutralized with aq. HCl to form silane groups, and the resulting silane groups combined with hydroxyl groups (OH^-) present on the surfaces of the Fe_3O_4 nanoparticles. Then, the Fe_3O_4 nanoparticles and $Fe_3O_4@SiO_2$ composite nanoparticles were characterized by using X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FT-IR), scanning electron microscope (SEM). The SEM and PXRD results show that the synthesized nanocomposite has a semispherical structure with an average particle size of 16-20 nm and excellent magnetization properties (27.9 emu/g). The synthesized $Fe_3O_4@SiO_2$ nanocomposites also aiming to remove methylene blue (MB) from aqueous solution. This adsorbent combined the magnetic property of magnetic Fe_3O_4 with the strong adsorption performance on methylene blue. The adsorbent exhibited a typical superparamagnetic, which could be rapidly separated from aqueous solution under external magnetic field. When the initial concentration of MB was 24 mg/L, the maximum adsorption capacity of methylene blue at room temperature was 30.14 mg/g within 30 s at pH 11.

Keywords: Fe_3O_4 , $Fe_3O_4@SiO_2$, structure, nanocomposite, Microwave, methylene blue.

I. Introduction:

In the recent decan, with the development of industrial production, environmental problems have become one of the one of the most challenges facing mankind in this century. Nowadays, organic dyes are one of the most dangerous and serious environmental pollutants [1]. These dyes and their degradation species are toxic in nature, which are regarded as primary cutthroat for potentially carcinogenic and mutagenic effects on human beings [2-5]. For example, methylene blue (MB), a kind of synthetic basic dye, has been widely applied in textiles, tannery, plastics, paper, and paints [6]. However, MB can cause skin irritation, allergy, eye burns, and cancer in humans owing to its toxicity. Therefore, developing relevant methods and materials to remove MB efficiently have aroused considerable attention in the last few decades [7].

The various traditional methods are removed methylene blue such as chemical oxidation, membrane filtration, electrolysis and photocatalytic degradation. However, the traditional methods' conversion and utilization is endowed with two major technological challenges such as the high cost and strictly operation conditions [8-9]. Compared with other methods, adsorption method is one of the promising approaches due to its high efficiency and economy.

Many of Researcher published their papers on magnetic Fe_3O_4 can be used for wastewater purification, such as to adsorb arsenite, arsenate, chromate, cadmium, nickel. They are also used to alkalinity and hardness removal, desalination, decolorisation of pulp mill effluent and removal of natural organic compounds. After adsorption, Fe_3O_4 can be separated from the medium by a simple magnetic process. Thus, an efficient, economic, scalable, and nontoxic in nature. But however, due to the large surface energy of the magnetic nanoparticles, they may cause aggregation during catalytic reactions. These nanoparticles have another prone to oxidation in the air, which reduces their magnetic properties. Various studies have also proven that the magnetite nanoparticles without modification have low thermal stability, low water solubility. This drawback can be overcome by using stabilizers for nanoparticles to be used as a coating or supported. The main function of these support of coating is to control the particle size, morphology and dispersion of nanoparticles [8-9]. Therefore, Magnetite (Fe_3O_4), they must be functionalized by various polymers [10], silica [11,12], and metals [13].

Various chemical methods including microemulsions [16], sol-gel syntheses [17], sonochemical reactions [18], hydrothermal reactions [19], hydrolysis and thermolysis of precursors have been used to synthesize Fe_3O_4 magnetic nanoparticles. In the specific synthesis of nanosheets, the methods of solvothermal process, solid-state thermal decomposition route, supercritical fluid technique and bottom-up technique have been attempted [20]. These synthesis methods are usually one-step reaction, and the surface modification procedure is incorporated with the synthesis of particles.

Several previous works, prove that the SiO_2 particles have been proven to be able to give protection to Fe_3O_4 , moreover to the high toxicity properties [11,14]. Silicon is a biocompatible and one of the trace element in the human body and has been the subject of important research due to its distinctive structural properties such as large surface area and specific surface area [14]. Silica (SiO_2) is stable in acidic conditions and has hydroxyl groups that bind magnetite to various biological ligands. Silica is non-toxic and used as a vitamin supplement and food additive [15]. To optimize the structure, size and stability of the magnetic pores, the surface must be modified by adding a silica template (SiO_2) so that the size and pore can be more controlled. The combination of Fe_3O_4 and SiO_2 in the nanocomposite system has more advantages such as having biocompatibility, high biostability, and excellent response in catalyst & adsorption. Hence, the selection of synthesis method and the materials for synthesis become difficult to improving the performance of Fe_3O_4/SiO_2 nanocomposites.

The objective of this study, we used microwave assisted solvothermal reduction synthesis method of synthesis of Fe_3O_4 and $Fe_3O_4@SiO_2$ NPs and study their structure by its characterization of using various analytical methods such as X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FT-IR), scanning electron microscope (SEM) and vibrating sample magnetometer (VSM).

In the present work our intended is to develop a simple, rapid and cost-effective method for the surface modification of Fe_2O_3 NPs by mesoporous silica with high specific surface area using an inexpensive source of silica source as sodium meta silicate. In this study, we also study an approach of methylene blue (MB) removal from wastewater using $Fe_3O_4@SiO_2$.

II- Methodology:

2.1 Chemicals-

Ferric chloride hexahydrate ($FeCl_3 \cdot 6H_2O$), ferrous sulfate heptahydrate ($FeSO_4 \cdot 7H_2O$), sodium hydroxide (NaOH), hydrochloric acid (HCl, 34.5 %), and sodium meta silicate (Na_2O_3),

were purchased from sigma-aldrich chemical co. ltd. Ethanol was purchased from Loba chemicals co.ltd. All chemicals mentioned above were of the A.R. Grade and used without further purification. Demineralised water was used in all experiments.

2.2 Synthesis of Fe₃O₄-

Magnetic nanoparticles (Fe-NPs) were prepared by using a method which is slightly modified the solvothermal reduction method [21]. Two solutions were prepared to synthesize the nanoparticles as follows. For solution 1, 5 mM FeSO₄ · 7H₂O (1.39g) were dissolved in 50 mL of distilled water and for solution 2, 10 mM FeCl₃·6H₂O (2.76 g) were dissolved in 50 mL of distilled water. Both solutions 1 and 2 were combined in 250 mL R.B. and then in this solution add 50 mM mercaptoethanol. This mixture placed in micro-oven at 80 °C for 2 min at 560 W power with continuous stirring. The pH of solutions was adjusted to 10 by the dropwise addition of NH₄OH (25%) along with continuous stirring until the solution become black. Then again solution placed in heat in the micro-oven at 80 °C for 2 min at 560 W power. The resulting magnetic NPs was collected using external magnet. After separation, nanoparticles were washed five times with ethanol and then with distilled water, followed by drying overnight in an oven at 80 °C.

2.3 Preparation of sodium silicate solution

The weighed 10 grams of sodium meta silicate (Na₂O₃) and add it into 100 mL of 4M NaOH solution in Conical flask. Then this solution was placed in sonication bath for 20 min make it homogeneous. Then solution is filtered and the filtrate is taken. The resulting filtrate is a sodium silicate solution which is used to make for further.

2.4 Synthesis of core-shell Fe₃O₄@SiO₂ -

Fe₃O₄@SiO₂ core-shell nanoparticle was synthesized by slightly modified Stöber method [22]. 0.2 g Fe₃O₄ NPs and mixture solution containing 80 ml ethanol and 20 ml deionized water were dispersed in an ultrasonic bath for 30 min to make the homogeneous solution. Then, sodium hydroxide (1 mL) and 2% solution of sodium silicate added drop by drop with constant stirring in above dispersion solution of Fe₃O₄ NPs and then this solution was placed microvan at 50 °C for 2 min at 560W Power. Then adjust the pH= 6 of mixture, by using 1 M HCl and the reaction mixture further heated in micro-oven at 50 °C for 10 min at 560W Power. Finally, the resultant Fe₃O₄@SiO₂ was separated by an external magnet, washed three times with distilled water, and dried in an oven at 50 °C.

2.5 Adsorption experiments -

All adsorption experiments were performed in 100 mL of plastic tubes containing 30 mL MB aqueous solution. The amount of Fe₃O₄@ SiO₂ adsorbent was kept at 30 mg. After the solution pH was adjusted with negligible amounts of 0.1 mol/L KOH and HCl solutions to designated values, the suspensions were shaken at 298 K for 3 h. The effect of solution pH on the adsorption of MB was studied in the range of pH 2–11. The adsorption percentages (η%) and adsorption capacity (mg/g) was measured by the amounts of MB adsorbed on Fe₃O₄@SiO₂, which was calculated according to the equation as follows,

$$\eta (\%) = \frac{(C_0 - C_e)}{C_0} \times 100 \% \quad \dots\dots\dots(1)$$

$$q_e = (C_0 - C_e) \times \frac{V}{M} \quad \dots\dots\dots(2)$$

Where V (mL) is the volume of the MB dye, M (g) is the mass of Fe₃O₄@SiO₂, and C₀ (mg/L) and C_e (mg/L) are the initial and the equilibrium concentrations of MB, respectively.

2.5 Characterization Techniques -

The obtained powder samples at were characterized by various sophisticated techniques were for identification of their structure and particle size.

2.5.1 Fourier transform infrared spectroscopy – Fourier transform infrared spectroscopy (FT-IR) spectra were obtained by using the Fourier-transform infrared (FTIR) analysis (Perkin Elmer - Spectrum RX-IFTIR). FT-IR spectra of the particles of samples were recorded by scanning the sample in the range of 400–4500 cm⁻¹.

2.5.2 X-ray diffraction -The structure and phase of silica were examined by X-ray Diffraction (XRD) Cu K-alpha-1 where as nickel metal is used as beta filter with $\lambda = 1.54060 \text{ \AA}$.

2.5.3 Scanning electron microscopy and energy dispersive X-ray analysis –The morphology and elemental analysis of the sample were characterized by using Scanning ElectronMicroscopy (SEM) Carl Zeiss SMT Ltd., Zeiss EVO 18.

III. Results And Discussion:

3.1 Powder X-ray diffraction –

The The crystallinity of the synthesized samples was investigated with X-ray diffraction analysis (XRD). Fig. 1. shown XRD patterns of the Fe₃O₄. Six characteristic peaks at 30,2, 35,5, 43,3, 53,7, 57,2 and 62,9 were corresponding to the (220), (311), (400), (422), (440) &(511) crystal planes of a pure Fe₃O₄ with a spinal structure [17].

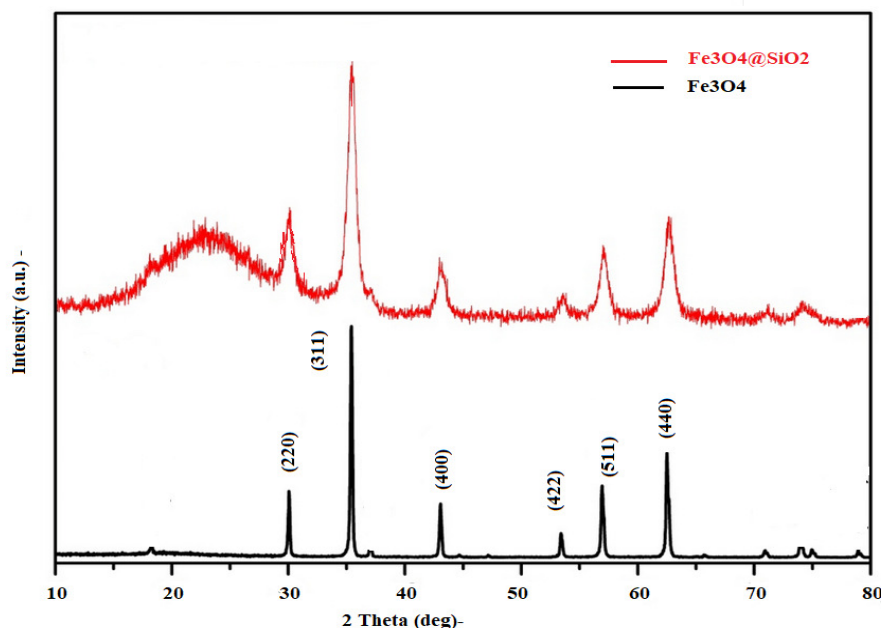


Fig. 1 XRD Pattern for synthesis samples Fe₃O₄ & Fe₃O₄@SiO₂

The peaks indicating that Fe₃O₄ with a spinal structure and no characteristic peak of impurities are detected in the XRD pattern.The highest intensity of diffraction peak (311) was analyzed using the Scherer equation (as shown in Equation 1) generated the particle sizes of 16 nm and 20 nm.

$$D = \frac{K\lambda}{\beta \cos\theta} \text{-----(1)}$$

where variable D is crystal size (nm), K is lattice constant (0.98), λ is wavelength (0.154 nm), β is full width half maximum (FWHM) of the maximum intensity, and θ is Bragg peak angle.

3.2 FT-IR analysis-

FT-IR spectra analysis were used to identify the synthesized structure, and the results are shown in Figure 1. The broad peak at 3424 cm⁻¹ and 1624 cm⁻¹ are assigned to stretching and bending vibrations of the hydroxyl group of water, respectively. The characteristic peak for the vibration mode of the Fe-O bond of Fe₃O₄ is located at 565 cm⁻¹ shown in the fig. 2. By comparing Figure 2, Fe₃O₄ & Fe₃O₄@SiO₂, we can be seen new peak around 1091, 950, and 799cm⁻¹ in the FT-IR spectrum of Fe₃O₄@SiO₂, which is related to asymmetric stretching, symmetric stretching, and vibration modes of Si-O-Si bonds that indicate that the SiO₂ on the surface of Fe₃O₄ nanoparticles[3]

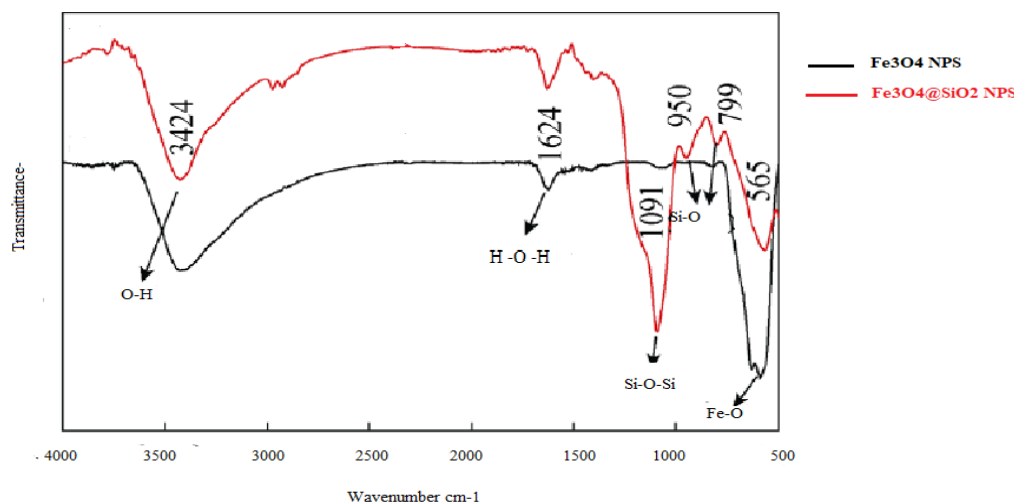


Fig.2 FT-IR spectra analysis

3.3 Surface Morphology (SEM) -

In order to investigate the morphology of prepared material, scanning electron microscopy (SEM) and the FTIR spectrum were employed to observe the surface morphology of Fe₃O₄, Fe₃O₄@SiO₂ NPS as shown in Figure 3. Based on the observation from SEM micrographs Fe₃O₄, Fe₃O₄@SiO₂ particles composed of small particle. A. shown the SEM image, the Fe₃O₄ nanoparticles were spherical, regular in shape, and uniform in size. The Fe₃O₄ nanoparticles were found to be approximately 16 nm in size, which was consistent with the results from the Scherrer equation based on the XRD data. Comparing Figs. 3(A)–(B), it is obvious that the Fe₃O₄ particles were coated with SiO₂, as verified by FTIR analyses described in subsequent sections. The control of the monodisperse size is very important because the properties of nano crystal strongly depend upon the dimension of nanoparticles [24].

3.4 Magnetic properties –

A vibrating sample magnetometer (VSM) were used to investigate the magnetic properties of synthesized materials. As shown in Figure 4, magnetic hysteresis loops do not show obvious remanence or coercivity at room temperature, indicating that all samples Fe₃O₄ & Fe₃O₄@SiO₂ have superparamagnetic properties. The magnetic saturation values (M_s) of Fe₃O₄ & Fe₃O₄@SiO₂ were 58.7, 27.9 emu/g, respectively. They decrease in the magnetic saturation values (M_s) value after coating confirms that it has been done successfully [23]. Fig.4, shows the VSM measurements for analysing changes in magnetization caused by formation of the SiO₂ layer on the surfaces of the Fe₃O₄ nanoparticles.

