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A Compendium of

Research Article
By Budding Researchers

Volume: 8
(2016-17)

(Research Promotion Scheme For Budding Researchers)

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MESSAGE

I am pleased to go through the 8th volume of compendium containing research articles by budding researchers. This has resulted due to collaborative and conscious efforts from both, students and our teachers. It is indeed an innovative leap towards bridging the void between formal education and research, with a prime objective of accelerating the participation of students in interdisciplinary research activities in both, basic and applied sciences.

In developing countries like India, the pace of research needs to be accelerated in order to cater the needs of growing population. Although, research activities have been underfunded in India, there is always a silver lining to this shortfall, if undergraduate students are properly guided and groomed to become independent thinkers. With these objectives, the present volume has fulfilled the need of helping young scientists to publish their 'original scientific thinking' and to provide a common platform to get involved in research projects. This would definitely enhance the research horizons of the students and it would definitely add to their visualization of scientific,social and environmental problems.

I admire this volume, at the outset, for its efforts towards creating a conducive environment for research in the institution and motivating student community to participate in research. Secondly, the volume brings together a wide spectrum of research articles on various streams such as life-, earth-, chemical-, physical- and computer sciences; alongwith information technology. All these together, touch upon the burning issues of the current panorama around us.

I hope, this volume would prove to be a trendsetter and would trigger similar innovative activities, encouraging research in all the fields of human concern. I whole heartedly appreciate the efforts of the students, researchers, teachers, project coordinator and all those involved in bringing out this volume in an excellent manner.

I congratulate all the research supervisors & members of the editorial board of this volume and extend my best wishes to all the budding researchers.

(Shri. N. G. Bendale)
Hon'ble President
KCE Society, Jalgaon

FROM THE DESK OF PRINCIPAL

It is my pleasure to pen a foreword for the volume, documented by our students of Moolji Jaitha College, Jalgaon, during academic year 2016-17. This activity is solely aimed at 'developing research aptitude' within young minds. Although the purpose of research is to identify newer sectors in various disciplines, we, the teaching faculty of this college, are of the opinion that 'initiation of research aptitude within students' is of prime importance. Moreover, this infiltration would definitely help them to apply their theoretical knowledge towards innovative research thoughts, applicable even outside of their domain of research (i.e., multidisciplinary approach).

It has been proved that a lot of learning occurs when students divert themselves towards research and not when traditional lecturing is imparted on the students. This kind of exercise allows them to completely assimilate what had been taught and they also get an opportunity to apply the same knowledge elsewhere.

It, then, invariably leads to a better understanding of the discipline under investigation. Students' career goals are usually finalised after they participate in research. Research is also a significant confidence booster. While students are continuing their research project, and when they complete it, their sense of accomplishment enhances multifold.

As budding researchers, they are longing for their research work to be publicized and therefore, M. J. college has developed a tradition of publishing such volumes everyyear.

I am, therefore, confident that this exercise will boost the research aptitude amongst our future scientists and thereby help the college to select talented youth for future research. For excellent compilation and printing of this volume, I thank all my colleagues for their untiring efforts to complete the task in a very short duration and in an appreciable way

(Dr. Uday D. Kulkarni)
Principal

From the Desk of Editor

Since last 7 years our college is organising a research festival, "Research Promotion Scheme for Budding Researchers". For 1st 2 years it was funded by UGC under the scheme of College with Potential for Excellence. (CPE), since last 4 years KCE society's Moolji Jaitha College is sponsoring this scheme for Under Graduate and Post Graduate students from the faculty of Arts & Humanities, Commerce & Management and Science. This year there were total completed 69 research projects from 24 departments All these projects were evaluated by appointing experts from North Maharashtra University, Jalgaon & affiliated colleges. The prizes were announced to the toppers and given them during prize distribution ceremony. The stipend of Rs. 1000/-per project was given to the students. Rs. 1000/- per project is given for contingency. For projects from science faculty additional Rs. 2000/- per project was sanctioned for glassware and chemicals. I take this opportunity to thank all the committee members, faculty wise project coordinators, guides & students for helping me in this endeavor. The research papers based on their articles is published in a separate volume as "Compendium of Research Articles by Budding Researchers – Vol 8" with ISBN. This volume is result of continuous efforts of teachers & students of this college. I am very happy to handover this volume to you all.

Dr. H. B. Gajare
Coordinator
Research Promotion Scheme
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SECTION A

SCIENCE

Comparative study to determine the quality of artificially and naturally ripened banana.

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ABSTRACT:
(Your abstract must use Normal style and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)
Preparation of Your Abstract
1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word ONLY (place names excluded). No full stop at the end.
2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.
Introduction: Clearly state the purpose of the abstract
Methods: Describe your selection of observations or experimental subjects clearly
Results: Present your results in a logical sequence in text, tables and illustrations
Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

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Comparative study to determine the quality of artificially and naturally ripened banana.

Abstract:
Banana is one of the major crops which are cultivated all over the world. It is considered as popular staple food for more than 400 million people. It has high nutritional value and possesses antioxidant properties. India is the largest producer of banana with 23.205 million mt. of annual productions. Banana ripening is done by natural as well as artificial method. Artificial ripening processes could have harmful effects on human and the nutrient content could be altered. Artificial ripened fruits are harmful for human as well as animal consumption. Therefore, the current project was undertaken with the aim of investigation on post harvest quality of banana following the artificial ripening treatments with respect to physico-chemical and sensory quality evaluation. Banana (musa species, local name-Shrimanti) at same maturity stage were treated with calcium carbide, ethephon and were compared with naturally ripened for the parameters like total sugar content, Vit C, Total titratable acidity, total soluble solids, refractive index, moisture content in pulp and peel, pulp and peel ratio, detection of phosphate and arsenic. Arsenic and phosphate content was found to be in higher concentrations in Calcium carbide ripened sample proving it to be hazardous for health.

Introduction

Banana (Musa sp.) is the second most important fruit crop in India next to mango. Its year round availability, affordability, varietal range, taste, nutritive and medicinal value makes it the favourite fruit among all classes of people. It has also good export potential (Kumar. et.al 2012).

Bananas are grown in about 120 countries. Total annual world production is estimated at 95.6 million tonnes of fruits. India leads the world in banana production with an annual output of about 26.2 million tonnes. Other leading producers are Brazil, Eucador, China, Phillipines, Indonesia, Costarica, Mexico, Thailand and Colombia (Kumar. et.al 2012).

In India banana ranks first in production and third in area among fruit crops. It accounts for 13% of the total area and 33% of the production of fruits. Production is highest in Maharashtra (3924.1 thousand tones) followed by Tamil Nadu (3543.8 thousand tonnes). Within India, Maharashtra has the highest productivity of 65.70 metric tons /ha. against national average of 30.5 tonnes/ha. The other major banana producing states are Karnataka, Gujarat, Andhra Pradesh and Assam (Kumar. et.al 2012).

Banana is a very popular fruit due to its low price and high nutritive value. It is consumed in fresh or cooked form both as ripe and raw fruit.
Banana is a rich source of carbohydrate and is rich in vitamins particularly vitamin B. It is also a good source of potassium, phosphorus, calcium and magnesium. The fruit is easy to digest, free from fat and cholesterol. Banana powder is used as the first baby food. It helps in reducing risk of heart diseases when used regularly and is recommended for patients suffering from high blood pressure, arthritis, ulcer, gastroenteritis and kidney disorders (Rangana.et.al. 1986).

The ripe fruit is laxative when eaten early in the morning. An excellent food for those anemic persons, having general weakness, jaundice, nervous breakdown, obesity, weak digestion and vitamin deficiency. Decoction of the unripe fruit is good for diarrhoea and scurvy. The juice of the plant is taken to cure hemorrhages, cholera, epilepsy and hysteria.
An extract of the trunk's juice can be used to massage scalp to promote healthy growth of hair and preventing hair loss. The pounded inflorescence "puso" is used as poultice for skin ulcers and wounds. The flowers are taken as an infusion in normal doses for painful menstruation (Mohapatra et al 2010).

Banana peels are utilized for extraction of banana oil which is used for food flavouring.
They are good sources of lignin, pectin, cellulose, etc and micronutrients like Fe and Zn. They are used in wine and ethanol production. They are also used as substrate for biogas production (Mohapatra et al 2010).

Banana leaves are used for weaving baskets, mats, food wrapper, table-cloths plates for eating etc. Various products like chips, fig, ready to serve drink, jams, confections, dehydrated slices, pickles etc can be made from male bud, immature fruit, and pseudo stem. Paper board, tissue paper etc can be prepared from pseudo stem (Mohapatra et al 2010).
There is a high demand of banana for its nutritional and medicinal values. Maximum production of banana is required within short time. Hence quick ripening using artificial agents such as Calcium carbide, ethephon, methanol etc are favoured. Though Calcium carbide is banned, still it is illegally supplied in many places for quick ripening. Local sellers and farmers being illiterate unaware of the hazardous effect of artificial ripening. Educated dealers though aware of the hazardous effects favour artificial ripening to gain profits.

Objective:

- To compare physico-chemical and sensory parameters between artificially and naturally ripened fruits.
- Minimization of side effects of calcium carbide and other ripening agents by promoting natural ripening process for banana.

Materials and methods:

Collection of sample:

Banana (local name Shrimanti) were harvested at optimum stage of maturity from same field and immediately transported to the laboratory. Banana hands were separated from bunches and allowed to delatex. Debris and dust on selected banana hands were removed from washing and blotted from piece of cloth.

Ripening process:

Bananas were divided into three groups. First group was treated with calcium carbide (0.25g/litre). Second group was treated with ethephon (1ml/litre). Third group was allowed to ripe naturally. After that they were packed in ventilated plastic baskets.

Methodology:

- Temperature maintained at 25 - 28C for a period of 9 days.

- Weight loss % was noted using analytical balance. Weight of pulp and peel were taken separately during the ripening period and from that weight loss % was calculated.
- Refractive index and total soluble solid using Refractometer by first calibrating the instrument using acetone and then placing a drop of sample on slide and reading the index of refraction using the telescope scale. (Gunasekara.et.al 2015)
- Total sugar content was determined by preparing standard glucose solution of different concentrations and adding anthrone reagent so that the colour changes to blue-green, then measuring the colour absorbance at 630nm using spectrophotometer. (J Jayayaraman .et.al 2008).
- Vitamin C and Total Titratable acidity using titrations as mentioned in (Gunasekara. et. al 2015) with some modifications.
- Phosphate content by fiske and subarrow method using spectrophotometer by plotting a standand graph of concentration on standard X-axis and absorbance at Y-axis as mentioned in (Kulkarni. et. al 2011) with slight modifications.
- Arsenic content was determined using spectrophotometer as referred in Narayana B. et. al. (2006) with slight modifications.

Results and discussions:
Changes in Physicochemical and sensory parameters were noted and observed during the ripening stages of all the three groups of banana.

Weight loss % increased from 5% to7% in case of Calcium carbide ripening. In ethephon it was found to increase from 2% to9%. In case of natural ripening it was maximum i.e from 2% to 10%. The increase in physiological loss in weight during ripening of banana may be due to upsurge in respiration rate of the fruits. (Soltani.et.al.2011)

Colour changed from green to yellow with brown spots in all the 3 samples.

a) Calcium carbide **b) Natural** **c) Ethephon**

Fig. 4.1 Images of ripened banana.

Moisture content:
In all the 3 samples moisture % content of peel and pulp increased from day 3 to day 9.

	Peel moisture %			**Pulp moisture %**		
Treated Condition	Day 3	Day6	Day9	Day3	Day6	Day9
Calcium carbide	73.42	74.37	75.86	51.32	53.13	54.52
Ethephon	75.32	76.42	77.84	52.19	54.79	55.83
Untreated	78.89	79.75	80.14	53.80	55.65	56.36

Fig. 4.2 Table showing changes in moisture content of pulp and peel during ripening stages.

The moisture contents of peel and pulp in all samples were increased during ripening. The least moisture content of 51.32 was observed for calcium carbide treated sample with a significant difference among others. The situation around calcium carbide and ethephon treated sample had considerable variation with naturally ripened samples for moisture content of pulp and peel. Similar variation in moisture content of pulp and peel was observed and mentioned in Gunasekara. et.al. (2015).

Sensory parameters:

Sensory evaluation was conducted on 6th day of ripening period.

Treated Condition	Aroma	Colour	Taste	Overall Acceptability
Calcium carbide	50.00%	33.33%	33.33%	50.00%
Ethephon	66.66%	33.33%	50.00%	50.00%
Untreated	83.33%	66.66%	83.33%	83.33%

Fig. 4.3 Table showing sensory score results.

Four different sensory attributes were evaluated separately. Overall acceptability can be considered as a summary of qualitative sensory evaluation. The analyzed results for all the attributes were in higher preference level for naturally ripened sample and least scores were recorded for calcium carbide and ethephon treated sample. So we can conclude that there was significant difference among artificially ripened sample with the natural one.

Total sugar content (mg/100g):

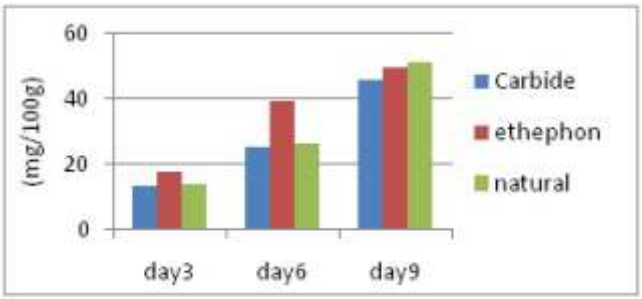

Fig. 4.4 Graph showing changes in total sugar content during ripening stages.

The highest total sugar value was recorded from untreated banana sample. Lower values were observed for Calcium carbide treated sample. The observed values of total sugar for ethephon treated banana sample were in between the values of other two samples. Total sugar variation was in trend of increment during ripening period of all three samples. Very similar results of total sugar content were mentioned in Gunasekara. et.al. (2015).

Total vitamin C content (mg/100ml):

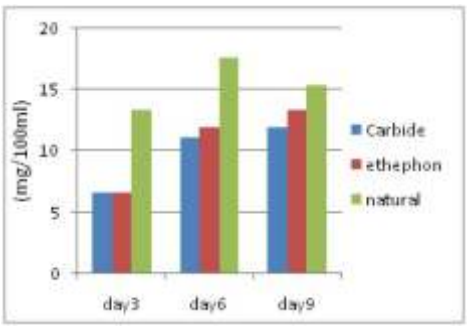

Fig. 4.5 Graph showing changes in Vitamin C content during ripening stages.

Vitamin C is a crucial nutritious character of fruits. Vitamin C also has a trend of increment during ripening. The highest vitamin C amount of 17.66 mg/100ml was observed in untreated sample. But after that it was inclined. Calcium carbide ripened banana had low level of Vitamin C than ethephon treated and untreated samples. The ethephon values obtained during the ripening stages showed contradiction with the values referred in Gunasekara. et.al. (2015). The increase in the ascorbic acid content may be attributed to the higher synthesis of some metabolic intermediary substances which promoted the greater synthesis of the precursor of ascorbic acid. Gonzalez (1998) and Novelo (1998) also found an increase in the ascorbic acid content of tomato with application of ethephon. Similar results were also reported in guava. (Soltani.et.al.2011)

Titratable acidity (g/100ml):

Treated Condition	Day3	Day6	Day9
Calcium Carbide	0.1139	0.0603	0.0402
Ethephon	0.1876	0.067	0.0469
Untreated	0.1139	0.0603	0.0603

Fig. 4.6 Table showing changes in Titratable acidity during ripening stages.

Titratable acidity was in trend of decrement during ripening period of all three samples. The highest value was recorded from the ethephon treated sample. The lowest titratable acidity was noted on day 9 in calcium carbide ripened sample. The decrease in titratable acidity could possibly be due to increase in phosphate content and reduction in acid content. The titratable acidity values showed difference with the values mentioned in Gunasekara. et.al. (2015). The amount of acidity in banana decreases gradually during the entire period of ripening which may be attributed to utilization of organic acid in pyruvate decarboxylation reaction occurring during the ripening process of fruits. The increased membrane permeability allows the acids, stored in cell vacuoles to be respired at faster rate. (Payasi.et.al.2005)

Refractive index:

Treated Condition	Day 3	Day6	Day9
Calcium Carbide	1.377	1.381	1.384
Ethephon	1.380	1.381	1.383
Untreated	1.376	1.388	1.389

Fig. 4.7 Table showing changes in refractive index during ripening stages.

Though the refractive index showed increasing trend from day 3 to day 9, there was a very slight change observed in the refractive index.

Total soluble solids (%):

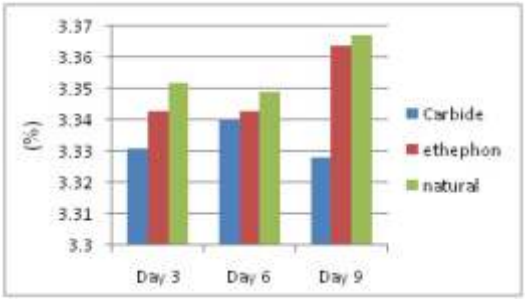

Fig. 4.8 Graphs showing changes in total soluble solids during ripening stages.

Total soluble solid was calculated from the above Refractive index values. Highest total soluble solid value was observed in untreated banana sample. Ethephon treated sample had a trend of increment but is in between the values of other two samples. The less % values were observed in calcium carbide treated sample. All the 3 samples of banana showed increment during the ripening period. The increase in TSS during ripening may result from an increase in concentration of organic solutes as a consequence of water loss. The increase may also be due to the numerous anabolic and catabolic processes taking place in fruits, preparing it for senescence. The reason for the increase in TSS could be attributed to the water loss and hydrolysis of starch and other polysaccharides to soluble form of sugar. (Deepak.et.al.2008).

Phosphate analysis (mg/100g):

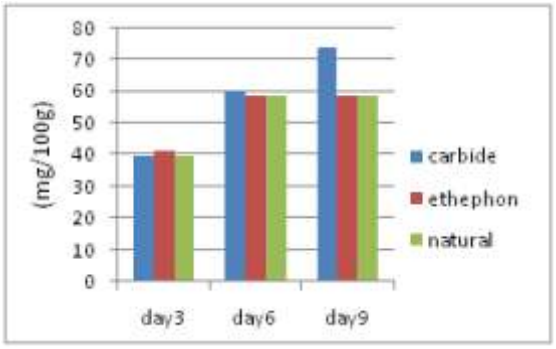

Fig. 4.9 Graph showing changes in phosphate content during ripening stages.

Phosphate content was determined during the ripening period and the highest value of 73.301mg/100gm was noted on day 9 in calcium carbide ripened sample. On day 6 and day 9 it was recorded that Ethephon treated and untreated samples contain same amount of phosphate. There was an increasing trend observed in all the three samples. Phosphate content values were very similar as referred in Kulkarni.et.al. (2011).

Arsenic content (µg/ml):

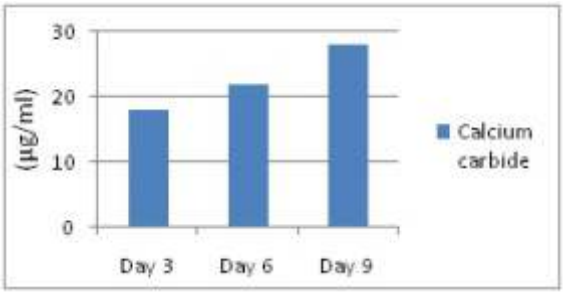

Fig. 4.10 Graph showing changes in Arsenic content during ripening stages.

Arsenic content in ethephon and untreated sample were found to be negligible when compared with calcium carbide ripened sample. Arsenic level showed a significant increase from day 3 to day 9 with the highest value recorded on day 9 i.e 28.16 µg/ml. Compared to the arsenic content found in tap water as mentioned in B Narayana.et.al 2006, the values were much higher found in carbide treated banana samples whereas the values in case of ethephon and untreated samples were negligible.

Conclusion:

Artificially ripened banana had significantly low level of physico-chemical, nutritional

quantitative quality than naturally ripened banana. Calcium carbide treated banana sample had comparatively low level of nutritious factors. Phosphate content of Calcium carbide ripened banana was found to be higher than ethephon and naturally ripened banana. A good amount of arsenic content was found in Calcium carbide ripened fruits which increased significantly during the ripening stages. Naturally ripened fruits showed high total soluble solid, Refractive index, and Total sugar content than Calcium carbide and ethephon ripening. All these characters of banana make it healthier and sweeter to eat.

According to the results of sensory evaluation, it can be concluded that the significantly excellent sensory quality was in naturally ripened banana with relative to artificially ripened banana.

Therefore we must consume naturally ripened fruits.

References:

- Kumar, K.P., Bhowmik, D., Duruivel, S. and Umadevi, M.(2012) Traditional and medicinal uses of banana. Journal of Phamacognocy and phytochemistry. 1(3). pp. 69-75.
- Rangana, S.(1986) Handbook of Analysis and quality control for fruits and vegetable products. 2nd edn. New delhi: Mcgraw Hill Publishing company Limited. 1.pp.12-15.
- https://www.etslabs.com
- David T Plummer (2008) An introduction to practical Biochemistry. Vol. 6, No. 3 pp. 131-132.
- J Jayaraman (2007) Lab manual in Biochemistry. Vol. 2 No. 3 pp. 49-54.
- B Narayana (2006) Spectrophotometric determination of arsenic in environmental and biological samples Vol. 13. pp. 36-40.
- S.R.W. Gunasekara, K.K.G.U. Hemamali, T.G. Dayananada and V.S. Jayamanne (2015) Post harvest quality analysis of 'embul' banana following artificial ripening techniques International Journal of Science, Environment, and Technology, Vol. 4, No 6, 2015, 1625 – 1632
- K. P. Sampath Kumar1, Debjit Bhowmik, S. Duraivel, M. Umadevi (2012) Traditional and Medicinal Uses of Banana, Journal of Pharmacognosy and Phytochemistry, Vol. 1 No. 3 2012, 51-63
- Debandya Mohapatra, Sabyasachi Mishra and Namrata Sutar (2010), Banana and its byproduct utilization: an overview, Journal of scienctific and industrial research, vol. 69, 323-329.
- Soltani, M., Alimardani, R., Omid, M., Karaj, I. 2011. Changes in physico-mechanical properties of banana fruit during ripening treatment. The Journal of American Science, 7(5), 14-19.
- Kulkarni, S.G., Kudachiker, V.B. and Prakash, M.N. (2011) Studies on physico- chemical changes during artificial ripening of banana (Musa sp) variety 'Robusta'. J Food Sci Technol. 48 (6). pp. 730-734.
- Ahenkora, K.M., Key, A., Marfo, K. and Banful, B. (1997) Nutritional composition of false horn Apantu pa plantain during ripening and processing. Afr.crop Sci. J. 5 (2). pp. 243-248.
- Wasim, S. and Dhua, S. (2010) Eating artificially ripened fruits is harmful. Current Science. 99 (12). pp. 1664-1667.
- Payasi, A. and Sanwal, G.G. (2005) Biochemistry of fruit ripening. Indian J Agric Biochem. 18 (2). pp.51-60.
- Deepak, G.P.N., Katiyar, J.P. and Sing, P.C. (2008) Effect of post harvest chemical treatments on shelf life and physico-chemical quality of banana cv. Harichchal. Asian J. Hort. 3 (2), pp. 386-388.

Analysis commercial Mango fruit juices

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ABSTRACT:
Fruit is gift given by god and it is very necessary to human health. Fruit are not available throughout the year, they have specific time period. So fruit are preserved as fruit juices by various processes for long term use. Commercially available fruit juices are generally adulterated by harmful food color and harmful preservative. Preservative are added to the juices to increase shelf life of packed fruit juices, saccharine to increase sweetness artificially. High levels of adulterants and preservatives are harmful for the health. Hence current research work was undertaken to analyzed quality of commercial available mango juices of various brands such as Fruity, Fruity-X and Slice. Mango juices of selected three brands were analyzed for microbial content and physical test such as pH acidity, sugar content, nutritional composition like carbohydrate, starch, vitamin C etc. Test for adulterants, preservative contents were also performed. The microbial count of Slice was less than fruity-x and fruity. Nutritional component such as carbohydrate, vitamin c, starch, iodine etc. are present in all three brands. Calcium, iron, saccharine and turmeric (curcumin) test are absent in all brands. Preservative like sodium benzoate also presents in all samples but in slice brand the value of sodium benzoate is under the normal range. Slice has good quality than fruity and fruity-x.
Keywords: Mango juices, Analysis, Adulteration, Preservation.

1 Introduction:

Fruit juices are becoming an important part of modern diet in many communities .They are nutritious beverages and can play a significant part in a healthy diet because they offer good taste and a variety of nutrients found naturally in fruits. Juices are available in their natural concentrations or in processed froms. juices is prepared by mechanically squeezing fresh fruit or is extracted by water juices are fat free ,nutrients –dense beverage rich in vitamins, minerals and naturally occurring phytonutrients that contribute to good health. The constituents of processed juices are mainly water sugar, preservative , colure, and fruit pulp .The most commonly used preservative are benzoic acid ,sorbet acid, or sulphur dioxide. Natural colours such as anthcynin and betanin are used. Acid is an essential universal constituent of juices and the most acid commonly used is citric acid. Heavey metals occur in all food as natural or inherent component of plant and animals tissues and fluid and also may be present as a result of contamination or deliberate addition.(Underwood, 1973) One from of environmental contamination arises from exposure to water polluted by industrial waste (Mathew, 1986).

Most fruit juices contain sufficient nutrients that could support microbial growth .Several factor encourage, prevent or limit the grow of microorganisms in juices;the most important are PH hygienic practice storage temperature and concentration of preservative. Storage of product at refrigeration temperature or below is not always best for the maintenance of desirable quality of some fruits. It should also be noted that change in PH could transform a food into one, which can support growth of pathogens (FDA, 2001).

The quality of fruit juices is strictly maintained in developed countries under some law and regulation but in many developing and under developed countries the manufacturer is not concerned about the microbiological safety and hygiene of fruit juices because of negligence of law. Thus the transmission of some human diseases through juice and other drinks are considered a serious problem in recent years.

Fruit juices are available in essentially the same form almost anywhere in the world. From polar bases to the tropics and from the largest developed countries, fruit juices are available in bottles, cans,

laminated paper packs, pouches, cups and almost every other form of packaging known. In recent years these juices have been included significantly in diet of every person irrespective to age. So maintaining the quality of processed fruit juices is important issue now. In order to develop awareness among the people about fruit juices in transmitting diseases this study was attempted to measure nutritional and microbiological quality of industrially processed locally available fruit juices. Mango is mostly consumed as fresh fruit, but due to its perishable nature it cannot be stored for long time. In order to make the mango fruit available during off season, it is processed to make juices, jams, squashes, nectars, chutney, pickles, toffees and canned mango slices etc. Mango is one of the cherished fruit not only for taste but also for nutritional values. In India mangoes are used as a blood builder, because of their high iron contents. They are suggested for treatment of anemia and beneficial to women during pregnancy and menstruation. People who suffer from muscle cramps, stress and heart problems can benefit from high potassium and magnesium contents that also help those with acidosis.

Mango fruit is also beneficial in the treatment of nephritis as well as other kidney troubles (Islam 1986). It serves as good source of energy, vitamins A, vitamin C, iron and phosphorus etc (Malik 1994). A large number of new brands of fruit juice based beverages have appeared in the market in glass & plastic containers and brick pack. Although, food laws exist for the production of quality food products (Awan 1985), yet most manufacturers do not strictly comply with these laws. Food adulteration can prove very dangerous for the development of a healthy society. It can lead to a number of diseases such as paralysis, cancer, mental retardation and hypertension etc. Therefore it is essential to take necessary steps to check food adulteration etc. Adulteration and contamination in edibles especially beverages, bottled water, cooking oil/ ghee, spices, tea, sweeteners like sugar, sweetmeats, bakery products, milk and milk products, fruit and vegetable products are constant threat to the health of common man. One of the important measures in this regard is to create awareness amongst the public regarding the hygienic conditions. The kinds of impurities found in food items sold in the markets should be highlighted. This can only be done by media through advertisements. Government should start campaign against food adulteration, forcing the producers to change their method of production. Keeping in view this fact the present study was undertaken to evaluate quality and nutrition value of the different mango juices available in the local market.

2 Materials And Methods:

2.1 Materials:

Three brands of mango juices mainly Fruity, Fruity-x and Slice were collected from local market.

2.2 Methods:

Various methods given in various references were used for Analysis of commercial fruit juices.

2.2.1 Microbial count-

Microbial count of all selected mango juices were performed using spread plate count method.

2.2.2 Physical Examination-

All selected mango juices were analyzed for colour, odor and taste.

2.2.3 Qualitative Test for nutritional Component –

2.2.3.1 Test for Acidity:

Take 5ml of juice in a test tube and dip a PH paper in it .If PH is less than 7 the juices is acidic else the juice is basic.

2.2.3.2 Test for Iron:

Take 2ml juice add drops of concreted nitric acid .Boil the solution .Cool it add 2-3 drops of potassium sulphocynide solution.

2.2.3.3 Test for calcium:

Take 2ml juices add ammonium chloride and ammonium hydroxide solution .Filter the solution and to filtrate add 2ml ammonium oxalate solution. White ppt indicate presence of calcium.

2.2.3.4 Test for starch:
Take 2ml juice in test tube add 2-3 drops iodine solution blue black color indicates presence of starch.
2.2.3.5 Test for table sugar
Measure out 10 ml juice into test tube and 5 ml of conc. HCl is added to it. The content in the juice will mix well and 0.1 g of resorcinol powder is added to test. Mix the content in the test tube is gently mixed. Now place the test tube in boiling water bath for 10 min. If the red colour is observed, indicates the presence of table sugar.
2.2.3.6 Test for Carbohydrate (Fehling test):
2ml juices + 1ml Fehling solution and boil it if red colour appears carbohydrate is present.
2.2.3.7 Formalin:
Measure 2ml sample in test tube add 2ml 90% sulphuric acid +ferric chloride mixture content .Formation of colour at interface of 2 layers indicate that sample adulteration with formalin.
2.2.3.8 Saccharin (Resorcinol sulphuric acid test):
To the residue add 5 drops of resorcinol-sulphoric acid (1:1) and heat on a low flame unit the product turns red Dissolve in 10 ml of water and make it alkaline using 10%NaOH solution and add few drops of iodine solution. A green fluorescence is developed if saccharin is present.
2.2.3.9 Test for Artificial coloring (curcurnin):
Evaporate an alcoholic extract of the material almost to dryness on the water bath with a piece of filter paper .Moisten the dried paper with a few drops of weak solution of boric acid to which some drops of HCI have been added .Dry the paper again. If turmeric is present, the dry paper will be cherry red in colour which changes to bluish green by a drop.
2.2.3.10 Sodium Nitrate Test:
Add 2gm of barium chloride to 100ml of sample .add 2-5 gm ca chloride and shake to dissolve, make alkaline with 10% Noah shake ,let stand for 2hr and filter .Acidity filtrate with 10ml of HCl add 0.2gm NaNO2 Warm content on hot plate. White ppt of BaSo4 is obtained in presence of Cyclamate.
2.2.4 Quantitative test for nutritional component
2.2.4.1 Test for ascorbic acid (vitamin C):
Pipette out 5ml of working standard solution into 100ml conical flask. Add 10ml of 4% oxalic acid to it and titrate against the dye [V1 ml]. End points are the appearance of pink colour which persists for few minutes. The amount of the dye consumed is equivalent to the amount of ascorbic acid. Pipette out 5ml of the supernatant in a conical flask and add 10ml of 4% oxalic acid and titrate against the dye [V2 ml].
Amount of ascorbic acid 9(mg/100g)=0.5mg/V2ml*V1ml/5ml*100ml/wt of sample
2.2.4.2 Sodium Benzoate
Take 2 gm sample into beaker and add 1ml of 10% NaOH solution and 12gm NaCl. Add water make up volume up to 50 ml standard for 30 min with frequency shaking. Add 1 drop of phenolphthalein ad drop HCl than add excess 3ml of HCl. Add 25ml of chloroform transfer into separator funnel stand for 20min with frequency shaking. Transfer 12.5 ml chloroform layer into conical flask, evaporate of chloroform on a steam bath. Add 50 ml of 50% ethanol. Titrate with 0.05M NaOH add 1 drop phenolphthalein indicator. Calculate amount of sodium benzoate in sample.
% of sodium benzoate = {wt of Na benzoate/ wt of sample}*100
2.2.4.3 Sodium chloride
Take 5 & 10gm of liquid portion from the drained weight determine. If it is acidic, neutralize it with standard sodium hydroxide using phenolphthalein as indicator. Add 1ml of 5% aqueous potassium chromate solution and titrate with 0.1N AgNO3 solution to produce red –brown end point.
NaCl%=Titrate value *normality of AgNO3 *58.4*100/wt of sample*1000

3 RESULTS AND DISCUSSION

3.1 Microbial count-

Sample	Microbial count
Fruity	1.3 X 102
Fruity-X	7 X 102
Slice	3 X 102

Previous reports showed that, there was a general increase in microbial numbers in the different fruit juices with increasing time spent on the shelf. This increase was different for all the fruit juices. This increase is supported by the study of Suaad and Eman (2008), who showed that, there is the presence of different species of bacteria in bacteria-free commercially available fruit juices over time. The increase is partly due to the high moisture content in fruit juices which has been found to promote the growth of yeast and bacteria (MacRae et al., 1993). According to our experiment the microbial colonies found in Fruity brand are 1.3 X102,in Fruity-X the value is 7 X 102, in Slice brand the value is 3 X 102..

1.1 Physical Examination-

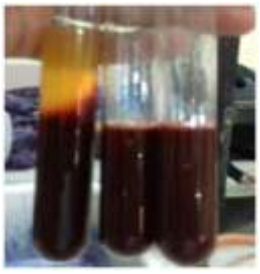
Test	Fruity	Fruity X	Slice
Odour	Pleasant	Sweet smell	Pleasant
Colour	Light yellow	Yellow	Light Orange
Taste	Sweet	Sweet	Sour

This study was performed to assess the quality of juices by studying their by performing sensory evaluation. The odour of fruity sample was pleasant, fruity X sample has sweet smell and Slice brand has pleasant smell. The color of fruity sample is light yellow, Fruity X has yellow color and slice has light orange colour. The fruity and fruity X brand was sweet in taste whereas slice brand sour in taste.

3.3 Qualitative test for nutritional component

Test	Fruity	Fruity-X	Slice
Acidity	Acidic nature	Acidic nature	Acidic
pH 3	2.7 3.5		
Test for Iron	-	-	-
Test for calcium	-	-	-
Test for table sugar	+	+	+
Test for starch	+	+	+
Test for Carbohydrate	+	+	+
Formalin	+	+	-
Test for Saccharin	-	-	-
Turmeric (curcurnin)	-	-	-
Sodium Nitrate Test	+	-	-

- Test for pH/ Acidity- The pH of sample as given, Fruity-3, Fruity-x-2.7, Slice-3.5. The pH of fruit juices often shows a noticeable decline towards acidity during storage (Nanos and Kader, 1993). This was evident in all the results obtained with the mango juice recording the least noticeable change in pH (from 5.63 in June, 2007 to 5.17 in February, 2008).
- Test for iron- Iron test absent in all three brands because red color not observed in samples.
- Test for table sugar- Red color observed in all three brands so table sugar present in all brands.



- Test for starch- Starch is present in Fruity sample and slightly present in fruity X and slice brand. We can observe the color in given figure.

- Test for Carbohydrate- Carbohydrates present in all three brands because red color ppt. found in all brands.
- Test for Formalin-Fruity and fruity X brands contain formalin to increase life span of packed fruit juices. Formalin absent in slice brand.

- Test for saccharine (Resorcinol sulphuuric acid test)- Saccharine is used to increases the artificial sweetness of pack fruit juises. But excess use of saccharine increases the blood sugar level of human being. Saccharine is absent in all three brands .According to table sugar test it is clear that table sugar added in all brands.
- Test for artificial coloring -Turmeric (curcurnin)- From above test it is clear that artificial coloring agents are absent in all brands.
- Sodium Nitrate Test: Sodium nitrate used as preservative. Sodium nitrate present in fruity brand but absent in fruity X and slice brand.

1.1 Quantitative test for nutritional components-

Table 1. Ascorbic acid, sodium benzoate and sodium chloride content of Fruity, Fruity-X and Slice

Test	Fruity	Fruity-X	Slice
Ascorbic acid (mg/100 ml)	22.24	14.34	47.14
Sodium Benzoate (%)	0.5	0.3	0.1
Sodium chloride (%)	0.25	0.68	0.39

The amount of ascorbic acid found in fruity-22.24 mg/100ml, fruity x-14.34 mg/100ml,slice-47.14 mg/100ml.The end point of titration is formation of pink color.The amount of sodium benzoate found

in fruity-0.5%, fruity x-0.3%, slice-0.1%. The normal range is not exceeding 0.13%. The amount of sodium chloride measured in fruity-0.25%, fruity x-0.68%, and slice-0.39%.

4 Conclusion

The microbial count of Slice was less than fruity-x and fruity. Nutritional component such as carbohydrate, vitamin c, starch, iodine etc. are present in all three brands. Calcium, iron, saccharine and turmeric (curcumin) test are absent in all brands. Preservative like formalin present in Fruity and Fruity-X sample whereas formalin absent in Slice. Sodium benzoate also presents in all samples but in slice brand the value of sodium benzoate is under the normal range. (Normal range= not exceed 0.13%). Ascorbic acid is present in all tested samples which act as antioxidant. Ascorbic acid content was observed higher in slice than fruity and fruity-x. Thus, from the above statement it can be conclude that Slice has good quality than fruity and fruity-x.

5 REFERENCES

1. Underwood -1973 I S I Handbook of Food Analysis (part VIII).
2. Mathew-1986 F.A.O Manual of Food Quality Control 1986.
3. FDA-2001 Manual Methods of Analysis for Adulterants and Contaminants in Food, I.C.M.R .
4. Malik, M.A., A. Salam and M. Saleem. (1994). Mango Products. In: Mango and Summer Fruits of Pakistan, Saeed, A. (ed.). A Brochure of the Hort. Foundation Pak., Islamabad.
5. Islam, N.U. (1986). Some physico-chemical studies on the mango pulp stored in glass bottles. M. Sc. thesis, Dept. of Food Tech., Uni. of Agri. Faisalabad.
6. Awan, I.M. (1985). Food Laws Manual. Mansoar Book House, Lahore.Food Qualitative Test.
7. Official Methods of Analysis. The Association of Official Analytical Chemists. 17th Ed. Arlington, Virginia, USA.
8. Awan, I.M. (1985). Food Laws Manual. Mansoar Book House, Lahore.Food Qualitative Test.
9. Goodrich. M., Saliva. P., Kvasnicka. F., Char. P and Cubic, M., (2002) Authenticity of 100% Orange Juice in the Czech Market in 1996–2001, Journal of Food Science, 20 (2): 83-88
10. Amherst, P. R., (2004). Production and Packaging on non-carbonated fruit juices and fruit Beverages. New Delhi, New York
11. Wallach, J.D., (2007) Nutrient Deficiency and Toxicity Symptoms, Longman Group: UK
12. Signal, R.S., and Kalama, P. R., (2001) Handbook of indices of food quality and Authenticity
13. Food and Food standards Act (2005) Chapter [15:04], Adulterated and Falsely Described Food, Part 2
14. Ahmad, I., M. Us man, S. Rashid, M.K. Saied, Imran-ul- Haq. (2011). Evaluation of quality of mango (Mangiferaindica L.) squashes available in Lahore market. Pakistan Journal of Food Sciences. 21 (1-4): 67-71.
15. Akbar, P.I. (1996). Dept. of Food Tech., Federal Polytechnic, P.M.B, 10371 dash, Nigeria, J. Plant Fruits for Human Nutrition. 49 (30): 213-219.
16. APHA. (2005). Standard methods for the examination of water and waste water, American Public Health Association. 21st ed. Washington DC.
17. Awan, M.S. and R.A. Ritz. (1993). Comparative study of changes during storage in uncarbonated and carbonated lime fruit juice beverage. Modern Agri. 4 (1): 19-22.
18. MacRae, R. J., Henning, J., & Hill, S. B. (1993). Strategies to overcome barriers to the development of sustainable agriculture in Canada: the role of agribusiness. Journal of

Agricultural and Environmental Ethics, 6(1), 21-51.
19. Suaad, S. A., & Eman, A. H. A. (2008). Microbial growth and chemical analysis of mineral contents in bottled fruit juices and drinks in Riyadh, Saudi Arabia. Res. J. Microbiol, 3(5), 319-325.
20. Malik, M.A., A. Salam and M. Saleem. (1994). Mango Products. In: Mango and Summer Fruits of Pakistan, Saeed, A. (ed.). A Brochure of the Hort. Foundation Pak., Islamabad.
21. Nanos, G.D. and A.A. Kader, 1993. Low oxygen induced changes in pH and energy charge in pear fruit tissues. Postharvest.

MILK ADULTERATION DETECTION

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ABSTRACT:
(Your abstract must use Normal style and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)
Preparation of Your Abstract
1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word ONLY (place names excluded). No full stop at the end.
2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.
Introduction: Clearly state the purpose of the abstract
Methods: Describe your selection of observations or experimental subjects clearly
Results: Present your results in a logical sequence in text, tables and illustrations
Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

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Abstract:-
Adulteration is an act of addition of other substances to food item in order to increase the profit, which may result in the loss of actual quality of food item and may cause harmful effects. Milk is one of those food items which is consumed daily nearly by every person. It is consumed as fresh milk, tea, coffee. In 2011 a survey was performed by FSSAI and it was observed that 68% of milk in India was adulterated which was available for selling in the market. Milk adulterants like urea, detergents, formalin, ammonia, sulphate may result in increased chances of cancer, kidney failure, cardiac arrhythmia, eye-loss, memory loss, early ageing and other health problems. Seven popular milk brand of Jalgaon District were used for the current project. Milk samples were analyzed for different adulterants like starch, urea, sulphate, ammonia, nitrates, detergents, formalin, soap, fat, boric acid and borates. Out of the seven brands analyzed for adulterants detection, not a single brand was adulterant free.
Key-words: milk, adulteration, adulterants

Introduction: -
When we look back in history our attention is drawn towards food adulteration which was seen very boldly in 18th & 19th century in U.S.A (Schell LM et al, 2012). People were turning towards urbanization and industrialization. Adulteration of food material for profit becomes a practice. Milk was often tempered with water & chalk powder. For the first time attention towards adulteration was drawn by Fredrick Accum in his book (Wallace F. Janssen,1981).
As time passed, science developed and with that adulteration techniques also developed which are somewhat difficult to detect and are much dangerous for health.
In India a programme was launched in 1970 known as White Revolution also known as Operation Flood (Singh K., 1999) which made India self sufficient in milk production and price of milk became very low and milk sellers started to adulterate milk to increase the profit and different types of adulterants were used for various purposes as to increase density or thickness, starch became a solution; to increase the solubility of fat externally urea is added; to increase the reading of lactometer, ammonium compounds are added; to increase the sweetness of milk, glucose is added; to neutralize the acidity developed in milk, neutralizers are used. But all this techniques and adulterants used for increasing economical profit reflects hazardous effects on health(Weise E, 2007)

Urea overburdens kidney and may even cause kidney failure, ammonium compounds develops problem for gastro intestinal tract, nausea, vomiting, diarrhoea and also acts as neurotoxin i.e. it can cause confusion and unconsciousness on consuming in large quantities, formalin is used to increase the shelf life of the milk but it is highly toxic and may lead to develop cancer, liver and kidney damage, oxytocin is not directly added in milk but is injected in cow or buffalo for early production and to increase the milking period but it is much harmful as if consumed for long period it develops feminine characters in male like breast development and in female it affects on menstrual cycle.
So the current research project had been undertaken to analyze the milk samples for the presence of adulterants (Honkar A S, 2015).

Materials and method:

Sample collection:
Samples of milk were collected from various centers of Jalgaon districts. Milk of various brands like Vijay, Saraswati, Datta, Vikas and Bapu which are famous in Jalgaon for good quality milk, were used for the study.

Chemicals and Reagents:
All chemicals and reagents used in the current work were of A. R. grade.

1. Detection and Quantification of Starch in Milk
Take about 5 ml of milk in a test tube. Bring to boiling condition and allow the test tube to cool to room temperature. Add 1-2 drops of iodine solution to the test tube. Development of blue color indicates presence of starch which disappears when sample is boiled and reappears on cooling. The limit of detection of method is 0.02%.

2. Detection of Added Urea in Milk
This method is based on the principle that urea forms a yellow complex with DMAB in a low acidic solution at room temperature.
Mix 1 ml of milk with 1 ml of 1.6% DMAB reagent. Distinct yellow colour is observed in milk containing added urea. The control (normal milk) shows a slight yellow colour due to presence of natural urea. The limit of detection of method is 0.2%.

Quantitative Estimation of Urea in Milk
10 ml of milk sample is mixed with 10 ml of TCA to precipitate the proteins and filtered using Whatman 42 filter paper. 5 ml of filtrate is then treated with 5 ml of DMAB reagent to develop the color. Blank is prepared by taking 5 ml of diluting reagent and treating with 5 ml of DMAB reagent. The optical density of the yellow color is measured at 420 nm. From standard curve the amount of urea in milk is calculated.

3.Detection of Ammonium Compounds in Milk
Take 1.0 ml of milk add 0.5 ml of 2% sodium hydroxide, 0.5 ml of 2% sodium hypochlorite and 0.5 ml of 5% phenol solution. Heat for 20 seconds in boiling water bath, bluish color turns deep blue in presence of ammonium sulphate. The development of pink color shows that the sample is free from Ammonium sulphate.

4.Tests for Presence of Sulphates in Milk
Take 10 ml of milk in a 50 ml stoppered test tube. Add 10 ml of TCA solution. Filter the coagulated milk through Whatman filter paper Grade 42. Take 5 ml of clear filtrate. Add few drops of barium chloride solution. Observe for any visible precipitates in the tube. Formation of milky-white precipitates indicates the presence

5. Detection and Estimation of Added Glucose in Milk

Take 1 ml of milk sample in a test tube. Add 1 ml of modified Barford's reagent. Heat the mixture for exact 3 min in a boiling water bath. Rapidly cool under tap water. Add one ml of phosphomolybdic acid reagent to the turbid solution. Observe the color. Immediate formation of deep blue color after adding phosphomolybdic acid reagent indicates the presence of added glucose in the milk sample. In case of pure milk, only faint bluish color can be observed due to the dilution of Barford's reagent. The limit of detection of method is 0.1%.

6.Detection of Sodium Chloride in milk

The presence of extraneously added sodium chloride in milk can be detected by silver nitrate and potassium chromate reagent.

Take 5.0 ml of milk sample and add 1.0 ml of 0.1 N silver nitrate solution (10%). Mix the content thoroughly and add 0.5 ml of 10% potassium chromate solution and observe the color. Appearance of chocolate brown precipitate indicates the absence of dissolved chloride in milk and appearance of yellow color indicates presence of dissolved chloride. The limit of detection of method is 0.02%.

7. Detection of Nitrates (Pond Water) in Milk

Take 2 ml of milk in a test tube. Rinse the tube with the milk and drain the milk from the test tube. Add two-three drops of the reagent along the side of the test tube. Note the developed color. Deep blue color will be formed in presence of nitrate in the milk sample. Pure milk sample will not develop any color.

8.Detection of Neutralizers in Milk

Method (Alkalinity of ash)

Neutralization with lime water/sodium bicarbonate/ caustic soda increases ash content and alkalinity of ash. Take 20 ml of milk in a silica dish, evaporate on a water bath and keep in muffle furnace at 550ºC to get white ash. Dissolve the ash obtained in 10 ml of water and titrate with 0.1 N HCI. The titre of more than 1.2 ml indicates the presence of neutralizers in milk.

9. Detection of Hypochlorites and Chloramines in Milk

Method 1. Detection of Hypochlorite

In this test yellowish fluorescence is produced due to the presence of chlorate (potassium or sodium chlorate) in the hypochlorite solution and is proportional to the amount present. Stannous chloride in the reaction acts as reducing agent.

Cool about 3 ml of milk sample in a test tube in a freezing mixture of ice and salt to 2 to 5°C. In another test tube, take an equal volume of the stannous chloride solution and similarly cool and add to milk. Shake the tube whilst in freezing mixture and hold for 3 min. Place the mixture in a centrifuge tube and centrifuge for 3 min at 2500 rpm. A yellow-green color is produced in the presence of hypochlorite. Alternatively, after centrifuging, examine the tube in ultraviolet light from a mercury vapour lamp fitted with Wood's filter for the presence of any yellow fluorescence.

Method 2. Detection of Hypochlorites and Chloramines

A. To 5 ml of sample in a test tube add 1.5 ml of Potassium Iodide solution, mix thoroughly and observe color.

B. If unaltered, add 4 ml of dilute HCl, mix thoroughly with a glass rod flattened at one end and note color of curd.

C. Subsequently, place the tube in a water bath previously heated to 85°C and allow it to remain for 10 minutes. The curd will rise to the surface. Cool the tube rapidly by placing in cold water. Note the color of the curd and the liquid.

D. Next add 0.5.to1.0 ml of starch solution to the liquid below curd and note the color.

10.Test for Quaternary Ammonium Compounds in Milk

To a centrifuge tube add 1 ml milk, 5 ml water, 1 ml indicator solution and 0.2 ml buffer and shake hard for 10 seconds. Centrifuge for 5 minutes at 3200 rpm. If QAC is present the bottom layer assumes a red or pink colour. Samples containing about 1 mg / kg of QAC show a faint pink colour. If the colour is deep pink or red, the amount of QAC can be approximately determined by titration with a standard anionic detergent solution.

11. Test for Presence of Formalin in Milk

Hehner's Test

Take milk sample (2 ml) in a test tube and add 2 ml of 90 percent H2SO4containing traces of ferric chloride from the side of the test tube slowly. Formation of purple ring at the junction indicates formaldehyde is present in milk. If sucrose is present, distil the milk sample (25 ml) and then carry out the test on the distillate by taking 2-3 ml of distillate and adding 2 ml of formaldehyde free milk. The violet coloration does not appear usually when relatively large quantities of formaldehyde are present. Precaution: If H2SO4 is added from the top and not from the side of the test tube, it may burn the milk solids and affect the end result.

12.Test for Presence of Boric acid and Borates

Take 20 ml of milk in a porcelain dish and add 1.4 ml of conc. hydrochloric acid and mix it thoroughly. Dip a strip of turmeric paper in the acidified milk. Appearance of characteristic red colour on the turmeric paper indicates the presence of boric acid or borax (Na2B4O7.10H2O). The red colour changes to dark blue green on adding ammonium hydroxide, but reappears on re-acidification with hydrochloric acid

13.Test for Presence of Salicylic acid in Milk

Measure 5ml of milk in test tube and add 5 drops of Conc. Sulphuric acid and gently shake the test tube. Then add 0.5% ferric chloride solution drop wise into test tube and mix it well. Development of Violet Colour indicates the presence of salicylic acid.

Result and Discussion:

Six types of milk samples were analyzed for the presence of various adulterants. The results obtained are mentioned in the table No.1.

Sample	*Urea*	*Ammonium compounds*	*Starch*	*Sulphates*	*Sodium Chlorides*	*Nitrate (pond water)*	*Hypoclorites and chloramines*	*Formalin*	*Boric acid & Borates*
Vijay	abscent no yellow colour observed	present Blue colour observed	abscent no blue clour observed	present ppt observed	present yellow colour observed	abscent no blue colour observed	yellow colour conc.1:5000	present purple ring observed	abscent no red colour observed
Saraswati	abscent no yellow colour observed	present Blue colour observed	abscent no blue clour observed	present ppt observed	present yellow colour observed	abscent no blue colour observed	pale yellow conc.1:5000	present purple ring observed	abscent no red colour observed

Datta	abscent no yellow colour observed	present Blue colour observed	abscent no blue clour observed	present ppt observed	present yellow colour observed	abscent no blue colour observed	dark purple colour 1:10000	present purple ring observed	abscent no red colour observed
Vikas	abscent no yellow colour observed	present Blue colour observed	abscent no blue clour observed	present ppt observed	present yellow colour observed	abscent no blue colour observed	pale yellow conc.1:5000	present purple ring observed	abscent no red colour observed
Bapu	present yellow colour observed	present Blue colour observed	abscent no blue clour observed	present ppt observed	present yellow colour observed	abscent no blue colour observed	pale yellow colour conc.1:5000	present purple ring observed	abscent no red colour observed

Table 1: Various adulterants present in milk samples.

Ammonium sulphate :-

Sample 1 Sample 2 Sample 3 Sample 4 Sample 5 Sample 6

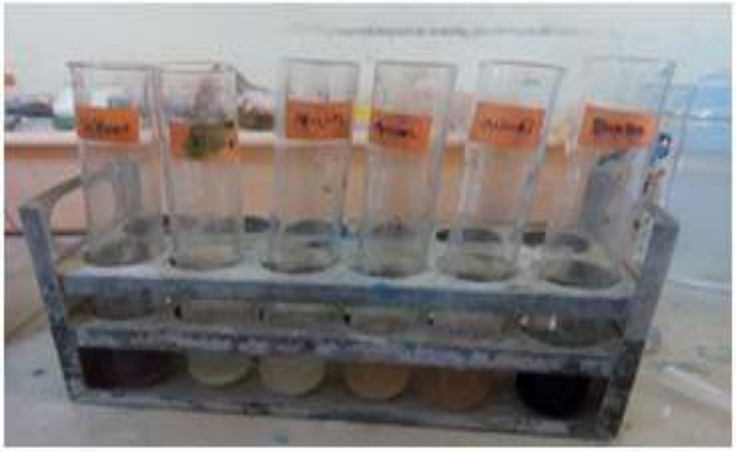
Ammonium compounds were found to be present in all the samples analyzed. Pooja Jaiswal and S. K. Goyal (2016) observed that ammonium compounds were present in 1 sample out of 50 samples examined.

NaCl:-

Sample 1 2 3 4 5 6

Sodium Chloride was present in all the samples analyzed. Chinta S. S. et al, (2014) observed that sodium chloride was present in 28.26% milk samples out of 92 milk samples examined.

Hypochlorites and Chloramine:-



Sample 1 2 3 4 5 6

Hypochlorites and Chloramine was present in all the samples analyzed.

Formalin:-

Sample 1 2 3 4 5 6

Formalin was present in all the samples analyzed. Chinta S. S. et al, (2014) observed that formalin was present in 2.2% milk samples among total 92 milk samples examined.

Boric acids and Borates:-

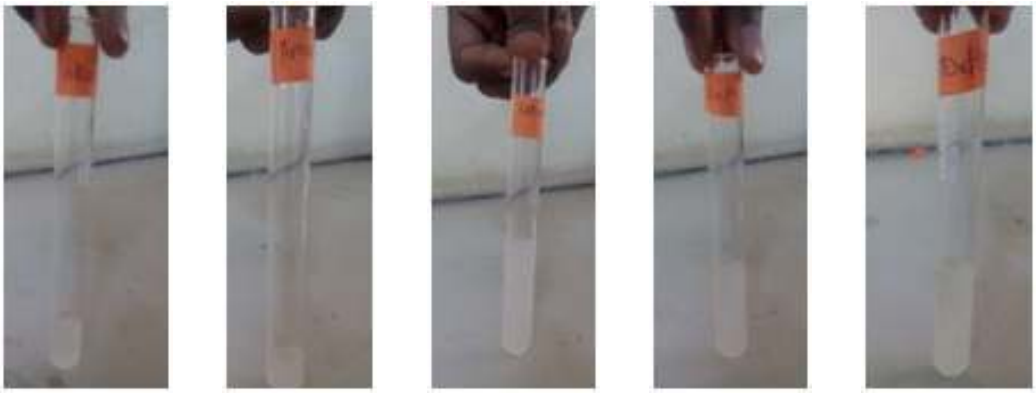
Sample 1 2 3 4 5 6

Boric acids and Borates were absent in all the samples analyzed.

Glucose:-

Glucose was absent in all the samples analyzed. Similar results were obtained by J. Singh et al. Glucose was absent in all 30 milk samples examined.

Sulphate:-



Sample 1 Sample 2 Sample 3 Sample 4 Sample 5

Sulphates were present in all the samples analyzed.

Starch:-

Sample 1 Sample 2 Sample 3 Sample 4

Starch was absent in all the samples analyzed. Swathi J. K. and Kauser Naazia (2015) got 60% samples adulterated with starch out of 10 milk samples they analyzed.

Conclusion:
Conduction of adulteration tests on various milk brands like Vijay, Saraswati, Vikas, Bapu and Datta indicated that all the brands tested had some or other adulterants present. Thus,it can be concluded that not a single milk sample was completely adulterant free.

References:

- Swathi J. K. and Kauser Naazia (2015) A study on adulteration of milk and milk products from local vendors, International Journal of Biomedical and Advance Research, 6(09): 678-681

- Azad Tanzania, Ahemad Shoeb (2016),common adulteration and their detection techniques, International journal of food contamination,3:22

- Roy. N.K. and Sen, D.C. (1991),Manual Methods of Analysis for Adulterants and Contaminants in Foods, I.C.M.R 1990, page 28

- Roy, N.K. and Sen, D.C. (1991) Rapid analysis of milk. In: Textbook of Practical Dairy Chemistry. Vol. I-Chemical analysis of fluid milk. Kalyani Publishers.

- Mahmood, A. and Usman S.(2010), A Comparative Study on the Physicochemical Parameters of Milk Samples Collected from Buffalo, Cow, Goat and Sheep of Gujarat, Pakistan, Pakistan Journal of Nutrition, 9(12): 1192-1197

- Dadasaheb Navale , Shelley Gupta(2016), To Detect Types of Adulteration Present in Milk Products (Volume V, Issue III).

- Jaiswal Pooja and Goyal S.K. (2016),identification of common milk adulterants using in Mirzapur city 2(1):313- 320(2016).

- Singh H. et al,(2014), study of composition, adulteration and hygienic status of milk in Mandi town and surrounding villages.

- Honkar A.S., Landge S.N. and Kele V.D.(2015) Impacts of adulteration of milk with melamine: A case of protein replacement.

- Chinta S. S. et al, (2014) the study on detection of adulteration in milk samples supplied by local vendors in Tirupathi region, India

- Singh J. et al,(2014), Detection of common adulterants in milk from Delhi and NCR, DU Journal of Undergraduate Research and Innovation.

- Singuluri H, Sukumaran MK (2014) milk adulteration in Hyderabad, India – A comparative study on the levels of different adulterants present in milk. 5:212.

- Bhamare Y. R., Matsagar M. B.,Dighavkar C.G.(2016),Impact of milk adulteration on food safety and human health in India: A review,World journal of pharmacy and pharmaceutical sciences,Volume 5, Issue 8, 636-644.

- Singh, Anita, Sharma, Juhi and Bhatt, Shuchi Rai (2011). Detection of ill-effects of urea adulterated milk in Varanasi, Food Sci. Res. J., 2 (1) : 46-49.

Study of lipase producing bacteria from soil contaminated with oil

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ABSTRACT:
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Preparation of Your Abstract
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Study of lipase producing bacteria from soil contaminated with oil

Abstract:-
Lipases are water soluble enzymes which have the ability to hydrolyze trigacylglycerol to release free fatty acid and glycerol. Bacterial lipases are mainly found in soil which is contaminated with oil (edible, non-edible). Samples of soil contaminated with oil were collected from various spots of city and was screened for lipase producing bacteria. Castor oil agar, Rhodamine plate assay, lipase screening of liquid medium and lipase assay were performed for isolation of lipase producing bacteria, gram staining and IMViC test. Soil contamination or soil pollution as a part of land degradation is caused by the presence of xenobiotic (human-made) chemicals or other alterations in the natural soil. It is typically caused by industrial activities, chemicals used for agricultural purposes, or improper disposal of waste which contains oil or other fatty substances which reduces the soil fertility and result in the creation of toxic dust. Due to these reasons pollution increases day by day.
Lipases are largely produced from microbes and specifically bacterial lipases play vital role in commercial ventures. Lipases are generally produced on lipidic carbon, such as oil, tween in the presence of nitrogen source.

Introduction: -

Soil pollution increases day by day due to the many factors. One of the factors which affect the soil nature, its characteristics and fertility is oil which is dumped by many industries, dairy waste, hotel and municipal waste or garbage. Accidental oil spills as well as its leakage are due to large variety of human activities related to oil refining, handling and transport, storage and use of crude oil and its distilled products. As oil and water are immiscible, an oil slick forms when oil is spilled in water. This increases the resistance of oil to natural attenuation processes and makes it more persistent in the environment.

Soil contamination or soil pollution as a part of land degradation is caused by the presence of xenobiotic (human-made) chemicals or other alterations in the natural soil environment. It is typically caused by industrial activity, agricultural chemicals, or improper disposal of waste. Lipases are largely produced from microbes and specifically bacterial lipases play vital role in commercial ventures. Lipases are generally produced on lipidic carbon, such as oil, tween in the presence of nitrogen source. It acts on oil spilled soil and oil is degraded as a simple form from free fatty acid and glycerol(1) .

Lipases (E.C.3.1.1.3.) belong to group of enzymes whose biological function is to catalyze the hydrolysis of triacylglycerols into diacylglycerols, monoacylglycerols, free fatty acids (FFA) and glycerol(2). Lipases should be activated by the presence of interface, that is, its activity should sharply increase as soon as the triglyceride substrate forms an emulsion. They have emerged as key enzymes which find usage in food, dairy, paper, textile, leather and detergent industries, waste water treatments. Lipases/esterase-producing bacteria's are found in diverse habitats such as soil contaminated with oil, dairy waste, industrial wastes, oil seeds and decaying food, compost heaps, coal tips and hot springs(3).

The sources of lipase enzyme are generally found in nature such as plant, animal, bacteria etc. Bacterial lipases are important; because of friendly for environment, non-toxic, and no harmful residues (4). Lipase producing bacteria can control the pollution of oil spills in water bodies with the help of lipase enzyme thus reducing the water pollution.(5) It is also helpful for soil contaminated with oil, and helps in increasing soil fertility. Soil is a reservoir of large and diverse microbial population. Lipase producers are mainly from soil that contains edible oil. A simple and reliable method for detecting lipase activity in microorganisms uses rhodamine B as a substrate and lipase production is indicated by the formation of clear haloes around the colonies grown(6,7).

Objective:-
Study of lipase producing bacteria from oil contaminated soil

Materials and method:
Collection of soil samples:
Samples of soil contaminated with oil were collected from different spot in city with the depth of 5-10 cm.
Codes were given as A, B, C, D, E. Soil is both edible and non edible. All the samples were aseptically subjected to serial dilution and plated on the Nutrient Agar.

Isolation of soil sample:
Isolation of samples were serially diluted with D.W. and spread on nutrient agar plate by spread plate method and incubated at 37˚C for 48 hr.(8) Each sample was diluted up to 10-4. Enumeration of viable cells is the characterised feature of the plate count technique. This method i.e. spread plate based on the principle that when material counting bacteria are cultured, every bacterium develops into visible colony on nutrient agar medium. 25 isolates were cultured on nutrient agar.

ROA plate assay: A sensitive and specific plate assay for detection of lipase producing bacteria makes use of rhodamine B-castor oil-agar plate assay. To identify the specific bacterial lipase, producer ROA medium plate was used. The bacterial isolates were inoculated into the medium by streak plate method. Lipase producing isolates were identified after incubation for 48 hr at 37°C. The hydrolysis of substrate causes the formation of orange fluorescent halos around bacterial colonies which were visible upon UV irradiation(9).

The microbial test for microorganisms :
a. Gram staining: It useful to classify bacteria into two major groups- gram positive and gram negative with the help of gram staining reagent. This method is easy to observe under microscope.
b. IMViC test: It is a useful set of four reactions which commonly helps in identification of family enterobacteriaceae. The four reactions are: Indole Production Test, Methyl Red Test, Voges Proskauer Test and Citrate Utilization Test.

Lipase screening liquid medium: In order to select the best lipase producer for enzyme purification and characterization, isolates were cultured in lipase screening medium with slight modifications.

Inoculums were prepared in the screening medium, devoid of oil. Triplicate flasks were inoculated for each isolate with 1%v/v of inoculums to a 100 ml of medium in 500 ml Erlenmeyer flasks and incubated on a rotary shaker at 150 rpm for 48hr. Samples were withdrawn and the cells were removed by centrifugation at 20,000 rpm for 10 min. The lipase production in the supernatant was estimated by colorimetric method.(10)

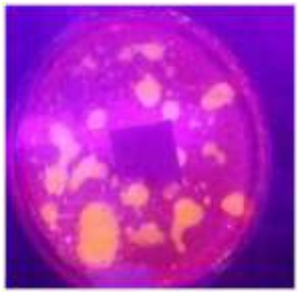
Assay of lipase enzyme by Colorimetric method: Fatty acids liberated during hydrolysis of a castor oil substrate by lipase can be determined colorimetrically using a cupric acetate/pyridine reagent33. Fatty acids complex with copper to form cupric salts or soaps that absorb light in the visible range (λmax 715 nm), yielding a blue colour. Quantification of fatty acid released by lipase is determined by reference to a standard curve prepared using oleic acid. Castor oil was used a substrate. The reaction mixture consists of 1ml of crude enzymes; 2.5ml of castor oil was incubated for 5 minutes. Then the reaction was stopped by adding 1.0ml of 6N HCL and 5ml Benzene. The upper layer of 4ml was pipette out into a test tube and 1.0 ml of cupric acetate pyridine was added. The FFA dissolved in Benzene was determined by measuring the absorbance of Benzene solution at 715nm. Lipase activity was determined by measuring the amount of FFA from the standard curves of oleic acid. One unit of lipase activity is defined as the amount of enzyme that liberated 1µmol FFA in 1min at 37° (11). Several authors reported the assay of microbial lipase by colorimetric copper soap method [12,13,and14].

Result and Discussion:

Sr. no	Name	Colony	Concentration/ml
1	Sample A	6	60,000
2	Sample B	5	50,000
3	Sample C	7	70,000
4	Sample D	10	1,00,000
5	Sample E	15	1,50,000

Plate counts for bacteria were between 60,000 to 1,50,000 cfu per ml per plate. The bacterial colonies on nutrient agar plates were subjected to qualitative and quantitative screening. Predominant colonies were isolated i.e.conc.10-5 for further study. From research works of Veerapagu et al. count between 30-300 cfu/ml per plate and P.Pallavi et al.-count ranges 5-48 × 10-5 CFUg-1 of soil.

ROA plate assay:



(Screening medium under UV rays)

Predominant isolates obtained from isolation were used for further study of rhodamine plate assay. **In Rhodamine-B** orange fluorescents of orange bacterial colonies were visible upon UV irradiation. The fluorescence observed was due to reaction of the hydrolysed substrate with rhodamine-B. Same results were observed in Screening of lipase producing bacterial isolation and production of lipase producing Bacillus sp, and its isolation by Vijay Kumar Gupta et al.(2012)

gram staining and microbial test:

Result:

(MR Test)

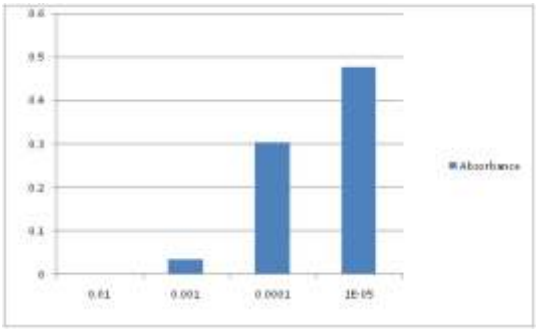
(Indole test)

(Citrate test)

TEST	RESULT
Staining Technique	Negative
Shape &morphology	Cocci & Bacilli
Indole test	Negative
Methyl red test	Negative
voges-proskaur test	Negative
Citrate agar test	Positive

Selected isolates were preliminarily examined for microbial test by gram staining and IMVic test.
The selected isolates, gave negative result for staining, indole, methyl red and VP test and positive results for Citrate agar test. Morphologically shapes seen were of cocci and bacilli. All the results were same but shape of bacteria was contradictory with respect to International Journal of Innovative Research in Science, Engineering and Technology (2014).

Graph showing free fatty acid concentration(µ/ml) :



Among 5 isolates, 4 isolates were obtained from colorimetric method. Sample A, C, D, and E were used for the lipase assay in colorimetric method. The result obtained from above graph in sample A gives minute free fatty acid concentration and sample E gives large free fatty acid concentration. Hence sample E containing microorganisms shows large activity in oil contaminated with soil. For colorimetric method contradictory result of lipase activity were seen in Vijay Kumar Gupta et al. (2012).

Conclusion:

From the study of lipase enzyme, we conclude that lipases have higher tendency to break down the oil complex. Lipases exhibit the ability to bio-transform a wide range of organic compounds and are able to degrade various chemical pollutants such as simple hydrocarbon, aromatic hydrocarbon etc,. Therefore present study was focused on lipase degrading bacteria from oil spilled soil which can be remediation of oil contaminated soil.

References:

(1) http://en.wikipedia.org/wiki/pollution by oil spilled soil

(2) A.P.Kempak,D.M.G.Freire,Bosyst.Eng.,2008,31,119-225

(3) J. Vakhu l,Electr .J.Biotechnol.,2006,9,69-85 and H.J.Wang.J.Fermant.bioenergy 1995,79:433-438 (4) F. Hasan, A. Sanh, and A. Hameed, "Industrial applications of microbial lipases," Enzyme and Microbial Technology, vol. 39, pp. 235–251, 2005.

(5) M.Veerapagu , Dr.A.Sankara Narayanan, : Screening selection identification production & optimization of bacterial lipase from oil spilled soil vol.6 suppl.3,2013International journal of innovative research in science technology, vol.3 issue 12,December 2014

(6) Ertuğrul, S., Dönmez, G and Takaç, S., "Isolation of lipase producing Bacillus sp. from olive mill wastewater and improving its enzyme activity", J Hazard Mater,Vol. 149,Issue 3, pp. 720–724, 2007

(7) Prasad, M.P. and Manjunath, K., "Comparitive study on biodegradation of lipid rich waste water using lipase producing bacterial species", Indian J Biotechnol,Vol. 10, Issue 1, pp.237-245, 2011

(8) Bashan,Y and Wolwelsky, j. "soil sample for qualifying microorganisms soil sci,.vol,143 pp`132-138 1987

(9) Bouaziz, A., Horchani. H., Ben Salem, N., Gargouri, Y and Sayari, A., "Expression, purification of a novel alkaline Staphylococcus xylosus lipase acting at high temperature", Biochemical Engineering Journal, Vol. 54, Issue 2, pp. 93–102, 2011.

(10) Kulkarni, N and Gadre. R.V., "Production and properties of an alkaline, thermophilic lipase from Pseudomonas fluorescens NS2W", J Ind Microbiol Biotechnol, Vol. 28,Issue 6, pp.344 –348, 2002.

(11) Screening selection identification production and optimization of bacterial lipase from oil spilled soil.

(12) Nisha, P., Nayana, M., Varghese,V., Deepalekshmi, K and Deepthi, M.D., "Lipase production at different bio parameters using Micrococcus roseus isolated from Vembanattu lake", Int J Adv Life Sci. Vol.6, Issue 5, pp. 490-496, 2013.

(13) Bashan, Y and Wolwelsky, J., "Soil samplers for qualifying microorganisms", Soil Sci, Vol 143, pp.132 - 138, 1987

(14) Bouaziz, A., Horchani. H., Ben Salem, N., Gargouri, Y and Sayari, A., "Expression, purification of a novel alkaline Staphylococcus xylosus lipase acting at high temperature", Biochemical Engineering Journal, Vol. 54, Issue 2, pp. 93–102, 2011

EVALUATION OF ANTI-DIABETIC ACTIVITIES OF MEDICINAL PLANTS

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ABSTRACT:
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Diabetes is one of the diseases, which have attained a global concern. The use of synthetic version of insulin been used to counter the adverse effects of diabetes. However, the continuous use of these synthetic drugs could prove detrimental in the future. In addition, factors like lack of knowledge or carelessness could result in hypoglycemia. Thus, a natural approach to remediate this disease is necessary. The use of Ayurveda and herbal medications is strongly advisable. The current work focus on the formulation of a PHM (poly-herbal medicine) that could used as a replacement of synthetic insulin, derived from natural plant extracts. Here the extracts studied individually and in combination for their biological and chemical properties. The extracts from plants Gymnema sylvestry, Adhatoda vasica, Justicia adhatoda, Syzigium cumini obtained and concentrated. The key secondary metabolite in this PHM is Gymnemic Acid that has antidibetic action. Along with the antidiabetic activity, the PHM possessed inhibitory activity of α-amylase and ability to scale-up the metabolism of excess sugar. The resultant PHM has a potential to use as a drug against diabetes as well as on different disorders like hyperinsulinism.
Keywords: PHM (poly-herbal medicine), Gymnemic acid and antidibetic activity.

Introduction

Diabetes mellitus is a metabolic disorder characterized by a loss of glucose homeostasis with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both [1]. Almost half of all deaths attributable to high blood glucose occur before the age of 70 years [2]. WHO projects that diabetes will be the 7th leading cause of death in 2030 [3]. The use of the drugs limited by their pharmacokinetic properties, secondary failure rates and associated side effects. Thus searching for a new class of compounds is essential to overcome diabetic problems. There is continuous search for alternative drugs. The medicinal plant shows huge potential to use as anti-diabetic agent with no side effects. The objective of the present study is to investigate the phyto-chemical, in-vitro antidiabetic activity of ethanolic extract of Gymnema sylvestre, Adhatoda vesica, Justicia adhathoda leaves, and seeds of *Syzigium cumini.*

Materials and Methods

Plant material The fresh leaves of plantscollected locally and authenticated by the Department of Botany, Moolji Jaitha College, Jalgaon.

Preparation of extracts The shade dried powdered of leaves of *Gymnema sylvestre, Adhatoda vesica, Justicia adhathoda,* and seeds of Syzigium cumini taken and subjected to extraction using ethanol in soxhlet apparatus. Each extract concentrated by distilling off the solvent and evaporated to dryness. The extracts dissolved in 1% Tween 80 and used for the present study.

Phytochemical screening of bioactive compounds: The qualitative analysis of bioactive compounds carried out by the methods reported by Patil et al., (2012) [4].

Non-enzymatic glycosylation of haemoglobin assay: Antidiabetic activity of leaves of *Gymnema sylvestre, Adhatoda vesica, Justicia adhathoda,* and seeds of *Syzigium cumini* investigated by estimating degree of non-enzymatic haemoglobin glycosylation, measured colorimetrically at 520nm. Glucose (2%), Haemoglobin (0.06%) and Gentamycin (0.02%) solutions were prepared in phosphate buffer 0.01 M, pH 7.4. 1 ml each of above solution was mixed. 1 ml of each concentration added to above mixture. Mixture incubated in dark at room temperature for 72 hrs. The degree of glycosylation of haemoglobin measured colorimetrically at 520nm. Alpha-Tocopherol (Trolax) used as standard drug for assay. Percentage of inhibition calculated as previously published protocol [5]. All the tests performed in triplicate.

Glucose uptake in Yeast cells: Yeast cells prepared according to the method of Yeast cells [6] briefly, commercial baker's yeast washed by repeated centrifugation (3,000×g; 5 min) in distilled water until the supernatant fluids clear and a 10% (v/v) suspension prepared in distilled water. Various concentrations of extracts (1–5 mg) added to 1 ml of glucose solution (5, 10 and 25 mM) and incubated together for 10 min at 37 °C. Reaction started by adding 100 µl of yeast suspension, vortex and further incubated at 37 °C for 60 min. After 60 min, the tubes centrifuged (2,500 × g, 5 min) and glucose estimated in the supernatant. Metronidazole taken as standard drug for antidiabetic. The percentage increase in glucose uptake by yeast cells [7].

***In vitro* enzymatic alpha-amylase inhibition assay** A starch solution (0.1% w/v) obtained by stirring 0.1 g of starch in 100 ml of 16 mM of sodium acetate buffer. The enzyme solution prepared by mixing 27.5 mg of alpha amylase (Himeida) in 100 ml of distilled water. The colorimetric reagent is prepared by mixing sodium potassium tartarate solution and 3, 5 dinitro salicylic acid solution 96 mM. Both control and plant compound added with starch solution and left to react with alpha-amylase solution under alkaline conditions at 25ºC. The reaction measured over 10 minutes. The generation of maltose was quantified by the reduction of 3, 5 dinitro salicylic acid to 3- amino-5- nitro salicylic acid. This reaction is detectable at 540 nm [8].

FTIR spectral analysis of ethanolic extract of *leaves of medicinal plants* The FTIR analysis of the ethanolic extract of G. sylvestre, S. cumini, J. adhatoda & A. vesica performed using the equipment IRaffinity S1, Shimadzu. The KBr used as carier for extracts. The identification of components based on picks spectra as well as comparison of their standard indices.

Results and discussion

Diabetes mellitus is a metabolic disorder with increasing frequency throughout the world. Insulin plays an important role in the control of glucose homeostasis. Lack of insulin affects carbohydrate, fat and protein metabolism, while the increase concentration leads to metabolic disorders like Acanthosis nigricans. Management of diabetes without side effects and reduced insulin disorder is still challenge to the medical community. It was anticipated that inhibition of the activity of such alpha-amylase, delay the degradation of carbohydrate, which would in turn cause a decrease in the absorption of glucose; as a result there is a reduction of postprandial blood glucose level [9]. However, that leads to increase in insulin concentration of blood, result in hyperinsulinism.

Phytochemical screening of bioactive compounds: The phytochemical screening of the ethanolic extract of *G. sylvestre, S. cumini, J. adhatoda & A. vesica* carried and the results given in the Table 1.

The ethanolic extract of *G. sylvestre, S. cumini, J. adhatoda & A. vesica* shows the presence of major phytoconstituents like alkaloids, flavonoids, steroids, terpenoids, saponins, tannins, phenols and glycosides.

Table 1 Phytochemical analysis of G. sylvestre, S. cumini, *J. adhatoda & A.*

Qualitative test	G. Sylvestry	A. vessica	S. cumini	Adulsa
Phenols	+	-	-	-
Steroids	+	+	+	+
Glycosides	-	-	-	-
Saponins	+	+	+	+
Volatile oils	-	-	-	-
Alkaloids	+	+	+	+
Flavonoids	+	-	-	+
Terpenoids	+	+	+	+
Tanins	+	+	+	+
Coumarins	-	-	-	-
Anthocianins	-	-	-	-

Note: (+) indicates presence of metabolites, (-) indicates presence of metabolites

Non-enzymatic glycosylation of haemoglobin assay: All extracts showed varying effect on non-enzymatic glycosylation of haemoglobin. These extracts caused a significant glycosylation during the experiment. The effects of *G. sylvestre, S. cumini, J. adhatoda & A. vesica* extracts on non-enzymatic glycosylation summarized in figure 1. It was evident from the table that the ethanol extract is potent non-enzymatic glycosylation agent.

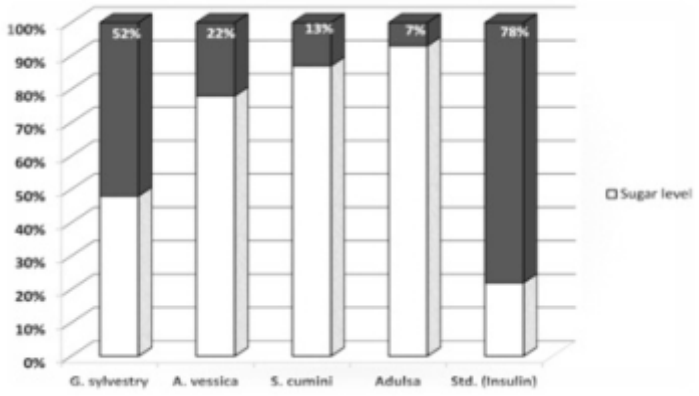

Figure 1 Non-enzymatic glycosylation of tested plants

Glucose uptake in Yeast cells The rate of glucose transport across cell membrane in yeast cells system studied and the results given in Figure 2. The amount of glucose remaining in the medium after a specific time serves as a marker of the glucose uptake by the yeast cells [10]. The ethanol extract of *G. sylvestre, S. cumini, J. adhatoda and A. vesica* increased the glucose uptake in yeast cells. The highest percentage of glucose uptake observed in G. sylvestre

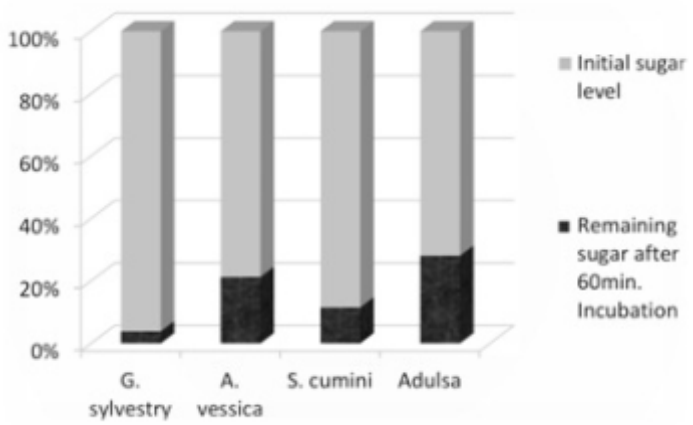

Figure 2 Effect of plant extract on glucose uptake in Yeast cells

In vitro **enzymatic alpha-amylase inhibition assay:** Among the different anti-diabetic therapeutic approach, one major strategy is reducing gastrointestinal absorption of glucose by inhibition of carbohydrate metabolizing enzymes alpha-amylase. The alpha amylase is the key enzymes for dietary carbohydrate digestion and inhibitors of these enzymes may be effective in retarding glucose absorption. This is because only monosaccharide readily taken up from the intestine. While all other carbohydrates have to be broken-down enzymatically before they can be absorbed [11]. The inhibition of alpha amylase by different plant extract illustrate in figure 3.

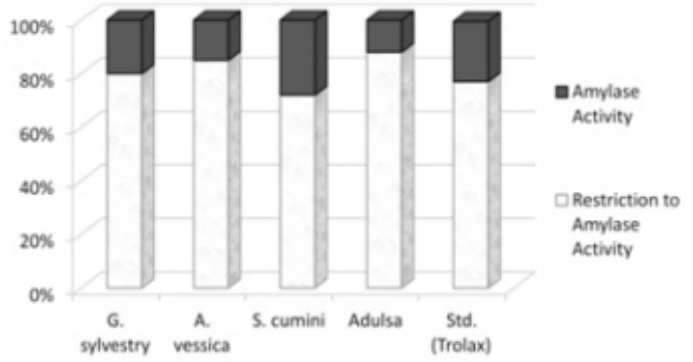

Figure 3 In vitro enzymatic alpha-amylase activity of tested plants

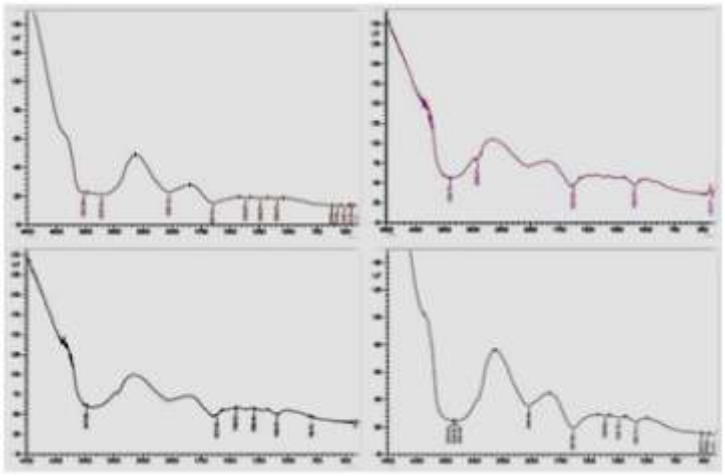

Figure 4 FTIR spectra of tested plants

Conclusion The results of above experiments concluded that the leaves of *Gymnema sylvestre, Adhatoda vesica, Justicia adhathoda,* and seeds of *Syzigium cumini* medicinal importance. The anti-diabetic activity of tested plants proved by in vitro alpha amylase inhibitory activity, inhibition of non-enzymatic glycosylation of hemoglobin and yeast glucose uptake assay. This is involved in regulation and absorption of carbohydrates. The present data, illustrate that the ethanolic extract of *Gymnema sylvestre, Adhatoda vesica, Justicia adhathoda,* and *Syzigium cumini* contains many bioactive compounds, it will be useful in treating various diseases including diabetes.

Acknowledgement

The authors are thankful to Principal, Dr. Uday D. Kulkarni, Budding research coordinator Mrs. Dr. G. M. Rane, and Dr. Leena D Dhake, Head of Biotechnology Department, M J College, Jalgaon for providing facilities and encouragement.

References

1. Thirupathy Kumaresan P., Saravanan S., and Subish R., In Vitro Anti Diabetic Activity of Morinda Tinctoria Fruits Extracts. Asian J Pharm Clin Res, 7(1), 2014, 90-92
2. Global report on diabetes. World Health Organization, Geneva, 2016
3. Projections of global mortality and burden of disease from 2002 to 2030. Mathers C D, Loncar D. PLoS Med, 2006, 3(11):e442
4. Patil K. J. Patil V. A., Patil S.V., and Bhuktar A.S., Comparative preliminary phytochemical studies of Jasminium Multiflorum and Jasminum Officinale, Trends in Life science, 1(3) (2012) ISSN: 2319–4731, 43-45
5. Megha G. Chaudhari, Bhoomi B. Joshi, Kinnari N. Mistry, In Vitro Anti-Diabetic And Anti-Inflammatory Activity Of Stem Bark of Bauhinia Purpurea. Bulletin of Pharmaceutical and Medical Sciences (BOPAMS), 1(2), 2013,139-150.
6. Gupta Daksha, Kondongala Subraya Chandrashekher, Girish Pal et al. In vitro antidiabetic activity of pentacyclictritrprnoida and fatty acid ester from Bauhinia purpurea. International Journal of Pharmacology and Pharmaceutical Technology, ISSN-2277- 3436, 2(1), 2013
7. Dinesh Kumar, A. Mitra and M. Manjunatha et al. In vitro and in vivo studies of antidiabetic Indian medicina plants: A review. Journal of Herbal Medicine and Toxicology 3. 2009., ISSN: (2) 0973- 4643.
8. S. Praylin Singh and Sugirtha. P. Kumar, In vitro antidiabetic activity of compounds from Pithecello biumdulce fruit peel. International Journal of Pharmaceutical Chemistry, IJPC (2015) 05 (04), 123-127.
9. Rhabaso L R. and Chiasson J L , Glucosidase inhibitors ed. International Textbook of Diabetes. 2004
10. Wagner H and Bladt S. 2004. Plant Drug Analysis-A Thin Layer Chromatography Atlas. 2nd Ed, New Delhi, Thompson Press Ltd.
11. Nagaraj Santhiya, Suriyamoorthy Priyanga, Subrhamanian Hemmalakshmi, Kanakasabapathi Devak, Phytochemical analysis, Anti inflammatory activity, in vitro antidiabetic activity and GC-MS profile of Erythrina variegata L. bark. Journal of Applied Pharmaceutical Science 6(07), 147-155, July, 2016

ISOLATION OF SURFACTANT PRODUCING MICROORGANISMS CAPABLE OF ASSIMILATING HYDROCARBONS

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ABSTRACT:

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Abstract:

Isolation and screening of microorganisms from oil contaminated soil samples with biosurfactant producing ability was investigated. The biosurfactant producing ability of the microorganisms isolated from the soil samples was investigated by haemolytic assay, drop collapse test, and emulsification index method. The isolates were used to study assimilation of crude oil, lubricant oil, kerosene, anthracene and naphthalene.

Key words: biosurfactant, haemolytic assay, emulsification index

Introduction

The hydrocarbons and petroleum constitute one of the main environmental pollutants and their abundance and persistence in several polluted environmental compartments have been reported (Casellas *et* al. 1995). Most of the hydrocarbons are insoluble in water and their degradation using microorganisms have an important role in combating environmental pollution. Hydrocarbon degrading microorganisms produce biosurfactants of different chemical nature and molecular size which are surface active compounds which increases the surface tension of the hydrophobic water-insoluble substrates and thereby enhancing their bioavailability and the rate of bioremediation (Pekdemir *et* al., 1999). Many microorganisms capable of degrading petroleum and its components have been isolated. Given the complexity of oil products, a combination of bacterial strains with broad enzymatic capabilities will be required.

Against these backdrops, this study was aimed at isolating and screening biosurfactants producing microorganisms capable of degrading hydrocarbons from oil contaminated soil samples

Materials and methodology

Microbial Consortium

The microbial consortium was isolated from petrochemical contaminated soil collected from various petrol bunk and garage areas. The strains was characterized by morphological and biochemical tests and was maintained on Nutrient Agar (NA) tubes at 4oC with successive subcultures obtained every one month.

Culture Medium and Cultivation Conditions for hydrocarbon assimilation

Tanner's minimal medium was used for biodegradation studies. The media contained (gl^{-1}): $CaCl_2.H_2O$, 0.12; KH_2PO_4, 0.03; NH_4Cl, 0.56; NaCl, 0.84; $MgSO_4$, 0.86; KCl, 0.03 supplemented with $CoCl_2.6H_2O$, 0.1; $ZnCl_2$, 0.05; $CuSO_4.5\ H_2O$, 0.15; $Na_2MoO4.2H_2O$, 0.03.

For biodegradation assay, the carbon source (0.2 % in all cases) used were: crude oil, lubricating oil and naphthalene. Controls without carbon sources were performed. The inoculum used was 2% (v/v) of a cellular suspension of concentration 0.5 McFarland (Jorgensen, J. et al., 1999). The consortium was incubated in 250 ml Erlenmeyer flasks containing 100 ml of medium at 30ºC during 14 days under shaking at 150 rpm. All the experiments were carried out in triplicate.

Screening test for biosurfactant producing isolates

Drop collapse test: Screening of biosurfactant production was performed using the qualitative drop-collapse test described by Bodour and Maier (1998). Crude oil was used in this test. Two microlitres of oil was applied to the well regions delimited on the covers of 96-well micro plates and these were left to equilibrate for 24h. Five micro litres of cell free supernatant was transferred to the oil-coated well regions and drop size was observed after 1 min with the aid of a magnifying glass. The result was considered positive for biosurfactant production when the drop was flat and those cultures that gave rounded drops were scored as negative, indicative of the lack of biosurfactant production (Youssef et al., 2004).

Hemolytic activity:

Pure culture of bacterial isolates were streaked on the freshly prepared blood agar and incubated at 37°C for 48-72 h. Results were recorded based on the type of clear zone observed i.e. α-hemolysis when the colony was surrounded by greenish zone, β-hemolysis when the colony was surrounded by a clear white zone and γ-hemolysis when there was no change in the medium surrounding the colony (Carrillo *et* al., 1996).

Emulsification Index (E24):

Several colonies of pure culture were suspended in test tubes containing 2 ml of mineral salt medium. After 48 h of incubation, 2 ml crude oil was added to each tube and the mixture was vortexed at high speed for 1 min and allowed to stand for 24 h (Bodour *et* al., 2004).

Emulsification index (E_{24}) = (Height of the emulsion layer / Total height) X 100

Based on the screening test results, the positive isolates were selected, and then identified by its microscopic appearance and biochemical tests based on Bergey's manual of determinative bacteriology. The method describe by Cappuccino (1999) was followed for all the procedure. These isolates were further used for biodegradation studies of naphthalene and crude oil in the form of consortium.

Results and Discussion

Identification of microbial consortium

A total of 18 bacterial strains from soil samples contaminated with crude oil were obtained. These isolates were submitted to sequential enrichment during ten days with crude oil as carbon source in order to select the best oil degrading strains. The strains were selected which tested positive for biosurfactant production. Only 5 isolates showed positive results for all the 3 screening methods viz., hemolytic test, drop collapse test and emulsification index (Table 1).

Test isolates	Haemolytic test	Drop collapse test	Emulsification index %
Isolate 1	+	+	57.5
Isolate 2	+	+	38.4
Isolate 3	+	+	42.6
Isolate 4	+	+	47.4
Isolate 5	+	+	49.1

Table 1: Screening results of five isolates for the production of biosurfactant

The results on blood agar media were similar to the work done by Mulligan et al. (1984) and Mulligan et al. (1989), who have isolated biosurfactant overproducer mutants with blood agar method. The flat drop appearance in micro titer plate confirmed the positive result for drop collapse test as suggested by Jain et al. (1991), proving the use of drop collapse method as a sensitive and easy method to test for biosurfactant production. These biosurfactant producers were characterized based on microscopic and biochemical analysis according to Bergey's manual of determinative bacteriology (Table 2).

Characteristics	Isolate 1	Isolate 2	Isolate 3	Isolate 4	Isolate 5
Colony Shape	Circular	Circular	Irregular	Punciform	Rhizoid
elevation	Raised	Convex	Flat	Convex	Flat
Gram Reaction	+	+	-	+	-
Motility	+	+	+	+	+
Pigmentation	Orange	Yellow	Pale Yellow	White	Cream
Cell Shape	Spherical	Spherical	Rod	Spherical	Rod
Citrate Utilization	-	+	-	-	-
Voges proskauser's	-	-	-	-	-
Indole	+	-	+	+	-
Methyl Red	-	-	-	-	-

Table 2: Identification and characterization of biosurfactant producing isolates

Growth of consortium on hydrocarbons

The growth of isolates was studied during 14 days experiment on various hydrocarbons by measuring the absorbance daily (Table 3).

Carbon source	Isolate 1	Isolate 2	Isolate 3	Isolate 4	Isolate 5	Consortium
Crude oil	+	-	+	-	-	+
Lubricant oil	+	-	+	+	+	+
Kerosene	-	+	-	-	+	+
Anthracene	+	+	+	+	-	+
Naphthalene	+	+	+	+	+	+

Table 3: Growth of selected isolates on various hydrocarbons

The results showed that none of the isolates were able to grow on all the selected carbon sources individually on crude oil, lubricant oil, naphthalene, toluene and, kerosene. Whereas when these isolates were grown in the form of consortium, growth was observed on all selected carbon sources.

Conclusion

The study represented surfactant activity of the bacterial strains isolated from petrochemical contaminated soils from the petrol bunk and garage areas. A total of five bacterial monocultures and were identified as capable of assimilating crude oil, lubricating oil, kerosene, naphthalene and anthracene as only source of carbon and energy. The microbial consortium degraded significant amounts of selected hydrocarbons as compared to individual isolates present in the mineral medium. The microbial consortium produced emulsification of the medium and degraded a variety of hydrocarbon substrates and its monoculture isolates displayed a wide substrate spectrum of activity, indicating the possibility of using the consortium for bioremediation of sites contaminated with mixtures of polynuclear aromatic and aliphatic hydrocarbons.

References

1. Casellas, M.; Fernández, P.; Bayona, J.M. and Solanas, A.M. (1995), "Bioassay-directed chemical analysis of genotoxic components in urban airborne particulate matter from Barcelona (Spain)", Chemosphere 30: 725–740.
2. Pekdemir, T., Ishigami, Y. and Uchiyama, H. 1999.Characterization of aescin as a biosurfactant for environmental remediation. J. Surfact. Detergents. 2(3): 337-341.
3. Joregensen, J.; Turnidge, J. and Washington, J.(1999), Antibacterial susceptibility tests: dilution
4. and disk diffunsion methods. In: Murray, P.; Baron,E.; Pfaller, M.; Tenover, F. and Yolken, R. (Eds.).Manual of Clinical Microbiology, 7th Ed. ASM Press, Washington, DC, pág. 1669.
5. Bodour, A.A., Gerrero-Barajas, C. and Maier, M. 2004.Structure and characterization of flavolipids, a novel class of biosurfactants produced by Flavolipid sp. Strain MTN11. Appl. Environ. Microbiol. 10(6): 1114-1120.
6. Youssef, N.H., Duncan, K.E., Nagle, D.P., Savage, K.N., Knapp, R.M. and McInernery. M.J. 2004. Comparison of methods to detect biosurfactant production by diverse microorganisms, J. Microbiol. Meth. 56(3): 339-347.
7. Mulligan, C.N., Chow, T.Y.K. and Gibbs, B.F. 1989.Enhanced biosurfactant production by a mutant Bacillus subtilis strain. Appl. Microbiol. Biotechnol. 31: 486-489.

8. Mulligan, C.N., Cooper, D.G. and Neufeld, R.J. 1984. Selection of microbes producing biosurfactants in media without hydrocarbons. J. Ferment. Technol. 62: 311-314.
9. Jain, D.K., Collins-Thompson, D.L. and Lee, H. 1991. A drop collapsing test for screening biosurfactantproducing microorganisms. J. Microbiol. Meth. 13: 271–279.

Response on yield of Hyacinth bean (Lablab purpureus L.) using Compost, Vermicompost verses Synthetic Fertilizers and Growth Regulator

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ABSTRACT:

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Abstract:

Hyacinth bean (*Lablab Purpureus* L.) is a protein rich crop belonging to family Fabaceae. But in this crop the flower shedding is a major and common problem which ultimately affects pod set and yield. Through this study, an attempt is made to solve this problem by treating crop with vermicompost, compost, synthetic fertilizer and growth regulator . For this experiment healthy seeds of *'Lablab purpureus'* were sterilized and treated with different concentrations of growth regulator Indole 3 Acetic Acid (viz.25% , 50% , 75% , 100% conc.) and in compost , vermicompost , synthetic fertilizer (Varlakshmi) together with control plant .Various morphological parameters were observed like days of germination , number of cotyledons , mature leaf size , days of flowering , height of plant etc. and recorded . The photographs are taken at various stages of growth. It is observed that as compared to growth regulator IAA & synthetic fertilizer, compost and vermicompost treated plants have given better yield in terms of vegetative and flowering growth. Similarly maximum flowering and fruiting is also observed in the same. Hence, the present study aims to propose the use of compost and vermicompost instead of synthetic fertilizer and growth regulator in improving the yield of Hyacinth bean.

Keywords: Hyacinth bean, Compost, Vermicompost, Growth regulator, Synthetic fertilizer.

Introduction:

Lablab purpureus L. belongs to family Fabaceae. It is known as *Dolichos* bean and have economicaly important as grain legume, vegetable, animal fodder and green manure. It is one of the major crop in Tamilnadu, Karnataka and Andhra Pradesh. It is perennial, twinning or creeping herb generally cultivated as and annual crop most of varieties are with twinning habit and few are bushy, prostrate or semi-erect in habit. Leaves are trifoliate and flowers are white, reddish or purple and borne on axillary recemes. Pods are flat or inflated, linear or broad,1-5 inch long with persistent style. Seeds are globuse, ovate or flat. It is cultivated as single crop or it is mixed with some other crop like corn, groundnut, castor, bajra etc.

Nutritional value:

Lablab purpereus is very nutritious as it contains high level of protein-24.9%, moisture-9.6%, fat-0.8%, fibre-1.4%, carbohydrate-60.1%, ash-3.2%, calcium-0.06%, phosphorous-0.45%, iron-2mg/100gm and nicotinic acid-1.8mg/100gm, vitamin c-7.33-10.26mg/100gm

Uses:
It is used in the treatment for various diseases like cancers, strokes, alcoholism etc. It is more traditionally grown as pulse crop for human consumption. *Lablab* is good green manure, clover crop. It improves soil quality. *Lablab* can be grazed or used for hay or silage.It is popular as vegetable in India. Various dishes are prepared both with its immature pods and the dry beans.

Material and methods:
For this study the good quality of seeds of *Lablab purpureus* L. were collected from the market and treated with compost, vermicompost, synthetic fertilizer, and growth regulator IAA (i.e. different conc. like 25%, 50%, 75%, 100%) and grown in different pots of normal size along with controlled plant.
The treated plants are observed for various morphological traits. These are recorded and compared with normal plant.

Observation:
Photo plate.(At the time of fruiting)

Compost

Vermicompost

Control

Synthetic Fertilizer(Varlaxmi)

Growth Regulator 25%

Growth Regulator 50%

Growth Regulator 75%

Growth Regulator 100%

Observation Table No. 1(Morphological Parameters)

Morphological Traits	25%	50%	75%	100%	Compost	Vermicompost	Synthetic fertilizer	Control
Days of 50% germination	3	3	4	4	4	4	5	4
No of cotyledon development(days)	4	4	4	4	5	5	6	5
No. of days to developed(2)leaflets	6	6	6	6	6	6	7	6
No. of days to developed(4)leaflets	10	10	10	11	9	9	11	10
Height of plant in 15 days (cm)	21.5	20	19.5	18	22	22.5	17.5	21
Height of plant in 30 days (cm)	40.5	28	33.5	33.5	43.5	34	20.5	35
Height of plant in 45 days (cm)	50.5	49	47	55	55.5	50	53.5	42.5
Height of plant in 60 days (cm)	51.3	50.3	48	57	57.5	51	60	43
No. of leaflets in 15 days	12	9	9	12	14	14	9	10
No. of leaflets in 30 days	29	25	31	35	41	35	25	29
No. of leaflets in 45 days	36	44	28	45	52	43	13	13
No. of leaflets in 60 days	43	51	35	51	63	55	47	39
Width of stem after 30 days(cm)	2.5	2.5	2.4	2.5	2.4	2.5	2	2.5
Width of stem after 45 days(cm)	3.3	3.1	3	3.5	3.2	3.6	2.7	2.8
Width of stem after 60 days(cm)	3.7	3.5	3.4	3.9	3.6	4	3.2	3.4
Length of mature leaf (cm)	7.5	7.5	7.4	7.5	7.4	**8.5**	6.2	7.5

Observation Table no. 2 (Yield Parameters)

Yield parameters	25%	50%	75%	100%	Compost	Vermicompost	Synthetic fertilizer	Control
Days of flowering	36	38	32	39	35	36	49	36
No. of flowers	38	34	21	42	**47**	**48**	24	20
Days of fruiting	43	45	42	45	**41**	43	55	41
No. of fruits	8	6	9	7	**12**	**19**	5	4
No. of seeds / pod	4-5	4	3	5	4-5	3-4	4-5	3-4
Pod length(cm)	12	10.5	9	12.5	12	12	12	9
Dry weight of seed / pod	1.428	1.021	1.559	0.905	**1.800**	**1.934**	0.503	0.976

Results and Discussions:

The experiment conducted on Lablab purpureus plant in order to understand which will be the most effective i.e. growth regulator, vermicompost, compost and synthetic fertilizer to plant.

All the seeds took almost same time (3-4) days for its 50% germination with exception of synthetic fertilizer. Vermicompost shows maximum height in 15 days. After 30 days compost containing plant shows maximum height as compared to others but after 60 days 100% conc. of IAA, compost and synthetic fertilizer containing plant shows maximum height. If the numbers of leaflets were concerned these are many in numbers in compost and vermicompost after 60 days. A leaflet of vermicompost plant significantly greater in size as compared to other.

Compost and vermicompost shows maximum flowering as compared to others after 60 days. Compost and vermicompost containing plant gave highest numbers of flower it was near about 47-48 flowers per plant. Control plant gave only 20 flowers within 60 days. We got more number of fruits from compost and vermicompost near about 12-19. By weighing sample of dry seeds of all plant it was found that the compost and vermicompost also shows maximum dry weight. Synthetic fertilizer containing plant seeds showed minimum weight.

Conclusion:

From the above observation it was concluded that compost and vermicompost shows better growth. If height is concerned compost, vermicompost, varlaxmi, 100% concentration of IAA treated plant show maximum height in 60 days. If we compare all these plants with another parameters such as number of leaflets, width of stem,compost and vermicompost treated plant shows notable positive results. As compared to other, vermicompost showed maximum leaf size, which leads to increase in vegetative growth. Further it is observed that compost and vermicompost applied plant shows maximum numbers of flowers. In lablab bean shedding of flower is a common problem , however present study helps to overcome it as observed in compost and vermicompost applied plant. Where number of flower formed at intial stage and then mature into fruit is maximum.

Compost and vermicompost not only reduced the problem of flower shedding it also increased numbers of pods , length of pods and seeds per pod. Use of compost and vermicompost leads to increased dry weight of seeds i.e. it also increased the nutritional value of seeds.

Hence from above study it can be concluded that lablab bean showed good response to compost and vermicompost and treatment of vermicompost is most suitable for the better growth, yield and quality improvement, over synthetic fertilizer and growth regulator.

References:

1. Jagtap SS. and More AD., 2014. "The effect of chemical and physical mutagens of pollen sterility in hyacinth bean". Ins journal of life science, 2014 vol.2(4):366-368.
2. Kay,1975."Hyacinth bean Food legume". Crop and Product digest No.3 Tropical Products Institute. xvi:184-196.
3. Lukana Barijintakul and Yuthana Phimolsiripol, 2013. "Physio-chemical and functional properties of starch and germinator flours form hyacinth bean". Food and applied bioscience journal,2013 vol.1(2):69-80.
4. Z.Madzonga and K.Magotasi, 2014."Production, harvest and conservation of Lablab purpureus L. sweet forage in semi arid livestock regions: The case of east central Botswana". The journal of Animal and Plant Science,24(4):Page: 1085-1090.

"Plant Tissue Culture: Micropropagation of Morinda citrifolia L."

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Abstract:

In recent years herbal medicines and extracts have gained renewed interest for several reasons; affordability,low pricing, no side effects, solutions for chronic diseases and disorders, time tested remedies, preventive approaches, etc. Enhanced market demands have posed threats to phytoresources due to unscrupulous mode of collections. There is an urgent need to conserve genetic diversity of medicinal plant resources by developing protocols for micropropagation. Plant cell, tissue, organ culture techniques offer an integrated approach for rapid multiplication and production of material with dependable active ingredients. Phytopharmacutical properties and protocols for the mass production of medicinal plant Morinda Citrifolia L. form the base for the present study.

Introduction:

Plants have been used as an important source of medicine. Since, ancient times and their products are being used for different purpose such as Medicine, Food and Health care, Agriculture, Agrochemicals, and Pharmaceutical etc. Morinda citrifolia, popularly known as Noni belongs to the Family Rubiaceae, is an important medicinal plant and is used in many countries for its neutraceutical and therapeutic properties. The leaves, seeds, bark, fruit and roots of Noni have been used in various topical remedies in South Pacific Islands and Southeast Asia. It is reported to have antibacterial, antifungal, analgesic, hypotensive, anti-inflammatory and immune enhancing effects. The package of practices related to Morinda citrifolia L. cultivation have been developed still it needs further refinements. Novel cultural and cultivable practices have to be developed with low cost options to benefit farmers relying on this miracle plant. It is a large evergreen shrub or small tree of 6 m or more in height and 13 cm or more in stem diameter. It is an important fruit tree, which is generally found throughout the coastal region and also found along the fences and roadside. The tree has attained significant economic importance worldwide in recent years through a variety of health and cosmetic products made from its leaves and fruits. Noni is relatively easy to propagate. It can be propagated from seeds, stem or root cutting and air layering. The preferred methods of propagation are by seeds and by cutting made from stem verticals. The Morinda citrifolia are bisexual and self-pollinating. Only one seeds needs to sprouts for a successful population to possibly emerge. They are relatively easy to propagate from seeds by stem or root cutting and air layering. The noni seeds have a problem of seed dormancy hard seed coat, thus, limiting its commercial cultivation.

Methods:

Media Preparation:

Nutritional requirement for optimal growth of a tissue in vitro may vary with the species. As such, no single medium can be suggested as being entirely satisfactory for all types of plant tissues and organs. When starting with a new system it is essential to work out a medium that would fulfill the requirement of that tissue. In order to formulate a suitable medium for a new system it would be better to start with a well-known medium such as MS.

Growth Regulators

- 2,4-dichlorophenoxyacetic acid (2,4-D)
- Indole acetic acid (IAA), IBA(IndoleButryric acid)
- alpha-Naphthalene acetic acid (NAA)
- 6-Benzyl amino purine (BAP)
- Kinetin (Kn)

Collection of plant material

Morindacitrifolia L.planting material was collected from North Maharashtra University campus was used for the tissue culture purpose. Healthy explants were collected from these field established plants.

Explant selection and sterilization

The disease free, young and healthy nodal explants were selected for carrying outstudy as young cells are supposed to have retained their totipotency.

Callus Induction

Callus is a mass of unorganized cells resulting either as a consequence of wounding in plants or in tissue culture. Under the stimulus of endogenous growth substances or hormones added to the medium, the metabolism of cells, which were in quiescent state, is changed and they began active division. During this period, cell differentiation, which may have been occurring in the intact plant, is reversed and this give rise to new tissue, which is composed of meristmatic and unspecialized cell types.

Although callus remains unorganized, as growth proceeds, some kinds of specialized cells may be again formed and which can give rise to organs such as roots, shoots and embroys. For plant cells to develop into a callus it is essential that the nutrient medium contain plant hormones, i.e. an auxin, a cytokinin and gibberellins.

Protocol followed

- Three types of explants: Leaf segments; internodal segments and nodal segments were used as a source of explant.
- Explant used for callus induction were taken from established cultures of Bacopa.
- The medium employed was MS Basal with different concentration andcombinations of phytohormones such as NAA, Kinetin and 2,4-D.
- After inoculation the culture bottles were properly capped and sealed. Afterlabelling these are transferred to the incubation room where they are incubated at 25± 2°C in the rack covered with black paper.

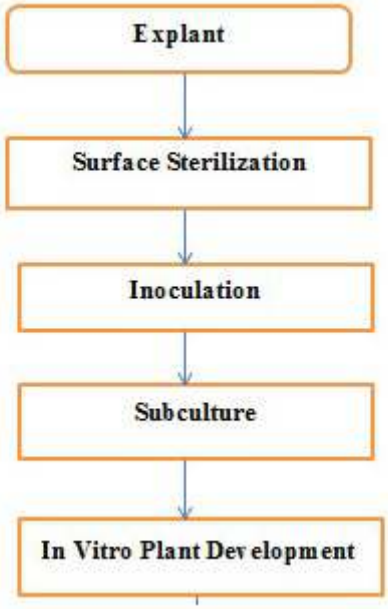

Fig. Methodology for Micropropagation

Results & Discussion:

Callus induction requires the presence of auxins or cytokinins or both in the nutrient media depending on the source of explant. Callus initiation was carried out by using leaf segment as source of explant. Initiation was carried out using different growth regulators such as BAP, IAA and 2,4-D containing media. The explants enlarged within 18-22 days of inoculation; however callus formation started after 26-28 days at the ends of the explant. Appearance of callus was irregular in shape and was of pale yellow in color. In the medium BCM (MS +0.5 mg/l BAP + 1mg/l 2, 4-D), rapid callus growth was observed which however turned pale yellow and of irregular appearance.

In case of BCM1 (MS +1 mg/l BAP + 1 mg/l IAA) initial small irregular callus was formed, from where small shoot buds have been regenerated after 20-25 days. Loose jelly type callus formation was observed in BCM2 (MS+ 0.5mg/l 2,4-D), BCM3 (MS+ 1mg/l 2,4-D) and BCM4 (MS+ 2mg/l 2,4-D) which however turned brown after few days. Response of callus induction varies with the type of explant. However, when callus explants with regenerated shoot buds were transferred to BCM, further regeneration did not occur and callus formation/reversion to callus phase started and when the same was transferred to BCM1 then callus again started showing regeneration threads after 9-10 days in dark.

Fig.Callus Induction and Proliferation in BCM Medium

Observation for the callus induction medium

Medium	Contamination	Appearance
BCM	No contamination	Irregular, pale yellow
BCM1	No contamination	Nodular, creamish
BCM2	No contamination	Jelly type brown
BCM3	No contamination	Jelly type brown
BCM4	No contamination	Jelly type brown

Conclusion:

Plants are being used since ancient time to maintain health, to treat disease andregain the healthy state of mind and body. They have been used in traditional formsof Indianmedicine and have provided solutions to even those health problems thathave defied modern science. However, due to over exploitation they are on theverge of extinction. In a recent threat assessment exercise undertaken by TRAFFICIndia (Trade Records Analysis of Flora and Fauna in Commerce) set up by the WorldWildlife Fund and the World Conservation Union) 33 plants have been placed on thecritically endangered list and 17 on the endangered list. There are 16 in thevulnerable category and seven that are near threatened.Deforestation and rapid urbanization have eroded the natural agroclimatic spaces inwhich these herbs grow. Overuse, unsustainable cultivation practices, illegal exportand trade are scrooges that have further increased the vulnerability of these plants.All these factors put together have made the ecosystem so vulnerable that they maywell destroy India's 5000-year-old natural health legacy (Extinction threat stalks medicinal plants by SurabhiKhosla. http://www.the-south-asian.com /June2001/Medicinal.htm).

The idea of this whole study is to standardize the viable commercial protocolfor massmultiplication of elite clones of Morinda citrifolia L. in future forcorporate farming. The preliminary studies clearly indicate that irrespective of the basal mediaused (MS), it is the hormonal combination that are very vitalfor the in-vitro response. Various hormonal combinations show the varied results and the callus formation. Duration required for the callus formation and the shape and size of the calli formed depends upon the combination of the hormones used. Further studies are to be carried in developing the roots and shoots to these calli using different hormonal combinations.

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References:

- Chandra KJ, Sagar DDG, 2013. A review on the propagation methods of a miraclefruit Morinda citrifolia L. Indian Journal of Plant Sciences 2, 78–84.
- Gajakosh AM, Jayaraj M, Mathad GV, Patta PV, 2010. Organogenesis from shoot tipand leaf explants of Morinda citrifolia, L. An important medicinal tree. Libyan Agriculture Research Centre Journal International 1, 250–254.
- Pattnaik SK, Chand PK, 1996.In vitro propagation of the medicinal herbs Ocimumamericanum L. syn. O. canum Sims (hoary basil) and Ocimum sanctum (holybasil). Plant Cell Reports 15, 846–850.
- Prakash E, ShaValli KPS, Reddy SP, Rao KR, 1999.Regeneration of plants from seed-derived callus of Hybanthusenneaspermus L. Muell.a rare ethnobotanical herb. Plant Cell Reports 18, 873–878.
- Rai MK, Asthana P, Jaiswal VS, Jaiswal U, 2010.Biotechnological advances in guava(Psidiumguajava L.). Recent developments and prospects for further

research. Tree Structure and Functions 24, 1–12.
- Sahoo Y, Chand PK, 1998. Micropropagation of Vitexnegundo L., A woody aromatic medicinal shrub, through high-frequency axillary shoot proliferation. Plant Cell Reports 18, 301–307.
- Sreeranjini S, Siril EA, 2014. Field performance and genetic fidelity evaluation of micropropagated Morinda citrifolia L. Indian Journal of Biotechnology 13,121–130.
- Subramani J, Antony S, Selvaraj D, Vijay M, Sakthivel M, 2007. Micropropagation of Morinda citrifolia L. International Journal of Noni Research 2, 38–44.
- Wang MY, West BJ, Jensen CJ, Nowicki D, Chen SU, Palu A, Anderson G, 2002. Morinda citrifolia (Noni): a literature review and recent advances in Noni research. ActaPharmacologicaSinica 23, 1127–1141.
- Wei LJ, Lu P, Su WP, 2006. Tissue culture and rapid propagation of Morinda citrifolia L. Plant Physiology Communications 42, 475.

"Plant Tissue Culture: Micropropagation of Justicia adathoda L."

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ABSTRACT:
(Your abstract must use Normal style and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)
Preparation of Your Abstract
1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word ONLY (place names excluded). No full stop at the end.
2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.
Introduction: Clearly state the purpose of the abstract
Methods: Describe your selection of observations or experimental subjects clearly
Results: Present your results in a logical sequence in text, tables and illustrations
Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

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Abstract:
Expanding global use of traditional medicines is leading to fast depletion of medicinal plants from the nature. Their cultivation in many areas has not been successful and there is concern about genetic fidelity. Cultivation has also reduced their secondary metabolite contents as compared to wild type. Plant tissue culture offers an easy and reproducible method of micro propagation of medicinal plants on large scale. The present study describes micro propagation of *Justicia adhatoda* L.

Introduction:
Plants have been used as an important source of medicine. Since, ancient times and their products are being used for different purpose such as Medicine, Food and Health care, Agriculture, Agrochemicals, and Pharmaceutical etc.
Justicia adathoda Lin. Is a perennial shrub belonging to family "Acanthaceae" Commonly known in English as Malabar nut, Adulsa, Adathoda vasa or vasaka is a medicinal plant native to Asia. Ayurvedic medicine, Justicia adathoda L. has been used for a multitude of disorders including; bronchitis, leprosy, blood disorders, heart troubles, thirst, asthma, fever, vomiting, loss ofmemory, leucoderma, jaundice, tumors, mouth troubles, sore-eye, fever, and gonorrhea (Nath and Buragohain, 2005). The leaves contained an essential oil and alkaloids quinazoline, vasicine, vasicinone and deoxyvasicine (Shinawie, 2002). The roots contained vasicinolone, vasicol, peganine and 2'-hydroxy-4-glucosyl-oxychalcone.The flowers contained–D-glucoside, kaempferol and its glucosides, as well as the bioflavonoid, namely quercetine. The alkaloids,vasicine and vasicinone present in the leaves, possess respiratory stimulant activity; whereas, vasicine, at low concentrations, induced bronchodilation and relaxation of the tracheal muscle.
The plant has antispasmodic, antiseptic, antihelminthic, insecticidal and parasiticidal properties. The vasicine yield of the herbage has been measured as 0.541 to 1.1 % by dry weight.
Hence, to conserve medicinal plant like *Justicia adhatoda* is essential for healthy life of human. There are several methods to conserve medicinal plant; in which Plant Tissue Culture is best method to conserve plant species. Plant Tissue culture is now well established technology like many other technologies. Plant tissue culture or Micro-propagation technology has made invaluable contribution to Agriculture by establishing the production of disease free, quality planting material of Commercial plants throughout the years. The present study was therefore, undertaken to establish a protocol for In vitro propagation studies of *J. adhatoda.*

Methods:

Media Preparation:

Nutritional requirement for optimal growth of a tissue in vitro may vary with the species. As such, no single medium can be suggested as being entirely satisfactory for all types of plant tissues and organs. When starting with a new system it is essential to work out a medium that would fulfill the requirement of that tissue. In order to formulate a suitable medium for a new system it would be better to start with a well-known medium such as MS.

Growth Regulators

- 2,4-dichlorophenoxyacetic acid (2,4-D)
- Indole acetic acid (IAA), IBA(IndoleButryric acid)
- alpha-Naphthalene acetic acid (NAA)
- 6-Benzyl amino purine (BAP)
- Kinetin (Kn)

Collection of plant material

Morindacitrifolia L.planting material was collected from North Maharashtra University campus was used for the tissue culture purpose. Healthy explants were collected from these field established plants.

Explant selection and sterilization

The disease free, young and healthy nodal explants were selected for carrying outstudy as young cells are supposed to have retained their totipotency.

Callus Induction

Callus is a mass of unorganized cells resulting either as a consequence of wounding in plants or in tissue culture. Under the stimulus of endogenous growth substances or hormones added to the medium, the metabolism of cells, which were in quiescent state, is changed and they began active division. During this period, cell differentiation, which may have been occurring in the intact plant, is reversed and this give rise to new tissue, which is composed of meristmatic and unspecialized cell types.

Although callus remains unorganized, as growth proceeds, some kinds of specialized cells may be again formed and which can give rise to organs such as roots, shoots and embroys. For plant cells to develop into a callus it is essential that the nutrient medium contain plant hormones, i.e. an auxin, a cytokinin and gibberellins.

Protocol followed

- Three types of explants: Leaf segments; internodal segments and nodal segments were used as a source of explant.
- Explant used for callus induction were taken from established cultures of Bacopa.
- The medium employed was MS Basal with different concentration andcombinations of phytohormones such as NAA, Kinetin and 2,4-D.
- After inoculation the culture bottles were properly capped and sealed. Afterlabelling these are transferred to the incubation room where they are incubated at 25± 2°C in the rack covered with black paper.

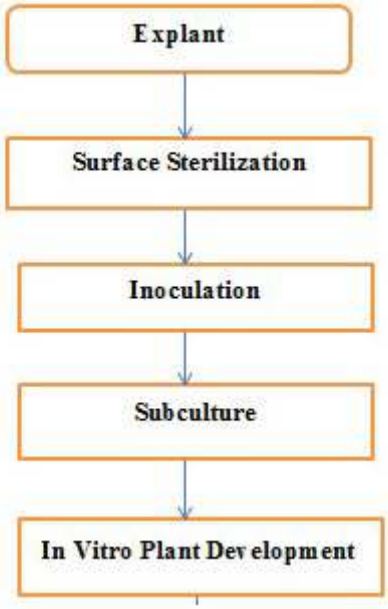

Fig. Methodology for Micropropagation

Results & Discussion:

Callus induction requires the presence of auxins or cytokinins or both in the nutrient media depending on the source of explant. Callus initiation was carried out by using leaf segment as source of explant. Initiation was carried out using different growth regulators such as BAP, IAA and 2,4-D containing media. The explants enlarged with in 12-14 days of inoculation; however callus formation started after 20-25 days at the ends of the explant. Appearance of callus was globular and was of pale yellow in color. In the medium BCM (MS +0.5 mg/l BAP + 1mg/l 2,4-D), rapid callus growth was observed which however turned pale yellow and of globular appearance.

In case of BCM1 (MS +1 mg/l BAP + 1 mg/l IAA) initial small globular callus was formed, from where small shoot buds have been regenerated after 20-25 days. Loose jelly type callus formation was observed in BCM2 (MS+ 0.5mg/l 2,4-D), BCM3 (MS+ 1mg/l 2,4-D) and BCM4 (MS+ 2mg/l 2,4-D) which however turned brown after few days. Response of callus induction varies with the type of explant. However, when callus explants with regenerated shoot buds were transferred to BCM, further regeneration did not occur and callus formation/reversion to callus phase started and when the same was transferred to BCM1 then callus again started showing regeneration threads after 9-10 days in dark.

Fig.Callus Induction and Proliferation in BCM Medium

Observation for the callus induction medium

Medium	Contamination	Appearance
BCM	No contamination	Irregular, pale yellow
BCM1	No contamination	Nodular, creamish
BCM2	No contamination	Jelly type brown
BCM3	No contamination	Jelly type brown
BCM4	No contamination	Jelly type brown

Conclusion:

Plants are being used since ancient time to maintain health, to treat disease and regain the healthy state of mind and body. They have been used in traditional forms of Indian medicine and have provided solutions to even those health problems that have defied modern science. However, due to over exploitation they are on the verge of extinction. In a recent threat assessment exercise undertaken by TRAFFIC India (Trade Records Analysis of Flora and Fauna in Commerce) set up by the World Wildlife Fund and the World Conservation Union) 33 plants have been placed on the critically endangered list and 17 on the endangered list. There are 16 in the vulnerable category and seven that are near threatened. Deforestation and rapid urbanization have eroded the natural agro climatic spaces in which these herbs grow. Overuse, unsustainable cultivation practices, illegal export and trade are scrooges that have further increased the vulnerability of these plants. All these factors put together have made the ecosystem so vulnerable that they may well destroy India's 5000-year-old natural health legacy (Extinction threat stalks medicinal plants by Surabhi Khosla. http://www.the-south-asian.com /June2001/Medicinal.htm).

Justicia adathoda Lin. is a perennial shrub belonging to family "Acanthaceae". Commonly known in English as Malabar nut, Adulsa, Adathoda vasa or vasaka is a medicinal plant native to Asia. Ayurvedic medicine, Justicia adathoda L. has been used for a multitude of disorders including; bronchitis, leprosy, blood disorders, heart troubles, thirst, asthma, fever, vomiting, loss ofmemory, leucoderma, jaundice, tumors, mouth troubles, sore-eye, fever, and gonorrhea. The demand of Justicia adathoda L. is met from natural population, which leads to put heavy strain on existing natural population and hence slow depletion of this important medicinal plant. Tissue culture techniques can be used to attain rapid multiplication of the elite clones and germplasm conservation of Justicia adathoda L.

In the present work we have attempted to develop suitable micropropagation protocol and try to improve existing protocol of Justicia adathoda L.

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References:

Abrie, A. and Staden, J.V. (2001) Micropropagation of endangered Justicia adhatoda, Plant Growth Regulation, 33(1): 19-23.

Bhojwani S.S. and Razdan, M.K. (1992) Plant tissue culture: Theory and practice, Elsevier, Amsterdam, London, New York, Tokyo.

Chaudhuri, S. and Mukundan, U. (2001) Justicia adhatoda L.—Micropropagation and Characterization of its gel, Phytomorphology, 51(2): 155-157.

Corneanu,M., Corneanu,G.,Vekas,M., and Minea, R. (1994) In vitro organogenesis of Aloe arborescencs.(Liliaceae),Revue Roumaine de Biologie.39(1):45-52.

Drew, R.K.L. (1979) effect of activated charcoal on embryo genesis and regeneration of plantlets

from suspension culture of carrot (Daucus carota L.), Ann. Bot., 44:387:389.
Groenewald, E.G., Koeleman, A. and Wessels, D.C.J. (1975) Callus formation and plant regeneration from seed tissue of Aloe pretoriensis, Z.Pflanzenphysiol. 75:270-272.
Kanta,K. and Maheshwari, P. (1963) Test tube fertilization in some angiosperms, Phytomorphology,13:230-237
Kartha, K.K., Leung, N.L. and Pahl, K. (1980) Cryopreservation of strawberry meristems and mass propagation of plantlets, J.Am. Soc. Hortic.Sci.,105:481-484.
Kumar, A. and Kumar, V.A. (1996) Plant Biotechnology and Tissue Culture Principles and Perpectives, International Book Distributing Co, Lucknow.
Meyer, H.J. and Staden, J.V. (1991) Rapid in vitro propagation Justicia adhatoda, Plant cell, Tissue and Organ Culture, 26:167-171.
Murashige, T. (1977) Clonal crops through tissue culture. In: W.Barz et al. (Editors), Plant Tissue Culture and its in Biotechnological Application, Springer-Verlag, Berlin, 392-403.
Murashige, T. and Skoog, F. (1962) A revised medium for rapid growth and bioassays with tabacco tissue cultures. Physiol. Plant, 115: 493-497.
Murashige, T. and Skoog, F. (1974) Plant propagation through tissue cultures, Ann.Rev.,Plant Phisiol.,25:135-165.
Natali, L., Sanchez, I.C. and Cavallini, A. (1990) In vitro culture of Justicia adhatoda L.:Micropropagation from vegetative meristems, Plant Cell, Tissue and Organ Culture, 20 :71-74.
Roy, S.C. and Sarkar, A. (1991) In vitro regeneration and micro propagation of Aloe vera, Scientia Horticulturae, 47(1-2): 107-114.
Sanchez, I.C., Natali, L. and Cavallini, A. (1988) In vitro culture of Justicia adhatoda Morphogenetic ability and nuclear DNA content, Plant Science, 55:53-59.
Withers (1998) Cryopreservation of higher plant tissue and cell cultures.
Zimmerman, R.H. and Broome, O.C. (1980) Blueberry micropropagation. In: Proceedings of the Conference on Nursery production of fruit plants through Tissue culture-Application and Feasibility. Agric. Res. Sci. Educ. Admin., U.S.D.A., Beltsville, 44-47.
Zimmerman, R.H. and Broome, O.C. (1981) Phloroglucinol and in vitro rooting of apple cultivar cuttings, J.Am.Soc.Hortic.Sci., 106: 648-652.

Aeromycological Studies in the Library of Moolji Jaitha College, Jalgaon

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ABSTRACT:
Aerobiology is study of airborne fungal spores, pollen grains and other airborne microorganisms present in air. Among all the air borne bio-particles, fungal spores constitute the greatest and most important portion in air. The fungi present in indoor air of library causes bio-deterioration of books and other materials in library. Due to the bio-deterioration, books may be damaged, deteriorated or discolored in pictures and prints. In India lot of work has been done on aeromycology of library. The aeromycological studies in the library of M.J. College, Jalgaon has been carried out which has very old & having collection of old valuable books. Over 1,30,000 books & 240 periodicals are present in this three storied library. This was done during September,October and December 2016 by using exposed plate method {EPM} and Direct inoculation method {DIM} the books with dust has been tapped on the surface of petri dish containing nutrient medium. Total 57 species of 15 genera were isolated from M.J. College Library. Among them 44 species and 9 genera were from Deuteromycotina, 7 species of 3 genera were from Zygomycotina, 1 species of 1 genus were from Ascomycotina & 5 species of 1 genus were from mycelia sterilia. Deuteromycotina were dominant with Aspergillus as dominant genus with 25 species.Great diversity of fungi was observed during these studies.

Aerobiology is study of airborne fungal spores, pollen grains and other airborne microorganisms present in air. Among all the air borne bio-particles, fungal spores constitute the greatest and most important portion in air. Books and documents in libraries are valuable cultural heritage as books and papers carry all kinds of knowledge through the barriers of time and have a capacity to pass them from generations to generations. The fungi present in indoor air of library causes bio-deterioration of books and other materials in library. Due to the bio-deterioration, books may be damaged, deteriorated or discolored in pictures and prints.

In India lot of work has been done on aeromycology of library. Tilak and Vishwe (1975) studied the microbial contents of air inside the library. Vittal and Leela Glory, (1985) studied airborne fungus of a Library in Madras, they have reported 19 genera. Singh and Singh (1995) made a note on fungal spores as important components of library air. Pande et al (1996) calculated the spore load inside the library atmosphere. Rane and Gandhe (2005) studied air and dust mycoflora of a library in Jalgaon. They have followed both Exposure Plate Method and Direct inoculation method and isolated 35 different species of fungi. Dalal et al (2011) worked on deteriorating fungi in the air inside the college libraries of Wardha city. They have studied the seasonal variation and identified total 10 types of fungal species. The adverse effects of fungal components inside library not only deteriorate paper material but significantly affected health of library staff. The library of M.J. College, Jalgaon is very old & having collection of old valuable books. M.J College library is the largest and one of the oldest academic libraries in North Maharashtra region. At present, the library has over 1,30,000 books in its repository. The library also subscribes to over 240 periodicals that include national and international journals and magazines. M.J College library is housed in a huge building spread in two floors and a mezzanine floor in between.

Materials And Methods

Aeromyological studies had been carried out during the months of September,October and December 2016 by using exposed plate method {EPM} and Direct inoculation method {DIM} the books with dust has been tapped on the surface of petri dish containing nutrients. Medium fast

growing species grows well on CzDA while slow growing species grows on LYEA. Dust samples were collected from the books of different cupboards.
Exposure Plate Method- The petriplates containing culture medium were directly exposed for 5 minutes in each section of the library during morning at 7:30 am & evening at 4pm.
Direct Inoculation Method-The dust from the books is directly tapped on the surface and petriplates during morning 7:30 am and evening at 4pm .
The exposed plates were incubated for 4 to 5 days .After that every plate is observed carefully. Each colony is observed carefully, its characters are described in details in respect of colour, reverse colour, odour, diameter, nature, etc. of the colony. Semi permanent slides of each colony were made using lactophenol and cotton blue. Slides were sealed with nail polish and carefully observed under microscope. Photograph of slides were taken. Slides were identified using relevant literature.

Results & Dicussion

Occurrence of fungi in Library:

The present aeromycological investigation was undertaken to study the aeromycoflora in the library for the entire three months. Total 57 species of 15 genera were isolated from M.J. College Library. Among them 44 species and 9 genera were from Deuteromycotina, 7 species of 3 genera were from Zygomycotina, 1 species of 1 genus were from Ascomycotina & 5 species of 1 genus were from mycelia sterilia. Deuteromycotina were dominant with Aspergillus as dominant genus with 25 species.

Occurrence of fungi in Library during September 2016:

Total 52 species of 14 genera were isolated during September 2016. In all 39 species of 9 genera of Deuteromycotina, 7 species of 3 genera of Zygomycotina, 1 species of 1 genera of Ascomycotina, 5 species of 1 genera of sterile mycelia were isolated during September 2016. Deuteromycotina members were dominant with Aspergillus as dominant genus with 20 species. 29 species of 8 genera were isolated by Exposure Plate Method when the exposures were done during morning while exposures during evening showed 21 species of 7 genera. Direct isolation method showed 18 species of 5 genera during morning and 25 species of 8 genera were isolated during evening. More number of fungi were isolated during morning time by Exposure Plate Method while by Direct Inoculation Method maximum number of fungi were isolated during evening.

Occurrence of fungi in Library during October 2016:

Total 50 species of 15 genera were isolated during October 2016. In all 38 species of 9 genera of Deuteromycotina, 6 species of 3 genera of Zygomycotina, 1 species of 1 genera of Ascomycotina, 5 species of 1 genera of sterile mycelia were isolated during October 2016. Deuteromycotina members were dominant with Aspergillus as dominant genus with 20 species. Total 29 species of 10 genera were isolated during morning by Exposure Plate Method while during evening 22 species of 6 genera were isolated. Direct isolation method of dust showed 27 species of 9 genera during morning and 20 species of 8 genera were isolated during evening. More number of fungi were isolated during morning time by both methods.

Occurrence of fungi in Library during December 2016:

Total 48 species of 13 genera were isolated during December 2016. In all 37 species of 9 genera of Deuteromycotina, 5 species of 2 genera of Zygomycotina, 1 species of 1 genera of Ascomycotina, 5 species of 1 genera of sterile mycelia were isolated during December 2016.Deuteromycotina were dominant with Aspergillus as dominant genus with 22 species. Total 23 species of 8 genera were isolated during morning by Exposure Plate Method while during evening 26 species of 9 genera were isolated. Direct isolation method of dust showed 18 species of 6 genera during morning and 26 species of 7 genera were isolated during evening. More number of fungi were isolated during evening than morning by both the methods.

DISCUSSION

A combination of two different methods such as Exposure Plate Method and Direct inoculation method were used in present investigation which get almost complete picture of aeromycoflora of library and dust. This type of combination was suggested by Tilak (1982) who focused on the requirement of using different methods in combination during aerobiological surveys done for the microscopic analysis of air flora and the spores present in culture. We also got almost same result by applying two different techniques. Tilak and Vishwe (1975) reported spores of Curvularia, Helminthosporium, Bispora, Fusarium, Torula and Cladosporium are the common constituents in the library atmosphere at Aurangabad. But in our studies we found Alternaria and Aspergillus were dominant while did not encounter Bispora and Torula throughout the studies. Predominance of Aspergillus species has been reported by Burge et al (1978) who made extensive aerometric studies on fungi in libraries at Michigan University USA. We also found the same results. Many species of Aspergillus are allergic contaminants. Not only in library air but Aspergillus species are dominant in all indoor environments such as homes, hospitals, class rooms, etc.

More number of fungi were isolated from Exposure Plate Method than Direct inoculation method. These results are contradictory with the results of Rane and Gandhe (2005) where they have isolated more number of fungi by Direct inoculation method. Fluctuations in the occurrence of fungal flora were observed during morning and evening exposures. It is observed that more number of fungi were observed during morning. This may be due to settling of fungal spores during night and as the college library opens at 7:30 am because of dusting and putting on fans, the fungal spores again float in the air but not till roof of the library and can be encountered in petriplates. There are many stained books observed in library due to pigmentation by fungi. Many books are also found in bad shape due to fungal attack. Majority of the fungal species encountered are greatly responsible for book deterioration. Hence the effective control measures should be applied.

To prevent the books from contamination, following care should be taken

1) Fumigation once in 4 months
2) Regular clearance of dust on furniture and books
3) Special attention to affected areas

Conclusion

The dominant fungal contribution of the Moolji Jaitha College Library exhibits a clear picture that it is appalling if the maintenances are inefficient and dismal. Further studies with longer monitoring period on their occurrence in indoor and outdoor air could bring about better understanding of their potential function. thus on the basis of this study the following conclusions can be made.

The indoor environment of this library is rich in fungal spores.

1. Among the species isolated group deuteromycotina form a dominant part of airspora.
2. The dominant fungal genus is aspergillus. This is appeared in both perfect and imperfect states.
3. The valuable literature available in library needs proper methods of preservation.

References

1. Burge, H.P., Boise,J.R.,Solomon, W.R. & Bandea,E. (1978) Fungi in libraries: An aerometric survey- Mycopathologia 64:67-72
2. G.M. Rane and R.V.Gandhe (2005) Air dust mycoflora of a library at Jalgaon. Indian J of aerobiology Vol 18 No. 2 pp 95 to 101.
3. L.Dalal, M.Bhowal, & S.Kalbende (2011) Archives of Applied Science Research, 2011, 3 (5):479-485.
4. Singh A.B. & Singh A. (1995) Fungal spores are important components of library air. Aerobiologia. European J. of Aerobiology. 11:231-237
5. Tilak S.T. (1982) Aerobiology. Vaijayanti Prakashan Aurangabad, India .p-211
6. Tilak, S.T., Vishwe, D.B. 1975 Microbial content of air inside libray. Biovigyan, 1: 187–190.
7. Vitthal B.P.R. & A. Leela Glory (1985) Airborne fungus spores of a library in India. Grana 24:129-132

Sr. No	Name of the fungus	September 2016				October 2016				December 2016			
		EPM		DIM		EPM		DIM		EPM		DIM	
		M	E	M	E	M	E	M	E	M	E	M	E
1.	*Alternaria alternata*(Ellis & Everh) Mason	+	-	-	+	-	+	-	+	-	+	-	+
2.	*A. tenuissima* (Peck) Von Beck	-	+	-	+	-	-	+	-	+	-	+	-
3.	*A. citri* Ellis & Pierce	+	-	+	-	+	+	-	-	-	-	-	-
4.	*A. brassicola* Schwemnitz	-	-	+	-	-	-	+	-	+	+	+	+
5.	*A. longipes* (Ellis & Everh) Mason	-	+	-	+	-	+	-	-	-	-	-	-
6.	*A. tenuissima* Ellis	+	-	-	+	-	-	-	-	+	-	+	+
7.	*Aspergillus alliaceus* Thom & Church	-	+	-	+	-	-	+	-	-	+	-	+
8.	*A. atroparasiticus* Zirm	+	+	+	+	+	-	+	-	+	+	-	+
9.	*A. awamori* Nakazawa	+	-	+	-	+	+	+	+	-	+	+	+
10.	*A. candidus* Link	+	-	-	+	-	-	+	-	+	+	-	+
11.	*A. carbonarius* Thom	-	+	-	-	-	+	+	-	+	+	-	-
12.	*A. effusus* Tiraboschi	-	-	+	-	-	+	-	-	+	-	-	+
13.	*A. flavipes* Thom & Church nger	+	-	+	-	-	+	-	-	+	-	+	-
14.	*A. flavus* Link	-	+	-	+	-	+	-	+	-	-	+	+
15.	*A. fumigatus* Fresenius	-	+	-	-	+	-	+	-	-	+	-	+
16.	*A. humicola* Chaudhuri & Sarkar	+	-	+	-	-	-	-	-	-	+	-	-
17.	*A. niger* van Tieghem	-	-	-	-	+	-	+	-	-	-	-	-
18.	*A. niger* Van Tieghem	+	+	+	+	+	+	+	+	+	+	+	+
19.	*A. nivens* Bloch , Emend	+	-	-	-	+	+	+	+	-	-	-	-
20.	*A. ochraceus* Wilhelm	-	+	-	+	-	+	-	-	+	-	-	-
21.	*A. oryzae* (Ahlburg) Cohn	-	+	-	+	-	+	-	+	-	-	-	+
22.	*A. panamensis* Raper & Thom	-	-	-	-	+	-	+	+	-	-	-	+
23.	*A. parasiticus* Speare	-	-	+	-	+	-	+	-	-	+	-	+
24.	*A. sulphureus* Thom & Church	+	-	+	-	-	-	-	+	-	-	-	-
25.	*A. sydowi* Thom & Church	+	-	+	-	+	-	+	-	+	-	+	-

		EPM		DIM		EPM		DIM		EPM		DIM	
		M	E	M	E	M	E	M	E	M	E	M	E
26.	*A. tamarii* Kita	-	-	-	-	+	+	+	-	+	-	+	-
27.	*A. terricola* Marchal	+	-	-	+	-	-	-	+	-	+	-	+
28.	A. ustus Thom & Church	-	+	-	-	+	+	-	+	-	+	-	-
29.	*A. versicolor* Tiraboschi	-	-	-	-	+	-	+	-	+	+	+	-
30.	*A. wentii* Wehmer	+	-	-	+	-	+	-	+	-	-	-	+
31.	*Choanephora cucurbitarum* Berlak Ravenel	-	-	+	-	+	-	-	+	-	-	-	-
32.	*Chaetopsina chaetopsinoides* Link ex Fries	+	-	+	-	+	-	-	+	-	-	-	+
33.	*C. herbarum* Link	+	-	-	-	+	-	-	-	+	-	-	+
34.	*C. oxysporum* Berk & M.A.Curtis	-	-	+	-	-	-	-	+	-	+	+	-
35.	Corynascus sp.	-	-	-	+	-	-	-	-	+	-	-	-
36.	*Curvularia lunata* Ellis	+	-	-	-	+	-	+	-	-	+	-	-
37.	*C. lunata* var. aeria	+	-	-	-	+	-	-	-	-	-	-	-
38.	*Drechslera rostrata* S. Ito	-	-	-	+	-	-	+	+	-	-	+	-
39.	*Fusarium oxysporum* Schlecht	-	+	-	-	+	+	-	-	-	+	-	-
40.	*Gliocladium deliquescens* Scopp	-	+	-	-	+	-	-	-	-	-	-	+
41.	*G. roseum* Corda	-	-	-	-	+	+	+	+	-	-	-	-
42.	*Idriella lunata* (Eggers) Schipper	+	+	+	+	-	+	-	+	+	+	+	+
43.	*M. mucedo* L.	+	-	-	+	+	+	+	+	+	+	-	+
44.	*M. plumbeus* Naumov, Oprel, Mukor	-	+	-	+	+	-	+	-	+	+	+	-
45.	*M. racemosus* Fresen., Beitr, Mykol	+	-	-	-	+	-	-	-	-	-	-	-
46.	*Penicillium citrinum* Thom	+	-	-	-	-	+	-	+	+	-	-	+
47.	*P. corylophilum* Dierckx	+	+	-	-	+	-	+	+	-	+	-	-
48.	*P. decumbens* Thom	+	+	-	-	+	-	-	-	-	-	-	-
49.	*P. italicum* Wehmer	-	+	-	-	-	+	-	-	-	+	-	-
50.	*Rhizoctonia butleriola* (Traub.) Butler	+	-	-	+	+	-	+	-	+	-	+	-
51.	*Rhizopus nigricans* Ehrenb, Taubenh, Vuill	-	+	-	+	-	-	+	-	-	+	-	+
52.	*R. stolonifer* Ehrenb .Sylv	+	-	-	+	-	-	-	-	+	+	-	-
53.	*Trichoderma roseum* L.	-	-	-	+	-	-	+	-	-	-	-	+
54.	Sterile Black Mycelium	+	+	+	+	-	+	+	+	-	+	+	+
55.	Sterile Green Mycelium	+	+	-	+	-	+	-	+	+	-	+	-
56.	Sterile White Mycelium	-	-	+	-	+	-	+	-	+	-	+	-
57.	Sterile Yellow Mycelium	+	-	+	+	+	+	+	-	-	+	-	+
	Total	**29**	**21**	**18**	**25**	**29**	**24**	**28**	**22**	**23**	**26**	**18**	**26**

Study of comparative effects of growth regulators on Vigna radiata L. varieties

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Note: *Corresponding author , **Guide

ABSTRACT:
(Your abstract must use Normal style and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)
Preparation of Your Abstract
1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word ONLY (place names excluded). No full stop at the end.
2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.
Introduction: Clearly state the purpose of the abstract
Methods: Describe your selection of observations or experimental subjects clearly
Results: Present your results in a logical sequence in text, tables and illustrations
Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

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Abstract:
The present study deals with the experiment conducted on Green gram(Vigna radiata Linn.) which is a widely grown legume belonging to the family Fabaceae. The study aims to determine good yeilding and quality variety plants suitable for the climatic situations of Maharashtra. For this, the seeds of different varieties of Green gram are treated with the different concentrations of growth regulators IAA & GA as 25%, 50%, 75% & 100% and potted. The treated plants were observed together with the controlled plants. Various morphological traits like first pair of cotyledons, number of leaf, leaf size, number of flowers, fruit set, seed weight etc. were observed and recorded. These are further compared with controlled plant. 100% IAA & 100% GA concentrations of 'Vaibhav' variety are proved to be the best yeild giving growth regulators in all aspects. Photographs of plants at various stages of growth are also taken. Maximum plant growth is achieved in 100% IAA and in 100% GA of the variety 'Vaibhav'. Highest number of flowers were developed on the same. Fruit set also occur earlier in 100% IAA and in 100% GA of 'Vaibhav'. Thus, desirable vegetative as well as reproductive responses to the 100% IAA and GA of 'Vaibhav' were observed in potted plants.

Key words: Green gram, Growth regulators, Morphological traits, Yield

Introduction:

The plant 'Vigna radiata L.' is commonly known as 'Mung Bean' and is of Chinese origin. The mung bean is mainly cultivated in India, China and South-east Asia. It is very much known for its nutritious and medicinal values.
It is an erect, sub erect or trailing, densely hairy, annual herb. The leaves are pinnate, divided into 3 leaflets. The inflorescence is a raceme of yellow pea flowers. The tap root produces a branched root system with smooth, rounded nodules. The pods are narrow, cylindrical and up to ten-twelve cm long.

Nutritional Value:

Green gram is very nutritious as it contains high levels of Protein (25g/100g), Potassium (983 mg/100g), Calcium (138 mg/100 g), Iron (7.57 mg/ 100 g), Niacin (1.447 mg/ 100 g), Thiamine (0.273 mg/ 100g) and Riboflavin (0.254 mg/ 100g).
Uses :

As a food it is in wide use through out the world and very spetialy in China and in Southeast Asia. It has got also many medicinal importance like, helps in weight control, lowers the blood pressure, lean source of protein, nonmeat source of Iron, etc.

Reasons to make this study:

The production rate of pulses of our country is not satisfactory. 'The commodity profile for pulses – October, 2016' which was came out as the collective work of the various departments of Indian Government says that the production rate of pulses in our country is not enough to fulfill the need of the ordinary people and the rate of them is shouted very high as gold within the short span of 5 years. Because of this, the study is undertaken.

Materials and Methods:

For this study pot experiment was carried out. Study was done on Green gram varieties like 'BM-4', 'China local', 'Kopergaon' and 'Vaibhav' by treating the seeds with different concentrations of growth regulators IAA and GA like 25%, 50%, 75% and 100% and comparing their growth with the controlled plant. Morphological growth of plants was observed together with the anatomical aspect of stomatal index and type of trichomes.

Results and Discussions:

According to Akbari, Barani and Ahmad variety of Vigna radiata treated with saline water but application of gibberelic acid (GA-3) overcome the effects of salt stress and improved the growth parameters. However, they have given the treatment of growth regulator as soaking before sowing as well as foliar application at four leaf stage. Present results are in accordance with them, but here only pre-soaking treatment of growth regulator proved beneficial for the crop.

GA -3 induced higher number of leaves in soybean (Deotale et al., 1998), okra (Kumer, et al. 1996), faba bean (Abd. el – Fattah, 1997) and French bean (Gabal et al. 1990). According to (Hoque et al., 2002) no significant effect of seed treatment with GA-3 on the number of pods per plant was found but plants sprayed with GA-3 had higher number of pods per plant. Present findings agree with above workers except Hoque. In present study seed treatment also had influenced crop positively, As the longest pod, maximum number of leaf, dry weight per pods is highest.

Conclusion:

The findings of present study indicate the role of proper concentrations of growth regulator. Hence, from above study it may be suggested that for the growth of Green gram 100% concentration of growth regulator both IAA and GA is most suitable for improving the yield of crop. However, 'Vaibhav' variety gave better results in all morphological traits and hence it is the superior variety among all.

References:

1. Abd El-Fattah, M.A., 1997. Effect of phosphorus, Boron, GA-3 and their interaction on growth, flowering, pod setting, abscission and both green pod and seed yields of broad bean (vicica faba L.) plants. Alexandria J. Agril. Res., 42: 311-332.
2. Deotale, R.vd, V. G. Maske, N.V. Sorte, B.S., Chimurkar and A. Z. Yerme, 1998. Effects of GA-3 and NAA on morpho-physiological parameters of soybean. J. Soils and Crops, 8: 91-94.
3. Gabal, G. M.,G. Oben and R. Marcell, 1990. Effect of Ga-3 on morpho-physiological characters and yield of kidney beans (phaseolus vulgaris). J. Agron. Crop Sci.,160: 94-101.
4. Kumar, S., P. Singh, R. P. Katiyar, C. P. Vaish and A. A. Khan, 1996. Beneficial effect of some growth regulators on the aged seeds of okra (Abelmoschus esculentus L) under field conditions. Seed Res., 24: 11 – 14.

5. Haroun, M. and S. Haque, 2002. Effects of GA-3 and its mode of application on morphology and yield parameters of mungbean (Vigna radiata L.). Pak. J. Biol. Sci., 5: 281-283

Index:

Table showing Stomatal Indices of plants at different concentrations of all varieties of Green gram

Plant Variety	IAA				GA				Control
	25	50	75	100	25	50	75	100	
BM-4	48.07 %	48.62 %	43.54 %	41.13 %	41.32 %	47.32 %	45.64 %	46.95 %	40.11 %
China local	33.64 %	37.04 %	41.10 %	36.15 %	48.30 %	41.85 %	45.90 %	48.39 %	48.60 %
Kopergaon	30.22 %	27.12 %	31.32 %	30.10 %	41.12 %	43.87 %	45.76 %	44.09 %	46.70 %
Vaibhav	35.64 %	20.18 %	25.74 %	18.53 %	41.34 %	42.86 %	44.53 %	38.97 %	40%

Plants of all Green gram Varieties

Plants of ‘Vaibhav’ variety of Green gram

Plants of 'Kopergaon' variety of Green gram

Plants of ‘China Local’ variety of Green gram

Plants of 'BM - 4' variety of Green gram

trackmybus
GPS based bus tracking android application or website

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ABSTRACT:
Android is the latest and a rapid growing technology available for all the users or customers in today's market. An enormous increase in the end user acceptance has been experienced in the past few years. This project has been developed on the Bus Information System in MSRTC. This paper proposes an Android mobile phone application that gives information about buses, bus numbers as well as bus routes online. Reason for Android platform - Android requires an open source development which is probably the more possible and a present user friendly approach. This paper also deals with Location Based Services, which are used to track the current location of the bus as well as give an approximate remaining time for the tracked bus to reach its destination using the Client-Server technology. Also, it displays the required maps with the help of GPS.
Keywords: GPS, LBS, Android users, Client-Server Technology

Introduction:
There are different modern technologies available for track the vehicle location such as GPS but other types of automatic vehicle location technology can also be used.GPS based Bus Tracking Android Application system includes mounting of mobile device in a Bus, with purpose designed web application to enable organization to track the location of Bus. Bus to be tracked equipped with a GPS receiver and relays the obtained coordinates via cellular networks to Home Station. Bus information can be viewed on electronic map via the internet or specialized software. In case of software application, we are using an android phone as a device in Bus and this Bus will be watched by administrator using a web application. Android application user can also view information of Bus.

Prior Approach:
Time Scheduling:- You can not set the time of your watch by the arrival of bus. You are lucky if Bus arrives and departs on time. You can see hoards of people waiting endlessly for their destination bus.
Frequency of Buses:- It is impossible to predict whether there are any buses on the particular route.
Passenger Problems:- Passengers cannot predict the timing of the bus and may miss the bus they need.
Environment: As many of the passengers use their private transport than public transport, there is frequent increase in the temperature of the environment. It is this never improving nature of Transport Systems every second family own a private vehicle.

Our Approach:
Bus Route Mapping: We will be pre-defining the route of each bus through web based application. Each bus and the android device will be mapped using an IMEI number of phone. 1 IMEI corresponds to Bus that is being tracked.

Bus Tracking: We can track the location of Bus using Android Phone's GPS device. The Bus and the phone is mapped using IMEI number.

Bus Speed Monitoring: We can also find the speed of the vehicle and if driver breaks the speed rule then we can find them

Methodology:

Architecture

GPS based Bus tracking consists of a client side and a server side. An overview of its architecture is represented in Figure:

- The client side consists of android application.
- The server side consists of the web application server, Bus is consists of android admin application with GPS enabled, and a database.

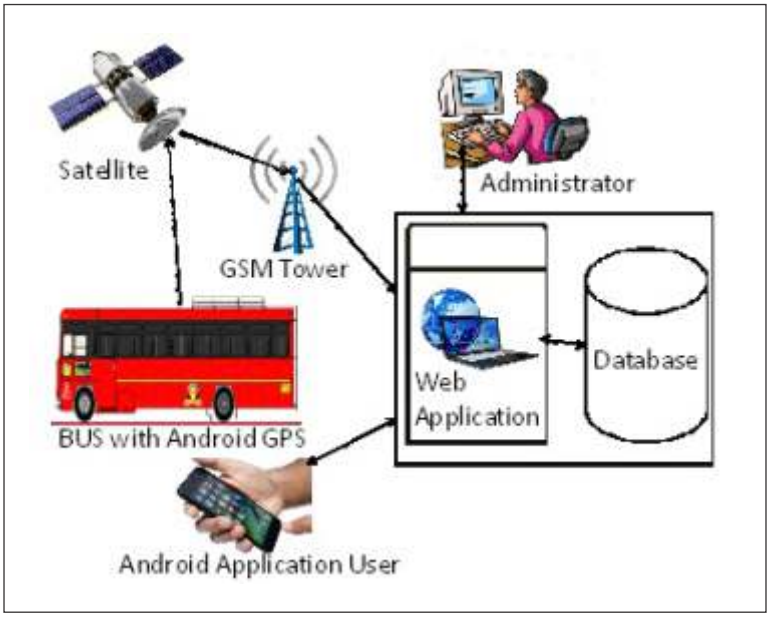

Figure1: Working Architecture of GPS based bus tracking android application

Working:

Sever Side Working:

For server side application, we are developing the web application, which is basically developed for the organization to handle the overall organizational activity. The web application provides information about bus like location of bus, which is obtained by fetching the co-ordinates through android GPS. These fetched co-ordinates are send to the server side web application, which plot them on Google map. Web application provides that fetched location to the android application user, who wants to know the location of particular bus. Organizational person can also see all the android application users. All information related to the bus is provided for the android users. The user, driver and bus database is stored and maintained.

Client Side Working:

At the client side, an android application is developed for the passengers. So by using this application passengers can also see the bus location on Google map and notifications of the bus location are also displayed on notification bar. Time table of buses from different stops are displayed and specification of one way and return way is given. Reminder is also provided for the specific bus stop.

Conclusion:-

For the purpose of bus tracking, a organization must have a database with all the information about bus stops routes. We propose a system GPS based bus tracking that enables the collection of bus stops location

and fetching co-ordinates of bus through GPS device. System consists of a Mobile Application to collect the bus stops, routes and location. A server that receives the information collected, fetch GPS

data. And a database to save the information collected and a Monitoring Application to visualize and edit all the information. The Data from the server is transformed to the user application on android phone. The user views the whole information

References:-

1. https://play.google.com/store/apps/details?id=com.appeffectsuk.bustracker&hl=en
2. www.ijetae.com
3. http://ieeexplore.ieee.org/document/7375712/?reload=true
4. Understanding GPS: Principles and Applications
   By Elliott Kaplan, Christopher Hegarty
5. Programming Android
   By Zigurd R. Mednieks, Laird Dornin, G. Blake Meike, Masumi Nakamura

Software On Smart Health Prediction

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ABSTRACT:
Technology holds great potential for improvements in the field of health care used in intelligent environments, with homes becoming the centers for proactive healthcare.Smart health care systems at home can be used to provide such solutions. A technology-assisted smart health care system would enable elderly people to lead their independent lifestyle away from hospitals and also avoid having expensive caregivers. In this paper, we present one such solution where a prediction model in an intelligent smart home system can be used for identifying health trends over time and enable prediction of future trends which can aid in providing preventive measures.

Introduction:

The integration of smart home technology to support health and social care is acquiring an increasing global significance. Provision is framed within the context of a rapidly changing population profile, which is impacting on the number of people requiring health and social care, workforce availability and the funding of healthcare systems.

It might have happened so many times that you or someone yours need doctors help immediately, but they are not available due to some reason. The Health Prediction system is an end user support and online consultation project. Here we propose a system that allows users to get instant guidance on their health issues through an intelligent health care system online. The system is fed with various symptoms and the disease/illness associated with those systems. The system allows user to share their symptoms and issues. It then processes users symptoms to check for various illness that could be associated with it. Here we use some intelligent data mining techniques to guess the most accurate illness that could be associated with patient's symptoms. If the system is not able to provide suitable results, it informs the user about the type of disease or disorder it feels user's symptoms are associated with. If users symptoms do not exactly match any disease in our database, is shows the diseases user could probably have judging by his/her symptoms. It also consists of doctor address, contacts along with Feedback and administrator dashboard for system operations

By using this software we try to solve the problem related with health care are solve and proper medicine get to the patient on time and if you have any doubt related with medicine so you can directly contact with doctors also for suggestion.

Prior Approach:

Online Software :- There are most of the software are available on the internet but most of the time internet connection not available in the small villages so they not find proper medicine Immediately.

Patients Problems:- Patient not get medicine on time when hospital is close and when doctor not available in hospital

Our Approach:

Offline Software: Important thing is that this software is offline so work anytime anywhere without any internet connection. And in this software you can also directly contact to the doctor for his suggestion .

Benefits Of Software :

1) People may get exact what they want to inject to fight against any disease.
2) Exact medicine people may ask to medical shopkeeper.
3) Time utilization.
4) People will get immediate results.
5) People will save money &pay for exact medicine

Methodology:

Today in the area of health care, a major issue is the provision of adequate and effective health for the elderly, as people aged 65 and older are the fastest growing segment of the population. Technology holds great potential for improvements in the field of health care used in intelligent environments, with homes becoming the centers for proactive health care. Smart health care systems at home can be used to provide such solutions. A technology-assisted smart health care system would enable elderly people to lead their independent lifestyle away from hospitals and also avoid having expensive caregivers. In this paper, we present one such solution where a prediction model in an intelligent smart home system can be used for identifying health trends over time and enable prediction of future trends which can aid in providing preventive measures.

Figure1:

How To Handle :

Enter the Name of disease into the combo box then click on the OK Button then Name of Medicine display on the Data greed view.

OR

Select the Name of disease from dropdown list and click on OK Button then Name of Medicine display on the Data greed view.

If You don't know the Name of disease then click on Symptoms Button for Check the symptoms.

Conclusion:

Smart health prediction have great importance for area of medicine, and it represents comprehensive process that demands thorough understanding of needs of the healthcare organizations. Healthcare is one of the major sectors which can highly benefit from the implementation and use of information system. We have provided an overview of applications of data mining in infrastructure, administrative, financial and clinical Health care system. Knowledge gained with the use of techniques of Smart health prediction using data mining can be used to make successful decisions that will improve success of healthcare organization and health of the patients. Data mining requires appropriate technology and analytical techniques, as well as systems for reporting and tracking which can enable measuring of results. Smart health prediction , once started, represents continuous cycle of knowledge discovery.

Smart health prediction have great importance for area of medicine, and it represents comprehensive process that demands thorough understanding of needs of the healthcare organizations. Healthcare is one of the major sectors which can highly benefit from the implementation and use of information system. We have provided an overview of applications of data mining in infrastructure, administrative, financial and clinical Health care system. Knowledge gained with the use of techniques of Smart health prediction using data mining can be used to make successful decisions that will improve success of healthcare organization and health of the patients. Data mining requires appropriate technology and analytical techniques, as well as systems for reporting and tracking which can enable measuring of results. Smart health prediction , once started, represents continuous cycle of knowledge discovery.

References:

1) http://www.emedexpert.com/lists/conditions.shtml

2) https://www.drugs.com/medical_conditions .html

3) http://www.wikihow.com/Program-in- Visual-Basic-.NET-(VB.NET)

4) https://www.tutorialspoint.com/vb.net/vb.n et_database_access.htm

5) http://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/dxc-20168651

ANALYSIS OF DRINKING WATER OF DIFFERENT PLACES FROM PATHRI & BHADHALI IN JALGAON DISTRICT, MAHARASHTRA

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ABSTRACT:
The ground water quality is Pathri & Bhadhali, a small village in Jalgaon District located Maharashtra State.. Ground water quality in the study area needs to pay attention as the people are dependent on it for drinking and irrigation purposes. It is also noted that people from this area are suffering from renal disorders. Therefore physico-chemical parameters of 10 samples from 5 Open wells and 5 Tube well were randomly collected and analyzed using different instruments. In Physico-chemical analysis, various quality parameter are measured including pH, electrical conductivity, total dissolved solids (TDS), total hardness(TH),content of Calcium ,Magnesium, COD, BOD, Sulphate ,Nitrate, Phosphates , Sodium, Potassium,
Keywords: Ground water, physico-chemical analysis, TH, TDS.

StudyArea:

Pathari Village

Bhadhali Village

Material and Methods:
The ground water samples have been collected from 5 tube wells and 5 Open Well during field work. Chemical analysis for study of 10 samples from tube wells were collected for parameters like pH, Electrical conductivity, total dissolved solids, total hardness, calcium, magnesium, Sodium, nitrate, sulphate and were performed in the college laboratory.

Results and Discussion:

From the above water analysis and obtained results

We conclude that; pH, cond., TDS are within prescribed limits WHO and BIS.

Total Hardness, Calcium, Magnesium, is very high and it is not in the prescribed limits Turbidity, Phosphate, sulphat, Nitrates, sodium & potassium content of the water sample collected from different areas of Pathri and Bhadhali in Jalgaon district are within prescribed limits WHO and BIS. Fluoride is within prescribed limit. Though Na & K are absent in the water samples salts of other heavy metals may be present in rich quantity in Jalgaon city and hence total hardness of ground water samples for most of the areas of city found beyond permissible limits of BIS and WHO. This indicates that the nature of ground water from the Jalgaon city is moderately hard. So it should be purified and filtered properly before used for drinking purposes. Otherwise people from those areas may suffer by cardio-vascular and excretory system related problems like nephritis, swelling in urinary tract, which may also leads to kidney & bladder stones.