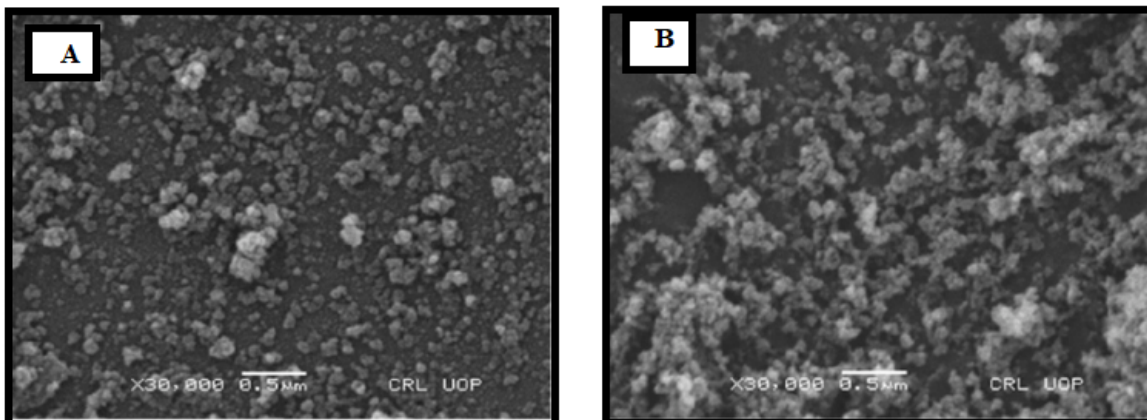


Fig.3 SEM micrograph of Fe₃O₄ nanoparticles (A) and Fe₃O₄@ SiO₂ nanocomposites (B)

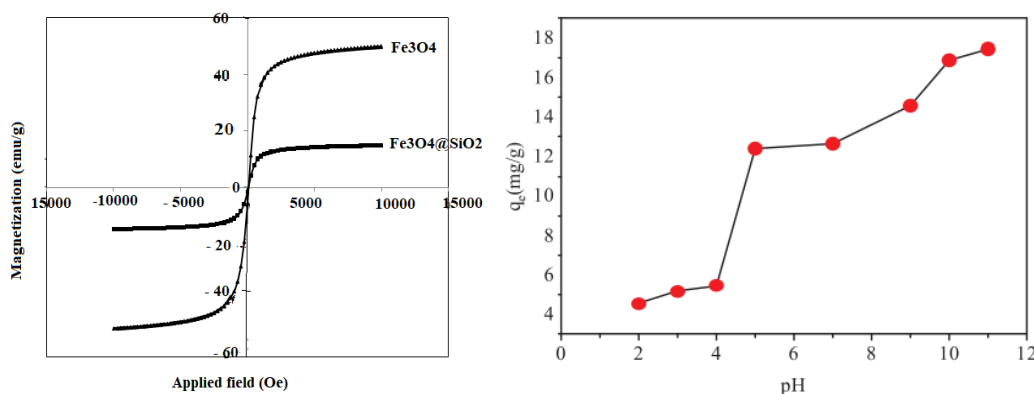


Fig. 4 Room temperature hysteresis loops and Fig. 5 Effect of initial solution pH on the adsorption of MB by Fe₃O₄@SiO₂, initial = 15 mg L⁻¹ .at T = 298 K,

3.5 Effect of pH on the adsorption-

The effect of pH on the adsorption of MB on the prepared Fe₃O₄@SiO₂- was investigated in the pH range of 2–11. The pH values were adjusted by HCl (0.1 mol/L) and NaOH (0.1 mol/L). As can be seen from Fig. 6, the adsorption capacity and dye removal rate increased with the increase of pH values from 2 to 11. The variation tendency is governed by the electrostatic attraction between the MB and the surface charge of Fe₃O₄@SiO₂ R-spheres [24]. MB is a cationic dye, which exists in solution in the form of positively charged ions due to a large amount of H⁺ at low pH values. The amino group and sulfonic acid group on the sorbent have an electrostatic repulsion force to the MB cations, therefore resulting in a low adsorption capacity. As the pH increases, the amino group and sulfonic acid group are deprotonated, and the electrostatic attraction between the Fe₃O₄@ SiO₂-CR and MB becomes stronger. The adsorption capacity suddenly increases at pH 5 may be due to the relatively weak protonation of amino and sulfonate, and the enhanced electrostatic adsorption. In addition, such as hydrogen bonding, van der Waals interaction as well as physical sorption had important impacts in the adsorption. Therefore, the adsorption capacity of MB on Fe₃O₄@SiO₂ can be improved at high pH and reached the best with strong alkali solution.

IV. Conclusion:

Fe₃O₄@SiO₂ core-shell magnetic composite nanoparticles were prepared successfully by a cost-effective one-pot microwave assisted hydrothermal process. The Fe₃O₄ magnetic particles

were approximately 16 nm in size, and the SiO₂ coating was approximately 4 nm thick. Based on the SEM results, the Fe₃O₄ was spherical, regular in shape, and uniform in size, and the SiO₂ coating layer was uniform. The saturation magnetization of the Fe₃O₄ nanoparticles was 58.7 emu/g, while that of the Fe₃O₄@SiO₂ composite nanoparticles was 27.9 emu/g. This difference could be attributed to the SiO₂ coated layer.

In this study, magnetic composites Fe₃O₄@SiO₂ were successfully synthesized as a novel adsorbent and applied to remove MB from wastewater. The excellent adsorption performance can be attributed to the strong electrostatic interactions between MB and Fe₃O₄@SiO₂. Besides, the adsorption of MB on Fe₃O₄@SiO₂ is also strongly dependent on solution pH. Fe₃O₄@SiO₂ nanospheres can be quickly and easily separated by magnetic separation from MB solutions. Therefore, the prepared Fe₃O₄@SiO₂ magnetic nanospheres can be potentially used as a highly effective material for the removal of MB from organic contaminated wastewater.

References :

1. L. Zhou, C. Gao, W. Xu, Magnetic dendritic materials for highly efficient adsorption of dyes and drugs, *ACS Appl. Mater. Interfaces* 2 (2010) 1483–1491.
2. L. Zhang, H. Zhang, W. Guo, Y. Tian, Removal of malachite green and crystal violet cationic dyes from aqueous solution using activated sintering process red mud, *Appl. Clay Sci.* 93–94 (2014) 85–93.
3. S. Liu, Y. Ding, P. Li, K. Diao, X. Tan, F. Lei, Y. Zhan, Q. Li, B. Huang, Z. Huang, Adsorption of the anionic dye congo red from aqueous solution onto natural zeolites modified with N,N-dimethyl dehydroabietylamine oxide, *Chem. Eng. J.* 248 (2014) 135–144.
4. Z. Zhou, R. Liu, Fe₃O₄@polydopamine and derived Fe₃O₄@carbon core-shell nanoparticles: comparison in adsorption for cationic and anionic dyes, *Colloids Surf.* N.O. Mahmoodi, A. Ghavidast, S. Mirkhaef, M.A. Zanjanchi, Photochromism of azobenzene-thiol-1,3-diazabicyclo-[3.1.0]hex-3-ene on silver nanoparticles, *Dyes Pigm.* 118 (2015) 110–117.
5. J. Gao, W. Wei, M. Shi, H. Han, J. Lu, J. Xie, A controlled solvothermal approach to synthesize anocrystalline iron oxide for congo red adsorptive removal from aqueous solutions, *J. Mater. Sci.* 51 (2016) 4481–4494.
6. B. Yu, X. Zhang, J. Xie, R. Wu, X. Liu, H. Li, F. Chen, H. Yang, Z. Ming, S.-T. Yang, Magnetic graphene sponge for the removal of methylene blue, *Appl. Surf. Sci.* 351 (2015) 765–771.
7. A.R. Khataee, Photocatalytic removal of C.I. Basic Red 46 on immobilized TiO₂ nanoparticles: artificial neural network modelling, *Environ. Technol.* 30 (2009) 1155–1168. J. Chen, J. Feng, W. Yan, Influence of metal oxides on the adsorption characteristics of PPy/metal oxides for Methylene Blue, *J. Colloid Interface Sci.* 475 (2016) 26–35.
8. Nourafkan E, Asachi M, Gao H, Raza G and Wen D 2017 Synthesis of stable iron oxidenanoparticle dispersions in high ionic media *J. Ind. Eng. Chem.* 50 57

9. Baipaywad P, Kim Y, Wi J-S, Paik T and Park H 2017 Size-Controlled Synthesis, Characterization, and Cytotoxicity Study of Monodisperse Poly(dimethylsiloxane) Nanoparticles *J. Ind. Eng. Chem.* 53 177–8
10. Khalkhali, M.; Rostamizadeh, K.; Sadighian, S.; Khoeini, F.; Naghibi, M.; Hamidi, M. The impact of polymer coatings on magnetite nanoparticles performance as MRI contrast agents: a comparative study. *DARU Journal of Pharmaceutical Sciences* 2015, 23, 1-12, <https://doi.org/10.1186/s40199-015-0124-7>.
11. Ji, Y.; Song, S.; Li, X.; Lv, R.; Wu, L.; Wang, H.; Cao, M. Facile fabrication of nanocarriers with yolk-shell mesoporous silica nanoparticles for effective drug delivery. *Journal of Drug Delivery Science and Technology* 2021, 63, 102531, <https://doi.org/10.1016/j.jddst.2021.102531>.
12. Beagan, A.M.; Alghamdi, A.A.; Lahmadi, S.S.; Halwani, M.A.; Almeataq, M.S.; Alhazaa, A.N.; Alotaibi, K.M.; Alswieleh, A.M. Folic acid-terminated poly (2-diethyl amino ethyl methacrylate) brush-gated magnetic mesoporous nanoparticles as a smart drug delivery system. *Polymers* 2021, 13, 59, <https://doi.org/10.3390/polym13010059>
13. Qiu, H.; Cui, B.; Li, G.; Yang, J.; Peng, H.; Wang, Y.; Li, N.; Gao, R.; Chang, Z.; Wang, Y. Novel Fe₃O₄@ ZnO@ mSiO₂ nanocarrier for targeted drug delivery and controllable release with microwave irradiation. *The Journal of Physical Chemistry C* 2014, 118, 14929-14, <https://doi.org/10.1021/jp502820r>.
14. Karimi, B.; Emadi, S.; Safari, A.A.; Kermanian, M. Immobilization, stability and enzymatic activity of albumin and trypsin adsorbed onto nanostructured mesoporous SBA-15 with compatible pore sizes. *RSC Advances* 2014, 4, 4387-4394, <http://doi.org/10.1039/c3ra46002a>.
15. Shao, H.; Qi, J.; Lin, T.; Zhou, Y. Preparation and Characterization of Fe₃O₄@ SiO₂@ NMDP core-shell structure composite magnetic nanoparticles. *Ceramics International* 2018, 44, 2255-2260, <http://doi.org/10.1016/j.ceramint.2017.10.184>.
16. Chin, A. B. & Yaacob, I. I. Synthesis and characterization of magnetic iron oxide nanoparticles via w/o microemulsion and Massart's procedure. *J. Mater. Process. Technol.* 191, 235–237 (2007).
17. Alborno, C. & Jacobo, S. E. Preparation of a biocompatible magnetic film from an aqueous ferrofluid. *J. Magn. Magn. Mater.* 305, 12–15 (2006).
18. Hee Kim, E., Sook Lee, H., Kook Kwak, B. & Kim, B.-K. Synthesis of ferrofluid with magnetic nanoparticles by sonochemical method for MRI contrast agent. *J. Magn. Magn. Mater.* 289, 328–330 (2005)
19. Wan, J., Chen, X., Wang, Z., Yang, X. & Qian, Y. A soft-template-assisted hydrothermal approach to single-crystal Fe₃O₄ nanorods. *J. Cryst. Growth* 276, 571–576 (2005).
20. Lin Zhuang, Wei Zhang, Preparation and Characterization of Fe₃O₄ Particles with Novel Nanosheets Morphology and Magnetochromatic Property by a Modified Solvothermal Method, *J. Cryst. Growth* 572, 571–576 (2020).
21. Shah, K.H.; Ali, S.; Shah, F.; Waseem, M.; Ismail, B.; Khan, R.A.; Khan, A.M.; Khan, A.R. Magnetic oxide nanoparticles (Fe₃O₄) impregnated bentonite clay as a potential adsorbent for Cr(III) adsorption. *Mater. Res. Express* 2018, 5, 096102.

22. Stöber, W.; Fink, A.; Bohn, E. Controlled growth of monodisperse silica spheres in the micron size range. *Journal of colloid and interface science* 1968, 26, 62-69, [https://doi.org/10.1016/0021-9797\(68\)90272-5](https://doi.org/10.1016/0021-9797(68)90272-5).
23. Hajizadeh, Z.; Valadi, K.; Taheri-Ledari, R.; Maleki, A. Convenient Cr (VI) removal from aqueous samples: executed by a promising clay-based catalytic system, magnetized by Fe₃O₄ nanoparticles and functionalized with humic acid. *Chemistry Select* 2020, 5, 2441-2448, <https://doi.org/10.1002/slct.201904672>.
24. L. Sophie, F. Delphine, P. Marc, R. Alain, R. Caroline, V. E. Luce, and N. M. Robert, "Magnetic iron oxide nanoparticles: synthesis, stabilization, vectorization, physicochemical characterization, and biological applications," *Chem. Rev.*, vol. 108, pp.2064-2110, 2008



A Study on Ethnobotanical Resources of Jaunsar Bawar Region of Garhwal, Uttarakhand

****Singh, S¹., Harashawaradhana²., Singh, S.K³., Guleri, S¹.**

School of Basic and Applied Sciences, Shri Guru Ram Rai University, Dehradun-248001,
Uttarakhand, India

Anthropological Survey of India, North West Regional Centre 192/1 Kaulagarh Road Dehradun-
248195

Botanical Survey of India NRC, 192 Kaulagarh Road Dehradun-248195

Abstract:

*Ethnobotanical resources are the indigenous knowledge of people about plants and medicine. Ethnography is the study of human society while botany refers to the study of flora or plants. The study area which is the Jaunsar Bawar region, houses two primitive groups of people – the Garhwalis and the Jaunsaries who still follow their traditional system of medicine extracted from plants. The Jaunsar Bawar is a hilly region in Garhwal division of Uttarakhand in northern India located in the north-western part of Dehradun district. The methods used in this ethnobotanical research work are pre-structured interview schedule of the local healers and elderly people who has a better knowledge and experience about herbal medicines for the treatment of various illnesses. This research work took approximately five months of field work. It is known from the societies living in surrounding that the indigenous people majorly use the ethnobotanical species such as *Anogeissus latifolia*, *Terminilia* species, *Lanneacoromandelica*, *Anogeissus latifolia* and *Adina cordifolia* that surrounds the Jaunsar Bawar region. A few samples of these plant species were also sent for scientific examination. The traditional knowledge of herbal medicine of these primitive groups of people may be scientifically validated with Ayurveda through phytochemical analysis.*

Keywords: Ethnobotany, Jaunsar Bawar, Primitive, Herbal Medicine, Garhwalis, Jaunsaries.

Introduction :

India is known for its rich heritage of the knowledge of natural products, particularly of its herbal medicine. Indian people are using medicinal plants from prehistoric period.^{1,6} Tribal, living mostly in the remote forest areas, still depend to a great extent on the indigenous system of medicine. Indigenous healing practices have been culturally accepted during all phases of human culture and environmental evolution. About 85% of traditional medicines are plant derived.^{2,5} Medicinal plants have a long-standing history in many indigenous communities, and are an integral part for treating various diseases, particularly to cure daily ailments, and this practice of traditional medicine is based on hundreds of years of belief and observations. With enormously diversified ethnic groups and rich biological resources, India represents one of the great emporia of ethno-botanical wealth.^{3,4} Nothing is more fundamental to human life than health (Strange), good physical and mental health helps a man go to the top or his or her destination very easily. But if any problem arises, physically or mentally then survive within the environment become effected. 'Health is the level of functional and metabolic efficiency of a living organism'. The WHO defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". Cited^{7,8}

Different types of tree or plant parts like bark, leaves, roots etc. as well as shrub also they have been used to made their herbal remedies for their treatment. Even now days sometribral groups are using ethno-medicinal practices for their treatment. As we all know that tribes are mainly depending on their natural resources and they also worship nature. Now days they always try not to use modern medicine for their minor ailments. The present study 'Ethno-medicinal practices among people of Jaunsar Bawar Region of Dehradun district of UttaraKhand. The livelihood of people in area is mainly depends upon forest collection and trading. They are very hard working and as a result mostly of the adult family members have been suffering from different types of fever and body pain. The most interesting thing is that; to heal this problem they do not go to hospital or any modern health care practitioners. When they cannot tolerate the pain then few of them take ethno-medicines to cure the problem and others go to near modern medicinal practitioners. However, when serious problems like breathiness, chest pain etc has been appeared then they must go to hospitals to getting the health facilities.

The primary objective of the present study is to find out the use of ethno-medicinal practices among people of the Jaunsar Bawar Region of Dehradun district of UttaraKhand. Apart from this the present study also try to find out different types ethno-medicinal herbs and systems among the studied people and area.