Observation:

Sr. No	Sample Location	PH	E.C $\times 10^{-3}$ ms	TDS ms	TH Of H_2O	Hard Of Ca.	Hard Of Mg	COD	BOD	Turbidity
	WHO	6.5-8.5	1400 (mS/cm)	500	500	-	-	10 mg/Lit	6.0 mg/Lit	-
	BIS	6.5-8.5	-	500	300	-	-	-	-	-
1.	P-1	6.89	3.043	1.545	744	500	244	98	1.5	0.1
2.	P-2	7.33	1.553	0.826	572	316	256	112	1.8	N.D
3.	P-3	7.34	1.899	1.025	496	284	212	93	2.7	N.D
4.	P-4	7.26	1.252	0.722	280	128	152	97	1.0	N.D
5.	P-5	7.30	2.375	1.328	640	356	365	106	2.3	N.D
6.	B-1	7.21	3.235	1.696	488	224	264	102	4.2	N.D
7.	B-2	7.28	3.549	1.914	436	244	192	115	3.8	N.D
8.	B-3	7.48	3.041	1.625	528	232	296	117	3.2	N.D
9.	B-4	7.52	1.601	0.832	104	104	0	111	4.1	N.D
10	B-5	7.50	1.335	0.709	260	204	56	98	2.9	N.D

Observation:

Sr. No	*Phosphates (690nm)*	*Sulphate*	*Nitrates (410nm)*	*Chloride*	*Alkalinity (PA)*	*Alkalinity (TA)*	Fluoride
COD		*400 mg/Lit*	*45 mg/Lit*	*250-1000 mg/Lit*	-	-	1-1.5
BIS		*200 mg/Lit*	*45 mg/Lit*	-	-	-	-
1	N.D	0.76	0.31	17.7	0	0	0.52
2	N.D	0.43	0.36	20.7	0	0	0.49
3	N.D	0.66	0.28	21.5	0	0	0.53
4	N.D	0.30	0.22	19.1	0	0	0.48
5	N.D	0.86	0.26	20.2	0	0	0.52
6	N.D	1.00	1.06	17.6	0	0	0.54
7	N.D	1.16	1.04	16.1	0	0	0.54
8	N.D	0.92	1.18	16.6	0	0	0.52
9	N.D	0.65	0.73	9.6	0	0	0.38
10	N.D	0.43	0.29	15.1	0	0	0.48

Conclusion:

This study shows that ground water is the only source for people in the study area, and the results of the chemical analyses of ground water indicate considerable variation. Most of the water samples do not match with WHO standards for drinking purpose. The water quality in the investigated area is found to be suitable for drinking only in few locations, while as out prior treatments. It must be noted that a regular chemical analysis must be done to insure that the quality of water in this area is not contaminated, in addition to research for new walls in the area in order to get additional water for the resident people

References:

1. Arvind Kumar Rai, Gurdeep sing, plant archies, vol 11 no 1, page no 389-392, 2011.
2. Standards methods for the examination of the water and waste water, APHA, 20th edition 1998.
3. Trivedy R K and Goel P K, Chemical biological methods for waste water pollution studies, Environmental publication, Karad, India.
4. Dr. Bandela N N, Masarrat Sultana, Er. Uday P Patil, Mannual of Environmental pollution analysis, First Edition, -Prithvi Publication. 2005.
5. Dr. B Subharao, Dr. S V Ranade, Prof J M Gadgil, Shri S D Khambe, Laboratory

manual of environmental chemistry, Goel Publication house Meerat.
6. Kaur H Syal J AndDhilon S S, WQI of the river Sutluj, Pollution research, 20(2), 199-204, 2001.
7. Handbook of methods in Environmental Studies, by S K Maiti.

Analysis of Soil Samples for its Physico-Chemical Parameters from Jalke and Gadegaon region.

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ABSTRACT:
The soil is the most important constituent to fulfillment of all the basic needs of human beings. Soil is an important component of our farming. An eminent position in global cultivation of various crops is occupied by Indian agriculture and reason of physical, chemical condition of whatever land is obligatory for proper implementation of the other management practices. Thus the physico-chemical study of territory is very significant because both physical and chemical properties which bear upon the soil productivity. This, physico-chemical study of soil is based on various parameters like pH, electrical conductivity, moisture, temperature, soil organic matter, available nitrogen, phosphorus and potassium. This knowledge will help to the people who are interested to work in agricultural field.
Keywords: Soil composition, physico-chemical parameters.

Jalgaon District is located in the Western part of Indian peninsula and Northern side of Maharashtra State. The soil may be defined as the uppermost weathered layer of the earth's crust in which are mixed organisms and products of their death and decay. It may also be defined as the part of the earth's crust in which plants are anchored. It is the need of time that we have to study the physico-chemical parameters of soil to know its quality. Ten representative samples were collected from various parts of the city and its physico-chemical analysis have been performed to know its different parameters like , alkalinity content, chloride, sulphate, pH, conductivity, sodium and potassium.[1]

Material and methods

Ten representative soil samples were collected in the depth of 0-20 cm from the surface of soil. Sample no G-1 to G-5 from Gadegaon region, samples from J-1 to J-5 numbers Jalke region were collected for analysis. Samples collected were thoroughly mixed on a piece of clean cloth, air dried and the lumps were broken using wooden pestle and mortar. Particles were disaggregated, crushed and sieved with 10 mesh diameters. The soil samples were preserved in polythene bags and labeled for further analysis. The chemicals and reagents used for analysis were of A.R. grade from S.D Fine and Merck. Standard instrumental and non instrumental methods were used for estimation of the above mentioned parameters the methods are as shown in the table 1.

Sr.No	Parameter	Method
1	pH	pH metry
2	Conductivity	Conductometry
3	Alkalinity	Volumetric method
4	Chloride	Volumetric method
5	Sulphate	colorimetric method
6	Soil moisture	Gravimetric method
7	Sodium	Flame photometry
8	Potassium	Flame photometry
9	Soil Organic Matter	Gravimetric method
10	Phosphorous	colorimetric method

*Table 1: Methods Use for Estimation of Parameters.

3. Result and Discussion:

Sample Code	pH	E.C mS/cm	Moist content %	WHC %	soil porosity	B.D. gm/cm^3	Na. ppm	K ppm	P kg/ha	SO_4^{2-}	Cl^-
G-1	7.2	3.06	11	28	0.522	1.265	0.4	0.2	17.92	4.80	319.0
G- 2	7.1	4.79	10.6	58	0.585	1.098	0.4	0.1	15.23	5.95	269.4
G -3	7.2	3.33	13	45	0.534	1.234	0.3	0.2	26.88	8.35	283.6
G-4	7.3	3.87	11	50	0.522	1.265	0.3	0.1	28.67	6.24	212.7
G- 5	7.2	3.97	11	49	0.522	1.265	0.4	0.2	11.64	5.66	191.43
J-1	7.5	4.33	4	62	0.483	1.369	0.1	0.2	17.92	6.04	148.8
J-2	7.6	4.19	9	39	0.476	1.388	0.3	0.1	15.23	4.51	226.0
J-3	7.8	3.62	7.2	61	0.483	1.369	0.3	0.1	17.92	12.76	92.1
J-4	7.6	3.67	9.1	38	0.476	1.388	0.2	0.1	26.88	9.50	226.0
J-5	7.7	4.03	11	69	0.476	1.388	0.3	0.2	8.96	5.85	92.1

*The values of physicochemical parameters are presented in table 2.

For the present study soil collected from Gadegaon and Jalke of Jalgaon District (M.S.).In the present study PH of soil of Gadegaon and Jalke region were ranges in between 7.1 to 7.8, PH of soil samples slightly basic nature of soil. In the present study electrical conductivity of soil of these regions was in between 3.06 to 4.79 m S/cm indicates normal ranges. In present study percent available phosphorous (% P) of soil of both region were in 8.96 to 26.88 kg/ha. For some soil samples % P was higher than the normal range the excessive phosphorous has been some harmful effects, such as profuse root growth in case of lateral and fibrous root lets. A higher value of 'K' shows that there is much large use of chemical fertilizers in soil. To avoid this, there is a need for use of natural fertilizers to improve the quality of soil. In present study the values of Na mg/gm were ranges in between 0.10 mg/gm to 0.40 mg/gm gm. For some soil samples the values of Na mg/gm were lower than normal ranges, it may cause shedding of flowers, poor seed setting and attack of diseases. In present study the values of alkalinity were normal and ranged in between 92 mg/lit to 319 mg/lit.

Conclusion:

The physico-chemical parameters are important to agricultural chemist for plant growth and soil management. A physico-chemical studies of soil samples from two places of Pachora region shows that the physico-chemical parameters, PH, conductivity, alkalinity are within the normal range but the % P, % K, Na (ppm), % organic carbon within the limits, this is due to improper use of fertilizer. These studies give information about the nature of soil, present nutrient in soil. According to this information former arrange the amount of which fertilizer and nutrients needed to soil for increases the % yield of crop as soil sample quality is improved, the production of plants is also increases and the amount of chemical decreases in the soil. So the crop will be much healthy for animal and human being.

References:

1. Dr. Syed Ummul Khair Asema Assistant Professor, Department of Chemistry, Maulana Azad College, Aurangabad, Maharashtra, IndiaVol 4 Issue 13 December, 2015 ISSN 2278 – 0211 (Online)Ijird Page 85-88.
2. Alexander, M: Introduction to soil microbiology. Toppan Company Ltd. Tokyo. 470(1961).

3. Bhardwaj, A. C. and Neelam Tyagi: Impact of organochlorine pesticide on the morphobehaviour of pantala flavescent fabr. J. Environ. Biol. 14(2), 089-094.
4. Choudhuri, D. K. and T. Pande: High altitude soil animals and their relation with soil factors, with special reference to mites. Rev. Eeol. Biol. Sol., 16(1) 219-226 (1979).
5. Choudhuri, D. K. and S. Roy: An ecological study on collembolan of West Bengal. India, Rev.Zool. Surv. India, 66(4), 81-110(1972).
6. Dwivedi, R. S.: Plant Physiology In: A decade of research. CSSRI Publication. Karnal 99-116(1979).
7. Dhage A. R.: Determination of Soil organic carbon. Department of soil science and agriculture chemistry.

"Depolymerization of Polyethylene Terephthalate (PET) using High Pressure Autoclave"

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ABSTRACT:

High pressure autoclave manufactured by Amar Equipments Pvt. Ltd. Mumbai, was used for depolymerization of Polyethylene terephalate (PET) waste. The percent conversion of PET into terephthalic acid (TPA) using high pressure autoclave were found to be 3.40% , 10.3%, 41.3% and 84.10%, 84.00% , 82.5% at 373 ,403, 423, 443, 473 and 503 K temperatures respectively. The velocity constants for conversion of PET into TPA using high pressure autoclave were found to be 2.883×10^{-4}, 9.059×10^{-4}, 4.439×10^{-3}, 1.532×10^{-2}, $1.527x10^{-2}$ and $1.452x10^{-2}$ min^{-1} at temperatures 373 ,403, 423, 443, 473 and 503 K respectively. The autogenious pressures at these temperatures were 0.0, 20.31, 50.0, 88.47, 195.8 and 358.24 psi respectively. The energy of activation was found to be 52.348 K J $mole^{-1}$. The percent conversion for the same reaction by reflux method was 1.23% at 373 K .The Arrhenius factor (Frequency factor) calculated from the intercept of Arrhenius plot was found to be $8.472\times 10^{3} min^{-1}$.

· Supervisor

Introduction:

Polyethylene terephthalate has become one of the most valuable recyclable materials because of the wide range of applications such as manufacture of synthetic fibers, beverage, food and other liquid containers, X-ray films, thermoformed products, etc. The recycling industry of PET waste started as result of environmental pressure to improve waste management. The various methods for recycling of PET waste can be divided into four main groups, namely primary (re-extrusion), secondary (mechanical), tertiary (chemical), and quaternary (involves energy recovery) recycling. Among the recycling methods, chemical recycling is the only one acceptable according to the principles of "sustainable development" because it leads to the formation of raw materials which the polymer is originally obtained i.e. to get value added monomer. The chemical recycling of PET waste can be carried out through hydrolysis, glycolysis, methanolysis, aminolysis or ammonolysis.[3] These methods are mainly focused on obtaining monomers such as terephthalic acid (TPA), ethylene glycol (EG), bis(2- hydroxyethyl) terephthalate (BHET) and dimethyl terephthalate. The first two products can be obtained from PET waste by hydrolysis under neutral acidic or alkaline conditions, the third product by the glycolysis and the last by methanolysis.

Methodology

Autoclave:

Chemical reactions at high pressure and temperature like alkylation, amination, bromination, carboxylation, catalytic reduction, dehydrogenation, chlorination, esterification, polymerization, etc are carried out using high pressure autoclave to save energy and time. It has stirred reactor with the size from 25 ml to 1000 litres capacity. The reactor is made up of SS-316/316L, with nickel, titanium, tantalum lined, zirconium,etc metals. It has maximum design pressures upto 5000 psi(344.7 bar) and temperatures up to 500^{0}C. In the present study we have used the high pressure autoclave of the capacity 450 ml and pressure of 1000 psi. It also provides controlling system like auto-cooling, chiller, condenser for distillation or reflux, thermic fluid heating and cooling systems.

Fig.1: High pressure Autoclave

Fig.2: Reactor joint by split clamp bolt

Autoclave - Salient Features:

High pressure autoclave has Stirred and non-stirred reactors, with high torque and zero leakage magnetic drive coupling. PID control system is provided with automatic temperature controller, pressure controller, RPM, auto cooling system. PC controlled autoclaves system to continuously monitor, control and record various parameters. Top mounted compact integral inline motor with magnetic drive. The whole assembly is noiseless, vibration free with infinite invariable speed regulator & indicator. No stand for motor mounting is required, hence there is no maintenance about alignment and vibration. No noise problem is observed. High pressure autoclave is lightweight, economical and very compact, hence occupies very less table space and it is wheel mounted there for portable. Brushless DC motor with BLDC drive & RPM indicator. Available for autoclaves from 50ml to 25 ltrs. volumes.

RPM: 300-1200 for 50ml- 5ltr, 300-750 for 10ltr.- 25ltr.

Stirrer: Single or two stage, 4/6 bladed pitch blade turbine type impeller surrounding by cooling coils.

Mechanism of depolymerization of PET:

The mechanism of depolymerization of PET into TPA with ethylene glycol byproduct is as given in figure 3.

Fig.3: Hydrolytic depolymerization of PET

Depolymerization of PET:

Polyethylene terephthalate waste obtains from PET drinking water bottles. In order to obtain maximum surface area for the reaction, the sample was cut into small pieces(4×4mm). 10gm of PET waste and 300 ml of water were charged into the reactor of 0.45 L capacity high pressure autoclave equipped with constant rotating stirrer at the speed of about 30.7 rpm for the proper mixing of reaction mixture. The temperatures of reaction mixture varies as, 100, 130, 150, 170, 200, 2300C for 120 minutes reaction time. The reaction was carried out in presence of definite amount of sodium hydroxide. Autogenious pressure developed at the particular temperature in the vessel was responsible to increase the rate of depolymerization. The autogenious pressures developed at different temperatures were recorded. After the specified time interval, the vessel was cooled suddenly by circulating cold water in vessel through inner coil. The vessel was opened by removing collar of the high pressure autoclave. The content of the reaction vessel after the reaction was withdrawn in a beaker and acidified with concentrated hydrochloric acid till the milky white precipitate of the terephthalic acid (TPA) was obtained. It was then dried, weighed and characterized by recording its melting point and FTIR spectra.

Fig.4: Heating mantle and reactor

Fig.5: Acidification of TPA

Fig.6: Mag. Coupled stirrer, cooling coil & pressure sensor

Fig.7: PID control panel

Reflux Method:
10 g (4x4 and 8x8) PET, 4 and 7 g of sodium hydroxide and 150 ml water were charged in round bottom flask equipped with reflux condenser, after 2 hours reaction time, the product was filter and wash with hot water. The same reaction was carried out using pyridine. The filtrate was acidified by concentrated hydrochloric acid till it becomes acidic. A white precipitate of TPA obtained was filtered, dried and weighed.

Characterization of TPA: The TPA obtained in depolymerization reaction was characterized by recording FTIR of Shimadzu make. The 1693.5 cm^{-1} frequency indicates presence of carbonyl group, 2555.6 to 3064.8 cm^{-1} frequency indicates presence of hydroxyl group, 783.1 cm^{-1} indicates Para substituted benzene and also comparing the spectra with control, TPA has been confirmed.

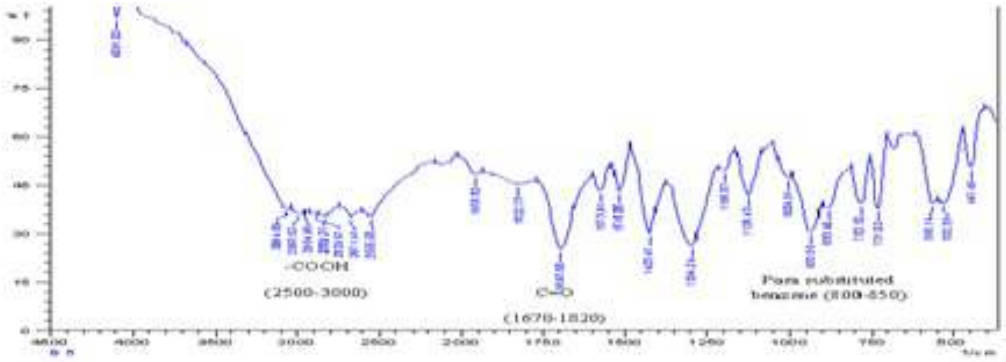

Fig.8: FTIR spectra of TPA (sample)

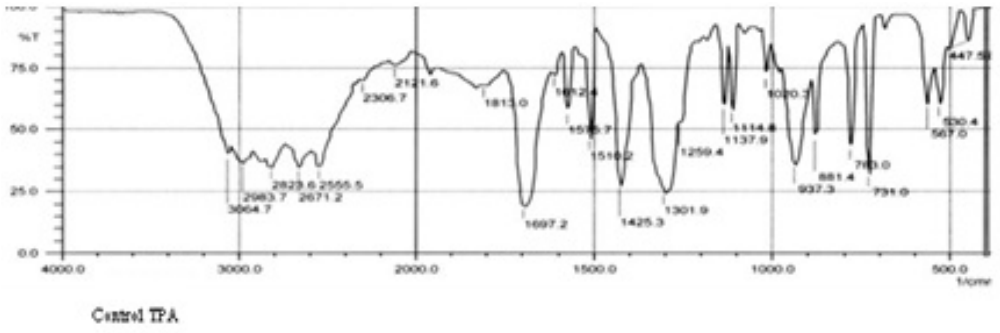

Fig.9: FTIR spectra of control TPA

Results and Discussion:

1. Percent conversion of PET in to TPA

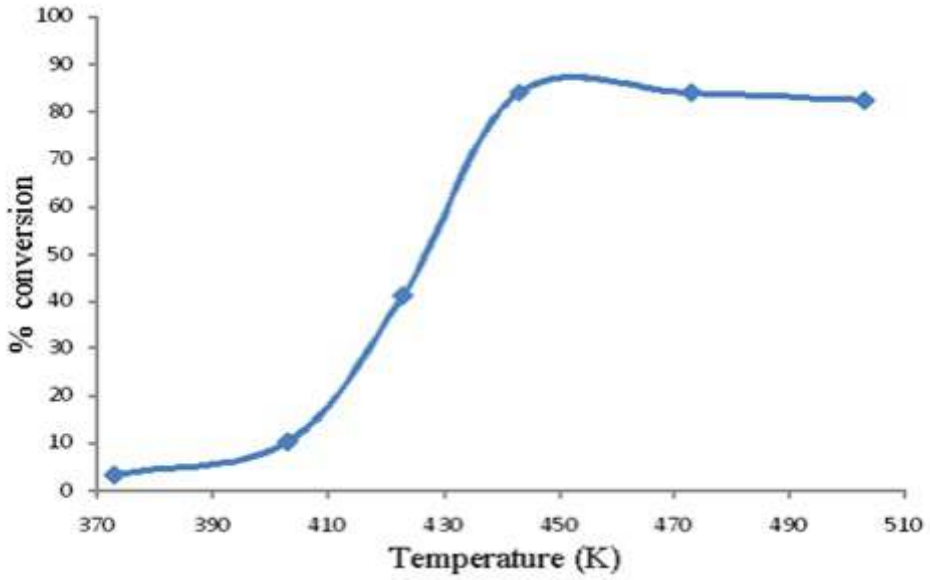

Fig. 10: Variation of Percent conversion with. temperature

The percent conversion of PET into TPA was found to be almost constant up to 403 K, i.e. 10.30%, then the percent conversion increases slowly up to 41.30% at 423 K. Further it increases drastically up to 84.10% at 443 K. After this temperature percent conversion almost remains constant. Hence 443 K temperature is an optimized temperature for depolymerization of PET waste.

2. Kinetics and thermodynamics of Depolymerisation of PET by HPA

Time= 120 min , Amount of NaOH =7.0g, Particle size 4x4 mm.

Sample No.	Temperature	Pressure		Weight of TPA	% conversion	Unreacted PET	K	1/T	log k
	K	Bar	psi	gm		gm	min^{-1}	K^{-1}	
1	373	0	0	0.34	3.40%	9.66	$2.88x10^{-4}$	$2.681x10^{-3}$	-3.5401
2	403	1.4	20.305	1.03	10.30%	8.58	$9.059x10^{-4}$	$2.481x10^{-3}$	-3.0428
3	423	3.5	50	4.13	41.30%	5.37	$4.439x10^{-3}$	$2.363x10^{-3}$	-2.3527
4	443	6.1	88.47	8.41	84.10%	0	$1.532x10^{-2}$	$2.257x10^{-3}$	-1.8147
5	473	13.5	195.8	8.4	84.00%	0	$1.527x10^{-2}$	$2.114x10^{-3}$	-1.8161
6	503	24.7	358.24	8.25	82.50%	0	$1.452x10^{-2}$	$1.988x10^{-3}$	-1.838

Table 1: Kinetics and thermodynamics of Depolymerisation of PET

3. Depolymerization of polyethylene terephthalate (PET) using Reflux Method

Sample No.	Temperature	Pressure		Time	Weight of NaOH	Weight of TPA	% conversion	Unreacted PET	k
	K	bar	psi	min	gm	gm		gm	min^{-1}
1	373	0	0	120	4	0.123	1.23%	9.77	$1.027x10^{-4}$
2	373	0	0	120	4 (pyridine 4ml)	0.09	0.90%	9.88	$0.753x10^{-4}$
3	373	0	0	120	7 (pyridine 4ml)	0.25	2.5%	9.72	$2.110x10^{-4}$

Table 2: Kinetics of Depolymerisation of PET

4. Comparative study of depolymerization of PET by different method:-

Comparative study of % conversion and specific reaction rate for depolymerisation reaction of PET using High pressure autoclave technique and reflux method is given in table 3.
Time 2.0 hrs, Amount of NaOH = 7.0 g, Temp = 100,^{O}C particle size , 4 mm,

Technique	% conversion	Specific reaction rate
High pressure autoclave	3.4	2.88x10-4 min-1
Reflux method	2.5	2.110x10-4 min-1

Table-3: Comparative study of depolymerization of PET by different method

The comparative study shows that the use of high pressure autoclave is more effective for depolymerisation reaction as compared to reflux method, since the vapour pressure in reactor of high pressure autoclave increase rate of depolymerisation reaction

1. Kinetics and Thermodynamics of depolymerization of PET

a. Variation of specific reaction rate with Temperatures:

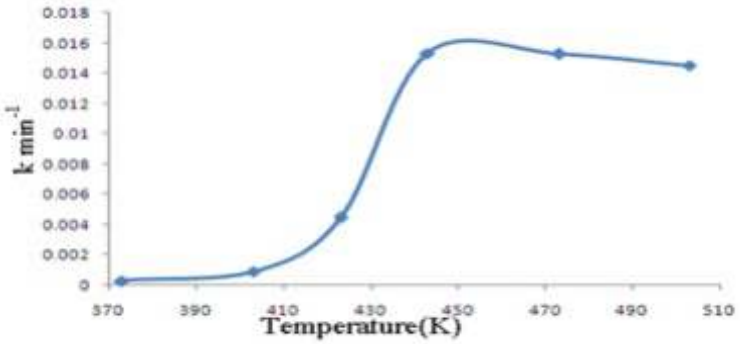

Fig.(11) Specific reaction rate vs. temperature

The graphical behavior of plot of k versus temperature was found to be almost similar as that of the graph of percent conversion versus temperature. Hence, It is evident from this that the specific rate constant at 443 K is maximum and was found to be $1.532x10^{-2}$ $min^{-1.}$

b. Variation of log k versus 1/T: Arrhenius plot:

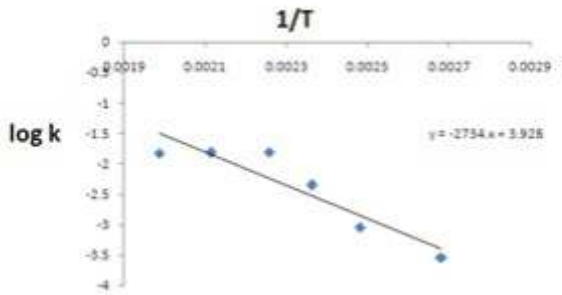

Fig.(12) log k vs. 1/T

Arrhenius plot, log k versus 1/T is the straight line having intercept (A) 3.928 and slope 2734. The slope has been used to find the energy of activation of reaction as given below:

$E_a = 2.303 \times R \times$ slope, $E_a = 2.303 \times 8.314 \times 2734$, $E_a = 52348$ J mol^{-1}.

E_a = 52.348 KJ mol^{-1}

The intercept of the plot has been used to find the frequency factor (A) as below,

Intercept = 3.928, log A = 3.928, A = AL (3.928), A = 8472 min^{-1}

A = 8.472 × 10^3 min^{-1}

Thus, The energy of activation and the frequency factor for depolymerisation reaction has been found to be **52.348 KJ mol^{-1}** and **8.473 × 10^3 min^{-1}** respectively.

Conclusions:

1) Autogeneous technique for depolymerisation of PET is the effective, convenient and environmental friendly technique.
2) The percent conversion by autoclave technique and reflux method are 3.4 & 2.5 respectively.
3) The depolymerization of PET is pseudo first order reaction with the specific reaction rate constant of the order 10^{-2} min^{-1}.
4) The energy of activation and frequency factor for the reaction are 52.348 KJ mol^{-1} & 8.472x$10^3$$min^{-1}$ respectively.

References:

1) S. Mishra, A. S. Goje and V. S. Zope, *Polym-Plast. Technol*., 2003, *42*, 581-603.
2) V. S. Zope and S. Mishra, *J. Appl. Polym. Sci.*, **2008**,*110*, 2179–2183.
3) ACADEMIA ROMÂNĂ *Revue Roumaine de Chimie* http://web.icf.ro/rrch/

ANALYSIS OF GROUND WATER QUALITY PARAMETERS OF SAMNER & GADEGAON IN JALGAON DISTRICT, Maharashtra

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ABSTRACT:
The ground water quality is Samner & Gadegaon, a small village of Pachora Taluka in Jalgaon District located Maharashtra State.. Ground water quality in the study area needs to pay attention as the people are dependent on it for drinking and irrigation purposes. It is also noted that people from this area are suffering from renal disorders. Therefore physico-chemical parameters of 8 samples from 8 Tube wells were randomly collected and analyzed using different instruments. In Physico-chemical analysis, various quality parameter are measured including pH, electrical conductivity, total dissolved solids (TDS), total hardness(TH),content of Calcium ,Magnesium, COD, BOD, Sulphate ,Nitrate, Phosphates , Sodium, Potassium,
Keywords: Ground water, physico-chemical analysis, TH, TDS.

StudyArea:

Samner Village

Bhadhali Village

Material and Methods:
The ground water samples have been collected from 8 tube wells during field work. Chemical analysis for study of 8 samples from tube wells were collected for parameters like pH, Electrical conductivity, total dissolved solids, total hardness, calcium, magnesium, Sodium, nitrate, sulphate and were performed in the college laboratory.

Results and Discussion:

From the above water analysis and obtained results

We conclude that; pH, cond., TDS are within prescribed limits WHO and BIS.

Total Hardness, Calcium, Magnesium, is very high and it is not in the prescribed limits Turbidity, Phosphate, sulphat, Nitrates, sodium & potassium content of the water sample collected from different areas of Samner and Gadegaon in Jalgaon district are within prescribed limits WHO and BIS. Fluoride is within prescribed limit. Though Na & K are absent in the water samples salts of other heavy metals may be present in rich quantity in Jalgaon city and hence total hardness of ground water samples for most of the areas of city found beyond permissible limits of BIS and WHO. This indicates that the nature of ground water from the Jalgaon city is moderately hard. So it should be purified and filtered properly before used for drinking purposes. Otherwise people from those areas may suffer by cardio-vascular and excretory system related problems like nephritis, swelling in urinary tract, which may also leads to kidney & bladder stones.

Sr. No.	Sample Location	PH	E.C ×10-3ms	TDS ms	TH Of H2O	Hard Of Ca.	Hard Of Mg	COD	BOD	Turbidity
	WHO	6.5-8.5	1400 (mS/cm)	500	500	-	-	10 mg/Lit	6.0 mg/Lit	-
	BIS	6.5-8.5	-	500	300	-	-	-	-	-
1	T-1	7.02	5.097	2.664	1900	644	1256	104	3.98	N.D
2	T-2	7.05	6.343	3.289	2620	864	1756	107	4.05	N.D
3	T-3	7.07	4.545	2.149	1156	820	336	125	5.82	N.D
4	T-4	7.22	2.381	1.465	700	444	256	93	4.71	N.D
5	T-5	7.55	2.512	1.381	736	396	340	111	5.2	N.D
6	T-6	7.52	1.61	0.909	408	352	56	118	3.32	N.D
7	T-7	7.54	1.387	0.746	840	192	688	99	4.12	N.D
8	T-8	7.18	4.276	2.12	748	404	344	115	4.14	N.D

Observation:

Sr. No	Phosphates (690nm)	Sulphate	Nitrates (410nm)	Chloride	Alkalinity (PA)	Alkalinity (TA)	Fluoride
COD		400 mg/Lit	45 mg/Lit	250-1000 mg/Lit	-	-	1-1.5
BIS		200 mg/Lit	45 mg/Lit	-	-	-	-
1	N.D	1.1	0.67	34.1	0	0	0.53
2	N.D	1.21	0.3	48.5	0	0	0.54
3	N.D	0.98	0.41	31.7	0	0	0.5
4	N.D	0.6	0.53	39.5	0	0	0.5
5	N.D	0.78	0.28	18.2	0	0	0.53
6	N.D	0.33	0.28	12.7	0	0	0.51
7	N.D	0.43	0.45	21.2	0	0	0.5
8	0.02	1.04	0.2	32.7	0	0	0.54

Conclusion:

This study shows that ground water is the only source for people in the study area, and the results of the chemical analyses of ground water indicate considerable variation. Most of the water samples do not match with WHO standards for drinking purpose. The water quality in the investigated area is found to be suitable for drinking only in few locations, while as out prior treatments. It must be noted that a regular chemical analysis must be done to insure that the quality of water in this area is not contaminated, in addition to research for new walls in the area in order to get additional water for the resident people

References:

1. Arvind Kumar Rai, Gurdeep sing, plant archies, vol 11 no 1, page no 389-392, 2011.
2. Standards methods for the examination of the water and waste water, APHA, 20th edition 1998.
3. Trivedy R K and Goel P K, Chemical biological methods for waste water pollution studies, Environmental publication, Karad, India.
4. Dr. Bandela N N, Masarrat Sultana, Er. Uday P Patil, Mannual of Environmental pollution analysis, First Edition, -Prithvi Publication. 2005.
5. Dr. B Subharao, Dr. S V Ranade, Prof J M Gadgil, Shri S D Khambe, Laboratory manual of environmental chemistry, Goel Publication house Meerat.
6. Kaur H Syal J AndDhilon S S, WQI of the river Sutluj, Pollution research, 20(2), 199-204, 2001.
7. Handbook of methods in Environmental Studies, by S K Maiti.

GREENER APPRAOCH FOR MULTICOMPONANT BIGINELLI REACTION USING DISODIUM HYDROGEN PHOSPHATE AS A CATALYST.

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ABSTRACT:

The green efficient methods for preparation of Dihydropyrimidone derivatives have been reported in this presentation reaction is carried using disodium hydrogen phosphate embedded with SiO2 as a catalyst under solvent free condition resulting compound are purified and characterized .

Keywords : Disodium hydrogen phosphate /SiO2, Dihydropyrimidone

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Introduction:

Dihydropyrimidone were first synthesized by Pitro Biginelli in 1893 Musing β-ketoester, aldehyde and urea. Many new approaches of Dihydropyrimidone synthesized have been reported in past decades like using chiral phosphoric acids, inorganic acid such as zeolite,mesoforous silica, and Lewis acid as well as protic acids such as conc. HCL, BF3 ,polyphosphonate ester(1) ,FeCl3/tetra Acetyl ortho -silicate , metal bromide ,Ionic liquid(2) Dihydrpyrimidone shows various biological activities like ,intrguing therapeutics,Ca-antagonists,vasolidative ,Ca- channel modulators and antihypertensive(3). Disodium hydrogen phosphate embedded with SiO2 shows efficient protocol like high yield, short reaction time and good recoveribity. Biginelli products have potential pharmaceutical applications such as antiviral, antitumor, antibacterial, anti-inflammatory, antihypertensive and alpha antagonists(7).Their applications in the field of drug research have stimulated the development of a wide range of synthetic methods for their preparation and chemical transformations.Out of the five major bases in nucleic acids three are pyrimidine derivatives which comprise of cytosine which is found in DNA and RNA, uracil in RNA and thymine, and in DNA Because of their involvement as bases in DNA and RNA.4-Aryl-1,4-dihydropyridines (DHPMs) of the Nifedipine type were first introduced into clinical medicine in 1975 and are still the most potent group of calcium channel modulators available for the treatment of cardiovascular diseases(8).Some of these method have suffered from one or more drawbacks like high temperature requirements, highly acidic conditions such as homogeneous catalysts such as Mg(NO3)2 , lanthanum chloride

Sr. No.	Aldehyde	Reaction Time	%Yield	M.P. reported	Literature
1	4-Chlorobenzaldehyde	3.30 hrs	85 %	210◦C	[209-211] (1)
2	4- Nitrobenzaldehyde	3.00 hrs	82%	204◦C	[205-207] (1)
3	Benzaldehyde	4.00 hrs	75 %	202 0C	[201-203] (1)
4	4-Flurobenzaldehyde	2.30 hrs	86%	1800C	----------
5	3-Chlorobenzaldehyde	2.45 hrs	81%	1900 C	[193-195](1)

heptahydrate , oxalic acid have been reported.This involved the use of Lewis acids like DDQ , $InBr_3$ $Yb(OTf)_3$, $CaCl_2$, $Y(OAc)_3$, $Cu(OTf)_2$, $BF_3.Et_2O/Cu(OAc)_2$, $ZnCl_2$,Metal triflimides $Ni(NTf_2)_2$, polymer supported Ytterbium reagents [3].Many synthetic methods for preparing these compounds have been developed to improve and modify this reaction by microwave [1,2], ultra- sound irradiation [3] and by using Lewis acid as well as Bronsted acids promoters. On the other hand, heterogeneous catalysts such as MCM-41-SO3H have been applied in organic reactions in recent years[7].We have reported a simple economic and efficient multicomponant one pot method for synthesis Dihydropyrimidon from uera , b-ketoses ,and aromatic aldehyde using Disodium hydrogen phosphate as catalyst.

Experimental Method:

1) Preparation of catalyst Na_2HPO_4/SiO_2:

Mixing gel silica get (1.5g) with solution Na_2HPO_4 (0.7g) (5mmol) In distilled water (10ml) the mixture. Was stirred for 30 min to absorbed disodium. Hydrogen phosphate on the surface of silica gel after was dried 120C for 4 to 5 hours the hetropolyacid were prepared.

2) Preparation of Dihydropyrimidone:

A solution of Ethyl acetate (3mmol) ,Aldehyde (3mmol) and Urea (3mmol) was heated 90^0C under free solvent condition in presence of Na_2HPO_4 (5mol%) the reaction was monitored by (TLC). Ethyl acetate (10%) /n-hexane (90%). The reaction mixture was poured in cold water give solid product .impure product was recrystallized using ethanol solvent (40%).

Reaction scheme:

CRHOCH3COCOOEtCNH2NH2ONa2HPO4/SiO2363KOEtNNHOOHRAldehydeBeta-KetoesterUrea

1	4-Chlorobenzaldehyde	3.30 hrs	85 %	210◦C	[209-211] (1)
2	4- Nitrobenzaldehyde	3.00 hrs	82%	204◦C	[205-207] (1)
3	Benzaldehyde	4.00 hrs	75 %	202 0C	[201-203] (1)
4	4-Flurobenzaldehyde	2.30 hrs	86%	1800C	----------
5	3-Chlorobenzaldehyde	2.45 hrs	81%	1900 C	[193-195](1)

Result and Discussion:

Synthesis of dihydropyrimidone from urea, ethyl aceto acetatSe and aldehyde using catalyst such as Disodium hydrogen phosphate under free solvent condition. Disodium hydrogen phosphate has an inexpensive, non-toxic readily available and easily removable catalyst for reactions .this reaction completed less time and easily work up and better yield. It was observed that the aroamatic aldehyde possessing withdrawing substituent required less reaction time , and good product yield. This compound was also characterized by IR spectral analysis. An IR spectrum of these compounds shows the N-H stretching frequency in the region 3200-3400 cm^{-1} which confirmed the presences amine group.

Characterisation

1) **M.P-** ethyl-4(4 chlorophenyl)-1,2,3,4-tetrahydro-6 oxopyrimidone-5-carboxylate - 210°C
   IR(C=O)-1745cm^{-1},(C=C)-1600cm^{-1}(N-H)-3200$cm^{-1.}$
2) **MP:** - ethyl-1,2,3,4-tetrahydro-6-methyl-4(4 nitrophenyl) -2-oxopyrimidone-5-carboxylate
   IR-(C=O)-1750cm^{-1},(C=C)-1600cm^{-1}, (N-H)-3200cm^{-1},(C-H)-3000cn^{-1}
3) **M.P:** - ethyl-1,2,3,4-tetrahydro-6-methyl -2-oxo-4 phenylpyrimidone-5-carboxylate
   IR- C=O)-1728cn^{-1},(C=C)-1600cm^{-1},(N-H)-3113cm^{-1}
4) **M.P:** ethyl-4(3 flurophenyl)-1,2,3,4-tetrahydro-6 oxopyrimidone-5-carboxylate
   IR-(C=O)-1714cm^{-1},(N-H)-3242cm^{-1}, (C=C)-1600cm^{-1}, 779 p-

substituded,
(C-H)-3120cm^{-1}.

5) **M.P:** ethyl-4(3 chlorophenyl)-1,2,3,4-tetrahydro-6 oxopyrimidone-5-carboxylate
IR- C=O)-1645cm^{-1} ,(N-H)-3089cm^{-1},(C=C)-1600cm^{-1},(C-H)-3010 cm$^{-1.}$

Conclusion:

(1) Disodium Hydrogen Phosphate is a excellent catalyst for multicomponenet Biginelli reaction.
(2) The method reported is efficient and facial.
(3) The catalytic property of Na_2HPO_4 increases by associating with SiO_2.
(4) Good yield of the product.
(5) Less reaction time.
(6) Simple procedure

Acknowledgement:

I express my sincere thanks to Principal Dr. U. D. Kulkarni, Vice Principal Dr. D.S. Bendale, Dr.V.S.Zope Head, Department of Chemistry, M. J. College, for providing me an opportunity to take part in such a research project sponsored by UGC. I made my sense thanks to Dr.H.B.Gajare coordinator, Research Promotion Scheme. I am also thankful to all teaching and non teaching staff of our department for their co-operation during the course of project.

Reference –

(1) Reza Tayebee and et.al.(Ammonium Dihydrogen phosphate catalyst for one – pot synthesis of 3.4, Dihydropirimidine-2(1H)-ones. Chinese Journal of catalysis , 2012,vol.33 no.4,659-665.
(2) N.S.Ghotkar and et.al.(Biginelli synthesis of 3,4-dihydropyrimidin-2(1H)-one using Layred Double Hydroxide(LDH) as eco-friendly catalyst),Der Pharma Chemica ,2015, 7(5) :167-172
(3) Suresh Patil and et.al.(Natural acid Catalyzed multi component Reaction as a Green Approach. Archives at applied science Research ,2011,3(1):203-208.
(4) Jiajian Peng and Youquan Deng*(Ionic liquids catalyzed Biginelli reaction under solvent-free Conditions) ,Tetrahedron Letters 42 (2001) 5917–5919.
(5) Ajay K. Bose and et.al(Large scale Biginelli reaction via water-based biphasic media: a green chemistry strategy),Tetrahedron Letters 46 (2005) 1901–1903.
(6) Nat_alia Aparecida Liberto and at.al(b-Cyclodextrin-assisted synthesis of Biginelli adducts under solventfree conditions),Tetrahedron 69 (2013) (8245-8249).
(7) Mohammad G. Dekamin A Facile Biginelli Reaction on Grinding Using Nano-Ordered MCM-41-SO3H as an Efficient Solid Acid CatalystPharmaceutical and Biologically-Active Compounds Research Laboratory Department of Chemistry, Iran University of Science and Technology, Tehran 16846-13114, Iran .
(8) Srinivasa Rao Jetti,and et.al(An Efficient One-Pot Green Protocol for the Synthesis of 5-Unsubstituted 3,4-Dihydropyrimidin-2(1H)-Ones Using Recyclable Amberlyst 15 DRY as a Heterogeneous Catalyst via Three-Component Biginelli-Like Reaction)International Scholarly Research Network.

"Metal Oxides:Efficient Catalyst for Esterification of Fatty Acids"

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ABSTRACT:
Esterification is one of the widely used process to produce various industrially important esters through glycerol and fatty acid as feedstock over different series of catalysts. To satisfy the demands of environmental protection, in present work the traditional liquid acid catalyst in the esterification reaction, was substituted by different metal oxide nanoparticles as a catalyst. The effects of all the parameters such as reaction temperature, and different catalyst on the reaction were studied and the conditions optimized to attain an adequate synthesis. The reaction product was characterized by FTIR analysis.
Key words: Esterification, Fatty acid, metal oxide nanocatalyst.

Introduction

In the first decade of the 21st century the EU adopted ambitious programs for wider use of biomass for energy production1. The commercial synthesis of fatty acid esters of glycerol is carried out by two different routes: direct esterification of the fatty acid with the glycerol (Glycerolysis). Ester derivatives of carboxylic acid in which -OH group has been replaced by -OR (alkoxy group). They have characteristic pleasant, fruity odour that leads to their use in fragrance and flavours industries2,3 . . In nature, fatty esters are, in general, tri-esters derived from glycerol and fatty acids4. In present work, to satisfy the demands of environmental protection, the traditional liquid acid catalyst in the esterification reaction, was substituted by green catalyst such as nano metal oxides. The concern toward the advancement of heterogeneous catalysts, especially by green processes, has led to the development of solid acid catalysts that should be ecofriendly5. In this perspective, metal oxides have attracted major attention owing to their effectiveness of strong surface acidity and high activity at low temperatures. These esters have wide applications in plasticizers, food preservatives, pharmaceuticals, perfumes, cosmetics.

Experimental:

Chemicals: Nano Alumina, Silica, Oleic acid, glycerol, KOH, Oxalic acid were procured from Sd. Fine chemicals, India.

The synthesis process was carried out in six station reaction assembly (Carousel 6 plus model, Radleys Tech., US) equipped with magnetic stirring system, refluxing condenser and electrical heating system. In a typical experiment oleic acid and glycerol with 1:1 molar ratio and synthesized metal oxide nano alumina (A) and nano silica (B) catalyst (2% & 4%) were placed in a dry reaction flask. The temperature was slowly raised to 60–800C for 5 hrs. The reaction was monitored by acid value. When the acid number of the reaction system no longer decreases, the reaction was stopped at once. Then a series of operation were carried out: cooling, centrifugation. The organic layer was dried over anhydrous sodium sulphate to finally isolate a transparent oily product.

RESULT TABLE:

Table 1: Effect of catalyst on esterification reaction

Sr. No.	Batch code	Catalyst	Temperature	Acid Value	Yield
1	E1	Catalyst A : 4%	80	12	92%
2	E2	2%	80	26	84%
3	E3	4%	60	37	80%
4	E4	2%	60	45	75%
5	E5	Catalyst B: 4%	80	43	77%
6	E6	2%	80	51	72%
7	E7	4%	60	59	70%
8	E8	2%	60	65	66%

The products were analyzed by IR spectroscopy.

Results And Discussion:

As shown in result table, nano alumina leads to the best oleic acid conversion rate though it gives more % yield than nano silica, at the same temperature and catalytic percentage. In comparison with nano alumina, esters from catalyst nano silica shows less yield as well as drop in acid value is also no more even at 4% catalyst and at 800c temperature also. In case of alumina shows good catalytic activity at low catalyst % and temperature. It proved that nano alumina is excellent catalyst for esterification reaction. The molar ratio of oleic acid: glycerol was also satisfied by drop in acid value in case of catalyst. This protocol is free from hazardous and expensive reagents, the product can be separated by centrifugation.

FTIR Spectra: Carbonyl frequency of ester group shows peak at 1740-1750 cm-1 indicates transesterification process was completed.. Peaks of the C–H bond of the methyl group and methylene group appeared at 2,924 cm-1and 2,857 cm-1 respectively.

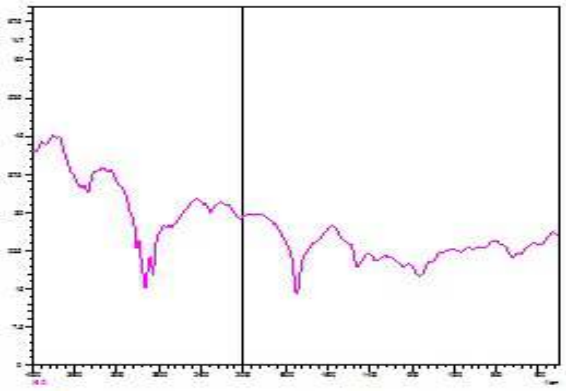

Fig. FTIR spectra of Batch E1

Conclusion:

This protocol is simple and green for the synthesis esters.The present nano alumina catalyst can be employed as an efficient environmentally benign catalyst, for the feedstocks that are rich in FA. The results obtained using metal oxides as esterification catalyst suggested that this material would be a potential candidate to replace the conventional non-selective homogeneous catalysts used for the synthesis of monoglycerides.

References:

1. G. Cholakov, S. Yanev, V. Markov, S. Stoyanov “Esterification of mixture of pure fatty acid with methanol”, Journal of Chemical Technology and Metallurgy, , 2013, 489-496, 48, 5
2. Azam, M. M., Waris, A., Nahar, N, M., Prospects and potential of fatty acid methyl esters of some non-traditional seed oils for use as biodiesel in India. Biomass and Bioenergy, 29, 293-302 (2005).
3. K. Khalisanni, K. Khalizani, M.S. Rohani and P.O. Khalid .,Analysis of Waste Cooking Oil as Raw Material for Biofuel Production Global Journal of Environmental Research 2 (2): 81-83, (2008).
4. Agarwal, A.K., Das, L.M., Biodiesel development and characterizationfor use as a fuel in compression ignition engines. J. Eng.Gas Turbines Power 123, 440–447., 2001.
5. Kamalpreet Kaur, Ravinder Kumar Wanchoo, and Amrit Pal Toor “Sulphated Iron Oxide a proficient catalyst for esterification of butanoic acid with glycerol” Ind. Eng. Chem. Res. 2015, 54, 3285−3292

"ANTIMICROBIAL ACTIVITY OF THE NANOPARTICLES."

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ABSTRACT:
The U.S. National Nanotechnology Initiative offers government funding focused on nanoparticle research. Nanomaterials have extremely small size which having at least one dimension 100 nm or less.Iron oxide nanoparticles were prepared by controlled oxidation of nano particles in the aqueous phase. Copper nanoparticles was also synthesized by using NaBH4 .Antibacterial activity of synthesized compounds was done by paper disc method.
Key Words: Copper Nps, Green Approach, NaBH4, Antibacterial activity.

Introduction

Nanoparticles are particles between 1 and 100 nanometers in size. In nanotechnology, a particle is defined as a small object that behaves as a whole unit with respect to its transport and properties. Scientific research on nanoparticles is intense as they have many potential applications in medicine, physics, optics, and electronics. The U.S. National Nanotechnology Initiative offers government funding focused on nanoparticle research. Nanomaterials have extremely small size which having at least one dimension 100 nm or less.Nanomaterials can be nanoscale in one dimension (eg. surface films), two dimensions (eg.strands or fibres), or three dimensions (eg. particles). They can exist in single, fused, aggregated or agglomerated forms with spherical, tubular, and irregular shapes. Common types of nanomaterials include nanotubes, dendrimers, quantum dots and fullerenes. Nanomaterials have applications in the field of nano technology, and displays different physical chemical characteristics from normal chemicals (i.e., silver nano, carbon nanotube, fullerene, photocatalyst, carbon nano, silica). According to Siegel, Nanostructured materials are classified as Zero dimensional, one dimensional, two dimensional, three dimensional nanostructures. Nanomaterials are materials which are characterized by an ultra fine grain size (< 50 nm) or by a dimensionality limited to 50 nm.

Material And Methods

Chemicals and glassware:

Analytical and research grade chemical were used in the present study. All the Glassware which was used in the present study was procured from the borosilicate. Synthesis of Fe2O3 Nanoparticles Iron oxide nanoparticles were prepared by controlled oxidation of iron nanoparticles in the aqueous phase. Typically,stabilizer 0.5 g of carboxy methyl cellulose was dissolved in 100ml of deionized water followed by addition of FeCl2 (0.2 M,20 ml) N2 was purged for 15 minutes to promote the formation of Fe2+ - CMC complex. 50 mL of NaBH4 (0.2 M) was then added into this precursor solution drop wise (5 mL/min) and the black iron NPs were formed immediately (Wanget al.,1997).After NaBH4 was consumed, the compressed air was bubbled into the solution at a flow rate of 40 mL/min. The solution turned brown due to the oxidation. To stop the oxidation, the particles were centrifuged and washed with ethanol twice. After washing, the particles were redistributed in ethanol and dried in the oven at 9000C.

Synthesis of pyrrole/Fe2O3 Nanocomposites:

0.4 g of Fe2O3 nanoparticles was sonicate in 20 ml of 0.1 M HCl solution for 3o minutes. Aftersonicate the mixture add 0.1 g (100µl) of pyrrole in Fe2O3 mixture. Slowly addition of 0.2 g of Ammonium peroxosulphate in 20 ml of 0.1 M HCl solution. Stirred the mixture for 24 hours at room temperature. After addition of APS black precipitate is formed indicates the formation of polypyrrole/Fe2O3nanocomposites. The Black precipitate thus obtained was washed with hot water,ethanol and then dried.

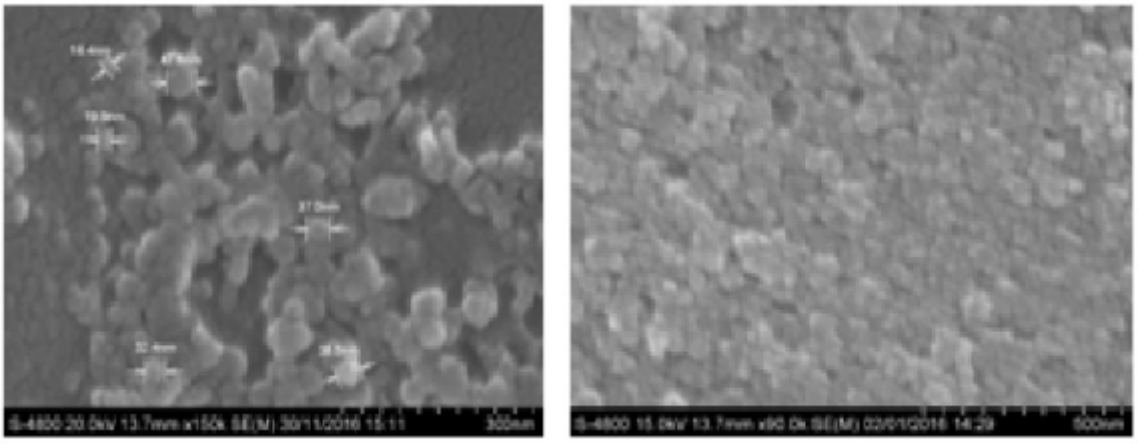
Synthesis of Copper nanoparticles :
10ml 1mM of CuCl2, was taken in 50 ml beaker and kept on a magnetic stirrer. Freshly prepared 40 ml of 2mM NaBH4 in ice cold water was added to above solution. The color was changes from black to light brown and then yellow. The synthesized CuNPs were kept at room temperature for 24 hrs before using to let unreached NaBH4 escaped. The synthesis was achieved by using 1:4 molar ratio solutions of Cu2+ and NaBH4water, ethanol and then dried.

Microorganisms And Culture Media:
Pure cultures of E. coli and Pseudomonas auruginosawere obtained from Department of Microbialogy, M. J. College, Jalgaon (India), were collected in 50 mL of saline solution and inoculated (spread) on nutrient agar medium at 37°C for 18 h. Study of antibacterial assay was carried out by using bore well method technique and zone of inhibition was measured using cmscale.

Result and Discussion:
FE-SEM Characterization Fe2O3nanoparticles::
The particle size of the Fe2O3 particles was in the range of 50-100 nm (Fig.3). The FE-SEM image also reveals that iron nanoparticles tend to from a chainlike aggregate due to the magnetic attractive force between particles. These chain-like nano iron aggregates were also observed by others (Phenratet al.,2007).

FE-SEM Characterization of pyrrole/Fe2O3nanoparticles:
The particle size of the Fe2O3 particles was in the range of 50-100 nm (Fig.3). The FE-SEM image also reveals that iron nanoparticles tend to from a chainlike aggregate due to the magnetic attractive force between particles. These chain-like nano iron aggregates were also observed by others (Phenratet al.,2007).

FE-SEM Characterization of Copper nanoparticles:
The particle size of the Fe2O3 particles was in the range of 50-100 nm (Fig.3). The FE-SEM image also reveals that iron nanoparticles tend to from a chainlike aggregate due to the magnetic attractive force between particles. These chain-like nano iron aggregates were also observed by others (Phenratet al.,2007).



Antimicrobial Activity:
Antimicrobial activity was done by using two microorgamisms i.e. Pseudomonas aurginosaandE. Coli. For this study 25mg, 50mg 75mg and 100mg/ml concentrations of Fe2O3, pyrrole/Fe2O3 and Copper nanoparticles were used. In this study maximum zone of inhibition was found in the concentration of 100mg/ml stock solution of Fe2O3 nanoparticles from which 100ul was used in the well that is 8mm shown by Pseudomonas aurginosa(Photo-plate 4)Table no.1followed by E. Colithat

is 7mm zone on inhibition(Photoplate No.5) Table no.1. Other nanoparticle showed the better zone of inhibition as compared to the streptomycin Table no.1

Table No. 1: Antimicrobial activity of different nanoparticles

Ę MNÑÝÔM	Volume of solution in µl	ĈĆÖ Ņ /ml	ĈĆÖ ŅC ml	ĊĆÖ ŅCÖ Õ	DĆÖ ŅCÖ Õ	50mg/mlStrp tomycin
		GÝÔÖ GÒMÖ ÑÑÑÝ				
ĜBNÓÖÔ	ČD			Č	Ĉ	
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ĜBNÓÖÔ	DĆ			Ç	Đ	
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ĜNÓÖÔ	ĐD	ĆBD	Č	Ċ	D	
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Conclusion :

We have come to conclusion that Iron nanoparticles at the concentration of 100 µl shown the better zone of inhibition in comparison with other nanoparticles. However, study of antimicrobial activity of iron nanoparticles is required for the better result as well as using other antibiotics.

References:

1. Auffan, M., W. Achouak, J. Rose, M. Roncato, C. Chanéac, D. T. Waite, A. Masion, J. C. Woicik, M. R. Wiesner, and J. Bottero. Relation between the redox state of iron-based nanoparticles and their cytotoxicity toward Escherichia coli. Environ. Sci. Technol.2008; 42:6730– 6735.].
2. Azam, A. S. Ahmed, M. Oves, M. S. Khan, S. S. Habib, andA. Memic, "Antimicrobial activity of metal oxide nanoparticlesagainst Gram-positive and Gram-negative bacteria: a comparativestudy," International Journal of Nanomedicine, vol. 7, pp.6003–6009, 2012.
3. Chiiriuc, V. Laz˘ar, C. Bleotu et al., "Bacterial adherence tothe cellular and inert substrate in the presence of CoFe2O4 andFe3O4/oleic acid-core/shell," Digest Journal of NanomaterialsandBiostructures, vol. 6, no. 1, pp. 37–42, 2011.
4. Farrell J, Kason M, Melitas N, Li T. Investigation of the long-term performance of zerovalent iron for reductive dechlorination of trichloroethylene. Environ SciTechnol 2000;34:514–521.
5. Joo SH, Feitz AJ, Sedlak DL, Waite TD. Quantification of the oxidizing capacity of nanoparticulate zero-valent iron. Environ SciTechnol 2005;39:1263–1268.
6. Farrell J, Kason M, Melitas N, Li T. Investigation of the long-term performance of zerovalent iron for reductive dechlorination of trichloroethylene. Environ SciTechnol 2000;34:514–521.

"Benign synthesis of copper nanoparticles and it's application towards bioprospecting properties."

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ABSTRACT:

Copper nanoparticles prepared by chemical reduction method. Chemical reduction of copper salts by Sodiumborohydrate (NaBH4) is used as reducing agent. The formation of copper nanoparticles in dispersion was monitored through the analysis of spectra by UV-Visible Spectrophotometer at different stages during the process of synthesis. The morphology of copper nanoparticles was characterized by Scanning Electron Microscopy (SEM). The characterization of Copper Nanoparticles by Fourier Transform Infrared (FTIR) Spectrophotometer. Some metal nanoparticles like copper is harmful to the fish and other aquatic life. Copper nanoparticles also have antimicrobial, antibacterial properties. This paper presents the copper nanoparticle synthesis, toxicity of Copper nanopareticles, and antibacterial activity of copper nanoparticles.

Key Words: Copper Nps, Green Approach, NaBH4, Toxicity, Antibacterial activity

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Nanoparticles have one dimension of 100 nm or less and nanotechnology industry is a rapidly growing science producing nano-sized particles. The NPs have always existed in our environment, from both natural and anthropogenic sources. A metal like copper with its low cost, easy availability, and higher electronic and thermal conductivity, compared to traditional noble metals like silver, gold and platinum. Due to their chemical and physical properties, are increasingly used in a wide range of industries. Copper nanoparticles are derivatives of metallic copper that inherit the antimicrobial properties of the copper ion. The copper nanoparticles (Cu-NPs) due to their antimicrobial properties have been produced a lot. The Cu-NPs cause cytotoxity, oxidative stress, and inflammatory responses in fish and other aquatic organisms. In some studies, it has been shown that the size of NPs is determinant in their uptake and thereby toxicity is reported to be reciprocally proportional to size. The properties of special shaped copper nanoparticles are much greater than bulk copper. It is very difficult to manufacture copper nanomaterials in aqueous solution because of its easy oxidizing capacity.

Experimental Section:

Synthesis of Copper nanoparticles: 10ml 1mM of $CuCl_2$, and concentrations 0.0025M, 0.0050M, 0.0075M was taken in 50 ml beaker and kept on a magnetic stirrer. Freshly prepared 40 ml of 2mM $NaBH_4$ in ice cold water was added to above solution. The color was changes from black to light brown and then yellow. The synthesized CuNPs were kept at room temperature for 24 hrs before using to let unreached $NaBH_4$ escaped. The synthesis was achieved by using 1:4 molar ratio solutions of Cu^{2+} and $NaBH_4$.

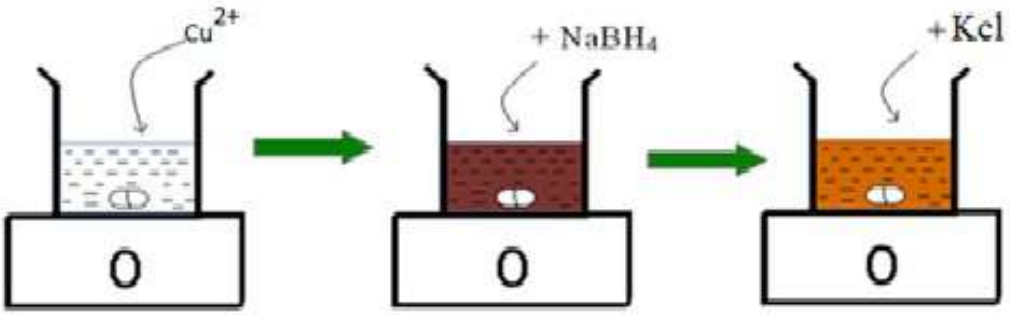


Fig (1)

Fig (2)

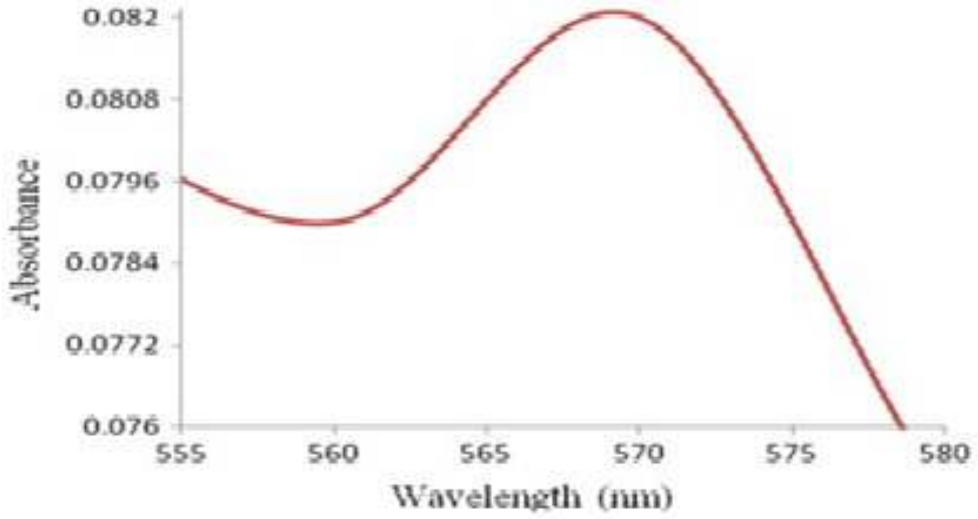
Procedure: In this Process we took different concentrations of Cu NPs. In that we arranged the five jars. First was of control, second 0.15 ppm, third 0.25 ppm, fourth 0.50ppm, fifth 0.75ppm. And in jar kept the 10 fishes in each jar. After 24 hours the Cu NPS shows Toxicity on fish in 0.75mg/lit concentration.

Media & Bacterial culture preparation: Antibacterial activity of Cu-NP was tested against both Gram positive & Gram negative bacteria. It is done by modified Cork well Diffusion Method. The bacterial culture is subculture in Nutrient broth at 37°C on a rotary shaker at 150 rpm for bacterial growth. From this culture 100µ of culture were spread on Nutrient Agar plate by sterile glass spreader. The 10mm wells are punched in nutrient agar plate for testing antibacterial activity of copper nanoparticles. Using micropipette 100µi of sample was loaded in well on plate. After overnight incubation of plate in inverted position at 37°C different zone of inhibition were observed & measured.

Results and Discussions:

Characterization:

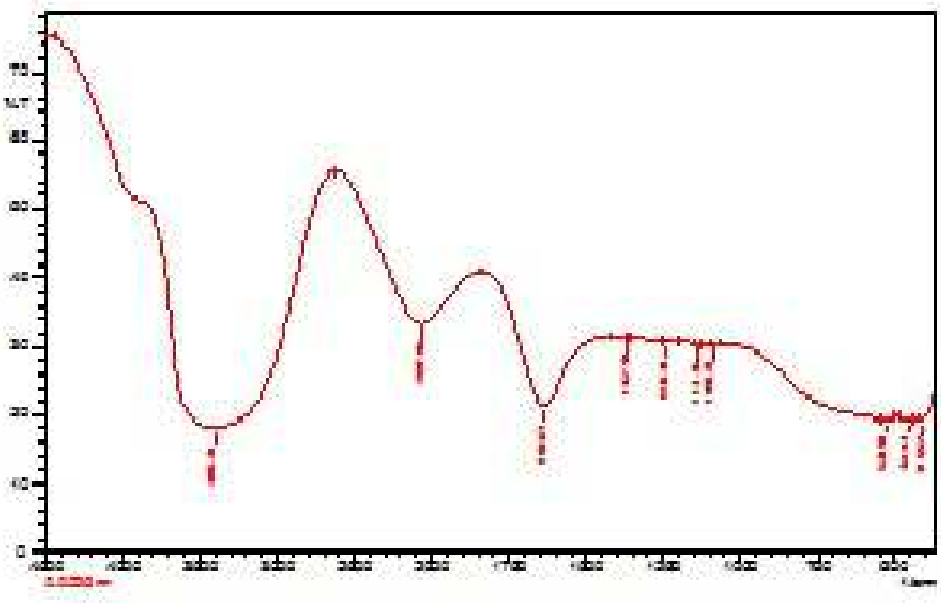
1. Uv-Visible spectroscopy analysis:



Fig(3)

UV-Vis Spectra Analysis: The absorbance of colloidal solution was recorded at different stages of synthesis using Schimadzu UV-1800, UV-visible spectrophotometer in the wavelength range: 200 nm to 800 nm. UV-Vis absorption spectra of the copper nanoparticles shows the copper nanoparticles prepared using different copper salts display an absorption peak at around 570 nm. This peak can be assigned to the absorption of copper nanoparticles.

2. FT-IR analysis:



FTIR: The FTIR spectra were recorded using FTIR spectrometer. A known amount of sample was ground with KBr and the pellet form of the samples was analyzed with FTIR instrument. FTIR measurement was carried out to identify the possible molecules responsible for capping and reducing agent for the copper nanoparticles. FTIR spectra of copper nanoparticles synthesized using copper salts.

FESEM analysis: SEM images of copper Nanoparticles

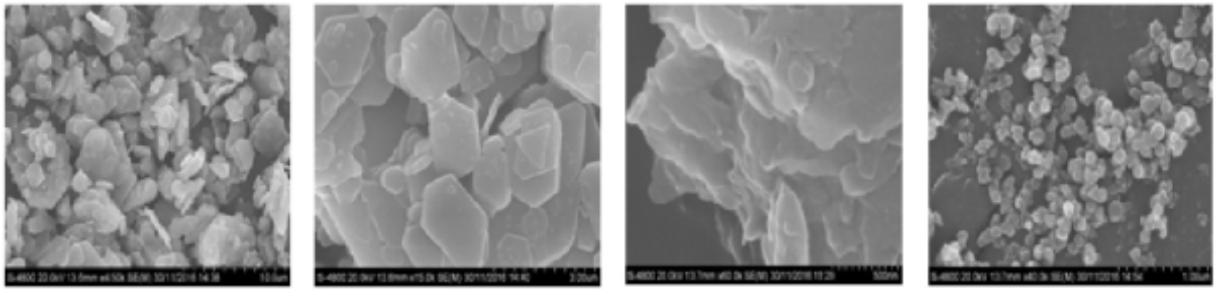
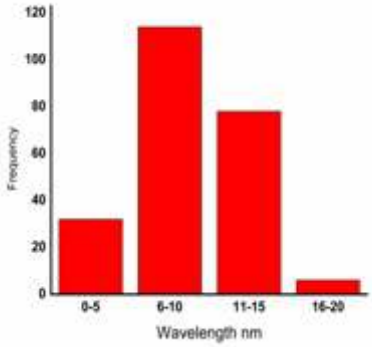


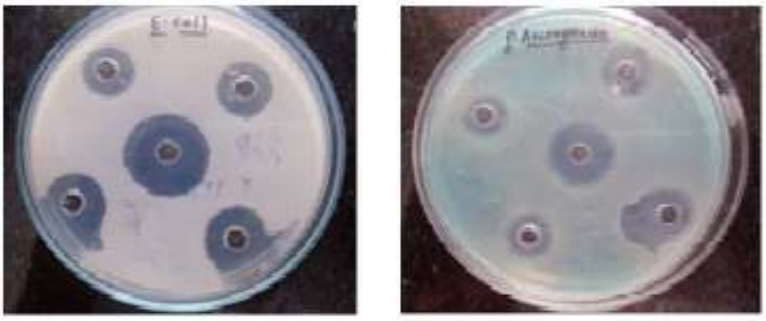
Fig (5)



Frequency	Wavelength
28	0-5nm
112	6-10nm
76	11-15nm
3	16-20nm

FESEM images of copper nanoparticles prepared using Cuprous chloride shows plate/flake like copper nanoparticles. The average particle size of the Cu nanoparticles is around 11 nm. Copper nanoparticles deposited on carbon coated aluminium sheet and on glass plate were examined using scanning electron microscope (SEM).

Antibacterial Activity of copper nanoparticles



Escherichia coli ***Pseudomonas aeruginosa***

1) Escherichia coli :- it is Gram negative, facultative anaerobic, rod shaped bacterium. Found in intestine of healthy person. Causes severe abdominal cramp, bloody diarrhea & vomiting, urinary tract infection.
2) Pseudomonas aeruginosa :- it is Gram Negative (γ- proteobacter) facultative aerobic, produce soluble blue pigment being fluorescence. It can infect ears, eyes, central nervous system & gastrointestinal infection. It is highly resistant to antibiotics.

Conclusion:

1) Copper nanoparticles stabilized by different stabilizers has been successfully prepared by using Crighton's method.
2) Qualitative characterization from the Surface Plasmon Resonance indicates that the CuNPs have different size and may be different shapes.
3) The most active CuNP was the one stabilized with KCl, KBr, KI.
4) The Copper Nanoparticles are inhibiting the growth of Escherichia coli and Pseudomonas aeruginosa after 2 days.
5) Copper NPs showed more toxicity on fish at concentration 0.75mg/lit than other concentration.
6) Copper NPs are toxic to fish.

References

1. Rajesh Mittu (2016) Synthesis, Characterization of Copper Nanoparticles , International Advanced Research Journal in Science, Engineering and Technology, Vol. 3
2. Shikha Jain, Ankita Jain, Vijay Devra (2014)Experimental Investigation on The Synthesis of Copper Nanoparticles By Chemical Reduction Method ,International Journal of Scientific & Engineering Research, Volume 5,
3. Robert J. Griffitt,Kelly Hyndman, Nancy D. Denslow, and Davis S. Barber(2008) Comparison of Molecular and Histological Changes in Zebrafish Gills Exposed to Metallic Nanoparticles.
4. Shobha G, Vinutha Moses & Ananda S (2014) Biological Synthesis of Copper Nanoparticles and its impact , International Journal of Pharmaceutical Science Invention.
5. Razium Ali Soomr, Ayman Nafady, Sirajuddin, Syed Tufail Hussain Sherazi, Nazar Hussain Kalwar, Mohammad Raza Shah, and Keith Richard Hallam(2014) Catalytic Reductive Degradation of Methyl Orange Using Air Resilient Copper Nanostructures, Journal of Nanomaterials Volume 2015.

"Environmental friendly synthesis of Fe2O3/polyaniline/polypyrrole Nano-composites and their Applications towards degradation of methyl orange."

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ABSTRACT:

Global researchers have been engaged in developing and improving a more effective method to deal with increasingly severe organic dye pollution. iron oxide (Fe2O3) nano-structure as remarkable photo-catalyst has been broadly applied in photo-catalysis on account of its high photo-catalytic activity and ease of preparation. The synthesis of Fe2O3 based nano-composites material good super capacitors properties as well as photo-catalytic activity. Synthesis of conducting polymer and their composites ease to synthesized and good environmental stability.

In this work synthesis of Fe2O3 nano-structures and their Fe2O3/Poly-pyrrole nano-composites good photo-catalytic activity for degradation of azo dyes (i.e. Methyl orange, Calmagite and Methylene blue).

Key words: Super- capacitor, Nano-composites, photo- catalysis.

Introduction:

Metal nanoparticles have found extensive use in different applications owing to their typical optical, electrical and magnetic properties . Different transition metal oxides including iron oxide nanoparticles (FeONPs) have been focused in various applications such as sensors, catalysts , in wastewater treatment , in energy storage, in tumor detection and as antimicrobial agents .There are good number of reports on the development of synthetic methods to produce Fe2O3 NPs which include reduction by chemical, electrochemical, photochemical methods and heat treatment. These methods not only use toxic chemicals but also produce toxic byproducts which have potential to become hazardous to the environment. On the other side, green methods show path to minimize the usage of toxic chemicals and reduce waste generation. Ultimately, the focus of the researchers has been on synthesizing nanoparticles through green methods using different plant extracts which serve as reducing and stabilizing agents.

Synthesis of Fe2O3 nano-structure andtheir poly-pyrrole nano-compositeshave good photo-catalytic activity fordegration of azo dyes (i.e;Methylorange)

Fig.1 Molecular structure of methyl orange as azo dye

Materials and methods
Materials:
All chemicals purchased from Aldrich and having higher percentage of purity

Synthesis of Iron(Fe) Nanoparticles:
2g ferrous chloride($FeCl_2$) is added to 50ml of the deionised water .The solution is shaked well, And $NaBH_4$ is added dropwise to it. And stirred for 24 hours. Then the Black precipitate is formed which indicates the formation of Fe(0) nano particles.

Synthesis of poly-aniline:
0.2g of Fe_2O_3 NPs are sonicated in 20ml 0.1M HCl solution for 30 minutes, Then 1ml of Aniline is mixed ,and slowly 0.2g of Ammonium peroxosulphate is added to the mixture. The solution is kept for stirring for 24 hours. Then after addition of APS Greenish precipitate is formed which indicates the formation of Poly-aniline.

Synthesis of polypyrrole:
0.2g of Fe_2O_3 NPs are sonicated in20ml 0.1M HCl solution for 30 minutes. Then 1ml Pyrrole is mixed and slowly 0.2g of Ammonium Peroxosulphate is added to the mixture. The solution is kept for stirring for 24 hours. After the addition of APS Black precipitate is formed indicates the formation of poly-pyrrole.
The reaction is carried out at the ratio of monomer-initiator = 1:2 and monomer :fe_2O_3 = 1 : 4. The Black precipitate thus obtained was washed with hot water and ethanol and then dried.
Reaction Mechanism:
According to above analysis, a probable mechanism for the degradation of methyl orange as shown in the figure(4). The azo group of methyl orange is transferred into dimethyl aniline and sodium salt of benzene sulphonic acid by using H^- ion from sodium borohydride.
Mechanism of the reaction

Fig(2): Shows mechanism of degradation of mehyl orange by Nanoparticles

4. Characterization of Nanoparticles:

4.1. FE-SEM analysis:

Fig(3) Fig(4) Fig(5)
Fig(3) : FESEM image of Fe_2O_3

The particle size of the Fe_2O_3 particles was in the range of 50-100 nm (Fig1.). The FE-SEM image also reveals that iron nanoparticles tend to from a chainlike aggregate due to the magnetic attractive force between particles.

Fig(4): FESEM image of Poly-anilline/Fe_2O_3

The particle size of the Poly-anilline/ Fe_2O_3 particles was in the range of 50-100 nm (Fig2.). The FE-SEM image also reveals that iron nanoparticles tend to from a floweres like structure aggregate due to the magnetic attractive force between particles.

Fig(5): FESEM image of Polypyrrole/ Fe_2O_3

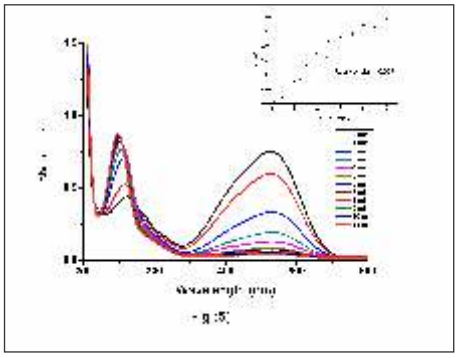
The particle size of the Poly-pyrrole / Fe_2O_3 particles was in the range of 50-100 nm (Fig2.). The FE-SEM image also reveals that iron nanoparticles tend to from a floweres like structure aggregate due to the magnetic attractive force between particles.

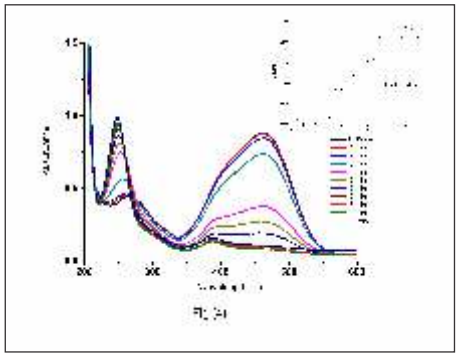
4.2. **FT-IR Analysis:**

Fig (6) Fig(7)

Fig(6) shows the FT-IR analysis of Poly-pyrrole/Fe_2O_3 nano composites

Fig(7) shows the FT-IR analysis of Poly-anilline/Fe_2O_3 nano composites





Fig(8) Fig(9)

Fig (8): Degradation of methyl orange using poly-anilline/Fe_2O_3 nanocomposites:
Fig (9): Degradation of methyl orange using poly-pyrrole/Fe_2O_3 nanocomposites:

Conclusion:

We conclude Fe2O3Nps have been used for the degradation of methyl orange in presence of NaBH4 and their catalytic activity have been determined by measuring the rate constant (k) using UV–Visible spectroscopy. In absence of Fe2O3Nps, the rate of degradation of azo dye is very slow. But on the addition of Fe2O3Nps into azo dye, rate of degradation is enhanced significantly indicating the improved catalytic behavior of Fe2O3Nps.

References:

1. S. N. Batchelor; D. A. Carr; R. J. Crowford and L. Fairelough; Patent Int. Publication No. WO 01 44127
2. K. Hunger; Industrial Dyes Chemistry Properties and Application; Wiley-VCH, Heidelberg, 2003.
3. N. Gupta; H. P. Singh; R. K. Sharma; J. Mol. Catalysis A: Chemical; 2011.
4. K. K. Sharma; P. O'Neill; J. Oakes; S. N. Batchelor; B. S. M. Rao; J. Phys. Chem. A, 2003.
5. J. A. Crighton; D. G. Edon; J. Chem. Soc. Faraday Trans. 1991.
6. H. Remita; I. Lampre; M. Mostafavi; E. Balazat; S. Buffard; Rad. Phys. & Chem. 2005.

Soil Testing For Nutritional Qualities with Different Physicochemical Parameters.

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ABSTRACT:
There may be as many definitions of soil as there are people who worry about it. One way to think about it is to define what it is not. Dirt is not soil. It may have once been soil, but once it was removed from its place in the landscape, it probably ceased being soil. It can become soil again in the right circumstances.

Organic matter is the residue left after multitudes of soil microbe generations have used the carbon and other easily usable constituents of once-living flora and fauna that ended up in the soil matrix. True organic matter, or humic substances, are relatively stable and resist any more rapid breakdown, although there will continue to be some activity on it. During the soil analysis some parameters can be considered which are pH, organic matter, sodium, salinity, electric conductance, phosphorous, potassium etc.

Keywords: Different region soil samples, different parameters.

Study Area:

Pathari and Domgaon Field Region, Jalgaon.

Material and Methods:

The soil samples have been collected from 10 different field areas during field work. Chemical analysis for study of 10 samples from field were collected for analyzing parameters like pH, Electrical conductivity, alkalinity ,organic matter, sodium, phosphorous, bulk density, WHC, potassium, sulphate, and were performed in the college laboratory on the instruments and qualitatively.

Results and Discussion:

The pH of couple of soil sample is found above prescribed limit. Some soils Sample are alkaline in nature. Some sample contains available sulphur and phosphorous. Potassium may is present due to fertilizers used in farms.

Sample Code	pH	E.C mS/cm	Moist content %	WHC %	soil porosity	B.D. gm/cm^3	Na. ppm	K ppm	P micro/ml	SO_4^{2}	Cl^-
P-1	8.03	4.79	11.5	61	0.52	1.26	0.4	0.1	26.88	5.47	212.0
P-2	8.08	3.33	9.5	20	0.40	1.58	0.3	0.1	32.25	4.22	191.4
P-3	7.99	2.83	11.9	56	0.53	1.23	0.7	0.3	26.88	3.64	99.26
P-4	8.24	3.06	8.0	45	0.53	1.23	0.8	0.3	24.19	8.92	163.0
P-5	8.01	3.35	11.5	49	0.53	1.23	0.3	0.2	18.81	6.33	92.17
D-1	8.72	350	3.1	22	0.49	1.35	2.3	0.3	8.96	5.56	212.7
D-2	8.80	3.32	6.2	18	0.52	1.26	0.1	0.1	11.64	5.37	141.8
D-3	7.75	3.39	7.2	32	0.61	1.02	1.0	0.4	6.27	14.3	177.2
D-4	8.01	3.21	8.2	22	0.47	1.40	1.0	0.3	15.23	11.7	177.2
D-5	7.79	310	9.1	23	0.55	1.19	0.4	0.4	17.92	4.99	226.0

Conclusion:

Soil testing provides sound information about the fertility and productivity of the soils. A soil test measure part of the total nutrient supply in the soil and represents only an index of nutrient availability. Soil test do not measure the exact quantity of nutrient potentially taken up by a crop. To predict the nutrient needs of crops, the soil test must be calibrated against nutrient rate experiments in the field and in the greenhouse. The quantity of nutrient extracted by the soil test should be closely related but not equal to the quantity of nutrient absorbed by the crop. It is very clear that soil testing act an important tool for soil fertility evaluation and fertilizer recommendation. Soil test based fertilizer recommendations is based on the basic assumption that an increase or decrease of available nutrients in the soil will directly influence crop yield.

References:

1. Alexander, M,: Introduction to soil microbiology. Toppan Company Ltd. Tokyo. 470(1961).
2. Bhardwaj, A. C. and Neelam Tyagi: Impact of organochlorine pesticide on the morphobehaviour of pantala flavescent fabr. J. Environ. Biol. 14(2), 089-094.
3. Choudhuri, D. K. and T. Pande: High altitude soil animals and their relation with soil factors, with special reference to mites. Rev. Eeol. Biol. Sol., 16(1) 219-226 (1979).
4. Choudhuri, D. K. and S. Roy: An ecological study on collembolan of West Bengal. India, Rev.Zool. Surv. India, 66(4), 81-110(1972).

"SYNTHESIS OF VERSATILE SYNTHONE:1-PHENYL-3-(ARYL)-1H-PYRAZOLE-4-CARBALDEHYDE BY VILSMEIER-HAACK REACTION"

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ABSTRACT:

Pyrazole and its derivatives constitute an important class of compound, which exhibit various biological pharmaceutical activities. The schiffs bases of ketones on treatment with DMF and $POCl_3$ undergo cyclisation reaction forming pyrazole as well as undergo formylation. By considering the wide range applications of formyl pyrazole and in contribution of our intrest in Vilsmeier-Haack reaction. A series of acetophenone phenyl hydrazones has been synthesis and their formylation was carried out by using Vilsmeier Hacck reagent DMF and $POCl_3$, yield 1-phenyl-3-(aryl)-1H-pyrazole-4-carbaldehyde. All formylpyrazoles derivatives were screened for antibacterial activities.

Keywords: Formylpyrazole, Phenylhydrazone, Vilsmeier-Haack, ,Schiffs base

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Inrtoduction

Heterocyclic compounds are one of the main groups of organic compounds possessing wide range of applications in various areas of science and high technologies 1-4. From the important group of heterocyclic compounds a growing interest is given to the pyrazole derivatives.5

Pyrazole and its derivatives constitute an important class of compounds, which exhibit various biological and pharmaceutical activities ranging from antitumor6 to anti-inflammatory7, antipsychotic8, antimicrobial,9 antiviral and antifungal activities. Formyl pyrazole are also useful intermediates for many industrial products.

The Vilsmeier-Haack reaction is common method for the synthesis of 4- formyl pyroles10. The application of Vilsmeier-Haack (VH) reagent ($POCl_3$ / DMF) for formylation of a variety of both aromatic and heteroaromatic substrates is well documented. Besides this, the reagent has also been extensively used for effecting various chemical transformations from other classes of compounds11. Many of these reactions have led to novel and convenient routes for the synthesis of various heterocyclic compounds. A significant application in heterocyclic chemistry is the synthesis of 4-formylpyrazoles from the double formylation of hydrazones with Vilsmeier-Haack (VH) reagent.In this investigation we synthesized pyrazole containing formyl group compounds.

Materials And Methods

All reagent used were of analytical grade. Solvents were distilled before use. All the melting points were determined in open capillary in a paraffin bath and are uncorrected. IR spectra were recorded on FT-IR spectrophotometer (Shimdtzu-FTIR Affinity model 1) in KBr. The progress of reactions was checked and monitored by TLC on glass plate coated with silica gel.

Stage -1

General procedure for the synthesis of substituted acetophenone phenyl hydrazones:

Substituted acetophenone (24 mmol) ,20 ml methanol shake well ,add phenyl hydrazine (24 mmol)and reflux for three hours .After cooling the reaction mixture the phenyl hydrazone derivative was filter wash with ethanol. Recrystallized from ethanol, crystalline product was separated by filtration.

Figure 1: Synthesis of acetophenone phenyl hydrazones.

Stage -2

General procedure for the synthesis of 1-phenyl-3-aryl-1H-pyrazole-4-carbaldehyde

Vilsmeier-Haack reagent prepared by adding $POCl_3$ (0.01 mol) to DMF (10 ml) at 00C . After

complete addition of POCl3 stirred for 10 min. Substituted acetophenone phenyl hydrazones derivative (0.01 mol) was dissolved in DMF (15ml) and then add Vilsmeier-Haack reagent to hydrazine solution warmed at room temperature and heated at 60-700C for 4hours. The reaction mixture was poured onto crushed ice and then neutralized with 10% NaOH solution. The precipitate was filtered wash with water and recrystallized from ethanol.

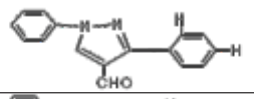
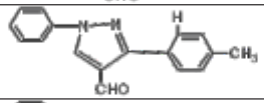
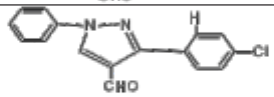
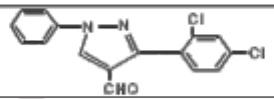
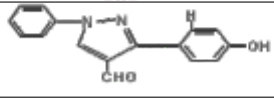
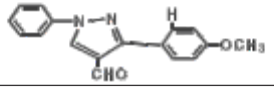
Figure 2: Synthesis of 1-phenyl-3-aryl-1H-pyrazole-4-carbaldehyde

COMPOUNDS		R1	R2
3 a	4 a	H	H
3 b	4 b	H	CH3
3 c	4 c	H	Cl
3 d	4 d	Cl	Cl
3 e	4 e	H	OH
3 f	4 f	H	OCH3

Result And Discussion

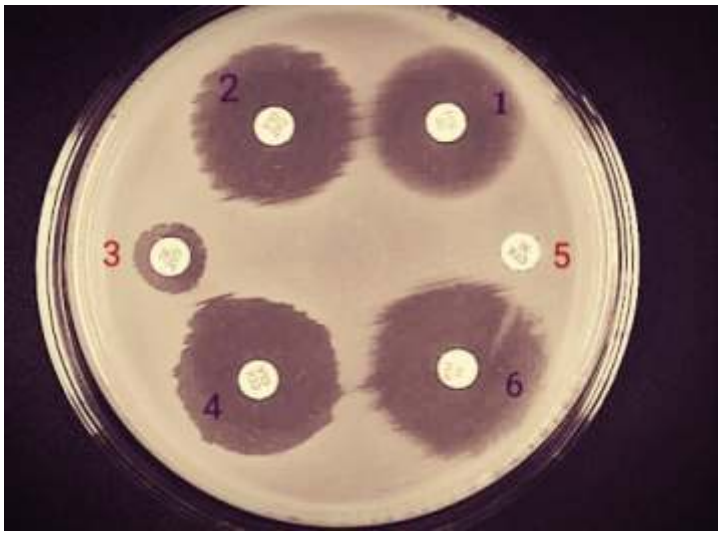
In the present communication, we report the synthesis of pyrazole-3-aryl-4-carbaldehyde.This method is effective for the preparation of pyrazole-3-aryl-4-carbaldehyde derivatives from both electron efficient as well as electron deficient groups. We found that, substituted acetophenones containing different group at different position worked well and did not shows remarkable differences in yield of project and reaction time. The present method is superior with regard to yield and reaction time. These compounds were also characterized by IR spectral analysis and by comparison of their melting point with literature melting points. Also IR (KBr cm-1) spectra of compound at 3350 cm-1 which is due to the N-H group in intermediate compound. Absorption band at 1701-1738 due to C=O, 1645-1674cm-1 is due to C=C, band at 1593-1610 cm-1 is due to C=N stretching of pyrazole in 1-phenyl-3-aryl-1H-pyrazole-4-carbaldehyde

Table 1: Synthesis of 1-phenyl-3-aryl-1H-pyrazole-4-carbaldehyde.

No.	Product	m.p(°C) observed	IR frequency (KBr cm^{-1})	Yield (%)
4a		203	2963(C-H),1701(C=O),1645(C=C), 1610(C=N)	81%
4b		209	3031(CH),1730(C=O),1670(C=C) ,1600(C=N)	73%
4c		219	3082(C-H), 1738(C=O), 1680(C=C),1610(C=N) , 834 (C-Cl),	60%
4d		211	3020(C-H), 1700(C=O),1672(C=C),1593(C=N), 840 (C-Cl),	78%
4e		179	3320(OH), 1710(C=O),1672(C=C),1593(C=N)	58%
4f		231	2964(C-H), 1727(C=O),1674(C=C),1600(C=N), 1030(C-OCH$_3$)	69%

Antibacterial Activity

All the synthesized compounds 4(a-f) were evaluated for antibacterial activity against bacterial E. coli at the concentration 1mg/ml by paper disc diffusion method using DMF as solvent and nutrient agar as culture media. The results were obtained in the form of clearing zone and were noted after the period of incubation (at 370C for 24hrs).



Conclusion

1) We have described a simple, highly efficient, and facile protocol for the synthesis of 1-phenyl-3-aryl-1H-pyrazole-4-carbaldehyde.
2) 4a, 4b, 4d, 4f compound shows good antibacterial activity against E-Coli.
3) Simple experimental procedure, cleaner reactions, and low cost, which makes it a useful and attractive strategy in view of economic and environmental advantages.
4) Cyclisation and formylation takes place in one step.

References

1) Kieemam, A, Engel, J, Kutscher,B, Reichert,D pharmaceutical substances, 3rd Ed, Georg Thieme: Stuttgart, new York NY, 1999,1190. Frinkelstein, B..strok, C.J.J. PesticSci 1997,50,324
2) Theodoridis,G., Kramer, W, Schirmer,U. Eds, Wiley-VCH:Weinneim,2007,153. Taklzawa,E,Fukuchi T.J. Pestic sci-2003,28,313(c)
3) Kees,L.L., Fitzgerald,J.J. Jr,Steiner,K.E., Mattes, J.F. Mihan, B, Tosi, t,Mondoro,D, McCaleb,M.L.J. Med chem. 1996,39 3920
4) Menozzi,G., Mosti,L, Schenone,P., D Amico, M, Falciani, M., Fillippelli W. Farmaco 1994,49,115.
5) Elkholy,Y.M. Erian,A.W., Elassar., A.A. Pig. Resin Technol 1993,25,4.
6) Behr, L.C., Fusco, R., Jarboe, C.H., Rings, Wiley and sons:London 1967.
7) Garg H G, Singhal A, Mthur. JMLJ,pharm. Sci 62,1973,494.
8) Kees K L, Fitzgerald J JJr, Steiner K Mattes J F, Mihan B, Tosi T, Mondoro D, Mccalen Me, J Med. Chem. 39,1996,3920.
9) ViehlyaerYa, inskii BI, Raevskii K S, Batulin Yu m, Grandberg I I , Kost A N, Formalkol, Toksikol, 25,1962,27 chem, Abstr. 57,1962,14288d.
10) Hernab E, Gabliks,J, cancer chemotherapy Rept.14,1964,85.
11) Rich, S. Horspall, JG Phytophathology, 42,1952,457.

Social Impact of Noise Level at Various Places of Jalgaon City

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ABSTRACT:
(Your abstract must use Normal style and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)
Preparation of Your Abstract
1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word ONLY (place names excluded). No full stop at the end.
2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.
Introduction: Clearly state the purpose of the abstract
Methods: Describe your selection of observations or experimental subjects clearly
Results: Present your results in a logical sequence in text, tables and illustrations
Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

Introduction

- The potential health effects of noise pollution are numerous, pervasive, persistent, and medically and socially, significant. Noise produces direct and cumulative adverse effects that impair health and that degrade residential, social, working, and learning environments with corresponding real (economic) and intangible (well-being) losses.
- It interferes with sleep, concentration, communication, recreation, vegetation, animals and birds. Though noise pollution is a 'slow and subtle killer', yet very little efforts have been made to ameliorate the same.
- Increasing number of vehicles, musical instruments, industries, urbanization, population explosion are considered as main causes of noise pollution but indiscipline among the mob is more responsible for the ambient noise overall.

Objectives

- Taking readings at different Silent Zones at different times.
- To know the noise levels (db) in different Silent zones.
- To compare the noise levels (db) with CPCB (Central Pollution and Central Board).
- To provide measures to reduce noise levels.

Study Area

Sr. No.	Locations	Location Code
1	Near M.J.College	SZ - 1
2	Near Orion English School	SZ - 2
3	Near A.T. Zambare school	SZ - 3
4	Near Aggraval Hospital	SZ - 4
5	Near IMR College	SZ - 5

Table 1: Study Area with Code

Material & Methods

- The study of noise level was carried out by using a portable digital sound level meter (Environmental Noise Pollution Monitor RT-5001) which is primarily

designed for community noise surveys.

- Measurements were carried out for 'A' weighting at the selected locations in different time interval.
- During Noise Monitoring, simultaneously Traffic Density also measured by physical counting.
- The sound level meter was taken in hand at a height of 1.0 - 1.5 m. and at a distance of 15 m. from the study locations.
- The measurements were carried out under the normal atmospheric condition having no rainfall and high wind speed.
- The Following Computation were made as per obtained data:
- Equivalent Sound Energy Level (Leq) Leq = L50+ [(L10-L90)2/56] dB (A)
- Noise pollution level (LNP) LNP = Leq + (L10-L90) dB (A)
- Traffic Noise Index (TNI) TNI = 4 (L10-L90) +L90-30 dB (A)

Results & Discussions

- Noise has been recognized as ambient air pollutant. Standards in this regards are laid down under Environment (protection) rules, 1986.

Sr. No.	Category of Zone	Permissible Limits dB (A) Leq	
		Day Time	Night Time
1	Industrial area	75	70
2	Commercial area	65	55
3	Residential area	55	45
4	Silence Zone	50	40

Table 2: Permissible Limit of Noise in Different Zones

Locations	Average Traffic Density during Study Period			
	Two-Wheelers	Three-Wheelers	Four-Wheelers	Heavy Vehicles
SZ - 1	374	182	108	05
SZ - 2	341	197	102	07
SZ - 3	275	177	78	04
SZ - 4	266	162	81	11
SZ - 5	249	154	71	02

Table 3: Average Traffic Density during Study Period

Monitoring Time	Locations	Lmax	Lmin	L_{10}	L_{50}	L_{90}	Leq	LNP	TNI
10:30 am to 11:30 am	SZ - 1	84.6	71.9	84	80	72	80.5	92.5	90
	SZ - 2	85.3	75.9	85	80	75	80.4	90.4	85
	SZ - 3	84.2	76.3	83	80	76	80.5	87.5	74
	SZ - 4	85.7	77.9	85	80	77	80.5	88.5	79
	SZ - 5	81.3	77.5	81	78	75	78.5	84.5	69

Table 4: Noise Level (dB) Indices observed at Study area at pick time period

Monitoring Time	Locations	Lmax	Lmin	Average	SD
6:30 am to 7:30 am	SZ - 1	59.2	56.3	57.86	0.94
	SZ - 2	74.3	69.9	72.45	1.54
	SZ - 3	79.5	68.3	73.67	3.02
	SZ - 4	61.2	52.6	58.18	2.69
	SZ - 5	61.7	55.8	58.81	2.24
10:30 am to 11:30 am	SZ - 1	84.6	71.9	78.92	4.64
	SZ - 2	85.3	75.9	80.83	2.76
	SZ - 3	84.2	76.3	81.24	2.50
	SZ - 4	85.7	77.9	83.9	2.38
	SZ - 5	81.3	77.5	79.89	1.22
2:00 pm to 3:00 pm	SZ - 1	62.5	60.2	61.28	0.79
	SZ - 2	66.9	64.3	65.86	0.89
	SZ - 3	68.9	66.5	67.8	0.82
	SZ - 4	59.9	57.5	58.89	0.74
	SZ - 5	62.1	55.7	58.79	2.18
5:30 pm to 6:30 pm	SZ - 1	78.2	72.3	75.21	1.85
	SZ - 2	87.5	81	84.02	2.10
	SZ - 3	88.1	81.2	84.23	2.51
	SZ - 4	82.1	74.6	79.31	2.17
	SZ - 5	82.9	80.1	81.55	0.89

Table 5: Noise Level (dB) observed at Study area at different time interval

Conclusions

- From the observations taken at the Silence Zone, it was found that the sound exceeds permissible limit.
- It was observed that the main sources of noise in the municipality are the vehicles like buses, trucks, tractors, motorcycles, delivery vans etc. running on the roads and generators during power cut hours.
- The bad condition of the vehicles especially tractors metallic body and their vibrationproduce much noise. The bad condition of roads and the drivers' behavior of using horn add more noise to study area.
- This Noise may have moderate to very sever effects on human health such as, poor concentrations, stress, cardiovascular illness and many more.

Recommendations

It is very essential to control noise at source, along the transmission path and at receivers end by using the various techniques. In order to reduce the noise pollution level in the study area and in other places following recommendations are suggested:

1. Since transport system is regarded as the major source of noise pollution in the urban areas, technical plans like: road maintenance, expansion of roads, repairing engine, repairing silencer, repairing body parts, limiting the types of vehicles, limiting the speed of vehicles, hours of access, etc. should be implemented.
2. Building acoustic barrier and planting bushy plants along the road sides passing through the study area, the noise level reaching to victim can be substantially reduced.
3. Awareness about the health hazards of noise pollution should be carried out by using different electronic media, print media, flash board, notice board, etc.
4. The noise level should be assessed in regular manner and noise level map should be prepared in the Municipality area.
5. Acoustic barrier should be made and horn & speed of vehicles passing through the region should be controlled.

References

1. Amey D. Deshmukh & Dr. P. A. Kadu (2015). "Study of Traffic Noise Pollution at Silent Zone in Amravati City". International Journal of Informative and Futuristic Research, Vol 2, Issue 9, Pp 3140-3144, ISSN-23471697.
2. Agarwal S and Swami B L (2010), "Status of Ambient Noise Levels in Jaipur City", Environment Conservation Journal, Vol. 11, No. 1, pp. 105-108.
3. Kisku G C et al. (2006), "Profile of noise pollution in Lucknow city and its impact on environment", Journal of Environmental Biology, Vol. 27, No. 2, pp. 409-412.

Impact of Particulate Matter on Flour Mill Workers

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ABSTRACT:
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Preparation of Your Abstract
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Results: Present your results in a logical sequence in text, tables and illustrations
Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

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Abstract:
The present investigation is based on measurement of Lung functioning of some flour mill workers who are exposed to heavy dust which is generate in their workplace (flour mill). The indoor air quality was assessed and monitored during the period of August –November 2016 at selected flour mill (near Grinding Machine) for finding the air pollutants concentrations in such area. The PFT test of selected workers of flour mill was carried out with control group. The selection of workers was done according to age group, working time and past medical history regarding respiratory disease. The software based spirometer was used for pulmonary functioning test (PFT). During the study, the high concentration of particulate matter was observed at most of the flour mills, while the PFT test of the workers shows remarkable variations in Forced Vital Capacity (FVC), Forced Expiratory Volume in one second (FEV1) and Peak Expiratory Flow Rate (PEFR) when compare with control group. During the study it was observed the workers were unaware regarding health problem which is associated with particulate matter generate in their flour mill. Study suggest some control measure like proper housekeeping at work place, installation of exhaust fan, use of mask etc. These practices may reduce the respiration problems of individual workers.

Introduction

- The term 'flour dust' refers to particles coming from finely milled cereal or non-cereal grains, 'grain dust' consists of particles produced during grain harvesting and handling, excluding milling.
- On the basis of running conditions, some of the flour mill produce excessive amount of particulate matter. Now a day's many flour mills are working on DG set, which contribute SOx in indoor environment.
- The flour mill worker directly exposed to particulate matter. Such type of exposure leads to create respiratory problems.

Objectives

1. To determine the concentration of dust particles in different flour mills.
2. Assessment of the respiratory health status of flour mill workers chronically exposed to dust particles at working place.

Study Area

Sr. No.	Locations	Location Code
1	Swati flour Mill	FM - 1
2	Bhagvati flour Mill	FM - 2
3	Gopal flour Mill	FM - 3
4	Sagar Pitachi Girni	FM - 4
5	Mayur Flour Mill	FM - 5

Table 1: Study Area with Code

Material and Methods

The study was conducted in to two parts

I. Assessment and Monitoring of Particulate Matter in and surrounding study area

- Average concentration of four months (August-November 2016) takes in to consideration for the study.
- Handy Sampler (Spertralab-HDS-8) was used. Dust particles were collected on glass fiber filter paper for 8 hr. with air flow rate of 0.5- 4.0 m3 min-1.

§ The difference in initial and final weights of the cup and filter paper will give the total quantity of SPM and RSPM collected over the 24 hr period.

II. Perform the Pulmonary function test (PFT) of workers

- The PFT test counted on each worker having no smoking habits of every flour mill.
- The PFT test was conduct by Spirotech portable Spirometer with in-built computer programme under standard condition.
- According to entered information spirometer gives two values, one is predicted according to BMI and other is result values.

Results & Discussions

Parameters	Mean/SD	
	Observed	Expected
FVC (L)	11.98 ± 0.49	16.04 ± 0.36
FEV1 (L)	10.42 ± 0.55	13.65 ± 0.0.28
PEFR (L/s)	16.29 ± 1.53	40.20 ± 0.50

Table 2: Mean of PFT test

Locations	Avg. Concentration of Dust Particles ($\mu g/m^3$)	Max Permissible Limits
FM - 1	404.82	100 ($\mu g/m^3$)
FM - 2	362.72	
FM - 3	329.80	
FM - 4	284.81	
FM - 5	379.37	

Table 3: Dust concentration at each study locations during study period

- The average concentration of dust particles was higher at all flour mill exceed the permissible limits.
- This higher concentration may affect the respiratory health of flour mill workers.
- The observed Forced Vital Capacity (FVC) of all workers was very low.
- The expected Forced Expiratory Volume was 13.65 while the observed value was 10.42.

The Peak Expiratory Flow Rate (PEFR) was observed very low when compare with expected values.

Conclusions

- The concentration of dust particles were exceeding the permissible limit of given standards. This may be due to improper housekeeping, insufficient space, poor ventilation, over use and improper maintenance of machine (Chakki) etc.
- By PFT test it was conclude that the observed values for Forced Vital Capacity (FVC), FEV_1 and PEFR in all workers were lowered as compared to expected values.
- During study it was also observed that, the workers were not aware regarding dust concentration and respiratory diseases. Not only dust but machine noise too affects the behavior of workers.

Recommendations

1. The workers should use face mask during working period. If possible use transparent goggle for the protections of eyes.
2. Maintain proper ventilation, housekeeping and healthy environment at workplace.
3. To perform medical checkup related to respiratory dieses at every year.
4. Rotation in time w.r.t. duty.
5. Use of ear plug or ear muff from protection of heavy noise.

References

1. Nilesh D. Wagh, Bhushan G. Panchpande, Vijay S. Patel, Sanjay B. Attarde and Sopan T. Ingle (2006). "The Influence of Workplace Environment on Lung Function of Flour Mill Workers in Jalgaon Urban Center." *Journal of Occupational Health*, volume 48 Pp-396-401.
2. Taggart SC (1996). Asthmatic bronchial hyper responsiveness varies with ambient levels of summertime air pollution. *Eur Respir J* 9, Pp 1146–1154.
   Jeelani Z, Tanki AS and Shawl MI (1992). Status of Peak Expiratory Flow Rate (PEFR) and Forced Expiratory Volume (FEV1) in Kashmiri population. *Indian J Pharmacol* 24, Pp 169–170.

Impact of Nala Water on Ground Water Quality

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ABSTRACT:
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Abstract:
The present study was undertaken to evaluate such effects of big nala's on ground water quality of selected areas. Nala water samples and ground water samples near adjoining area of these Nala's were collected from different selected locations of Jalgaon city. The ground water samples were analyzed for physico-chemical parameters like Color, Taste, pH, EC, Turbidity, Acidity, Alkalinity, Hardness, Total dissolved solids, Chlorides, Fluorides. MPN test were determined to evaluate biological contamination of ground water in this study area. All observations were compared with Bureau of Indian Standard for Drinking Water (BIS: 10500:1991). It has been found that most of the parameters of ground water quality exceed the permissible limits due to the contamination from seepage of Nala water. The study conclude that improper slope, flowing pattern and poor construction of Nala's as well as lack of cleaning practices may be increase the rate of percolating the pollutants to ground water and affects its quality. The study suggests that, local peoples should take initiatives to make their area healthy, clean and sanitized and shall avail the pure drinking water and promote healthy practices.

Introduction

- The sewage waste water collect and flows from Nala's play an important role in contamination of the ground water quality at nearby areas. Contamination of such water sources is a big problem creating health hazards.
- WHO reported that around 94% of the worldwide diarrheal trouble and 10% of the aggregate infection load are because of unsafe drinking water, lacking sanitation, and deprived hygienic practices. About 48% of the children's in India are suffering from diarrhea and pneumonia due to unsafe drinking water, lacking sanitation. (Neha Panchal,2006)
- The present study was undertaken to evaluate such effects of big nala's on ground water quality of selected areas.

Objectives

1. To evaluate the physico-chemical and biological characteristics of Nala water and Ground water samples collected from study area.
2. To review the status of water borne & vector borne diseases in study area.

3. To create awareness among the people living near open Nala site regarding the ground water quality, sanitation, Hygiene condition and its effect on their health.

Study Area

Nala Water Samples	Sample Code	Ground Water Samples collect from nearby area with Code
Neri Naka Nala	NW-1	NGW-1
		NGW-2
Ajanta Chowk Nala	NW-2	AGW-1
		AGW-2
B. J. Nagar Nala	NW-3	BGW-1
		BGW-2

Table 1: Details of Nala water & Groundwater sampling

- Three major Nala's in Jalgaon city were selected for the study. Two ground water samples from each nearby area were collect for the study.

Material and Methods

- **Water sampling:** Water samples from selected Nala's and groundwater that are extensively used for drinking purposes by the local residents were collected randomly by grab sampling technique. Total 3 Nala water and 6 ground water samples were collected from study sites to evaluate its effect on groundwater aquifer.

- **Water analysis:** The collected ground water samples were analyzed for 4 physical and16 chemical parameters respectively. Most Probable Number (MPN) test was determined to assess the biological contamination of water. All analysis was estimated as per standard methods (APHA, 1998)

Parameters	WHO (1983) Standards	No. of samples Exceeding Permissible Limits	Total No. of Samples	% of samples exceeding the limits	Undesirable Effect on Human
pH	6.5-8.5	1	6	16.66%	Taste
TDS (mg/l)	500 mg/l	1	6	16.66%	Gastrointestinal Irritation
TS (mg/l)	500 mg/l	5	6	83.33%	
TH (mg/l)	300 mg/l	4	6	66.66%	Scale Formation
Mg^{2+} (mg/l)	30 mg/l	1	6	16.66%	
Cl^- (mg/l)	250 mg/l	2	6	33.33%	Salty Taste
F^- (mg/l)	1.5 mg/l	5	6	83.33%	Dental & Skeletal Fluorosis
MPN	(MPN/ 100 ml)	All Locations (6)	6	100%	Gastrointestinal Irritation & Water born Disease

Table No. 2: Parameter wise summary of ground water samples exceeding permissible limit and resulting undesirable effect on human health.

Table 2 shows the possible effects of some physical, chemical and biological parameters of water samples which exceeding the permissible limits on human health. 8 parameters namely pH, Total Dissolved Solids, Total Solids, Total Hardness, Magnesium ions, Chlorides, Fluorides and MPN shows exceed contamination in all three samples.

Conclusion

- From physico-chemical analysis of the groundwater sample of study area, it was conclude that the ground water quality is contaminated due to seepage of Nala water.
- The study conclude that due to poor sanitation, unhygenic practices and unsecured drinking water people of these areas are prone to diseases like malaria, typhoid and diarrhea. The positive results of MPN test of all samples shows the biological contamination of ground water in these areas.
- The study conclude that improper slope, flowing pattern and poor construction of Nala's as well as lack of cleaning practices may be increase the rate of percolating the pollutants to ground water and affects its quality.

Recommendation

- The solution of the problem should be handled and managed by Municipal Corporation of Jalgaon City. Maintain the proper slope, flow of Nala water.
- The Nala`s should be clean with proper frequency. If possible, Nala`s should be closed or construct underground with proper concrete material. Sanitation awareness campaigns should be extended to the study area.
- Local people should take initiatives to make their area healthy, clean and sanitized and shall avail the pure drinking water and promote healthy practices.

References

- Abbasi, S.A. and Vinithan. S, Water quality in and around an industrialized suburb of Pondicherry. The Indian Journal of Environmental Sciences and Health, 1999, 41(4): 253-263.
- Cocchi D. and Scagliarini. M, Modelling the Effect of Salinity on the Multivariate Distribution of Water Quality Index. Journal of Mathematics and Statistics 2005, 1(4): 268-272.
- Dhere, A.M. Pawar, C.B. Pardeshi, P.B. and Patil, D.A. Municipal solid waste disposal in Pune city- An analysis of air and groundwater pollution. Current Science, 2008. 95(6): 774-777.

ON 2-ABSORBING IDEALS OF COMMUTATIVE RINGS

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ABSTRACT:
In this paper, we characterize ideals, prime ideals, maximal ideals and 2-absorbing ideals of a ring $R = (P(X), ,)$ where $X = \{ a_1, a_2, \ldots, a_n \}$, n finite but variable and $A \ B = (A - B) \ (B - A)$ for all $A, B \ R$.
Key words: Prime ideals, maximal ideals, 2-absorbing ideals.
*Address to whom the correspondence should be made (Supervisor)

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1. Introduction:

A. Badawi [1], introduced the concept of 2-absorbing ideals in a commutative ring with identity element, which is a generalization of prime ideals. Now a days many researchers are working on 2-absorbing ideals as it is recently introduced. We refer [3] and [4], for the definition of ideal, prime ideal, maximal ideal in commutative rings with identity element. The set of all subsets of a set X is denoted by $P(X)$. In this paper, we characterize ideals, prime ideals, maximal ideals and 2-absorbing ideals of a ring $R = (P(X), ,)$ where $X = \{ a_1, a_2, \ldots, a_n \}$, n finite but variable and $A \ B = (A - B) \ (B - A)$ for all $A, B \ R$.

2. Main Results:

Definition 2.1[1]: A non-zero proper ideal I of a ring R is called 2-absorbing ideal if whenever $a, b, c \ R$ and $abc \ I$, then $ab \ I$ or $bc \ I$ or $ac \ I$.

Note: 1) Every prime ideal of a ring R is a 2-absorbing ideal of R[1].

2) Intersection of two prime ideals of a ring R is a 2-absorbing ideal of R[1].

Now obtain characterizations of ideals, prime ideals, maximal ideals and 2-absorbing ideals of a ring $R = (P(X), ,)$.

Theorem 2.2: Let $R = (P(X), ,)$ be the ring where $X = \{ a_1, a_2, \ldots, a_n \}$, n finite but variable and $A \ B = (A - B) \ (B - A)$ for all $A, B \ R$.

i) For $A \ R, < A > = P(A)$.

ii) I is an ideal of R if and only if $I = < A >$ for some $A \ R$.

iii) An ideal I of R is a prime ideal if and only if $I = < A >$ for some $A \ R$ and $|A| = |X| - 1$.

iv) An ideal I of R is a maximal ideal if and only if $I = < A >$ for some $A \ R$ and $|A| = |X| - 1$.

v) An ideal I of R is a 2-absorbing ideal if and only if $I = < A >$ for some $A \ R$ and $|A| = |X| - 1$ or $|X| - 2$.

Corollary 2.3: Let R be a ring as stated in Theorem 2.2. Then

1) An ideal I of R is a 2-absorbing ideal if and only if $I = P_1$ or $I = P_1 \ P_2$, where P_1 and P_2 are prime ideals of R.

2) The number of 2-absorbing ideals in R is exactly $n(n+1)/2$.

Conclusion:

Theory of ideals plays a vital role in Ring Theory. Since 2-absorbing ideals are generalization of prime ideals in commutative rings with identity element and is introduced by A. Badawi in 2007, researchers have wide scope in studying this topic and giving its applications. In this project we have studied 2-absorbing ideals and characterize all 2-absorbing ideals in the ring $(P(X), ,)$ where $X = \{a_1, a_2, \ldots, a_n\}$, n finite but variable and $A \ B = (A - B) \ (B - A)$ for all $A, B \ R$.

References:

[1] A. Badawi, *On 2-absorbing ideals of commutative rings*, Bull. Austral. Math. Soc., Vol. 75(2007), 417-429.

[2] J. Huckaba, *Commutative ring with zero divisors*, Markel Dekker, New York, Basel, 1988.

[3] Nathan Jacobson, *Basic algebra Volume II*, Hindustan Publishing Corporation, India, 1984.

[4] R. Y. Sharp, *Steps in commutative algebra*, Cambridge University Press, 2000.

Decolourization of Congo red by using *Kluveromyces marxianus*.

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ABSTRACT:
Man is always fascinated to color. The importance of dye to human civilization both ancient and contemporary is well documented. Recently it is notice that there is great shift from natural to synthetic dyes. In the dye and dye stuff manufacturing industries most neglected units at the industrial sites are effluent treatment plants. Dyes are aromatic or heterocyclic, belonging to: triphenyl methane dye, azo dyes, anthracene derivative compound. Dyes are widely used in industries such as textile, paper, plastics to color their product. Waste material from these industries cause pollution and some dyes like benzedium based dyes are known as Human carcinogen. The studies revealed maximum dye degradation at PH 5 i.e. 80.3% where optimum temperature was found to be at 45°C i.e.87.73%. The optimum substrate concentration was found to be 80.97at 50 PPM.Kinetic study revealed as incubation time increased decolourization also increases but pH changes to alkaline during the study. HPLC results revealed shift in peak and formation of new peak which suggest the formation of byproduct and slight conformation change in structure of dye.
Key words: Azo dye, Congo red, waste water, *K. marxianus*.

Introduction:
Over the last few decades, increasing globalization, urbanization and industrialization have caused different environmental pollution (Soudha et al., 2014). One of it is water pollution which has become a major concern to the society since past few decades. Approximately 28000 tones of dyes has been discarded to the environment annually (Jin et al., 2007, Ramlan et al.,2012). Most widely used dye is azo synthetic dye. The textile manufacturing and dye products, industries consume huge amounts of water that is subsequently discharged into the environment as a wastewater (Andleeb et al., 2010)
Azo dye is being widely used as the coloring agent in textile industries because of its lower production cost and has more variation in color compared to natural dye (Ramlan et al., 2012)The toxicity of most of the azo dyes is one of the serious environmental concerns(lade et al., 2012; Dong et al., 2003; wang et al., 2009) as the effluents coming from dye processing and manufacturing industries are known to be carcinogenic as well as mutagenic to various organisms (Mathur et al., 2005; Chen 2006; Novatny et al., 2006; Mathur and Bhatnagar 2007). Dye wastewater is usually treated by physical and chemical treatment processes. Although they can remove dye partially, various limitations prevent them to be economical and thus cannot be used widely and economically (chen et al., 2003) to alternate these techniques microorganism can be usedto completely degrade the azo dyes (verma & Madamwar 2003; Moosvi et al., 2005; Pandey et al., 2001; Khalid et al., 2008; Sudha et al., 2014) because by secreting enzymes such as Laccase, azoreductase, peroxidase and hydrogenase.Despite their great promise both bacteria and fungi have suffered certain limitation with respect to their individual abilities to completely degrade and detoxify azo dyes. (khelifi et al., 2009; su et al., 2009; Qu et al., 2010)In present investigation K. Marxianus was used to decolorize and degrade textile red and congo red.

MATERIALS ANDMETHODS:

Materials:

Congo red, MGYP, Minimal media, Chloroform, Minimal Basal Medium

Culture media:

- **Minimal Basal Medium** (**MBM**) containing gL^{-1}: $Na_2HPO_4.7H_2O$, 12.8; KH_2PO_4, 3.1; NaCl, 0.5; NH_4Cl, 1; $MgSO_4.7H_2O$, 0.5; Glucose, 4; Yeast Extract, 2;concentration of dyes, 0.1; pH 5.

- **Malt glucose yeast extract peptone agar (MGYP)** containing gL^{-1}:Malt extract, 3; Glucose, 10; Yeast extract, 3; Peptone, 5; Agar, 30; pH 6.4 – 6.8.

Methods

1. Maintenance of pure culture of *K. marxianus* NCIM 3565 :

Yeast culture were maintain on the MBM agar slant containing dye as well as on MGYP slant, which were then used for further studies. Bulk biomass was obtained by growing the culture in MGYP broth for 24 hrs on shaker.

After the growth was observed, it was maintained 4^0C for further study.

2. Decolorization Study :

Decolorization study of *k. marxianus*was done, both on solid as well as in liquid medium

2.1.Solid phase Decolorization :

The ability of the *k. marxianus*to decolorize the dyes was evaluated using MGYP plates supplemented with 100 mgl^{-1} of the individual dyes. A spot of *K. marxianus*was placed in the center of each plate. In addition, un-inoculated plates containing each of the dyes were used as controls. The plates were then incubated at 30°C for 48 hrs. , after which the zone of decolorization was observed.

2.2. Liquid phase decolorization:

The ability of the *k. marxianus*to decolorize the dyes was evaluated using 50ppm concentration solution of the individual dyes. 20 ml of each dye solution was inoculated with 0.5ml cultural filtrate (crude enzyme), un-inoculated bottles containing the dyes was used as controls. The tubes were then incubated at 30°C for 48 hrs, after which decolorization was observed. The ability of the fungi to decolorize the dye was then expressed as the % decolorization, which was calculated using the following formula $\%D = (A_0 - A) \times 100/A0$, where A_0 is the initial absorbance and A is maximum absorbance at the current time period.

3. Determination of λmax for Congo red by U. V. Scanning :

Maximum absorbance for Congo red was determined by U. V. Scanning of filtered dye solutions using UV-Visible Spectrophotometer.

4. Decolorization of Congo dyes using *K. marxianus*

Initial decolorization studies were carried out using MB medium containing 50ppm Congo red at acidic pH. 100ml of medium in 250ml of Erlenmeyer flask was inoculated with 1gm % of 24hrs culture grown in MGYP Broth. The flasks were incubated at room temperature on shaker for 5days. Samples were withdrawn at regular intervals. Decolorization, cell biomass and pH were measured.

5. Effect of pH on decolorization.

Effect of pH on decolorization of Congo red by *K. marxianus* was carried out at pH 4.0, 5.0, 5.5, 6.0, 7.0, 8.0 in MB Medium. The flasks were incubated at room temperature and decolorization was measured at the end of 48 hrs.

6. Effect of temperature on decolorization.

Effect of temperatures on decolorization of Congo red 25 by *K. marxianus*was carried out at temperatures Room Temperature, 30°C, 35° and 45°C in MB Medium. Decolorization was measured at the end of 48 hrs.

7. Effect of different concentrations of dye on decolorization.

Effects of initial dye concentrations on Congo red, decolorization was evaluated in 50 ml MB by inoculating 2 g% wet yeast cells. Four different initial dye concentrations of 50, 100, 200, 300 and 400 mg l^{-1} Congo red were used.

8. HPLC analysis.

Samples were centrifuged and supernatant clarified by passing through 0.45 µm filter. The filterate was extracted in double the volume of chloroform. Samples were concentrated under reduced pressure after drying with sodium sulphate. Extracted samples were analysed using HPLC 1100 series (Agilent, Germany) using UV-Vis detector set at 254nm and Bondapak RPC18 Column. Mobile phase acetonitrile: water in ratio of 10:90 was used under isocratic condition at the flow rate of 1.2 ml min-1.

Results and Discussion:

1. Decolorization Study:

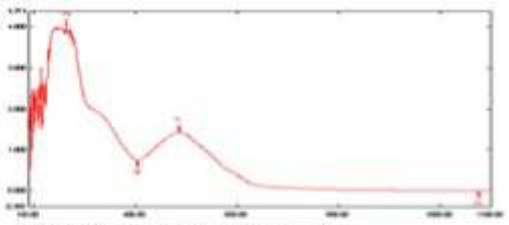
Sr.No.	Dye	λmax
01	Congo red	485nm

Fig: Liquid Phase

Fig: Solid Phase

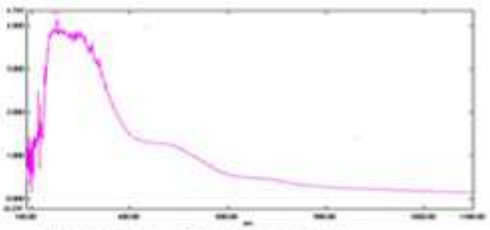
2. Determination of λmax for Congo red by U.V.Scanning :

Sr.No.	Dye	λmax
01	Congo red	485nm



U.V. scanning of Congo red (Control)

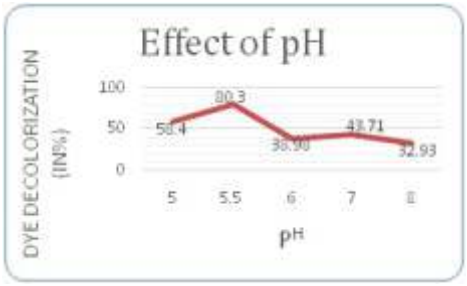
Peak no.	Wavelength	Abs.
1	485 nm	1.415
2	264 nm	3.977

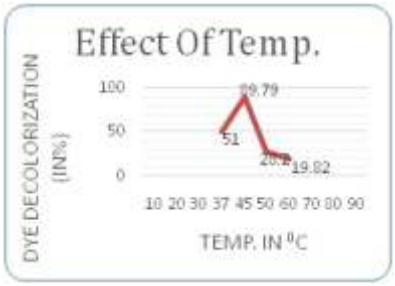


U.V. scanning of Congo red (Test)

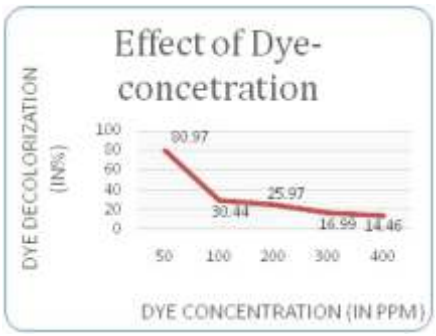
Peak no.	Wavelength	Abs.
1	215 nm	3.963

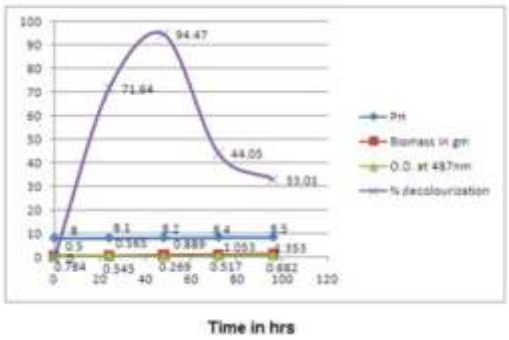
- In solid phase decolorization zone of clearance was observed which clearly indicate ability of the yeast to decolorize dye.
- In liquid phase decolorization studies showed decrease in peak of dye at 485nm and formation of new peak as 21mm.
- To optimize various culture condition in order to achieve efficient & rapid decolorization of the dye, the effects of PH, temperature & dye concentration were studied. The studies revealed maximum dye degradation at PH5 i.e. 80.3% where optimum temperature was found to be at 45°C i.e.87.73%





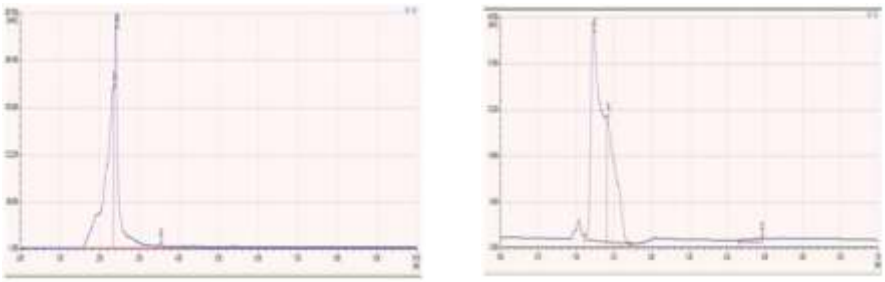
- The growth & subsequent dye decolorization affected by culture condition like PH , temperature & dye concentration etc.





Kinetic study

- Kinetic study of dye decolorization revealed increase in decolorization till 48 hrs. then thus in sudden decrease in % decolorizarion. It may be due to reformation of product having λmax similar to that of dye. Whereas biomass in continuously increase and pH remains as constant.



Standard Congo redAfter treatment

• HPLC studies revealed that as the dyes treated with the K. marxianus shows the maximum absorption of dye shift to different wavelength. The shift in the wave length may be due to transformation of the substrate or formation of new by product with different retention time and growth.

CONCLUSION:

- In the recent study, K. marxianuswas capable or decolorization of Congo red dye.
- In the solid phase decolorization clear zone was seen around the yeast colony where as in liquid phase abo decolorization was observed and confirmed by U.V. visible studies.
- For the studies of parameters like Temperature and pH substrate concentration were optimize in temperature studies as the temperature was increased further 450c, present decolorization was decreased. It may due to effect on temperature and on enzyme. Enzymes are protein nature so it must have denature due to temperature.
- In the pH studies as the pH increases above 5 the present decolorization in dropping down. It must be due to conformational change in structure of enzyme due to pH and extract was used for azo reduction assay and found to positive.
- It has been reported in many papers that yeast has Azoreductase enzyme so mg–L concentration of dye was found to be optimum for the studies. In constant absorption as well as increased inhibition act on the growth of K. marxianus.
- Kinetic study revealed as incubation time increased decolorization also get increased till 48 hrs. But pH remain constant throughout the study. Biomass increased with incubation period.
- HPLC results revealed shift in peak and formation of new peak which suggest the formation of byproduct and slight conformation change in structure of dye.

REFERENCES:

1. Chen H (2006) Recent advances in azo dye degrading enzyme research. Curr Protein PeptSci 7(2):101–111
2. Rai HS, Bhattacharyya MS, Singh J, Bansal TK, Vats P, Banerjee UC (2005) Removal of dyes from the effluent of textile and dyestuff manufacturing industry: a review of emerging techniques with reference to biological treatment. Crit Rev Environ SciTechnol 35:219–238
3. Stolz A (2001) Basic and applied aspects in the microbial degradation of azo dyes. ApplMicrobiolBiotechnol 56:69–80
4. Joe MH, Lim SY, Kim DH, Lee IS (2008) Decolorization of reactive dyes by Clostridium bifermentans SL186 isolated from contaminated soil. World J MicrobiolBiotechnol 24:2221–2226
5. Adamson RH, Dixon RL, Francis FL, Rall DP (1965) Comparative biochemistry of drug metabolism by azo and nitro reductase. ProcNatlAcadSci USA 54:1386–1391
6. Bragger JL, Lloyd AW, Soozandehfar SH, Bloomfield SF, Marriott C, Martin GP (1997) Investigations into the azo reducing activity of a common colonic microorganisms. Int J Pharmaceut 157:61–71
7. Dubin P, Wright KL (1975) Reduction of azo food dyes in cultures of Proteus vulgaris. Xenobiotica 5:563–571
8. Rafii F, Franklin W, Cerniglia CE (1990) Azoreductase activity of anaerobic bacteria isolated from human intestinal microflora. Appl Environ Microbiol 56:2146–2151
9. Scheline RR, Nygaard RT, Longberg B (1970) Enzymatic reduction of azo dye, Acid Yellow, by extracts of Streptococcus faecalis, isolated from rat intestine. Food CosmetToxicol 8:55–58
10. Wuhrmann K, Mechsner K, Kappeler T (1980) Investigation on rate-determining

factors in the microbial reduction of azo dyes. Eur J ApplMicrobiol 9:325–338
11. Xu M, Guo J, Sun G (2007) Biodegradation of textile azo dye by Shewanelladecolorationis S12 under microaerophilic conditions. ApplMicrobiolBiotechnol 76:719–726
12. Russ R, Rau J, Stolz A (2000) The function of cytoplasmic flavinreductases in the bacterial reduction of azo dyes. Appl Environ Microbiol 66:1429–1434
13. Kudlich M, Keck A, Klein J, Stolz A (1997) Localization of the enzyme system involved in the anaerobic degradation of azo dyes by Sphyngomonas sp. BN6 and effect of artificial redox mediators on the rate of azo reduction. Appl Environ Microbiol 63:3691–3694
14. Rafii F, Moore JD, Ruseler-van Embden JGH, Cerniglia CE (1995) Bacterial reduction of azo dyes used in foods, drugs and cosmetics. MicroecolTher 25:147–156
15. Zimmermann T, Kulla HG, Leisinger T (1982) Properties of purified Orange II azoreductase, the enzyme initiating azo dye degradation by Pseudomonas KF46. Eur J Biochem 129:197–203
16. Zimmermann T, Gasser F, Kulla HG, Leisinger T (1984) Comparison of two azoreductasesacquarid during adaptation to growth on azo dyes. Arch Microbiol 138:37–43
17. Moutaouakkil A, Zeroual Y, Zzayri FZ, Talbi M, Lee K, Blaghen M (2003) Purification and partial characterization of azoreductase from Enterobacteragglomerans. Arch BiochemBiophys 413:139–146
18. Chen H, Wang RF, Cerniglia CE (2004) Molecular cloning, overexpression, purification, and characterization of an aerobic FMN-dependent azoreductase from Enterococcus faecalis. Protein ExprPurif 34:302–310
19. Chen H, Hopper S, Cerniglia CE (2005) Biochemical and molecular characterization of an azoreductase from Staphylococcus aureus, a tetrameric NADPH-dependent flavoprotein. Microbiology 151:1433–1441
20. Nakanishi M, Yatome C, Ishida N, Kitade Y (2001) Putative ACP phosphodiesterase gene (acpD) encodes an azoreductase. J BiolChem 276:46394–46399
21. Suzuki T, Timofei S, Kurunczi L, Dietze U, Schuurmann G (2001) Correlation of aerobic biodegradability of sulfonatedazo dyes with the chemical structure. Chemosphere 45:1–9
22. Yan B, Zhou J, Wang J, Du C, Hou H, Song Z, Bao Y (2004) Expression and characteristics of the gene encoding azoreductase from Rhodobactersphaeroides AS1.1737. FEMS MicrobiolLett 236:129–136
23. Liger D, Graille M, Zhou CZ, Leulliot N, Quevillon-Cheruel S, Blondeau K, Janin J, van Tilbeurgh H (2004) Crystal structure and functional characterization of yeast YLR011wp, an enzyme with NAD(P)H-FMN and ferric iron reductase activities. J BiolChem 279:34890–34897
24. Ramalho PA, Cardoso MH, Cavaco-Paulo A, Ramalho MT (2004) Characterization of azo reduction activity in a novel ascomycete yeast strain. Appl Environ Microbiol 70:2279–2288
25. Carvalho MC, Pereira C, Goncalves IC, Pinheiro HM, Santos AR, Lopes A, Ferra MI (2008) Assessment of the biodegradability of a monosulfonatedazo dye and aromatic amines. IntBiodeterior Biodegradation 62(2):96–103
26. Pearce C, Guthrie JT, Lloyd JR (2008) Reduction of pigment dispersions by Shewanella strain J18 143. Dyes Pigm 76(3):696–705
27. El Ahwany AMD (2008) Decolorization of Fast red by metabolizing cells of Oenococcusoeni ML34. World J MicrobiolBiotechnol 24:1521–1527
28. Wong PK, Yuen PY (1996) Decolorization and biodegradation of methyl red by Klebsiellapneumoniae RS-13. Water Res 30:1736–1744

29. Ozdemir G, Pazarbasi B, Kocyigit A, Omeroglu EE, Yasa I, Karaboz I (2008) Decolorization of Acid Black 210 by Vibrio harveyi TEMS1, a newly isolated bioluminescent bacterium from Izmir Bay, Turkey. World J MicrobiolBiotechnol 24:1375–1381
30. Khalid A, Arshad M, Crowley DE (2008) Accelerated decolorization of structurally different azo dyes by newly isolated bacterial strains. ApplMicrobiolBiotechnol 78:361–369
31. Kapdan KI, Kargi F, Mullan G, Marchant R (2000) Decolorization of textile dyestuff by a mixed bacterial consortium. BiotechnolLett 22:1179–1181
32. Pearce CI, Lioyd JR, Guthrie JT (2003) The removal of colour from textile wastewater using whole bacterial cells: a review. Dye Pigm 58:179–196
33. Yatman HC, Akyol A, Bayramoglu M (2004) Kinetics of photocatalyticdecolorization of an azo reactive dye in aqueous ZnO suspensions. IndEngChem Res 43:6035–6039
34. Khalid A, Arshad M, Crowley DE (2008) Decolorization of azo dyes by Shewanella sp. under saline conditions. ApplMicrobiolBiotechnol 79:1053–1059
35. Mohanty S, Dafale N, Rao NN (2006) Microbial decolorization of reactive Black-5 in a two- stage anaerobic-aerobic reactor using acclimatized activated textile sludge. Biodegradation 17:403–413
36. Adedayo O, Javadpour S, Taylor C, Anderson WA, Moo-Young M (2004) Decolourization and detoxification of Methyl Red by aerobic bacteria from a wastewater treatment plant. World J MicrobiolBiotechnol 20:545–550
37. Angelova B, Avramova T, Stefanova L, Mutafov S (2008) Temperature effect of bacterial azo bond reduction kinetics: an Arrhenius plot analysis. Biodegradation 19(3):387–393
38. Chang J, Kuo T (2000) Kinetics of bacterial decolorization of azo dye with Escherichia coli NO3. BioresourTechnol 75:107–111
39. Mali PL, Mahajan MM, Patil DP, Kulkarni MV (2000) Biodecolorization of members of triphenylmethanes and azo groups of dyes. J SciInd Res India 59:221–224
40. Asad S, Amoozegar MA, Pourbabaee AA, Sarbolouki MN, Dastgheib SMM (2007) Decolori- zation of textile azo dyes by newly isolated halophilic and halotolerant bacteria. BioresourTechnol 98:2082–2088
41. Uddin SM, Zhou J, Qu Y, Wang P, Zhao LH (2007) Biodecolorization of azo dye Acid Red B under high salinity condition. Bull Environ ContamToxicol 79:440–444

Lignocellulosic destruction of agro industrial waste through physio-chemical approach

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ABSTRACT:

Being agriculture based country, huge amount of lignocelluloses biomass is generated in India per year as waste of agro industry. It is huge biomass available for Bio energy like biogas, bio ethanol, with low cost and sustainable availability. However, lignocelluloses based technology has major challenge of outer lignin layer destruction of plant sheath and simplification of lignocellulosic biomass for Bio energy production. To overcome these challenges, pre-treatment may serve as fascination approach as it is rapid and high yielding. Present work is focused to study effect of different physical, chemical and physicochemical stresses for simplification of lignocelluloses to enhance Bio energy production. The effect of these treatments was discussed in terms of sugar analysis, total solid and volatile solid study.

Key words : Agro waste, Bio energy and pre-treatment

Introduction

In today's energy demanding life style, there is need of exploring newer sources of energy. It is also desirable that, the energy resources must be renewable as well as eco-friendly. Agricultural activities are generally known to generate waste materials during crop growth and harvest. Unfortunately these agricultural wastes are usually burnt on the farm in preparation for planting season as supplement materials for soil improvement. These wastes when not properly harnessed pose series of problems which ranges from environmental pollution, alteration of water chemistry and depletion of dissolved oxygen when deposited in water bodies, and causes diseases to many municipalities. Therefore, attempts have been made by various researchers in the search of ways of reducing the accumulation and spread of these wastes either through biological, chemical and mechanical means with much attention focused on biological approach through anaerobic digestion to produce biogas or bio ethanol.Among the different forms of renewable sources, biomass is one of the most promising (Messineo et al.2012). Bioenergy system can provide multiple benefits to the users and the community resulting in resource conservation and environmental protection (Sims 2013). About 16% of global final energy consumption comes from renewable resources, with 10% of all energy from traditional biomass, mainly used for heating, and 3.4% from hydroelectricity.

In this regard, residual lingocellulosic materials from agriculture, forestry, and industry can play major roles as biomass sources for bio fuel production (Vivekanand et al., 2014). As per the crop index of Jalgaon district, maize, cotton, wheat and jawar are the major crops and ultimately the agro waste generated from these cereals is also maximum. Corn residues which are produced from this region, which cover the husk, stover, and cob, are lignocellulosic biomass which has been commonly used as one of the substrates for bio energy production worldwide. With the high content of cellulose and hemicelluloses, agro wastes are considered to be a good substrate for the biogas production.Lignocellulosic biomasses mainly consist of cellulose (40-50%), hemicelluloses (25-35%) and lignin (15-20%), which vary quantitatively and qualitatively according to plant origin (Aman, 1993). Therefore, in order to achieve enzymatic hydrolysis for the bioethanol and biohydrogen production, as well as in order to improve the production of biogas from some lignocellulosic substrates more difficult to degrade(e.g. wheat straw, maize stalk…), a pretreatm ent step is necessary(Taherzadeh and karimi,2008).

Pretreatments, originally investigated for the production of second generation bioethanol are normally classified into three catagories: physical (milling irradiation, microwave,,steam explosion, liquid hot water….) , chemical (alkaline, acidic, oxidative, ionic liquids, wet oxidation, inorganic salts…) and biological(enzymatic, fungal…) or their combination(Mosier et.al., 2005). The best method and condition of pretreatment depend greatly both on the type of substrate and on the final end products (bioethanol, biohydrogen or methane). In the anaerobic digestion process, if a substrate is well enclosed in lignin structures, the type of disintegration of the substrate becomes important (Avicenna et al., 2015). The cellulose, hemicellulose and lignin within the plant cell wall form a complex structure, which greatly limits its biodegradability. Thus a comparison between many different types of pretreatment applied on the same substrate could be useful in order to define best pretreatment strategy. The Total Solids (TS) concentration of the waste influences the PH, temperature and effectiveness of microorganisms in the decomposition process (Ayotamuno et.al. 2008). Substrates having larger TS and VS concentration, leading to a greater potential for organic matter conversion to biogas (Fedrico et.al. 2015). Total Solids (TS) are composed of two components, Volatile Matter (VM) and fixed solids. The VM are organic portion of TS that biodegrade anaerobically (Tsunatu et. al. 2014). The aim of this study is to screen the regional agricultural wastes with the best bioenergy production potentials on the basis of giving pretreatments and to determine fermentable sugars, %TS, %VS.

Therefore, initially it is necessary to determine fermentable monomers, %VS, %TS, and others from selected agro waste substrates for bioenergy production. All analytical procedures are performed in accordance with APHA(1998).

Methodology:

- Selected five substrates viz. baggase, stalk of Cotton, Jawar, maize, wheat and cobs of maize and jawar were oven dried at 105^0 C, grinded and fine powder was prepared by passing through 1mm mesh size sieve. All substrates were conserved into air tight container at room temperature for pretreatment studies.

- Thermal, acidic, alkaline and thermo alkaline pretreatments were performed in batch experiment with a total solid content of 100 g TS/L.

- Pretreatment were applied for all selected five substrates. The experimental conditions are summarized in **table1**.

- Pretreatment conditions i.e. dosage of acid and alkali, pretreatment temperatures and contact times were chosen according to literature suggestions on agricultural substrates reported in Cecilia 2012, Fernandes *et al*., 2012; Hamid *et al*., 2013
  Samusiti *et al*., 2013; Menardo *et al*,. 2012; Yebo Li *et al*., 2014; Zainab *et al*., 2014; Zehara *et al*., 2013; Zhu *et al*., 2014.

Sr. No.	Pretreatment	Type		Pretreatment conditions
1	Physical		A1	1000C for 30 min without stirring
2			A2	1000C for 1 hour without stirring
3			A3	1210C for 15 min.{Autoclaving}
4	ChemicalAcidic		B1	2% H2SO4for 24 hours at 250C
5			B2	4% H2SO4for 24 hours at 250C
6		Alkaline	C1	4% NaOH for 24 hours at 250C
7			C2	8% NaOH for 24 hours at 250C
8			C3	10%NaoH for 24 hours at 250C
9	Physico chemical		D1	10% NaOH at 1210C for 15 min
10			D2	10% NaOH at 1000C for 30 min without stirring

After pretreatment, only for compositional analysis, samples were filtered through a sieve of 0.20 mm size. The sieve separated solid and liquid fractions were taken for compositional analysis. Solid fraction was used for %TS, %VS analysis and Liquid fraction was used for fermentable sugar analysis.

1. Estimation of the total solids (TS) of pretreated waste (APHA 1998)
   The total solids (TS) were calculated by subtracting moisture from hundred percent. Weight after drying at 105^0 C
2. Estimation of the volatile solids (VS) of pretreated waste (APHA 1998)

To determine volatile solid and Ash analysis, oven dried moisture free sample were weighed as 1g each in moisture free and pre weighed crucibles and place at the muffle furnaces at 575 5^0 C for min 4 hrs. The volatile solids % and ash% were calculated.

3. Determine the reducing sugar of pretreated waste by DNSA method (Sadasivam et al.,2008

- 100 mg of the Glucose sample was weighed into a boiling tube.
- Pipetted out 0.2, 0.4, 0.6, 0.8 and 1ml of the working standard into a series of test tube .
- Pipetted out 0.1 and 0.2 ml of sample solution into two separate test tube Make up the volume in each tube to 1ml with water .A blank set with 1ml of water.
- 1ml of DNSA solution added to each tube.
- Shakes the content and place in boiling water bath for 10 min.
- Read the color at 540 nm and,
- Supernatant of pretreated sample was collected and 0.5 and 1ml aliquots taken for analysis

- Calculated the amount of % reducing carbohydrate present in the sample solutio n by using formula,

  100ml of the sample solutio n contains X 100mg of glucose
  = % of the reducing carbohydrate present

Results

Figure 1:-

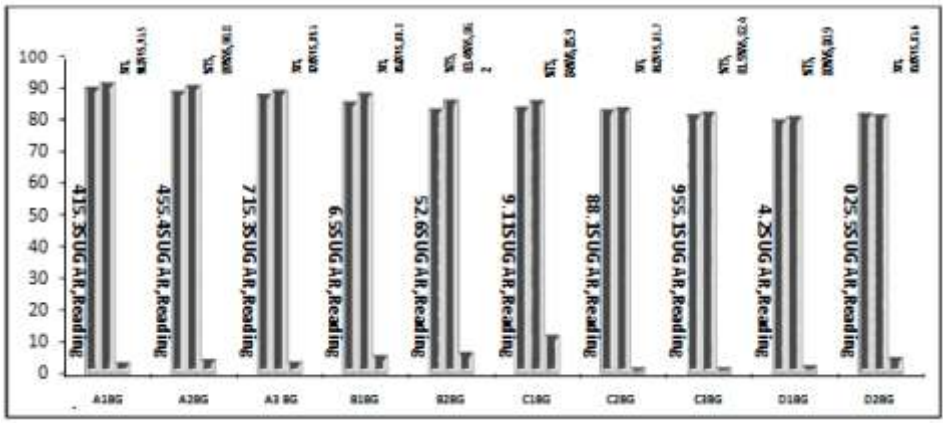


Figure 2:-

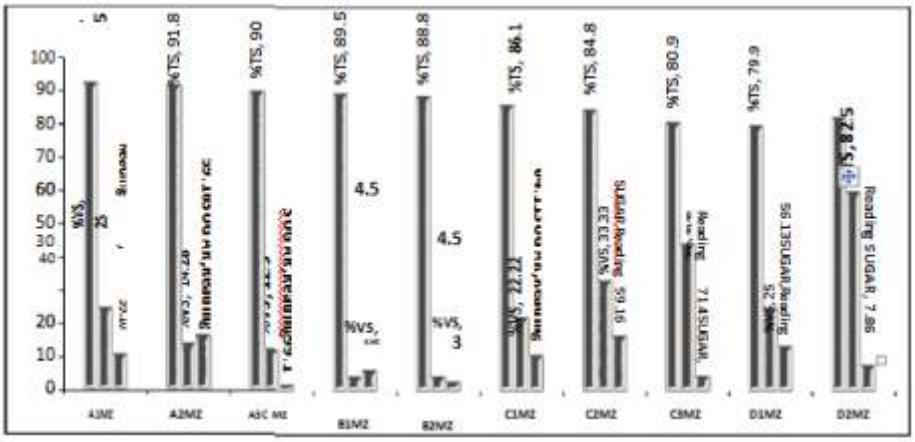


Figure 3:-

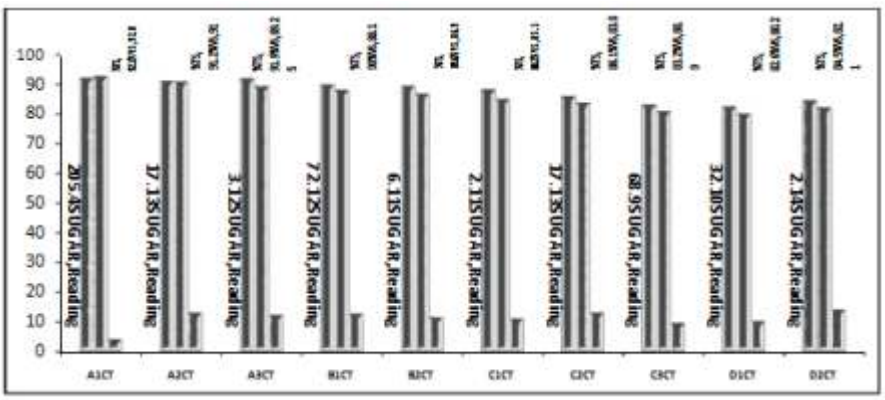


Figure 4:-

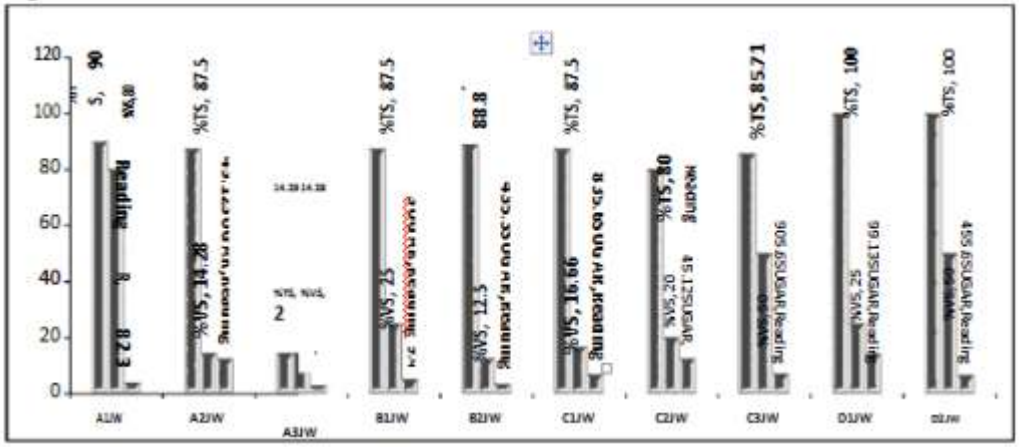
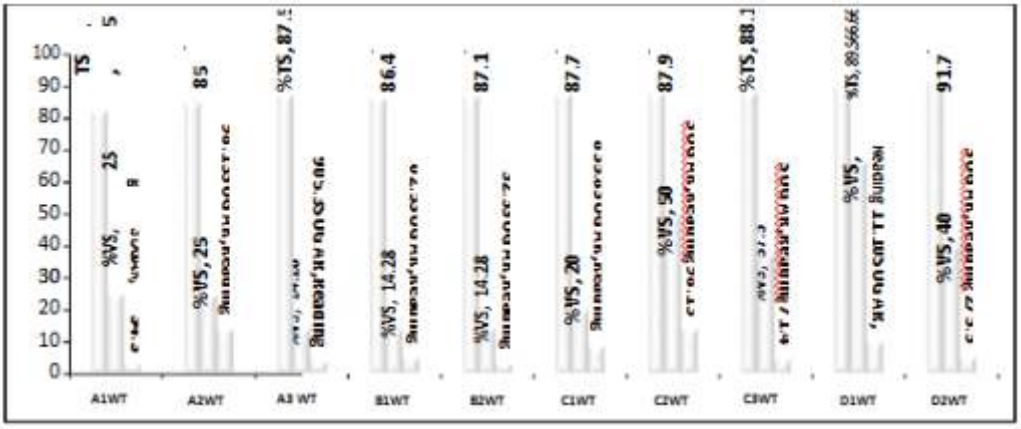


Figure 5:-



The best pretreated condition for all substrates was observed at physical (heating at 100 0 C) and physico chemical treatment (thermo alkaline condition [10 g NaOH per 100 gram of TS at 1000C temperature for 30 min without stirring and/or 10% NaOH at 1210C for 15 min], as compared to other pretreatment methods maximum sugar was released, Lignocellulos ic biomasses mainly consist of cellulose, hemicell uloses and lignin, and therefore pretreatment convert com plex structure into monomers.

The pretreatment conditions for all substrates was observed promising because as compared to %TS %VS of untreated substrates, % TS was fou nd to be decreased. It gives evidence that complex mater of lingocellulosic substrates are partially solublized because of pretreatments and it is also confirmed by increase in reducing sugar of liquid fraction after pretrea tment. The Total Solids (TS) concentration of the agro waste influences the PH, temperature and effectiveness of microorganisms in the decomposition process (Ayotamuno et.al. 2008). Substrates having more than 80% T S concentration, leading to a greater potential for org anic matter conversion to Bioenergy (biogas or bioethanol (Fedrico et.al. 2015).

Conclusion

- Out of five agriculture waste samples wheat, maize, bagasse, cotton, Jawar, ha s Bio energy potential and found to be suitable fe edstock for Bio energy production at laboratory scale.

- Selection of single substrate for bio energy production may also depend on avability of substrate.
- Also by using the chemic al, Physical, physicochemical pre-treatment to this feedstock does improve the quality of their biomas s as an efficient feedstock for Bio energy production.
- Thus a comparison betwee n many different types of pretreatment applied on the same substrate could be useful in order to define best pretreatment strategy.
- A volatile solid estimated was help to compare % amount of biomass fraction actually available for energy production.
- Lignocellulosic substrates for bio fuel production were found to be promising substrate.

References

1. APHA(1998). American Public Health Association standard method for the exami nation of waste water. APHA and American Waste Water Association and Water Pollution Control Fe deration, Washington, DC.293-440.
2. Avicenna, Maizirwan M, San yizan I, Roy HS (2015). Process Improvement of Biogas Production from Anaerobic Co-digestion of Cow Dung and Corn Husk. Procidia Chemistry, Elesvier: 91-100.
3. Messineo A, Volpe R, Marvuglia (2012). A. Ligno-cellulosic biomass exploitation f or power generation:A case study in Sicily. Energy 45 , 613-625.
4. Sadasivam S, Manickam A (2008). Determination of total carbohydrate by anthrone and phenol sulphuric acid method.Biochemical methods, 3rd edition. New age international publishers, Delhi: 6-8.
5. Sims KM (2013). Strategies to Enhance Conversion of Lignocellulosic Biomass to Fermentable Sugars and to Enhance Anaerobic digestion of Algal Biomass for Biogas Production. All Graduate Plan B and other Reports. Paper 256. http://digitalcommons.usu.edu/gradreports/256. Accessed on 19 January 2014.
6. Sluiter A, Hyman D. (2008), Determination of total solids in Biomass and total dissolved solids in liquid process samples, Laboratory analytical procedure (LAP), Technical Report March.
7. Sambusiti C, Monalu F, Ficara E, Carrere H, Malpei F [2013]. A comparesion of different pre-treatments to increase methane production from two agricultural substrates. Applied energy [104]:62-70.
8. Tsunatu DY, Usman HT, Nuhu M, James M (2014). Comparative study of Mesophilic Biogas Production Potentials of Selected Agro wastes. The International Journal of Engineering and Science(3) 2:1805- 1813.
9. Vivekanand V, Elisabeth f, Olsen, Vincent GH, Eijsink, Horn SV (2014). Methane Potential and Enzymatic Saccharification of Steam-exploded Bagasse. Bio-Resources 9(1):1311-1324.

PRODUCTION OF LACCASE BY SSF USING *Basidiomycetes Spp*.

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ABSTRACT:
Laccases are extracellular, multicopper enzyme that has potential ability to oxidize both phenolic and non-phenolic lignin related compounds as well as highly recalcitrant environmental pollutants. In the present focuses on laccase production by Solid Substrate Fermentation (SSF) using indigenously isolated white rot fungi was studied. Wheat bran used as substrate for laccase production using SSF technique. For the SSF, two different types of inoculums such as disc method and liquid biomass inoculum method were used. In the production medium lignin used as inducer and also supplemented with CuSO4, nitrogen source, at pH 3.6 & temperature 35°c. Laccase activity was highest (4561U/gm) on 11th day of incubation period for liquid biomass inoculum method in presence of spentwash as an inducer & activator. Laccase assay was determined using ABTS as substrate.
Key words: Laccase, wheat bran, white rot fungi, ABTS

Introduction

Introduction biocatalyses can be utilize on a wide type of application (Zahida N. et al 2015).

Laccase (E.C.10..3.2.P-benzenedial : oxygen oxidoreductase are multi copper enzyme belonging to the group of blue oxidase . They are defined as the oxidoreductase in enzyme commission (E.C.) which catalyse the oxidation of various aromatic compounds (phenol) with the concomitant reduction of oxygen to water. (khanam R. and et al 2012)

Laccase enzyme are widespread among plants , fungi and bacteria and have various biological function but the most important source are fungi and particularly basidiomycetes and white rot fungi (V. Bhuvaneshwory et al 2015) fungal laccase are involved in the degradation of lignin or in the removal of potentially toxic phenols arising during ligning morphogenesis sporulation or phytopathogenesis and fungal virulence (Sukhbir kaur and Varsha nigam 2014) Recently several works are being done to search specific mechanism of enzymatic lignin oxidation by laccase. After determining correct oxidative mechanism industrial

Laccase has large number of biotechnological applications like dye degradation ,bioremediation of some toxic chemical waste , soil treatment and also biosensor development (Ahmed et al 2015). Laccase have the capacity to decolorize a variety of dyes belonging to the different chemical classes, likea20,anthraquinonederivative, heterocyclic and triphenylmethane (silvianepinheiro et al 2015).

Laccase are also used as cleaning agents for certain water purification system, as catalysts for the manufacture of anticancer drugs and even as Ingradients. In cosmetics (Susana R. and et al 2006). Laccase are used in several industrial applications, such as pump delignification, textile dye bleaching, effluent detoxification , biopolymer modification

(Rosana C. and et al 2007).

The objective of the present invastigation is to optimize the production of laccase by wheat bran under solid state fermentation (TocaHerrera J. and et al 2007). During production inducers like lignin and spentwash and activator like CuSO4 also play
important role in the production of laccase (Tapwal

Materials and Methods

1.Inoculum production

Organism- Basidiomycetes strain of white rot fungi was subculture on potato dextrose agar at 370C for 7 days of incubation and stored at 40C. Three different types of inoculums viz. Disc inoculums, Liquid inoculums and Mat inoculums was used for fermentation process and optimized it by calculating the enzyme activity after incubation.

2.Solid State Fermentation-

Take 18gm wheat bran as a substrate for fermentation then add 180ml phosphate citrate buffer (pH 3.6), 0.4mm CuSo4 is used as activator, 0.0198gm NaNO2 and Aspergine as nitrogen source and addition of 1.194g lignin as an inducer. Sterilize the medium into autoclave. Inoculate the medium with inoculums and incubate at 300C for 11 days. After incubation enzyme extraction was carried out and performed enzyme assay to calculating enzyme activity for crude enzyme.

3. Enzyme Extraction -

The enzyme extraction required for addition of 150ml d/w to fermented matter and mix for 45 min. at room temperature using shaker after Solid removed by filtered and centrifuge at 10,000 rpm for 10 minute. Filtrate used as crude enzyme.

4. Enzyme assay-

For enzyme assay used ABTS as a substrate. Enzyme activity was determined by UV-Visible spectrophotometer at 420nm (UV probe kinetics). Calculate the enzyme activity.

5.Biomass determination-

The growth measurement was done by dry weight of fungus. The fungus was filtered using pre-weighed

A. etal 2014) .

filter paper and was dried in hot air oven at 600C till standard weight was obtained.

6.Optimization of Activator (CuSO4)-

Optimization of CuSO4 was performed by using various CuSO4 concentration such as 0.1mm. to 0.7mm. into fermentation medium.

7.Optimization of incubation period-

Optimization of incubation period was performed by recover the enzyme from 1st to 12th days. Optimum incubation period for enzyme production was found from higher enzyme activity and higher biomass.

Result and Discussion

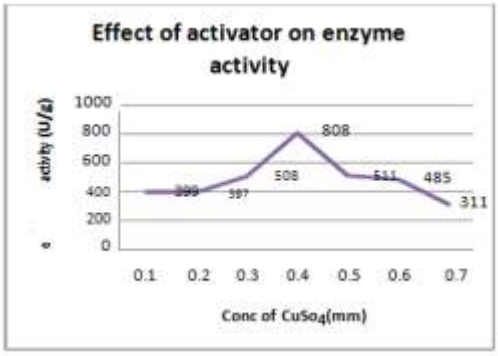
1.Inoculum-

Sr.no	Inoculum	Enzyme activity
1	Disc inoculums	128 U/g
2	Liquid inoculums	152 U/g
3	Mat inoculums	421 U/g

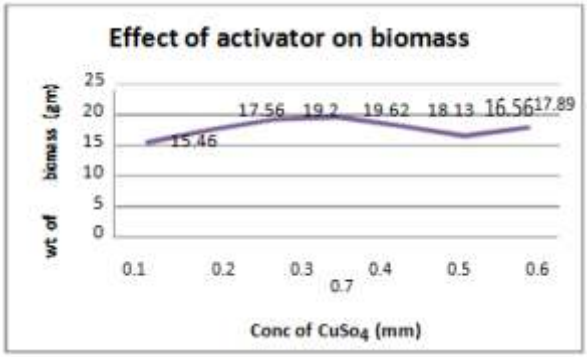
2. Solid State Fermentation-

Sr.no	Condition	Enzyme activity
1	In the absence of CuSo4	311 U/g
2	In the presence of CuSo4	808 U/g
3	In the absence of lignin	657 U/g
4	In the presence of lignin	4261 U/g
5	In presence of spentwash and trace element	4561U/g

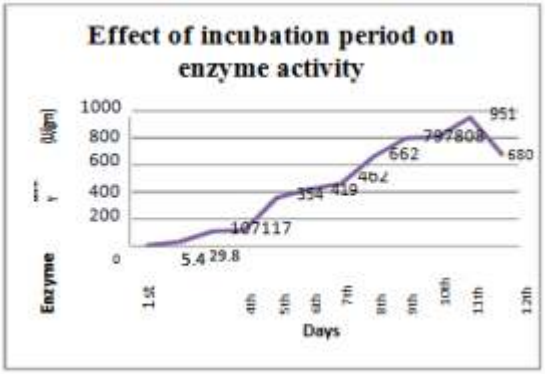
3. Optimization of CuSO4-

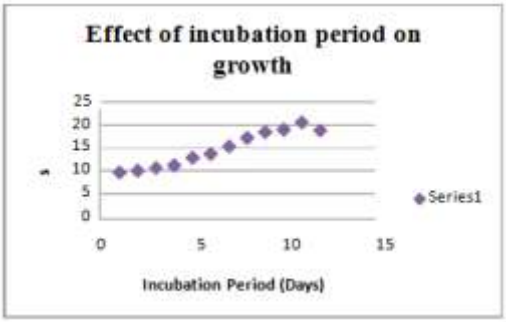


At 0.4mm concentration of activator in the fermentation broth shows highest enzyme activity i.e. 808 U/gm and also shows highest biomass yield i.e. 19.62 gm.



4. Optimization of incubation period–





After optimization of incubation period upto 12th day it's shows highest enzyme activity and biomass growth at 11th day i.e 951U/g and 20.8gm respectively. And after 11th days of incubation period the both enzyme activity and biomass was decline.

Conclusion

The fungal culture of *Basidiomycetes* spp. able to produce laccase by using solid substrates i.e. wheat bran for fermentation, by using different types of inoculums. Also optimization of concentration of activator, CuSo4 in the medium shows highest activity 808 U/gm at 0.4 mm of concn with increase in biomass 19.62 gm as compaired to others. Its optimum incubation period was 11 days, optimum pH was 3.6 and the optimum temperature was 35^0C for the production of laccase. In the present study showed that, increase the activity 4561 U/gm in presence of inducer, spentwash and trace elements in the fermentation medium.