Materials And Methods :

The present study is a cross-sectional study. And the study has been done among people of Jaunsar-Bawar Region of the Dehradun district of UttarKhand. Field work have been carried out in the area for around six months in three phases in different seasons to encounter different medicines for different health problems. Pre-structured interview schedule has been used to collect the primary data. Face to face interview of local healers, patients and senior members of society have been carried out. To verify the data some, focus group discussions also made of local healers, older male and older women groups. The primary data have been classified and systematised with their botanical name with consultation of Botanists. Further data is classified as medicines using for communicable and non-communicable diseases.

Results And Discussion:

Different type of morbidity and it's healing process are presented below:

Viral disease:

For cough and cold, symptoms of the disease were watering from nose and cough. Causes of the disease were weather change and cold. Treatment was as follows- (a) traditional treatment- leaf, root and bark of Abiespindrow Royale, Abrusprecatorius L., and Acacia catechuWilld.bark of the Totla tree. They used the bark of this tree by boiling with water, and eat biscuits; (b) modern treatment was using antibiotic, antacid, syrup, and antihistamine.

Fever :

Local name was Bukhar. Symptoms of the disease were high temperature, headache, and body ache. Causes of the disease were weather change, cold, and hard working. Treatment of the disease was as follows: (a) traditional treatment was they used the leaf, root, flower of the Justiciaadhatoda L. and leaf and stem of NernerisasiaticaRoxb. Ex DC.Extract of neem leaves, and use the bark of deshim tree, and chewed the root of ultekhara tree, eat honey, use a piece of wet clothes on the forehead, and use jadibuti; (b) modern treatment was using antibiotic (tablets- Amoxyclav, Liff laxi, PPI, paracetamol, vitamins, ORS, azithromycene).

Pain in abdomen :

Local name was pet dard. Symptoms of the disease was heavy pain in abdomen. Causes of the disease were polluted water, unhygienic conditions and bad food habit. Total individuals who were suffering from this disease were 14. Treatment followed was- (a) traditional treatment was chewing peyarapata (leaves of guava tree), using mantra andingboiled water; (b) modern treatment was using pain killer (Decolic, Cyclopan), ORS, antacid (Rantac, Pancid, Aciloc).

Headache :

Local Name wasmathadard. Symptoms of the disease was headache and feeling irritated. Causes of the disease was high blood pressure, hard work and cold. (a) Traditional treatment was the leaf, root, stem of VitexnegundoL.consuming cooked sojinaand consume it, use to eat the bark of the lagakomache and arjun tree; (b) modern treatment was using painkiller such as Parasafe, disprins, crocin.

Acidity :

Local name was gas. Symptoms of the disease were pain in abdomen and vomiting. Cause of the disease was wrong food habit. Treatment followed was- (a) traditional treatment was the leaf, stem, fruit, bark and root of Callicarpa Vahl utilising extracts of tree sugarcane, use branches of sandhi tree, extracts of guava leaves, bark of chatuhal tree, mantra, the root of gurjer tree; (b) modern treatment- antacid (PPI, Aciloc 300, Rantac).

Rashes :

Local name of the disease was khujali. Symptom of the disease was rashes on skin. Causes of the disease were water pollution, weather change and uncleaning. Treatment of the disease was- (a) traditional treatment- use the leaf, bark, seed, flower and fruit of the herb, Cannabis sativa L. extract of neem, ambashi, toltla, dunche, vutta tree; (b) modern treatment was using B-tex, lifeboy, amoxyclave, Amaxycol, Azythromycal, flouconazole, antihistamine, BB lotion and Detol.

Chest Pain :

Local name was chhatidard. Symptom of the disease was pain in chest. Causes of the disease were hard work, acidity, cough, and heart disease. Treatment followed was (a) traditional treatment was chewing brikhma and punga flowers; (b) modern treatment was using pain killer, antacid and use few other medicines after pathological test.

Foot pain :

Local name was pairdard. Symptoms of the diseases were pain in foot, and swelling in pain. Cause of the disease was hard work. Treatment followed was- (a) traditional treatment was oiling on foot, one type of jadibuti (Cinnabar, china rose, incense, clove, oil, half boiled rice binding with white string); (b) modern treatment was using Moov, pain killer.

Pulmonary obstructive disease:

Local name was sans samasya. Symptoms of the disease was shortness of breath. Causes of the disease were cold, dust and weather change. Treatment followed was- (a) traditional treatment was chewing the roots of ultekhara tree, the bark of gamari tree, using the root of beetle nut tree; (b) modern treatment was using Vetolin HFA, ProAir HFA.

Pain in back :

Local name was pith dard. Symptoms of the disease were pain in mid-section, problem in up down movements. Cause of the disease was hard work. Treatment followed was- (a) traditional treatment was giving massage with oil, and mantra, one type of jadibuti (Cinnabar,

china rose, incense, clove, oil, half boiled rice binding with white string); (b) modern treatment was using Moov and pain killer.

Pain in waist :

Local name was kamardard. Symptoms of the disease was pain in mid-section and problem in up down movements. Cause of the disease was hard work. Treatment of the disease followed was- (a) traditional treatment was giving massage with oil, and mantra, one type of jadibuti (Cinnabar, china rose, incense, clove, oil, half boiled rice binding with white string); (b) modern treatment followed was using Moov and pain killer.

Eye Problem :

Local name was najarkisamasya. Symptoms of the disease was pain in eye and vision problem. Cause of the disease was aging. Treatment given was- (a) traditional treatment– they do not use any traditional healing process; (b) modern treatment was using various eye drop.

Decrease of blood cells :

Local name was khunki kami. Symptoms of the disease were fading skin color, weakness, white eye colour and migraine. Cause of the disease was improper food habits. Treatment was- (a) traditional treatment used was marusai and rai leaves as a vegetable, and use to eat fishes, and meat; (b) modern treatment followed was using iron tablet and folic acid tablet.

Liver problem :

Local name was libharkisamasya. Symptoms of the disease was loss of appetite, weakness, reddish eye and stool problem. Cause of the disease was bad food habit, hard work and using polluted water. Treatment followed was- (a) traditional treatment was using- extracts of lauribedh tree, root of beetle nut tree, extract of sugarcane, branch of sandhi tree, boiled papaya, use tika (give them one type of chemical, which can make a mark on their forehead) on their forehead; (b) modern treatment was using poyratynimide and injection of streptomycine.

Tumor:

Local name was massa. Symptoms of the disease was lump on body parts pain. Cause of the disease was nil. Treatment was as followed: (a) traditional treatment was using jarivuti and mantras; (b) modern treatment was operation.

Tooth pain :

Local name was dathdard. Symptoms of the disease were pain in teeth, sometime blood appear from tooth. Cause of the disease was over pressure on teeth and something enter into teeth (meat). Treatment was (a) traditional treatment was utilising bark of satankadana and neem trees with honey; (b) modern treatment was using pain killer, antibiotics, and antacid.

Neck Pain :

Local name was gale me dard. Symptom of the disease was pain in neck. Cause of the disease was hard work and bad life style. Treatment used was- (a) traditional treatment was massaging oil on neck; (b) modern treatment was nil.

Rural and tribal people residing in area are having trust on ethno-medicine and sometimes on magico-religious practices. But at present with the pace of civilization these people of the state is continuously face the westernization and as result a huge acculturation in their daily behavioural life takes place. At present most of t people give up their traditional dress and start to wear western dress and blindly follow the western culture to fulfil every need of their life, they also give up their age old traditional medicinal practices which are entirely based on the natural resources. Instead of that they are now mostly depends on the western medicine to treat

their ailments. From the present study it has been observed that only 15 % families still believe on ethno-medicine. And these families practice ethno-medicinal system due to trust on nature. They think nature has all healing power of human's problem. Now the present situation has changed. More than sixty-five percent (65.5%) of families now practice both ethno-medicinal and modern medicinal system. The individuals of these families choose ethno medicine first. After that when ethno-medicine fails to heal the problem then they go for getting treatment from modern medical system. Beside this rest 34.5% families totally depend upon on modern medicinal system. They do not believe in any traditional health care system. Various types of tree barks, roots and leaves has been used to treat the alignment. The traditional medicine practitioners known as Ojha always extend their helping hand to sort out the health problem of the villagers. And the bonding between traditional local healers and villagers is very strong and healers are from the same society.

Conclusion :

Jaunsar- Bawar region is mostly dominated by tribal and rural families. They occupied the region from ancient time and live in symbiosis with nature. Impact of Education in general and medical education in particular is below then the state and national average. Present study reveals this is the basic reason of their belief on traditional medicine. Ethnobotanical medicine using by people in this region needs phytochemical analysis and validity. Further the rich natural resources and their traditional knowledge on herbal medicine may be an asset to the Government of Uttarakhand and AYUSH Department, Ministry of Health and Family Welfare ,Government of India if it will be taken up for scientific and medicinal uses for the region and country.

Acknowledgements :

We would like to express our gratitude to the people of Jaunsar Bawar region. I am thankful to my Ph.D. Guide Dr.SaurabhGuleri and Co-Guide Dr. S.K Singh and Dr.Harashawaradhana

For their valuable guidance and supports.

References :

1. Singh S, Singh U, Lahiri N. Ancient India New Research. Indian Historical Review. 2010;37(1):157- 9.
2. Fransworth NR. Screening plants for new medicines. In: Wilson EO, eds. Biodiversity. Washington DC: National Academy Press; 1988: 83-97.
3. Kala CP. Current status of medicinal plants used by traditional vaidyas in Uttaranchal State of India. Ethnobotany Res and Appl. 2005;3:267-78.
4. Gao L, Wei N, Yang G, Zhang Z, Liu G, Cai C. Ethnomedicine study on traditional medicinal plants in the Wuliang Mountains of Jingdong, Yunnan, China. J EthnobiolEthnomed. 2019;15(1):41.
5. Ghosal PK, Goswami A, Dhara KC, Quintessence of the Conventional Medicines of an endemic tribe Of West Bengal, India. Plant Archives. 2020;20(2) 5277-91.
6. Gohre A, Nienguesse AB, Futuro M, Neinhuis C, Lautenschlager T. Plants from disturbed savannah vegetation and their usage by Bakongo tribes in Uige, Northern Angola. J EthnobiolEthnomed. 2016;12(1):42.
7. Ghosh AB, Banerjee G, Biswas D. Psychiatric Morbidity in A Sub-Himalayan Tribal Community: An epidemiological Study. Indian J Psychiatry. 2004;46(4):324-32.
8. Jain. SP, Sinha. J. Traditional Medicinal practices among the tribal people of Raigarh (Chhatisgarh), India. Indian J of Natural Produ and Resour. 2010;1:109-15.

Study on Measuring The Effectiveness of Online Marketing on Integrated Marketing Communication : A Special Reference to Anand City

Ms. Rina Dave¹ & Dr. Ajay Soni²

1. Assistant Professor, SEMCOM, The CVM University, Vallabh Vidyanagar
2. M. M. Gandhi Arts & Commerce College, Kalol. Dist- Panchmahals

Abstract :

IMC merges various promotional tools and communication / marketing / advertising services and techniques to maximize profit. IMC is ultimately achieved through concise and reliable messaging that fosters familiarity and consumer affinity. In the this research study, Descriptive research is followed. Descriptive research is usually a fact-finding view generalizing a cross - sectional study of current situation. The main goal of descriptive research is to describe any particular event, phenomenon and situations on the basis of observations. Survey for research work was conducted in the Anand city for keeping in mind that online marketing is still a metropolitan phenomenon in the developing country like India. Sample of 200 respondents was selected for survey.

Key Words: Marketing communications, advertising, online marketing

Introductions

Integrated marketing communication (IMC) is an approach used by organizations to brand and to align their communication efforts for objectives accomplishment. The American Association of Advertising Agencies defines IMC as "a concept that recognizes the added value of a comprehensive plan that evaluates the strategic roles of a variety of communication disciplines, and combines these disciplines to provide clarity, consistency and maximum communication impact." The primary objective behind an IMC strategy is to create a unified experience for consumers across different aspects of the marketing mix. As each marketing communication channel works together in unity with the brand's core image and messaging, rather than in isolation.

As per Don Schultz (2008), IMC is a strategic business process used to plan, develop, execute and evaluate coordinated, measurable, persuasive brand communication programmes over time with consumers, customers, prospects, and other targeted, relevant external and internal audiences. The key difference in this definition of IMC from that of simple Marketing Communication is highlighted by use of three words: i) strategic, ii) appraise and iii) quantifiable. In essence, IMC applies use of marketing communication mix in such a way that strategically designed to accomplish organizational objectives, it is used to measure to accountability over marketers and are evaluated over time. These elements are also stressed on by various IMC authors (Schultz, 1996; Duncan & Caywood, 1996), who believe that although the concept of IMC is not new, but the fact that previously marketing communication was not coordinated strategically and strategy is now believed critical, gives this concept a new look. Since the major domains of research topic are – Integrated Marketing Communication & Online Marketing. The review of literature will revolve around these.

Research objectives:

Based on the above research problems, the research objectives are as follows:

- i. To analyze the effectiveness of online marketing as compared to traditional marketing tools.
- ii. To know sources of information for various brands amongst customers of Anand City.
- iii. To find awareness about Internet advertising amongst customers of Anand City

- iv. To find purpose/reasons of using Internet amongst respondents of Anand City
- v. To know customers' perception for online marketing strategies amongst respondents of Anand City.

In the this research study, Descriptive research is followed. Descriptive research is usually a fact-finding view generalizing a cross - sectional study of current situation. The main goal of descriptive research is to describe any particular event, phenomenon and situations on the basis of observations.

In present research study, the required data was collected through Sample survey using structured questionnaire. Since 'Customer`s inclination towards Online marketing' is the core focus of the study, a structured & closed ended questionnaire was prepared for customers only. The questionnaire incorporated questions related to customers' preference for online marketing and other traditional mediums for getting awareness on various brands and making purchase decision.

In the present study, researcher has used published and unpublished sources of secondary data. Secondary data was collected to provide this research paper necessary conceptual clarity. Information related to IMC, online marketing & its implication etc. was collected through various secondary sources such as research journals, reference books, business magazines and content sharing websites.

In present study researcher has used stratified probability sampling with -

- Sample size: 200 (Sample size is selected on the basis of discussion with the research expert)
- Area covered – Anand District
- Sample frame – Households

Data Analysis & Interpretation

In the present study researcher used descriptive statistical tools. Primary data is used while analyzing and drawing inferences.

This part of study is mainly focused on verifying main objectives of study. Researcher used statistical tools like mean, standard deviation and graphs for analysis of primary data.

Profile of Respondents

Survey for research work was conducted in the Anand city for keeping in mind that online marketing is still a metropolitan phenomenon in the developing country like India. Sample of 200 respondents was selected for survey. The questionnaire included a segment on customers profile as a classification of their demographic factors such as gender, age & occupation. During data collection phase, due care was taken in order to make sure that the given questionnaire is completely filled by the respondents.

The detailed respondent profile is as follows:

Table no. 1 Respondent's profile

Age	Occupation				Gender		
	Student	Service	Self Employed	Total	Male	Female	Total
18 to 25	81	0	0	81	38	43	81
25 to 35	19	41	3	63	31	32	63
35 to 45	0	47	9	56	29	27	56
Total	100	88	12	200	98	102	200

From the above table no. 1, Out of 200 respondents - 100 are students out of which 81 are between the age 18 to 25 years & 19 are between the age 25 to 35 years. There are 88 respondents who are jobber out of which 41 are between the age 25 to 35 years & 47 are between the age 35 to 45 years. Also, there are total 12 respondents who are self-employed out of which 3 are between the 25 to 35 years & 9 are between the age 35 to 45 years.

As far as gender wise segmentation is concerned, there are total 98 males out of which 38 are between the age 18 to 25 years, 31 are between the age 25 to 35 years & 29 are between the age 35 to 45 years. And there is total 102 males out of which 43 are between the age 18 to 25 years, 32 are between the age 25 to 35 years & 27 are between the age 35 to 45 years.

The details of responses given regarding the medium to get knowledge are given in the following table.

Table no. 2 Do consumers rely on just one medium to get knowledge about any brand?

Particulars	Frequency	Percent
No	82	41.0
Somewhat	47	23.5
Yes	71	35.5
Total	200	100.0

From table no.2, it is observed that when respondents were asked if they rely on just one medium to get knowledge about any brand; 41% have given negative response, 35.5% respondents have given complete positive response while only, 23.5% responded that they rely partially.

Table no. 3 Sources of awareness for various brands

Sources of awareness	Frequency	Percent
Print ads	22	11.0
Television commercials	53	26.5
In-store promotion	37	18.5
Outdoor media	18	9.0
Online media	70	35.0
Total	200	100.0

From table no. 3, it is observed that when respondents were asked about through which source do, they refer the most to get information about various brands; 11% have chosen print ads, 26.5% respondents have chosen Television commercial, 18.5% have chosen In-store promotion, Only 9 % have chosen Outdoor media, 35 % respondents have chosen Online media, which is the higher of all.

Table no. 4 Details for information and time spend to take purchase of any commodity

	Do not require much information to take purchase decision		Do not prefer to spend much of my time in purchase of any commodity	
	Frequency	Percent	Frequency	Percent
Strongly disagree	33	16.5	27	13.5
Disagree	80	40.0	38	19.0
No opinion	36	18.0	34	17.0
Agree	28	14.0	68	34.0
Strongly agree	23	11.5	33	16.5
Total	200	100.0	200	100.0

From table no.4, it is observed that when respondents were first asked whether they require much information to take purchase decision; secondly whether they spend much time for purchasing any commodity; 16.5% respondents shown strong disagreement to the first question and 13.5% to second question, whereas 40% respondents were disagreeing to the first question and 19% to second question. Considering data of complete sample of all respondents' descriptive statistics parameter scores are calculated and tabulated below.