Reference

1. Ahmed I. El. Batal , Elkenway N., Mogdy A. (2014) laccase production by pleurotusostreatus and it's applications in synthesis of gold nanoparticles. Biotechnology report. Doi – 10.1016 /J .btre .2014 .11.001. vol 5,31-39.
2. Bhuvaneshwary V, preethikaharshini J, Amsaveni R. (2015). Isolation optimization and production of laccase from Halobacillushalophilus. International journal of bioscience and Nanaoscience. ISSN-2349-525. vol 2, p.p. 41 -47.
3. Khanam R. and Prasuna G. (2012) formulation of high laccase production media using residue by Trameteshirsuta. International Journal of pharma and Bioscience. ISSN– 0975-6299. Page – B274-B 283.
4. Nasreen Z, Usman S, Ahmed S (2015) Production of laccase enzyme by Basidiomycetes Coriolus Versicolor through ssf International journal of current Microbiology and Applied science. ISSN-2319-7706. vol 4 no. 8 p.p. 1069-1078.
5. Tapwal A, Varghese S, Arora J. (2014) production of laccase by Alternaria alternate and Lasiodiplodiathreobromae. European journal of Experimental Biology ISSN: 2248 -9215 vol. 4(4):196-201
6. Vinicios Y., Santes S., Pinheiro S. (2013) Production of laccase from white rot fungi isolated from amazon forest for oxidation of Remazol Brilliant Blue R. Acedemic Journals. ISSN:1992-2248. vol 10(4) p.p. 132- 136. Doi : 10. 5897/SRE 2013. 5695.

Recycling of Agrowaste and its quality testing

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ABSTRACT:
Composting is natures way of recycling. Composting biodegrades organic waste. i.e food waste, manure, leaves, grass trimmings, papers, wood, feathers, crop residue etc, and turns it into a valuable organic fertilizers. Composting is relatively simple to manage and can be carried out on a wide range of scales in almost any indoor or outdoor environment and in almost any geographic location. Compost can be used in variety of applications. High quality compost can be used in agriculture, horticulture, landscaping and home gardening. Medium quality compost can be used in application such as erosion control and roadside landscaping. Low quality compost can be used as a landfills cover or in land reclamation projects. Compost help buffer soils against extreme chemical imbalances: aids in unlocking soil minerals: releases nutrients over a wide time window: act as buffer against the absorption of chemicals and heavy metals: promotes the development of healthy root zones: suppresses diseases associated with certain fungi: and helps plants tolerates drought conditions. It also increase the numbers of beneficial and normal micro flora associated with root zone. So over study focuses over the production of compost. After the production of compost it was tested for Carbon: Nitrogen ratio, PH, EC, organic content and water holding capacity by means of using different chemical and physical methods. Produce compost was used for trial and pot with addition of compost showed better growth as compared to control pot.
Key words: - Composting, pot assay, quality testing

Introduction

Composting method use for breaking of agrowaste through recycling. Composting is degradation process in which the organic waste is degraded in the blackish end products and many microbes take part in conversion these microorganisms including yeasts, different bacteria and fungi. Composting maturity tests can be easily classified into physical, chemical, plant and microbial activity assays (Getu K., 2015).

The composting is a biological degradation process, which help in stabilization of organic substrate. In Initial step of composting, mesophilic population build up by the utilization of simple nutrients, which raises the temperature of pile; thermophilic microbes proliferate in the second phase. The final product is stable, plant seeds will be free of pathogens. Hence, it can be beneficially applied to soil (Singh and Nain, 2014). Overall, composting process is an ecofriendly and sustainable approach to stabilize lignocellulosic organic substrate.

The most important physical and chemical parameters of compost were inspect with importance on the parameters such as pH, C:N ratio, moisture content, organic carbon, electrical conductivity and organic matter (Ayesha etal 2016),.

Quality and stability compost depands on preparation of agrowaste which further depends upon the compositon of raw material used for compost production.

Compost depends on number of factors they include type of raw materials being composted, its nutrient composition, moisture content, temperature etc. The stabilized compost produced should benefit growtth and be suitable for agricultural application. The chemical nature of compost organic

matter changes throughout composting process and can be useful indication of compost stabilisation.

To obtain a final product that is stable, free from pathogens, plants seeds can be beneficially applied to land. So, the study was undertaken to evaluate physicochemical, biological characteristics during maturity stages of composting process of agrowaste.

Alternatively soil microorganisms play an important role in breakdown of organic waste. Therefore biofertilizer made by composting process has been identified as an alternative to chemical fertilizer to improve soil fertility and crop production.

There are many benefits of using compost

1) Addition of orgainic matter provides food for soil life and increases the stability of soil.
2) Compost protects the soil from erosion.
3) Increases soil structural stability.
4) Improves moisture holding capacity. Infiltration and reduce water running off.
5) Increases water infiltration and reduce water running off.

Material and Method

1) Materials

Chemicals-All the chemicals used during experiment were of analytical research(AR)grade,

Hi-media laboratories, and Qualigen chemicals,Mumbai, distilled water used throughout the experiments for preparing growth media and reagents.

Instruments- Necessary glasswares, shaker, pots, pH meter,Electro conductemeter etc.

Method

1.Sample Collection Sample were collected from Kasoda Farm.
2.Compost Preparation Composting method is carried out at small scale by using windraw method.

We followed the basket type composting, having the dimension of basket were 34 cm length, 28 cm width and 11 cm depth

The layer should be made up of 1 inch of layer of soil.

↓

Over that soil surface, the second layer is made from half inch of agro waste.

↓

After that, animal manure collected from fresh cow dung slurry is speared over the surface of agro waste.

↓

Repeat again the above procedure one time.

↓

Then after packing the layer with cow dung slurry. Keep it as it is for few days in shaded area for proper aeration

↓

Mix that organic matter properly.

↓

The mixture as composting is obtained within 45 days.

↓

After composting, various physic- chemical parameters are checked by various methods.

Sr. No.	Test	Methods
1.	pH	Digital PH meter.
2.	EC	Electro conductometer.
3.	Organic carbon	Walkey & Black (1934) method
4.	Total Nitrogen	Micro Kjeldahl method
5.	Temperature	Thermometer

Table1.List Of various Test And Method

Observation

Dia.1 Pot Assay

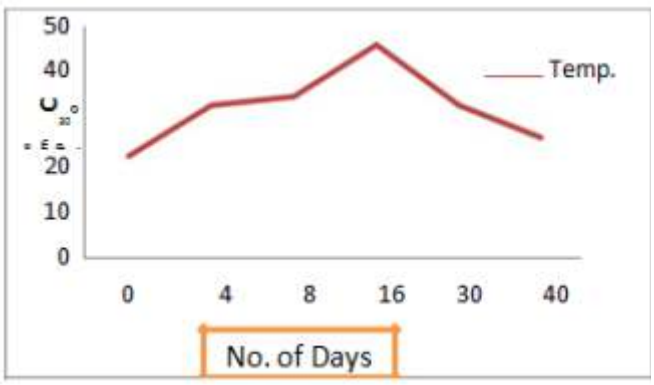
Germination occurs early in the pot having compost as compared to pot having only soil.

Results and Discussion

Sample	pH	Temp. In degree	Carbon%	Nitrogen %	E.C.	Moisture content	Organic matter
Compost	7.8	30^0 c	3.33 %	3.13%	7.18*10-3	14%	5.74 %
Soil	7.6	30^0 c	3.11 %	2.93%	1.30*10-3	10%	5.54 %
Agrowaste	7.3	30^0 c	3.20 %	2.99%	2.60*10-3	-	5.44 %

Table 2. Result of various Test and Method

Graph of no. of days Vs. Temp.



Dia.2 Graph of no. of days Vs. Temp.

Conclusion

Percent carbon was found more in the compost as compared to agro waste and soil respectively.
Compost was found to be rich in organic matter content as compared to soil and agro waste.
We have studied different physicochemical parameters of compost sample. The overall study concluded that composted sample were safe for use in agricultural fields, also recycling of agro residue which is helpful for increasing soil fertility.

Future Aspect

Isolation and identification of Efficient Strain Standardization of Parameter Optimization Method

References

1. Getu Kassegn etal. (2015),. "Physiochemical characterization and microbial identification of compost"Agriculture and environmental science. Volume 2 pp: 25 - 30.
2. Ayesha A., Ahmed J., Munir n.,and Raza S.,(2016), Physical and Chemical analysis of compost, European Journal of pharamaceutial and medical research 3(5): 84 - 87.
3. Dr. M. Vasanthy and Rama L. et al. (Aug. 2014), Market waste management using compost technology, International journal of plant, Animal and Environmental science, volume 4, pp No. 57 to 61.
4. Shymala D. C., Belagali S.L. et al. (2012), studies on variations in physio-Chemical and Biological characteristics at different maturity stages of municipal solid waste compost, International journal of environmental sciences, volume 2, No.4.
5. Eyheraguibel B, Silvestre J Morard P., et al. (2008), Effects of Humicsubstances derived from Organic waste enhancement on the Growth and Mineral Nutrition of Maize. Bioresour. Technol. 99(10: 4206-4212.doi:10.1016/j.boirtech.2007.08.082.
6. Lauue, C., Landry, H. and Roberge, M. et al.(2005). Engineering of land application systems for livestock manure. A review. Can. Biosyst. Eng.47:6.17- 6.28.
7. Muthukumaravel K., Amsath A., SukumaranM. et al. Vermicomposting vegetable waste using cowdung, E-j Chem, (2008), 5(4), 810-813.
8. Hauang D.Y., Lu W. J., Zhou H. Y. and Z. C. et al.(2004). Application of high efficient cellulose utilization microorganisms in co-composting of vegetable wastes and flower stalk. Haun Jing KeXue. 25(2):145-149.
9. Douwes J., Thorne P., Pearce N. and Heederik D. et al. (2003). Bioaerosol health effects and exposure assessment: progress and prospects. Annals of occupational Hygiene, 47(3), 187-200.
10. Grigatti M., Ciavatta C. and Gessa C., et al (2004). Evolution of organic matter from sewage sludge and garden trimming during composting. Bioresource Technology, 91(2), 163-169.
11. Azim, K., Ouyihya, K., Amellouk, A., Perissol, C., ThamiAlami., and Soudi, B. et al. Dyanamic composting optimization through C/N ratio variation as a startup parameter. Building organic Bridge, (2014); 3: 787-790.

Utilization of keratin feathers waste as supplementation of plant fertilizer

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ABSTRACT:
The keratinase has diverse biotechnological applications such as leather hiding process, recovery of silver from X-ray film, production of plant growth promoter, removal of hair as well as blood from the cloth. In recent years, feather treated with microbial keratinase is attracting wide attention with several applications. In the present investigation a feather-degrading Bacillus sp.isolated from a local feather waste site was studied for utilization of keratin feathers waste to prepare supplement of plant fertilizer. The efficiency of feather hydrolysate was evaluated their effect on germination, root and shoot elevation on wheat and gram seeds. The results are encouraging and hence can be further exploring for potential applications.
Key words: Bacillus sp, keratin, keratin degradation, keratinase production

Introduction

Large amount of feather waste is generated through poultry as higher as millions of tons per year which is deposited in the environment and leads to pollution as well as creates threat of occurrence of epidemic disease from such waste. However, so far less emphasis has been given for feather waste management and its control. This feather keratin is a very rich source of β-keratin protein constituting 91% of feather protein(Brandelli, 2008; Hariram, 2015).Feather keratin exhibits an elevated content of several amino acids. The presence of keratin makes feather recalcitrant to most common proteases like trypsin, pepsin, papain, and so forth, thus slowing down its degradation process in nature (Agrahari*et al*. 2010)

Conversion of keratin rich materials into amino acid, peptides and soluble proteins by keratinase is a potential approach to improve the nutritional value of keratinous wastes and used as feed supplement and plant fertilizer (Kazi*et al.*, 2015). A single feather naturally gets degraded in five to seven years but this particular microorganism and their enzyme such as keratinase enhances the speed of degradation after which the same feather gets destroyed within 48 to 72 hours. Keratinases(EC 3.4.99) is a serine protease, which attack on 'hard-to-degrade',insoluble keratin substrates. They are robust enzymes displaying a great diversity in their biochemical characteristics(Brandelli*et al*., 2010).Keratinase produce by various fungi, Streptomyces and bacteria at around alkaline pH and almost thermophilic temperatures. These enzymes have wide range of substrate specificity and have ability to degrade other fibrous protein fibrin, elastin, collagen and other non-fibrous protein likecasein, bovine serum albumin gelatin etc.(Gurav and Jadhav, 2012).

In recent years, feather treated with microbial keratinase is attracting wide attention with several applications. Keratinase-treated feather is increasingly considered as a viable source of dietary protein in food and feed supplements, as the enzyme-treated end product retained high nutritive value. Owing to this ability, keratinases find immense applications in various environmental and biotechnological sectors. They stand out among proteases since they attack the keratin residues and

hence the major application of keratinases has always been in recycling of feather waste converting it into nutritious, cost-effective, environmentally benign feather meal (SelvamandVishnupriya, 2012; Gupta and Ramnani, 2006). Feather meal being nitrogen rich, inexpensive and readily available source serves as a potential additive for organic farming.Besides these outstanding applications, the protease dominant sectors such as leather, detergent and textile are also looking out for keratinases as better substitutes over conventional proteases for processes such as dehairing of leather, collarwashings, removal of scurf and improving the dyeing capacity of wool (Cai*et al.,*2008).

Materials and Methods

Materials

All chemicals used during experiment were of analytical research (AR) grade, Hi-media laboratories and Qualigen chemicals. Distilled water used throughout the experiment for preparing growth media and reagents. Seeds and treatment pots were obtained from local agricultural shop.

Collection and processing of Feathers

Chicken feathers collected from a local poultary farm were thoroughly washed with tap water, followed by mild detergents wash. They were surface sterilized with 0.1% mercuric chloride and alcohol for few second. It is followed by boiling and oven dried overnight at 50^{o}C.

Production of keratinase

keratinasewas produce under surface fermentation process in sterile miniral salt enrichment medium with feathers. The composition of the medium was (g/L)NaCl0.5, $K_2HPO_4$1, $KH_2P_4$0.6, $MgCl_2$1, Glucose0.1, Yeast extract0.1, Feathers 1%. Hundred ml of raw feather broth was autoclaved at 121^{o}C at 15 psi for 15 minutes.Production medium was inoculated with 1% bacterial suspension and incubate at 30^{o}C for 4 days at 120 rpm.After incubation the broth was centrifuged at 10,000r.p.m. At 4˚C for 10min.Supernatant was collected and used as a crude enzyme for application (Mehta*et al*.2013, Birari*et al.* 2013)

After incubation,feathers were removed from the culture. The collected pieces were washed thoroughly with tap water, ethanol and then distilled water. The pieces were shed dried and weighed for final weight. Similar procedure was repeated for all the treated samples.

Determination of degradation of feathers

The percentage of degradation of feathers by *Bacillus sp.* was determined by calculating the percentage of weight loss (Birari*et al.*2014)

$$\text{Percentage of weight loss} = \frac{\text{Percentage of weight loss}}{\text{Percentage of weight loss}} \quad X100$$

Plant growth promotion study using pot assay

Black cotton fertile soil was collected from nearest agricultural farm, a plastic tray containing small pots collected from nursery. Seed (Local variety) was collected from local market.The soil was filled in the pots up to 3/4th capacity and every potwerelabeled appropriately. The seeds were surface sterilized with 0.1% $Hgcl_2$ up to 1h at room temperature. The experiments were conducted as given in

the table 1. All the seeds were sown in respective labeled pots and watered regularly. After 12 days of incubation, seedlings were harvested and seed germination rate, root and shoot length was determined (Sivkumar*et al.*2012; Cao *et al.*2012).

Table 1 Growth promoting activity of plant in pot study

Sr No	Experiment	Pot soil contain following mixture
A	Test 2	10% Feather Hydrolysate
B	Negative control	Seeds and soil without any treatment

Result and Discussion

Observations of the seed germination, root / shoot elongation rate was noted 12 days in pot assay. The observations are as follows.

Wheat Gram

Figure 3: Effect of feather hydrolysat on root and shoot elongation rate of (after 12 days) in pot assay

Table 2: Effect of feather hydrolysates on wheat plant growth

Treatment	Test (Wheat)	Root length (cm)	Shoot length (cm)	Seed germination %
Feather hydrolysate	1	15.2	15.4	100
	2	14.8	15.2	100
	3	13.2	14.8	100
	4	13.9	14.9	100
Control	1	12.3	14.0	100
	2	10.1	12.0	100
	3	12.5	11.8	50
	4	13.0	12.4	100

Table 3: Effect of feather hydrolysates on Gram plant growth

Treatment	Test (Gram)	Root length (cm)	Shoot length (cm)	Seed germination %
Feather hydrolysate	1	13.5	11.8	100
	2	16.0	10.0	100
	3	15.2	11.4	100
	4	14.5	10.2	100
Control	1	12.0	7.2	100
	2	9.0	8.3	100
	3	10.1	9.1	100
	4	10.8	7.8	50

The treatment for seed germination was found to be effective as the seed all seeds are germinated in test. Moreover, the treatment by feather hydrolysate was found to be more effective as the shoot and root length was increased as compared to control (table 2 and 3; figure3). It is to be noted that the feather hydrolysate was more effective in case of gram plant.

Conclusion

The feather hyrolysateobtained from Bacillusspwas found to be having plant growth promoting ability, it increases the percent of seed germination, root and shoot stimulation. The bacteria can be utilized for feather waste recycling through such treatment. The huge amount of feather waste can be sustainably utilized as supplement for plant bio fertilizers.

References

- Agrahari, S., and Wadhwa, N. Degradation of Chicken Feather a Poultry Waste Product by Keratinolytic Bacteria Isolated from Dumping Site at Ghazillpur Poultry Processing Plant. Int. J. Poultry Sci., 2010; 9 (5): 482-489.
- Birari AR, Narkhede KP, Patil SR (2014) Screening of keratinolyic fungi from poultry waste dumped soil for feather waste management. Bionano Frontier 7 (Special Issue-12):75-78.
- Birari AR. Narkhede KP, and Salunkhe RC (2013) Feather degradation using Stenotrophomonas sp. AB20 screened from poultry waste soil. International journal of Pure and Applied Microbiology 7(4): 2973-2979.
- Brandelli,A.,D.J., Riffel, A. (2010) Mini-Review Biochemical features of microbial keratinases and their production and applications. ApplMicrobiolBioyrchnol, 85:1735-1750.
- Cai,C.,Lou,B.,Zheng,X. (2008) Keratinase production and keratin degradation by a mutant strain of Bacillus substillis. J Zhejiang UnivSci B. 9(1):60-67.
- Gupta R, Rajput R, Sharma R, Gupta N (2013) Mini-Review: Biotechnological applications and prospective market of microbial keratinases. ApplMicrobiolBiotechnol 97: 9931–9940.
- Gurav, G. R., and Jadhav, J. P. (2012) Biodegradation of keratinous waste by Chryseobacteriumsp.RBT isolated from soil contaminated with poultry waste. J Basic Microbiol., 2012; 52: 1-8.
- Hariram N (2015) Industrial Enzyme: Isolation and Purification of Extracellular Keratinase Enzyme from Feather Waste. IJSART 1: (5) 242-247.
- Indhuja, S., Shiburaj, S., Prdeep N. S., Thankamani, V., and Abraham, T. K. Extracellular keratinolytic protease from and lakalophilic Streptomyces albidoflavus

TBG-S13A5 enhance production and characterization. J Pure ApplMicrobio., 6(4): 1599-1607.

- Jin-Ha,Jeong.,O-Mi,Lee.,Young-Dong,Jeon.,Jeong-Do,Kim,Na-Rim,Lee.,Chung-Yeol,Lee., (2010) Production of keratinolytic enzyme bya newly isolated feather-degradingS.maltophilia that produces plant growth-promoting activity.Proc.Biochem.,45(10):1738-1745.
- Joshi, S. G., Tejashwini, M. M., Revati, N., Sridevi, R., and Roma, D. (2007) Isolation, Identification and Characterization of a Feather Degrading Bacterium. Inter J Poultry Sci.,6(9): 689-693
- Kazi YF, Kumar P, Soomro IH (2015) Characterization of the keratinolytic activity of indigenous Bacillus subtiliskeratinase. Journal of Chemical and Pharmaceutical Research 7 (4): 800-809.
- Mehta RS, Jholapara RJ, Sawant CS (2013) Optimization of Cultural Conditions For Extracellular Keratinase Production By Bacillus Species Isolated From Poultry Farm Soil. Int J Pharm Bio Sci 4(2): 454 – 463.
- Selvam, K,.andVishnupriya, B. (2012) Biochemical and Molecular Characterization of Microbial Keratinase and Its Remarkable Applications. Inter J Pharma&Biolog Archives, 3 (2): 267-275.

Biosynthesis of Cerium Oxide Nanoparticles using the Leaf Extracts of Catharanthus Roseus

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ABSTRACT:
In the present study, fabrication of Cerium Oxide (CeO2) nanoparticle is achieved by bio synthesis using the aqueous leaf extract of Catharanthus roseus. Catharanthus roseus is an evergreen flowering bush. The plant has various medicinal properties and used to make anticarcinogenic and anti-diabetic drugs. CeO2 nanoparticle also exhibit antibacterial activity. The reduction of Cerium Nitrate salt using the aqueous leaf extract resulted in the formation of CeO2 nanoparticle. The plant extracts functions as both a reducing and also as a capping agent. The as synthesized nanoparticle are characterized by FTIR and FSEM.. Compared to other chemical reduction methods, this method proves to be cost effective, environment friendly.

Introduction

Bio-synthesis of metal oxide nanoparticles has high potential application in the field of bio medical sciences because of their high stability, faster rate of synthesis and nanoparticle of various sizes and shapes can be prepared compared to other methods[1-3]. The structure and function of biomolecules present in nature have specific properties which are still unknown to mankind. Synthesis of nanoparticle using green synthesis is one such method, which uses the compounds like terpenoids, alkaloids,phenols, amine present in plants as both reducing and stabilising agent [4]. Green synthesis is of more importance today compared to other processes, as it is simple, eliminates the usage of harmful chemicals which affect the environment, cost effective and forms stable product [5-7]. Cerium oxide (CeO_2) is a semiconductor with wide band gap energy (3.19 eV) and large exciton binding energy. It is used in wide range of applications such as, catalyst, sensor, solid oxide fuel cells, sun screen cosmetics, bio-imaging, biotransformation and antibacterial activity [1–7]. In this study , the synthesis of CeO_2 NPs using Catharanthus roseus plant leaf extract and their characterization are reported.

2. Experimental

I) Preparation of leaf extract

Fresh Catharanthus roseus leaves were collected from the garden and the collected leaves were washed several times under running water and then washed with distilled water 3 to 4 times to remove dust particles. The leaves were dried and were in a blender. About 50 g of the crushed leaves was added to 150 mL of double distilled water and boiled at 80 °C for 20 min. The obtained extraction was filtered using Whatman No. 1 filter paper and the filtrate was collected in 250 mL flask. The extract functions as both the reducing agent and stabilizing agent.

ii) Synthesis of $C_eO_2$nanoparticles

1 g Cerium Nitrate salt was added to 100 mL of Catharanthus roseus leaf extract. This solution was stirred constantly at a temperature of 80 °C for 4–6 h. A white precipitate formed and then it became a yellowish brown in color on continuous stirring. Further the precipitate was calcined at 400 °C for 2 h. The whitish CeO2 nanopowder thus obtained was used further for the characterization by FESEM and FTIR studies.

Results And Discussion

1. Fourier Transform Infrared Spectroscopy

The chemical composition of the as synthesized product was investigated by FTIR in

the range of 500 cm^{-1} to 4000 cm^{-1}. FT-IR spectra of the as prepared C_eO_2 NPs obtained using the KBr pellet method in the wave number range 500 cm-1 to 4000 cm^{-1} is shown in following figure..

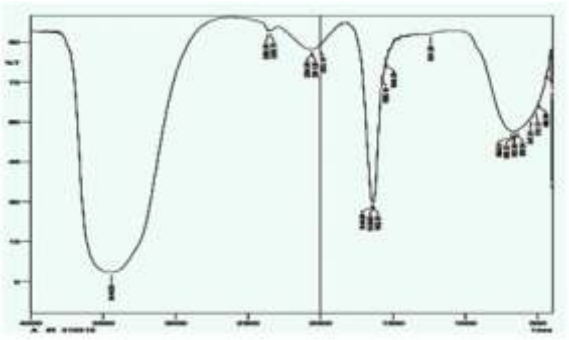


Fig.1. FTIR of the *Catharanthus roseus* plant extract.

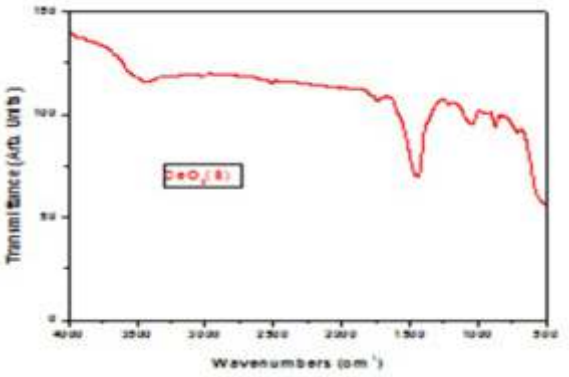
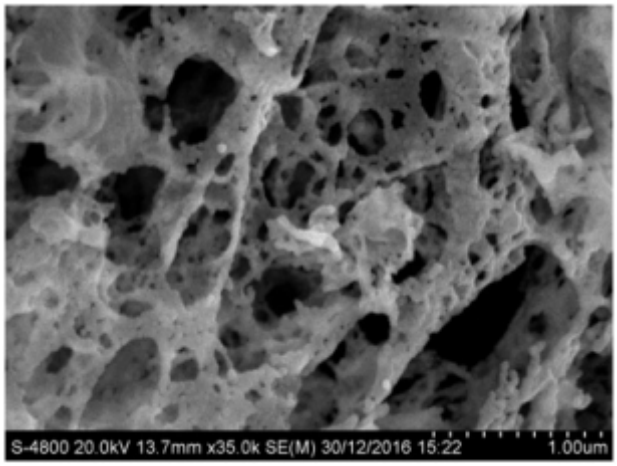


Fig.2. FTIR of the CeO2 nanoparticles synthrsisec by *the*plant extract.

The broad absorption band (fig.2) in the frequency band 3750–3000 cm^{-1} is assigned to O–H stretching from residual alcohols, water and Ce–OH. The band at 1447 cm^{-1} corresponds to the bending of H–O–H which is partly overlapping the O–C–O stretching band. The weak band due to the stretching frequency of Ce–O can be seen in the regain around 600 to 800 cm-1 [1] When compared with the FTIR spectrum of plant extract (Fig.1)[2] , it is seen that the alkaloids, phenolic groups, polysaccharides, flavones and terpenoids present in the extract are still attached to the C_eO2 nanoparticles.

2. Field Emission Scanning Electron Microscopy (FESEM) .



To determine the surface morphology of the synthesized In_2O_3 nanostructure, FESEM studies were carried out. The FESEM image is shown in the above figure. Agglomerations of the ultrafine CeO_2 NPs is seen to form the granular structure . For better understanding a TEM image is required.

Conclusions

In conclusion , we have synthesised In_2O_3 nanoparticles via a plant mediated green synthesis route using the *Catharanthus roseus* leaf extract. The whitish color final powder obtained indicates incomplete formation of the CeO_2 nanoparticles which is supported by FTIR results. The synyhesis method needs modification.

References

[1] Arumugam A, Karthikeyan C, Haja Hameed AS, Gopinath K, Gowri S, and Karthika V "Synthesis of cerium oxide nanoparticles using Gloriosa superba L. leaf extract and their structural, optical and antibacterial properties." Mater Sci Eng C Mater Biol Appl. **2015** Apr;49:408-15.

[2] Mary Vergheese. T, Prince Jacob Raj. J, Kiran Vishal, Ansha Elizabeth Mammen Rinto Jose and Ebenezer Joshua. J "Fabrication of copper nanoparticle using Catharanthus Roseus by green synthesis and its antibacterial activity" Int. J. Pharm. Bio. Sci. **2015** Oct; 6(4) 287 - 295

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Hydrothermal Synthesis of Indium oxide Nanocubes using Aloe Barbadensis Miller Gel (Alovera extract)

Authors & affiliations:

Guide Name: S. S. Tongaonkar

Narkhede Vishakha Madhukar, Chaudhari Dipali Ravindra, Kadam Simran Ravi

Department: Physics

ABSTRACT:

The synthesis of metal oxide nanoparticles with certain morphologies and sizes has become the matter of great interest in present experimental protocols. Bio synthesis production of metal oxide nanoparticles using plants is more desirable than physical and chemical methods due to its eco-friendliness. The objectives of this study is to report the potential of green chemistry to synthesize indium oxide nanoparticles using alovera plant extract through hydrothermal reaction. Furthermore, results of characterizations such as X-ray diffractometry, Fourier Transform Infrared Spectroscopy, Transmission electron microscopy are discussed.

Introduction

Indium oxide (In_2O_3) is an important wide band gap (3.55- 3.75 eV), transparent material with attractive optoelectronic properties suitable for applications in solar cells[1].It has received considerable attention because of its high electron affinity and low electron effective mass and increasingly extensive applications in fuel cells [2,3], sensors [4], nano scale transistors [5] and flat-panel display materials [6].In this paper we present Green synthesis of In_2O_3 nanostructure using alovera plant extract as one of the precursors along with indium nitrate as a source of indium ions under hydrothermal conditions.. The plant extract acts as reducing agent for synthesis of In_2O_3 because of the 'gel' content of the plant. The obtained In_2O_3 nanostructure is characterized by Fourier Transform Infrared Spectroscopy (FTIR) , X-ray diffraction (XRD) and Field Emission Scanning Electron Microscope (FESEM) for determining the chemical composition, crystal structure and surface morphology of the synthesized In_2O_3 nanostructure.

2. Experimental

2.1 Preparation of alovera extract

Few big leaves from Aloe barbadensis miller plant were collected and washed thoroughly with water to remove any dirt or debris on the surface. Rind from the leaves was carefully peeled off using a sharp knife and discarded. The leaf was slit longitudinally into half, sharp edged spoon was used to scrap off the gel from the leaf into a sterile beaker. The finely cut *Aloe vera* leaves were boiled in 100 ml of de-ionized water. The resulting extract was filtered and used as an *Aloe vera* extract solution.

2.2 Synthesis method

0.5 g of Indium (III) Nitrate Hydrate ($In(NO_3)_3 .xH_2O$) [purchased from Sigma-Aldrich] was dissolved in to 100 ml of *Aloe vera* extract solution.This solution was stirred using a magnetic stirrer until a homogeneous solution was formed. To this aqueous solution aloevera leaf extract of 10ml was added. The reaction mixture was stirred for 30 mins continuously. The solution was then transferred in to a 200 ml Teflon-lined autoclave cylinder. The hydrothermal reaction was carried out at 100^{o}C for 4 h. After natural cooling , the resulting reaction product was collected in a Petri dish and were slowly dried at 80 ^{o}C to remove the water content. The powder thus formed is calcinated in a crucible at 400 ^{o}C for 4 h. The final calcinated product is in the form of pale yellow powder of indium trioxide, which was used for the characterization and for further studies.

RESULTS AND DISCUSSION

The as prepared samples of indium oxide powder were characterized by Fourier Transformed Infra Red (FTIR) spectroscopy and Field Emission Scanning Electron Microscopy (FESEM) .The Characterization by X-ray diffraction (XRD) is in progress

1. Fourier Transform Infrared Spectroscopy

The chemical composition of the as synthesized product was investigated by FTIR in the range of 500 cm^{-1} to 4000 cm^{-1}. The FTIR spectrum is shown in figure 1. The FTIR spectrum of the green synthesized product is shown in Fig 1 .It shows the bands 750 to 500 cm^{-1} which corresponds to In–O stretching and of In–O bending vibrations in the cubic In_2O_3 [7,8]. In addition, the band at the broad band at ~ 3427 cm^{-1} may be assigned to the stretching vibrational mode of an O-H group bonded to the In atom, i.e., In-OH [8]. The bands in the region 1750 to and 1000 cm^{-1} originates from the C-H vibrations of the organics [9] . Thus, FTIR spectroscopy result reveals that the phase formation is complete for the *Aloe Vera* derived In_2O_3 nano particles with a little evidence for the presence of organic byproduct in the sample.

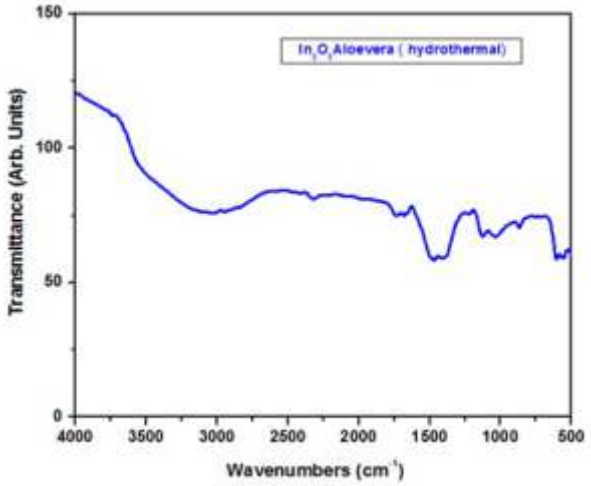
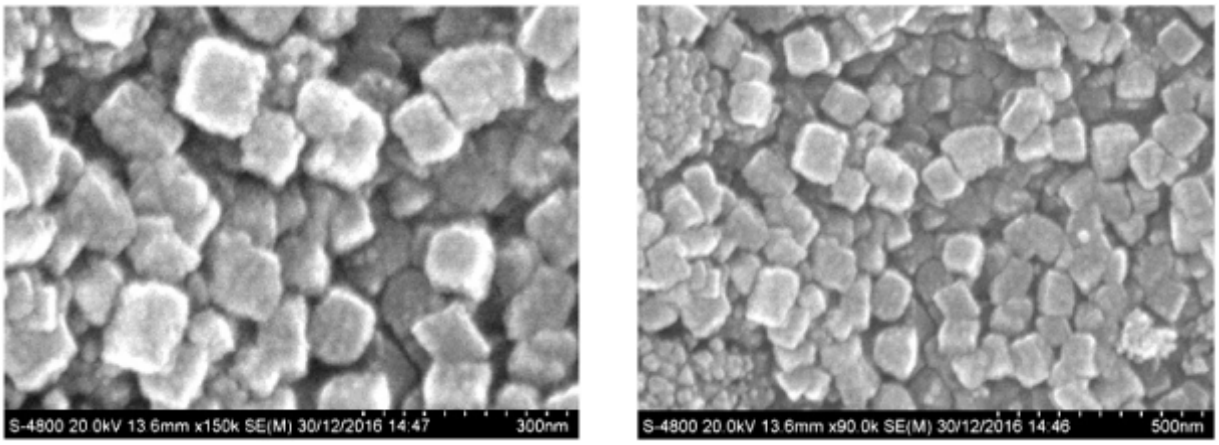


Figure 1 FTIR spectrum of In_2O_3 samples.

2. Field Emission Scanning Electron Microscopy (FESEM) .

To determine the surface morphology of the synthesized In_2O_3 nanostructure, FESEM studies were carried out. The images are shown in figures 2 (a) & (b)



a b

Figure 2. FESEM images of In_2O_3 samples.

The FESEM images shows the formation of In2O3 nanocubes with edge lengths in the range of ~ 50 to 100 nm.

Conclusions

In summary, we have synthesised In_2O_3 nanocubes via a hydrothermal route using the Aloe vera plant extract.

References

[1] C. Y. Huang, G. C. Lin, Y. J. Wu, T. Y. Lin, Y. J. Yang and Y. F. Chen, Efficient light harvesting by well-aligned In2O3nanopushpins as antireflection layer on Si solar cells, *J. Phys. Chem. C,* 2011, **115**, 13083−13087.

[2] J. Parrondo, R. Santhanam, F. Mijangos and B. Rambabu, Electrocatalytic performance of In2O3- supported Pt/C nanoparticles for ethanol electro-oxidation in direct ethanol fuel cells, *Int. J. Electrochem. Sci*., 2010, **5**,1342-1354.

[3] W. H. Ho, C. F. Li, H. C. Liu, S. K.Yen, Electrochemical performance of In2O3thin film electrode in lithium cell, *J. Power Sources*,2008, **175**, 897−902.

[4] D. Zhang, Z. Liu, C. Li,T. Tang,X. Liu, S. Han, B. Lei and C. Zhou, Detection of NO2 down to ppb Levels using Individual and Multiple In2O3 Nanowire Devices,*Nano Lett*.,**2004**, *4*, 1919-1923

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[5] P.Nguyen,H.T.Ng,T.Yamada,M. K. Smith, J.Li, J.Han and M.Meyyappan,Direct integration of metal oxide nanowire in vertical field-effect transistor,*Nano Lett*.,**2004**, 4, 651-657.

[6] J.Cui, A.Wang, N. L.Edleman, J.Ni, P.Lee, N. R.Armstrong and T. J. Marks, Indium tin oxide alternatives-high work function transparent conducting oxides as anodes for organic light-emitting diodes,*Adv. Mater.,* **2001**, *13*, 1476-1480.

[7] E. C. C.Souza, J. F. Q. Rey and E. N. S. Muccillo, Synthesis and characterization of spherical and narrow size distribution indium oxide nanoparticles, *Appl. Surf. Sci*.,**2009**, 255, 3779-3783.

[8] A.Ayeshamariam, M.Bououdina and C. Sanjeeviraja, Optical, electrical and sensing properties of In2O3 nanoparticles.,*Mater. Sci. Semiconductor Processing,* 2013, 16, 686-695. .

[9] G. Sai Priya, Abhimanyu Kanneganti, K. Anil Kumar, K. Venkateswara Rao, Satish Bykkam Bio Synthesis of Cerium Oxide Nanoparticles using Aloe Barbadensis Miller Gel , International Journal of Scientific and Research Publications, Volume 4, Issue 6, June 2014

* * * *

Hydrothermal Synthesis of Indium Oxide Using Orange Fruit Waste (Orange Peel Extracts)

Authors & affiliations:

Guide: Dr. K. B. Mahajan

Mahajan Madhuri Vasantrao, Patil Puja Prakash, Kshirsagar Swati Raghunath

Department : Physics

ABSTRACT:

Indium oxide (In_2O_3) is an important wide band gap (3.55- 3.75 eV), transparent material with attractive optoelectronic properties suitable for applications in solar cells[1].It has received considerable attention because of its high electron affinity and low electron effective mass and increasingly extensive applications in fuel cells [2,3], sensors [4, nano scale transistors [5] and flat-panel display materials [6].In this paper we present Green synthesis of In_2O_3 nanostructure using Orange Peel extract as one of the precursors along with indium nitrate as a source of indium ions under hydrothermal conditions.. The orange peel extract acts as reducing agent for synthesis of In_2O_3 because orange fruits contain Citric acid, as main source in its peel. The obtained In_2O_3 nanostructure is characterized by Fourier Transform Infrared Spectroscopy (FTIR) , X-ray diffraction (XRD) and Field Emission Scanning Electron Microscope (FESEM) for determining the chemical composition, crystal structure and surface morphology of the synthesized In_2O_3 nanostructure.

Experimental

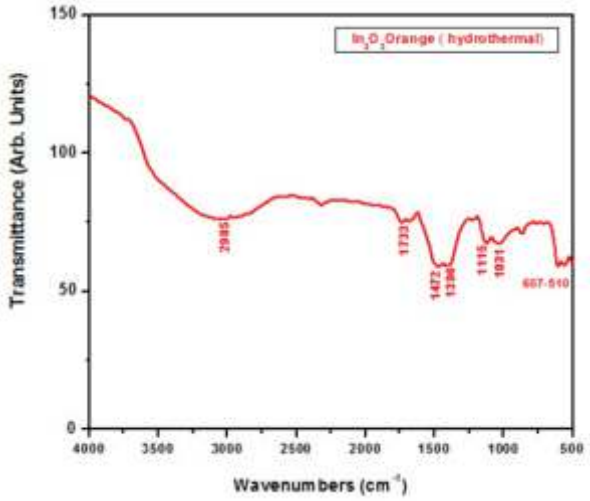
Fresh oranges were purchased from local market and the orange peel was collected from left over material of eaten orange fruit and was cut in to small fine pieces. A 0.5 g of Indium (III) Nitrate Hydrate ($In(NO_3)_3 .xH_2O$) [purchased from Sigma-Aldrich] was dissolved in to 100 ml of double distilled water with continuous stirring for ½ an hour. To this solution, 50 g of finely cut orange peel was directly added and the resulting mixture was transferred in to a 200 ml Teflon-lined autoclave cylinder. The hydrothermal reaction was carried out at 100°C for 4 h. After natural cooling , the resulting reaction content was collected in a Petri dish and was slowly dried at 80 °C to remove the water content. The powder thus formed is calcinated in a crucible at 400 °C for 4 h. The final calcinated product is in the form of pale yellow powder of indium trioxide, which was used for the characterization and for further studies.

RESULTS AND DISCUSSION

The as prepared samples of indium oxide powder were characterized by Fourier Transformed Infra Red (FTIR) spectroscopy and Field Emission Scanning Electron Microscopy (FESEM) .The Characterization by X-ray diffraction (XRD) is in progress

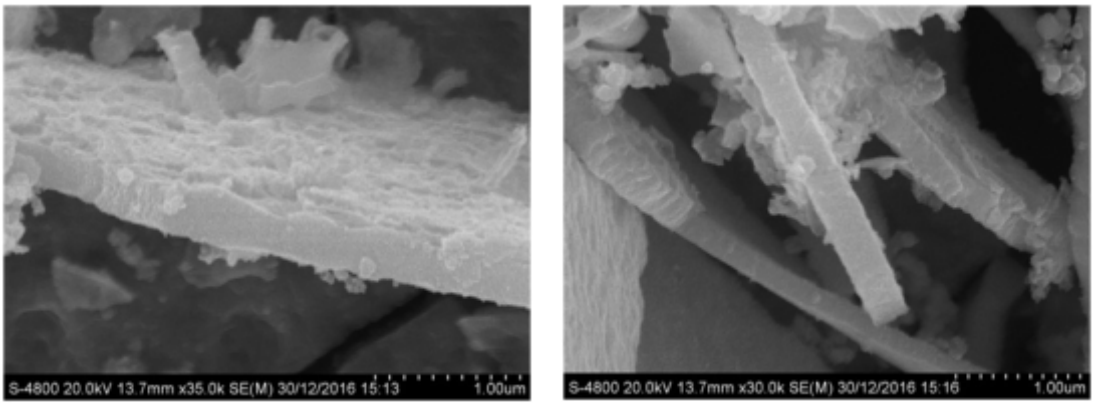
1. Fourier Transform Infrared Spectroscopy

The chemical composition of the as synthesized product was investigated by FTIR in the range of 500 cm^{-1} to 4000 cm^{-1}. The FTIR spectrum [fig.1} shows the presence of organic matter in the orange peel and the bands due to indium oxide. The signals around 2985 cm^{-1} are caused by asymmetrical and symmetrical stretching vibrations of C–H groups. The band at 1733 cm^{-1} was assigned to the carbonyl (C=O) stretching. The band at 1031 cm^{-1} corresponds to the link C–O–R while the distinctive band around 1115 cm^{-1} was attributed to aliphatic chains (–CH2– and –CH3) forming the basic structure of lignocellulosic materials.[7] The bands in the range of 607 cm^{-1} to 510 cm^{-1} are attributed to the In-O-In stretching and In-O-In bending vibrations .



2. Field Emission Scanning Electron Microscopy (FESEM).

To determine the surface morphology of the synthesized In_2O_3 nanostructure, FESEM studies were carried out. The images are shown in figures 2 (a) & (b)



a b

Figure 2. FESEM images of In_2O_3 samples.

As seen from the figure plate like morphology is observed. Log plates of few microns with a width of ~ 200 nm are observed.

Conclusions

In summary, we have synthesised In_2O_3 nanosheets via a hydrothermal route using the waste product of orange i.e. using orange peels.

References

[1] C. Y. Huang, G. C. Lin, Y. J. Wu, T. Y. Lin, Y. J. Yang and Y. F. Chen, Efficient light harvesting by well-aligned In2O3nanopushpins as antireflection layer on Si solar cells, *J. Phys. Chem. C,* 2011, **115**, 13083−13087.

[2] J. Parrondo, R. Santhanam, F. Mijangos and B. Rambabu, Electrocatalytic performance of In2O3- supported Pt/C nanoparticles for ethanol electro-oxidation in direct ethanol fuel cells, *Int. J. Electrochem. Sci*., 2010, **5**,1342-1354.

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[4] D. Zhang, Z. Liu, C. Li,T. Tang,X. Liu, S. Han, B. Lei and C. Zhou, Detection of NO2 down to ppb Levels using Individual and Multiple In2O3 Nanowire Devices,*Nano Lett*.,**2004**, *4*, 1919-1923

[5] P.Nguyen,H.T.Ng,T.Yamada,M. K. Smith, J.Li, J.Han and M.Meyyappan,Direct integration of metal oxide nanowire in vertical field-effect transistor,*Nano Lett*.,**2004**, 4, 651-657.

[6] J.Cui, A.Wang, N. L.Edleman, J.Ni, P.Lee, N. R.Armstrong and T. J. Marks, Indium tin oxide alternatives-high work function transparent conducting oxides as anodes for organic light-emitting diodes,*Adv. Mater.,* **2001**, *13*, 1476-1480.

[7] Raymundo S..O..Gamma Irradiation Induced Degradation of Orange Peels *Energies* **2012,** 5, 3051-3063

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Synthesis and Characterization of Indium Oxide (In_2O_3) Nanoparticles Using Gloriosa Superba L. Leaf Extract

Authors & affiliations:

Guid : S.S.Tongaonkar

Chaudhari Pawan Bhagwan, Sonowane Milan Subhash, Patil Mahesh Bhaskar

Department : Physics

ABSTRACT:

In_2O_3 nanoparticles (NPs) were green synthesized using Gloriosa superba L. leaf extract. The synthesized nanoparticles were characterized by Fourier Transform Infrared Spectroscopy and X-ray diffractometry. The X-ray diffraction study indicates formation of In_2O_3 cubic structure. The In–O and bending stretching bands were observed in the FTIR spectrum.

The plant G. superba L. belongs to Colchicaceae family. It is a perennial, greenish, climbing herb and native to South Africa. Since 2000 B.C. it is being used as a traditional medicine by the tribes. Every part of the plant has been used in Siddha, Ayurveda and Unani system of medicine. G. superba is a tuberous plant with L- (or) V-shaped cylindrical tubers. The tuber powder has been effectively used against paralysis, rheumatism, snake bite, insect bites, against lice, intermittent fevers, wounds,anti-fertility, gonorrhea, leprosy, piles, debility, dyspepsia, flatulence,hemorrhoids, helminthiasis and inflammations. It contains two major alkaloids namely colchicines and colchicosides. The seeds consist of colchicines, which are 2–5 times higher than in the tubers. Its leaf extract contains superbine, colchicine, gloriosine, gloriosol, phytosterils and stigmasterin [1]. In the present investigation, In_2O_3 nanoparticles are synthesized by using G. superba leaf extract. We have studied the structural properties of In_2O_3 nanoparticles (NP's). To the best of our knowledge, this is the first report on the phytosynthesis of In_2O_3 nanoparticles by using G. superba leaf extract and their characterization studies.

2. Experimental

The G. superba leaves were collected from local garden and washed thoroughly with water to remove any dirt or debris on the surface. The 50 g of finely cut leaves was added with 150 mL of double distilled water and boiled at 80 °C for 15 min. The obtained extraction was filtered using Whatman No. 1 filter paper and the filtrate was collected in 250 mL flask. Thereafter, 1 g Indium Nitrate salt was added to 100 mL of G. superba leaf extract. This solution was stirred constantly at a temperature of 80 °C for 4–6 h. A white precipitate formed and then it became a yellowish brown in color on continuous stirring. Further the precipitate was calcined at 400 °C for 2 h. Thus, the In_2O_3 nanopowder was obtained. A schematic diagram for the formation of In_2O_3 NPs using G. superb leaf extract is shown in Fig.1.

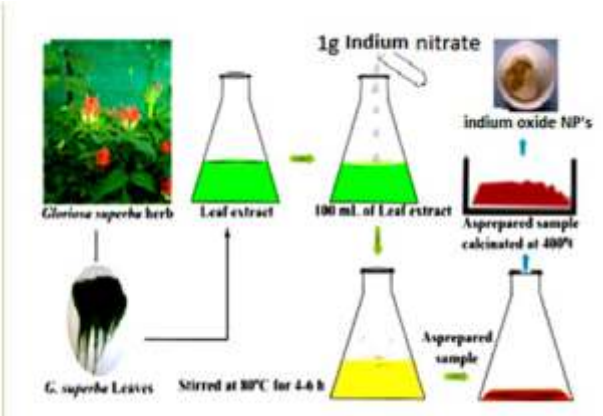


Fig.1. Synthesis of In_2O_3 NPs using G. Superba leaf extract.

RESULTS AND DISCUSSION

The as prepared samples of indium oxide powder were characterized by Fourier Transformed Infra Red (FTIR) spectroscopy and Characterization by X-ray diffraction (XRD) studies.

1. Fourier Transform Infrared Spectroscopy

The chemical composition of the as synthesized product was investigated by FTIR in the range of 500 cm^{-1} to 4000 cm^{-1}. FT-IR spectra of the as prepared In_2O_3 NPs obtained using the KBr pellet method in the wave number range 500 cm^{-1} to 4000 cm^{-1} is shown in figure 2.

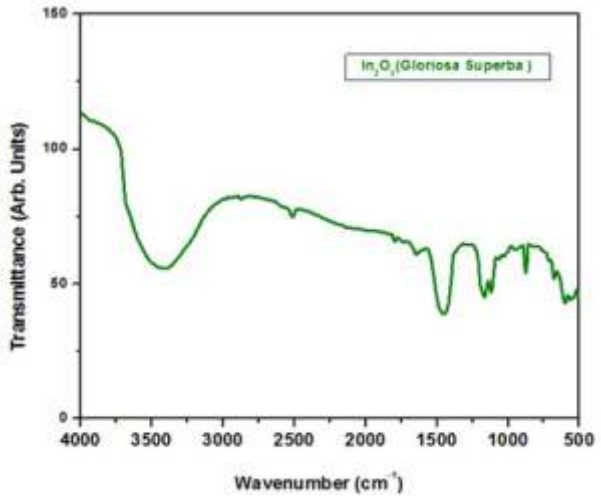
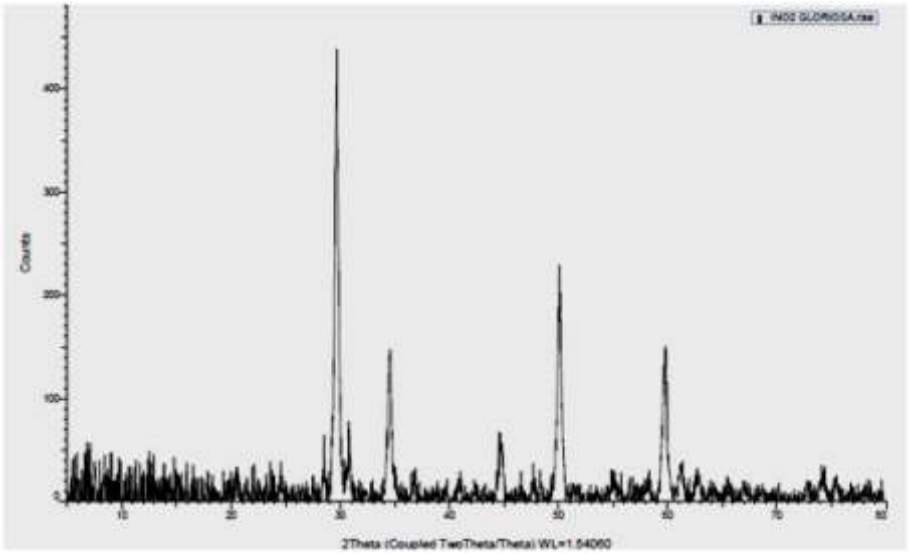


Fig.2. FTIR of In_2O_3 NP's synthesized by G. Superba leaf extract.

The broad absorption in the frequency band 3500–3000 cm^{-1} is assigned to O–H



stretching from residual alcohols, The CO_2 peaks are observed at 1448 cm^{-}. These CO_2 band may arise due to some trapped CO_2 in air ambience. The band at 1170 and 1100 cm^{-1} originates from the C-H vibrations of the organics. The band at 593 cm^{-1} is a characteristic of In–O bending vibrations in the cubic In_2O_3 . Thus, FTIR spectroscopy result reveals that the phase formation is complete for the *G. Superba leaf extract* derived In_2O_3 nano particles with a little evidence for the presence of organic byproduct in the sample

2. X-ray diffraction (XRD) studies..

Fig.3. XRD pattern of In_2O_3 NP's synthesized by G. Superba leaf extract.

The XRD pattern of the as synthesized product is shown in Fig.3. It exhibits the diffraction peaks at 2 values of, 29.58°, 34.88°, , 44.81, 50.11°, and 59.67°, which are attributed to the formation of base centered cubic phase (bcc) of In_2O_3 with lattice parameter a = 10.11 A˚ (ICSD code :14387). No peaks for other impurities were detected in the spectrum , confirming that the adopted synthesis method gives pure In_2O_3.

Conclusions

In conclusion , we have synthesised In_2O_3 nanoparticles via a plant mediated green synthesis route using the G. superba plant leaves extract.

References

[1] Arumugam A, Karthikeyan C, Haja Hameed AS, Gopinath K, Gowri S, and Karthika V Synthesis of cerium oxide nanoparticles using Gloriosa superba L. leaf extract and their structural, optical and antibacterial properties. Mater Sci Eng C Mater Biol Appl. 2015 Apr;49:408-15.

Synthesis and Characterization of Cerium Oxide (CeO_2) Nanoparticles Using Gloriosa Superba L. Leaf Extract

Authors & affiliations:
Guide: V. R. Khadse
Rajput Ankita Pradipsingh, Jadhav Yogita Bapu, Atale Chitra Sanjay
Department: Physics

ABSTRACT:

CeO2 nanoparticles (NPs) were green synthesized using Gloriosa superba L. leaf extract. The synthesized nanoparticles were characterized by Fourier Transform Infrared Spectroscopy, X-ray diffractometry and Field Emission Electron Microscopy (FESEM) . The X-ray diffraction study indicates formation of CeO2 cubic structure. The Ce–O stretching bands were observed in the FTIR spectrum. FESEM images showed the agglomerations of the ultrafine CeO2 NPs. .

1. Introduction

Cerium oxide (CeO_2) is a semiconductor with wide band gap energy (3.19 eV) and large exciton binding energy. It is used in wide range of applications such as, catalyst, sensor, solid oxide fuel cells, sun screen cosmetics, bio-imaging, biotransformation and antibacterial activity. Generally, CeO_2 NPs are synthesized by physical and chemical methods such as hydrothermal, spray-pyrolysis sono-chemical, microwave, sol–gel, and co-precipitation methods . How-ever, most of the techniques are complex, time consuming, expensive and hazardous . The green chemistry approaches to the development in green synthesis of metal and metal oxide NPs. This method offers a plenty of advantages such as cost-effectiveness, large-scale commercial production and pharmaceutical applications. In this study , the synthesis of CeO_2 NPs using Gloriosa superba plant leaf extract and their characterization studies are reported .

2. Experimental

The G. superba leaves were collected from local garden and washed thoroughly with water to remove any dirt or debris on the surface. The 50 g of finely cut leaves was added with 150 mL of double distilled water and boiled at 80 °C for 15 min. The obtained extraction was filtered using Whatman No. 1 filter paper and the filtrate was collected in 250 mL flask. Thereafter, 1 g Cerium Nitrate salt was added to 100 mL of G. superba leaf extract. This solution was stirred constantly at a temperature of 80 °C for 4–6 h. A white precipitate formed and then it became a yellowish brown in color on continuous stirring. Further the precipitate was calcined at 400 °C for 2 h. Thus, the CeO_2 nanopowder was obtained. A schematic diagram for the formation of

CeO_2 NPs using G. superb leaf extract is shown in Fig.1.

Fig.1. Synthesis of CeO_2 NPs using G. superba leaf extracts.

RESULTS AND DISCUSSION

The as prepared samples of indium oxide powder were characterized by Fourier Transformed Infra Red (FTIR) spectroscopy and Field Emission Scanning Electron Microscopy (FESEM) .The Characterization by X-ray diffraction (XRD) is in progress

1. Fourier Transform Infrared Spectroscopy

The chemical composition of the as synthesized product was investigated by FTIR in the range of 500 cm^{-1} to 4000 cm^{-1}. FT-IR spectra of the as prepared CeO_2 NPs obtained using the KBr pellet method in the wave number range 500 cm^{-1} to 4000 cm^{-1} is shown in following figure..

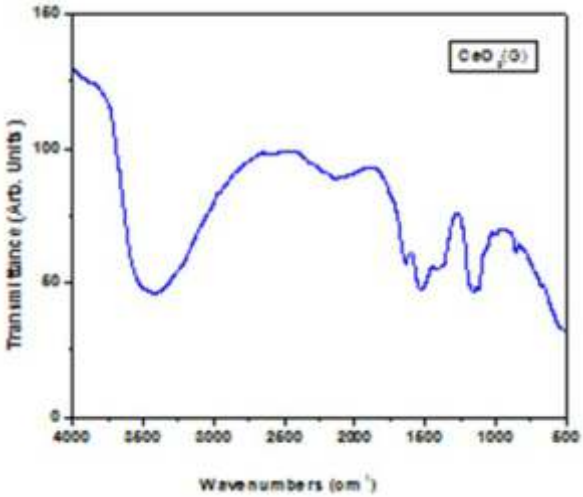


Fig.2. FTIR of CeO2 NP's synthesized by G. superba leaf extracts.

The broad absorption in the frequency band 3750–3000 cm^{-1} is assigned to O–H stretching from residual alcohols, water and Ce–OH. The absorption peak is observed at 3475 cm^{-1} for CeO_2 NPs. The CO_2 peaks are observed at 2358 cm^{-1} and cm^{-1} for CeO_2 NPs. These CO_2 band may arise due to some trapped CO_2 in air ambience. The band at 1647 cm^{-1} corresponds to the bending of H–O–H which is partly overlapping the O–C–O stretching band. The weak band due to the stretching frequency of Ce–O can be seen in the regain around 600 to 800 cm^{-1} [1]

2. Field Emission Scanning Electron Microscopy (FESEM) .

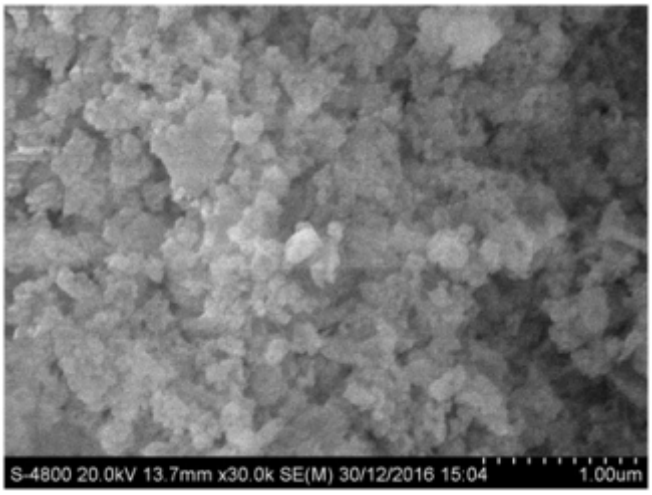


Fig.3. FESEM Image of CeO_2 NP's synthesized by G. superba leaf extracts.

To determine the surface morphology of the synthesized In_2O_3 nanostructure, FESEM studies were carried out. The FESEM image is shown in the above figure. Agglomerations of the ultrafine CeO_2 NPs is seen to form the granular structure . For better understanding a TEM image is required.

Conclusions

In conclusion , we have synthesised In_2O_3 nanoparticles via a plant mediated green synthesis route using the G. superba plant leaves extract.

References

[1] Arumugam A, Karthikeyan C, Haja Hameed AS, Gopinath K, Gowri S, and Karthika V Synthesis of cerium oxide nanoparticles using Gloriosa superba L. leaf extract and their structural, optical and antibacterial properties. Mater Sci Eng C Mater Biol Appl. 2015 Apr;49:408-15.

Application of DMAIC Methodology for Improving Passing Rate of Students: A Case Study

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1. Riya Rajendra Jain 2. Priyanka Ratan Mahajan
3. Shital Devidas Mahajan Dr.K.G Khadse*
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ABSTRACT:
(Your abstract must use Normal style and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)
Preparation of Your Abstract
1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word ONLY (place names excluded). No full stop at the end.
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Abstract:
Recently, the quality in education is beginning to occupy the center stage. Deming five stage Define-Measure-Analyze-Improve-Control (DMAIC) methodology as an improvement approach has been attracting the attention of service sector. Though DMAIC in higher education is not widely spread, this paper illustrates how DMAIC can be effectively applied to educational institute. DMAIC methodology was applied to address the problem "Why do students fail or get less marks in exam?". Data was collected by framing questionnaire and from the analysis of data; the result indicates that CTQ's (Critical to quality characteristics) are students spend less time on study, not attending regular lectures. The students engagement towards study will be increased by giving them group work and regular test. From this article we conclude that DMAIC methodology can also be implemented in educational institute.
Key Words: DMAIC, CTQ's, Educational Institute.

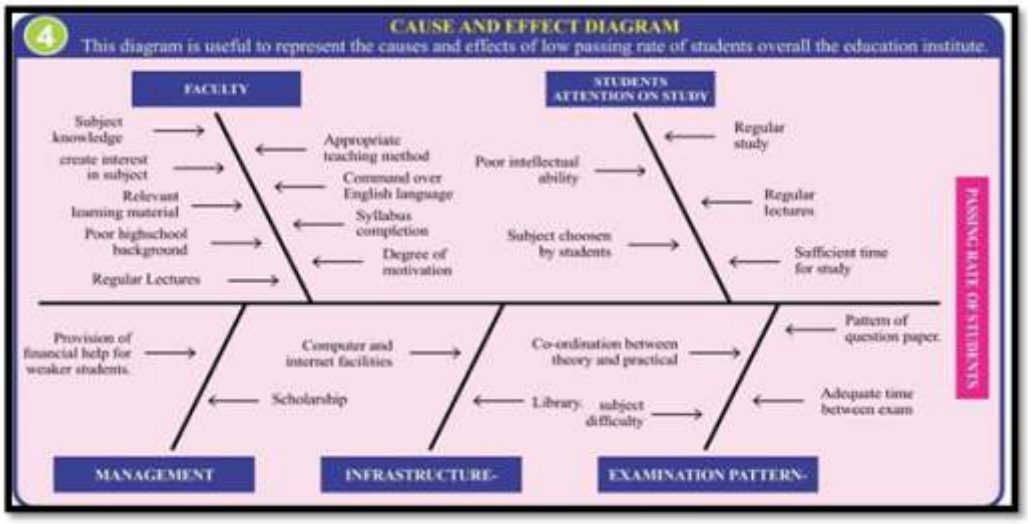
1. Introduction

Now, the quality is no more desirable strategy, it has become a survival strategy. Educational institute requires an innovative supporting tool which helps in improving quality of education system. This paper reviews the implication of applying DMAIC methodology over education system to increase passing rate of students. DMAIC is set of methodologies which are used to achieve excellence in the field of education by improving the overall performance of the students. In education system there are many stakeholders like students, parents, government etc. Since students are the primary stakeholders and their primary objective is passing the final examinations. So, passing rate of students is being accepted as a parameter to improve the education quality.

2. Methodology

Five step improvement cycle, DMAIC been successfully implemented in education system to improve passing rate of students as follows.
Define: This phase guides a team to define a problem effectively, correctly identify the problem so has to achieve maximum returns. Here we define a problem as "Why do students fail or get less marks in examination?".
Measure: To study the problem of low passing rate of students, data was collected from 'XYZ' department of science faculty of specific affiliated college by framing questionnaire related to all

possible causes of failure or low passing rate of students. In the brainstorming session we have used cause and effect diagram to note possible causes of failure or low passing rate of students. The main factors considered as a possible causes include faculty, student's attention on study, management, infrastructure and examination pattern. For each factor there are number of key aspects which are displayed in cause and effect diagram.

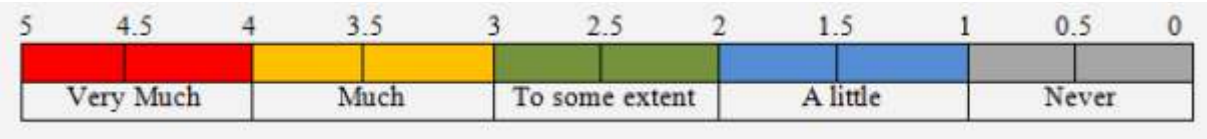


Great care has been taken in drafting a questionnaire as this is the medium through which data is collected. We have used five point scale shown below for measuring causes impact on the passing rate of students. The drafted questionnaire is given below to understand data collection process for analysis.

Questionnaire
XYZ College
Department: ABC

Student feedback on: Why do student fail or get less marks in Examination?

Please rate the following probable causes regarding 'Why do student fail or get less marks in Examination?' using 5 point scale shown below.



Name of the student (optional):……

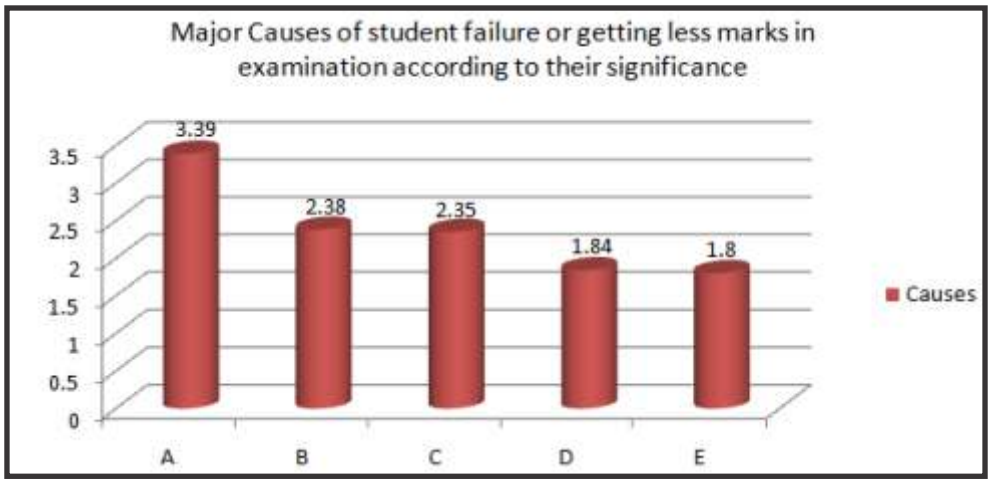
Sr. no.	Causes	Your response
1	The subject is difficult to understand	
2	Teacher does not use appropriate teaching method	
3	Teacher does not take lectures regularly	
4-21		
22….	Any other causes you wish to add	

Total number of students who have stated their responses is 58 which include 28 Male students and 30 female students. Additionally we have considered responses of 7 faculty members which includes Principal of the college.

Analyze : The data collected in measure phase is analyzed using exploratory data analysis (EDA). Pareto chart is also used to focus most significant causes of the problem.

3. Results and Discussion

On the basis of descriptive statistics we found that most significant factor for student failures or getting less marks in examination is student attention on study whose average response is 3.39 on the basis of 5 point scale with standard deviation 0.024. Second most significant factor is faculty whose average response is 2.38 with standard deviation 0.457 and 3rd significant factor is examination pattern whose average response is 2.35 with standard deviation 0.624 and remaining factors are not significant. This information is graphically represented using Pareto chart as given below



A: Student Attention on Study. B: Faculty C:Examminatoin pattern D:Infrastructure E: Management

Causes	Key aspects	Suggested counsel
Students attention on Study	1. Regular study	• Teachers and parents should motivate students for regular study. • Teachers should give home work and must take weekly test for practice purposes and project work should be given to create interest in the subject.
	2. Subject chosen by students	• Students should choose subject in which they are interested or they like most.
	3. Poor intellectual ability	• Teachers should provide special guidance to students for the core subject to improve the basic fundamentals . • Students should participate in extracurricular activities.
	4. Regular Lectures	• Attendance should be compulsory.

Faculty	1. Subject knowledge	• Students attendance should be sent to parents for their information. • Teachers should attend academic staff development programs • Fully qualified and competent candidates must be recruited.
	2. Teaching method 3. Regular Lectures 4. Degree Of Motivation	• Teachers should use effective teaching method according to topics. • Teachers should use new technology while teaching • Teachers should take lectures regularly. • Teachers must complete syllabus within specified time. • The college should have an open and participative mechanism for evaluation of teaching and promoting work satisfaction of the teacher. • Teachers must motivate students for study.
	5. Learning Material	• Teachers should provide relevant and useful learning material.
Examination pattern	1. Pattern of question paper	• Pattern of question paper must be declared in advanced.
	2. Adequate time between two papers	• Students must get sufficient time to revise all the topics at the time of examination
	3. Subject Difficulty	• Well qualified and experienced teachers must be assigned to each subject.

4. Conclusion

This article reveals that DMAIC methodology can be use not only in manufacturing sector but also in improving the quality of education system. So education system should plan to implement DMAIC for continuous improvement and to achieve more stakeholders' satisfaction. Though DMAIC used to solve problem of low passing rate of students, this can be use in number of educational process improvement.

5. References

1. Institutional Accreditation Manual for Self Study Report for Affiliated or constituent Colleges.
2. Prabhakar Kaushik And Dinesh Khanduja (2010)- Utilising Six Sigma Methodology For Improving Passing Percentage Of students: A Technical Institute Case Study. Educational Research & Review Vol. 5(9), pp. 471-483
3. Douglas C. Montgomery-Introduction to Statistical Quality Control (2010) Sixth Edition.

Quality Status of students who are joining Bachelors of Science Programme using Capability Indices for the last five years

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ABSTRACT:

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Measuring quality status of incoming students and outgoing students is one important key aspect of quality assurance cell in higher education. The society, employers, parents, management, teachers and students are stakeholders of educational institutions. Stakeholder's point of view the objective of this paper is to measure quality status of students who are joining Bachelor of Science (B.Sc.) programme and compare it with academic year wise as well as the quality status of students who are joining B.A. and B.Com. programme. Capability index which is used in manufacturing industries as process capability index is used as a measure to measure quality status of incoming students. For demonstration purposes last five years students' data for B.Sc. programme and current years students' data for B.A. and B.Com. programme have been considered from reputed educational institute. Considering desirable value of capability index it is found that quality status of students who are joining B.Sc. Programme is low. Though, it is continuously improving in last five year and quality status of B.Sc. programme is comparatively good than B.Com. and B.A. programme.

KeyWords:- Normal Distribution, Capability Index, Quality Status, Lower Specification Limit.

Introduction

Keeping in mind the assessment and accreditation of quality of educational Institutions in India, the NAAC has been established in 1994. In this regard, the concept of quality is widely used in the field of education, though it has its roots in industry and management. NAAC has identified seven criteria as the backbone of the Assessment and Accreditation. The seven criteria are,

i) Curricular Aspects,
ii) Teaching-Learning and Evaluation,
iii) Research Consultancy and Extension,
iv) Infrastructure and Learning Resources,
v) Student Support and Progression,
vi) Governance, Leadership and Management and
vii) Innovations and Best Practices.

The Key Aspects identified under each of the seven criteria reflect the processes and values of the educational institutions on which assessment is made. The focus of Student Support and Progression criterion is captured by three Key Aspects which are

i) Student Mentoring and Support,
ii) Student Progression and

iii) Student Participation & Activities.

Stakeholder's point of view the main objective of this paper is to measure quality status of students who are joining Bachelor of Science (B.Sc.) programme because there is strong link between incoming students' quality status and their progression.

Methodology

For demonstration purposes last five years students' data for B. Sc programme and current year students' data for B.A. and B.Com.programme have been considered from reputed educational institute. The data set contains the 12^{th} standard students' marks in percentage that are joining Bachelors of Science Programme for the last five years and Bachelor of Arts and Commerce programme for current year.

Seven variables are defined as, Marks1213Sci, Marks1314Sci, Marks1415Sci, Marks1516Sci, Marks1617Sci, Marks1617Art, Marks1617Com.

The description of these variables is as follows:

Marks1213Sci: 12^{th} std. marks of students who are joining B.Sc. programme for academic year 2012-13.

Marks1314Sci: 12^{th} std. marks of students who are joining B.Sc. programme for academic year 2013-14.

In the similar fashion other variables are defined. Keeping in mind our objective, suitable measure to measure quality status of students, capability index *CPL* is used. In the current scenario this index is used as a quality indicator though original development of this index is as a measure to measure capability of industrial processes. This capability index defined under the assumptions that are:

1. the process is in statistical control.
2. a tolerance region of a quality characteristic is specified by lower specification limit (LSL) and
3. the process measurements are normally distributed with mean μ
4. and variance σ^2
5. .

The index CPL is defined as,

$$CPL = \frac{\mu - LSL}{3\sigma}$$

where μ process mean, *LSL* lower specification limit and σ process std deviation .

While testing assumption of capability index we have observed that all assumptions are valid. The desirable value of capability index is 1. If index value is less than one then process is not capable and if the value of index is larger than 1 then process is capable. Magnitude of index value gives us idea regarding how much process is capable.

Results

This section splits in two subsections. First subsection gives descriptive statistics and capability Index of 12^{th} percentage of students who are joining B.Sc. programme for the last five years and second subsection gives faculty wise descriptive statistics and capability index of 12^{th} percentage of students of B.Sc., B.A. and B.Com. programme for current year.

Subsection 1.

Year wise descriptive statistics of 12thpercentage of students who are joining B.Sc. programme.

Variable	No.of students	Mean	Std. Dev.	Minimum	Maximum
Marks1213Sci	445	53.914	9.480	35.50	94.83
Marks1314Sci	458	52.574	8.287	35.00	87.63
Marks1415Sci	451	56.904	8.490	37.00	86.00
Marks1516Sci	640	57.740	8.441	38.00	86.46
Marks1617Sci	515	59.030	8.543	40.77	84.60

On the basis of descriptive statistics we claim that, there is no significant difference between

standard deviations of all variables. And referring mean values it is observed that increasing trend in mean values of all variables. If we assume these are the representative samples from respective populations then to test the significance difference between average quality status of 1st and 5th variable we apply " t – test" is as follow,

Testing of Hypothesis:-

H_0 : Average Quality Status of Students for Academic Year 2012-13 & 2016-17 is Same.

H_1 : Average Quality Status of Students for Academic Year 2012-13 is Less than Academic Year 2016-17.

Hypothesis is tested, using Minitab Software and applied "t-test". Here P-value is 0.00, So we reject null hypothesis (H_0) and accept alternative hypothesis (H_1).

Capability Index Table:-

Variable	Marks1213Sci	Marks1314Sci	Marks1415Sci	Marks1516Sci	Marks1617Sci
Capability index	0.660	0.706	0.859	0.897	0.937

This table reflect values of capability index which are all less than one that means quality status of incoming students is at low level. In other words overall quality status of incoming students is not good as desirable value of capability index is one. But if we compare capability index values academic year wise we conclude that quality status is improving.

Subsection2:

Faculty wise descriptive statistics of 12th percentage of students for current year.

Variable	No.of students	Mean	Std. Dev.	Minimum	Maximum
Marks1617Sci	515	59.030	8.543	40.77	84.60
Marks1617Art	402	59.171	9.364	35.00	88.00
Marks1617Com	407	61.974	10.601	37.08	92.00

On basis of descriptive statistics we claim that, on an average quality status of commerce students is better as compare to other faculties for the academic year 2016-17. But this may not be true as standard deviation for corresponding variable is also large as compare to other.

Capability Index Table :-

Variable	Marks1617Sci	Marks1617Art	Marks1617Com
Capability index	0.937	0.848	0.860

The all values of capability index are less than 1. But for first variable it is larger than other two variables, means quality status of incoming students of science faculty is better as compare to Arts and Commerce faculty students for the academic year 2016-17.

Conclusion

The society, employers, parents, management, teachers and students are stakeholders of educational institutions. From stakeholder's point of view, the objective of this paper is to measure the quality status of students who are joining B.Sc. programme and compare it with academic year wise as well as the quality status of students who are joining B.A. and B.Com. programme by using proper statistical tools. Considering the desirable value of capability index which is also used as

quality indicator, it is found that quality status of students who are joining B.Sc. programme is at low level. But overall it is observed that, the average quality status of incoming students is continuously improving for last five years. To support this claim, considering two academic years' data (2012-13 and 2016-17) we have tested hypothesis that there is an improvement in quality status of incoming students and it is found that there is improvement in quality status of incoming students. In other words there is significance difference between average quality status of students for academic year 2012-13 and 2016-17. For current year academic year 2016-17, the quality status of students who are joining Bachelor of Science (B.Sc.) programme is comparatively good than the students who are joining B.A and B.Com programme.

References

1. Montgomery, D. C (2000). Introduction to Statistical Quality Control, fourth edition, John Wiley and Sons, Inc.
2. M. Albing. Licentiate Thesis on Process Capability with focus on Indices for one sided specification limits, Department of mathematics, 2006. Lulea University of Technology, SE-97187 Lulea, SWEDEN.
3. Process Capability Indices , by Kotz. New York, Chapman and hall.
4. Institutional Accreditation Manual for Self Study Report Affiliated or constituent Colleges published by NAAC.
5. Quality Assurance in Higher Education: An Introduction, Published by NAAC.
6. MINITAB software Manual.
7. Yerriswamy Wooluru Swamy D. R. and P. Nagesh. "The Process Capability Analysis- A tool for Process Performance measures and Metrics- A case study", International Journal for Quality Research 8(3) 399-416
8. Process Capability Analysis and Process Analytical Technology, Presentation by Steven Walfish President, Statistical Outsourcing Services, http://www.statisticaloutsourcingservices.com.

On Truncated Binomial and Truncated Poisson Distributions

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ABSTRACT:

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Abstract:

Count data is a type of data in which the observation can take only the non-negative values where these integers arise from counting. Count data are often modeled using appropriate discrete distribution such as binomial, Poisson and negative binomial, when this data is random variable. Research point of view selection of appropriate probability distribution is very important as improper selected distribution mislead researchers. In some situations we discard some values of count variable then appropriate distribution of new random variable is truncated version of existing distribution. Researcher's point of this paper reviews truncated binomial and truncated Poisson distribution and compare their performance with binomial and Poisson distribution. Some real life situation are discussed where these distribution are well fitted as compare to binomial and Poisson distribution.

Key word: Truncated distribution; ZTB; ZTP.

Introduction:

Count data are often modelled using appropriate discrete distribution such as binomial, Poisson and negative binomial, when this data is a random variable. The Bernoulli distribution, named after the Swiss mathematician Jacques Bernoulli (1654-1705), describes a probabilities experiment where a trial has two possible outcomes, a success or a failure. The parameter p of Bernoulli distribution is the probability for a success in single trial, the probability of failure thus being 1-p. From the Bernoulli distribution we may deduce several probability distributions which are based on series of independent Bernoulli trials these includes binomial, geometric, negative binomial etc. Binomial distribution expresses the probability for success in an experiment with n trials; negative binomial distribution express probability of having to wait exactly r trails until k successes have occurred. Poisson probability distribution is name after the French mathematicians Simenon Denis Poisson (1781-1840) who was the first to present this distribution in 1837. The Poisson distribution is one of the most important distributions in statistics with many applications. We used Poisson distribution instead of binomial distribution when number of trials (n) tends to infinity and p probability of success tends to zero such that np is constant. In some situations we discarded some values of random variable then appropriate distribution of new random variable is truncated version of existing distribution. When we discarded the value of random variable less than ‘a’ and greater than ‘b’, in such situation the resulting distribution also termed as conditional distribution subject to the hypothesis random variable lies between ‘a’ and ‘b’. Basically there are three type of truncated

distribution as left truncated, right truncated and double truncated.

Zero-Truncated Binomial (ZTB) Distribution:

A binomial random variable X is said to be truncated to the left at X=0 if it does not takes value X=0. In this case it takes values 1,2,…..n.
The p.m. f. of truncated binomial distribution when x=0 discarded is

The mean and variance of this distribution is

Zero-Truncated Poisson (ZTP) Distribution:

A Poisson random variable X is said to be truncated to the left at X=0 if it does not takes value X=0. In this case it takes values 1,2,…..∞.

The mean and variance of this distribution is

Research point of view selection of appropriate probability distribution is very important as improper selected distribution mislead researchers. In this paper our objective is to identify situation where appropriate distribution is truncated binomial and truncated Poisson by applying goodness of fit test.

Methods:

The real life situations where truncated binomial and truncated Poisson distribution is applicable is based on secondary data which is taken from number of sources these mainly include:

1. Indian states ranking by household size from survey conducted by the international Institute of Population Science Mumbai released on Oct-2007
2. Road accident data within the jurisdiction of Jalgaon city Police Station from 2011 to 2015.
3. Internal test examination marks out of ten, data from certain college.
4. Simulated data using R software also used for justification.

Following Statistical methods are used:

1. Usual method to derive probability mass function of truncated distribution and its mean and variance.
2. Method of simple iteration to estimate the parameter of truncated binomial and Poisson distribution. This method is also called method of successive approximations.
3. Chi-square test for goodness of fit to test that the fit of the given distribution is appropriate against that it is not so.
4. Techniques to construct control charts and operating characteristics curves using appropriate distributions.

Results:

This section is splits into two subsections. First subsection gives the applications of truncated binomial distribution and second subsection gives the application of truncated Poisson distribution.

Applications of truncated binomial distribution:

Following is the distribution of internal marks out of 10 scored by 146 students who appeared for the test examination held during second semester in a certain college.

Marks scored:	1	2	3	4	5	6	7	8	9
No of students:	1	1	2	17	31	38	38	16	2

Let X denotes the marks scored by the students. Assuming X Follows zero truncated binomial distribution and taking initial value of 'p' as mean/9, we have estimated parameter 'p' using method of

successive approximations. Using estimated 'p' and taking n=9, we have noted zero truncated binomial probabilities for each x. Using truncated binomial probabilities expected frequencies are obtained, using expected frequencies=N*P(x).
Estimated P=0.6635965

Marks scored :	1	2	3	4	5
P(X=x):	0.0009796126	0.0077296169	0.0355777426	0.1052720987	0.2076619434
Expected freq:	0.1430234	1.1285241	5.1943504	15.3697264	30.3186437
Marks scored:	6	7	8	9	
P(X=x):	0.2730921949	0.2308745891	0.1138570107	0.0249551911	
Expected freq:	39.8714604	33.7076900	16.6231236	3.6434579	

Applying chi square test for goodness of fit it is found that internal marks obtained by students follows truncated binomial distribution.

2. Household size, number of person living together in one house is an important parameter in social survey. An analysis recently released census data reveals that the average household size in urban India is now less than four for the first time in history. In rural India, the average household size is between four and five members, but closer to four than it has ever been.

Household size:	1	2	3	4	5	6	7-10	11-14	15+
No of household (in thousands):	795	1735	2473	4136	4061	2643	328	331	128

Source: Census of Maharashtra 2001.

Here household size follows zero truncated binomial random variable with approximate mean 4.

3. Suppose that a lot of size N is large (theoretically infinite) has been submitted for inspection. A single sampling plan is defined by the sample size 'n' and the acceptance number 'c'. Under this, the distribution of the number of defectives 'd' in a random sample of n items is binomial with parameters n and p , where p is the fraction of defectives items in the lot. Here the operating characteristics curve is developed by computing probability of acceptance for various values of 'p'. When the value 'p' approaches to bad quality level the distribution of number defectives approaches to truncated binomial distribution.
To justify this claim consider the following simulated random sample of size 25 by taking n=89, c=3 and p=0.06

X :	1	2	3	4	5	6	7	8	9
Frequency :	1	2	4	1	7	2	3	3	2

Applications of truncated Poisson distribution:

1. Consider the example of the number of items in a shopper's basket at a supermarket checkout lines as a random variable. Assuming a shopper will purchase at least one item, so this the example of zero truncated Poisson distribution.
2. Consider the example of number of deaths due to accident during three years periods 2011 to 2013.

X :	1	2	3	4	5	6	7	8	9
Frequency :	3	2	4	9	5	3	1	2	1
X :	10	11	12	13					
Frequency :	1	1	1	0					

   Assuming no of death is a random variable. This is an example of truncated Poisson distribution.
3. In a certain health care application truncated Poisson distribution is more important than Poisson

model; example could be number of medical errors observed over 3000 patients where zero medical error not observable.

Conclusion:

Researcher's point of view selection of appropriates probability distribution is very important as improper selected distribution mislead researchers. This paper tries to discuss the importance of truncated binomial and truncated Poisson distribution over binomial and Poisson model respectively. Some real life situations are mentioned where truncated binomial and truncated Poisson distribution are applicable. In statistical quality control engineers use binomial and Poisson model number of times but real data reflects value zero not observable so in this case appropriate model is the truncated version of respective distribution. Examples could be number of defective found in a random sample of size n is an example of truncated binomial distribution when process fraction defective approaches to bad quality level. In manufacturing industries c chart use to test whether process is in control or not where Poisson distribution is the best for computing control limits but when value zero is not observable appropriate distribution is the truncated Poisson.

References:

1. Banik, Shipra and Kibria, B. M. Golam (2009) "On Some Discrete Distributions and their Applications with Real Life Data," Journal of Modern Applied Statistical Methods: Vol. 8: Iss. 2, Article 8, 423-447
2. S. C. Gupta and V. K. Kapoor: Fundamental of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
3. Gupta S. C. & Kapoor V. K: Fundamental of Applied Statistics, S. Chand Sons, New Delhi.
4. R, EXCEL and MINITAB Software Manual.

Statistical Analysis of Road Accidents in Jalgaon City

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Abstract:
According to central government annual report on "Road accidents in India 2015" about 1,374 accidents and 400 deaths take place every day on Indian roads and the total number of persons killed in road accidents increased by 4.6 per cent in 2015 as compare to 2014. During 2015, Tamil Nadu has reported the highest number of road accidents (69,059) and Maharashtra has reported the second highest number of road accidents (54,947) in the country. Central government of India committed to reduce the number of road accidents and fatalities by 50 per cent by 2020. With regard to this from Jalgaon city public point of view our objective is to analyze statistically road accidents data in Jalgaon city. For statistical analysis we have considered road accidents data within the jurisdiction of Jalgaon city police stations from 2011 to 2015. The statistical analysis of accidents data reveals that on an average 14 accidents take place every month and accidents are not uniformly distributed over the hours of the day. Distribution and causes of road accidents also studied.
Keywords: - Accidents, Accidental deaths, Accidental injured, Roads.

Introduction:-

Road accidents cause injuries, fatalities, disabilities and hospitalization with severe socio economic costs across the country. Consequently, road safety has become an issue of concern both at national and international level. According to central government annual report on "Road accidents in India 2015" about 1,374 accidents and 400 deaths take place every day on Indian roads and the total number of persons killed in road accidents increased by 4.6 per cent in 2015 as compare to 2014. The report by the ministry of road transports and highways highlights that 5 states – Maharashtra, Tamil Nadu, Madhya Pradesh, Karnataka and Andhra Pradesh – account for over 50% fatalities in road accidents. Central government of India committed to reduce the number of road accidents and fatalities by 50 per cent by 2020. On the whole, it is vital to control road traffic accidents as its impact on the family and society is significant. With regard to this from Jalgaon city public point of view our objective is to analyze statistically road accidents data in Jalgaon city. Point wise objectives of this paper are,

- To analyze statistically the total number of road accidents in Jalgaon city during the period from 2011 to 2015
- To analyze statistically the road wise number of accidents in Jalgaon city during the period 2011 to 2015.
- To identify the root causes of road accidents.

- To find out on spot rate of death and injury due to road accidents.
- To find out the remedial measures to reduce the number of road accidents.

Methods:-

Data collection is based on secondary data. The accident data were collected from Superintendent Police Office, Jalgaon City. Accident, Fatality and Injured data were collected from each police station records during year 2011 to 2015. Existing data contain cases of road accidents within the jurisdiction of Jalgaon city police station during the year 2011-2015. These road accidents cases are converted into the tabulated form in which columns are: 1) Months, 2) Number of accidents, 3) Number of accidental death, 4) Number of accidental injured respectively. First column data type is character and second, third and fourth data type is Numeric.

Mon.	No. of Accidents					No. of Accidental death					No. of Accidental Injured				
	2011	12	13	14	15	2011	12	13	14	15	2011	12	13	14	15
Jan	24	11	10	14	24	1	2	4	4	14	50	28	11	13	23
Feb	21	25	15	19	15	5	8	5	5	1	32	35	15	24	20
Mar	19	10	11	15	13	3	4	6	0	5	32	9	5	22	13
Apr	10	16	19	21	18	3	12	10	15	6	12	22	15	36	22
May	16	12	20	16	20	5	9	5	2	8	16	10	17	18	25
Jun	15	10	7	12	11	4	4	0	4	7	19	10	11	12	11
Jul	15	10	7	17	9	6	3	1	3	3	20	12	29	18	9
Aug	15	12	14	8	11	4	4	1	2	6	14	11	20	9	8
Sep	11	12	4	11	14	5	4	3	3	2	11	12	6	11	14
Oct	21	4	19	12	14	4	0	3	6	5	23	4	23	14	14
Nov	13	19	15	12	18	7	11	7	2	5	11	48	11	16	25
Dec	14	1	10	14	15	6	0	2	2	5	11	1	13	20	13
Tot	194	142	151	171	182	53	61	47	48	67	251	202	176	213	197

Keeping in mind our objectives, the proper statistical tools are used to analyze data these includes,

1] Diagrammatic Presentation:

An easily understood method Diagrammatic Presentation is used for presenting data.

2] Chi-square (χ^2) Test:- Chi-square test is the simplest and most widely used non-parametric test in statistical work. The Chi-square test hypothesis is:-H0: There is no significance difference between observed and expected frequencies Verses H1: There is significance difference between observed and expected frequencies. An assumption for this test is that sample observations should be independent, $\sum Oi = \sum Ei$ where Oi & Ei are observed and expected frequencies, total frequency should be large, no theoretical cell frequency should be less than 5, which is valid.

3] Two-Sample Poisson Rate Comparison test:- This test compares two samples from Poisson processes by performing hypothesis tests and calculating confidence intervals for the difference between the two populations

- Occurrence rates
- Mean numbers of occurrence

A Poisson process describes the number of occurrences of an event in a given length of time, area, volume, etc.

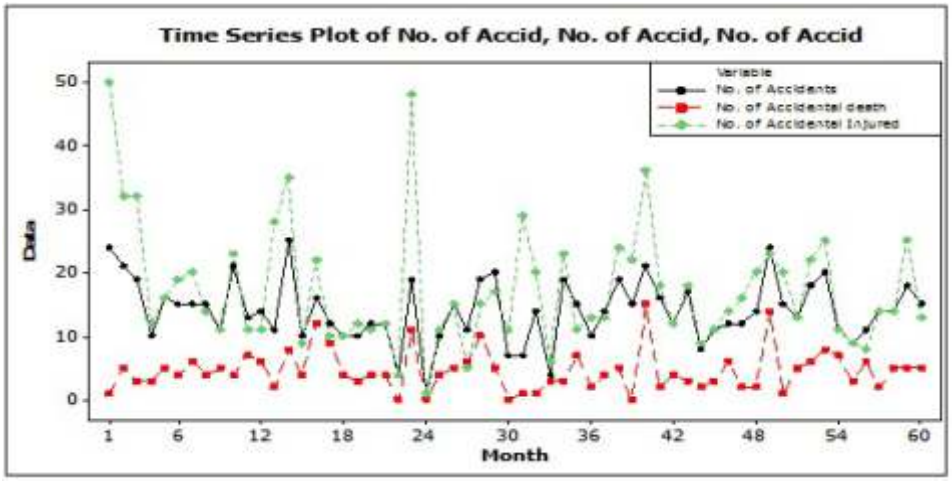
Results:-

This section splits in three subsections. First subsection gives graphical representation of number of accidents, number of accidental deaths & number of accidental injured. In second subsection we have

used Chi-square test for testing null hypothesis (H01) which is stated as Accidents are uniformly distributed over the hours of the day. In third subsection we have used Two Sample Poisson Rate test for testing null hypothesis (H02) which is stated as average accidents occurred on Jalgaon-Dhule road and Other roads are same and (H03) average accidents occurred on Jalgaon-Bhusawal and Other roads are same.

Subsection – 1)

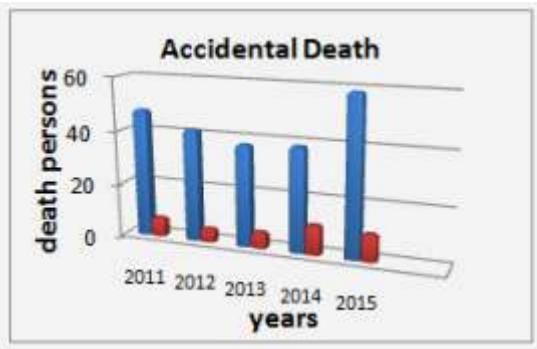
a) Time series plot of number of accidents, number of accidental deaths & number of accidental injured during 2011-15.

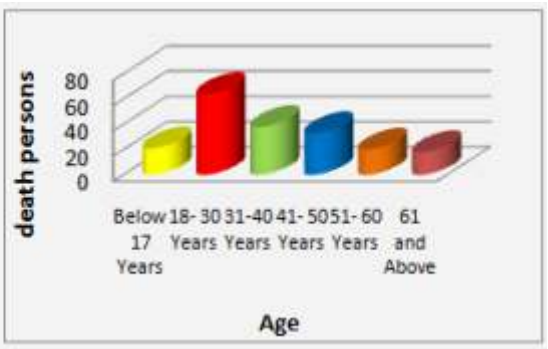


b) Month wise accidents in percentage in Jalgaon City during the years 2011-2015.

Interpretation:- Month wise accidents in percentage in Jalgaon City during the year 2011-2015 is shown in fig. Figure indicates that there is no definite trend for month wise accidents. Accidents in the month of February are quiet high.

c) Accidental death by gender and age during the years 2011-2015.





Hours	Observed Frequency	Expected Frequency	d.f.	Tabulated χ^2	Calculated χ^2
24.00 to 03.00 Hrs	44	105			
03.00 to 06.00 Hrs	40	105			
06.00 to 09.00 Hrs	84	105			
09.00 to 12.00 Hrs	136	105			
12.00 to 15.00 Hrs	144	105	7	14.067	150.648
15.00 to 18.00 Hrs	133	105			
18.00 to 21.00 Hrs	168	105			
21.00 to 24.00 Hrs	91	105			
Total	840	840			

Calculated χ^2	d.f.	Tabulated χ^2	Result
150.648	7	14.067	Rejected

Here Calculated χ^2 > Tabulated χ^2 , so we reject the null hypothesis at 5% levels of significance.

Subsection – 3)

1] H02: Average accidents occurred on Jalgaon-Dhule road and Other road are same.
H12: Average accidents occurred on Jalgaon-Dhule road and Other road are not same.

Applying two sample Poisson rate test to test the null hypothesis, we get following statistical information

Table :-3) Computation of two sample poisson rate test to test H02

Variable	Total Occurrences	N	Rate of Occurrence
Jalgaon-Dhule Road	27	12	2.25
Other Roads	81	12	6.75

Exact Test: P-Value = 0.000

Here, p-value <0.01 , So we reject the null hypothesis at 1% as well as 5% levels of significance.

2] H03: Accidents occurred on Jalgaon-Bhusawal road and Other road are same.
H13: Accidents occurred on Jalgaon-Bhusawal road and Other road are not same.

Applying Two Sample Poisson Rate test to test the null hypothesis, we get following statistical information

Table :-4) Computation of two sample poisson rate test to test H03

Variable	Total Occurrences	N	Rate of Occurrence
Jalgaon-Bhusawal Road	14	12	1.16667
Other Roads	81	12	6.75000

Exact Test: P-Value = 0.000

Here, p-value < 0.01 , So we reject the null hypothesis at 1% as well as 5% levels of significance

3] Similarly, Accidents occurred on Jalgaon-Aurangabad road and Other road are not same

Conclusions:-

The analysis reveals that: -

- Accidents are not uniformly distributed over the hours of the day during the year 2011-2015, generally the majority of accidents take place in the time 18:00 to 21:00 followed by the time 12:00 to 15:00.
- The number of accidents on an average take place on Jalgaon-Dhule, Jalgaon-Aurangabad, Jalgaon-Bhusawal and Other roads are not same.
- The number of accidents take place on other roads are significantly different as compared to Jalgaon-Dhule , Jalgaon-Aurangabad , Jalgaon-Bhusawal road i.e. Most of the accidents take place on other roads followed by Jalgaon-Dhule road.
- A month wise road accident in percentage shows no definite trend. Accidents in the month of February are quite high followed by April and May.
- The accidental death data shows significantly high percentage of male victims as compare to female victims. This is because of low percentage of women in the Indian work-force as compare to men.
- The most of the accidental death occurred in the age group of 18-30 followed by the age group 31-40.

References :-

1. Central government annual report on "Road accidents in India 2015"
2. Statistical Analysis of Road Accidents in Salem City,Tamil Nadu (Student mini project).
3. Pawan Deshpande, Road Safety and Accident Prevention in India: A Review, International Journal of Advanced Engineering Technology, E-ISSN 0979-3945.
4. Excel & MINITAB Software Manual.

Rainfall Monitoring Using Control Charts for Last Hundred Years (1916-2015) within Jalgaon District

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ABSTRACT:

(Your abstract must use Normal style and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

Preparation of Your Abstract

1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word ONLY (place names excluded). No full stop at the end.
2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.

Introduction: Clearly state the purpose of the abstract

Methods: Describe your selection of observations or experimental subjects clearly

Results: Present your results in a logical sequence in text, tables and illustrations

Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

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Abstract :-

Economic growth of India depends on rainfall and about two third employments directly or indirectly depends on agriculture sector. Normal rainfall acts as a strong check on food inflation by increasing food output and availability and it would be totally opposite when rainfall is abnormal. The objective of this study is to monitor rainfall for Jalgaon district for the last hundred years using Shewhart control chart for individual measurement. The entire data set is split in two phases as per the requirements of control chart and for better understanding of decadal change. The period of first phase is 1916-1965 and period of second phase is 1966-2015. Considering first phase data as a normal operating data we have decided parameters of control charts and then using these parameters we have monitored second phase data. On the basis of control chart it is observed that rainfall is normal but while considering specification limits overall rainfall is not satisfactory for number of years.

Key Words: Annual rainfall ; SPC ; Phase I ; Phase II ; Shewhart Control Chart ; Specification limits ; Drought ; Severe Drought ; Heavy rainfall ; Extremely heavy rainfall (Flood).

Introduction :-

The study area is the Jalgaon District of Maharashtra state, India. Jalgaon is located in North West region of Maharashtra. Geographical location of Jalgaon district is between 200001-210001 North latitudes and 74055l-76028l East longitudes. It is bounded by Satpuda hills in North, Ajantha mountain ranges in the south. Administratively, Jalgaon district is divided into four subdivisions and 15 tahsils. It hosts a population of about 4 million in the area 11,765 sq.km. Out of total population 71% lives in rural areas and agriculture and agriculture related activities are there predominant occupation. Out of total area 66.36% falls under agriculture zone & there is rain-fed agriculture in Jalgaon district. It receives an average rainfall of about 755.6 mm and temperature varies from minimum 100-120C to maximum 450-480C. Jalgaon is rich in volcanic soil and falls under semi-arid zone which is well suited for cotton and banana production. The major crops grown in Jalgaon district are Banana, cotton, Pulses. Bananas grown in the district are exported outside the state and to other countries, Jalgaon is largest banana growing district in India.

The objective of this paper is to analyze the trend, recurrence and variability of annual rainfall by using SPC, Analysis of rainfall would enhance the management of water resources applications as well as the effective utilization of water resources. Such information can also be used to face the problem floods or drought situations & applied to the planning and designing of water resources such

as flood control work, soil and water conservation planning etc. The important approach of this study is to show the application of control charts for individual measurement (X-chart) in natural events like rainfall. Our interest is to check the comparative study of annual rainfall and detecting Flood, Normal and Drought situation. The entire data set of 100 years is split in two phases as per the requirements of control chart, then we have plotted X and MR control chart for Phase I (1916-1965) which indicates the process is in statistical control and using parameters obtained in phase I, We monitored Phase II data (1966-2015).

Then we introduced specification limits for annual rainfall in Jalgaon district obtained from IMD (Pune). Specification limits are those values between which process is normal. These limits are usually set by customer requirements, for our study specification limits are obtained from IMD (Pune) and which were derived for Jalgaon district considering requirements of irrigation purposes. On the basis of specification limits we examine years which fall under drought or flood situation. This work enhance the understanding of rainfall trends, recurrence and variability in relation to long range prediction of dry or wet (drought or flood) periods of regional precipitation and crop forecasting issues. We studied Nashik district annual rainfall same as Jalgaon District for comparative purpose. Average Annual rainfall for Nasik district is 1134.5mm i.e. Nasik district receives high annual rainfall as compared to Jalgaon district and faces flood situation for more years which is exactly opposite to Jalgaon.

Methodology :-

The Statistical analysis of Annual rainfall presented in the paper is based on data obtained from website www.Panchayat Bhuvan ver 2.0 and www.Mahaagri.gov.in. Yearly rainfall data set for Jalgaon district for the period of 100 years (1916-2015) is collected from website Bhuvan panchayat ver 2.0 where yearly rainfall data is available in the form of grids. Jalgaon district is divided in 6 different grids, then we select each grid one by one and for each grid annual rainfall is given in the form of simple bar diagrams we note down rainfall (mm) for100 year and each grid and then by taking average of 6 grids we noted annual rainfall of Jalgaon district for 100 years in excel for further study. For Statistical analysis purpose we have two variables having 100 observations First set contains years from 1916-2015 and second set contains annual rainfall for each year in mm (millimeter).

Then we divide total available data of 100 years in two different phases, Phase I is considered as 1916-1965 and Phase II is considered as 1966-2015 Considering Ist phase data as normal operated data. We draw Shewhart control chart for individual measurement (X-chart) & MR chart for 1st phase using Minitab software and we observed that process is in state of statistical control. We had decided parameters of control chart and using these parameters we monitored IInd phase data we draw individual control chart for IInd phase data by using parameters obtained in 1st phase. Here we observed that the process is out of control, the year 2006 has crossed control limits & here we came to know that there was extremely heavy rain in year 2006. Then we introduced Specification limits for annual rainfall in Jalgaon district as,

Particular	Minimum	Maximum
Normal Range of annual rainfall	604.48 mm	906.72 mm
Drought	528.9 mm	604.48 mm
Severe Drought	Below 528.9 mm	
Heavy Rain	906.72 mm	982.3 mm
Extremely Heavy rainfall (Flood)	Above 982.3 mm	

(As per IMD, Pune)

Outside this normal range of annual rainfall is to be treated as abnormal and which is again divided in Drought, Severe Drought, Heavy rain, Extremely Heavy rain (flood). Then we plotted control charts using Specification limits and examined the abnormal years. The same procedure we applied to Nasik District considering specification limits for Nasik district.

Results and Discussions :-

The annual rainfall data during the period of hundred years (1916-2015) was analyzed. Phase I – A set of historical data is available treated as normal operated data. Interest is on understanding process variation, assessing process stability, and estimating in-control process parameters. When we plot X-chart for phase I the annual rainfall is in control as shown is fig.1. Then we plotted I-MR chart for phase I which monitors stability of the process, determining process is stable as shown in fig.2.We monitored phase II using parameters mean =755.4mm, StDev = 148.9mm, UCL =1187.3mm, LCL =323.6mm as Shown in fig.3 here test fails for year2006 because there was extremely heavy rainfall in year 2006, then we plotted control chart for phase II considering specification limits as shown in fig.4 here we observed that 31 years falls under Normal range of annual rainfall but 19 years are outside the normal range, out of which 7 years falls under Drought situation, 5 years falls under severe drought situation, 4 years falls under heavy rainfall situation and 3 years falls under extremely heavy rainfall (Flood) situation. This is further establishes the shift in pattern of rainfall in Jalgaon district and we can predict Drought and flood situation in future years.

Similarly, we studied annual rainfall for Nasik district. Here we observed that maximum years are falls under Heavy rainfall situation i.e. 13 years falls under Heavy rainfall situation considering specification limits which is opposite to Jalgaon district because in Jalgaon district 12 years falls under Drought situation it may be because of annual temperature in Jalgaon district is more that's why Jalgaon district is under semi-arid zone. Both Jalgaon and Nasik district shows variation in annual rainfall but opposite to each other. The shift of recurrence pattern in Jalgaon district is towards drought and Nasik district towards heavy rain. This work will help up to enhance the understanding of rainfall trends, recurrence and variability in relation to long range prediction of dry or wet (drought or flood) periods of regional precipitation and crop forecasting issues.

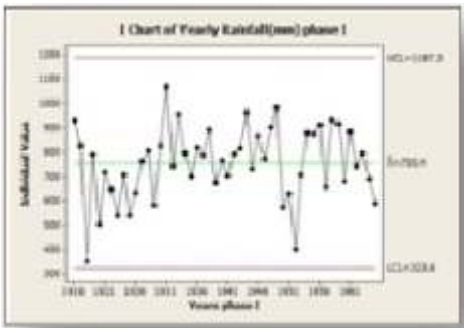

Fig.1 Shewhart control chart for individual measurement (X-chart) Phase I (In control)

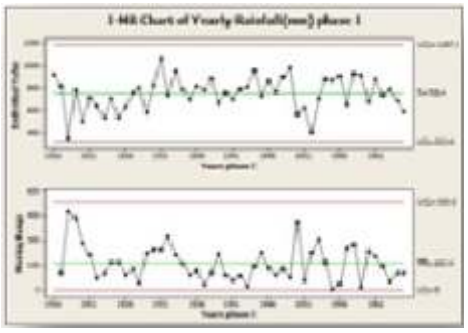

Fig.2 I-MR Chart for Phase I indicates that process is in state of statistical control

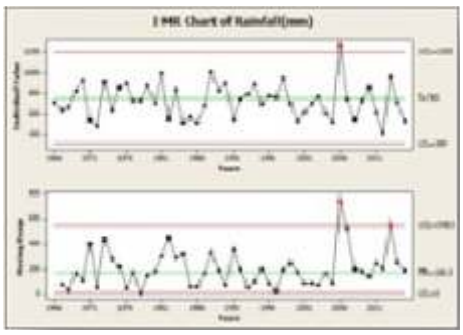

Fig.3 I-MR for phase II using parameters obtained in Ist phase, Process is out of control for year 2006

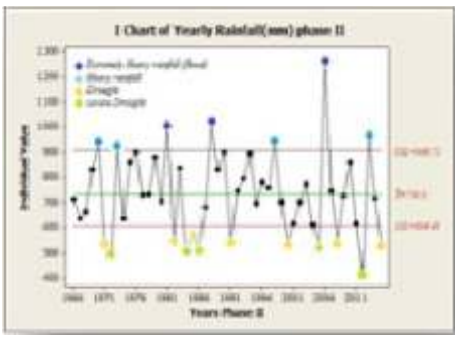

Fig.4 Control Chart using specification limits, 19 years falls under various situations like Drought & Flood

This present study has revealed that variation in rainfall in Jalgaon district. The driest and wettest year in Jalgaon district for the period 1916-2015 had been identified too. It could be revealed that District had received less than average rainfall in many years and experiencing drought situation and this affected agriculture production levels. Studying the total annual rainfall during the period of hundred years, we observed that there is high value of average annual rainfall recorded in year 2006 (1261mm) while least value of average annual rainfall in year 2012 (414.2mm). Monitoring of IInd phase data is our prime importance and the data is analysed. Results shows that District had fluctuating rainfall pattern, while considering specification limits overall for phase II we observed that 19 years are outside the Normal range of rainfall out of which 13 falls under drought and 7 falls under flood situation. From above study we conclude that after 3-4 years Jalgaon district is facing a problem of Drought and there is greater impact on farmers.

References :-

- Montgomery D.C. (2000). "Introduction to statistical Quality control", fourth edition, John Wiley and Sons, New York.
- Indian Meteorological Department (IMD), Pune, www.imdpune.gov.in
- Bhuvan Panchayat, Bhuvan panchayat ver 2.0 website, Jalgaon.nic.in website
- Mahaagri.gov.in website
- Andy Y. Kwarteng, Atsu S. Darvlo and Ganiga T. Vijaya Kumar, Analysis of a 27-year rainfall data (1977-2003) in the Sultanate of Oman, Int.J.Climatal.29:605-617 (2009)
- Bewket W (2009), Rainfall variability and crop production in Ethiopia: Case study in the Amhara Region. Proceedings of the 16th International Conference of Ethiopian studies. (ed) Svein Ege, Harald Aspen, Birhanu Taferra, shiferaw Bekele,Trondheim SV (eds) 2:827-836
- Rane Gauri and Joshi Bhushan LAND USE - LAND COVER MAPPING USING REMOTE SENSING ANG GEOGRAPHIC INFORMATION SYSTEM, J.Environ.Res.Develop.Vol. 8 No. 3A, January-March 2014
- Francis Ndamani and Tsunemi Watanabe, Influences of rainfall on crop production and suggestions for adaptation, International Journal of Agricultural Sciences ISSN: 2167-0447 Vol.5(1),pp.367-374, January 2015
- Microsoft Excel and Minitab Software Manual.

Antisickling Activity of Trigonella foenum-graecum Leaves Extracts on Sickle Blood Cells"

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Department of Zoology

ABSTRACT:

1. Introduction

Context of the Study

Every year approximately 100,000 children in the world are born with sickle cell disease (SCD) which is a genetic disorder. This disease is considered as a public health problem in many countries, but with a major burden in Africa (WHO, 2014). SCD also known as sickle cell anemia or drepanocytosis, is an inherited illness which is caused by an abnormal hemoglobin. The SCD causal hemoglobin (Sickle hemoglobin or S hemoglobin, HbS), comes from a mutation at the 6th position of the beta globin chain, which led to the substitution of glutamic acid, a polar amino acid, by valine a non-polar amino acid. This structural modification influences significantly physical and chemical properties of hemoglobin, hemoprotein that are responsible for the transport of oxygen from the lungs to other tissues in the body (Mpiana et al., 2007 and Mpiana et al., 2014). This mutation decreases the affinity of hemoglobin for oxygen. At low oxygen tension, the mutant hemoglobin polymerizes inside the red blood cell into a gel or further into fibers leading to a drastic decrease in the red cell deformability. Polymerization and precipitation of S hemoglobin within the erythrocytes cause the change of the shape of erythrocytes from their normal globular form into one resembling a sickle. Sickling of blood cells is the cause of precocious hemolysis of erythrocytes and various complications of SS subjects (Mpiana et al., 2007 and Mpiana et al., 2014). Some of the antisickling agents investigated exhibits varying degrees of toxicity, and/or cause haemolysis of the sickle red blood cell at the effective dose levels and are therefore unsuitable for clinical use and also quite expensive. Therefore, there is a need for more definite and effective treatments for the disease. Herbal extracts have been used in Indian folk medicine for decade in the management of various ailments. Trigonella foenum-graecum is commonly known as Fenugreek and in Marathi as Methi. It is an annual herb indigenous to the countries touching on the eastern shores of the Mediterranean and widely cultivated in India, Egypt, and Morocco. The plant parts like leaves and seeds are widely consumed in Indo-Pak subcontinent as well as in other oriental countries as a spice in food preparations and as an ingredient in traditional medicines. Traditionally, fenugreek used as food, forage and medicinal plant (Dharajiya et al. 2016). Medicinally it was used in the treatment of wounds, abscesses, arthritis, bronchitis, ulcer and digestive problems etc. Fenugreek is also used traditionally as a demulcent, laxative, lactation stimulant and exhibits hypocholesterolemic, hypolipidemic and hypoglycemic activity in healthy, diabetic animals and humans (Syeda et al., 2008). Its leaves have been reported to possess potential antibacterial activity, antifungal activity, anti-diabetic and antioxidant property (Dharajiya et al.

2016). Fenugreek is an ancient medicinal plant as the plant contains active constituents such as alkaloids, flavonoids, steroids, saponins, etc. (Snehlata and Payal, 2012).

The first-line clinical management of SCD includes medullar transplantation, repeated blood transfusion to stabilize the patient's hemoglobin level. Despite the fact that the molecular biology of sickle cell is well characterized, there is at present no specific drug that can prevent or permanently cure the disease (Mehanna, 2001). The lack of effective therapy for sickle cell anaemia has prompted investigation into a large number of antisickling agents (Asakura et al., 2001; Nagel and Chang, 1982; Vichinsky, 2002).

The present study was performed with the aim of evaluating the antisickling activity of methanolic and aqueous extracts of Trigonella foenum-graecum. For the best of our knowledge, this plant has not yet been scientifically investigated for its antisickling properties.

Prevalence of sickle gene in tribal communities in India

The first description of sickle haemoglobin in India was by Lehman and Cutbush in 1952 in the tribal populations in the Nilgiri hills in south India. In the same year, Dunlop and Mazumder also reported the presence of sickle haemoglobin in the tea garden workers of Upper Assam who were migrant laborers from tribal groups in Bihar and Odisha. Since then, many population groups have been screened and the sickle cell gene has been shown to be prevalent among three socio-economically disadvantaged ethnic groups, the scheduled tribes, scheduled castes and other backward classes in India.

The prevalence of sickle cell carriers among different tribal groups varies from 1 to 40 per cent. Madhya Pradesh has the highest load with an estimated number of 9, 61,492 sickle heterozygotes and 67,861 sickle homozygotes. Further, 27 of the 45 districts in Madhya Pradesh fall under the sickle cell belt and the prevalence of HbS varies from 10 to 33 per cent. It has also been estimated that 13,432 pregnancies would be at risk of having a child with sickle cell disease in this state and the expected annual births of sickle homozygotes would be 335818. Gonds and Bhils constitute the largest tribal groups in central India.

In Maharashtra, the sickle gene is widespread in all the eastern districts, also known as the Vidarbha region, in the Satpura ranges in the north and in some parts of Marathawada. The prevalence of sickle cell carriers in different tribes varies from 0 to 35 per cent. The tribal groups with a high prevalence of HbS (20-35 %) include the Bhils, Madias, Pawaras, Pardhans and Otkars. It has also been estimated that Gadchiroli, Chandrapur, Nagpur, Bhandara, Yoetmal and Nandurbar districts would have more than 5000 cases of sickle cell anaemia. The entire tribal population of 1,25,000 individuals in the Wayanad district of Kerala was screened, followed by genetic counseling where carriers of HbS were advised not to marry carriers. A very high prevalence of HbS is seen in these tribes (18.2 to 34.1 %). In Gujarat, the Dhodia, Dubla, Gamit, and Naika tribes have a high prevalence of HbS (13-31 %). More recently very extensive population surveys have been done by the Indian Red Cross Society, Gujarat State Branch where 1,68,498 tribals from 22 districts were screened and the overall prevalence of sickle cell carriers was 11.37 per cent. Some tribal groups in south Gujarat like Chaudry, Gamit, Rohit, Vasava and Kukana have shown both a high prevalence of HbS (6.3 to 22.7%) as well as β-thalassaemia trait (6.3 to 13.6 %). These tribal groups would have the likelihood of co-inheriting both these genes. In a large multicentre study where 15200 individuals from 14 primitive tribes from Maharashtra, Gujarat, Tamil Nadu and Odisha were screened, the HbS allele frequency varied from 0.011 to 0.120 and β- thalassaemia allele frequency varied from 0.005 to 0.024. Associated iron deficiency was seen in 26.2 per cent of sickle heterozygotes as well as in 67.7 per cent of sickle homozygotes in this study. Kaur et al., have summarized the distribution of HbS in different tribal groups from individual states. Although a large number of tribal groups have been screened for HbS, there are still many gaps in our knowledge about the distribution of the HbS gene in tribal communities in India (Colah et al.,2015).

Rationale for the Study

Despite the fact that the molecular biology of sickle cell is well characterized, there is at present no

specific drug that can prevent or permanently cure the disease (Mehanna, 2001). The lack of effective therapy for sickle cell anaemia has prompted investigation into a large number of antisickling agents (Asakura et al., 2001; Nagel and Chang, 1982; Vichinsky, 2002). Some of the antisickling agents investigated exhibit varying degrees of toxicity, and/or cause haemolysis of the sickle red blood cell at the effective dose levels and are therefore unsuitable for clinical use. Many antisickling agents that also inhibit sickling by interacting directly with haemoglobin in vitro were abandoned because of the unacceptable dose that was required to inhibit HbS sickling in vivo (Orringer et al., 1994; Walder et al., 1980). The rationale for this study therefore is to evaluate the antisickling effect of Trigonella foenum-graecum leaves extracts on sickle blood cells.

2. Aim and Objective

To encounter burgeoning problem of sickle cell anemia, there is pressed need to developed antisickling drug from plant origin. Even though this plant has been documented for different pharmacological activities, their effect on sickle cell has yet not been explored. In regard to this, the present study is planned to examine the "Antisickling Activity of *Trigonella foenum-graecum* Leaves Extracts on Sickle Blood Cells".

3. Literature review

Chikezie et al., (2010) studied the effects of anti malarial drugs by spectrophotometrically using hemolysates of HbS and he found that drug cause significant reduction in HbS polymerization.

Chikezie (2011) in his work studied that the capacity of three medicinal plants namely, Anacardiaum occidentale, Psidium guajava and Terminalia catappa to alter the sickle cell hemoglobin by spectophotometric method and he monitored the level of polymerization hemolysate HbS molecules treated with metasulphide at regular intervals of 30s for period of 180s. He found that aqueous extract of these plants exhibited the highest and the polymerization of molecule depends on the time incubation and concentration of extract.

Mpiana et al., (2014) studied the antisickling properties of Baobab tree by using the breaks of this plant and he monitored that aqueous extract of Adansonia digitalia show the antisickling activity with maximal normalization rate of 65.7 % and minimal concentration required to normalize sickle cell. The anthocyanins extract also show the stabilization effect on sickle blood cell membrane and reduction of methamoglobin to hemoglobin.

Adegoke et al., (2014) used the Allium sativa garlic a food herb to see the effect on osmotic fragility of red blood cell in normal and sickle cell patients. From that he observed that fragility of red cell decreased as concentration of NaCl increased. There was complete hemolysis at 0.20 gm% of NaCl, at 75% NaCl cessation of hemolysis was observed in normal cell. Thus it is shown that there is significant increase in osmotic fragility of red cell treated with garlic in both the samples.

Alabdallat and Adam (2016) studied that SCD is caused by polymerization of abnormal hemoglobin S when oxygen tension decrease an. This leads to change the shape of red blood cells and anemia. It is found that some medicinal plants have shown an antisickling activity such as ginger by using Emmel test. After performing the experiment it is found that the ginger plant extract shown significant anti sickiling activity.

Imaga et al., (2009) examined the methanolic leaf extract of Carica papaya L for possible in vitro antisickling and membrane stabilizing activities involving the use of positive and negative controls for the antisickling experiments and osmotic fragility test on Hbss red blood cells obtained from non crisis state sickle cell patients. It is found that plant extract reduces the hemolysis and protects erythrocytes membrane. From this it is concluded that C. papaya as an attractive potential candidate for SCD therapy.

In 2009 Egunyomi et al., evaluate the antisickling activities of two ethnomedicinal plant recipes used for the management of sickle cell anaemia in Ibadan, Nigeria. They found that extracts of recipe 1 and 2 showed antisickling activities, 63.4 and 78.8 % inhibition, respectively, at 180 min incubation.

Alabdallat (2016) studied in vitro antisickling activity of Achillea fragrantissima (Forssk) Sch. Bip

(Qaysum) methanolic extract on sickle cell disease. They found no significant increase in the percentage of unsickled red blood cells was observed after incubation of red blood cells with 2% sodium metabisulfitenin the presence of 250, 500 and 1000µg/ml of Achillea fragrantissima methanolic extract.

In 2010 Imaga discussed the research findings of slected medicinal plants with antisickling properties which currently in use for the management of sickle cell anemia.

Ngbolua et al., in 2014, investigated Ethno-botanical survey, in vitro antisickling and free radical scavenging activities of Garcinia punctat Oli.. Their results showed that methanolic, ethyl acetate and dichloromethane soluble fractions, anthocyanins and organic acids exhibited a significant antisickling and antioxidant activity compared to that of n-hexane soluble fraction.

4. Materials and Methods

4.1 Collection of plant specimen

The plant is collected from North Maharashtra Region in the period of September 2016. The plant was identified by Dr. Maroti Deshattiwar, Department of Botany, Moolji Jaitha College, Jalgaon.

Trigonella foenum **(Fenugreek)**

The taxonomical position is as follows:

Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Order : Fabales
Family : Fabaceae
Genus : *Trigonella*
Species : *Foenum-graecum* Linn.

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Figure 1 *Trigonella foenum*

It is an erect hairy annual of the bean family, reaching 30-60 cm (1-2 ft.). It is an old medicinal plant. It has been commonly used as a traditional food and medicine. Fenugreek is known to have hypoglycemic, and hypocholesterolaemic effects, antiinflammatory effects. Recent research has identified fenugreek as a valuable medicinal plant with potential for curing diseases and also as a source for preparing raw materials of pharmaceutical industry, like in steroidal hormones.

The plants leaves and seeds are widely consumed in Indo-Pak subcontinent as well as in other oriental countries as a spice in food preparations, and as an ingredient in traditional medicine. A wide range of uses were found for fenugreek in ancient times. Medicinally it was used for the treatment of wounds, abscesses, arthritis, bronchitis, ulcer and digestive problems. Traditional Chinese herbalists used it for kidney problems and conditions affecting the male reproductive tract. Fenugreek was, and remains, a

food and a spice commonly eaten in many parts of the world (Snehlata and Payal, 2012).

Leaves: The leaves contain 7 saponins, known as graecunins. These compounds are glycosides of diosgenin. Leaves contain moisture 86.1%, protein 4.4%, fat 0.9%, minerals 1.5%, fiber 1.1%, and carbohydrates 6%. The mineral and vitamins contents are calcium, iron, phosphorous, carotene, thiamine, riboflavin, niacin and vitamin C (Snehlata and Payal, 2012).

4.2 Preparation of extract of plant specimen

Leaves were separated, washed under continuous current of distilled water for 15 min and dried. After complete drying the material was crushed and grinded to form coarse powder. Powdered plant material was exhaustively extracted in Soxhlet apparatus with methanol and distilled water. The solvent extracts so obtained were then filtered to remove any suspended impurities. Each extract was concentrated under reduced pressure and controlled temperature (55^0C to 60^0C). btained extracts were labeled as Aq for aqueous extract and MeOH for methanolic extract and then preserved in dry, cool condition in desiccator and used for experimental purpose.

4.3 Collection of blood sample

The blood samples used in the evaluation of the antisickling activity of the plant extracts in this study were taken from patients known to have sickle cell disease. The blood samples were collected in EDTA tubes and stored for maximum a few hours for the experiment.

4.4 Washing and Preparation of erythrocytes haemolysate

The erythrocytes were washed by centrifugation method as described by Alabdallat (2016). Within 2 h of collection of blood samples, portion of 1.0 ml of the samples were introduced into centrifuge test tubes containing 3 ml of sterile normal saline. The erythrocytes were separated from plasma by centrifugation at 1200 X g for 10 min, washed three times by the same centrifugation method with sterile normal saline. The erythrocytes were finally re-suspended in 1.0 ml of this buffer and stored at 4^0C. The washed erythrocytes were lysed by freezing/thawing as described by Galbraith and Watts (1980) and Kamber *et al*., (1984). The erythrocytes haemolysate was used for polymerization analysis.

4.5 Polymerization study

Sodium metabisulphite ($Na_2S_2O_5$) induced polymerization of HbS molecules was ascertained as described by Iwu *et al*., (1988) with minor modification according to Chikezie *et al*., (2010). The underlying principle is that HbS molecules undergo gelation when deprived of oxygen; sodium metabisulphite was used as reductant. The level of polymerization was monitored by recording increasing absorbance of the assay mixture with time. A 0.1 ml of HbS hemolysate was introduced into a test tube, followed by 0.5 ml of 150 mM phosphate buffered saline solution (NaCl 150mM, 120mM $Na_2HPO_4.2H_2O$, 30mM $NaH_2PO_4.2H_2O$ and pH=7.4) and one ml of distilled water. The mixture was transfer into cuvette and 3.4 ml of 2 % aqueous solution of sodium metabisulphite was added. The absorbance of the assay mixture was recorded with a spectrophotometer at every 30 second for 180 second at λmax = 700 nm (control sample). This procedure was repeated by substituting the distilled water with 1.0 ml of corresponding three increasing concentrations (250, 500 and 1000 µg/ml) of the both extracts (test sample) and parahydroxy benzoic acid (5mg/ml). Percentage polymerization was calculated according to Chikezie *et al*., (2010).

Percentage polymerization = $[A_{t/c}/Ac_{180\ sec}^{th}]$ X 100

Where $A_{t/c}$ = Absorbance of test/ control sample at time t sec.

$Ac_{180\ sec}^{th}$ = Absorbance of control sample at the 180^{th}sec.

Statistical analyses

All data were expressed as mean ± SE and the ANOVA was applied to determine the significance of the difference between the standard group and experimental groups by Dunnett's test.

Table 1 Phytochemicals present in MeOH and Aq extracts of *T. foenum-graecum* leaves.

Extracts / Phytochemicals	Methanol	Aqueous
Alkaloids	+	+
Saponins	+	+
Tannins	+	-
Sterols	+	+
Cardiac glycoside	+	+
Flavanoids	-	+
Phenol	+	+

+ = present, − = absent

Table 2 Percentage reduction of HbS polymerization in presence of aqueous and methanolic extracts of *Trigonella foenum-graecum* leaves with time.

Time(sec) / Groups	0	30	60	90	120	150	180
Standard	98.61±0.1	98.28±0.21	98.65±0.12	98.54±0.16	98.73±0.14	98.39±0.25	98.58±0.17
Aq 250	96.56±0.1	96.44±0.11	96.44±0.13***	96.59±0.14***	96.11±0.22	96.07±0.17	96.07±0.17
Aq 500	88.88±0.13	81.92±0.17	82.93±0.14***	81.70±0.13***	81.47±0.17	81.66±0.15	82.37±0.14
Aq 1000	89.26±0.22	87.43±0.10	86.98±0.28***	88.21±0.15***	88.66±0.19	89.30±0.12	90.12±0.11
MeOH 250	97.64±0.17	97.64±0.16	97.82±0.40	97.87±0.16*	97.42±0.17	97.30±0.23	97.19±0.17
MeOH 500	93.79±0.13	94.28±0..16	93.82±0.18***	94.39±0.17***	94.09±0.17	93.83±0.16	93.97±0.14
MeOH 1000	83.27±0.17	82.97±0.11	82.60±0.20***	83.27±0.17***	83.27±0.20	83.04±0.19	83.72±0.15

Each value expressed as mean ± SE, n=6, ***P<0.001, *P<0.05 Vs Standard

5. Results and Discussion

The qualitative phytochemicals analysis is useful in determining the presence of significant chemical constituents of the extracts. The results of preliminary analysis of phytochemicals are given in Table 1. Results indicated that methanol extract contain alkaloids, saponin, tannins, sterols, cardiac glycosides and phenol however aqueous extract showed alkaloids, saponin, sterols, cardiac glycosides, flavonoids and phenol.

The results presented in Table 2 showed that two extracts of *Trigonella foenum* caused significant ($p<0.001$) reduction in HbS polymerization, when compared to standard. For instance, within experimental time of 30-180 seconds, the polymerization range was between 2.36-19.22% and 2.13-17.4% upon the introduction on of aqueous and methanolic extract of *Trigonella foenum* respectively. Aqueous extract (250 and 1000µg/ml) at 90 second showed highest reduction in polymerization, 96.59±0.14% and 97.64±0.16% respectively. However, at 60 second, 500µg/ml aqueous extract exhibited maximum reduction 82.93±0.14%. Methanolic extract (250 and 500µg/ml) caused 97.87±0.17% and 94.39±0.13% reduction in polymerization at 90 second. At 180 second methanolic extract (1000µg/ml) inhibit the polymerization about 83.72±0.15%. After comparing the all test groups of both extracts, methanolic extract at 250µg/ml caused maximum reduction (97.87±0.17%) in HbS polymerization at 90 second, this fell gradually so that at the 180 second it was 97.19±0.17%. In present study, there was decrease in capacity of the both extracts to affect HbS polymerization between the 90-180 seconds.

In vitro deoxygenation of haemolysate HbS molecules by sodium metabisulphite caused aggregation and polymeriztion of the individual haemoglobin molecules. This process of gelation

(polymerization) of haemoglobin molecules resulted in increasing absorbance of the assay solution.
The present study showed that, at 90 second, aqueous and methanolic extracts of *Trigonella foenum* at their lower concentration (250µg/ml) exhibited maximum reduction in polymerization.
Previous reports have proposed the use of herbal preparations as candidate for management of sickle cell disease (Ekeke and Shode, 1985; Kade *et al*., 2003; Chikezie, 2006; Okpuzor *et al.*, 2008; Imaga *et al*., 2009; Imaga *et al*., 2010). Their proposals were drawn from the fact that these plant extracts, from *in vitro* studies, exhibited anti-sickling/polymeriztion property. The findings of this research are comparable to those previous reports.
Research findings have established that the capability of a biomolecule to impede *in vitro* polymerization depends on one or combinations of the following options: (a) the tendency and efficiency to bind to the complimentary contact region/site of deoxyHbS monomers (Chang *et al*., 1983; Charache *et al*., 1995; Abdulmalik *et al*., 2005); (b) modification of amino acid residues that contribute to the three dimensional structures of HbS contact region and other critical sites (Oyewole *et al*., 2008; Manning and Acharya, 1984; Xu *et al*., 1999); (c) stabilization of the R (relaxed) state of HbS molecule (Oyewole *et al*., 2008; Kark *et al*., 1978; Manning and Acharya, 1984; Stuart *et al*., 1994). The diminishing capacity of the plant extracts to inhibit polymerization of deoxyHbS molecule with progression of experimental time suggest that the constituents of the extracts did not covalently modify the amino acid residues unlike other reported compounds (Jensen *et al*., 1973; Manning and Acharya, 1984; Charache, et al., 1995; Xu *et al*., 1999; Mehanna, 2001; Chang *et al*., 1983; Abdulmalik *et al*., 2005).
Rather, the anti-polymerization principles of the plant extracts may have formed a relatively weaker hydrophobic interaction with the contact regions of HbS molecules that temporarily reduced polymerization of HbS monomers. Furthermore, the protein/ligand associations may have transiently stabilized the R-state conformation, but were subsequently displaced by more thermodynamically favorable interactions that cause and promoted haemoglobin polymerization (Chikezie, 2011). Therefore, the capacity of the two extracts to inhibit HbS polymerization was not sustained with the progress of experimental time.

6. Conclusion

For the first time we recorded this results. The results obtained in this study have shown significant *in vitro* antisickling activity of aqueous and methanolic extracts of leaves of *Trigonella foenum*. Further study on its isolation and characterization of active principle for antisickling activity is warranted.

7. References

1. World Health Organization. Drépanocytose et autres hémoglobinopathies. French.(2014).
2. Mpiana P.T., Misakabu F.S., Tshibangu D.S.T., Ngbolua K.N. and Mwanangombo D. T.: Antisickling Activity and Membrane Stabilizing Effect of Anthocyanins Extracts from Adansonia digitata L. Barks on Sickle Blood Cells. International Blood Research & Reviews 2(5): 198-212, (2014).
3. Mpiana P.T., Tshibangu D.S.T., Shetonde O.M., Ngbolua K.N.: In vitro antidrepanocytary activity (anti-sickle cell anemia) of some congolese plants, Phytomedecine.14:192-195, (2007).
4. Dharajiya D., Jasan H., KhatranI T., Kapuria M., Pachchigar K., and Patel P.: Evaluation of Antibacterial and Antifungal activity of Fenugreek (Trigonella foenum-graecum) extracts. Int J Pharm Pharm Sci, 8(4): 212-217, (2016).
5. Mehanna, A.S.: Sickle cell anaemia and antisickling agents, then and now. Current Medicinal Chem. 8: 79-88, (2001).
6. Asakura, T., Lian, L., Ollinger, F., Chen, Q., Iyamu, E.W., Abdulmalik, O., Zhang, C., Brugana, C. and Evans, G.: Current status of the NIH Sickle Cell Disease Reference Laboratory: Validation of 7 new therapeutic agents. Proceedings of the 43rd annual

meeting of the American Society of Haematology. Orlando, Florida. Abstract 2031 :487, (2001).
7. Nagel, R.L. and Chang, H.:. The status of the development of antisickling agents. In: Fried W (ed). Comparative clinical aspect of sickle cell disease. New York Elsevier. 163-170, (1982)
8. Vichinsky, E.P. (2002). New therapies in sickle cell disease. Lancet. 360 (9333): 629-631.
9. Snehlata H.S., Payal D.R.: Fenugreek (Trigonella foenum-graecum L.): an overview. Int J Curr Pharm Rev Res. 2:169-87, (2012).
10. Syeda B.B., Muhammad I.B., Shahabuddin M.: Antioxidant activity from the extract of fenugreek seeds. Pak J Anal Environ Chem. 9:78-83, (2008).
11. Alabdallat N.G. and Adam I.A.: In vitro Antisickling Activity of Zingiber officinale Roscoe (Ginger) Methanolic Extract on Sickle Cell Disease. British Journal of Medicine & Medical Research. 12(12): 1-7, (2016).
12. Galbraith D.A., Watts D.C.: Changes in some cytoplasmic enzymes from red cells fractionated into age groups by centrifugation in FicollTM/TriosilTM gradients: Comparison of normal human and patients with Duchenne muscular dystrophy. Biochem. J. 191: 63-70, (1980).
13. Kamber K., Poyiagi A., Delikonstantinos G.: Modifications in the activities of membrane-bound enzymes during in vivo ageing of human and rabbit erythrocytes. Comp. Biochem. Physiol. B.77B: 95-99, (1984).
14. Iwu M.N., Igboko A.O., Onwubiko H., Ndu U.E.:. Effect of Cajanus cajan on gelation and oxygen affinity of sickle cell hemoglobin. J. Ethnopharm. 20: 99-104, (1988).
15. Chikezie P.C.: Sodium metabisulphite induced polymerization of sickle cell haemoglobin incubated in extracts of three medicinal plants (Anacardium occidentale, Psidium guajava and Terminalia catappa). African Journal of Biotechnology. 10(32): 6154-6161, (2011).
16. Ekeke G.I., Shode F.O.: The Reversion of Sickled cells by Cajanus cajan. Planta Medica. 6: 504-507, (1985).
17. Kade IJ, Kotila OO, Ayeleso AO, Olaleye AA, Olawoye TL. Antisickling properties of Parquetina nigrescens. Biomed. Res. (Alligarh). 14: 185-188 (2003).
18. Chikezie P.C.: Studies on the anti-sickling effect of Azadirachta indica and Veronica amygdalina on HbSS eryhrocytes. Int. J. Nat. Appl. Sci. 2(1): 24-28, (2006).
19. Okpuzor J., Adebesin O., Ogbunugafor H., Amadi I.: The potential of medicinal plants in sickle cell disease control: A review. Int. J. Biomed. Health. Sci. 4(2): 47-55, (2008).
20. Imaga N.O.A., Gbenle G.O., Okochi V.I., Adenekan S.O., Edeoghon S.O., Kehinde M.O., Bamiro S.B., Ajiboye A., Obinna A.: Antisickling and toxicological profiles of leaf and stem of Parquetina nigrescens L. J. Med. Plant. Res. 4(8): 639-643, (2010).
21. Imaga N.O.A., Gbenle G.O., Okochi V.I., Akanbi S.O., Edeoghon S.O., Oigbochie V., Kehinde M.O., Bamiro S.B.: Antisickling property of Carica papaya leaf extract. Afr. J. Biochem. Res. 3(4): 102-106, (2009).
22. Chang H., Ewert S.M., Nagel R.L.: Identification of 2-imidazolines as anti-sickling agents. Am. Soc. Pharmacol. Exp. Ther. 23(3): 731-734, (1983).
23. Charache S., Terrin M., Moore R., Dover G., Barton F., Eckert S.: The effect of hydroxyurea on the frequency of painful crises in sickle cell anemia. N. Engl. J. Med. 332: 1317-1322, (1995).
24. Abdulmalik O., Safo M.K., Chen Q., Yang J., Brugnara C., Ohene-Frempong K., Abraham D.J., Asakura T.: 5-hydroxymethyl-2-furfural modifies intracellular sickle haemoglobin and inhibits sickling red blood cells. Br. J. Haematol. 128(4): 552-561, (2005).
25. Oyewole O.I., Malomo S.O., Adebayo J.O.: Comparative studies on antisickling

properties of thiocyanate, tellurite and hydroxyurea. Pak. J. Med. Sci. 24(1): 18-22, (2008).
26. Manning J.M., Acharya A.S.: The mechanism of action of two antisickling agents: sodium cyanate and glyceraldehyde. Am. J. Pediatr. Hematol. Oncol. 6(1): 51-54, (1984).
27. Xu A.S.L., Labotka R.J., London R.E.: Acetylation of human hemoglobin by methyl acetylphosphate; evidence of broad regioselectivity revealed by NMR studies. J. Biol. Chem. 274: 26629-26632, (1999).
28. Kark J.A., Kale M.P., Tarassoff P.G., Woods M., Lessin L.S.: Inhibition of erythrocyte sickling in vitro by pyridoxal. J. Clin. Invest. 62: 888-891, (1978).
29. Stuart J., Mojiminiyi F.B., Stone P.C., Culliford S.J., Ellory J.C.: Additive in vitro effects of anti-sickling drugs. Br J. Haematol. 86: 820-823, (1994).
30. Colah R. B., Malay B. Mukherjee, Martin S. and Ghosh K.: Sickle cell disease in tribal populations in India. Indian J Med Res. 141: 509-515, (2015).
31. Chikezie P.U., Chikezie C.M. and Amaragbulem P.I.: Effect of antimalarial drugs on polymerization of sickle cell hemoglobin (HbS). Turkish J. of Biochemistry. 35(1): 41-44, (2010).
32. Adegoke S.H., Adamu G.M., Ige J. A., Fatima B. and Rita O.: The effect of aqeous extract of Allium sativum (garlic) on erythrocyte osmotic fragility in normal and sickle cell. American J life sciences. 2(5): 278-281, (2014).
33. Egunyomi A., Moody J.O. and Eletu O.M.: Antisickling activities of two ethnomedicinal plant recipes used for the management of sickle cell anaemia in Ibadan, Nigeria. African J Biotechnology. 8(1): 20-25, (2009).
34. Alabdallat N.G.: In vitro antisickling activity of Achillea fragrantissima (Forssk) Sch. Bip (Qaysum) methanolic extract on sickle cell disease. Int.J.Pharm.Sci.Rev Res. 38(2): 248-251, (2016).
35. Imaga N.O.A.: "The use of phytomedicines as effective therapeutic agents in sickle cell anemia. Scientific Research and Essays. 5(24): 3803-07, (2010).
36. Ngbolua K., Bishola T.T., Mpiana T.P., Mudogo V., Tshibangu S.D., Ngombe K..N., Ekutsu E.G., tshilanda D.D., Gbolo Z.B., Mwanangombo D. T., Ruphin F. P. and Baholy R.: " Ethno-botanical survey, in vitro antisickling and free radical scavenging activities of Garcinia punctat Oli.". J Advanced Botany and Zoology. 1(2): 1-8, (2014).
37. Kaur M., Das G.P., Verma I.C.: Sickle cell trait and disease among tribal communities in Orissa, Madhya Pradesh and Kerala. Indian J Med Res. 55 : 104-9 (1997).
38. Orringer E. P., Abraham, D. J. and Parker, J. C.: Development of drug therapy. In: sickle cell disease: Basic principle and clinical practice ed. By Embury S.H., Hebell R.P., Mohandas N. and Steinberg M.H. Raven press, New York. (1994).
39. Jensen M., Bunn H.F., Halikas G., Kan Y.W., Nathan D. G.: Effect of cyanate and 2, 3-diphosphoglycerate on sickling relationship to oxygenation. J. Clin. Invest. 52(10): 2542-2547. (1973).

Effect of Iron Oxide (Fe2O3) Nanoparticals Exposure to Common Carp Fish

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ABSTRACT:
The nanostructure material is mostly focus on current research of nanoscience and nanotechnology. In the present work, focus was benign synthesis of iron nanoparticles by controlled oxidation of iron nanoparticles in the aqueous phase. The wide use of iron oxide nanoparticles (Fe_2O_3 NPs) in various applications has raised great concerns worldwide. In this work, we measured the potential harmful effects of Fe_2O_3 NPs on biochemical regulatory responses in common carp fish. In present study suggest that, the alterations of these parameters can be used as nonspecific biomarkers to monitor the environmental risks arising from nanoparticles in aquatic ecosystem and also regulate the use, production and release of nanoparticles.
Key Words: Fe_2O_3 NPs Synthesis, Characterization, Toxicity, Fish *Cyprinus carpio*

Introduction

Nanotechnology, this fundamentally different area of nanotechnology results from starting at the atomic scale and building up materials and structures, atom. Nanotechnology is the science and technology of small things- in particular, things that are less than 100nm is size. One nanometer is 10^{-9} meters or about 3 atoms long. For comparison, a human hair is about 60-80,000 nanometers wide. Nanotechnological products called often as a technology of the future used in various fields such as electronics, computer technology, cosmetics industry, in drug delivery or medical diagnostics and also in considerable interest as viable biomedical materials and research into them is growing due to their unique physical and chemical properties (Brigitta Szalay 2012). It is essentially molecular engineered nanoparticles in particular, having unwanted or unexpected negative impacts on biological systems, resulting in adverse consequences to human and environment. However, there is a lack of information concerning the impact of NPs on human health, as it was proved that the nanoparticles could be administered to human body by several routes including inhalation, ingestion, dermal penetration, and injection, the potential risks and negative effects of NPs followed by the distribution of these nanoparticles to various tissues through systemic circulation (Burch, 2002). Present study data suggest that the alterations of these biochemical parameters can be used as nonspecific biomarkers to monitor the environmental risks arising from nanoparticles in aquatic ecosystem and also regulate the use, production and release of nanoparticles.

The engineered nanoparticles (ENPs) in science and technology can finish up in aquatic ecosystems and recently these particles come into view as a new class of pollutants (Matranga and Corsi, 2012). Aquatic environment is predominantly prone to contamination from engineered nanomaterials, and our knowledge on the behaviour, entry and toxicity of these materials is very limited (Canesi *et al.,* 2010; *Scown et al.,* 2010). Previous studies indicate that exposure to ENPs could have harmful effects in invertebrates and fishes (Nelson et al. 2010; Matranga and Corsi 2012). Therefore, studies on safety and ecotoxicity of NPs are of intense importance for the sustainable development of nanotechnology. Moreover, the studies on the acute toxicity of nanomaterials to aquatic organisms are lacking, and for this reason it has become vital issue (Taju *et al.,* 2014). Consequently, the present investigation was carried out to evaluate short-term (24-h) exposure of Fe_2O_3 NPs on certain biochemical of an Indian Commen carp.

Materials And Method

Materials

All chemicals used in the study were reagent grade without further purification. Sodium borohydride

(99.99 %), sodium carboxymethyl cellulose (CMC) (MW = 90,000), sodium borohydride($NaBH_4$) were purchased from Aldrich,USA. All chemical have high percentage of purity.

Synthesis of iron oxide nanoparticles

Iron oxide nanoparticles were prepared by controlled oxidation of iron nanoparticles in the aqueous phase. Typically, stabilizer 0.5 g of carboxy methyl cellulose was dissolved in 100ml of deionized water followed by addition of $FeCl_2$ (0.2 M,20 ml) N_2 was purged for 15 minutes to promote the formation of Fe^{2+} - CMC complex. 50 mL of $NaBH_4$ (0.2 M) was then added into this precursor solution dropwise (5 mL/min) and the black iron NPs were formed immediately. Syntheses of NPs were carried out by Wang and Zhang (1997) method. After using Scaning Electron Microscope we are confirm the size of Iron Oxide Nanopartical, which size less than 100nm.

Characterization

FESEM Analysis: The particle size of the Fe_2O_3NPs was in the range of 50-100 nm (Fig 2).

Biochemical parameters

The estimation of protein concentration was done by Biuret and Dumas described by Dumas *et al.,* (1971). Glycogen was estimated following the Anthrone method of Van der Vier (1954). Results have been expressed as mg glycogen-g of tissue.

Result And Discussion

The toxicity of Fe_2O_3NPs to common carp was increased with concentration and with dependency. Although Fe_2O_3NPs at a concentration of 1 mg/L produced no mortality in common carp and also for control group were maintained for 24 Hrs. Mortality were calculated 24 hrs LC_{50} of 2.5 mg/L. exposed to concentrations of Fe_2O_3NPs separately exhibit many biochemical alterations (liver) have been summarized in table 1., FESEM and IR fig 2, and 3.

The release of nano products from various industrial sources can accumulate in the aquatic environment, and their potential for exhibiting environmental toxicity is also likely to increase (Scown et al., 2010). Previous studies on the acute toxicity of nanometals to aquatic organisms indicate that these materials can be lethal to fish with concentrations in the mg–lg/L range (Shaw and Handy 2011). Increase concentration of glycogen level as a result of stress, during the process of detoxification of active moieties and their metabolites. In the present investigation, no mortality was observed during the study period, and biochemical changes such as loss of equilibrium and gulping of air were noticed in fish exposed to high Fe_2O_3 NPs. A marked fall in the protein level in all the tissues of the fish was observed on exposure to Iron oxide NPs. Due to the acute toxic stress and generally the breakdown of proteins dominates over synthesis under enhanced proteolytic activity and, indicating a tissue condition favoring anaerobic respiration to meet the energy demands when aerobic oxidation is lowered (Arora et al., 2012; Brigitta Szalay, 2012; Dissanayake 2015).

Conclusion

Study concluded that of Fe_2O_3NPs by chemical reduction method using $NaBH_4$ and its toxicity test at 2.5ppm and under exposure Fe_2O_3NPs alters biochemical contents like Glycogen were increase, Protein decreased in the tissue of the sample fish, due to a decreased in the protein synthesis and cellular degradation.

Reference

1. Arora S, Rajwade JM, Paknikar KM. 2012. Nanotoxicology and in vitro studies: The need of the hour. Tox App Pharm 258:151-165.
2. Brigitta Szalay (2012): Iron Oxide Nanoparticles and their Toxicological Effects: *in vivo* and *in vitro* studies., PhD Thesis., University of Szeged.
3. Burch, W. M. (2002): Passage of inhaled particles into the blood circulation in humans.

Circulation 106, e141–e142, author reply e141–e142.
4. Canesi, L., Ciacci, C., Vallotto, D., Gallo G., Marcomini, A., Pojana, G., (2010): In vitro effects of suspensions of selected nanoparticles (C60 fullerene, TiO2, SiO2) on Mytilus hemocytes. Aquat Toxicol 96:151–158.
5. Dissanayake, N. (2015): Mutagenic Effects of Iron Oxide Nanoparticles on Biological Cells. *Int. J. Mol. Sci.* **2015**, *16*, 23482-23516; doi: 10.3390/ijms161023482.
6. Dumas B.T., Determination of total protein and albumin in serum, Clinc. Chem. Acta, 31, 87-96 (1971).
7. Le Van Nhan, Chuanxin Ma, Yukui Rui, Weidong Cao, Yingqing Deng, Liming Liuand Baoshan Xing (2016): The Effects of Fe2O3 Nanoparticles on Physiology and Insecticide Activity in Non-Transgenic and Bt-Transgenic Cotton, doi: 10.3389/fpls.2015.01263., Frontiers in Plant Science | www.frontiersin.org., Vol 6. Article 1263.
8. Matranga V, Corsi I (2012): Toxic effects of engineered nanoparticles in the marine environment: model organisms and molecular approaches. Mar Environ Res 76:32–40.
9. Nelson, S.M., Mahmoud, T., Shapiro, MBP., McIlroy, D.N., Stenkamp, D.L., (2010): Toxic and teratogenic silica nanowires in developing vertebrate embryos. Nanomed Nanotechnol Biol Med 6(1):93–102.,
10. Scown, T.M., van Aerle, R., Tyler, C.R.,: (2010) Do engineered nanoparticles pose a significant threat to the aquatic environment? Crit Rev Toxicol 40(7):653–670.
11. Shaw B J, Handy R D (2011) Physiological effects of nanoparticles on fish: a comparison of nanometals versus metal ions. Environ Int 37(6):1083–1097.
12. Taju, G., Abdul Majeed, S., Nambi KSN., Sahul Hameed, A.S., (2014): In vitro assay for the toxicity of silver nanoparticles using heart and gill cell lines of Catla catla and gill cell line of Labeo rohita. Comp Biochem Physiol Part C 161:41–52.
13. Van der Vier, J., (1954): Two methods for determination of glycogen in liver. Biochem J, 57:410-416.

2. Fishes for Experimental Test

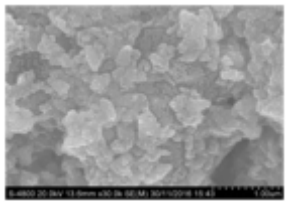

Fig 2. FESEM images of Fe_2O_3 NPs

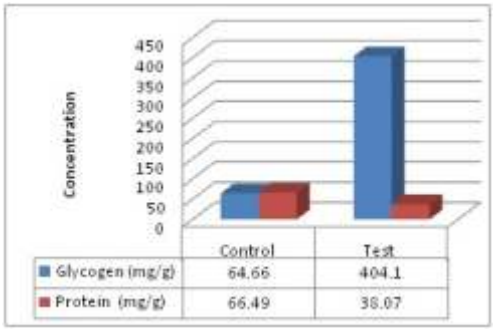

Table 1. Biochemical Parameters alters after exposure to Fe_2O_3 NPs at 24 Hrs.

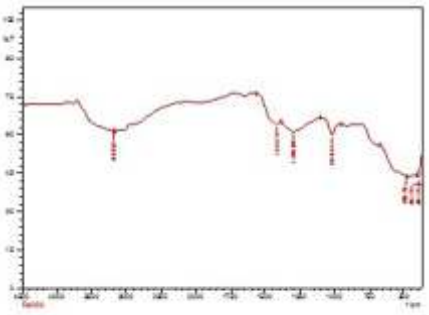

Fig 3. The IR of Fe_2O_3 NPs match with ref.

Effect of Iron oxide Nanoparticles (Fe_2O_3 NPs) on Biomarker of Common Carp fish.

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ABSTRACT:
Nanotechnology has achieved a great deal of public interest due to the needs and applications of nanomaterials in many achieve such as industry, agriculture, business, medicine, public health and many others. Iron Oxide nanoparticles are increasingly used for environmental remediation; however, impacts of iron oxide nanoparticles on biochemical effect on the aquatic ecosystem remain poorly understood. The increasing production and use of iron oxide nanoparticles (Fe2O3 NPs) will inevitably result in a greater exposure risk for both people and the environment. Thus, it has become essential to assess the potential health and environmental effects of Fe2O3 NPs on humans, non-human biota, and ecosystems. Hence, the present study of toxic effect of iron oxide nanoparticles on common carp fish. This study highlights the potential ecotoxicological effects of Fe2O3 NPs release in aquatic environments and may serve to encourage regulatory agencies in India to more carefully monitor and regulate the industrial use and disposal of Fe2O3 NPs.
Key words: Fe2O3 NPs, biochemical parameters, common carp fish (Cyprinus carpio).

INTRODUCTION

Nanoscience is the study of materials on the nanoscale level approximately between 1 and 100 nm (Rotello, 2003). Metal oxide nanoparticles are extensively used in a considerable number of applications in food, material, chemical and biological sciences (Aitken *et al.,* 2006). It is well known that bulk materials based on TiO2, SiO2, aluminium and iron oxides have been massively produced for many years (Kadar *et al.,* 2010).. Recently, nanoparticulate versions of these metal oxides have been manufactured and introduced in commercial products such as cosmetics and sunscreens (TiO2, Fe2O3 and ZnO) (Nowack and Bucheli, 2007). However,
due to the increasing interest of these nanomaterials to be used as potential devices for biomedical applications, water soluble iron oxide NPs is an active area of research. Iron is necessitated by most of living organisms because it is required for many to execute metabolic processes including oxygen transport, drug metabolism, steroid synthesis, DNA synthesis, ATP production and electron transport (Crichton, 1991). However, the use of iron in biological systems is associated with two problems: low solubility of free metal ions and generation of toxic oxidants. The increasing production and use of iron oxide nanoparticles (Fe_2O_3 NPs) will inevitably result in a greater exposure risk for both people and the environment (Chen *et al.,* 2011; Paur *et al.,* 2011). Thus, it has become essential to assess the potential health and environmental effects of Fe_2O_3 NPs on humans, non-human biota, and ecosystems. Hence, the present study of toxic effect of iron oxide nanoparticles on common carp fish. This study highlights the potential ecotoxicological effects of Fe_2O_3 NPs release in aquatic environments and may serve to encourage regulatory agencies in India to more carefully monitor and regulate the industrial use and disposal of Fe_2O_3 NPs.
NPs are of interest because of their novel properties such as small particle size, large surface-to-volume ratio and greater reactivity Kashiwada *et al*., (2006). However, the unique properties of these materials have raised questions concerning potential adverse effects on human and environmental health (Polak *et al.,* 2014; Soenen and De Cuyper, 2010). Metal oxide NPs may leak into natural bodies of water in their life cycles (production, storage, transportation, consumption, disposal, or reproduction), but relatively little is known about the magnitude of NPs released and exposed to organisms living in impacted aquatic environments, as well as the potential for toxic effects to aquatic species The increasing production and use of iron oxide nanoparticles (Fe_2O_3 NPs) will inevitably

result in a greater exposure risk for both people and the environment. Thus, it has become essential to assess the potential health and environmental effects of Fe_2O_3 NPs on humans, non-human biota, and ecosystems (Smith *et al.,* 2007; Remya *et al.,* 2014). Hence, the present study of toxic effect of iron oxide nanoparticles on common carp fish. This study highlights the potential ecotoxicological effects of Fe_2O_3 NPs release in aquatic environments and may serve to encourage regulatory agencies in India to more carefully monitor and regulate the industrial use and disposal of Fe_2O_3 NPs.

MATERIALS AND METHOD

Synthesis of iron oxide nanoparticles

Iron oxide nanoparticles were prepared by controlled oxidation of iron nanoparticles in the aqueous phase. Typically, stabilizer 0.5 g of carboxy methyl cellulose was dissolved in 100ml of deionized water followed by addition of $FeCl_2$ (0.2 M,20 ml) N_2 was purged for 15 minutes to promote the formation of Fe^{2+} - CMC complex. 50 mL of $NaBH_4$ (0.2 M) was then added into this precursor solution dropwise (5 mL/min) and the black iron NPs were formed immediately. Syntheses of NPs were carried out by Wang and Zhang (1997) method. After $NaBH_4$ was consumed, the compressed air was bubbled into the solution at a flow rate of 40 mL/min. The solution turned brown due to the oxidation. To stop the oxidation, the particles were centrifuged and washed with ethanol twice. After washing, the particles were redistributed in ethanol and dried in the oven at 90^0C.

Synthesis and Characterization

Iron oxide (Fe_2O_3) nanoparticle was synthesized by the slow chemical reduction method. 5 mM aqueous solutions of $FeCl_3$ (Merck) were prepared using de-ionized water. After the mixture was stirred for 20 min, pH was adjusted to 7.0 with a 5M NaOH solution; subsequently 10 ml of a 10 mM aqueous solution of $NaBH_4$ was poured instantaneously. A fine precipitate was obtained and filtered, then washed three times with de-ionised water, after that water was removed with NaBH4. NaBH4 was used as a dehydrating agent since it has a high solubility for water but not for the mental salts involved. After using scaning Electron Microscope we are confirm the size of Iron Oxide Nanopartical, which size less than 100nm.

Characterization

FESEM Analysis:

The particle size of the Fe_2O_3NPs was in the range of 50-100 nm (Fig 2). The FE-SEM image also reveals that iron nanoparticles tend to from a chainlike aggregate due to the magnetic attractive force between particles. These chain-like nano iron aggregates were also observed by (Phenrat *et al.,* 2007).

Biochemical parameters-Estimation of lipids: The estimation of total lipid concentration was done by Folch *et al.,* (1957).

Result And Discussion

The toxicity of Fe_2O_3NPs to common carp was increased with concentration and with dependency. Although Fe_2O_3NPs at a concentration of 1 mg/L produced no mortality in common carp and also for control group were maintained for 24 Hrs. Mortality were calculated 24 hrs LC_{50} of 2.5 mg/L. exposed to concentrations of Fe_2O_3NPs separately exhibit many biochemical alterations have been summarized in table 1., FESEM and IR fig 2, and 3.

Relatively small amount of work is available in the literature that discusses the toxicity of Cu nanoparticles in fish (Scown et al. 2010). The release of nano products from various industrial sources can accumulate in the aquatic environment, and their potential for exhibiting environmental toxicity is also likely to increase (Scown et al. 2010). Present study shows acute toxicity of Cu nanoparticles for common carp (*C. carpio*) as 2.5 mg/L and this is well in accordance with the acute toxicity of Cu nanoparticle in fish (24 h LC50) and principal toxic mechanisms were probably associated with the

physical and chemical characteristics of Cu nanoparticle and also reported as nanoparticles will cause toxic effect (Ramesh *et al.,* 2014) Previous studies on the acute toxicity of nanometals to aquatic organisms indicate that these materials can be lethal to fish with concentrations in the mg–lg/L range (Shaw and Handy 2011). In the present investigation, no mortality was observed during the study period, and biochemical changes such as loss of equilibrium and gulping of air were noticed in fish exposed to high Fe_2O_3 NPs. A marked fall in the lipid level in all the tissues of the fish was observed on exposure to Iron oxide NPs. Due to the acute toxic stress and generally the breakdown of proteins dominates over synthesis. (Arora et al., 2012; Brigitta Szalay, 2012; Dissanayake 2015)

Conclusion

Study concluded that of Fe_2O_3NPs by chemical reduction method using $NaBH_4$ and its toxicity test at 2.5ppm and under exposure Fe_2O_3NPs alters biochemical contents like lipid were decreased, The present data happens to constitute the first repor in Fe_2O_3NPs toxicity to fishes.

References

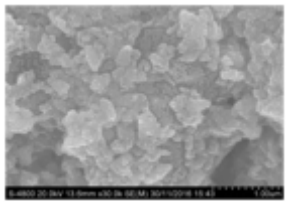
1. Aitken, R.J., Chaudhry, M.Q., Boxall, A.B.A. and Hull, M. (2006). Manufacture and use of nanomaterials: Current status in the UK and global trends. *Occup. Med.* 56: 300-306.
2. Arora S, Rajwade JM, Paknikar KM. 2012. Nanotoxicology and in vitro studies: The need of the hour. Tox App Pharm 258:151-165.
3. Brigitta Szalay (2012): Iron Oxide Nanoparticles and their Toxicological Effects: *in vivo* and *in vitro* studies., PhD Thesis., University of Szeged.
4. Canesi, L., Ciacci, C., Vallotto, D., Gallo G., Marcomini, A., Pojana, G., (2010): In vitro effects of suspensions of selected nanoparticles (C60 fullerene, TiO2, SiO2) on Mytilus hemocytes. Aquat Toxicol 96:151–158.
5. Chen, P.J., Su, C.H., Tseng, C.Y., Tan, S.W., Cheng, C.H., (2011): Toxicity assessments of nanoscale zero-valent iron and its oxidation products in medaka (*Oryzias latipes*) fish. Mar Pollut Bull 63:339–346.
6. Crichton, R.R. (1991). Inorganic biochemistry of ironmetabolism. West Sussex: Ellis Horwood.
7. Dissanayake, N. (2015): Mutagenic Effects of Iron Oxide Nanoparticles on Biological Cells. *Int. J. Mol. Sci.* 2015, *16*, 23482-23516; doi: 10.3390/ijms161023482.
8. Folch, J., Lees, M., and Sloane-Stanley, G.H. (1957) A Simple Method for the Isolation and Purification of Total Lipids from Animal Tissues, *J. Biol. Chem. 226*, 497–509.
9. Kadar, E., Lowe, D.M., Sole, M., Fisher, A.S and Jha, A.Nl. (2010): Hutchinson, Uptake andbiological responses to nano-Fe versus soluble FeCl3 in excised mussel gills. Ana Bioanal Chem., 396: 657–666.
10. Kashiwada, S. (2006). Distribution of nanoparticles in the see through medaka (*oryzias latipes*). *Environ. Health Perspect.* 114: 1697-1702.
11. Nowack, B. and Bucheli, T.D. (2007). Occurrence, behaviour and effects of nanoparticles in the environment. *Environ.Pollut.* 150: 5-22.
12. Paur, H.R., Cassee, F.R., Teeguarden, J., Fissan, H., Diabate, S., Aufderheide, M., Kreyling, W.G., et al. (2011).: In-vitro cell exposure studies for the assessment of nanoparticle toxicity in the lung−A dialog between aerosol science and biology. J Aerosol Sci 42:668-692.
13. Phenrat, T., Saleh, N., Sirk, K., Tilton, R. D., and Lowry, G.V. (2007): Aggregation and sedimentation of aqueous nanoscale zerovalent iron dispersions. Environ. Sci.