Table no. 5 Descriptive statistic scores for information and time spend to take purchase of any commodity

Parameter	Do not require much information to take purchase decision	Do not prefer to spend much of my time in purchase of any commodity
Mean	2.6400	3.2100
Median	2.0000	4.0000
Mode	2.00	4.00
Std. Deviation	1.24020	1.30168

From table no. 5, it is observed that

1. Mean value scores for parameter much information to take purchase decision is not required is 2.64 which indicates respondent disagreement. It means they really required much information to take purchase decision. Median and mode values are equal to 2 also support this result.
2. Mean value scores for parameter much time is required to spend to take purchase of any commodity is 3.21 which indicates respondent agreement. It means they do not prefer to spend much of their time in purchase of any commodity.

Importance of Online advertising in changing market scenario:

Online Marketing refers to a set of powerful tools and methodologies used for promoting products and services through the internet. It connects organizations with qualified potential customers and takes business development to a much higher level than traditional marketing.

Knowledge about the use of internet:

Today, Internet is one of the most important parts of our daily lives. There are large numbers of activities that can be done using internet and so it is very important. Most of the traditional communication media including telephone, music, film, and television are being reshaped or redefined by the internet.

To understand whether respondents are convergent with the use of Internet; they were asked about their knowledge about use if internet. The details of which are tabulated below.

Table no. 6 Knowledge about the use of internet

Code	Response	Frequency	Percent
1	Not knowledgeable about	14	7.0
2	Somewhat knowledgeable about	28	14.0
3	Knowledgeable about	67	33.5
4	Very well knowledgeable about	91	45.5
	Total	200	100.0

Interpretation:

From table no. 6, it is observed that 7% were not knowledgeable about internet and 14% were somewhat knowledgeable about internet.

It means major percentage of respondents is very well knowledgeable about internet. They are well aware with various usage, functions and benefits being offered by internet. While out of 200 respondents, only few i.e., 7% were not aware about internet. So, it reveals that there is high degree of knowledge for internet usage.

Frequency of being online:

Table no. 7 Descriptive statistic scores for knowledge about the use of internet and frequency of being online

	Are you convergent with the use of Internet?	Frequency of being online
Mean	3.1750	3.5650
Median	3.0000	4.0000
Mode	4.00	4.00
Std. Deviation	.92120	1.23832

From table no. 7, it is observed that Mean value scores for parameter their convergence with internet is 3.17 which indicates respondent agreement of being convergent with internet.

Hence, most of the consumers are well versed with the usefulness of internet and they actually make maximum utilization of the various functions served by internet and therefore their tendency of being online is high.

Purpose for using Internet:

To understand the real purpose for using internet respondents were asked to ranking each purpose between the scales of 1 to 5, where 1 is the most important and 5 is least important. The details are tabulated in the following table.

Table no. 8 Purpose for using internet

	Social networks		Media sharing sites		Blogs		Podcasts & RSS		Collaborative websites		Other content sharing websites		Online shopping	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Most important	73	36.5	50	25	26	13	33	16.5	32	16.0	43	21.5	60	30.0
2.00	65	32.5	48	24	42	21	32	16.0	43	21.5	43	21.5	42	21.0
3.00	20	10	22	11	45	22.5	25	12.5	25	12.5	29	14.5	21	10.5
4.00	20	10	34	17	40	20	47	23.5	38	19.0	37	18.5	40	20.0
Least important	22	11	46	23	47	23.5	63	31.5	62	31.0	48	24.0	37	18.5
Total	200	100	200	100	200	100	200	100	200	100	200	100	200	100

From table no. 8, it is observed that Social networks are considered most important 36.5% respondents and least important by 11% respondents, Media sharing sites are considered most important 25% respondents and least important by 23% respondents.

It means that Social networking is the foremost purpose for which majority of respondents use internet. Certain social networking sites such as Facebook, Orkut, LinkedIn etc. have become popular in recent times, used to share the personal & professional views with known and unknown people who can be found out through these sites. After Social networking, second preference given to the online shopping. It allows flexibility to the consumers to view a

wide range of products & brands, evaluate them online by reading their features and making an online purchase. Media sharing is at third place. It allows them to share media material such as photos, music, video, news etc.

To analyze in detailed, some important statistics (parameter) were calculated, and the results of analysis are tabulated below.

Table no. 9 Descriptive statistic scores Purpose for using internet

	Social networks	Media sharing sites	Blogs	Podcasts & RSS	Collaborative websites	Other content sharing websites	Online shopping
N	200	200	200	200	200	200	200
Median	2.00	3.00	3.00	4.00	3.50	3.00	2.00
Mode	1.00	1.00	5.00	5.00	5.00	5.00	1.00

Hence, respondents strongly feel that the most important activities to be done through internet are social networking as it connects them with others, online shopping as it offers them convenience of shopping and media sharing site as it allows them to download their favorite enticing material such as songs, video, games etc.

Use of online activities by companies in their marketing efforts:

Online advertising is geared towards defining markets through unique and useful applications. Having an online presence will first bring their business to the potential customer's attention. If online presence is complete with positive reviews and a professionally updated website; customers will see the reputation of the brand and will be more likely to choose those brands. To analyze in detailed respondents were asked to give their view on agreement scale considering two different attributes.

Table no.10 Do companies include online activities in their marketing strategy?

Code	Response	Frequency	Percent
1	Strongly disagree	32	16.0
2	Disagree	41	20.5
3	No opinion	22	11.0
4	Agree	43	21.5
5	Strongly agree	62	31.0
	Total	200	100.0

From table no. 10, it is observed that when respondents were asked whether companies should use online activities in marketing efforts; 16% were strongly disagreed, 20.5% shown disagreement and 21.5% shown agreement whereas 31% were strongly agreed.

It means majority of respondents are completely agreed that companies should use online activities in their marketing efforts. Since online activities facilitate good access and higher reach to the customers; companies must take this advantage by incorporating online advertising in their marketing strategy.

Hence, consumers are with the strong opinion that companies use online activities to spread awareness & sell their product.

Table no. 11 Importance of factors motivating respondents to like the brand on internet

	Discount		Stay informed about the activities of company		Get updates on brands and its future extensions		For fun, entertainment		Get access to the exclusive content		Interaction	
	F	%	F	%	F	%	F	%	F	%	F	%
Most important	49	24.5	52	26.0	36	18.0	33	16.5	53	26.5	48	24.0
Important	66	33.0	52	26.0	49	24.5	56	28.0	59	29.5	61	30.5
Least important	44	22.0	42	21.0	61	30.5	45	22.5	42	21.0	36	18.0
Not important	41	20.5	54	27.0	54	27.0	66	33.0	46	23.0	55	27.5

It means majority of respondents are motivated to use internet as it offers them products at discounted rates, gives access to exclusive content such as specific functional & emotional benefits of the brand and facilitates interaction about the brand directly with the company.

Table no. 12 Preference for the print ads or television commercials

	Frequency	Percent
Strongly disagree	23	11.5
Disagree	41	20.5
No opinion	19	9.5
Agree	79	39.5
Strongly agree	38	19.0
Total	200	100.0

From table no. 12, it is observed that whether they don't prefer the print ads or Television commercials much to get the brand awareness, 11.5% respondents have shown strong, 20.5% respondents were disagreeing and 39.5% respondents were agreed

It means majority of respondents agreed that they do not prefer Television commercials or print ads to get brand related awareness. So, these popular traditional mediums are no longer remained first preference for the consumers to receive ad messages.

Table no. 13 Descriptive statistic scores for Preference for the print ads or television commercials

Parameter	Value
N	200
Mean	3.3400
Median	4.0000
Mode	4.00
Std. Deviation	1.30880

Hence, it reveals that today consumers do rely on print ads television commercials much to get awareness.

Table no. 14 Benefits of online marketing over traditional marketing

	Frequency	Percent
Wide range of information	48	24.0
Ease of shopping	46	23.0
Time saving	31	15.5
Low cost	24	12.0
Interactive medium	51	25.5
Total	200	100.0

From table no. 14, it is observed that 24% of respondents find online marketing advantageous as it offers wide range of information about the brand, 23% of respondents find online marketing advantageous as it offers ease of shopping and 25.5% of respondents find online marketing advantageous as it is an interactive medium.

Table no. 15 Loopholes in online marketing over traditional marketing tools

	Frequency	Percent
More Susceptible	33	16.5
More scope for fraudulent activities	52	26.0
Lack demonstration	40	20.0
Privacy Issue	42	21.0
Often interrupting	33	16.5
Total	200	100.0

From table no. 15, it is observed that 16.5 % of respondents find online marketing is not safe as it is more susceptible, 26% of respondents find online marketing is not safe as there is more scope of fraudulent activities, 20% of respondents find online marketing is not safe as it lacks demonstrations and 21% of respondents find online marketing is not safe as it may result in some serious privacy issues.

Conclusion :

The study concludes that consumers rely upon more than one medium in order to enhance their brand related knowledge. It means that they use the combination of various sources for making final purchase decision. Along with the traditional sources, they heavily rely on modern marketing tool i.e., online advertising.

Consumers do require detailed information about the brand so as to evaluate its strengths & weaknesses; this ample amount of information then saves their time by allowing them to make the purchase decision quickly. This shows that consumers try to get more information before they make purchase. They receive this information through various mediums; so, integration of these mediums is necessary to feed the required information to the customers for brand evaluation which in turns will save consumers' time & efforts while making an actual purchase.

The study also reveals that main reason for growing importance of online marketing is the increasing literacy about internet among people. They have identified that internet is truly advantageous through which they can serve their various purposes mainly social networking, online shopping & media sharing (photo, music, video). This efficacy of internet has intensified their tendency of being online.

Today's consumers strongly feel that every company must use this efficacy to strengthen its marketing efforts. So that they will get motivated to use online

Marketing with the intent of getting access to exclusive content about the brand and getting discount and sharing their feedback about brand with the advertiser.

With the advent of internet technology, consumers' preference towards traditional marketing tools has decreased. Most popular traditional marketing tools are television & print media. The major benefits of online marketing are its capability of interaction between consumers and advertisers followed by availability of wide range of information & ease of shopping. These benefits make online marketing superior than traditional marketing.

But at the same time consumers are susceptible about the user-safety side of internet. They feel that online marketing is unsafe as it may lead to increase in frauds & privacy issue.

Recommendation :

Conclusion given above reveals that consumers use more than one medium to make brand choice, therefore it is recommended that Companies should mix & match various mediums to reach their desired target audience. This will help to spread awareness among them and to influence buyer's behavior thus companies must formulate an effective Integrated Marketing Communication plan where they can combine various tools to grasp maximum prospects.

It is also revealed that consumers have good enough knowledge about internet technology and they are in favor of using online marketing, therefore it is recommended that Every company big or small should grab this advantage and include online marketing in their marketing efforts. Online marketing forms can be mainly web marketing, E-commerce, social media marketing. Consumers find certain benefits in online marketing over traditional marketing; therefore, companies can spend more on online media rather than the traditional tools.

But along with its advantages, online marketing has certain limitations also, limitations like possibility of fraudulent activities or privacy issues are beyond control. Cybercrime cannot be eradicated easily or completely therefore, it is recommended that Companies should not rely entirely on online marketing; they must make it a part of Integrated Marketing Communication strategy. As a result of which limitations of online marketing will be covered as the other mediums will build the required credibility and positive image about the brand. This credibility will generate trust among consumers towards the brand.

The study could be extended; so as to cover all the states of India as the researcher believes that consumer buying behavior w.r.t online marketing may be at the variance in different states.

Bibliography:

- Philip Kotler & Kevin Lane Keller, Marketing Management, New Delhi, Pearson Education, 2006, pg. no. 5372.
- Warren J. Keeyan, Global Marketing Management, USA, Prentice-Hall of India Pvt. Ltd., 2002, pg. no. 33.
- Philip Kotler & Kevin Lane Keller, Marketing Management, New Delhi, Pearson Education, 2006, pg. no. 524.
- Belch, G. E. and Belch, M. A., 2004. Advertising and Promotion – An Integrated Marketing Communications Perspective. 6th ed. New York: TataMcGraw-Hill.5.
- Beard, Fred K., Conflict in the Integrated Marketing Communications Task Group, in Proceedings of the 1993 Conference of the American Academy of Advertising, E. Thorson, Ed., Omnipress, Madison, WI. 1993, pg.no. 21-31.6.
- Abed Abedniya, Sahar Sabbaghi Mahmoudi, The Impact of Social Networking Websites to Facilitate the Effectiveness of Viral Marketing, December 2010, International Journal of Advanced Computer Science and Applications, Vol. 1, No.67.
- Andrea C. Wojnicki, Word-of-Mouth and Word-of-Web: Talking About Products, Talking About Me, 2006, Advances in Consumer Research, Volume 33.

आधुनिक समाज में वृद्धों की समाजिक एवं मानसिक स्थिति का समाजशास्त्रीय अध्ययन

प्रियंका कुमारी

शोधार्थी

एम.ए., एम. फील (समाजशास्त्र)

स्नातकोत्तर समाजशास्त्र विभाग

राँची विश्वविद्यालय, राँची

ई मेल : pandaypriyanka1994@gmail.com

“वृद्धावस्था या बुढ़ापा जीवन की उस अवस्था को कहते हैं जिसमें उम्र मानव जीवन के औसत काल के समीप या उससे अधिक हो जाती है। बुढ़ापा जीवन का अंतिम पड़ाव होता है, इस पड़ाव में आते-आते जीवन अशक्त हो जाता है, वे शारीरिक एवं मानसिक रूप से कमजोर हो जाते हैं। वृद्धों की यह स्थिति उनकी समस्याओं का मुल कारण बन जाती है।

भारतीय परम्परा एवं संस्कृति ने हमेरा बुजुर्गों का सम्मान किया है, जिससे उन्हें समाज में एक सम्मानजनक स्थान मिला है। मनुष्य के औसत जीवन चक्र में वृद्धावस्था या बुढ़ापा सभी समाजों में श्रेष्ठ मानी जाती है, लेकिन किस उम्र में व्यक्ति को वृद्ध माना जाए इस पर एक राय नहीं है। दुनिया के विकसित देशों में जहाँ वृद्ध होने के उम्र का आकलन ६५ वर्ष से अधिक को माना गया है, वहीं दुसरी ओर भारत में इनके उम्रों का आकलन ६० वर्ष के पश्चात् से प्रारंभ कर दी जाती है।

वर्ष १९५१ में वृद्धों की जनसंख्या १.६८ करोड़ थी जो वर्ष २००१ में बढ़कर ७.६ करोड़ हो गई तथा २०११ की नवीनतम जनगणना के अनुसार वृद्धों की आबादी (६० वर्ष से उपर) १०.३८ करोड़ है जो भारत की कुल आबादी का ८.५८ प्रतिशत है। इससे स्पष्ट है कि वृद्ध लोगों की संख्या में निरंतर बढ़ोतरी जारी है।

आज तेजी से बढ़ते आधुनिकीकरण एवं शहरीकरण ने मात्र एक शताब्दी के अंतराल में ही उन्नती कर नई-नई तमाम आवश्यक वस्तुओं की खोज की है जो आज लगभग सारी जरूरत की आवश्यकताओं में शामिल हो चुकी है, आज इनके बिना मानव जीवन की कल्पना करना नामुमकिन है। भोग विलासिता की जीवन जीने की होड़ ने सामाजिक-ताने-बाने को तोड़ कर रख दिया है। युवा अपने परम्परागत कार्य को छोड़कर मशीनीकरण की ओर आसानी से अग्रसरित हो रहे हैं, जिससे उन्हें कहीं भी जाकर रोजगार करना संभव बना दिया है। अंततः संयुक्त परिवार एकल परिवार में परिवर्तित होने को मजबूर हो गए हैं। युवा वर्ग के अपने गांव-शहर छोड़ जाने तथा व्यक्ति अपने बच्चों के पढ़ाई-लिखाई, अच्छी नौकरी हेतु परिवार से अलग होने को बेबस हैं जिसके कारण घरों में वृद्ध अकेले रह गए हैं जिससे उनकी सुरक्षा और गंभीर बन गई है।

आज बुजुर्ग की स्थिति अकल्पनीय है। वृद्धावस्था अभिषाप सदृश होती जा रही है। उनका जीवन यापन बहुत कठिन होता जा रहा है। कोई चलने में असमर्थ तो कोई अपाहिज सदृश बेड को ही अपनी नियति मानकर जीवन निर्वाह कर रहे हैं। अगर किन्हीं का जीवन भौतिक सुख सुविधा से परिपूर्ण हो फिर भी समय किस तरह व्यतीत करें इसकी समस्या उन्हें आहत करती है। जिन बच्चों के लालन-पालन में उनका सारा जीवन व्यतीत हो गया वे बच्चे अपने परिवार में ही व्यस्त हैं। कुछ मजबुरीवश लाचार हैं तो कुछ माता-पिता के कर्तव्यों से विमुख, बेचारे बुजुर्ग सोचते हैं कि कोई उनसे दो बातें कर लें। बेचारे बुजुर्ग उपेक्षित जीवन जी रहे हैं। वे पड़ोस की दया पर निर्भर रहते हैं कि कोई पड़ोसी मित्र आए तो दिन कट जाए। विडम्बना यह है कि न तो वे अपनी स्थिति के विषय में कुछ कह सकते हैं और न तो अपने बच्चों की गलतियों को अनदेखा कर सकते हैं, समाज में वे अपनी संतानों की छवि को कम नहीं करना चाहते