Technol., 41(1), 284-290.
14. Polak, N., Read, D. S., Jurkschat, K., Matzke, M., Kelly, F. J., Spurgeon DJ, Stu¨rzenbaum, S.R., (2014): Metalloproteins and phytochelatin synthase may confer protection against zinc oxide nanoparticle induced toxicity in Caenorhabditis elegans. Comp Biochem Physiol Part C 160:75–85.
15. Ramesh, M., Sankaran, M., Veera-Gowtham, V., Poopal, R.K., (2014): Hematological, biochemical and enzymological responses in an Indian major carp Labeo rohita induced by sublethal concentration of waterborne selenite exposure. Chem Biol Interact 207:67–73.
16. Remya, A. S, Ramesh, M., Saravanan, M., Poopal, R. K., Bharathi, S., Nataraj, D. (2014): Iron oxide nanoparticles to an Indian major carp, Labeo rohita: impacts on hematology, ionoregulation and gill Na^+/K^+ ATPase activity. J King Saud Univ Sci 27:151–160.
17. Rotello, V.M. (2003). Nanoparticles: Building blocks for nanotechnology. 1st edn., New York: Springer.
18. Scown TM, van Aerle R, Tyler CR (2010) Do engineered nanoparticles pose a significant threat to the aquatic environment? Crit Rev Toxicol 40(7):653–670.
19. Smith, C.J., Shaw, B.J. and Handy, R. D. (2007). Toxicity of single walled carbon nanotubes to rainbow trout (*Oncorhynchus mykiss*): Respiratory toxicity, organ pathologies and other physiological effects. *Aquat. Toxicol*.82: 94-109. .
20. Soenen, S.J.H. and De Cuyper, M., (2010): Assessing iron oxide nanoparticle toxicity in vitro: current status and future prospects. Nanomedicine, 5(8):1261–1275.
21. Walencik, J. and Witeska, M. (2007). The effect of anticoagulants on hematological indices and blood cell morphology of common carp (*Cyprinus carpio* L.). *Comp. Biochem. Physiol*. 146: 331-335.
22. Wang C. & W. Zhang, 1997. Nanoscale metal particles for dechlorination of PCE and PCBs. Environ. Sci. Technol. 31(7), 2154–2156.

Fig1: Schematic representation of synthesis of iron nanoparticles.

Completely Oxidised Fe_2O_2

2. Fishes for Experimental Test



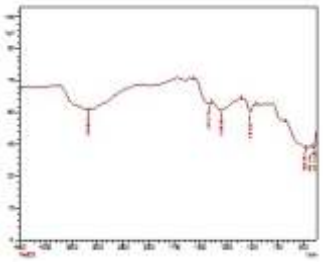


Fig 3. The IR of Fe_2O_3 NPs match with ref.

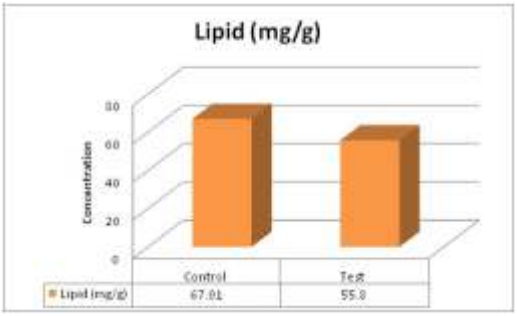


Table 1. Biochemical Parameters alters after exposure to Fe_2O_3 NPs at 24 Hrs

Efficacy of farmer's friend- Earthworm with reference to antibacterial activity and its conservation

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ABSTRACT:

Earthworm is well known annelid popular as farmer's friend. Abundantly found in damp area. Earthworm has efficiency to live in degraded material which contains many microbiota. The products of earthworm are vermicompost, vermiwash etc. The vermiwash contains many enzymes which has medicinal as well as agricultural activities. In relation to this, in present study an attempt has been made to evaluate the potency of coelomic fluid of earthworm against some microbial strains like *Salmonella typhi, Staphylococcus aureus, Proteus vulgaris, Escherichia coli, Bacilus subtilis* etc. The antibacterial activity was determined by well plate diffusion method by measuring the inhibition zone. Therefore, it is necessary to exploit the earthworm culture through the broad view of its scientific values and conservation.

Keywords: Earthworm, Antibacterial activity

Introduction

Earthworm is well recognized annelid in agricultural sector due to its productivity i.e. vermiwash and vermicompost. Both are best solid and liquid biofertilizer and they are best alternative for chemical fertilizers. Both vermicompost and vermiwash contain not only micronutrients like Potassium, Calcium, Ferrus, Magnesium, Nitrogen, Copper , Manganese, Zink etc. but bacteria and fungi also present, which is beneficial to increase soil productivity. Earthworm is well recognized in science community also for the reason that they use in ancient time as a food source as well as treatments of various ailments, like rheumatism, paralysis, headache, toothache, kidney diseases, muscle tone, skin diseases etc. Since to see all these properties the earthworm is vital creature so it is essential for both farmer and science community. The earthworm is easy to culture as they feed on organic matter which found anywhere. It is noticeable that the earthworm live with many microbes since it remains safe that means earthworm have an such type of molecule which is protect them from this microbes. In this regard present research work evaluates the coelomic fluid of Indian earthworm "Eisenia spp." for its antimicrobial potential.

Material and Method

Collection of coelomic fluid:

Collection of coelomic fluid is done by using 3.8 V batteries that remains no harmful effect on earthworm's body. After collection of coelomic fluid earthworms release in to culture. In this method of collecting the coelomic fluid, 7 to 8 earthworms were used. The earthworms were taken in large petri plate and stimulate the earthworm with gentle shock using 3.8 V batteries. After 10- 15 sec. from stimulation earthworms secrete off white colour coelomic fluid. Coelomic fluid was seemed like thick sputum, that's why it collects after dilution of distilled water. The concentration of coelomic fluid obtained by substraction of added distilled water from total obtained coelomic fluid.

Fig. Extraction of coelomic fluid

Microbes used in present study:

In present research work, two gramm positive strains and three gramm negative strains, namely *Bacillus subtilis, Staphylococcus aureus*, *Salmonella typhi , Escherichia coli, Proteus vulgaris*. All strains were collected from department of Microbilogy, Moolji Jaitha College, Jalgaon.

Culture Media and Inoculum

Nutrient agar was used for culturing and preparing agar plates. Certified bacterial strains were used for antibacterial study i.e. *Bacillus subtilis, Staphylococcus aureus*, *Salmonella typhi, Escherichia coli, Proteus vulgaris*. Using Agar well diffusion plate which is adapted from Mahajan et. al. (1999), the media used for microbial culture for bacteria was Nutrient agar. The bacterial cultures inoculated in NA were incubated at 37°C for 12 hours. The suspension was established between 0.08 and 0.10 AU which is equivalent to 0.5 McFarland 108cfu/ml, sterile nutrient broth.

Microorganism	Inhibition zone [Std(mm)]	Inhibition zone (mm)
Staphylococcus aureus	13.16 ± 0.65	4.16 ± 0.74
Salmonella typhi	5.33 ± 0.33	4.16 ± 0.47
Proteus vulgaris	19.66 ± 0.42	5.00 ± 0.36
Escherichia coli	8.33 ± 0.42	3.16 ± 0.40
Bacilus subtilis	20.16 ± 0.60	4.83 ± 0.30

Values expressed as mean ± standard error

Table: Zone of Inhibition of antibacterial activity by well diffusion method

The antibacterial activity determine by measuring zone of inhibition on agar plate after incubation at 370 C for 12 hours. The data arrange statistically as Mean ± SE of mean values of zone of inhibition. The coelomic fluid shows highest antibacterial activity against Salmonella typhi that is 4.16 mm ± 0.47 mm and for standard is 5.33 mm ± 0.33 mm, which is close to each other. The zone of inhibition of coelomic fluid against Staphylococcus aureus, Proteus vulgaris, Escherichia coli, Bacilus subtilis is 4.16 mm ± 0.74 mm, 5.00 mm ± 0.36 mm, 3.16 mm ± 0.40 mm, 4.83 mm ± 0.30 mm respectively. The zone of inhibition for standard against Staphylococcus aureus, Proteus vulgaris, Escherichia coli, Bacilus subtilis 13.16 mm ± 0.65 mm, 19.66 mm ± 0.42 mm, 8.33 ± 0.42, 20.16 mm ± 0.60 mm respectively.

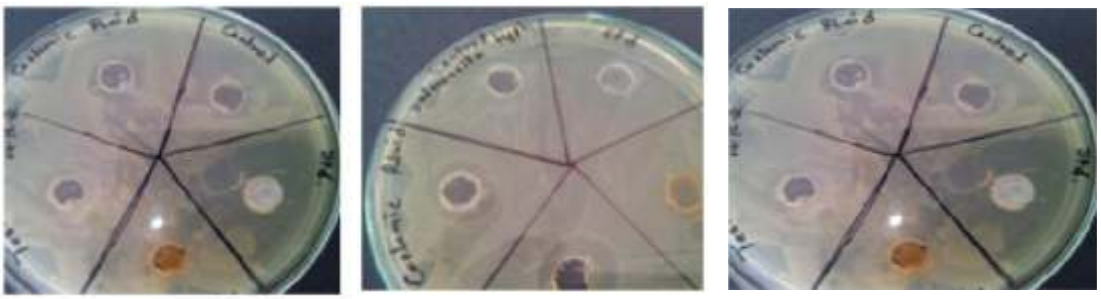

Fig. 2: Plates showing zone of inhibition.

Discussion

Earthworm immunity is somewhat like vertebrates involves both humoral and cellular mechanisms. The Ph. Roch in 1979 study and evaluate the polymorphic system of proteins in earthworm and they get evidence that in the secretion of chloragogen cells have bacteriostatic and plasma clotting systems are present in earthworm. Cho et. al., (1998) isolate and purification of proline rich antibacterial peptide "Lumbricin" from earthworm "*Lumbricus rubellus*". Shobha and Kale (2007) evaluate the Antimicrobial potency of earthworm, *Eudrilus eugeniae* against some soil born plant pathogens. On the other hand earthworm play important role in soil fertility also In 2013, M. Grdisa study on the role of earthworm in soil fertility and conclude that the earthworm is valuable and low cost source of many biomolecules they have whole variety of applications which is remarkably increase crop yielding and also effective in veterinary and human medicine. For this instances *Eisenia spp*. used in present study since the properties of above foreign earthworm may be transmit in Indian earthworm also *i.*e. *Eisenia* genera. The evidence shows in our result the coelomic fluid of *Eisenia spp*. is effective against *Salmonella typhi*, *Staphylococcus aureus, Proteus vulgaris, Escherichia coli, Bacilus subtilis*.

Conclusion

On the basis of result it has been concluded that the earthworm is essential creature for farmer community as well as in science community. The agricultural field is mostly depending on the nutritive fertilizers for increasing crop yielding capacity. The vermicompost and vermiwash is the best biofertilizer as compare to chemical fertilizers and it is safe to use, available easily, and ecofriendly. On the basis of our experiments the *Eisenia spp*. has a potential to inhibit some bacterial strains which is pathogenic to higher animal. especially coelomic fluid is strongly effective against *Salmonella typhi*. The earthworm gives us such amazing product which play vital role in agro as well as in human therapeutic also. So it is essential to conserve the earthworm in broad scale.

References

1. Mahajan, R.T.; Chaudhari, G.S. and Chopda, M.Z.: Screening of some indigenous plants for their possible antibacterial activity. Environment Bulletin.15. Pp- 10-11, -1999.
2. Shobha SV, Kale R.: Antimicrobial potency of earthworm, *Eudrilus eugeniae* on certain plant pathogens. Administrater, 2007.
3. Cho, J.H., C.B. Park, Y.G. Yoon and Kim, S.C. Lumbricin I: A novel proline-rich antimicrobial peptide from the earthworm: purification, cDNA cloning and molecular characterization. Biochim. Biophys. Acta. , 1408, 67-76, 1998.
4. Bhorgin, A. J. and Uma, K. M.: Antimicrobial activity of Earthworm Powder (*Lampito mauritii*), *International Journal of Current Microbiology and Applied Sciences,* 3, 437-443, 2014.
5. Y. Liu, Z. Sun, C. Wang, Purification of antimicrobial short peptide in earthworm *Eisenia fetida*, Biochim. Biophys. Acta, 36, 297-302, 2004.
6. M.S.Mohamed Jabir,S. Ramu, N.Shabeer, S.Shantkriti, S.Senthil Kumar, Preliminary Evaluation Of The Larvicidal Efficacy Of Coelomic Fluid of *Eudrilus eugeniae* on Anopheles Mosquito, International journal of pharmaceutical science invention, vol. 3, issue. 8, 20-27, 2014.
7. Yogendra Kumar Verma, Mahendra Kumar Verma, Earthworm - A Potential Source For Stable And Potent Antimicrobial Compounds, Isolation And Purification Study , International Journal Of Pharmacy And Pharmaceutical Science, Vol. 4, Issue. 4, 2012.
8. Yan-Qin LIU, Zhen-Jun SUN, Chong WANG, Shi-Jie LI, and Yu-Zhi LIU, Purification Of A Novel Antibacterial Short Peptide in Earthworm *Eisenia foetida*, Acta Biochimica et Biophysica Sinica, 36(4), 297-302, 2004.
9. Zhang Hua, Yan-Hong Wang, Hong-Wei Cao, Li-Jun Pu, and yu-Dong Cui, Purification of Protein from coelomic fluid of the earthworm Eisenia foetida and

evaluation of its hemolytic, antibacterial, and antitumor activities, Pharmaceutical Biology, 49(3). 269 – 275, 2011.
10. Elif Ozlem Arslan- Aydogdu, Aysin Cotuk, Antibacterial and Hemolytic Activity of the Coelomic Fluid of *Dendrobaena veneta* (Oligochaeta, Lumbricidae) Living in Different Localities, IUFS Journal of Biology, 67(1), 23-32, 2008.
11. J. Marlin Cynthia, K. Uma, R. Gouthami, Immunological response of *Lampito mauritii* (Kinberg) coelomic fluid determined by hemolytic activity and sperm cytolysis, International Journal of Innovative Research in Science, Engineering and Technology, Vol. 3, Issue 1, 2014.
12. Packialakshmi N and Mahalakshmi C, Effect of Earthworm Vermicompost and Coelomic Fluid Treating on Unfertile Soil, Research Journal of Pharmaceutical, Biological and Chemical Sciences, 5(2), 1630, 2014.
13. P.Kathireshwari, A.Alakesan, P.Abirami and P.Sangeetha, Antimicrobial activity of Earthworm Coelomic Fluid against disease causing microorganisms, International Journal of Current Microbiology and Applied Sciences, Vol. 3, 608-613, 2014.
14. Shweta Yadav, A Simple protocol to Isolate and Culture Coelomic Cells of Earthworms, International Journal of Current Microbilogy and Applied Sciences, Vol. 4, 1218-1221, 2015.
15. Dr, Shankerappa S. Hatti, Extraction of Coelomic Fluid from the Earthworm *Polypheretima elongata* for the antibacterial activities, Indian Journal of Applied Research, Vol. 4, Issue.1, 2014.
16. P. Valembois, Ph. Roch, M. Lassengues, N. Davant, Bacteriostatic activity of chloragogogen cell secretion, Pedobiolog 24, 191-195, 1982.
17. P. Valembois, Ph. Roch, M. Lassengues, Evidence of plasma clotting system in earthworms. *J. Invert. Pathol* .15, 221-228, 1988.
18. J.H. C.B. Park, Y.G. Yoon, S.C. Kim, Lumbricin I a novel proline-rich antimicrobial peptide from the earthworm: purification, cDNA cloning and molecular characterization. *Biochem. Biophy. Acta*. 1408, 67-76, 1998.
19. Ph. Roch, E.L. Cooper, E.L. Invertebrate immune responses: cells and molecular products, Adv. Comp. Env. Physiol. 23, 116-145, 1996.
20. Ph. Roch, Protein analysis of earthworm coelomic fluid. I. Polymorphic system of the natural hamolysin of *Eisenia fetida andrei*. Dev. Comp. Immunol. 3, 599 – 608, 1979.
21. M. Grdisa, K. Grsic, MD. Grdisa, Earthworm – role in soil fertility to the use in medicine and as a food. ISJ 10: 38- 45, 2013.


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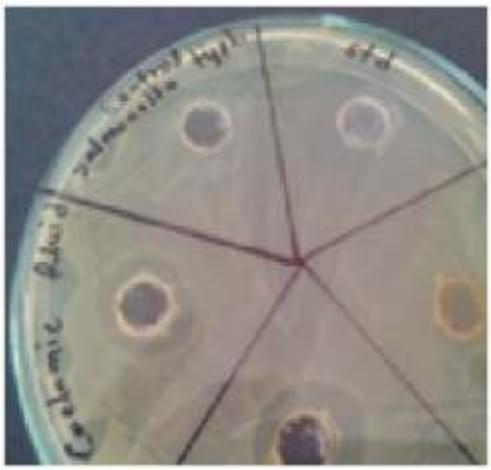


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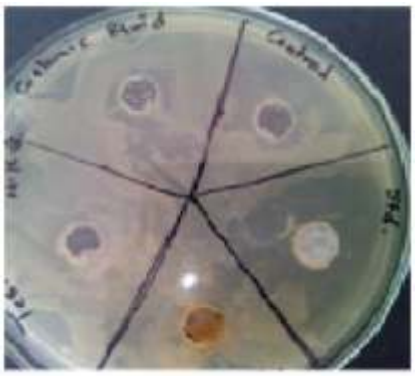

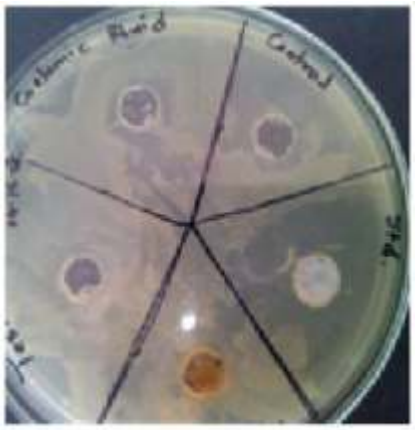

Determination of the antibacterial activity Antibacterial activity of coelomic fluids of earthworms was performed by dilution and agar diffusion assays against Gram negative and Gram positive bacteria (Table 1). Table 1. List of test organisms
Bacteria species
Citrobacter freundii
Pantoea spp.
Enterobacter cloacae
Klebsiella terrigena
Klebsiella pneumophila
Bacillus pumilus
Acinetobacter calcoaceticus
Bacillus megaterium
Bacillus cereus
Chryseomonas luteola
Stenotrophomonas maltophilia
Serratia marcescens
Non-diluted coelomic fluid of (V) displayed antibacterial activity against a broad spectrum of bacteria, including Citrobacter freundii, Pantoea spp., Enterobacter cloacae, Klebsiella terrigena, K. pneumophila, Bacillus pumilus, B. megaterium, B. cereus, Chryseomonas luteola, Stenotrophomonas maltophilia and Serratia marcescens (Table 2). Although, diluted (V) fluids was not effective as non-diluted (V) fluid, just B. megaterium strain was inhibited at least 50% ratio by all diluted (V) fluids. The antibacterial activity of (S) was less effective than (V) (Table 2). Non-diluted (S)
inhibited also nine bacteria species (C. freundii, Pantoea spp., E. cloacae, K. pneumophila, B. pumilus, B. megaterium, B. cereus, C. luteola and S. maltophilia). Additionally, Non-diluted (B) was effective on 8 bacteria species (C. freundii, E. cloacae, K. terrigena, K. pneumophila, B. pumilus, B. megaterium, S. maltophilia and S. marcescens). Nevertheless, all diluted (1:10, 1:100, 1:250 and 1:500) and non-diluted (B) suspensions were effective on C. freundii, B. megaterium and S. marcescens, whereas all dilutions of (V) and (S) only inhibited B. megaterium. In these experiments, growth of Acinetobacter calcoaceticus was not inhibited by any coelomic fluid suspensions. The antibacterial activity of coelomic fluids of three earthworms groups could not be detected with diffusion method (data not shown).

Impact of Engineered Copper Nanoparticals (Cu-Nps) on Fish

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ABSTRACT:
Cu-NPs are the unique properties and behavior of matter at the nanoscale. The impacts are related to the smaller size of the particles, their increased reactivity as a result of greater surface area per particle, or the greater number of particles in a concentration. With this respect that, the fish (animal model) cannot be effective to prevent xenobiotics, the particles also can enter the muscle easily. In the present study, toxicity and its biochemical effect on fish. As we know that one of the healthy foods for humans is fish. Knowing the fact that how engineered nanoparticle can affect fish and its body is becoming a hot topic, from this point of view, we have synthesized Cu-NPs by Crighton's method, their effect and potential in use of aquarium fish and farm fish as animal model for investigation. The current findings indicate that preventing the entry of Cu-NPs into the aquatic environment would seem to be essential.
Key words: Cu-NPs, biochemical parameters, common carp fish *(Cyprinus carpio)*

The research in nanotechnology has gained a significant priority worldwide. Many engineered nano size materials have been extensively used in consumer products but the adverse effects of these nanoparticles on the environment and organisms have recently drawn much attention (Aasma Noureen and Farhat Jabeen (2015). Nanoparticle (NP) is a microscopic object that behaves as a whole unit with respect to its transport and properties and differs largely from bulk materials of the same composition. The properties of NPs vary with size, shape and chemical environment and despite their widespread applications; NPs associated toxicity has gained significant importance in the last decade (Murray, Kagan, and Bawendi, 2000). Owing to its increased usage, there is an inevitable discharge of nanomaterials and of their byproducts from the industries in the aquatic environment, which causes adverse effects in the organisms (Mueller *et al.,* 2012). Knowledge on the interaction of NPs with biotic and abiotic components is scarce and currently there is no reliable method to assess nanomaterial toxicity (Arora, Rajwade, and Paknikar, 2012). However, it has been suggested that the bioavailability of metal NPs by aquatic pollution and subsequent accumulation in fish constitute a substantial risk to human health and to the environment (Shaw and Handy, 2011).

Nowadays, copper and its alloy nanoparticles have been prepared and used widely in microelectronic device, magnetic recording media and catalyst industry. The potential toxicity of copper nanoparticles (nano-Cu) has received increasing concern. Copper nanoparticles are generally used as antimicrobial (antiviral, antibacterial, and antifouling, antifungal), antibiotic treatment substitutes, nanocomposite coating, catalyst, lubricants, inks, filler materials for enhanced conductivity and wear resistance (Brownheim, 2011). Fish are vulnerable to copper nanoparticles because it can induce gill injury and acute lethality. Nano size copper particles are extensively used as a bactericide, additives in inks, lubricants, metallic coatings of circuits and batteries, for filtration of air and liquid. Metal oxides NPs such as copper (Cu), silver, titanium have garnered significant attention due to their negative ecological effects. Though the contamination is minimal, separate pockets of lakes and ponds isolated from the main river stream have a high level of metallic contamination. A wide range of NPs is being used as biosensor immobilizers for greater sensitivity and specificity.

The common carp, Cyprinus carpio is a freshwater teleost cultivated in various parts of the world, including India owing to its low cost of production, high muscle content and easy rearing. Despite its economic importance, this teleost is referred as an ideal experimental animal model for studying

ecology, developmental biology, and evolution. Therefore, the possible health effects and toxicology of Cu-NPs have caused great concerns in both the public interest. Hence, common carp research has received more attention in recent years for toxicity test. Fish are vulnerable to copper nanoparticles because it can induce gill injury and acute lethality. The present study aims to examine the effect of Cu-NPs toxicity of the common carp. However, the dosages used in our experiments were lower than other studies.

Materials And Method

Synthesis and Characterization

For the synthesis of Cu nanoparticles 10ml 1mM of CuCl2 was taken in 50 ml beaker and kept on a magnetic stirrer. Freshly prepared 30 ml of 2mM NaBH4 in ice cold water was added to above solution. The colour changes from black to pale greenish. The synthesized CuNPs were kept at room temperature for 24 hrs before using to let unreached NaBH4 escaped. The synthesis was achieved by using 1:3 molar ratio solutions of Cu+ and NaBH4. After using Scaning Electron Microscope we are confirm the size of Cu-Nanopartical, which size less than 100nm.

FESEM Analysis:

The particle size of the Copper NPs was in the range of 50-100 nm (Fig 2). The FE-SEM image also reveals that Copper NPs.

Biochemical parameters:

The estimation of protein concentration was done by Biuret and Dumas described by Dumas *et al.,* (1971). The lactate dehydrogenase (LDH) activity was determinated by the method of Nachlas *et al*., (1960) as modified by Pramilamma *et al*., (1975).

RESULT AND DISCUSSION

The toxicity of Cu NPs to common carp was increased with concentration and with dependency. Although Cu NPs at a concentration of 1 mg/L produced no mortality in common carp and also for control group were maintained for 24 Hrs. Mortality were calculated 24 hrs LC_{50} of 0.75ppm. exposed to concentrations of Fe_2O_3NPs separately exhibit many biochemical alterations have been summarized in table 1. and FESEM and IR fig 2, and 3.

In all tissues, there were interactions between time and Cu-NP levels, and also some significant differences were observed in Cu levels throughout the experiment. In this study, the Decrease activity of stress enzyme LDH indicates the alteration of normal homeostasis. The effect of metal NP on renal functions in other species is corroborative to present report (Handy *et al.,* 2011).

Alterations in the LDH isoenzyme spectrum tissues, induced by toxic conditions, reflect metabolic cellular dysfunction of these tissues. The degree of tissue damage and the LDH isoenzyme pattern reflects which tissues are damaged. LDH isoenzymes are suitable tools for the indentification of damaged organs. The roles of this enzyme as observed in the different animals when treated with the different pesticides were reported earlier (Velisek *et al*., 2008). The present study also analyzed the selected tissue as a central compartment for Cu metabolism.

Conclusion

Synthesis of copper nanoparticles by chemical reduction method using NaBH4. 2.Cu Nanoparticles shows toxicity at 0.75 ppm. 3. Protein concentration decreases and also LDH activity.

References

1. Aasma Noureen and Farhat Jabeen (2015): The toxicity, ways of exposure and effecs of Cu nanoparticles and Cu bulk salts on different organisms., International Journal of

Biosciences | IJB | Vol. 6, No. 2, p. 147-156.
2. Arora, S., Rajwade, J. M., & Paknikar, K. M. (2012). Nanotoxicology and in vitro studies: The need of the hour. Toxicology and Applied Pharmacology, 258, 151e165.
3. Brownheim SV. 2011. Characterization and *in vitro* toxicity of copper nanoparticles in murine neuroblastoma (N2A) cells. Department of Systems and Engineering Management, Graduate School of Engineering and Management, Air Force Institute of Technology. Air University USA.
4. David, M., Ramesh, H., Patil, V.K., Marigoudar, S.R., Chebbi, S.G., 2010. Sodium cyanide-induced modulations in the activities of some oxidative enzymes and metabolites in the fingerlings of C. carpio (L). Toxicol. Environ. Chem. 92, 1841–1849.
5. Dube, P.N., Shwetha, A., Hosetti, B.B., 2014. Impact of copper cyanide on the key metabolic enzymes of freshwater fish *Catla catla* (Hamilton). Biotechnol. Anim. Husband 30, 499–508.
6. G. A. Al-Bairuty, B. J. Shaw, R. D. Handy, and T. B. Henry, "Histopathological effects of waterborne copper nanoparticles and copper sulphate on the organs of rainbow trout (*Oncorhynchus mykiss*)," *Aquatic Toxicology*, vol. 126, pp. 104– 115, 2013.
7. Handy, R. D., Al-Bairuty, G., Al-Jubory, A., Ramsden, C. S., Boyle, D., Shaw, B. J., et al. (2011). Effects of manufactured nanomaterials on fishes: A target organ and body systems physiology approach. Journal of Fish Biology, 79, 821e853.
8. Mueller, N. C., Braun, J., Bruns, J., _Cerník, M., Rissing, P., Rickerby, D., et al. (2012). Application of nanoscale zero valent iron (NZVI) for groundwater remediation in Europe. Environmental Science and Pollution Research International, 19, 550e558.
9. Murray, C. B., Kagan, C. R., & Bawendi, M. G. (2000). Synthesis and characterization of monodisperse nanocrystals and close-packed nanocrystal assemblies. Annual Review of Materials Science, 30, 545e610.
10. Pramilamma, Y. and Swami, K. S. (1975): Glutamate dehydrogenase activity in the normal and denervated gastronemius muscles of frog *Rana hexadecatyla*. Curr. Sci., 44: 739–740.
11. Prashanth, M.S., 2012. Acute toxicity, behavioral and nitrogen metabolism changes of sodium cyanide affected on tissues of *Tilapia mossambica* (Perters). Drug Chem. Toxicol. 35, 178–183.
12. Shaw, B. J., & Handy, R. D. (2011). Physiological effects of nanoparticles on fish: A comparison of nanometals versus metal ions. Environment International, 37, 1083e1097.
13. Velisek, J., Svobodova, Z., Piackova, V., Novotny, L., Blahova, J., Sudova, E. and Maly, V. (2008): Effects of metribuzin on rainbow trout (*Oncorhynchus mykiss*). VeterinarniMedicina., 53(6): 324–332.

Mosquito repellant activity of lemon and clove

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ABSTRACT:
The mosquitos are one of the potent vector for sparing diseases. Globally, different products in the form of biological, electrical and chemical sources are being used to control the menace of mosquitoes. here a attempt to control this vector using commonly used editable herbal products from Kitchen. In this we used clove in leman to repeal mosquitoes and it found non allergic and totally safe to human.

Keyword: Lemon, clove, mosquito repellant

Introduction

Today's market is flooded chemical based mosquito repellent which were proved harmful & poisonous by the most researchers. Commercial repellents are prepared by using chemicalsl ike allethrin, N-N-diehyl-m-toluamide, dimethylphthalate and N, N-diethyl mendelic acidamide. It has been reported that these chemical repellents are not safe for public use Because of unpleasant smell, oily feeling to some users and potential toxicity (Pal et. al; 2011). Synthetic mosquito repellent used for control of vectors are causing irreversible damage to ecosystem and also chemicals are non-degradable in nature. The WHO reports that malaria, parasitic disease transmitted by mosquitoes. Mosquitoes are transmitted parasites and pathogens (Geeta and Roy 2014). They spread disease like malaria, dengue, Chikungunya. Mosquito can transmit malaria to more than 700 million people annually worldwide. Present investigation will emphasize on the preventive approach pertaining to malaria. Various herbal sources with mosquito repellent activities have been claimed in various Traditional resources like Ayurveda (Wannang et al, 2015). To evaluate the use of effective and affordable mosquito repellents activity of natural product to minimize the side effect of chemical insect repellant. An attempt has been made to prepare herbal based mosquito repellent several formulations like lemon and clove. Repellent Activity Repellent Activity of lemon and clove repellent activity was found to be approximately within 5-7cm area from where the prepared formulation was kept.

Materials and methods

The *Citrus limon* (Lemon) Linn. collected from field and *Syzygium aromaticum* (clove) Linn were collected from Market.

Mosquito larva containing water sample was collected from lotus pond situated in the Moolji Jaitha College, Jalgaon, Maharashtra. The collected sample is kept in the laboratory up to adult mosquito development inside net to avid absconding (Pal et al 2011).

To test the effect we make two compartments both having equal amount of mosquitoes. One compartment is for test and other is control. The test compartment has cloves inserted into half slice of lemon. Last four days of experiment we put clove powder with lemon juice in compartment II.

Table 1 Effect of cloves inserted in Leman on mosquitoes

Days	No. of Mosquito	Compartment I	Compartment II
1	25	20±1.34	5±0.98
2	23	19±1.22	4±1.15
3	18	12±1.38	6±1.22
4	14	10±1.18	4±0.85

Table 2 Effect of lemon juice mixed with clove powder on mosquitoes

Days	No. of Mosquito	Compartment I	Compartment II
1	18	14±1.25	4±0.98
2	24	16±1.35	8±0.96
3	19	15±1.38	4±0.92
4	25	18±1.36	7±.89

Results and Discussion

- In this research work, Natural base mosquito repellent was formulated successfully.
- Evaluation studies showed that the clove inserted in lemon was determined very efficient, convenient, and safe to use as up to 8 days of experiment.
- From this data it may be concluded that, strong effectiveness of clover powder and lemon juice shows up to last 4 days of experiment. No any complaints about allergic consequences. So, it is totally safe product.
- Although the formulation was not able to treat the malaria but it can minimize the prevalence of the disease. The formulation was also ecological, economical and pocket friendly.

References

- A.Manimaran, M. Mary Jee Jee Cruz, C.Muthu, S. Vincent and S.Ignacimuthu, Repellant activity of plant essential oils formulation against three disease causing mosquito vectors,, Journal of Agricultural Technology 2013; 845-854.
- B. Pattnayak and N.K.Dhal, Aug-Sep, 2015, Plants Having Mosquito Repellent Activity: An Ethnobotanical Survey, 1760-1765.
- Duangkamon Sritabutra, Mayura Soonawera, Sirirat Waltanachanobon, Supaporn Poungiai, 2011, Evaluation of herbal essential oil as repellents against *Aedesaegypti* (L.) and Anopheles *dirus* Peyton & Harrion, Asian Pacific Journal of Tropical Biomedicine
- Kodali Vidya Prabhakar, Kodali Kinnera, Kota Krishna priya and karlapudi Abraham Peele, July 2013, Investigation of the repellence activity Bio-Out, A natural Mosquito Repellent, 3.
- Mahesh Pal, Anil Kumar, Shri Krishna Tewari, 2011, Chemical Composition And Mosquito Repellent Activity Of The Essential Oil Of Plectranthus Incanus Link, 57-64.
- M.A. Ansari, P.K. Mittal, R.K. Razdan & U. Sreehari, September 2005, Larvicidal and mosquito repellent activities of Pine (Pinus Longifolia, Family: Pinaceae) oil, J Vect Borne. 95-99.

· Mohammad Barat Shooshtari, Hamed Haddad Kashani, Siamak Heidari and Ruhollah Ghanlandari, February, 2013, Comparative mosquito repellent efficacy of alcoholic extracts and essential oils of different plants against Anopheles Stephensi, 310-314.
· R V Geetha, Anitha Roy, April-June 2014, Essential oil Repellents- A short Revew. 6.
· Wannang N.N, Ajayi V.F, Ior L.D, Dapar L.M.P, Okwari V. A, Ohemu T,. June 2015, Mosquito repellent property of *Azadirachta Indica* Extract (Fruit Bark and Seed Kernel)., Scientific Journal (SCIRJ), III.

SECTION B

Commerce

"Customers Satisfaction Regarding Organized Retail Sector of Jalgaon City"

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Introduction:

Customer satisfaction is a term used to explain a situation when an exchange meets the wants and potential of its user. It captures the provision of goods or services that fulfill the customer's expectations in terms of quality and service in relation to the price paid. Customer satisfaction, as a business term, can also be used to measure how the supply of products or services surpasses customer expectations.

The retail sector includes all the shops that sell goods to the ultimate customer, who buys them for personal and not business use. It encompasses all kinds of shops, from kiosks and small groceries to supermarket chains and large department stores. In addition to traditional bricks-and-mortar shops, the retail sector includes mail-order and online businesses.

The growth in the Indian organized retail market is mainly due to the change in the consumer's behavior. This change has come in the consumer due to increased income, changing lifestyles, and patterns of demography which are favorable. Now the consumer wants to shop at a place where he can get food, entertainment, and shopping all less than one roof. This has given Indian organized retail market a major boost.

Review Of Literature:

U. Dineshkumar, P. Vikkraman, (Sep-Oct. 2012), "Customers Satisfaction towards Organized Retail Outlets In Erode City", in this research involves Customer satisfaction is widely recognized as a key pressure in the formation of consumers' future purchase intentions. Satisfied customers are also likely to tell others of their favorable experiences and thus engage in positive word of mouth advertising. The present study aims to investigate customer satisfaction in the organized retail outlets in Erode city of Tamil Nadu state in India.

Dr. S. Rosita, assistant professor, department of commerce, Madurai Kamaraj University, Madurai. e. Anand Kumar, research scholar, department of commerce, Madurai kamaraj University, Madurai. "customers' perception & satisfaction in organized retail sector in india"(August 2014), INTERNATIONAL RESEARCH JOURNAL OF MANAGEMENT AND COMMERCE VOLUME-1, ISSUE-5 ISSN: (2348-9766) in this research involvesRetailing, both as a consumer pastime and as an organizational activity, has changed significantly during recent years. It is one of the world's largest and most diverse industries. The Indian retail industry is no more nascent today.

Research Methodology:

Objective:-

1) To study customer awareness of organized retail sector.
2) To study of customer behavior of organized retail sector.
3) To study the customer satisfaction level regarding organized retail sector.

Primary Data:-

Primary data is collected from customers through questionnaire method which involves close ended questions. And researcher is used observation and discussion method.

Secondary Data:

The secondary data includes books, magazine, research paper, newspaper, articles etc. but out of these researchers is used research paper and internet website for collection of already published data.

Sample Size:-
Researcher is selected 100 Customers as a sample. These customers are doing shopping from Big Bazar, D-Mart, NavjivanSupershop, and other shops.

Data Analysis And Interpretation
4.1. Organized Retail Sector Prefer For Shopping

Table 4.1 Organized Retail Sector Prefer For Shopping

Option	No. of respondent	Percentage
D-Mart	28	28%
Big Bazar	22	22%
Navjivan	20	20%
Shubham Super Shop	10	10%
Other	20	20%

Interpretation:-
28% customers say that they prefer for shopping D-Mart. 22% customers say that they prefer for shopping Big Bazar. 20% customers say that they prefer for shopping Navjivan. 10% customers say that they prefer for shopping Shubham Super Shop. 20% customers say that they prefer for shopping Other Shop.

4.2 Reason for like to Particular Retail Chain

Table 4.2 Reason for like to Particular Retail Chain

Option	No. of Respondent	Percentage
Free offers	15	5%
Discount Scheme	80	26%
Attractive Price	70	22%
Customer Service	50	16%
Wide range of choices	95	37%
Other	0	0%

Interpretation: Out of 100 customers, 15% customers like to particulars retail chain due to free offers.80% customers like to particulars retail chain due to discount scheme.70% customers like to particulars retail chain due to attractive price.50% customers like to particulars retail chain due to customers service.95% customers like to particulars retail chain due to wide range of choice.

4.3Retail Chain Visit for Shopping

Table 4.3 Retail Chain Visit For Shopping

Option	No. of Respondent	Percentage
Big Bazar	90	37%
D-mart	60	25%
Navjivan	50	21%
ShubhamSupershop	40	17%

Interpretation:-
Out of 100 customers, 90% Customers visit to Big Bazar for shopping. 60% Customers visit to d-mart for shopping. 50% Customers visit to local market for shopping. 40% Customers visit to super shop for shopping.

4.4 Retail Chain for Regularly Shopping

Table 4.4 Retail Chain for Regularly Shopping

Option	No. of Respondent	Percentage
Big Bazar	75	75%
D-mart	30	30%
Navjivan	40	40%
Shubham Supershop	35	35%

Interpretation:-
Out of 100 Customers,75% Customers visit to Big Bazar for regularly shopping.30% Customers visit to D-Mart for regularly shopping. 40% Customers visit to local market for regularly shopping.35% Customers visit to super Shop for regularly shopping.

4.5 Satisfied Regarding Shopping In Organized Sector

Table 4.5 Satisfied Regarding Shopping In Organized Sector

Option	No. of respondent	Percentage
Yes	72	72%
No	28	28%
Total	100	100%

Interpretation:-
Out of 100 respondents, 72% customers are satisfied regarding shopping in organized sector.28% customers are not satisfied regarding shopping in organized sector.

4.6Satisfaction Level of Customers

Table 4.6 Satisfaction Level of Customers

Option	No. of Respondent	Percentage
Strongly satisfied	28	28%
Satisfied	32	32%
Neutral	20	20%
Dis-Satisfied	12	12%
Strongly Dis-Satisfied	8	8%

Interpretation:-
Out Of 100 customers,28% customers are strongly satisfied regarding organized retail sector like Big Bazar and D-Mart. 32% customers are satisfied regarding organized retail sector like Big Bazar and D-Mart. 20% customers are neutral regarding organized retail sector like Big Bazar and D-Mart. 12% customers are Dis-satisfied regarding organized retail sector like Big Bazar and D-Mart. 8% customers are strongly dis-satisfied regarding organized retail sector like Big Bazar and D-Mart.

FINDINGS:

- Maximum respondents (i.e. 28%) customers say that they prefer for shopping D-Mart and Big Bazar.
- Maximum respondents (i.e. 90%) Customers visit to Big Bazaar for shopping.
- Maximum respondents (i.e. 95%) customers like to particulars retail chain due to wide range of choice.
- Maximum respondents (i.e. 75%) Customers visit to Big Bazaar for regularly shopping.
- Maximum respondents (i.e. 72%) customers are satisfied regarding shopping in organized sector.
- Maximum respondents (i.e. 28%) customers are strongly satisfied regarding organized retail sector like Big Bazaar and D-Mart.
- Maximum respondents (i.e. 72%) Customers say that organized sector provide more facilities.

Conclusion:

Customers prefer organized retail sector for shopping. Maximum customers are say that they prefer for shopping D-Mart and Big Bazaar. They visit to Big Bazaar for shopping. Maximum customers like to organized retail chain due to wide range of choice and they visit to Big Bazaar for regularly shopping.

Customers are strongly satisfied regarding organized retail sector like Big Bazaar and D-Mart but some are satisfied regarding shopping in organized sector.

Customers say that organized sector provide more facilities like as free offers, discount, attractive price and they purchase cloths in organized retail sector.

Suggestions:

1) The consumer should be careful while making purchase decision they should be not be carried away with the promotional strategies employed by the retailers and make a proper analysis and make a purchase.

2) As a far as the organized retail sector is concerned they should make a careful study before making investments because the need of the hour and biggest challenge is the retail space and the cost of rentals.

REFERENCES:

Research paper:-

U. Dineshkumar, P. Vikkraman, (Sep-Oct. 2012), "Customers Satisfaction towards Organized Retail Outlets In Erode City", IOSR Journal of Business and Management (IOSRJBM) ISSN: 2278-487X Volume 3, Issue 4 (Sep,-Oct. 2012), PP 34-40

Dr. S. Rosita, assistant professor, department of commerce, Madurai Kamaraj University, Madurai. e. An and Kumar, research scholar, department of commerce, Madurai kamaraj University, Madurai. "Customers' perception & satisfaction in organized retail sector in India"(August 2014), INTERNATIONAL RESEARCH JOURNAL OF MANAGEMENT AND COMMERCE VOLUME-1, ISSUE-5 ISSN: (2348-9766)

Internet Website:-

http://www.iosrjournals.org/iosr-jbm/papers/vol3-issue4/E0343440.pdf
http://shodhganga.inflibnet.ac.in/bitstream/10603/13557/9/09_chapter%201.pdf
https://www.worldwidejournals.com/paripex/file.php?val=November_2014_1416651229__12.pdf

Cost Comparison of "Effective Waste Management System" & Its Adverse Effect on Public Health" in Jalgaon City

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ABSTRACT:

Jalgaon Citizens are suffering from improper waste management and diseases that spreads through proliferation and incubation of flies, mosquitoes etc. on such dirty waste disposal sites. At one side Jalgaon City Municipal Corporation is incurring huge expenditure on waste management for better public health, whereas on another side Jalgaon Citizens is also incurring huge medical cost because of improper waste management by Municipal Corporation. These shows the lacunas of JCMC waste Management System. Present research paper studies the actual situation in terms of cost and provides suggestions for effective and efficient waste management system for Jalgaon City Municipal Corporation.

Introduction

House waste disposal containers and sites are found within and outskirts of Jalgaon City, turning into root source of contamination due to incubation and proliferation of flies, mosquitoes and rodents. This is turning into transmission of diseases like Dengue, Swine Flu, Malaria, Chikun Gunia etc. It not only affects population's health but also financial positions. Further it is troubling question that to whom the liability of waste management lies with, Government or individuals. Therefore, this study is design to answer the above Questions and measure for good waste management system.

Objectives

Objective of the present study are

- To study the waste disposal behavior of Jalgaon City Public.
- To compare cost of waste management and its adverse impact on public health and financial position.
- To suggest healthy & economic household garbage disposal System

Hypothesis

H0— there is no relation between waste management practice and public health

Ha—there exists relation between waste management practice and public health

Research Methodology

Primary data is collected through observations and questionnaires. Sample size is determined by Cochran's (1977) formula. Actual sample size was 171 out of which 111 respondents responded to questionnaire. Simple Convenient Sampling Technique is used to collect the primary data. Primary data also include unstructured interviews of Public Health Officer, Jalgaon City Municipal Corporation.

Secondary data is collected through newspaper cuttings, Articles and research papers in renounced journals, Reports published by Jalgaon City Municipal Corporation, Web sites etc. Hypothesis is proved with the help of chi-square test for associations

Importance

- Helps to take actual scenario of present waste management system giving its lacunas.
- Suggestions from the project shall be referred to other municipalities also for better,

healthier and effective waste management practices.

Limitation

Present study suffers from some limitations, which are as follows,

- Reliability of primary data depends on response from respondents
- Due to improper management, secondary data collected from Jalgaon Municipal Corporation is Difficult.

Present Waste Management System of Jalgaon City

According to the law, responsibility of city waste management lies with Area Municipal Corporation. In case of Jalgaon City, department of Public Health along with Public Health Officer is shouldered with the responsibility of Jalgaon City Waste Management. With objective of making this job easy, effective and more efficient, the contract of Jalgaon City Waste Collection and Disposal for 20 yrs. was given to Hunjar Biotech Pvt. Ltd (a company with green technology to recycle Mixed Solid Waste into valuable green products.). on 12th June 2010. The project was inaugurated by Past President of India Smt. Pratibhatai Patil. Project ran very well till 2013. But on 24th June, 2013 the contractor stop this project without any prior notice to JCMC. From thereafter the responsibility of Jalgaon City Waste Management is looked after by Department of Public Health JCMC.

However improper and flawful management by this department has led to incure huge cost which was revealed during "Swaccha Bharat Abhiyan Sarvekshan".

Cost incurred by this Department on diesel and maintenance is as follows –.

Years	Diesel (Rs.)	Maintenance (Rs.)
2014-15	1,17,08,322	18,32,207
2015-16	1,05,93,235	26,28,323
2016-17 (till 30 Nov)	84,07,994	14,00,217

Current Workforce cost (2016-17)

Employees	Monthly Pay	Annual Pay	Total
276	17,000	2,04,000	5,63,04,000
654	7,250	87,000	5,68,98,000
930			1,32,02,000

Expected workforce cost according to SWM Survey 2017

Employees	Monthly Pay	Annual Pay	Total
1,213	17,000	2,04,000	24,74,52,000
654	7,250	87,000	5,68,98,000
Total			30,43,50,000

Overflowing garbage and waste bin in and around Jalgaon City has resulted in traffic jam on main roads of city and many people have suffered from diseases which spread through Mosquitos, Flies proliferating on such overflowing garbage bins. Further JCMC is not caring our proper waste disposal procedure. All collected City garbage is dumped at the place of project of JCWM given to Hunjar Biotech Pvt. Ltd on contact basis. This improper dumping of garbage has resulted in pollution of air,

earth and environment.

On the one side JMCM is showing huge cost on waste management, at the same time Jalgaon citizen are suffering from medication and many complexities due to improper waste management. Hence cost incurred by JMCM is not going back to Jalgaon Citizen in the form of Clean City Management.

This shows that, Department of Public Health and JCMC has failed to fulfill its responsibility of Jalgaon City Waste Management.

Review of literature

A report by Asian Development Bank on Solid Waste Management in Nepal: Current Status and Policy Recommendations (2013)Notified that household waste contributed about 50 per cent –75 per cent of the total municipal solid waste i.e. 317 g/capita/day in 58 municipalities of Nepal. Out of this, organic waste accounted for the highest fraction. These municipalities in Nepal were unable to manage municipal solid waste effectively because of the lack of technical and human resources, statistical records, proper planning, insufficient budget and lack of political leadership.

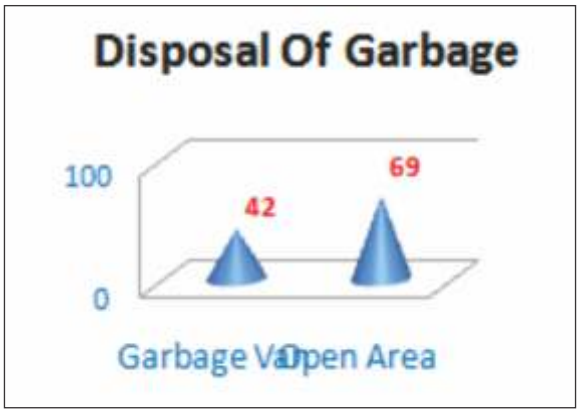
According to Tunmise A. Otitoju, in his paper,"Individual Attitude toward Recycling of Municipal Solid Waste in Lagos, Nigeria." - One of the most important aspects of public participation is to get each and every individual to cooperate in the daily waste management activities. These activities include waste separation, proper storage and placement of individual waste in containers, discipline in the use of public collection points, placement of waste bags in the collection points at the right day of collection, participation in composting activities, etc. These aspects can be enhanced with the help of continuous education campaigns through a reliable media for easy access and must be transparent. Thus for effective waste management, active participation of citizen is also required along with responsible Municipal Corporation.

According toI.B.Addo, D. Adei and E.O. Acheampong, in their research paper, "Solid Waste Management and Its Health Implications on the Dwellers of Kumasi Metropolis, Ghana" - The perception of the heads of household respondents is that accumulation of solid waste in close proximity to residential areas constitutes a pathway to many diseases including malaria, typhoid fever, intestinal worm infections, cancer, diarrhea and hepatitis The households adopted the use of skip containers, pit at backyard and burning of wastes as processes of disposing off their wastes. Improper management of these approaches affected the health status of the households. Household residents living near dumpsites were prone to more bouts of solid waste related diseases as a result of exposure to toxic pollutants from the open dumpsites. The physical observation of wastes at collection points in the sampled communities revealed that most of the collection centers were not collected on time from the households and exacerbated in the indiscriminate disposal of waste in the communities. Challenges faced by waste managers included; high operation cost, inadequate funding equipment and personnel. The paper argues that's agitation should not be negotiable and/or compromised. Adherence to proper sanitary practices should be promoted at all cost to improve the health status of all household residents.

Analysis and Interpretation of Data

The data collected through the well-structured questionnaire are analyzed and interpretations made on the basis of such analysis are represented as below:

57% of the respondents are habitual to maintain special dustbins for wet and dry garbage. Whereas 43% people are throwing garbage in same dustbin, without segregating it into dry and wet category. 42 of respondents dispose off garbage into garbage van, whereas 69 respondents throw garbage on open area, either because garbage van are not visiting to their areas, or they are not regular or there is no proper schedule of visit. Thus majority of respondents are throwing garbage on open



areas.

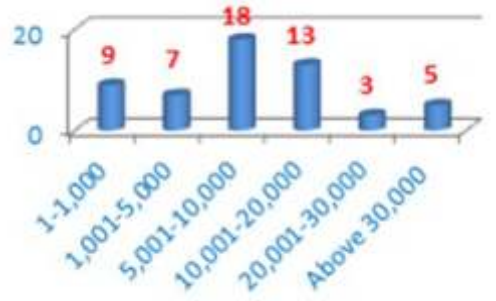
38 % respondents are maintaining compost bins, whereas 62% respondents are not maintaining compost bins. When the question was asked "would you like to have com- post bins in future?" 31% Respondents answered yes, whereas 69% said no and reasons behind that were- either they do don't have that much time or they don't have space or they don't need it. However, all this reasons are not valid

Majority of respondents said they have 3-5 members in their family. This shows that lot of bio degradable waste is produced every day at these respondents, which can help to produce biogas or compost fertilizer. But because of ignorance or lack of guidance a huge resource of energy is wasting.

48% respondents doesn't use any fertilizer for their garden or shared garden, whereas 52% respondents uses fertilizers to nourish their gardening. Among those 31% respondents uses chemical fertilizers and 69% respondents uses compost fertilizers. Again when this 69% respondents were asked do you prepare you own compost? 75% respondents answered no, whereas only 25% respondents said yes, they prepare compost fertilizers at home. This shows the laziness of respondents. When respondents were asked whether any family member has suffered from below mentioned diseases in last two years, 23 respondents said, they suffered from Typhoid, 22 from Dysentery, 11 from Malaria, 8 from Dengue, & 7 from Yellow Fever, & 2 from Chikungunia and 2 from Cholera. This data shows that huge population has suffered from diseases, majorly caused by improper waste management.

10 respondents took one week to get recover, 13 respondents took 2 weeks, 22 respondents took 3-5 weeks, 8 respondents took weeks, 2respondents took more than 8 weeks to get

recover and many are still in recovery period.Among them 39% respondents said they got paid leave for recovering, whereas 61% responds were unpaid during their leave. These shows that many people are facing harassment because of improper waste management.



9 respondents incurred Rs.1-1,000 cost of medication, whereas 7 respondents incurred Rs.1,001-5,000, 18 respondents incurred Rs.5,001-10,000, 13 respondents incurred Rs.10,001-20,000, 3 respondents incurred Rs.20,001-30,000 and 5 respondents have incurred more than Rs.30,000 cost on medication of above mentioned diseases.Thus on the once hand this citizen have no source income due to unpaid leave and on other hand they have to pay big amount for medication to get recover soon.

8% respondents said that they have lost their job during medication leave.This means every 8 Citizens out of 100, are losing their job during to medication leaves of diseases spreads through improper waste management.

41% respondents have never informed to Municipality when garbage bins around their residential area are overflowing whereas 59% respondents have informed to Municipality.This shows that many citizens are not fulfilling their duties.

44% respondents said that they are happy with the waste management system around their residential area, whereas 56% respondents are not happy.This means that majority of citizens are not happy with the

existing waste management system of the City

Among those who were unhappy with existing waste management system only 43% respondents have informed to Nagarsevak about their unhappiness, where as 57% responded said that they had never talked to Nagarsevak of their area.38% of respondents had given suggestions to their Nagarsevak or Municipality and 62% respondents had never given their suggestions to Nagarsevak not to Municipality. They said either they don't think that someone will hear them or they had never come up with any ideas for more effective Waste Management System. Among those who had informed to Nagarsevak or Municipality, 21% respondents said that their suggestions are implemented whereas rest 79% respondents said that their suggestions were no implemented.In short this shows that majority of Citizens of Jalgaon City are ignorant about their duties towards clean and healthy Waste Management Practices.

10% of the respondents said that only municipality is responsible for waste management of city, 2% respondents said only Public and 88% respondents said Both-Public and Municipality are together responsible for Waste Management of City.

Thus without active participation and cooperation of Public and Municipal Corporation, Effective and Healthy Waste Management System is not possible. Further Medication cost incurred is determined by Hospital, Doctor and Pathologist citizens opt for. Medications rates are higher for

specialty Hospital and M.D. Doctors as compared to General Hospital and General Doctor. Further patients history, tendency and

No.	Test	Civil Hospital (Rs)	Private Hospitals (Rs)
1	H.B.	20	100-120
2	Malaria	30	400-500
3	Urine	30	150-175
4	Stool	35	150-200
5	Platelet	35	150-300
6	Dengue	125	550-600 & Above

combination of diseases determines to medication cost that could be incurred. Following table shows the medical test and their charges in Civil Hospital of Jalgaon.

Though Maharashtra Government had laid down the ceiling of Rs600 for Dengue test, many Pathologists are charging more than that. **In nut shell we can interoperate that though Jalgaon Municipality is incurring huge cost on Waste Management, it is no going to Public in returns of clean and healthy environment. In fact due to improper waste management**

	Typhoid	Malaria	Dysentery	Dengue	Yellow Fever	ChikunGunia	Cholera	Total
Open	18	7	15	4	4	2	1	51
Garbage Van	4	4	8	4	3	0	1	24
Total	22	11	23	8	7	2	2	75

system citizens are suffering from huge medication cost and financial, mentally harassment.

Hypothesis Testing To test the hypothesis of the present study chi square test for association is used. Results of the test are as below:
P Value = 0.032019502
P value of the chi Square test for given data is less than0.05 i.e. level of significance
Thus H0 is rejected and Ha is accepted
Thus, there exists relationship between waste management practice and public health.

Conclusion

- No Coordination among public and Municipal Corporation Waste Management System.
- Citizens are ignoring their duties.
- "A Rupee &A Minute Invested in for healthy Waste Management Practice, can save & earn Thousands of Rupees & minutes for future Medication."
- Public ignorance towards "Healthy & Environment Friendly" Waste Management tools & techniques.
- Public and municipality are together responsible for Waste Management.

Suggestions

- Introducing "Waste to Energy Concept"
- Levying Landfill Ban and Landfill Tax
- Re-Scheduling the Routes for Garbage Van
- Separate bins for Organic & Inorganic Waste
- New easy and convenient Mobile App for public
- Use of CCTV Camera
- Use of GPS Machines
- Assigning a person to each Garbage Van

The anticipated cost sheet for above mentioned suggestions is given below -

Suggestions	Expected App. Cost
New easy and convenient Mobile App for public	Rs.87,000-88,000/-
Use of CCTV Camera	Installation 9,750*100=Rs.9,75,000/-
Use of GPS Machines	7,000*103=Rs.7,21,000/-
Assigning a person to each Garbage Van	7,250*12*103=Rs.88,74,000

References

Bibliography

B. C. Sarker, S. K. (n.d.). Public Awareness about Disposal of Solid Waste and its Impact: A Study in Tangail Pourashava, Tangail. J. Environ. Sci. & Natural Resources, 5(2): 239 - 244 , 2012 .

Christianson, T. A. (n.d.). Rural-Urban differences in environmental knowlede and actions. Hournal of Environmental Education25(1) , 19-25.

Dunlap, K. D. (n.d.). Environmental Concern:Does it make a difference how it, is measured? Environment and Behaviour, 13 , 651-676.

Foday Pinka Sankoh, X. Y. (2013). Environmental and Health Impact of Solid Waste Disposal in Developing Cities - A Case Study of Granville Brook Dumpsite Freetown, Dierra Leone. Journal of Environmental Protection , Vol4, 665-670.

I.B. Addo, D. A. (July25, 2015). Solid Waste Mangement and Its Health Implication on the Dwellers of Kumasi Metropolis, Ghana. Curremt Researcj Journal of Social Sciences , Vol7(3),.

M. R. A. Moghadam, N. M. (2009). Municipal solid waste management in Rasht City, Iran. Journal of Waste MAnagement , 485-489.

Olufemi, K. (Vol 4, No 4, November 2013). Health Consequences of Indiscriminate WAste Disposal by Market Women. Mediterranean Journal of Social Science, Rome, Iatly , 553.

Otitoju, T. A. (2014). Individual Attitude Toward Recyclign of Municipal Solid Waste in Lagos, Nigeria. Ameriacal Journal of Engineering Research (AJER), V-03, Issue-07 , pp-77-88.

Petts, J. (n.d.). Effective Waste Management: Understanding and dealing with public concerns. Waste Management & Research , 207-222.

R.K. Henry, Z. Y. (n.d.). Municipal solid waste management challenges in developing countries - kenyan case study. Journal of Waste Management , 92-100.

T. Hazra, a. S. (n.d.). Solid Waste Mangement in Kolkata, India: Practices and challenges. WAste Management , 470-478.

आरोग्यविभागाच्यावाहनांवरकोटींचाखर्च . (२०१७ , जानेवारी२). दिव्यामराठी, सिटीकनेक्ट (जळगाव) , p. ४ .

घनकचराप्रकल्पासाठीनव्यानेअहवाल . (२०१७, जानेवारी२). लोकमतशहरविशेष (जळगाव) , p. २.

सरप्राईझविझिटनेकरणारस्वचछसर्वेक्षण . (२०१७, जानेवारी४). दिव्यामराठी,सिटीऍक्टिव्हिटी-दिव्यासिटी (जळगाव) , p. ४ .

स्वचछभारताच्यापरीक्षेतहंजरचाअडथळा..... (२०१७, जानेवारी४). लोकमतशहरविशेष (जळगाव) , p. ४.

"A STUDY ON GREEN HRM PRACTICES AND ITS AWARENESS IN JAIN IRRIGATION SYSTEMS LTD, JALGAON"

Authors & affiliations:
Dr. A. P. Sarode, Thosare Nikhil Prabhakar, KolaseKomalArun, Nagar DivyaMurli

1. Introduction:

Green HR is presented to the panel of business professionals with the result pointing towards eco-friendly initiative which helps to reduce an employee carbon footprint. The results included to meet is: electronic filing, ride sharing, teleconferencing and virtual interviews, recycling, telecommunicating, online training, and developing more energy efficient office spaces. Not only we are reading about how to become more "Green" but we are seeing these concepts implemented more and more each & every year.Green HR also includes Carbon Footprint, Recycling, Videoconferencing, Reducing printouts / Reduces Paperwork, Carpooling, etc.

2. Company Profile:

Jain Irrigation Systems Limited Company founded by Shri. BhavarlalHiralal Jain, Jain Irrigation Systems Limited (JAIN) with more than 11,000 associates worldwide and revenue of more than a billion dollars is an Indian multinational company with manufacturing plants in 29 locations across the globe. It is an integrated player in global food systems and leads in manufacturing of Micro Irrigation Systems, Plastic Pipes & Products, Agro Processed Products, Renewable Energy solutions, Tissue Culture Plants, Financial Services and other agricultural inputs since several decades. It has pioneered a revolution with modern irrigation systems and innovative technologies using cutting edge research and development in order to save precious water and to get significant increase in crop yields using global agronomical knowledge for millions of small as well as large farmers. It has also ushered in the new concept of large scale Integrated Irrigation Projects.

3. Review Of Literature

G.N. Pandey (1997) in his book entitled that, "Environmental Management", mentioned about the concept of Water Pollution, Air Pollution, noise pollution and their control. This book mostly concentrates on environment and pollution. A large quantity of water is used for domestic and industrial applications, requires a large amount of water for their condensers and coolers. The engineering industry also requires a considerable amount of water. They had given source of pollution, natural pollution, agricultural pollution, etc.

AkshataSakhawalkar, Dr. AnandThadani (2013), ISSN No. 2319-7064 entitled that "To study the Green HRM practices and their responsiveness among the employees of I.T. sector in Pune region. Mentioned about Human Resource is in charge of employee benefits, employee manuals, standard operating procedures, and workplace policy. Green HRM is the strategy used primarily for reducing the carbon footprint of each employee and talent retention.

4. Research Methodology

Objectives of Study:

- To study about the green practices of Jain Irrigation Limited, Jalgaon
- To study awareness among employees about their responsibility towards environment.

Primary data: Researcher is collected primary data by using various questionnairemethods. And it is distributed among employees as senior officer of OSHAS, HR Manager, discussion done with employees and observation method.

Secondary data: Researcher is collected secondary data through research paper in journals, various internet website.

Sample size:Researchers choose 50 respondents as sampling among various populations by using random sampling.

Hypothesis: There is relationship between Green HRM and Environment.

5. Data Analysis And Interpretation

5.1. GreenPractices adopted in a Company.

Table 5.1 Green practices adopted in Jain Irrigation

Option	No of Respondents	Percentage
Paperless work	45	90%
Carbon footprint	10	20%
Recycling	40	80%
Video conferencing	25	50%
Car pulling	48	96%
Corporate Social Responsibility	50	100%

Interpretation:
100% respondent responds that Jain Irrigation Systems Ltd. adopts the Green HRM Practices like CSR, 20% responds that carpooling facility is available and used by organization, 90% of respondents responds that paperless work is done in Jain Irrigation and 80% of them responds that recycling of waste material is done in the organization.

5.2. The Concept Of Green HRM Is Environmentally Safe.

Table No.5.2The Concept of Green HRM Is Environmentally Safe

Options	No of Respondents	Percentage
Strongly agree	44	88%
Agree	6	12%
Total	50	100

Interpretation:
88% of respondents strongly agreed that statement of Green HRM is environmentally safe, There are 12% of said that they are agree with the statement of Green HRM is environmentally safe.

5.3. Objective of organization regarding Green HRM.

Table5.3 Objective of organization Green HRM

Options	No of Respondents	Percentage
Provision of eco-friendly environment	35	70%
Maintaining the goodwill of company	3	6%
Sustainability	12	24%
Total	50	100

Interpretation:
70% of respondent responds that Jain Irrigation Systems Ltd. is focused on Provision of eco-friendly environment.6% of respondents said that Jain Irrigation Ltd. is maintained the goodwill of company. 24% of respondents respond that the objective of Jain Irrigation Ltd. is sustainability towards society.

5.4. WastagesFound In Company.

Table 5.4 Wastages Found In Company

Options	No of Respondents	Percentages
Paper	15	30%
Glass	5	10%
Metal	7	14%
Plastic	18	36%
Food	5	10%
Total	50	100

Interpretation:
36%, 30%, 14%, 10%, 10% respondents say that plastic, paper, metal, glass and food wastage is found in a company.

5.5. Recyclethe, Food, and Garden Waste

Table no 5.5 Recycle the food and garden waste

Options	No of Respondents	Percentages
Yes	44	88%
No	6	12%
Total	50	100

Interpretation:
88% of respondents are responds that Jain Irrigation Systems Ltd. recycles the waste material Like food, garden waste, and other material.

5.6. ImproveAwareness Regarding Green HRM among the Employees

Table 5.6 Improve awareness regarding Green HRM

Options	No of Respondents	Percentage
Through the training program	23	46%
Internal communication	25	50%
other	2	4%
Total	50	100

Interpretation:
Out of 50 respondents,50% respondents is improved awareness regarding Green HRM among employees through internal communication, through training program (46%) and other (4%).

6. Findings:

- 100% respondent responds that Jain Irrigation Systems Ltd. adopts the Green HRM Practices like CSR, 20% responds that carpooling facility is available and used by organization, 90% of respondents responds that paperless work is done in

Jain Irrigation and 80% of them responds that recycling of waste material is done in the organization.

- 88% of respondents strongly agreed that statement of Green HRM is environmentally safe.
- 70% of respondent responds that Jain Irrigation Systems Ltd. Focused on Provision of eco-friendly environment.
- 36% respondents say that plastic wastage is found in a company. And paper, metal, glass and food wastage is also found in a company.
- 88% of respondents are responds that Jain Irrigation Systems Ltd. recycles the waste material like food, garden waste, and other material.
- 50% respondents is improved awareness regarding Green HRM among employees through internal communication.

7. Hypothesis Testing

Hypothesis: There is relationship between Green HRM and Environment.

Hypothesis is tested on the basis of data analysis and findings.

100% respondent responds that Jain Irrigation Systems Ltd. adopts the Green HRM Practices like CSR, 20% responds that carpooling facility is available and used by organization, 90% of respondents responds that paperless work is done in Jain Irrigation and 80% of them responds that recycling of waste material is done in the organization.(Table 5.1)

88% of respondents strongly agreed that statement of Green HRM is environmentally safe. (Table 5.2)

70% of respondent responds that Jain Irrigation Systems Ltd. Focused on Provision of eco-friendly environment. (Table. 5.3)

36% respondents say that plastic wastage is found in a company. And paper, metal, glass and food wastage is also found in a company. (Table 5.4)

88% of respondents are responds that Jain Irrigation Systems Ltd. recycles the waste material like food, garden waste, and other material. ((Table 5.5)

On the basis of above information it is proved that, "There is relationship between Green HRM and Environment"

8. Conclusion

Jain Irrigation Systems Ltd. Adopts the Green HRM Practices like CSR, carpooling facility is available and used by organization, paperless work is done in Jain Irrigation and recycling of waste material is also done in the organization. Employees of Jain Irrigation Systems Ltd are strongly agreed that concept of Green HRM is environmentally safe and Jain Irrigation Systems Ltd. Focused on Provision of eco-friendly environment. Organization maintains the goodwill of company. Main objective of Jain Irrigation Ltd. is sustainability towards society. Various waste materials are found within the Jain Irrigation Ltd. i.e. waste of plastic, Paper, metal and glass material. Jain Irrigation Systems Ltd. recycles that waste material like food, garden waste, plastic, and paper, metal, glass another material. Jain Irrigation System Ltd. has improved awareness in their employees regarding Green HRM Practices through the internal communication and through the training program. Jain irrigation systems Ltd. use the natural resource like solar energy, solar cookers for food making purpose and solar lamps for lightning the organization.

9. Suggestion

In canteen, coupons system should be avoided. Smart canteen system should use replacing coupons system.

Jain irrigation should have to take part in more activities of Corporate Social Responsibility.

Example:

Promoting accident awareness among employees, Adopt a small village, Food camp,Tree plantation in approach road, Social awareness regarding save Water/Girls/ Energy.

References

AkshataSakhawalkar, Dr. AnandThadani (2013), ISSN No. 2319-7064, entitled that To Study the Current Green HR Practices and There Responsiveness among the Employees of I.T. Sector in Pune Region

G.N. Pandey (1997) in his book entitled that, "Environmental Management"

Websites Refernces

http://www.hkihrm.org/intro_text/58409.554362297
http://www.alternativeenergyhq.com/ways-for-your-hr-department-to-go-green-part-one,php
http://www.citehr.com/103639-how-human-resources-can-help-companies-go-green.html
http://www.shrm.org/research/surveyfindings/articles/document/shrm.
http://www.humancapitalreview.org
http://www.scribd.com/doc/12703119/the-greening-of-hrsurvey

"A Study of Entrepreneurship Development to Utilize Waste Plastic to Solve Environmental Pollution Problem of Jalgaon District"

Authors & affiliations:
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1. Introduction:

Entrepreneurship development is the nation's prime objective to reduce the problem of unemployment as well as to boost the economy. Government of India has offered various schemes and programs to boost small scale sector. The New Industrial Policy, 1991 has played a significant role in the development of small scale industries and entrepreneurship across the nation. The solution of such problem of waste plastic is to recycle them. Polypropylene mat industry of MIDC, Jalgaon is world's largest Polypropylene mat industry which not only solves the problem of waste plastic up to a considerable extent but also creates employment through entrepreneurship in the Jalgaon district of Maharashtra state.

The proposed research emphasizes on the study of the recycled Polypropylene mats industry in Jalgaon district and suggests a Role-Model to develop Polypropylene mats industries across the nation to avoid the problem of plastic pollution.

2. Review Of Literature

TOM ZELLER (JANUARY 2008) national geographic Magazine in his article entitled that, "Recycling The Big Picture" mentioned about important of recycling in his article and also mentioned about how recycling solves environmental pollution problem.

John Tierney (3 Oct 2015) The New York Times in this article entitles that "The reign of recycling" nothing that modern recycling movement had really just begins just a few years earlier they predicted it would flourish as an industry matured and a public learned how to recycle properly.

3. Research Methodology

Objectives of Study:

- To study the entrepreneurship development in plastic recycling industries for solving environmental pollution problem.
- To study problems faced by entrepreneurs in this business.

Primary Data: Primary data is collected through questionnaire method.

Secondary Data: Researcher collects secondary data from research paper, articles, journal and internet website.

Hypothesis: Entrepreneur in plastic recycling based on Polypropylene Mat Manufacturing in Jalgaon produce employment opportunities and reprocessing or reusing the plastic and given a big contribution to minimize the waste of plastic and recycling it.

Sample Size:

For Entrepreneurs - n1 $= \dfrac{no}{\dfrac{no}{Populatio1+n}}$

$= n0/ (1+n0/Population)$

$= 384/(1+384/100)$

$=384/ (1+3.84)=384/4.85 = 80$

Where population size = 100

n0 = required return sample size according to Cochran's Formula = 384

n1 = required return sample size

Because, Sample > 5% of population

But, (100 * .05 = 5)

These procedure results in minimum return sample size of 80. Using the same over sampling procedure as cited in the continuous data example and again assuming response rate of 65% a minimum drawn sample size of 123 should be used. These calculations were based on the following.
Where, anticipated return rate =65%
Where, n2 = sample size adjusted for response rate
Where, minimum sample size corrected 80
Thereforen2 = 80/.65 = 123

For Employees-
Categorical Data The sample size formulas and procedures used for categorical data are very similar, but some variations do exist. Assume a researcher has set the alpha level a priori at .05, plans to use a proportional variable, has set the level of acceptable error at 5%, and has estimated the standard deviation of the scale as .5. Cochran's sample size formula for categorical data and an example of its use is presented here along with explanations as to how these decisions were made.

$$\frac{\text{no}}{\frac{\text{no}}{\text{Populatio1+n}}}$$

= 384/ 1+384/600
= 384/1+ 0.64
=384/1.64
= 235
Where population size = 600

n0 = required return sample size according to Cochran's Formula = 384
n1 = required return sample size

Because, Sample > 5% of population
But, (600* .05 = 30)
These procedure results in minimum return sample size of 235. Using the same over sampling procedure as cited in the continuous data example and again assuming response rate of 65% a minimum drawn sample size of 362 should be used. These calculations were based on the following.
Where, anticipated return rate =65%
Where, n2 = sample size adjusted for response rate
Where, minimum sample size corrected 235

Therefore n2 = 235/.65 = 362

4. DATA ANALYSIS AND INTERPRETATION:

4.1 Problems Face in Recycling Of Plastic

Table 4.1 Problems Face in Recycling Of Plastic

Opinion	Entrepreneurs	Percentage	Employees	Percentage
Yes	35	43.75%	100	42.55%
No	25	31.25%	70	29.78%
Don't Know	15	18.75%	30	12.76%
Can't Tell	5	6.25%	35	14.89%
Total	80	100%	235	100%

4.2 Plastic Affect Environment

Table 4.2 Plastic Affect Environment

Opinion	Entrepreneurs	Percentage	Employees	Percentage
Yes	42	52.5%	130	55%
No	25	31.25%	90	38%
Don't Know	5	6.25%	11	5%
Can't Tell	8	10%	4	2%
Total	80	100%	235	100%

4.3 Help from Government

Table 4.3 Help from Government

Opinion	Entrepreneurs	Percentage	Employees	Percentage
Yes	25	31%	60	26%
No	40	50%	150	64%
Don't Know	10	13%	20	9%
Can't Tell	5	6%	5	2%
Total	80	100%	235	100%

4.4 Problems Face in Business

Table 4.4 Problems Face in Business

Opinion	Entrepreneurs	Percentage
Government support	25	31%
Lack of awareness of employees	40	50%
Irrigation facilities	10	13%
other	5	6%
Total	80	100%

4.5 Satisfied with job

Table 4.5 Satisfied with job

Opinion	Employees	Percentage
Yes	85	36.17%
No	95	40.42%
Don't Know	20	8.51%
Can't Tell	35	14.89%
Total	235	100%

4.6 Problems Face in Job
Table 4.6 Problems Face in Job

Opinions	Employees	Percentage
Low Salary	120	51.06%
Health Issues	80	34.04%
Lack of Satisfaction	30	12.76%
Other	5	2.12%
Total	235	100%

5. Findings

- Nearly 43.75% (35) entrepreneurs say that yes they face problem in recycling of plastic
- 42.55% (100) employee say yes problems face during plastic recycling
- 52.5% (42) entrepreneurs say yes plastic is badly affected on environment.
- 55% (130)employee say yes plastic is badly affected the environment
- 50% (40) entrepreneurs do not give any help from government.
- Entrepreneurs is faced problem of government support (31%), lack of awareness of employees (50%), irrigation facilities (13%)
- Employees (95%) are not satisfied regarding their job.
- Employees are faced problem in their job such as low salary, less satisfaction and health issues

6. TESTING OF HYPOTHESIS

Hypothesis: "Entrepreneurs of PP Mat Manufacturing Industries of Jalgaon are faced various problems due to lack of support."

Out of 80 entrepreneurs 43.75% (35) entrepreneurs say yes problem face in recycling of plastic. (Table 4.1)

Out of 80 entrepreneurs, 52.5% (42) entrepreneurs say yes plastic affect environment badly. (Table 4.2)

Out of 80 entrepreneurs, 31% (25) entrepreneurs say yes they got help from government, 50% (40) entrepreneurs say no they didn't got help from government, 13 % (10) entrepreneurs say don't know & 6% (5) entrepreneurs say can't tell about help got from government. (Table 4.3)

According to Entrepreneurs, 31%(25) entrepreneurs say government support is not too good, 50% (40) entrepreneurs say lack of awareness of employees, 13% (10) entrepreneurs say irrigation facilities are not there & 6% (5) entrepreneurs say other problems are face in the business. (Table 4.4)

Out of 235 employees 40.42% (95) employee say no they are not satisfied anyhow,8.51% (20) employee say don't know & 14.89% (35) employee say can't tell about the job satisfaction. It means employees are not satisfied and hence they are not happy in their job and hence employee retention problems also faced by entrepreneurs in their business. (Table 4.5)

According to Employees point of view, 51.06% (120) employee say loss of salary is a major problem in the job, 34.04% (80)employee say health issues , 12.76% (30) employee say lack of satisfaction & 2.12% (5) employee say other problem face in the job. Employee related problems are faced by entrepreneurs. (Table 4.6)

And hence on the basis of above information it is proved that, "Entrepreneurs of PP Mat Manufacturing Industries of Jalgaon are faced various problem due to lack of support.

7. Conclusion

Entrepreneurs are faced problem in recycling of plastic. Employees say yes problems face during plastic recycling. Entrepreneurs say yes plastic is badly affected on environment. Employees say yes plastic is badly affected on the environment. Entrepreneurs do not give any help from government. Entrepreneurs are faced problem of government support, lack of awareness of employees, irrigation facilities. Employees are not satisfied regarding their job. Employees are faced problem in their job such as low salary, less satisfaction and health issues

8. Suggestions

- Government should provide the help to industries for this project.
- Government mostly provides loans instead of loans they had to launch the new n beneficial schemes.
- Employees are not satisfied with salary so they not work not properly so find out some middle way for it.

References:

- https://www.nytimes.com/2015/10/04/opinion/sunday/the-reign-of-recycling.html
- http://ngm.nationalgeographic.com/2008/01/high-tech-trash/recycling-text
- http://www.sciencedirect.com/science/article/pii/S0197397503000444
- http://home.iitk.ac.in/~anubha/H16.pdf
- http://link.springer.com/article/10.1007/s12132-001-0018-2
- http://www.ryedale.gov.uk/attachments/article/690/Different_plastic_polymer_types.pdf
- https://www.qualitylogoproducts.com/lib/different-types-of-plastic.htm

National Geographic Magazine TOM ZELLER (Jan 2008) in his article name that, "Recycling the Big Picture".

The New York Times JOHN TIERNY(3 Oct2015) in this article name that "The Reign of Recycling".

"Modern Technology of Waste Management Pollution Control", Recycling,Treatment, Utilization published by Asian Pacific Business.

"To Study Investors perception Towards Mutual Fund of Religare Securities Ltd Jalgaon"

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1. Introduction:

A Mutual Fund is a trust that pools the savings of a number of investors who share a common financial goal. The money thus collected is then invested in capital market instruments such as shares, debentures and other securities. The income earned through these investments and the capital appreciations realized are shared by its unit holders in proportion to the number of units owned by them. Thus a Mutual Fund is the most suitable investment for the common man as it offers an opportunity to invest in a diversified, professionally managed basket of securities at a relatively low cost. In 1996, SEBI, the regulator of mutual funds in India, formulated the Mutual Fund Regulation which is a complete regulatory framework. A mutual fund is a basket of various investments, such as stocks, investors and institutions. Today's mutual fund is beneficial to investors in some ways such as Beat inflation, Expert Manager, Convenience, low cost Diversification, Liquidity, Higher Return potential, Safety & clearness. By increasing personal wealth, investing can contribute to higher overall economic growth and prosperity.

2. Company Profile:

Religare Enterprises Limited (REL) is the holding company for one of India's leading diversified financial services groups, headquartered in New Delhi, India. It offers an integrated suite of financial services through its underlying subsidiaries and operating entities, includes Loans to Small and Medium Enterprises (SME)'s, Capital Markets, Wealth Management, Health insurance and Asset Management. It has one million clients in India and more than 1700 offices across India.

3. Review Of Literature

Newspaper 'Economic Times' (December 22, 2016):-"Are you Investing in the right mutual fund schemes" Identifying the purpose of your investment is the most important step 'Says Sunil Date, Certified Financial planner FINANZFOLIO you should first list your various financial goals like foreign vacation , your child's higher education, your own retirement, and so on.

GauravAgrawal (Dr. Mini Jain) Journal of Indian Research (ISSN: 2321-4155) Vol.1, No 4, October-December, 2013, 115-131 "Investor's Preference towards Mutual Fund In Comparison to the Other Investment Avenues"In today's competitive environment, different kinds of investment avenues are available to the investors. All investment modes have advantages & disadvantages. An investor tries to balance these benefits and shortcomings of different investment modes before investing in them. Among various investment modes, Mutual Fund is the most suitable investment mode for the common man, as it offers an opportunity to invest in a diversified and professionally managed portfolio at a relatively low cost. In this paper, an attempt is made to study mainly the investment avenue preferred by the investors of Mathura, and we have tried to analyse the investor's preference towards investment in mutual funds when other investment avenues are also available in the market.

4. Research Methodology

Objectives:-

- To Study perception of investors towards Mutual Fund.
- To Study the awareness of Investors towards Mutual Fund.
- To Study about the Factors responsible for selection of Mutual Fund as an investment pattern.