फलतः उन्हें घुट-घुट कर जीवन जीना पड़ता है। आज समाज का रूप परिवर्तित हो रहा है। आजकल बच्चों के पाठ्यक्रमों को भी इतना विस्तारित किया गया है कि उन्हें समय नहीं मिलता कि वे अपने दादी-नानी के पास बैठकर किस्से या कहानियाँ सुन सकें। ऐसी बहुत सारी महत्वपूर्ण बातें जो बुजुर्गों से सीखी जा सकती हैं वे उनसे वंचित रह जाते हैं, जिसके कारण बच्चों में वह गुण नहीं आ पाते। बच्चों को बुजुर्गों के प्रति लगाव भी उतना नहीं हो पाता जिसकी वजह से बुजुर्गों को अकेलापन का एहसास होने लगता है। कभी-कभी स्थिति ऐसी हो जाती है कि बहु-बेटे भी उनसे बात नहीं करते वृद्ध किसी कोने में बैठ कर उपेक्षित जीवन जीने को मजबूर हो जाते हैं। तमाम कठिनाइयों को झेलकर अपना पेट काटकर माँ-बाप अपने बच्चों को बड़ा करते हैं, उन्हें पढ़ा-लिखा कर एक मुकाम दिलाते हैं लेकिन बड़े होकर वहीं बच्चे उनसे विमुख हो जाते हैं। ऐसे किस्से कहानियाँ रोज सुनने को मिलते हैं जब कोई कपुत अपने पिता या माँ को किसी अनाथाश्रम में या कहीं दर-दर भटकने को छोड़ जाता है, बेचारे लाचार दर-दर की ठोकर खाने को मजबूर हो जाते हैं। बच्चों को उंगली पकड़कर चलना सिखाने तथा उन्हें चांद सूरज की संज्ञा देने वाले बुजुर्गों को जब सहारे की बेहद जरूरत होती है, बच्चे उनका हाथ छोड़ जाते हैं।

वस्तुतः वृद्धावस्था अपने आप में एक ऐसी बिमारी है जिससे उबर पाना इस उम्र में संभव नहीं रह पाता है। 'वेद व्यास महाभारत में कहते हैं कि वृद्धावस्था और मृत्यु के वश में पड़े मनुष्य को औषधि मंत्र, होम और जप भी नहीं बचा पाते हैं।'

आज के बुजुर्ग अचानक आए परिवर्तनों को स्वीकार नहीं कर पा रहे हैं। आधुनिकीकरण एवं वैश्वीकरण के कारण मानव का रहन-सहन, खान-पान एवं सोच में बदलाव आ रहे हैं। बुजुर्ग ये चाहते हैं कि उनके बच्चे उसी आदर्श और संस्कारों के साथ चले जैसे पहले हुआ करती थी, उन्हें अपने समय के जीवन मूल्य और आदर्श ही अच्छे लगते हैं, अतः इसके लिए वे नए जमाने और नयी पीढ़ी को दोषी मानते हैं, परन्तु नयी पीढ़ी को उनकी सोच एवं उनके सिद्धान्त नहीं पसंद आते वे उसे नकार देते हैं और पुरानी पीढ़ियों से दूरियाँ बनाने लगते हैं जिससे परिवार में सामंजस्य का अभाव उत्पन्न होने लगता है जो घर के बुजुर्गों के लिए दुखदायी होता है।

पिछले कुछ दशकों में पूरे विश्व में वृद्धों की जनसंख्या तेजी से बढ़ी है। संयुक्त राष्ट्र जनसंख्या कोष का यह आकलन है कि २०५० तक समूचे विश्व में प्रत्येक छः सर्वाधिक बुजुर्गों में से एक भारत का निवासी होगा तथा चीन एकमात्र ऐसा राष्ट्र होगा जहाँ विश्व के सर्वाधिक संख्या में बुजुर्ग लोग जीवन व्यतीत करेंगे। वर्ष २०११ के आवास संबंधी आंकड़ों से यह भी स्पष्ट होता है कि पिछले एक दशक में घरों की संख्या में भारी वृद्धि हुई है, ऐसा समझा जाता है कि आगामी समय में ग्रामीण एवं शहरी क्षेत्रों में निवास कर रहे बुजुर्गों की जीवनयापन व्यवस्थाओं में भारी परिवर्तन आ सकता है। अतः उन्हें विशेष प्रकार का सामाजिक, आर्थिक एवं मनोवैज्ञानिक सहारा देने की आवश्यकता है, जिससे उनकी स्थिति को सुदृढ़ बनाया जा सके। आज हमारे देश में समस्याओं के बढ़ने के अनेक कारण हैं जो समाज की देन हैं, लेकिन जैसे-जैसे आधुनिकीकरण, वैश्वीकरण एवं भौतिकवाद का विकास हुआ वृद्ध लोग उपेक्षा का शिकार होकर समस्याओं से घिर गए उनकी स्थिति दयनीय हो गई। उनकी स्थिति इस प्रकार है-

वृद्धों की सामाजिक स्थिति :

बुजुर्ग हमारे समाज की धरोहर होते हैं, उनका परिवार में होना सिर्फ परिवार के लिए नहीं बल्कि पूरे समाज के लिए जरूरी है। भारतीय संस्कृति एवं परम्परा ने हमेशा बुजुर्गों को सम्मान किया है, जिससे उन्हें समाज में एक सम्मानजनक स्थान मिला है, लेकिन शहरीकरण तथा औद्योगिकरण के परिणामस्वरूप संयुक्त परिवार प्रणाली कमजोर हो गई है। आज संयुक्त परिवार एकाकी परिवार में बंटते जा रहे हैं। घर में वृद्ध बेबस और बेसहारा बच जाते हैं। अकेलेपन की भावना वृद्धजनों में आत्मसम्मान एवं विश्वास की कमी को उत्पन्न करता है। प्रायः ऐसा देखा जाता है, वृद्ध महिलाएँ घर के कामकाज में अपने आपको थोड़ा व्यस्त रखती हैं तथा पुरुष घर के बाहर के कामों में अपने परिवार की सहायता करते हैं, इस सबके बावजूद वृद्धों को परिवार में वह सम्मान नहीं मिलता जिसके वे हकदार होते हैं।

सामाजिक क्षेत्र में जीवन के प्रारंभिक चरण में जब व्यक्ति वयस्क हो जाता है तो उसके कार्य कलापों में वृद्धि हो जाती है, जैसे-विवाह कार्य, परिवार का पालन-पोषण सामाजिक संगठनों में सदस्य बन जाना आदि। इस कार्यकलापों में उनके अडेड होने तक अनुभवों एवं जिम्मेदारियों में बढ़ोतरी होती रहती है, वृद्धावस्था में उनकी भूमिकाएँ या तो समाप्त हो जाती है या तो उनके उत्तरदायित्व शक्ति में कमी आ जाती है। अतः व्यक्ति के वृद्ध होने पर जीवन के सभी क्षेत्रों में उसकी समाज में सामंजस्य स्थापित करने की क्षमता कम हो जाती है। नौकरी या व्यवसाय से मुक्त होने के कारण समाज एवं परिवार में उनका वर्चस्व, मान-सम्मान में कमी होने लगती है जिससे इन्हें अपना जीवन-यापन कठिन लगने लगता है।

कभी-कभी ऐसा देखा जाता है कि बच्चे को अपनी नौकरी या किसी अन्य कारणों से शहर से दूर जाना पड़ता है तथा वे अपने माता-पिता की सेवा करने में असक्षम होते हैं तो उनकी सुरक्षा के लिए उन्हें वृद्धाश्रम भेज देते हैं।

वृद्धों की मानसिक स्थिति :

वृद्धावस्था में शारीरिक बदलाव के अनुसार मानसिक परिवर्तन भी होता है। इस अवस्था के प्रवेश करते ही मानसिक तनाव की स्थिति बनने लगती है तथा लोगों से संपर्क बनाना सहयोगी या मित्रों के निधन हो जाने से मानसिक तनाव उत्पन्न होने लगती है। यह सर्व विदित है कि पति या पत्नी में से किसी एक की मृत्यु हो जाने से हीन भावना की वृद्धि होती है तथा आत्मविश्वास का अभाव दिखने लगता है, जिससे मानसिक विकृत, अकेलापन आदि जैसे दोष निर्माण होते हैं। अतः समाज में वे ज्यादा सहयोग नहीं दे पाते जिससे उनमें निरूपयोगिता की भावना उत्पन्न होने लगती है। परिवार में सामंजस्य की कमी तथा आपसी मतभेद के कारण उनकी मानसिक स्थिति खराब होने लगती है। आर्थिक दृष्टि से सम्पन्न होते हुए भी बहुत से वृद्धजन अकेलेपन के कारण डिप्रेशन का शिकार हो जाते हैं; जिससे उनमें शारीरिक एवं मानसिक रोगों की उत्पत्ति होती है।

बुढ़ापे में उनकी इन्द्रियाँ कमजोर हो जाती है जिससे उनकी आँखों की नजर घट जाना, जोड़ों में दर्द होना, स्वाद और सूँघने की चेतना कम हो जाना तथा सुनने की शक्ति घट जाना आदि रोग से वे पीड़ित हो जाते हैं। उनकी सोचने समझने की शक्ति कम हो जाती है। उन्हें हर समय लगता है सब उनकी उपेक्षा करते हैं और वे अपने आपको बिल्कुल अकेला समझने लगते हैं।

आधुनिकीकरण से पूर्व संयुक्त परिवार ही वृद्धजनों की मानसिक सुरक्षा प्रदान करता था परन्तु अब इसके विघटन के परिणामस्वरूप कोई ऐसा विकल्प उनके सामने नहीं है जो उन्हें संयुक्त परिवार जैसी मानसिक सुरक्षा प्रदान कर सके। अभी हाल ही के अध्ययनों से यह स्पष्ट हुई है कि संयुक्त परिवार में रहने वाले वृद्धजनों में अकेलेपन एवं मानसिक असुरक्षा का एहसास एकाकी परिवार में रह रहे वृद्धजनों के मुकाबले काफी कम हाता है।

वृद्धों के प्रति सरकारी नीति एवं कार्यक्रम %Government Policy and Programe for Eletorly%

सर्वप्रथम संयुक्त राष्ट्र संघ ने १९४८ ई. में वृद्ध आयु अधिकार पर एक घोषणा पत्र तैयार किया जो १९६६ ई. में आम सभा तथा १९७२ ई. में संयुक्त राष्ट्र संघ की आर्थिक एवं सामाजिक कॉन्सिल में रखा गया तथा उस पर विस्तारपूर्वक विचार विमर्श किया गया। १९८२ ई. में Vienna International Plan of Action on Ageing पारित किया गया जिसमें निम्नलिखित सुझाव दिए गए-

१) स्वास्थ्य एवं पोषण २) आर्थिक सुरक्षा ३) सामाजिक सहभागिता ४) आवास एवं पर्यावरण ५) उपभोक्ता एवं संरक्षण ६) अनुसंधान एवं संरक्षण

१९६० ई. में संयुक्त राष्ट्र संघ की आम सभा में ५ अक्टूबर को “वृद्ध लोगों का अधिकार दिवस” मनाने की घोषणा की गई।

१९६१ ई. में संयुक्त राष्ट्र ने वृद्ध लोगों हेतु नियमों पर अपनी मोहर लगाई। जिसमें भोजन, पानी, आवास तथा वस्त्रों तक पहुँच, स्वास्थ्य रक्षा हेतु सामाजिक एवं कानूनी सेवाएँ कार्य हेतु अवसरों की उपलब्धता, सम्मान सुरक्षा एवं बिना शोषण के जीने जैसे अधिकार पर बल दिया गया।

राष्ट्रीय सामाजिक सहायता कार्यक्रम :

इस कार्यक्रम की शुरुआत १५ अगस्त १९६५ को हुई थी यह कार्यक्रम गरीब परिवारों में वृद्धावस्था, जीविकोपार्जन करने वाले मुख्य सदस्य की मृत्यु तथा मातृत्व जैसे स्थिति में लाभ पहुंचाने के लिए सामाजिक सहायता की एक राष्ट्रीय नीति प्रस्तुत करता है। इसके तीन अंग हैं-

- I. राष्ट्रीय वृद्धावस्था पेंशन योजना
- II. राष्ट्रीय परिवार लाभ योजना
- III. राष्ट्रीय मातृत्व लाभ योजना

१९६८ में इन योजनाओं में आंशिक सुधार किया गया जो इस प्रकार है-

इंदिरा गाँधी राष्ट्रीय वृद्धावस्था पेंशन योजना :

- आवेदनकर्ता (पुरुष या महिला) ६० वर्ष या इससे ज्यादा उम्र के हो। पहले उम्र ६५ वर्ष थी, पर जून २०११ में संशोधन कर इसे ६० वर्ष कर दिया गया। इसके अलावा ८० वर्ष से अधिक आयु के वृद्धों को ५०० रु० प्रतिमाह पेंशन प्राप्त होंगे।
- ऐसे आवेदनकर्ता जो अपने जीविकोपार्जन के लिए परिवार या दुसरे पर निर्भर होंगे वे दरिद्र की श्रेणी में आएंगे। केन्द्रीय सहायता के दावे के लिए वृद्धापेंशन की राशि २०० रूपए प्रतिमाह है।
- इस स्कीम की उपर्युक्त शर्तें पूरी करने पर ७५० रूपए प्रतिमाह की राशि उपलब्ध कराई जाती है। झारखण्ड राज्य में कुल ५.६८ लाख लोग वृद्धावस्था पेंशन के अंतर्गत लाभ पाते हैं, जिसमें ३,६६,२३६ व्यक्ति राष्ट्रीय वृद्धावस्था पेंशन के तहत एवं २३१६७१ व्यक्ति राजकीय वृद्धावस्था पेंशन के तहत प्राप्त करते हैं।

वृद्धजनों के लिए राष्ट्रीय नीति %NPOP%

यह नीति जनवरी १९६६ में वृद्धजनों के कल्याण और प्रतिबद्धता सुनिश्चित करने के लिए घोषित की गई।

नई राष्ट्रीय वृद्धजन नीति २०११ में लागू की गई इसका मुख्य उद्देश्य व्यक्ति को स्वयं या अपने सहयोगी के वृद्ध जीवन की तैयारी हेतु प्रोत्साहन देना, गंभीर हालत वाले वृद्ध लोगों के स्वास्थ्य की देखभाल और संरक्षण तथा वृद्धों में ऐसी जागरूकता पैदा करना जिससे वे स्वयं आत्मनिर्भर बन सकें।

राष्ट्रीय वृद्धजन परिषद् %NCOA%

केन्द्र सरकार द्वारा वर्ष २००५ में इसे पुनर्गठन किया गया। जो वृद्धों के बारे में नीतियों और कार्यक्रमों के विकास के लिए सरकार को सलाह और सहायता देती है।

वृद्धों के लिए समन्वित कार्यक्रम :

इस योजना के अंतर्गत गैर-सरकारी संगठनों पंचायती राज संस्थाओं और स्थानीय निकायों को परियोजना लागत की ६० प्रतिशत वित्तीय सहायता दी जाती है। यह सहायता वृद्धाश्रम बनाने और उसकी देखभाल करने, वृद्धों को गैर संस्थागत सेवाएँ उपलब्ध कराने पर व्यय की जाती है।

वृद्धजनों के लिए भारतीय रेल में रियासत :

न्यूनतम ६० वर्ष से अधिक आयु के व्यक्तियों के लिए कुल किराये पर ३० प्रतिशत की छूट तथा महिला वरिष्ठ नागरिकों को ५० प्रतिशत तक की छूट प्रदान की जाती है।

बैंक जमाओं पर अधिक ब्याज : बैंकों में वरिष्ठ नागरिकों को उनके निवेश पर तुलनात्मक रूप से आधे से पौन प्रतिशत अधिक ब्याज दिया जाता है।

वरिष्ठ नागरिक बचत योजना : वरिष्ठ नागरिक बचत योजना पर ब्याज दर ६ फीसदी की होती है। इस योजना में प्रवेश करने की उम्र ६० वर्ष है तथा सेवानिवृत्त रहे व्यक्ति की उम्र ५५ साल या इससे अधिक है।

वरिष्ठ नागरिक अधिनियम २००७ **Senior Citizen Act, 2007**

- आय अथवा अपनी संपत्ति से अपना खर्च उठाने में असक्षम है। माता-पिता अपने बच्चों से रख-रखाव के लिए उचित भोजन, आवास, कपड़े और चिकित्सा, उपचार के व्यय के लिए आवेदन कर सकते हैं।
- संतानहीन वरिष्ठ नागरिक जो ६० वर्ष या इससे अधिक के हैं, वे भी अपने रिश्तेदारों से रख-रखाव का दावा कर सकते हैं जो उनकी संपत्ति पर कब्जा रखते हैं या बाद में इसकी संभावना है।
- रख-रखाव के लिए ट्रिब्यूनल द्वारा अंतरिम मासिक भत्ता, वरिष्ठों की अपेक्षा तथा देखभाल से इंकार किया तो १०,००० रूपए की मासिक भत्ता देने का आदेश का प्रावधान है।
- इसके विरुद्ध जाने पर दोषी व्यक्ति को ३ माह का कैद या ५००० रूपये का जुर्माना अथवा दोनों दण्ड दिया जा सकता है।
- इस अधिनियम में लाभार्थियों के लिए वृद्धाश्रम की स्थापना तथा अस्पतालों में वृद्ध नागरिकों के लिए अलग से सुविधाएँ प्रदान करने का प्रावधान है।
इस प्रकार वृद्धों के सुरक्षा हेतु अनेक नीतियाँ एवं कार्यक्रम चलाए जाते हैं जिससे वृद्धों की स्थिति अधिक से अधिक बेहतर बन सके।

संदर्भ सूची

१. शर्मा, रतन, वरिष्ठजन का समाजशास्त्र, विश्वभारती पब्लिकेशन्स, नई दिल्ली, २०११
२. आहुजा, राम, सामाजिक समस्याएँ, रावत पब्लिकेशन्स, नई दिल्ली, २०१६
३. शर्मा, जी. एल, सामाजिक मुद्दे, रावत पब्लिकेशन्स, नई दिल्ली, २०१५
४. महाजन, धर्मवीर, महाजन, कमलेश, भारतीय समाज : मुद्दे एवं समस्याएँ, विवेक प्रकाशन, जवाहर नगर, दिल्ली, २०१०
५. पंत, जे.सी., जनांकिकी, विशाल पब्लिकेशन्स, जलंधर, २०१२-१३
६. प्रसाद, चन्द्र मौलेश्वर, वृद्धावस्था विमर्श, परिलेख प्रकाशन, नवीजाबाद, २०१६
७. अग्रवाल, गिरिराजशरण, वृद्धावस्था की कहानियाँ, प्रभात प्रकाशन, नई दिल्ली, २००४
८. गुप्ता, एम. एल. एवं शर्मा, डी.डी., भारतीय समाज : मुद्दे एवं समस्याएँ, साहित्य भवन पब्लिकेशन्स, २०१५
९. मीणा, रमेश चन्द, वृद्धों की दुनिया, लता साहित्य सदन गाजियाबाद, २०१५
१०. शर्मा, प्रभुदत्त, वरिष्ठजन के मानवाधिकार, विश्वभारती पब्लिकेशन, २०११

माध्यमिक शिक्षा में सूचना प्रौद्योगिकी की भूमिका का समाजशास्त्रीय अध्ययन

माया कुमारी

पीएच. डी. शोधार्थि, समाजशास्त्र विभाग

रॉची विश्वविद्यालय रॉची

akm08031997@gmail.com

शोध सार

शिक्षा व्यक्ति का मानसिक, सामाजिक, नैतिक चरित्रिक तथा सांस्कृतिक विकास करता है। शिक्षा लोगों की मनोवृत्तियों में परिवर्तण ला कर, उन्हें इस प्रकार के व्यवहार के लिए प्रेरित करती है जो व्यवहार खुलें समाज की विशेषता है।

शिक्षा मानव जीवन की अमूल्य धरोहर है शिक्षा के द्वारा मानव सुसंस्कृत बनाता है शिक्षा मनुष्य की सभी प्रकार की दास्ताओं पर प्रहार करके उसे तार्किक एवं ज्ञान वान बनाती है। शिक्षा व्यक्ति के व्यक्तित्व के सर्वांगीण विकास के लिए अत्यन्त महत्वपूर्ण है। शिक्षा व्यक्ति में आत्मनिर्भरता, स्वात्मता और अधिकार सम्पन्नता की भावना विकसित करती है। इससे व्यक्ति सामाजिक सरोकार पारस्परिक सदभाव और सहनशीलता जैसे गुण प्राप्त कर जीवन मूल्य और शालीनता अपनाने में सफल होता है। शिक्षा से ही मानव की संपूर्ण प्रतिभा योग्यता एवं संभावनाओं का विकास संभव होता है। अशिक्षित व्यक्ति किसी भी समाज के लिए अभिशाप होता है, क्योंकि वह समाज का जिम्मेदार नागरिक नहीं बन सकता है।

शिक्षा का समाजशास्त्रीय परिप्रेक्ष : अलग-अलग विद्वान शिक्षा का आकलन एवं मूल्यांकन अलग-अलग प्रकार से करते हैं। कभी-कभी इनका दृष्टिकोण एक दुसरे के विपरित होता है। फ्रांसीसी समाजशास्त्री एमिल दुर्खीम (१८५८-१९१७) ने शिक्षा को एक विद्या के रूप में स्थापित करने का प्रयास किया। इन्होंने कहा शिक्षा कैसी भी हो, इसे नैतिकता पर जोर देना चाहिए। दुर्खीम के बाद वेबर ने शिक्षा को अपने अध्ययन का केन्द्र बनाया। १९४० के दशक के बाद युरोप और अमेरिका में यह समझा जाने लगा कि विज्ञान तथा प्रौद्योगिकी की शिक्षा प्रदत्त गुणो पर जोर नहीं देती है। जहाँ-जहाँ औद्योगिक समाज में शिक्षा का प्रसार हुआ है वहाँ सामाजिक संस्तरण में बदलाव आया है।

कीवर्ड : आनलाईन लर्निंग, सूचना तकनीकी, कम्प्युटर, माध्यमिक शिक्षा, मोबाइल ।

फ्रांसीसी विद्वान पी. बोरदयू ने कहा है शिक्षा का मुख्य कार्य शासक वर्ग की संस्कृति, अधार्त विचारधारा, मूल्यों एवं हितो का “सांस्कृतिक पूर्णउत्पादन” करना है। प्रभुवर्ग शिक्षा के माध्यम से विशेष प्रकार के अर्थ को लोगों पर थोप देते हैं, उन्हें सही साबित करते हैं।

बोरदयू ने कहा है कि निम्न वर्ग के बच्चे यही समझते हैं कि उन्हें कुछ विशेष हासिल नहीं होना है, इसलिए वे प्रयास ही नहीं करते हैं वे समझते हैं कि चाहे कुछ भी कर ले, बड़ों की सुविधायें उन्हें नहीं मिल सकती है। बोरदयू ने शिक्षा को “सांस्कृतिक पूँजी” का है।

शिक्षा के प्रकार्यात्मक परिप्रेक्ष :

इमाइल दुर्खीम ने कहा है कि शिक्षा समाज की आवश्यकता को पूरा करती है शिक्षा से समाज में एकता, सुदृढ़ता एवं स्थिरता उत्पन्न होती है। शिक्षा से समाज में समरूपता उत्पन्न होती है। स्कूल में बालक निश्चित नियमों के अन्तर्गत ही अन्य लोगों के साथ अन्तर्क्रिया करता है। यह अनुभव बालक को समाज के अन्य सदस्यों के साथ अन्तः क्रिया करने हेतु तैयार करता है। दुर्खीम के समान पारसनस भी यही मानते हैं कि विद्यालय समाज का लघु रूप में प्रतिनिधित्व करता है। विद्यालय बच्चों को समाज के मूलभूत मूल्यों में समाजीकृत करते हैं। टालकॉट पार्सनस भी प्रकार्यावादी दृष्टी से शिक्षा की चर्चा की है। शिक्षा से सार्वभौमिक मूल्य पनपते हैं, अपनाये जाते हैं। शिक्षा से समाज में मूल्य सिखये जाते हैं।

जान डी.वी. (J.DEWEY) मानते थे शिक्षा का उद्देश्य अपनी सम्पूर्ण क्षमता को विकसित करने हेतु प्रोत्साहन देना है। इवान इलीच (IVANILICH) ने अपनी पुस्तक (DESCHOOLING SOCIETY) (१९७१) में वर्तमान औपचारिक शिक्षा पद्धति को

अनुपयोगी बतलाया है उनके विचार से समाज को विद्यालय विहित करने की आवश्यकता है। इलीच ऐसी शिक्षा की बात करते हैं जो अनौपचारिक तथा आत्म निर्देशित हो। इन्होंने (WEB LEARNING) वेब शिक्षा पर काफी बल दिया है, ऐसी शिक्षा जिसे व्यक्ति स्वतंत्र होकर कम्प्यूटर पर अर्जित कर सकता है।

भारत में शिक्षा का स्वरूप : भारत में बुनियादी शिक्षा की तस्वीर काफी डरावनी है। इसे आकड़ों में साफ देखा जा सकता है। निरक्षरों की आबादी के मामले में भारत का स्थान आज विश्व में पहला है। विश्व के कुल निरक्षरों में उनकी 30: आबादी भारत में है। 6 से 14 वर्ष आयुवर्ग के 20: से अधिक बच्चे स्कूली शिक्षा से वंचित हैं। भारतीय शिक्षा व्यवस्था में अनेक समस्याएँ हैं घर से स्कूल की दूरी यातायात की सुविधा का अभाव जातीय एवं लिंगभेद तथा विद्यालयों का अनुपयुक्त वातावरण।

शिक्षा का स्तरीकरण : आधुनिक समय में शिक्षा एक बाजार वस्तु के रूप में तीन भागों में विभक्त है सबसे ऊपर उच्च कोटि की शिक्षा है, जिसपर केवल संभ्रान्त वर्ग का कब्जा है। जो शिक्षा के निजीकरण और क्रय करने के लिए बाध्य है। मध्य स्तरीय शिक्षा पर मध्यमवर्गीय लोग तथा कुछ मात्रा में निम्न वर्ग के लोगों का प्रभुत्व है। अंतिम स्तर पर सकारी स्कूलों में शिक्षण पाने वाला निम्न वर्ग है जो वंचित अवश्य है, लेकिन संतुष्ट है।

माध्यमिक शिक्षा : शिक्षा पैमाना के अन्तराष्ट्रीय मानक वर्गीकरण पर दो चरणों को शामिल करती है। स्तर-2 को बुनियादी शिक्षा का अंतिम और दुसरा चरण माना जाता है हर देश का उद्देश्य बुनियादी शिक्षा प्रदान करना है। माध्यमिक शिक्षा आम तौर पर प्राथमिक शिक्षा के छः साल बाद होती है। अधिकांस देशों में माध्यमिक शिक्षा "अनिवार्य" है कम से कम 96 वर्ष की आयु तक। बच्चे 99 वर्ष की आयु में निम्न माध्यमिक चरण में प्रवेश करते हैं। 1954 से, शिक्षा को एक बच्चे के लिए बुनियादी मानव अधिकार के रूप में देखा गया है। बाल अधिकार के कन्वेंशन के अनुच्छेद 28 में कहा गया है कि प्राथमिक शिक्षा निशुल्क और अनिवार्य होनी चाहिए। माध्यमिक शिक्षा हर बच्चों को उपलब्ध और सूलभ होने चाहिए। कुछ देश 96 वर्ष से कम आयु के सभी युवाओं के लिए अनिवार्य और मुफ्त शिक्षा की ओर बढ़ रहे हैं।

सूचना प्रौद्योगिकी : वर्तमान समय में सूचना प्रौद्योगिकी ने मानव जीवन में क्रांति ला दी है और यह नगरीय क्षेत्रों के साथ-साथ ग्रामीण क्षेत्रों में अपनी दस्तक दे दी है आज समाज की विभिन्न आवश्यकताओं की पूर्ति सूचना क्रांति ही कर रही है। टेलीफोन, मोबाइल फोन, कम्प्यूटर, लैपटॉप जैसी अनेक सूचना यंत्र आज लोगों को तरह-तरह की जानकारियाँ उपलब्ध करवा रही हैं जैसे-कृषि, शिक्षा, स्वास्थ्य की जानकारी, राष्ट्रीय घटनाएँ आदि भारत में कम्प्यूटर उपभोक्ताओं की संख्या 29 मिलियन तथा डैन्सटी 0.9: है जो भारत में सूचना क्रांति के बढ़ने का सूचक है।

सूचना प्रौद्योगिकी क्षेत्र के विस्तार हेतु अनेक योजनाएँ तथा परियोजनाएँ भारत सरकार द्वारा संचालित की जा रही हैं। इसमें राज्य सरकारें भी अपना योगदान दे रही हैं। आज किसी भी देश में शिक्षा एवं तकनीकी शिक्षा में जो सुधार हो रहे हैं वह बहुत कम समय में दुनिया के अधिकांस देशों तक पहुँचाये जा रहे हैं। जैसे कम्प्यूटर का प्रयोग अब अधिकांस लोगों द्वारा होने लगा है। 1954 में टेक्नोलॉजी मिशन ग्रामीण दूर संचार मिशन, भी सरकार द्वारा चलाए गये जिससे संचार क्रांति हर गाँव तक पहुँच सके और लोगों को नवीनतम तथा त्वरित जानकारी प्राप्त करने में सहायता मिले।

माध्यमिक शिक्षा में सूचना प्रौद्योगिकी : कक्षा में मोबाइल उपकरणों का उपयोग करना छात्र की रुची को बनाये रखने का साधन बन गया है। 'एडुटोपिया के नवीनतम गाइड' 'मिडिल स्कूल फार लर्निंग' यह मोबाइल एप है। जिसके द्वारा शिक्षण की सामग्री उपलब्ध रहती है। टेलीविजन पर शैक्षिक प्रसारण द्वारा एक साथ बड़े क्षेत्र और बहुत बड़ी संख्या तक पाठ्य सामग्री पहुँचाना सलुभ हो गया है। कक्षा में खूबसूरत अध्ययन के साथ-साथ दूर शिक्षा के मामले में कक्षा आधारित अध्ययन के विकल्प के एक रंग के रूपमें इन प्रसारण का महत्व असंदिग्ध है। इन दृश्य श्राव्य माध्यमों को कैसेटों द्वारा उपलब्ध करा कर विद्यार्थियों को समय और स्थान की सीमाओं से मुक्त कर दिया है। जब चाहे शैक्षणिक कार्यक्रम देख और सुन सकते हैं। कई प्राइवेट ट्यूटर अपने विद्यार्थियों को पढ़ाने के आडियो विडियो का प्रयोग कर रहे हैं।

सूचना प्रौद्योगिकी के द्वारा विद्यार्थी उन स्थानों को अपनी आंखों से देख सकता है। जिसके बारे में वह पढ़ता है। विज्ञान का विद्यार्थी प्रयोगशालाओं, अनुसंधान केन्द्रों और विविध प्रकार के प्रयोगों से दृश्य माध्यम के द्वारा परिचित हो रहा है।

फ्री आनलाइन कोर्स योजना : 9. स्वयं प्रभां—> मानव संसाधन विकास मंत्रालय ने छात्रों के लिए कए नई योजना शुरू की है इस योजना से सरकार छात्रों को मुफ्त में आनलाइन शिक्षा प्रदान करेगी। स्वयं (SWAYAM) के ३२ चैनल के जरिए भी पढाई कर सकेंगे। इस योजना से स्कूल से लेकर कॉलेज तक के छात्रों को मदद मिलेगी। स्वयं खुद २००० पाठ्यक्रम की मेजबानी करने में सक्षम है।

२. ई. पाठशाला : केन्द्रीय मानव संसाधन मंत्रालय ने ई-पाठशाला नाम से मोबाइल फोन एप और वेबसाइट पोर्टल लांच कर दिया है। इस एप के जरिये एन.सी.आर.टी की किताबों को मुफ्त में डाउनलोड किया जा सकेगा हिन्दी और अंग्रेजी दोनों माध्यम से सभी विषयों की किताबें उपलब्ध होती है।

३. टॉप पैरेंट एप : तीन से आठ साल तक के बच्चों के अभिभावकों के लिए निःशुल्क मोबाइल एप है। “इस एप से मध्यप्रदेश राज्य के सभी विद्यार्थी घर बैठे स्कूल शिक्षा विभाग द्वारा अध्ययन सामग्री प्राप्त कर, आनलाइन अध्ययन कर सकेंगे।

४. दीक्षा एप : NCTE के द्वारा जारी किया हुआ एंड्राइड एप्लीकेशन है, जिसे मोबाइल में इंस्टाल करने के बाद घर बैठे अपने मोबाइल से ही पढाई कर सकते है। इस एप से पहली कक्षा से लेकर दसवी कक्षा तक, की पढाई आनलाइन अपने मोबाइल से कर सकते है।

५. बाइजू एप (BYJU'S) : यह आनलाइन एप्लीकेशन है जिसके द्वारा स्कूल के पाठ्यक्रम को इंटरनेट के माध्यम से पढाया जाता है। इंडिया के वेस्ट शिक्षक के द्वारा पाठ्यक्रम को पढाया जाता है,। यह शिक्षण मोबाइल, लैपटॉप, टैबलेट, आदि के द्वारा उपलब्ध किया गया है।

६. वेदान्तु एप (Vadantu App) : यह ई-लर्निंग एप है जिसका उपयोग कर बच्चे लाइव क्लास के साथ-साथ स्टडी मेटेरियल क्लास-१-१२ तक स्कोलरशिप क्विज, टेस्ट इत्यादि पा सकते है यह इंडिया एप है जो सभी वर्ग के बच्चों को शिक्षा से जोडने का काम करती है।

७. डाउटनर एप (Doubtner App) : यह एप्लीकेशन २४ घंटे विद्यार्थी के समस्या के सुझाव के लिए बनाया गया है।

पूर्व साहित्य का अध्ययन (Review of Earlier studies.)-> पान्डेय, रवि प्रकाश (२०१२) इसमें इन्होंने लिखा है- आज दुनिया के विभिन्न विश्वविद्यालय ई-लर्निंग के माध्यम से शिक्षण प्रशिक्षण का कार्य सम्पन्न कर रहे है दुनिया के एक कोने में बैठा व्यक्ति अथवा संस्था इंटरनेट के माध्यम से ज्ञान एवं विमर्श को दुनिया के दुसरे कोने पर बैठे व्यक्ति या संस्था को उपलब्ध करा रहे है। इसमें समय और दूरी समाप्त हो गई है। भारत में विभिन्न मुक्त विश्व विद्यालय आज इसी के प्रयोग से ज्ञान बाट रहे हैं।

चौबे, सरयू प्रसाद (1990) : इसमें इन्होंने कहा है कि चलचित्र एव आकाशवाणी द्वारा व्यक्ति अपनी मनोदशा को पूनर्जीवित कर रूचिकर बनाता है, परन्तु ये शिक्षा के दृष्टिकोण से अत्यधिक प्रभावशाली है। वे घटनाये जो दूर-देश में वातावरणों में घटती है, उन्हें इसकी सहायता से कक्षा में सजीवता के साथ प्रदर्शित किया जा सकता है, और तत्सम्बन्धी शिक्षा प्रदान की जा सकती है।

साहु, गायत्री (2007) : इन्होंने लिखा है कि शिक्षा कैसी हो, उसका उद्देश्य कैसा हो, किस प्रणाली द्वारा शिक्षा दी जाए ये सब शिक्षा की महत्वपूर्ण बातें है। शिक्षण को सरल, सहज बोधगम्य, रोचक, तथा मनोरंजक बनाने के लिए मिडिया के विभिन्न साधनों का प्रयोग शिक्षकों द्वारा किया जाता है जिसमें टी.वी. कम्प्यूटर इंटरनेट आदि प्रमुख है। शिक्षा के लिए कई तरह की नई प्रौद्योगिकी का प्रयोग स्वयं भारत में किया जा रहा है।

सिंह जे.पी. (२०१३) : शिक्षा आवश्यक ज्ञान और दक्षता प्रदान करती है जो व्यक्ति को समाज में आर्दश रूप में कार्य करने योग्य बनाती है। विज्ञान तथा तकनीकी के माध्यम से हम अपनी शिक्षा प्रणाली को २१ शताब्दी के लिए तैयार कर सकते है सूचना तथा संप्रेषण प्रौद्योगिकी में आये ताजा बदलाव शिक्षा की अलख जगा सकते है। आज शिक्षा ज्ञान और सूचना की पूँजी

का आधार बन गयी है। राष्ट्रीय शिक्षा नीति १९८६ यह मानती है। कि “एक निश्चित स्तर तक हरेक शिक्षार्थी को बिना किसी जात पात, धर्म स्थान या लिंग भेद के लगभग एक जैसी अच्छी शिक्षा उपलब्ध हो।

श्री वास्तव, राजीव कुमार (२०१२.१३) : इन्होंने लिखा है कि दुनिया बहुत छोटी हो गई है, एक गाँव बन गई है जहाँ सब लोग सब कुछ जान सकते हैं आज सूचना प्रौद्योगिकी की विश्व स्तर पर एकीकरण हुआ है। इसके अधिकाधिक प्रयोग से विशेष रूप से इन्टरनेट के तीव्र विस्तार के फलस्वरूप विभिन्न क्षेत्रों में मानव गतिविधियों में क्रांतिकारी परिवर्तन दृष्टिगोचर होते हैं।

दाधीच, बालेन्दु शर्मा (योजना २०२१) : डिजिटल इंडिया की बदौलत एक अरब भारतीय को आनलाइन लाने कि दिशा में बड़ी सफलता प्राप्त की जा चुकी है। भारत में सस्ती दरो पर उपलब्धी स्मार्टफोनों के साथ-साथ सस्ती दरो पर इन्टरनेट कनेक्टिविटी की उपलब्धता और दुर संचार की विश्व-स्तरीय आधार भूत ढांचे ने डिजिटलीकरण की अदभुत क्रांति को साकार कर दिखाया है।

निशंक, रमेश पोखरियाल (योजना २०२१) : शिक्षा अन्य बातों के अलावा सांस्कृतिक जागरूकता और सहानुभूति दृढ़ता धैर्य, टीमवर्क नेतृत्व संवाद सहित ज्ञान सम्बंधी सामाजिक और व्यवहारिक कौशल विकसित करती है इस प्रकार २०२२ तक नया भारत एक ऐसी शिक्षा प्रणाली के लिए मजबूत आधार प्रदान करेगा जो आसनी से सुलभ निष्पक्ष, गुणवर्त्तापूर्ण, किफायती और जवाब देही के सिद्धान्तों पर आधारित होगी। नये भारत की शिक्षा विद्यार्थी को लाभकारी और संतोषप्रद रोजगार के लिए तैयार कर चरित्र निर्माण का बढावा देने में सक्षम बनायेगी।

प्रस्तावित शोध का महत्व : (Significance of the studies.) प्रस्तुत शोध अध्ययन का महत्व वृद्ध स्तर पर होगा। आज कल वैश्विक महमारी कोरोना के कारण सभी स्कूल बन्द है और बच्चों की शिक्षा पर कोई प्रभाव नहीं पड़े इसलिए प्रत्येक वर्ग की पाठ्यक्रम को सूचना प्रौद्योगिकी के स्रोत, कम्प्यूटर मोबाइल, इन्टरनेट के द्वारा जारी किया गया। जिसमें प्रत्येक आय समूह के लोगों ने सराहनीय योगदान दिया। माध्यमिक शिक्षा काल में ही बच्चों का चरित्रिक विकास के साथ-साथ उनकी रुचियों एवं व्यवहारिक गुणों एवं रचनात्मक प्रवृत्तियों आदि का विकास होता है। वैसे तो सूचना प्रौद्योगिकी शिक्षा का अच्छा माध्यम है जो शिक्षा से संबंधित कई आवश्यकताओं की पूर्ति करता है।

कोविड जैसे महामारी के समय में भी भारत नहीं बल्कि पूरे विश्व स्तर पर सूचना प्रौद्योगिकी ने अहंम भूमिका निभाई चाहे वह क्षेत्र अर्थव्यवस्था हो या सांस्कृतिक, सामाजिक, अन्तःक्रिया या शैक्षणिक व्यवस्था ही क्यों न हों।

आज के समाज की समस्याओं और आवश्यकताओं की दृष्टि से इस अध्ययन की प्रासंगिकता : (Relevance to the present Day problems and needs of society.) आज के युग में स्मार्ट फोन, कम्प्यूटर, ई-लर्निंग की महत्ता से हम सभी परिचित हैं। राष्ट्रीय शिक्षा नीति में विद्यालयी स्तर से ही कम्प्यूटर शिक्षा पर अधिक बल दिया गया है ताकि बालक शुरू से ही सभी स्तर का ज्ञान को और भी तीव्र गति से विकसित कर सके। १९८५ में पहली बार शिक्षा को विद्यार्थी तक पहुँचाने के लिए दृष्ट्य एवं श्राव्य माध्यम को आवश्यक हिस्से के रूप में प्रयोग आरंभ किया गया १९९९ से 'ज्ञान दर्शन' के नाम से दूरदर्शन का एक स्वतंत्र चैनल आरम्भ किया गया। जो पहला शिक्षण चैनल कहा जाता है। आज प्रौद्योगिकी के जिस दौर से हम गुजर रहे हैं उनमें शिक्षा के लिए कई तरह की नई प्रौद्योगिकी का प्रयोग स्वयं भारत में किया जा रहा है दूर शिक्षा के व्यापकीकरण के चलते इनकी उपयोगिता की बढ़ रही है। अब फोटो कम्पोजिंग का इस्तेमाल ज्यादा हो रहा है। फोटो कापीयर ने विद्यार्थियों के लिए अधिक बड़े स्तर पर तरह तरह की पाठ्य सामग्री आसानी से उपलब्ध कराने में मदद की है।

इस प्रकार शिक्षा के क्षेत्र में सूचना प्रौद्योगिकी ने संभावनाओं के नये द्वार खोल दिये हैं, परन्तु प्रश्न यह उठता है कि भारत जैसे देश में जहाँ अभी भी एक तिहाई से अधिक आबादी निरक्षरता के अभाव से ग्रस्त हैं, जहा लगभग इतनी आबादी गरीबी की रेखा से नीचे जीवन यापन कर रही है, वहां क्या शिक्षा के सार्वभौमिकरण के अभियान को सिर्फ सूचना प्रौद्योगिकी के माध्यम से सफल बनाया जा सकता है? क्या इस प्रौद्योगिकी का प्रयोग गरीबी रेखा से नीचे जीवन यापन करने वाले वर्ग भी कर रहे हैं? जिन तक शिक्षा पहुचाना सबसे पहली प्राथमिकता है। इस दृष्टि से विचार करे तो स्थिति कतई संतोषप्रद नहीं है।

गांव में ट्राजिस्टर तो फिर भी उपलब्ध हो जाते हैं, परन्तु टेलीविजन खरीदना गरीब परिवारों के लिए अब भी असंभव है। भारत के अधिकांश गांवों में बिजली की आपूर्ति बहुत कम है।

ऐसी स्थिति में यह संभव नहीं लगता कि, प्रसारण केंद्रों और सैकड़ों चैनल के बावजूद गांवों और सुदूर क्षेत्रों में रहने वाले गरीब और पिछड़े लोगों को इन सभी सुविधाओं का लाभ सचमुच मिल सकेगा।

अतः इन समस्याओं को देखते हुये आज के वर्तमान समाज में शोध कार्य की अत्यंत आवश्यकता है। वर्तमान शिक्षा के क्षेत्र में जो परिवर्तन या विकास हो रहा है, अतः इस संदर्भ में यह मेरा यह शोध अध्ययन विद्यार्थी तथा मानव समाज के लिए उपयोगी होगा।

आकड़ों का अभिसरण एवं विश्लेषण : (Suggestion)

प्रस्तुत शोध अध्ययन का योगदान इस बात को अनुरोधित करेगा कि पिछले कुछ वर्षों में सूचना प्रौद्योगिकी ने शिक्षा और विज्ञान के क्षेत्र में अमूल्य योगदान दिया है। विश्व की आबादी का लगभग ३.९ मिलियन लोग रोजाना सूचना प्रौद्योगिकी का प्रयोग कर रहे हैं, परन्तु भारत में संसाधन की पहुँच लोगों तक समुचित रूप से नहीं हो पाई है कठिनाई भी यही है कि शिक्षण में सूचना प्रौद्योगिकी का प्रयोग उसी सम्पन्न वर्ग तक ही सीमित है जो कम्प्यूटर खरीदने की क्षमता हासिल कर चुके हैं। २१वीं सदी में सूचना के माध्यम का विस्फोटक युग एक नये तरिके से समाज की संभावनाओं का निर्माण करेगा। माध्यमिक शिक्षा पर सूचना प्रौद्योगिकी की बढ़ती हुई भूमिका को देखते हुये सरकार को कोई ठोस कदम उठाना चाहिए, जिससे हर क्षेत्र, वर्ग के विद्यार्थी को उचित और मूल्यवान शिक्षा प्राप्त हो सके। शोध के होन से मौजूदा ज्ञान में बढ़ोतरी होती है तथा कार्य क्रम क्रियान्वयन करने में सहायता मिलती है। वर्तमान समय में स्मार्टफोन, कम्प्यूटर में इन्टरनेट के द्वारा शिक्षा ग्रहण करने में सबसे ज्यादा बच्चे प्रभावित हो रहे हैं उनपर इसका नाकारात्मक प्रभाव भी पड़ रहा है अतः यह शोध विद्यार्थियों के शिक्षण से सम्बंधित समस्याओं के सामाधान में सहायता पहुँचायेगा इसके साथ ही इस विषय पर नया प्रकाश पड़ेगा, जो भविष्य के कार्य योजना निर्माण में सहायक हो सकता है।



संदर्भ सूची

- सिंह, जे.पी., समाजशास्त्र अवधारणाएं एवं सिद्धान्त पी.एच.आई लर्निंग प्राइवेट लिमिटेड, दिल्ली, २०१३
- साहु, गायत्री, बच्चों के विकास में मिडिया का प्रभाव पब्लिकेसन्स के.के. २००७
- पाण्डेय, रवि प्रकाश, वैश्वीकरण एवं समाज, विजय प्रकाशन वाराणसी, २०१२
- चौबे, सरयुप्रसाद, शिक्षा के समाजशास्त्रीय आधार विनोद पुस्तक मंदिर आगरा (१९९०)
- श्रीवास्तव, राजीव, वैश्वीकरण और समाज प्रकाशन वैभव लक्ष्मी २०१२-१३
- भार्गव, नरेश, वैश्वीकरण (समाज शास्त्रीय परिप्रेक्ष्य) पब्लिकेसन्स, रावत २०१४
- दाधिच, बान्देलु शर्मा, योजना जनवरी, २०२१ पब्लिकेशन्स डिविजन
- निशंक रमेश पोखरियाल, योजना, जनवरी २०२१, पब्लिकेशन्स डिविजन
- आहुजा, राम, सामाजिक समस्याएँ, रावत पब्लिकेशन्स, नई दिल्ली २०१६
- इंटरनेट

लोकविधी जागरण : एक विधिनाटय

प्रा. डॉ. निवृत्ती विनायक मिसाळ

कला, वाणिज्य व विज्ञान महाविद्यालय

सोनई ता. नेवासा जि. अहमदनगर पिन कोड नं. ४१४१०५

प्रस्तावना :

विधीनाटयात एकाच वेळी विधी व नाट्य प्रकटत असते. विधिनाटय ही लोकनाटयाची पूर्ण अवस्था असते. विधी, भक्ती व नाट्य या गोष्टीविधीनाटयात एकत्रपणे येतात. खंडोबाच्या नावाने जागरण घालणे हा विधीनाटयाचाच प्रकार आहे. महाराष्ट्र, कर्नाटक, आंध्रप्रदेश आणि तामिळनाडू या प्रदेशात अनेक जाती जमातीत खंडोबाचे जागरण घालणे हा एक कुलाचार आहे. ज्या घराण्याचे कुलदैवत खंडोबा आहे, अशा कुटुंबात वर्षातून एकदातरी स्वतःच्या घरी किंवा देवस्थानाला जावून खंडोबाच्या नावाने जागरण घातले जाते. जागरण केल्याशिवाय खंडोबाच्या उपासनाविधीस पूर्णत्व येत नाही, अशी लोकांची धारणा असते. म्हणून जागरण घालून देवाची शक्ती जागृत करावी व त्यांची कृपा आपल्या कुटुंबावर व्हावी, संकटे तळावीत म्हणून जागरण हा विधी कुलाचाराच्या माध्यमातून केले जातात. लोकांची धार्मिक भावना जागृत करण्यासाठी हि विधीनाटयासारखे विधी उपयोगी ठरतात.

जागरण हा कुलाचार व कुलधर्माचाच एक भाग मानला गेला असून त्याचे सादरीकरण जागरणाच्या स्वरूपात केले जाते. वाघ्यामुरळीची उपास देवता जेजुरीचा खंडोबा ही होय. त्या दैवताच्या उपासनेसाठी करावयाचा विधी जागरण या नावाने ओळखला जातो. या विधीत पुरोहित म्हणून वाघ्याआ-मुरळी व त्यांचा संच आलेले असतात. यजमानाने त्यांना मुद्दाम श्रद्धापूर्वक बोलविलेले असते. सगे-सोयरे, मित्रपरिवार, गावकरी हे त्यात श्रद्धापूर्वक सामील होतात. या विधीसाठी विशिष्ट वस्तू वाघे व त्यांचा मांड असे घटक समाविष्ट झालेले असतात. हे घटक एकात्मतेने विधीनाटय सादर करतात.

श्रीकृष्णाने पहिले जागरण घातल्यामुळे हिंदूधर्मात ते शास्त्रसंमत झाले. विशेष म्हणजे

खंडोबाची पूजा ही शंकराची पूजा मानली जाते. म्हणून आजही भाविक भक्त वाघ्या- मुरळीला बोलावून जागरण गोंधळ घालतात.

“तिळा इडा पावड पूजा |

देव आले भक्ता काजा

भक्ती भावाची माळ तुळशीची |

पुत्र पंचावन्न लक्ष्मी

गाई, म्हशीन भरतील वाडं |

ताक दुधानं भरतील डेरं

जो भाव भरला कोटंबा तो भाव

सिद्धीस ने मल्हारी म्हाळसा राव” ||

त्यानंतर जागरण स्थळी देवताची स्थापना केली जाते. पूजाविधी मांडला जातो. त्याचे एक पारंपारिक शास्त्र आहे. त्यानुसारच पूजाविधी मांडतात.

वाघ्या-जागरणाच्या पूजेसाठी यजमानाला खालील सामग्री आणावयास सांगतो. त्यात पाच नारळ, हळद-कुंकू, लाल गाचे वस्त्र, खोबरं, सात खारका, सात हळकुंडे, सात फळे, फुले व फुलांचे हार, भंडारा, गोडेतेल, सात बदाम, सात लाल सुपाऱ्या, नागवेलीची पानं, कापूरवड्या, गुलाल, खंडोबाचा टाक, चांदीचा गाडा, दिवटी-बुधली, लंगर, पाच ज्वारीची ताटे, गहू, गांडूळ, कलश, बाजरीच्या कडकन्या इ. सामग्री तयार ठेवण्यास

सांगतो. परंपरेने पाच वस्तू व सात वस्तू यांना शुभ संकेत आहे. त्यामुळे पाच सात असा शुभ अंक कल्पून या वस्तू मांडल्या जातात असे वाघे सांगतात.

❖ पूजाविधी :

जागरणाच्या पूजेसाठी सामुग्री आणल्यानंतर वाघे प्रथम गायीच्या शेणाने जमीन सारवून घेवून त्या जागेवर व आजूबाजूला मुत्र शिंपून वातावरण शुद्ध करून घेतात.

रंगभूमी भरल्यानंतर पूजा मांडली जाते. हि पूजा मांडताना प्रथम उसाच्या अथवा ज्वारीच्या ताटांची तिकाटणी एका रंगावर उभी केली जाते. चौरंगावर लाल वस्त्राची गादी करून ठेवतात. व त्यावर भंडार्याची भरणी करतात. तिकाटणीवर लांच्या माळा सोडतात. नागवेलीची पाने ठेवून त्यावर नारळाचा घट बसवितात. चौरंगावर असे दोन घट बसविले जातात. प्रात एक घट खंडोबाचा व दुसरा घट देवीचा असतो. घटाच्या समोर देवीचा टाक ठेवून यजमान त्या घटाची व टाकाची पूजा करतो. वाघे व इतर जमलेल्या सर्व मंडळींच्या कपाळावर भंडारा लावून व यजमानालाही भंडारा लावून “यळकोट यळकोट जय मल्हार” म्हणून जागरणाला प्रारंभ केला जातो.

जागरणाचा पूर्वरंग :

जागरणाचा प्रमुख वाघ्या हातात खंजिरी घेवून आपल्या पारंपारिक वेशात उभा राहतो. त्याच्या गळ्यात भंडार्याने गरीबाच्या चामड्याची पिशवी असते. त्याच्या सोबत मध्ये मुरळी आणि मागे इतर साथीदार वाघे तुणतुणे, इफ, टाळ, पाटी, दिमडी अशी पारंपारिक वाद्ये घेवून ही मंडळी उभी असते. जागरणाचा प्रारंभ गणेशाचे नमन करून होतो. त्यास,

गण- १ :

“महाराजा गणराया, तुझ्या चरणी नमन माझे
गण हा गौरीचा नंदन, चौदा विद्येचा हो साधन
मलदार मार्तंड तुझे ध्यान आम्ही लागतो तुमच्या पाया
महाराज गणराया”

याप्रमाणे गण गायिल्यानंतर आवतन होते त्यात देवदेवतांना जागरणासाठी येण्याचे आवाहन केले जाते.

पूर्वरंगाच्या या टप्यात वाघ्या-मुरळी देवदेवतांना जागरणासाठी येण्याचे आवाहन करतात. हे आवाहन करण्यामागे देवदेवतांची आपल्यावर कृपा होईल आणि सादर करीत असलेला कार्यक्रम निर्विघ्न पार पडेल अशी भूमिका जागरण सादर करणाऱ्या वाघ्या-मुरळींची असते. वाघ्या-मुरळीं देवतांना आवाहन खालील गितातून करतात.

“जागरण मांडिले मल्हारी जागरणाला यावे”

सोबत म्हाळसा-बाणु आणावे |

खंडोबा जागरणाला यावे |

सकळीक देवा जागरणाला यावे |

आपल्या भक्ताला वारंवार तारावे” ||

अशा गीतातून वाघ्या-मुरळीं देवदेवतांना जागरणासाठी येण्याचे आवाहन करतात. यावेळी मुरळीचा पदन्यास असतो. सर्व वाद्येही खालच्या स्वरात वाजविली जातात.

गीतातून गण आणि देवदेवतांना आवाहन केल्यानंतर जागारानातील प्रमुख वाघ्या संचातील इतर वाघ्यांना व मुरळींना रंगमंचावर स्थान ठरवून देत असतो. त्यात उजव्या किंवा डावीकडे सर्व बाजूकडून देव जागरणाला

आले असे गृहीत धरून डोबाची अध्यात्मिक उपासना गीते गायली जातात. त्यातून खंडोबाचे गुणगान केले जाते.

“सोन्याची जेजुरी | गडाला नवलाख पायरी |
तेथे नांदतो देव मल्हारी |
संग म्हाळसा-बाणाई या दोन्ही नारी |
झेडे लावती अहो जेजुरीला नवसाचे |
काय वर्णू गुण या खंडेरायाचे |
होऊन घोड्यावर स्वार निघाले खंडेराया |
मार्ग चालली फौज भक्तांची लावली माया” ||

म्हाळसा-बाणाईचा संदर्भ घेतल्याशिवाय खंडेरायाच्या जीवनाला पूर्णत्व प्राप्त होऊ शकत नाही. त्यामुळे वाघ्या-मुरळी रेखाबाविषयीची महानता नोंदवतात. त्याठिकाणी म्हाळसा आणि बाणाई यांचाही उलगडा नकळत वाघ्या-मुरळी यांच्या गीतातून पास होत असतो.

साध्या -मुरळी जागरणात जी गीते गातात ती सहसा ग्रामीण संस्कारातून आलेली असतात. त्यामुळे ग्रामीण धर्मविषयक कल्पना, देवदेवतांच्या संदर्भातील श्रद्धा, ग्रामीण जिजवनातील सुखदुखांच्या प्रसंगाचे देवतेच्या संदर्भातील आरोपण, महाराष्ट्रातील संस्कार, अध्यात्मिक कुटाचा स्पर्श, ग्रामीण शृंगार आदी बाबींचा स्पर्श वाघ्या-मुरळीच्या गीतांना झालेला असतो.

पूर्वरंगातील गीते :

“तू तालात घाटी वाजव
तू डोक्यात दिमडी वाजव
तू तुनतुना संबळ वाजव
जागरण गोंधळाची रात गाजव
खंडेरायाच चांगभल बोलायचं
रूप हे पाहून भंडारा उधळून लंगर तोडायचा
मल्हारी मार्तंडांचा यळकोट गजर करा
देवाचिया तळी भरा, भक्तीभाव धरा
देव हा मायाळू आहे तो कृपाळू
मल्लू देवाला जागरणाला उठून बोलवायचं
तू डोक्यात दिमडी वाजव” ...

जागरणाचा उतररंग :

जागरणाचा पूर्वरंग संपल्यानंतर दहा-पंधरा मिनिटे विश्रांती घेवून वाघ्या-मुरळी उतररंगाला सुरुवात करतात. यात डोबाची महात्म्यपर गीते, पौराणिक स्वरुपाची गीते, खंडोबा, म्हाळसा, बाणाई यांची सांसारिक कथा आणि कथागीते, नृत्य, संगीतासह सादर केली जातात. तसेच राजे महाराजे यांची उदाहरणे देवूनही काही गीते वाघ्या-मुरळी या भागात गातात. शिवाय लंगर ताडणं, भार उतरणे आदी बाबीही उतररंगात येतात. त्यामुळे गोंधळापेक्षा जागरण विधीनाटय अधिक रंगतदार असते. भगत याच्या नृत्यात पदन्यासाची विशिष्ट पद्धत असते. कृपाणी **कथागीते**

जागरणाच्या या उतररंगात सादर केली जाणारी कथागीते म्हणजे जागरणाची नाट्यसंहिताच असते. ती अलिखित स्वरुपाची आहे. मौखिक परंपरा ही वाघ्या-मुरळीत परंपरेनेच आलेली असल्यामुळे आणि ते

खंडोबाचे उपासक असल्याने याविषयी आणि म्हाळसा बाणुविषयांच्या गीतांची संख्या त्यांच्याकडे विपुल प्रमाणात असते. त्यांच्या गीतातील विषय हे जीवनातील घटना प्रसंग आणि जीवानुभव खंडोबा देवाच्या माध्यमातून उत्कटतेने चित्रित केलेले असतात. जागरणाच्या रंगात वाघ्या-मुरळी खंडोबाच्या लग्नाचे, खंडोबाच्या सांसारिक जीवनाचे, दोन बायकांचे, त्यातील सवती मत्सराचे, खंडोबाच्या प्रसिद्ध स्थळांचे, बाणाईच्या सौंदर्याचे, म्हाळसाच्या केविलवाण्या अवस्थेचे चित्रण अनेक गीतात अतिशय कुशलतेने सादर करीत असतात. त्यांचे नृत्यही पाहण्यासारखे असते.

त्यादृष्टीने काही कथागीते पाहता येतील.

“काळाचा कर्दनकाळ मल्हारी तो कैवारी, दैत्याची

धडकेने खडक फोडतो, भैरवनाथ जय मल्हारी |

नाथाचा नाथ मल्हारी, भक्तांना पावतो जय मल्हारी ||

दर्शन देतो जय मल्हारी ...

गडाचा राजा मल्हारी हाय गं , तो येडा हाय गं , तो कुपनी चेडा

त्यांचा ढवळा घोडा त्याचा लंगर तोडा , त्याची वारी चढा

जेजुरीच्या राज्याचं लगीन पालीला ठरलं , देवाच्या हे लग्नात तांदूळ वाटलं

चला चला जाऊ ग पालीला म्हाळसाईच्या लग्नाला

हळद लावा देवाला बोई , तेलचं लावा देवाला बाई , बाशिंग बांधा देवाला बाई,

कंगण बांधा देवाला बाई

पालीला पाली देवाचं व-हाड गेलं , देवाच्या लग्नाला गौरीचा गणपती आलं

ब्रम्हा , विष्णू आलं ग पार्वतीच शिव आलं , सभेचा इंद्र आला गं ...

अन केदारनाथ आला गं आला , गडाचा राजा मल्हारी हाय गं ...

ते शंभूश शिवगण आलं , सारं भाविक भक्त आलं

जेजुरीत दिवाळी साजरी झाली , देवाची पटराणी पालीची भारता आली

गडावर बिपमाळ पेटवली जेजुरी सारी नटवली

जेजुरी गाव सजून गेलं , वरात पाहून भाऊन गेलं ...

देवाला पाहून सारं हारलं, देवाचं चरण भक्तांनी धरलं

गडाचा राजा मल्हारी देव मल्हारी हाय गं

असा पाहून सोहळा आहा , भक्त आनंदी झाला पाहा ...

लंगर तोडणे :

काही ठिकाणी जागरणाची सांगता करताना लंगर तोडण्याचा विधी केला जातो. उत्तर रंगात कथा सादरीकरणाचा पहाटेपर्यंत चालतो. तो संपल्यानंतर जसे काही लोक भार उतारतात तर काही लोक लंगर तोडण्याचा विधी करतात. किलो वजनाची अठ्ठावीस कड्या लोखंडाची साखळी म्हणजे लंगर होय. एक पहार जमिनीत रोवून त्याला हा लंगर लावतात. प्रथम या लंगराची पूजा केली जाते. विशिष्ट प्रकारचे गीतही लंगर तोडताना म्हणतात, “मारी मातंड घेऊन खंडा तोडी मुंडा या वैऱ्याचा”.

असे गीत म्हटल्यानंतर वातावरण भारले जाते. या वातावरणाने वाघ्याच्याही अंगात देवाचे वारे येते व त्या अवस्थेत वाघ्या किंवा भगत लंगर तोडतो. लंगर तोडण्याचा हा विधी अत्यंत काटेकोरपणे केला जातो. या विधीत नाट्य भरलेलं असल्याने जागरणाची जमलेले भाविक भक्तही तनमनधनाने या विधीचा सोहळा पाहत असतात.

या लंगर तोडण्यालाही खंडोबाच्या भक्तीत आणि जागरणात अतिशय महत्वाचे स्थान आहे. कारण हा लंगर जर नाही तर जागरण घालणार्यांचे काही तरी चुकले आहे, या जागरणाला देव पावला नाही असे म्हटले जाते. आणि जर सदानंदाचा यळकोट यळकोट म्हणत तर जागरण खंडेरायाजवळ पोहोचले असे समज वाघ्या-मुरळी आणि जागरणासाठी जमलेल्या श्रोत्यांचा असतो. लंगर तोडण्याचा विधी अतिशय काळजीपूर्वक केला जातो.

जागरणातील उत्तररंगात लावलेले आख्यान संपल्यानंतर लंगर का तोडला जातो याचे सविस्तर वितरण देवाची प्रचात सोपान खुडे पुढीलप्रमाणे करतात. “वाघ्याजवळ कोटंबा आणि लंगर या वस्तू असतात.कोटंबामधील कोट नाम आणि अंबा याचा अर्थ आई असा आहे. थोडक्यात मातृदेवतेचे म्हणजेच स्त्रीत्वाचे लंगर हे प्रतिक आहे. “लंगर” हा “नांगर” या शब्दाशी संबंधित आहे. नांगर हा शेतीच्या बीजवपन करीत असत. त्या काठीच्या हा प्राचीन ऑस्ट्रीक शब्द वापरलेला आहे. लंगर या शब्दाचे मूळ “लक” हा शब्द आहे. म्हणजे लंकर , लंगर प्रक्रियेशी संबंधित आहे. अशा प्रकारे लंगर या शब्दाचा उलगडा सोपान खुडे यांनी केलेला आहे.

समारोप :

वरील विवेचनावरून वाघ्या-मुरळी हे समाजानेच जन्माला घातलेले अपत्य आहे. समाजाच्या मानसिकतेतून काही खातर हा विचार बाहेर आलेला दिसतो. कारण जुन्या काळी देवाला माणसांचा बळी देला जात असे. तसेच प्राचीन काळी देवाला मानुस वाहण्याची परंपरा होती. नंतर त्या प्रथेला पायबंद बसला. आणि कोंबडे, पशुपक्षी, जनावर देवाला बळी देण्याची प्रथा अस्तित्वात आली. गुलाम म्हणून माणसे विकायची परंपरा होती. याचाच मागळातील माणसांची किंमत शून्य होती.

संदर्भ :-

- १) डॉ. मदन कुलकर्णी : “खंडोबाची वाघ्या-मुरळी” विजय प्रकाशन, नागपूर. प्रथम आवृत्ती -१९९६
- २) डॉ. गोडबोले अ.वा. “श्री मल्हारी महात्मे कथासार” क्षीरसागर आणि कंपनी पुणे. प्रथम आवृत्ती- २००५
- ३) डॉ. वाकळे मार्टंड : “खंडोबाचे लग्न” प्राजक्ता प्रकाशन पुणे, २००९.
- ४) डॉ. रा. चिं. ढेरे : “दक्षिणेचा लोकदेव खंडोबा” पद्मगंधा प्रकाशन पुणे, २००७.



Category

- INDEXED JOURNAL
- SUGGEST JOURNAL
- JOURNAL IF
- REQUEST FOR IF
- DOWNLOAD LOGO
- CONTACT US

- SAMPLE CERTIFICATE
- SAMPLE EVALUATION SHEET

Journal Detail

Journal Name	RESEARCH JOURNEY
ISSN/EISSN	2348-7143
Country	IN
Frequency	Quarterly
Journal Discipline	General Science
Year of First Publication	2014
Web Site	www.researchjourney.net
Editor	Prof. Dhanraj Dhangar & Prof. Gajanan Wankhede
Indexed	Yes
Email	researchjourney2014@gmail.com
Phone No.	+91 7709752380
Cosmos Impact Factor	<u>2015 : 3.452</u>



News Updates Due to large number of application please allow us time to update your journal



Research Journey

Ins	SJIF 2019: 6.625	Previous evaluation SJIF
	Area: <u>Multidisciplinary</u>	2018: 6.428
	Evaluated version: online	2017: 6.261
		2016: 6.087
		2015: 3.986

The journal is indexed in:

SJIFactor.com

Basic information

Main title	Research Journey
Other title [English]	Research Journey
Abbreviated title	
ISSN	2348-7143 (E)
URL	http://WWW.RESEARCHJOURNEY.NET
Country	India
Journal's character	Scientific
Frequency	Quarterly
License	Free for educational use
Texts availability	Free

Contact Details

Editor-in-chief	Prof. Dhanraj Dhangar M.G.V.'S ARTS & COMMERCE COLLEGE, YEOLA, DIST NASHIK
	India
Publisher	MRS. SWATI SONAWANE

Get Involved

- Home
- Evaluation Method
- Journal List
- Apply for Evaluation/Free Service
- Journal Search

Recently Added Journals

Research Journey	
ISSN	2348-7143
Country	India
Frequency	Quarterly
Year publication	2014-2015
Website	researchjourney.net
Global Impact and Quality Factor	
2014	0.565
2015	0.676