- To Study the investment option of investor.

Hypothesis: **Mutual Fund is the Best Investment Option**
Primary Data: - In this project, researcher has collected Primary Data through questionnaire method. The questionnaire is collected by customer who uses Religare Securities Ltd. services and I have taken 30 sample sizes for collection of Data.
Secondary Data:-Secondary data is collected through internet website, research paper, journals, and articles in newspaper.
Sample Size: - 30 Investors of Religare securities Ltd, Jalgaon

5. Data Aalysis And Interpreation:

5.1. Interested In Investing In Mutual Fund

Table 5.1 Interested in investing in mutual fund

Option	Yes	No	Total
No of Respondent	21	9	30
Percentage	70%	30%	100%

Interpretation:-
Out of 30 respondents, 70% respondents are interested in invested in mutual fund while 30% respondents are not interested in investing in mutual fund

5.2 Investors Ever Invested Money in Mutual Fund

Table 5.2 Investors Ever Invested Money in Mutual Fund

Option	Yes	No	Total
No of Respondent	18	12	30
Percentage	60%	40%	100%

Interpretation:-
Out of 30 respondents, 60% respondents are invested money in mutual fund regularly while 40% respondents are not investing money in mutual fund.

5.3Satisfaction Regarding Investment Option

Table 5.3 Satisfaction Regarding Investment Option

Option	Yes	No	Total
No of Respondent	25	5	30
Percentage	83%	17%	100%

Interpretation:-
Out of 30 respondents, 83% respondents are satisfied regarding with their investment option while 17% respondents are not satisfied with their investment option.

Preference Factor for Investment

Table 5.4 Preference Factor for Investment

Option	Liquidity	Low risk	High return	Company reputation	Total
No of Respondent	7	13	8	2	30
Percentage	23%	43%	27%	7%	100%

Interpretation:-
Out of 30 respondent 43% respondent prefer low risk investment factor while 27%, 23%, 7% high return, and liquidity and company reputation respectively.

5.5. Factors Affecting on Investment in Mutual Fund

Table 5.5 Factors Affecting the Investment in Mutual Fund

Option	Bitter past experience	Lack of Knowledge	Difficulty in Selection of scheme	Inefficient investment advisors	Other	Total
No of Respondent	13	2	0	4	11	30
Percentage	43%	7%	0%	13%	37%	100%

Interpretation:-
Out of 30 respondents, 43% respondents say that bitter past experience is affected on the investment in Mutual Fund and 7%, 13%, 37% respondents says that lack of knowledge, inefficient investment advisors and other investment in mutual fund.It is found that 43% investors having bitter past experience factor prevent investors to invest in mutual fund.

5.6. Risk level in Mutual Fund

Table 5.6 Risk level in Mutual Fund

Option	Low	Moderate	High	Total
No of Respondent	12	10	8	30
Percentage	40%	33%	27%	100%

Interpretation:-
Out of 30 respondents, 40% respondents prefer low risk in mutual fund while 33% and 27% prefer moderate and high risk in mutual fund.It is observed that mostly investors feel that there is low risk and less investor feel high risk in mutual fund.

5.7. Features of Mutual Fund for Attraction

Table 5.7 Features of mutual fund for attraction

Option	Diversification	Better return and safety	Reduction in risk and transaction cost	Regular income	Tax benefit	Total
No of Respondent	7	9	0	8	6	30
Percentage	23%	30%	0%	27%	20%	100%

Interpretation:- Out of 30 respondent, 30% respondents are attract by better return and safety while 23%, 27%,20% respondent attract by diversification, regular income and tax benefit respectively.
It is found that mostly investor allure most of Better return and safety, Not a single investor allure of Reduction in risk and transaction cost.

6. Findings

- Maximum (70%) investors are interested in investing in mutual fund.
- 60% investors ever invested money in mutual fund.
- 83% of Investors are satisfied with their Investment option, while some of them still not.
- Maximum respondent's (i.e. 43%) prefer low risk factor for investment of money.
- 43% Investors having bitter past experience factor prevent investors to invest in mutual fund.
- 40% investors feel there is low risk in mutual fund.
- 33% Investor allure most of Better return and safety.
- 50% of investors are fully aware of mutual fund.

7. Testing Of Hypothesis

Mutual Fund Is The Best Investment Option.

The hypothesis is tested on the basis of data collection and data analysis.

70% respondents are interested in invested in mutual fund(Table 5.1) and60% respondents are ever invested money in mutual fund (Table 5.2). But out of 30 respondents, 83% respondents are satisfied regarding with their investment option(Table 5.3) because 43% respondent prefer low risk investment factor(Table 5.4) and 27% respondent invest in mutual fund for high return. And hence40% respondents say that there is low risk in mutual fund while 33% prefer invested money in mutual fund due to moderate risk (Table 5.6).

30% respondents areattracting for investment in mutual fund by better return and safety.(Table 5.7)

On the basis of above information it is proved that, "Mutual Fund Is the Best Investment Option."

8. Conclusion

Investors are interested in Mutual fund.Investors are Satisfied with their investment option.Investors are fully aware of mutual fund.Investors prefer the factor of investment is low risk and after that high return.Investors mostly prefer mutual fund and other Investment option such as shares, gold etc.to earn huge profit.Bitter past experience and other general factor are affected on Investment in mutual fund.Investor attract to Investment in mutual fund due to Better return and safety.Investors are fully aware towards Investment.

9. Suggestion

- Investors are not well alert about the mutual fund and hence there is need to improve their Knowledge and consciousness regarding the mutual fund. Hence, we suggest the AMC's should conduct training program concerning the mutual fund.
- Mutual Fund Company needs to give the training of the Individual Financial Advisers about Fund/Scheme and its objective, because they are the main source to influence the investors.

References

- Gaurav Agrawal (Dr. Mini Jain) Journal of Indian Research (ISSN: 2321-4155) Vol.1, No 4, October-December, 2013, 115-131:-"Investor's Preference towards Mutual Fund In Comparison to the Other Investment Avenues"
- Newspaper 'Economic Times' (December 22, 2016):-"Are you Investing in the right mutual fund schemes"

Internet Website:

www.economictimes.indiatimes.com
www.mujournal.mewaruniversity.in
www.gnu.inflibnet.ac.in
www.amfiindia.com/researchinformation.co
www.shodhaganga.inflibnet.ac.in
www.wikipedia.org/wiki/mutualfund.com

"A Study on Corporate Social Responsibility Activities of Small, Medium and Large Scale Industries in Jalgaon"

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1. Introduction:

Corporate social responsibility (CSR) is a company's obligation to be accountable to all of its stakeholders in all its operations and activities with the aim of achieving sustainable development not only in the economical dimension but also in the social an environmental dimension. Some consider social responsibility in terms of services rendered to claimants or stakeholders, who could be both insiders and outsiders. The insiders are employees and shareholders while outsiders include consumers, suppliers, and creditors, competitors, government and the general public. Consumers sped quality goods and services at fair prices, workers expect fair wages without being exploited, shareholders expect reasonable dividends and fair return on investments and managers expect challenging jobs with attractive salary. Government and the general public expect them to add to the wealth and wealth and welfare of the country without polluting the environment. Another way in which the scope of social responsibility could be viewed is in terms of social concern and promotion of common welfare programs for the benefits of the poor and the indigent public. Companies have highlighted social issues and brought then to the notice of the public through hoarding and other means of drawing the attention of people through hoarding and other means of drawing the attention of people to the issue in question and generate public awareness. There had been occasions though limited in numbers ,when corporate have joined hands to sponsor advertisements promoting public causes or issues of social concerns such as drug addiction and smoking.

2. Review Of Liturature

Dr.Parag Narkhede "Corporate Social Responsibility" which published in 2011 and published by Prashant Publication, Jalgaon, Corporate social responsibility has turned out to have one of the most persistent "management fashions" and business key worlds of the last decade. Corporate social responsibility is considered by corporationsworldwide as an increasingly necessary practice.

A.C.Fernando in his book "Corporate Governance" mentioned the introduction of CSR, definition of corporate social responsibility, the scope of social responsibility which is published in2006. This book also presents a comparative study of how various countries approach the concept, how they have institutionalized mechanisms for governance, and where they are headed.

3. Research Methodology

Objective:

1. To study importance and relationship between corporate social responsibility and industries.
2. To study and analyse Corporate Social Responsibility activities in small and medium scale industries in Jalgaon.

Primary Data: Primary data is collected through questionnaire among employees.

Secondary Data: Secondary data is collected through internet website, books, and articles

Sample Size:Researchers has selected 60 sample randomly from Small and Medium Scale Industries, Jalgaon

4. Data Analysis And Interpretation

4.1 separateallocation Of Funds For Csr Implementation

Table 4.1 Separate Allocation of Funds for CSR Implementation

Option	No. of Respondent	Percentage
Yes	40	67%
No	20	33%
Total	60	100

Interpretation: Out of 60 respondents,67% respondents respond that their companies have separate allocation of funds for Corporate Social Responsibility activity.And 33% respondents respond that their company has separate allocation of funds for Corporate Social Responsibility activities.

4.2.Company Invested As Part of Its Community Investment Initiatives

Table 4.2 Company Invested As Part of Its Community Investment Initiatives

Community investment initiatives	Yes	Percentage	No	Percentage
Education	40	67%	20	33%
Helping the underprivileged	45	75%	15	25%
Local heritage	20	33%	40	67%
Youth development	15	25%	45	75%
Poverty alleviation	50	83%	10	17%
Working for disability	60	100%	-	-
Conservation of nature	17	28%	43	72%
Games and sports	20	33%	40	67%
Promotion of culture	38	63%	22	37%
Infrastructure support to local community	15	25%	45	75%
Others	19	32%	41	68%

4.3. Company Awarded for CSR Activities.

Table 4.3 Company Awarded for CSR Activity.

Option	No. of Respondent	Percentage
Yes	40	67%
No	20	33%
Total	60	100

Interpretation: Out of 60 respondents, 67% respondents respond that their company award for Corporate Social Responsibility activities. And 33% respondents respond that their company not award for Corporate Social Responsibility activities.

4.4 Percentage of Net Profits

Table 4.4 Percentage of Net Profits

Option	No of Respondents	Percentage
Not disclosed	30	50%
Between 1% to 2%	10	17%
Between 2% to 3%	15	25%
More than 3%.	5	8%
Total	60	100

Interpretation:
Out of 60 respondents, 50% respondents say that their companies do not disclosed their net profit.25% respondents says that their companies earn net profit between 2% to 3%. 17% respondents say that their companies net profit between 1% to 2%. And only 8% respondents say that their company's net profit more than 3%.

4.5Opinion about the following Items for Adoption of Corporate Social Responsibility Practices by Companies/Organizations

Table 4.5 Opinion about the following Items for Adoption of Corporate Social Responsibility Practices by Companies/Organizations

Items	Strongly agree	Percentage	Agree	Percentage	Indifferent	Percentage
Promote corporate image	48	80%	12	20%	-	-
Increase financial efficiency	-	-	49	82%	11	18%
Competitive market advantage	-	-	41	69%	18	31%
Organizational value	-	-	60	100%	00	00%
Pressure from stakeholders	31	52%	8	13%	21	35%

Interpretation: Out of 60 respondents, 80% respondents strongly agree to their organization adopts CSR for promotes corporate image.82% respondents agree to their organization adopts CSR for increase financial efficiency.69% respondents agree to their organization adopts CSR for increase competitive market advantage.52% respondents strongly agree to their organization adopts CSR for increase pressure for stakeholders

Findings:

- Maximum number of respondents (i.e. 67%) said that they have separate allocation of funds for CSR implementation.
- Maximum number of respondents (i.e. 67%) responds that their company invested in education, helping the underprivileged (75%), poverty alleviation (83%),

working for disability (100%) and promotion of culture (63%) as a part of its community investment initiatives.

- Maximum number of respondents (i.e. 67%) responds that their company not invested in local heritage, youth development (75%), conservation of nature (72%), games and sports (67%), Infrastructure support to local community (75%) as a part of its community investment initiatives.
- Maximum number of respondents (i.e. 67%) responds that their companies awarded for Corporate Social Responsibility activity.
- Maximum number of respondents (i.e.50%) says that their companies do not disclose their net profit.

Hypothesis Testing:

There is relationship between Corporate Social Responsibility and Profitability.

Hypothesis is tested on the basis of data analysis and findings.

In this research, researcher is taken area of survey of Small and Medium Scale Industries of Jalgaon. But small scale industries are not involved in Corporate Social Responsibility activities on large scale. And hence this survey is based on Medium Scale Industries and Large Scale Industries of Jalgaon (Data Analysis). Small scale industries profit is not more and hence such types of industries is not capable to spend or invest money on the society welfare purpose. And hence Small Scale Industries are not involved in CSR activities. But Medium and Large Scale Industries are involved in CSR activities. Because such types of industries earn a huge profit. And hence these companies are spending a large amount of money on society welfare purpose.

67% respondents respond that their companies have separate allocation of funds for Corporate Social Responsibility activity.And 33% respondents respond that their company has separate allocation of funds for Corporate Social Responsibility activities. (Table 4.1)

67% respondents respond that their company award for Corporate Social Responsibility activities. And 33% respondents respond that their company not award for Corporate Social Responsibility activities. (Table and Figure 4.3)

50% respondents say that their companies do not disclose their net profit.25% respondents say that their companies earn net profit between 2% to 3%. 17% respondents say that their companies net profit between 1% to 2%. And only 8% respondents say that their company's net profit more than 3%. (Table and Figure 4.4)

82% respondents agree to their organization adopts CSR activities for increase financial efficiency (Table and Figure 4.5)

On the basis of above information it is proved that "There is relationship between Corporate Social Responsibility and Profitability.

Conclusion:

There is very less awareness regarding Corporate Social Responsibility in Small Scale industries. Maximum companies spend their money on education, helping the underprivileged, poverty alleviation, working for disability, and promotion of culture as a CSR. There are companies awarded for corporate social responsibility. Company is report of corporate social responsibility. Veryfewer companies are reported to employee. These companies increase their awareness through internal communication and training and awareness program and management briefings. The involvement of Small industries in Corporate Social Responsibility is very less in comparison Medium Scale Industries and Large Scale Industries. There are maximum no of company never communicate the policy to the community. They sometimes provide policy to customer. Almost all companies adopts corporate social responsibility for promote corporate image and they are fully agree for they adopts Corporate social responsibility for organizational value.

Hypothesis: There is relationship between Corporate Social Responsibility and Profitability.

Conclusion: Small Scale Industries is not involved in CSR activity due less profit. Only Medium and

Large Scale industries are spending money on society welfare purpose because such industries income and profit is high in comparison small scale industries.

Suggestion:

1. Small and medium scale industries should improve awareness among employees regarding CSR activity for social welfare purpose.
2. Company should increase awareness among employees through internal communication.
3. Company should communicate their policy with their Stakeholders.
4. Company should adopt activities for employee's entertainment purpose weekly. Like indoor games, outdoor games, involvement in sports etc.

References

Research Paper

- R.K.Suri, Parineeta Sharma, Sanjiv Verma, "Politics, Ethicsand social responsibility of business"
- James Epstein Reeves , Forbes magazine, "Six Reason Companies Should Embrace CSR"

Website

- www.culturaldiplomacy.org/...papers/.../The_Impact_of_Corporate_Social_Responsib
- https://www.ssrn.com/link/Corporate-Social-Responsibility.html
- www.polyu.edu.hk/af/.../CSR%20literature%20review%201980%20to%202014.pdf
- https://www.paperwritings.com/free.../business-and-corporate-social-responsibility.ht...

Books:

- C.S.V.Murthy, "Business Ethics Text and Cases", (2009), Himalaya Publishing House, ISBN 81-8318-148-1.
- Dr. Parag Narkhede, "Corporate Social Responsibility",(2011),Prashant Publication, ISBN -978-93-80638-94-2.
- A.C.Fernando,"Corporate Governance",(2006),Dorling Kindersley(India) Pvt.Ltd,licensees of pearson education in South Asia. ISBN-978-81-7758-565-0.

Study Of Comparision Of Performance Between Public and Private School In Jalgaon City

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ABSTRACT:
The researcher wants to intend the study the comparison of Public sector schools and Private schools based upon their educational system and performance. Government and Private school students differ on their critical thinking and study habits. Those students who were on Private schools had better critical thinking ability and study habits in favor of Government school students. It means, the critical thinking abilities and Study Habits of private school students are better than government school students.

Introduction

The base of any nation that is willing to be a superpower in every sense of the term always needs to be commendably strong so that it is able to realize that ambition. One of the several ways in which this can be achieved is through education for one and all. India, as a nation, has taken some steps.

Literature Review

Private schools usually have a more rigorous academic reputation. But within the public school system, Charter Schools and Magnet schools both blur the distinction between public and private schools.

Academic reputation plays a big role when considering private versus public schools. School Special programs, Costs, Religious and Moral instruction, Location, Ideology systems vary greatly in their academic reputation.

Objectives

To compare the quality of education of both public and private schools.

To analyze the education level of student, on behalf of various dimensions such as infrastructural facility, sports, technology and teacher student ratio at public and private schools.

Research Methodology

Research methodology is away to systematically solve the research problems research methodology has many dimensions and research methods do constitute apart of research methodology research methodologies also consider the logic behind the methods

Need of research

Elaborates all the information about public school conditions.

Sketch an ideological structure which changes in the positive direction.

Describe the difference between public school and private school.

Procedure for the research

To collect all the required information about the public schools and private school. Make the analysis of the information collected about jalgaonstudents in different ways. The information can be collected by the various resources. To collect the information called as primary data such as in the form of the questionnaire.

Do the collective study about the information and represent the information in graphically and make the comparison information collected.

To study the problems and difficulties faced by the students in the public schoolas compare to private school students and for that suggest the proper solution.

Data collection

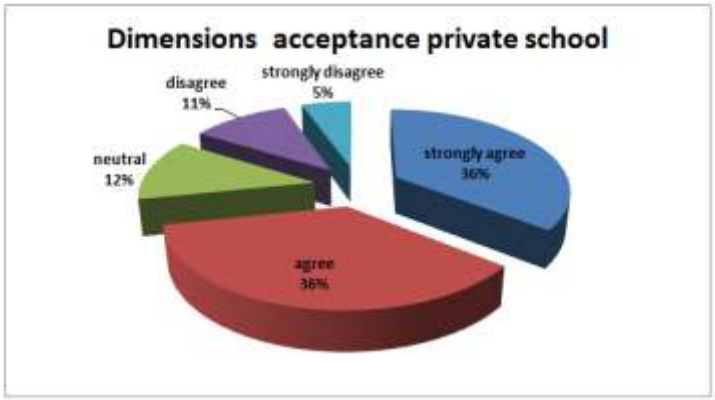
Primary data

Three resources for primary data collection are questionnaire, observation and interview.The core question emphasized 15 determinant dimensions which compare performance of students between public and private schools. Those core valued dimensions included learning conditions, infrastructure facility, sports activity, sports facility and staff, extra curriculum opportunities, school climate, class room size, teacher- student ratio, admission criteria, technology and gadgets, laboratories, progress report card, parents meeting

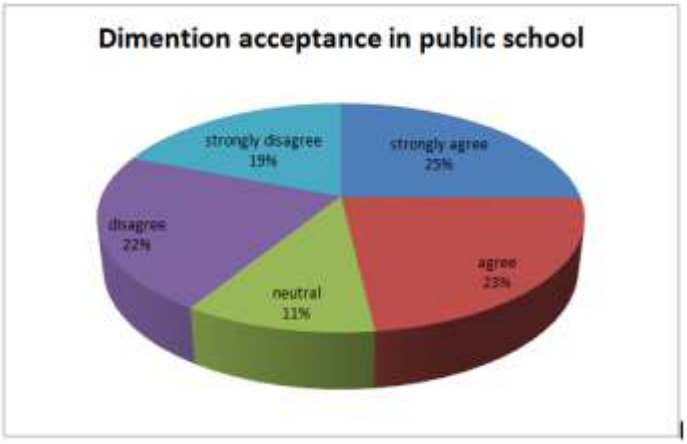
Secondary data

The other required information collected through web sites which are having data about schools and education in India. Data about the some previous years or month's statistics with the help of internet to conclusion the project report.

Data Analysis

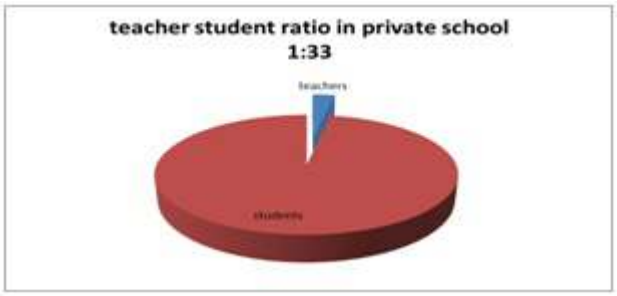


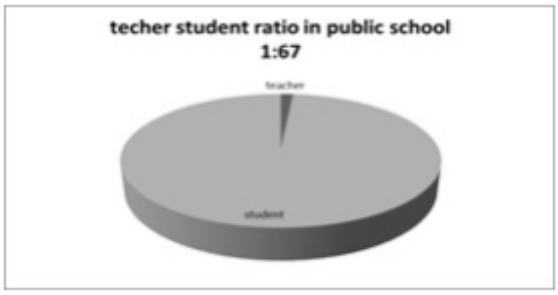
After the analysis of data, researchers have found that the all the dimensions which are taking in consideration while the preparing the project report, 36 % agree and 36% strongly agree that they found all the facility equipment and staff of faculty or teacher fulfillment in proper manner.
Only 11% and 5 % students of private school disagree on the dimensions fulfillment in there school.



In the analysis of data of public school researchers have found that the all the dimensions which are taking in consideration while the preparing the project report, 22 % disagree and 19 % strongly disagree that they found all the facility equipment and staff of faculty or teacher never fulfill by their school.

Secondary data





In the private school teacher student ratio is 1:33 which is very ideological structure world widely. And teacher student ratio in public school is 1:67 which is not as per the policies of education in India.

- This primary data analysis shows that infrastructural facility, sports activity extra curriculum activities, Technological gadgets, internet facility all these dimensions are better in private school as compare to public school
- Teacher student ratio is very low in public school.

Suggestions

- Public school and private school need to maintain those dimensions which are very helpful for student development.
- Public school should maintain teacher-student ratio.

References

The role of government in education. In Solo, R. (Ed.). Economics and the Public Interest. Rutgers University Press.
The Empirical Evidence on Private Schools and School Choice. Indianapolis, IN: Milton & Rose D. Friedman Foundation. Retrieved Dec. 9, 2007, from http://www.friedmanfoundation.org/friedman/downloadFile.do?id=255
www.google.com
www.wikipeadia.com
www.youtube.com

"THE AWARENESS OF MKCL'S E-SUVIDHA AMONG THE COLLEGE STUDENTS"

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ABSTRACT:
E-services mean 'the provision of services via internet'. E-services are provided in various sectors like banking government education and so on. The services offered by government electronically are referred as e-governance. The objectives of this research paper are to study the E-Services offered by North Maharashtra University using the project E-Suvidha and To study The Awareness of MKCL's E Suvidha among the College Students. Researcher is collected primary data through questionnaire of college students. And secondary data is collected through research paper, articles and journal.

1. Introduction:

The present study deals with the Student's E Service Management using e-governance. Usually e-services means 'the provision of services via internet'. E-services are provided in various sectors like banking government education and so on. The services offered by government electronically are referred as e-governance. Governance is spreading into all types of sectors. Universities are no exception. Student's e-service management using e governance is success story in India. The objectives of this service are saving costs, time and efforts of university administration. The concept of E-service (short form of electronic service), represents one prominent application of utilizing the use of Information and communication technologies (ICTs) in different areas. However, providing an exact definition of e-service is hard to come by as researchers have been using different definitions to describe e-service. Despite these different definitions, it can be argued that they all agree about the role of technology in facilitating the delivery of services which make them more of electronic services.

2. Review Of Literature

Kulkarni R.A, Chaudhari P.R(2013) "A study of students E-services management using e-governance in colleges affiliated to North Maharashtra University":- In their Thesis they have studied the e-services offered by the North Maharashtra University to the Students and also the challenges regarding that. They found that the e services offered are very helpful to College students as well as college administration. e-suvidha is a effective single window. Educational e-Governance with e-suvidha has made student services simple and transparent.

Ajbani L.A (2015) "E-learning Initiatives at Yashwantrao Chavan Maharashtra Open University", in this paper the author stated that, In this advanced digital era, educational providers cannot possibly survive if they remain restricted to the traditional chalk and talk method of imparting education. Considering the various technological advances taking place from time to time, the Yashwantrao Chavan Maharashtra Open University (YCMOU) has taken various initiatives to facilitate students of open and distance learning and provide them with academic inputs using e-learning. This paper presents a case study on e-learning at YCMOU, focusing on the innovative practices followed by YCMOU for imparting education to the distance learners and sharing the challenges faced while offering them.

3. Research Methodology

3.1 Objectives of Study:

1) To Study the E-Services offered by North Maharashtra University using the project E-Suvidha
2) To Study The Awareness of MKCL's E Suvidha among the College Students
3) To study the Challenges regarding e suvidha

4) To Give Suggestions for Increasing the Awareness among the College Students

3.2 Primary Data: In the present study, we have collected primary data by filling questionnaire from College Students by directly communicating with them through questionnaire method.

3.3 Secondary Data: The major sources of secondary data for present study are –
Govt. reports and circulars, Journals, Conference proceedings, Internet, Websites, e-literature
The secondary data adopted gets duly recorded in the end of Review of literature and in References.

3.4 Sample Size:
Sampling Details of colleges from Jalgaon city

Sr. No.	College Name	Number of Students
1	M. J. College Jalgaon	20
2	Dr. Anna Saheb G. D. Bendale Girls College Jalgaon	20
3	Nutan Maratha College Jalgaon	20
4	Ad. Seetaram Anandramji Baheti College Jalgaon	20
5	Iqra Education Societies, H. J Thim College Jalgaon	20
	Total	100

Table No.3.1 Sample Size

4. Data Analysis And Interpretation

4.1. Access Of E-suvidha?

Options	No. of Respondents	Percentage
Regularly	14	14 %
Once a Week	17	17 %
Sometimes	26	26 %
Admission time only	41	41 %
Never	02	02 %

Table no 4.1- Access of E-Suvidha

Interpretation:-
Out of 100 Respondents, 14% Respondents access E Suvidha Regularly, 17% Respondents Access E Suvidha Once a Week, 26% Respondents Access E Suvidha Sometimes, 41% Respondents Access E Suvidha Admission time only and 02% Respondents Never Access E Suvidha.

4.2 Most Preferred Method Of Accessing E Suvidha

Options	No. of Respondents	Percentage
Cyber café	61	61 %
College Internet Access	12	12 %
Personal Computer	14	14 %
Laptop	09	09 %
Mobile	04	04 %

Table no 4.2- Most Preferred Method of Accessing E Suvidha

Interpretation:-
Out of 100 Respondents, 61% Respondents use Cyber Cafes for accessing E Suvidha, 12% Respondents use College Internet Access Facility, 14% Respondents use Personal Computers, 09% Respondents use Laptops and 04% Respondents use Mobiles for Accessing E Suvidha.

4.3 Use internet for Social Networking

Options	No. of Respondents	Percentage
Yes	92	92 %
No	08	08 %

Table no 4.3. Use Internet for Social Networking

Interpretation:- Out of 100 Respondents, 92% Respondents use Internet for Social Networking and 08% Respondents do not access Social Networking.

4.4 Most preferred method of accessing Social Networking

Options	No. of Respondents	Percentage
Cyber café	08	08 %
College Internet Access	03	03 %
Personal Computer	11	11 %
Laptop	07	07 %
Mobile	71	71 %

Interpretation: - Out of 100 Respondents, 08% Respondents use Cyber Cafes for accessing Social Networking, 03% Respondents use College Internet Access Facility, 11% Respondents use Personal Computers, 07% Respondents use Laptops and 71% Respondents use Mobiles for accessing Social Networking

4. Findings From Study

From the Present Study We Found That:-

- The Students who are using E-Suvidha they access e-suvidha only at the time of Admission (41%)
- Very few of the students prefers personal computer for accessing E-Suvidha (14%)
- Most of the Students Prefers Cyber Cafe's for using E suivdha. (61%)
- More than 90% students use social networking sites (92%)
- The Most preferable mobile phones are used to access social networking sites (71%)

5. Conclusion

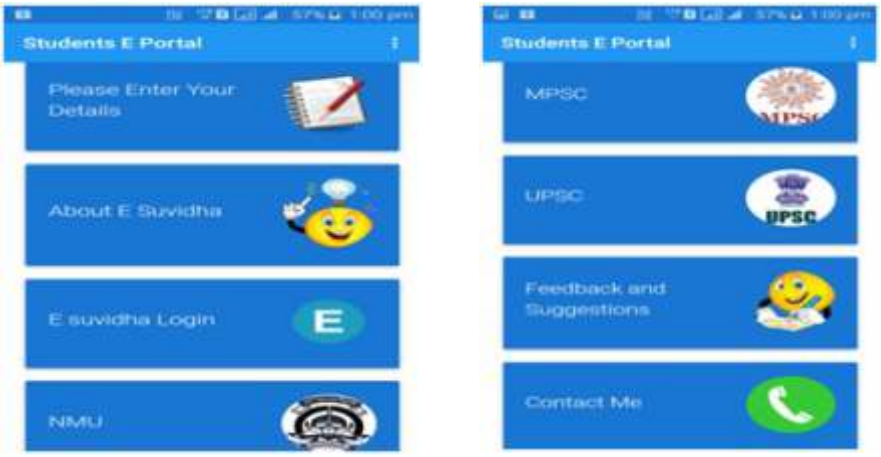
From the Present Study we found some Challenges such as:

- The awareness of MKCL's E Suvidha Among the college students is very less.
- More than 90 % Students use the social Networking Sites and they prefer mobiles for accessing the social networking sites.
- Most of the students use E-Suvidha at the time of college admission only.
- There is no Infrastructural Facility Available in Colleges for Accessing E Suvidha.
- Most of the Students do not have Personal Computers and Laptops.
- Therefore the students go to Cyber Cafes for accessing E-Suvidha.

6. Suggestions

- The university and colleges should take efforts for increasing awareness about e-suvidha among students
- They should conduct an introductory program for first year students and make them fully aware about the services made available under e-suvidha scheme.
- In order to make students more aware about e-services, a compulsory practical on accessing e-suvidha needs to be included in first year syllabus of graduation.
- The existing e-suvidha portal needs to be improved.
- Colleges should develop infrastructural facility for students to access e-suvidha
- Develop an application of the e-suvidha so that the use of the e-suvidha will increase among the students.

  For Increasing the Awareness of MKCL's E Suvidha Among the College Students, I Developed a Mobile App-" Students E Portal".



Scan this Barcode for Downloading the Students E Portal App:

References:

- Kulkarni R.A, Chaudhari P.R(2013):- A study of students E-services management using e-governance in colleges affiliated to North Maharashtra University-Thesis submitted to North Maharashtra University.
- Ajbani L.A (2015):- E-learning Initiatives at Yashwantrao Chavan Maharashtra Open University- Global Online Electronic International Interdisciplinary Research Journal Volume – III, Issue – V ISSN : 2278 – 5639

Web References:-

1. www.nmuj.digitaluniversity.ac
2. www.esuvidha.gov.in
3. www.nmu.ac.in
4. www.mkcl.org
5. www.maharashtra.gov.in

SECTION C

ART & HUMANITIES

संशोधनपेपर

विषयाचे नाव : जलयुक्त शिवार अभियानाचे एरंडोल तालुका एक विशेष अध्ययन

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प्रस्तावना

आपल्या गावात पावसाळ्यातील शेतीचा हंगाम जर सिचनाच्या पाण्याची सोय नसेल तर जवळ जवळ सहा महिने हाताला काम नसते . गावातील भूमिहीन मजूर , कोरडवाहून लहान शेतकरी यांना वर्षाचा मोठा काळ काम शोधावे लागतेच अशा कायम स्वरूपी मातकरण्यासाठी सरकारने सर्वासाठी पाणी टंचाईमुक्त महाराष्ट्र २०१९ अंतर्गत जलयुक्त शिवार ही योजना आहे१ .

विषय निवड

महाराष्ट्रातील सरकारने ग्रामीण भागातील लोकांसाठी अनेक योजना चालू केल्या आहेत त्याचा आभ्यास आपण या प्रकल्पात करणार आहोत त्या साठी या प्रकल्पाचा न्नजलयुक्त शिवार अभियानाचे एरंडोल तालुका एक विशेष अध्ययन '' करण्यासाठी आम्ही या योजनेचा आभ्यास यात करणार आहोत .

संशोधनाचे उद्दिष्टे

१) एरंडोल तालुक्यात झालेल्या जलयुक्त शिवार योजनेच्या कामांचा अभ्यास करणे .
२) या योजनेतील समस्यांचा अभ्यास करणे.
३) उत्पादकता वाढीचा अभ्यास करणे .
४) रोजगार वाढीचा अभ्यास करणे .
५) लागवडी खालील जमिनीचा अभ्यास करणे जल स्त्रोतातील गाळ गाव सहभागातून काढून पाणीसाठा वाढवणे
६) पाण्याचे तळे बांधण्याबाबत

गृहीतके

१) या योजनेमुळे बागायती/ओलीताखालील क्षेत्र वाढले
२) या योजनेमुळे पिक रचनेत बदल झाला.
३) पिकांची उत्पादकता वाढली.
४) रोजगारात वाढ झाली.

संशोधन पद्धती

१) संशोधनाचा अर्थ

सर्वसामान्य भाषेमध्ये ज्ञानाचा शोध म्हणजे संशोधन होय . एखाद्या विषयासंबंधीची संपर्क माहीती गोळा करण्यासाठी पद्धतशीर आणि शास्त्रशुद्ध अन्वेषण केले जाते . त्याला संशोधन म्हणतात . शास्त्रीय शोधाची कला म्हणजे संशोधन होय.१

२) अर्थशास्त्रीय संशोधनाचा अर्थ

मानवी आर्थिक व्यवहारांचे समानीकरण करणे हा आर्थिक संशोधनाचा पहिला महत्वाचा अर्थ होय .२ आर्थिक समस्येतून निर्माण होणाऱ्या प्रेरणामुळे होणाऱ्या मानवी व्यवहाराचे समानीकरण करणे हा अर्थशास्त्र संशोधनाचा दुसरा अर्थ होय. ३

सदर संशोधन पुढील दोन पद्धतीत करण्यात येणार आहे .

१) स्थूल पातळीवरील विश्लेषण२

एरंडोल तालुक्यातील जलयुक्तशिवार योजनेअंतर्गत करण्यात आलेली कमांचे एक विशेष अध्ययन व उपाय याचा अभ्यास प्रस्तुत संशोधनात करण्यात येणार आहे. त्यासाठी दुय्यम स्वरूपाचा आकडेवारीचा आधार घेण्यात आला आहे . दुय्यम आकडेवारी ही शासनाचे विविध अहवाल परिपत्रके मासिके पुस्तके सदर्भ ग्रथ विविध वेबसाईट इत्यादीतून घेतलेली आहे .

२) सूक्ष्म विश्लेषण पद्धती

हि पद्धती नमुना निवडलेल्या शेतकऱ्यांच्या प्राथमिक माहितीवर आधारलेली आहेत . प्राथमिक माहितीवर आधारलेली आहेत . प्राथमिक आकडेवारी गोळा करण्यासाठी मुलाखत अनुसुचीचा वापर करून निवडलेल्या नमुन्याची घेऊन प्राथमिक माहीती संकलित केलेली आहे . त्यासाठी नमुना निवड पद्धतीचा वापर केला आहे१

नमुना निवड

अध्ययनाचे क्षेत्र असलेला एरंडोल तालुका हा जळगाव जिल्ह्यातील प्रमुख तालुका आहे . त्यासाठी त्रिस्तरीय स्वौर नमुना निवड पद्धतीचा (जीतममै जंजमै जतंजपपिमक त्ंदकवउैं उचसम) वापर केला आहे. त्यात तालुका हा पहिला एकक. गाव हा दुसरा एकक तर निवडलेले लाभधारक हा अंतिम एकक आहे . जेव्हा अभ्यास विषय असणाऱ्या समष्टीचे विविध गटात वर्गीकरण झालेले असते तेव्हा

स्तरीत स्वौर नमुना चाचणी वापर करावा लागतो या पद्धतीत समष्टीच्या विविध गटातील आवश्यक तेवढे एकक स्वौर पद्धतीने निवडल्यानंतर त्या सर्व एककांच्या मिळून स्तरीत स्वौर नमुना होतो.

सर्व प्रथम एरंडोल तालुक्यातील ६३ गावांमधून १० गाव निवड केलेली आहे . या निवडलेल्या १० गावांमधून प्रत्येक १० शेतकरी या प्रमाणे एकूण १०० शेतकऱ्याची निवड केलेली आहे. हि निवड करताना स्त्री – पुरुषची निवड करण्यात आली आहे . त्यामधून पुरुष जास्त होते. तर स्त्री महत्तम होती.

एरंडोल तालुक्यातील १० गावांची नवी पुढील प्रमाणे आहेत .

१) पिंपळकोठा प्र. चा	२) आडगाव	३) कासोदा	४) रिंगणगाव	५) सावदे प्र. चा
६) विखरण	७) निपाने	८) जवखेडे सिम	९) तळई	१०)खेडी खु.

संशोधनाची व्याप्ती व कालखंड

प्रस्तुत संशोधनाची व्याप्ती हि एरंडोल तालुक्या पर्यन्त मर्यादित आहे व याचा कालखंड २०१६ – २०१७ हा आहे.[३]

संशोधनाची उपयुक्तता

प्रस्तुत संशोधन हे महाराष्ट्रात एकुणच ग्रामीण भागात भविष्यात निर्माण होणाऱ्या पाणी टंचाईवर मात करण्यासाठी महाराष्ट्र शासनाला ,शेतकऱ्याना, नियोजनकार व या क्षेत्रात भविष्यात काम करणाऱ्या संशोधकांना उपयुक्त ठरेल. .

संशोधकांच्या मर्यादा

प्रस्तुत संशोधन हे नमुना निवडीवर आधारलेले आहेत . त्यामुळे नमुना निवड पद्धतीचा मर्यादा या संशोधनाला लागू पडतात . तसेच हे संशोधन एरंडोल तालुक्यातील निवडलेल्या शेतकऱ्याच्या प्रतिसदावर आधारलेले आहे . या मर्यादा असल्यातरी प्रस्तुत संशोधन हे याच प्रकारची सामाजिक , आर्थिक परिस्थिती असलेल्या भारतातील इतर भागांना उपयुक्त ठरेल४ .

प्राथमिक आकडेवारीवर आधारित प्रमुख निष्कर्ष

- सर्वेक्षण केलेल्या एकूण १०० शेकऱ्यांच्या कुटुंबातील स्त्री, पुरुष व मुले यांची एकूण व्यक्तींची संख्या ८६२ होती. म्हणजेच प्रत्येक कुटुंबाचा सरसरी आकार ८.६२: एतका दिसून आला.
- एकंदरीत सर्वेक्षण केलेल्या लाभ शेतकरी माध्यमिक स्तरेपर्यंत शिक्षण घेतलेल्या शेतकऱ्यांचे प्रमाण (२३:) अधिक आहे
- एकदरीत सर्वेक्षण केलेल्या शेतकरी पैकी शेतकरी (५१:) या गटातील संख्या तुलनेने जास्त आहे. यावरून असे लक्ष्यात येते की ग्रामीण भागात आजही शेती व्यवसायाचे प्रमाण जास्त आहे.
- एकंदरीत सर्वेक्षण केलेल्या लाभधारकानपैकी ३१ ते ४० या वयोगटातीललाभधारकांचे प्रमाण सर्वात जास्त (३१ :) होते.
- सर्वात जास्त शेती करण्याचा अनुभव लाभधारक (४२:) ६ ते १० यात येतात. व १ ते ५ यात १९ : व अनुक्रमे ११ ते १५ मध्ये २२ : तर २१ पेक्षा जास्त १० आहेत.
- एकंदरीत असे दिसून येते की आजही ग्रामीण भागात लहान शेतकऱ्यांचे प्रमाण जास्त आहे.
- एकंदरीत सर्वेक्षण केलेल्या शेतकऱ्यांचे सर्वात जास्त दुबारलागवडी खालील क्षेत्र असणारे ७१ (७१:) शेतकरी होते. तर या खालोखाल निव्वळलागवडी खालील क्षेत्र असणारे २९ (२९:) होते
- मध्ये सर्वेक्षणासाठी निवडलेल्या १०० शेतकरी पैकी अनुक्रमे,विहीरचा वापर करणारे ५९ शेतकरी,कुपनलिका वापर करणारे असणारे ३० शेतकरी , तर पाटाचा वापर करणारे ११ होते.
- सर्वेक्षण केलेल्या १०० शेतकऱ्यांपैकी ही योजना आपल्या गावाला मिळावी यासाठी ग्रामसभा ४१ शेतकऱ्यांनी उपस्थिती दिली.
- एकंदरीत असे दिसून येते की, ४४: शेतकरी योजनेसाठी नाखुश होते.
- एकंदरीत सर्वात जास्त श्रमदान ५२: तर अनुक्रमे आर्थिक .०८: व वस्तु १०: आणि सामाजिक ३०: दिसून आलेत. सर्वात जास्त श्रमदान शेतकरी यानी केलेले या ठिकाणी दिसून येत असते
- सर्वेक्षणासाठी निवडलेल्या १०० शेतकऱ्यांचे योजनेअगोदर व नंतर लागवडी खालील क्षेत्राचे सर्वेक्षण केले असता पाहणी केलेल्या सीमांत लाभधारक शेतकऱ्यांपैकी लागवडी खलील क्षेत्रात झालेली वाढ २५: दिसून आली.
- योजना लागु केल्यानंतर हरभरा पिक घेण्याचे प्रमाण वाढलेले दिसून येते. तसेच शेतकरीनी नवीन तंत्र वापर करण्यास प्रधान्य क्रम दिलेला दिसून येतो.
- आधीच्या तुलनेत आता पिकांची उत्पादकता वाढलेली दिसून येते आधी ती सर्वात जास्त २० ते ३० (५९ :) ,नंतर अनुक्रमे १० – २० (३१:). ३० – ६० (६:) आणि ४०– ५० (४:) अशी होती व नंतर ती वाढलेली दिसून येते.
- एकंदरीत योजने अगोदर १२५–१५० रुपये एवढे जास्तीचे वेतन देणाऱ्या शेतकऱ्यांची संख्या जास्त होती. तर सर्वात कमी १७५–२०० रुपये देणारे शेतकरी होते.
- या योजना आल्यानंतर १५० ते १७५ रूपये वर काम करताना (२०:) स्त्रिया दिसून आलेत.
- एकंदरीत रोजगारात वाढ झाल्याचे प्रमाण लक्षणीय दिसून आले.

- सर्वेक्षण केलेल्या १००शेतकऱ्यांचे आपल्याला रोजगारत सर्वात जास्त ४० यात ३५: वाढ होताना दिसून येते.
- सर्वेक्षणासाठी निवडलेल्या १०० शेतकऱ्यांपैकी शेतीकडे पहाण्याचा ड्डष्टिकोण बदलला आहे हे सागणारे ९३: होते. व नाही हे सागणारे ७ : असलेले दिसून आलेत.
- एकंदरीत सर्वात जास्त नगदी पिके घेणारे प्रमाण ३८: तर व्यापारी पिके घेणारे यांचे प्रमाण २८: तर बारमाही पिके घेणारे शेतकरी २४: व फलबाग करणारे फक्त १०: आपल्याला शेतकरी दिसून येतात.
- १०० शेतकऱ्यांनपैकी ५८: शेतकरी शेतीला जोड म्हणून पूरक व्यवसाय जास्त आहेत.तर ४२: शेतकरी फक्त शेतीच करतात.एकंदरीत असे दिसून येते की शेतीवर अवलंबून असणारे शेतकरी बरेच आहेत. की ते जोड व्यवसाय करत नाहीत.
- एकंदरीत सर्वात जास्त शेतकरी हे कुकुट पालन करणारे असल्याचे दिसून आले.
- सर्वेक्षण केलेल्या शेतकरी पूरक व्यवसायात किती उत्पन्न मिळते हे दर्शविले आहे. त्यात १० हजार ते २० हजार ५३: सर्वात जास्त दिसून येतो.
- जलयुक्त शिवार योजनेमुळे शेतकऱ्यांच्या उत्पन्नात वाढ झाल्याने गुंतवणुकीत वाढ झालेली दिसून येते.
- सर्वेक्षण केलेल्या शेतकऱ्याचे उपभोग प्रमाणाचे ८९ : वाढलेले दिसून आले.
- सर्वेक्षणासाठी निवडलेल्या १०० शेतकरी पैकी ५ ड्ड १०(७८:) आहेत. तर १० - २०(२२:) आहेत आणि २० -३० (१०:) हे तक्त्या नुसार दिसून आलेले आहे.
- सरकारने जर खुप मोठ्या प्रमाणात शेतकरी ला मदत केली तर शेतकरी आपल्या शेतीच्या उत्पन्नात वाढ करण्यास तयार आहेत.
- सर्वेक्षण केलेल्या १०० शेतकऱ्यापैकी सर्वात ज्यास्त ५१: शेतकरी कुपनलिका यंत्रात गुंतवणूक करण्यास उत्सुक दिसून आले.

संदर्भ सूची

१) उद्योजक , मे २०१५ पु २१
२) लोकराज्य, फेब्रुवारी मार्च ऑगस्ट-२०१५
३) अर्थसवाद - २०१५
४) दैनिक सकाळ विविध अंक
५) शासन निर्णय क्रमांकरू जलअ-२०१४/प्र.क्र.२०३/जल-७ मंत्रालय, मुंबई-४०० ०३२. तारीख : डिसेंबर, २०१४ https://www.maharashtra.gov.in/site/Upload/Government%20Resolutions/English/201412061015068426.pdf
६) जलयुक्त शिवार अभियानरू शाश्वती सिंचन धोरण
७) जलसवाद मासिक - २०१५
८) शासनाच्या परिपत्रकानुसार
९) कुरुक्षेत्र (फेब्रुवारी २००८) अग्रवाल उमेशचंद्र
१०) महाराष्ट्रातील जलसंपदा- प्रा.डॉ.एस.व्ही.ढमढेरे

संशोधनपेपर

जळगाव शहरातील घरकाम करणाऱ्या स्त्रियांचे सामाजिक व आर्थिक अध्ययन.

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कु. कापुरे करिश्मा जगदीश (TY BA. ECO)
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प्रस्तावना

ग्रामीण भागात काम करणाऱ्याचा स्त्रियांचा प्रश्न जसा तीव्र आहे. त्याचप्रमाणे शहरी भागातही काम करणाऱ्या स्त्रियांचा प्रश्न आधिक तीव्र आहे. असंघटीत क्षेत्रातील महिला अशिक्षित असल्यामुळे घरकाम करणाऱ्या स्त्रियांचे प्रमाण दिवसेंदिवस वाढत आहे.तसेच त्यांना येणाऱ्या समस्या आधिक आहे. त्यामुळे आम्ही घरकाम करणाऱ्या स्त्रियांचे सामाजिक व आर्थिक अध्ययन हा विषय निवडला आहे.

उदिष्टे

१) जळगाव शहरातील घरकाम करणाऱ्या महिलांचे सामाजिक अध्ययन करणे.
२) जळगाव शहरातील घरकाम करणाऱ्या महिलांचे आर्थिक अध्ययन करणे.
३) जळगाव शहरातील घरकाम करणाऱ्या महिलांच्या समस्यांचा अभ्यास करणे.
४) जळगाव शहरातील घरकाम करणाऱ्या महिलांचा समस्यांवर उपाययोजना सुचविणे.

गृहितके

१) घरकाम करणाऱ्या स्त्रियांना वेतन कमी आहे.
२) घरकाम करणाऱ्या स्त्रियांना कामाच्या ठिकाणी येणाऱ्या समस्या अधिक आहेत.
३) घरकाम करणाऱ्या स्त्रियांसाठी जळगाव शहरात संघटना नाहीत.
४) घरकाम करणाऱ्यां स्त्रियांना वर्षभर काम मिळत नाही.

संशोधन पध्दत

जळगाव शहरातील घरकाम करणाऱ्या स्त्रियांचे सामाजिक व आर्थिक अध्ययन करण्यासाठी जी मजुरांची जळगाव शहरातुन भागनिहाय निवड करण्यात आली आहे, त्यातुन १०० स्त्रियांची निवड करण्यात आली आहे. १. हरिविठ्ठल नगर २. रामानंद नगर ३. वाघ नगर ४. व्यंकटेश नगर ५. समता नगर ६. शांती नगर ७. जिजाऊ नगर ८. रुख्मिणी नगर ९. खंडेराव नगर १०. राजीव गांधी नगर ११. स्वामी विवेकानंद नगर १२. मुकुंद नगर १३. शाम नगर १४. श्रीकृष्ण नगर १५. शिवाजी नगर

महत्त्व

आजच्या गतीमान जगात सरकारला समाजातील काम करणाऱ्या स्त्री- पुरुषांची विविध गटातील माहिती असणे अत्यंत आवश्यक आहे. म्हणूनच जळगाव शहरातील घरकाम करणाऱ्या स्त्री मजूरांची आर्थिक व सामाजिक स्थितीचे अध्ययन करणे गरजेचे आहे. त्याच प्रमाणे त्यांना मिळणारे वेतन, कामाचे स्वरुप,त्याचप्रमाणे कामाचे तास त्यांना येणाऱ्या समस्या इत्यादी चा अभ्यास सरकारला योजना ठरविण्यासाठी व योजना कारकांना तसेच सामाजिक कार्यकर्ते आणि समाजाला आणि या विषयाचा अभ्यास करणाऱ्या संशोधकांना अत्यंत महत्वपूर्ण व उपयुक्त आहे.

मर्यादा

प्रस्तुत संशोधन हे नमुना निवडीवर आधारलेले आहे.त्यामूळे नमुना निवड पध्दती या संशोधनाला लागु पडतात तसेच हे संशोधन जळगाव शहरातील निवडलेल्या घरकाम करणाऱ्या स्त्री मजुरांच्या प्रतिसादावर आधारलेले आहे. या प्रकारची भौतिक, सामाजिक आणि आर्थिक परिस्थिती असलेल्या भारतातील इतर भागांना उपयुक्त ठरते.

निष्कर्ष-

१. सामाजिक स्थितीवर आधारित निष्कर्ष
सर्वाधिक स्त्रिया (५२%) या ३०-४० तर सर्वात कमी स्त्रिया (३%) या ५०-६० या वयोगटातल्या आहेत.

२. सर्वाधिक महिलांचे प्रमाण (४५%) अशिक्षित आहे तर सर्वात कमी महिला (४%) या उच्चमाध्यमिक आहेत.

३. कुटुंबातील व्यक्तीनुसार वर्गीकरण केले असता पुरुषांचे प्रमाण (२२%) तर स्त्रियांचे प्रमाण(२४%) आहे तर मुलांचे प्रमाण (५४%) आहे. तर कुटुंबातील सदस्यांचे प्रमाण सरासरी ४.७५% कुटुंबात मुलांचे प्रमाण सर्वाधिक (५४%) आहे तर सर्वात कमी प्रमाण (२२%) पुरुषाचे आहे.

४. मोबाईल धारकानुसार मोबाईल असणाऱ्याने प्रमाण सर्वात कमी (३३%) आहे तर मोबाईल नसणाऱ्यांचे प्रमाण (६७%) सर्वाधिक आहे.

५. कुटुंबातील व्यक्तीचे साक्षरतेचे प्रमाण मोजले असता सर्वात जास्त पुरुष (९६%) साक्षर आहेत तर सर्वात कमी पुरुष (४%) निरक्षर आहेत तर पुरुषांचे सरासरी प्रमाण (१.४%) आहे.

६. कुटुंबातील स्त्रियांचे साक्षरतेचे प्रमाण मोजले असता साक्षर स्त्रियांचे सर्वाधिक प्रमाण (८८%) आहे तर निरक्षर स्त्रियांचे सर्वात कमी प्रमाण (१२%) आहे स्त्रियांचे सरासरी प्रमाण (१.१३%)आहे.

७. कुंटुंबातील मुलांनुसार साक्षरतेचे प्रमाण (७८%) सर्वाधिक असून निरक्षर मुलांचे प्रमाण सर्वात कमी (१२%) आहे त प्रत्येक कुटुंबातील मुलांचे सरासरी प्रमाण (२.५८%) आहे.

८. कमविणाऱ्या व्यक्तीचे गटानुसार सरासरी प्रमाण १-२,२-३,३ पेक्षा जास्त या गटात कमविणाऱ्या व्यक्तींचे प्रमाण अनुक्रमे (५४%),(३२%),(१३%) एवढे आहे. कमविणाऱ्या व्यक्तिंचे सर्वाधिक प्रमाण १-२ या गटात (५४%) आहे तर ३ पेक्षा जास्त या गटात सर्वात कमी प्रमाण (१३%) आहे.

९. सर्वात जास्त काम करणाऱ्या महिलांचे प्रमाण घरकाम या गटात (७१%) आहे तर सर्वात कमी प्रमाण (७%) मेस मध्ये जाणाऱ्या महिलांचे आहे.

१०. सर्वात जास्त प्रमाण २-३ किमी अंतर जाणाऱ्या या गटात (४९%) महिला आहेत तर सर्वात कमी प्रमाण (७%) एवढया महिला ४ पेक्षा जास्त किमी या गटात आहेत.

११. कामाच्या ठिकाणी ५९% महिला पायी तर ५% महिला बस ने तर ३६% महिला रिक्षाने जातात सर्वात जास्त महिलांचे प्रमाण (५९%) पायी जाणाऱ्या तर सर्वात कमी महिलांचे प्रमाण (५%) बस ने जातात.

१२. सर्वाधिक प्रमाण असणाऱ्या (५४%) महिला ५ ते १० वर्षापासून काम करतात तर सर्वात कमी प्रमाण असणाऱ्या (१२%) महिला २० पेक्षा जास्त वर्षापासून काम करतात.

१३. सर्वात जास्त प्रमाण ६१% महिलांचे कामाच्या ठिकाणचे वातावरण साधारण आहे तर सर्वात कमी प्रमाण (४%)महिलांचे कामाचे ठिकाणचे वातावरण वाईट आहे.

१४. सर्वाधिक प्रमाण (५७%) या ४ ते ६ तास काम करणाऱ्या महिलांचे आहेत तर सर्वात कमी प्रमाण (२०%) महिलांचे ८ ते १० तास काम करणाऱ्या आहेत.

१५. समस्या सोडविण्यासाठीसर्वाधिक प्रमाण (८४%) महिलांच्या मते सरकारने उपाय योजावे तर सर्वात कमी (२%)महिलांच्या मते महिला संघटनेने उपाय योजावे.

१६. सर्वाधिक प्रमाण असणाऱ्या (५७%) महिलांना वेतनाबाबत समस्या येतात तर सर्वात कमी प्रमाण असणाऱ्या १२% महिलांना इतर समस्या येतात.

१७. काम कंटाळवाणे वाटणाऱ्यांचे प्रमाण सर्वाधिक (८५%) आहे तर काम कंटाळवाणे नाही वाटणाऱ्यांचे प्रमाण (१५%) सर्वात कमी आहे.

१८. कामाच्या ठिकाणी अन्याय झाल्यास दाद मागणाऱ्यांचे प्रमाण सर्वाधिक महिला (७९%) आहेत तर दाद नाही मागणाऱ्या महिलांचे प्रमाण सर्वात कमी (२१%) आहे.

१९. सर्वाधिक महिलांचे प्रमाण (७०%)समाजाकडे तर सर्वात कमी प्रमाण ३% महिला या कलेक्टर कडे दाद मागतात.

२०. व्यसन असणाऱ्यांचे सर्वाधिक प्रमाण (७३%) आहे तर व्यसन नसणाऱ्यांचे प्रमाण सर्वात कमी (२७%) आहे.

२१. ५ ते १० वर्षापासून व्यसन असणाऱ्यांचे सर्वाधिक प्रमाण (४६%) आहे तर १ ते ५ वर्षापासून व्यसन असणाऱ्यांचे प्रमाण सर्वात कमी (१२%) आहे.

२२. सर्वाधिक प्रमाण असलेले व्यक्ती (६५%) यांनी व्यसनमुक्ती केंद्राचा तर सर्वात कमी प्रमाण असणारे १७% व्यक्तिंनी समुपदेशन केंद्राचा व्यसन सोडविण्यासाठी उपयोग केला.

२३. घरामध्ये त्रास देणाऱ्यांचे प्रमाण सर्वाधिक ५६% आहे तर त्रास नाही देणाऱ्यांचे प्रमाण सर्वात कमी (४४%) आहे.

२४. सर्वाधिक प्रमाण असणाऱ्या ५२% महिलांना शारिरीक तर सर्वात कमी प्रमाण असणाऱ्या (१०%) महिलांना मानसिक त्रास दिला जातो.

२६. विधवा असणाऱ्या स्त्रियांचे प्रमाण सर्वात कमी ९% आहे तर विधवा नसणाऱ्यांचे प्रमाण सर्वात जास्त (९१%) आहे.

२७. पतीपासून सहकार्य मिळणाऱ्यांचे प्रमाण सर्वात कमी (४४%) आहे तर पतीपासून सहकार्य नाहीमिळणाऱ्यांचे प्रमाण सर्वात जास्त (५६%) आहे.

२. आर्थिक स्थितीवर आधारीत निष्कर्ष

१. सर्वात जास्त प्रमाण असणाऱ्या (२९%) महिला २००० ते २५०० वेतन असणाऱ्या आहेत तर २५०० ते ३००० एवढे वेतन असणाऱ्या प्रमाण सर्वात कमी(१७%) आहे.

२. सर्वाधिक प्रमाण असणाऱ्या (९७%) महिलांना वेतन पुरेसे नाही तर सर्वात कमी प्रमाण असणाऱ्या (३%) महिलांना वेतन पुरेसे आहे.

३. सर्वाधिक प्रमाण असणाऱ्या (७६%) महिला बचत नाही करत तर सर्वात कमी प्रमाण असणाऱ्या (२४%) महिला बचत करतात.

४. विमा न काढणाऱ्यांचे प्रमाण सर्वाधिक (८७%) आहे तर विमा काढणाऱ्यांचे प्रमाण सर्वात कमी (१३%) आहे.

५. बचत करणाऱ्यांचे सर्वाधिक प्रमाण ३००ते४०० या गटात (५०%) आहे तर बचत न करणाऱ्यांचे सर्वात कमी प्रमाण २००-३०० या गटात (१२%) आहे.

६. महिला बचत गटाची माहिती असणाऱ्यांचे सर्वाधिक प्रमाण (७८%) आहे तर बचत गटाची माहिती नसणाऱ्यांचे प्रमाण सर्वात कमी (२२%) आहे.

७. महिला बचत गटाच्या सदस्य असणाऱ्यांचे प्रमाण सर्वाधिक (६६%) आहे तर महिला बचत गटाच्या सदस्य नसणाऱ्यांचे प्रमाण सर्वात कमी (३४%) आहे.

८. बचतगटामार्फत खिचडी बनवणाऱ्यांचे प्रमाण सर्वाधिक (३९%)आहेत तर सर्वात कमी प्रमाण भाजीविक्रेत्यांचे (१४%) आहे.

९. सर्वात कमी प्रमाण असणाऱ्या ११% महिलांना ६००- ८०० या गटात वेतन मिळते तर ४००-६०० या गटात सर्वाधिक प्रमाण ७४%महिलांना वेतन मिळते.

१०. बचत गटामुळे सर्वाधिक प्रमाण असणाऱ्या ९१% महिलांनी कर्ज मिळाले तर इतर मदत मिळणाऱ्यांचे प्रमाण ९% हे सर्वात कमी आहे.

११. असंघटित क्षेत्रातील महिला कामगारांसाठी असणाऱ्या शासकीय योजनांची माहिती असणाऱ्यांचे प्रमाण सर्वात किमी २% आहे तर माहिती नसणाऱ्यांचे प्रमाण सर्वाधिक (९८%) आहे.

१२. घरकाम करणाऱ्यांसाठी जळगावात संघटना नाहीत असे १००% महिलांचे मत आहे.

१३. घरकाम करणाऱ्यांसाठी जळगावतल्या संघटनेमध्ये सभासद नसणाऱ्यांचे प्रमाण १००% आहे.

१४. सर्वाधिक महिलांचे पती (३५%) इतर काम करतात तर सर्वात कमी महिलांचे पती (१३%) गवंडी काम करतात.

१५. ५-१० हजार उत्पन्न असणाऱ्या महिलांच्या पतीचे सर्वाधिक प्रमाण (८९%) आहे तर सर्वात कमी असणारे प्रमाण (११%) व्यक्तीचे उत्पन्न १०-१५ हजार आहे.

१६. सर्वाधिक महिलांच्या मते (७०%) पेन्शन योजना लागु करावी तर सर्वात कमी प्रमाण (२%) महिलांच्या मते महिला संघटना स्थापन करावी अशी सरकारकडुन अपेक्षा आहेत.

१७. सर्वाधिक प्रमाण (८२%) महिलांच्या मते समाजाकडून वेतनवाढ व्हावी तर सर्वात कमी प्रमाण (१८%) महिलांच्या मते वाढीव कामाचे वाढीव वेतन मिळावे, अशी समाजाकडून अपेक्षा आहे.

समस्या

१) मिळणारे वेतन पुरेसे नाही.

२) पुरेशा वेतनाअभावी राहणीमानाचा दर्जा खालावलेला आहे.

३) कामाच्या ठिकाणी वेतनाबाबत समस्या येतात म्हणजेच वेतन वेळवर मिळत नाही.

४) कामाच्या ठिकाणी जास्त काम करावे लागते

५) कुटुंबातील सदस्याकडून सहकार्य मिळत नाही.

६) मिळालेले सर्व पैसे नवरा किंवा कुटंबीय घेतात म्हणजेच आर्थिक स्वतंत्र नाही.

७) घरातील महत्वाचे आर्थिक कौटुंबिक निर्णय घेण्यात कोणालाही अधिकार नाही.

८) नवऱ्याचे दारुचे व्यसन, जुगार इ, मुळे मानसिक व शारीरिक तसेच मारहाणीचा त्रास होतो.

९) कामामुळे घराकडे, मुलांकडे (शिक्षण व इतर बाबतीत) फारसे लक्ष देता येत नाही.

१०) प्रभावी संघटना नसल्यामुळे आपल्यावरील अन्याय कोणापुढे मांडवा याविषयी माहिती मार्गदर्शन नाही.

११) निरक्षरता, अज्ञान इ.मुळे दुसरे कोणतेही काम करता येत नसल्याने नाईलाजाने हे शारिरीक कष्टाचे काम करावे लागते.

१२) कामाच्या ठिकाणाचे अंतर जास्त आहे. त्यामूळे पायी जावे लागते.

१३) कामाचे तास जास्त आहे.

१४) कामाचे ठिकाणाचे वातावरण बऱ्याचशा प्रमाणात साधारण आहे.

१५) वेतन कमी असल्यामुळे बचत करता येत नाही.

१६) विम्याची बऱ्याचशा लोकांना माहिती नाही कारण ते अशिक्षित आहे.

१७) महिलां बचत गटाची माहिती नसल्यामुळे बऱ्याचशा महिला बचत गटाच्या सदस्य नाही

१८) बचत गटामार्फत मिळणारे उत्पन्न कमी आहे.

१९) बचत गटामार्फत काम करतांना वाढीव कामे करावे लागतात. तसेच वाढीव कामाचे वाढीव वेतन मिळत नाही.

२०) सर्वाधिक महिलांच्या पतीचे उत्पन्न कमी आहे.

२१) वेतनाचे प्रमाण कमी असल्यामुळे बहुतेक महिलांचे मुले शिकत नाही.

२२) बहुतेक महिलांच्या पतीनां व्यसन आहे.

२३) बहुतेक महिला अशिक्षित असल्यामुळे तसेच त्यांच्यापर्यंत महिती न पोहल्यामुळे त्यांना असंघटित क्षेत्रातील महिला कामगारांसाठी असणाऱ्या शासकीय योजनांची माहिती नाही.

२४) घरकाम करणाऱ्या महिलांसाठी जळगावात संघटना नाही.

संशोधनपेपर

धरणगाव तालुक्यातील महिला शेतमजुरांच्या सामाजिक आर्थिक स्थितीचे अध्ययन
मार्गदर्शक : कु.भाग्यश्री संदिप पवार
डॉ. एम.एम.बडवे (व्दितीय वर्ष – अर्थशास्त्र)
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अर्थशास्त्र विभाग

प्रस्तावना

भारत कृषी प्रधान देश आहे.बहुसंख्य लोकसंख्या ही शेतीवर अवलंबून आहेत.आजही ग्रामीण भागातील महिला शेतमजुरांना विविध प्रकारच्या समस्या भेडसावत आहे.त्यांचे सामाजिक आणि आर्थिक जीवन ही अत्यंत हालाखीचे आहे.त्यामुळेच या महिला शेतमजुरांच्या सामाजिक आणि आर्थिक स्थितीचे अध्ययन करण्याचे ठरविले आहे,म्हणून न्न धरणगाव तालुक्यातील महिला शेतमजुरांच्या सामाजिक आर्थिक स्थितीचे अध्ययन ष्हा विषय निवडला.

संशोधनाचे उद्दिष्टे

१)शेतमजूर स्त्रियांच्या सामाजिक परिस्थितीचे अध्ययन करणे.
२) शेतमजूर स्त्रियांच्या आर्थिक परिस्थितीचे अध्ययन करणे.
३) शेतमजूर स्त्रियांच्या समस्यांचे अध्ययन करणे.
४)शेतमजूर स्त्रियांच्या समस्यांवर उपाय सुचविणे.

गृहीतके

१)शेतमजुरांचे कामाचे तास जास्त आहेत.
२)शेतमजुरांना मिळणाऱ्या मजुरीचे प्रमाण कमी आहे.
३) शेतमजुरांना वर्षभर काम मिळत नाही.

संशोधन पद्धती

संशोधन म्हणजे वस्तुस्थिती जाणून घेण्यासाठी एखाद्या विषयाचा बारकाईने केलेला समीक्षात्मक अभ्यास किंवा वैज्ञानिक चिकित्सा होय.

नमुना निवड

अध्ययनाचे क्षेत्र असलेला धरणगाव हा जळगाव जिल्ह्यातील प्रमुख तालुका आहे.त्यासाठी त्रिस्तरीय स्वैर नमुना पध्दतीचा (Three State Stratified Random Sample) वापर केला आहे.त्यात तालुका हा पहिला एकक,गाव हा दुसरा एकक तर निवडलेल्या महिला शेतमजूर हा अंतिम एकक आहेत.
जेव्हा अभ्यास विषयक असणाऱ्या समष्टीचे विविध गटात वर्गीकरण झालेले असते तेव्हा स्तरीय स्वैर नमुना चाचणीचा वापर करावा लागतो.या पध्दतीत समष्टीच्या विविध गटातील आवश्यक तेवढे एकक स्वैर पध्दतीने निवडल्यानंतर त्या सर्व एककांचा मिळून स्तरील स्वैर नमुना होतो.

संशोधनासाठी निवडलेल्या धरणगाव तालुक्यामधील महिला शेतमजुरांच्या सामाजिक आणि आर्थिक स्थितीचे अध्ययन करण्यासाठी चांदसर,चोरगाव,कवठळ,लाडली आणि रेल या पाच गावांमधून प्रत्येकी २० महिला म्हणजेच एकूण १०० महिला शेतमजुरांची निवड केली.

व्याप्ती

सदर संशोधनाची व्याप्ती ही फक्त धरणगाव तालुक्यांपुरती मर्यादित आहे.

कालावधी

सदर संशोधनाचा कालावधी हा २०१६–१७ आहे.

संशोधनाची उपयुक्तता/महत्त्व

आजच्या गतिमान जगात सरकारला समाजातील काम करणाऱ्या स्त्री पुरुषांच्या विविध गटाची माहिती असणे अत्यंत आवश्यक आहे.म्हणूनच शेत काम करणाऱ्या स्त्री मजुरांची आर्थिक आणि सामाजिक स्थिती,मिळणार वेतन,कामाचे तास,कामाचे स्वरूप इ.चा अभ्यास सरकारला,योजनाकारांना,सामाजिक कार्यकर्त्यांना, समाजाला व या क्षेत्रात भविष्य काळात संशोधन करणाऱ्या संशोधकांना

अत्यंत उपयोगी पडणार आहे.

मर्यादा

नमुना निवड पध्दतीच्या मर्यादा या संशोधनाला लागू पडतात.तसेच हे संशोधन धरणगाव तालुक्यातील निवडलेल्या शेतात काम करणाऱ्या स्त्री मजुरांच्या प्रतिसादावर आधारलेले आहे. या मर्यादा असल्या तरी प्रस्तुत संशोधन हे याच प्रकारची भौतिक,सामाजिक व आर्थिक परिस्थिती असलेल्या भारतातील इतर भागांना उपयुक्त ठरते.

प्रमुख निष्कर्ष

दुय्यम माहितीवर आधारित निष्कर्ष

१) शेतमजूर स्त्रियांच्या घरातील कमवत्या लोकांची संख्या ही कमी दिसून आली आहे,त्यामुळे घरातील अर्थाजर्नाचा भार हा एकट्या स्त्रीवर पडल्याचे दिसते.तिला घरातील सर्व बाबींकडे लक्ष द्यावे लागते,तसेच बाहेर जावून मजुरी सुध्दा करावी लागते.

२) या शेतमजूर स्त्रियांना वर्षभरातील जास्तीत जास्त शेतात जावून काम करावे लागते,तेव्हा थोड्या प्रमाणात का होईना त्यांच्या गरजा भागविल्या जातात,त्यामुळे या स्त्रियांचा जास्त वेळ काम करण्यात जात असल्याने स्वतरूकडे जास्त लक्ष देऊ शकत नाही.

३) शेतमजूर स्त्रियांना शेतमालक ज्यादिवशी काम केले,त्यादिवशी मजुरी देत नाही,त्यामुळे ह्या स्त्रियांना आर्थिक गरजा पूणपणे शक्य होत नाही.एखादी अचानक अडचण उभी राहिल्यास त्यांच्याकडे आवश्यक तेवढा पैसा राहत नाही,तेव्हा त्या अडचणीला सामोरे जाणे कठीण जाते.

४) आर्थिक गरजा पूर्ण होत नसल्याने स्त्रियांना जास्तीत जास्त दुसऱ्यांच्या शेतात मजुरी करावी लागते.त्यांचा अधिक वेळ मजुरी करण्यात गेल्यामुळे त्या त्यांच्या कुटुंबातील मुलामुलींच्या शिक्षणाकडे अधिक लक्ष देऊ शकत नाही.यामुळे ह्या स्त्रियांच्या मुलामुलींच्या शिक्षणात बराच वेळ खंड पडतो.

५) या स्त्रियांचे शिक्षण हे प्राथमिक व माध्यमिक पर्यत झाल्याचे दिसते.

६) शेतमजूर स्त्रियांच्या कुटुंबाचा मुख्य व अधिक अर्थाजर्नाचा भाग शेतमजुरी करणे हा आहे.त्यामुळे त्यांना दुसरा पर्याय नसल्याने दुसऱ्यांच्या शेतात जाऊन शेतमजुरी करावी लागते.

७) अधिकाधिक शेतमजूर स्त्रियांकडे मजुरीला धरून जोडव्यवसाय नाही.त्यामुळे केवळ त्यांना मजुरीच्या उत्पन्नावर अवलंबून राहावे लागते.

८) या स्त्रियांना दिल्या जाणाऱ्या मजुरीचे प्रमाण हे महागाईच्या तुलनेत बरेच कमी आहे.त्यामुळे या शेतमजूर स्त्रियांच्या आर्थिक गरजा पूर्ण होऊ शकत नाही.

९) स्त्रियांना आर्थिक गरज भासल्यास त्या बऱ्याच वेळा सावकाराकडून व्याजाने पैसे घेतात.तसेच काही वेळा त्या शेजाऱ्यांकडून व शेतमालकाकडून उसनवार म्हणून घ्यावे लागतात.

१०) घरातील आर्थिक व्यवहार हा बऱ्याच कुटुंबात घरातील पती म्हणजेच पुरुषांकडे असल्याने सर्व आर्थिक अधिकार पर्यायाने सर्व बाबींवर त्यांच्या ताब्यात असल्याने या स्त्रियांना घरातील पुरुषांप्रमाणे वागावे लागते.

११) बऱ्याच शेतमजूर स्त्रियांच्या गावात प्राथमिक आरोग्य केंद्र नाही.त्यामुळे बऱ्याच आरोग्याविषय समस्या निर्माण झाल्यास या शेतमजूर स्त्रियांना तालुक्याच्या ठिकाणी जावे लागते.पण तेथे जाण्यासाठी कोणतेही साधने उपलब्ध नसतात.त्यामुळे बऱ्याच वेळा या स्त्रियांना दुखणे अंगावर कढावे लागते.

१२) शेतमजूर स्त्रियांनी व्यावसायिक प्रशिक्षण घेतलेले नाही.त्यामुळे त्यांना केवळ शेतमजुरीच्या उत्पन्नावर अवलंबून राहावे लागते.

१३) घरातील निर्णय प्रक्रियेत या शेतमजूर स्त्रियांचा सहभाग फार कमी स्वरूपाचा असल्याचे दिसून येते.घरामध्ये पुरुषी वर्चस्व असल्याने या स्त्रियांना आपले निर्णय मांडता येत नाही.

१४) बऱ्याच स्त्रियांना ग्रामसभेविषयी माहिती नाही,त्यामुळे एकूणच परिस्थिती कशी आहे,याविषयी ह्या स्त्रियांना कल्पना येत नाही.

१५) या शेतमजूर स्त्रियांचे शिक्षण अधिक झाले नसल्या कारणाने त्यांना शासनाच्या शेतमजुरांसाठी असणाऱ्या विविध योजनांची माहिती कमी स्वरुपात दिसून आली आहे.

प्राथमिक माहितीवर आधारित निष्कर्ष

सामाजिक स्थिती

१) संशोधन केलेल्या धरणगाव तालुक्यातील १०० महिला शेतमजुरांपैकी मोबाईल असणाऱ्यांचे प्रमाण सर्वात कमी (३८:),तर मोबाईल नसणाऱ्यांचे प्रमाण सर्वात जास्त (६२:)एवढे आहे.

२) सर्वात जास्त (४५:) माध्यमिक ,तर सर्वात कमी (४:)उच्च माध्यमिक महिलांचे शिक्षण झाले आहे. आजही ग्रामीण भागात निरक्षरतेचे प्रमाण जास्त (२६:)असल्याचे दिसून येते.

३) सर्वात जास्त प्रमाण (४२:)हे २५-४० या वयोगटात,तर सर्वात कमी (८:)हे १५-२५ या वयोगटात आढळून आले.

४) पुरुषांचे साक्षर प्रमाण ५९.८७: तर निरक्षर प्रमाण ४०.१३: एवढे आहे.

५) स्त्रियांचे साक्षर प्रमाण ४८.८०:तर निरक्षर प्रमाण ५१.२०:असे आहे.

६) मुलांचे साक्षर प्रमाण ६१.६५:तर निरक्षर प्रमाण३८.३५:एवढे आढळून आले.

७) घर मिळालेल्या महिलांची संख्या सर्वात जास्त (६८:) तर घर न मिळालेल्या महिलांची संख्या सर्वात कमी (३२:) म्हणजेच ३२: महिला शेतमजूर भाड्याच्या घरात राहतात.

८) कुडाचे,मातीचेध्कच्चे आणि सिमेंटचे घर असणाऱ्याचे प्रमाण अनुक्रमे १३:,१८:आणि ६९:आहे.म्हणजेच,सर्वात जास्त

(६९:)सिमेंट काँक्रीटचे घर,तर सर्वात कमी (१३:)कुडाचे घर आहेत.

९) सर्व महिलांना घर मिळण्याबाबतच्या सरकारच्या योजनांची माहिती आहे.

१०) सर्वात कमी (१८:)महिलांना सरकारच्या योजने अंतर्गत घर मिळाले आहे ,तर सर्वात जास्त (८२:) महिलांना घर मिळाले नाही.

११) सर्वात जास्त (११:)१-३ वर्षापासून तर सर्वात कमी (७:) ४-६ वर्षापासून महिलांना सरकारच्या योजने अंतर्गत घर मिळाले आहे.

१२) सर्वात जास्त (६९:)महिलांकडे रेशन कार्ड आहे,तर सर्वात कमी (३१:)महिलांकडे रेशन कार्ड नाही.

१३) सर्वात जास्त (३६) महिलांना ३० पेक्षा जास्त वर्षापासून तर सर्वात कमी (२) महिलांना १-१० वर्षापासून रेशन कार्ड मिळालेले आहे.

१४) सर्वात जास्त (२७)महिलांना गहू,तर सर्वात कमी (१८)महिलांना साखर इ.प्रकारचे धान्य रेशन कार्ड मार्फत मिळते.

१५) ६९ महिलांकडे रेशन कार्ड असून सर्वच महिलांना दर महिन्याला ३ लिटर इंधन (रॉकेल) मिळते.

१६) शेती असणाऱ्या महिलांचे प्रमाण सर्वात जास्त (७४:) तर शेती नसणा-यांचे प्रमाण सर्वात कमी (२६:) आहे.

१७) सर्वात जास्त प्रमाण (६४:) कोरडवाहू,तर सर्वात कमी प्रमाण (३६:) बागायती शेती आहे.म्हणजेच बागायती शेतीपेक्षा कोरडवाहू शेतीचे प्रमाण जास्त आहे.

१८) सर्वात जास्त (६०)०-५ या गटात तर सर्वात कमी (१) १५ पेक्षा जास्त या गटात शेती असल्याचे दिसून आले.

१९) सर्वात जास्त (५४:) महिलांना शेतीकाम चांगले तर सर्वात कमी (९:) महिलांना शेतीकाम कंटाळवाणी वाटते.

२०) सर्वात जास्त (९५:) महिलांना सकाळी शेतात जाण्यास आवडते तर सर्वात कमी (५:) महिलांना दुपारी शेतात जायला आवडते.

२१) सर्वात जास्त (६८:)महिलांना सर्व प्रकारची तर सर्वात कमी (३:)महिलांना पेरणीचे कामे येतात

२२) सर्वात जास्त (६७:)महिला १५ पेक्षा जास्त वर्षापासून तर सर्वात कमी (९:) महिला ५-१० वर्षापासून शेती व्यवसाय करत आहेत.

२३) २०: महिलांना ६-८ तास काम तर ८०: महिलांना ८-१० तास काम करावे लागते.

२४) सर्वात जास्त (३३:) महिलांना २ किमी पेक्षा जास्त तर सर्वात कमी (९:) महिलांना ०-१६२ किमी अंतरापर्यंत कामाला जावे लागते.

२५) शेतात१५: महिलांना वर्षभर काम मिळते,तर ८५: महिलांना वर्षभर काम मिळत नाही,याचा परिणाम त्यांच्या जीवनमानावर होतो म्हणजेच आजही ग्रामीण भागात बेकारीची समस्या उद्भवते.

२६) हंगामात सर्वच महिलांना काम मिळते.म्हणजेच हंगामामध्ये ग्रामीण भागात पूर्ण रोजगार असतो.

२७) हंगामातील मजुरी आणि इतर वेळेसची मजुरी यात ५० रु.चा फरक आहे. इतर वेळेसची मजुरीपेक्षा हंगामातील मजुरी जास्त आहे.

२८) सर्वात जास्त (५४:) महिलांना १८० दिवसांपेक्षा जास्त दिवस तर सर्वात कमी (७:) महिलांना १५० दिवस शेतात काम मिळते.

२९) कामाच्या ठिकाणी ८७: महिलांना अडचणी येतात,तर १३: महिलांना येत नाही.

३०) सर्वात जास्त (२८:) महिलांना वेळेवर मजुरी मिळत नाही,जरी मिळाली तरी अपूर्ण मिळते ही अडचण,तर सर्वात कमी (१४:) महिलांना ठरलेल्या वेळेपेक्षा जास्त वेळ काम करावे लागणे,ह्या अडचणी कामाच्या ठिकाणी येतात.

३१) सर्वात जास्त (७६:)महिलांना बचत गटाची माहिती नाही ,तर सर्वात कमी (२६:) महिलांना माहिती आहे.

३२) एकूण २६ (१००:)महिलांना बचत गटाची माहिती आहे,त्यापैकी २१ (८१:)महिलांचा बचत गट आहे,तर ५ (१९:) महिलांचा नाही.

३३) सर्वात जास्त (३४:)महिलांना इतर व्यक्तींकडून,तर सर्वात कमी (१४:)महिलांना नातेवाईकांकडून बचत गटाची माहिती मिळाली.

३४) सर्वात जास्त (५२:) महिलांचे खाते १-३ वर्षापासून,तर सर्वात कमी (२०:)महिलांचे बचत गटात खाते ७-९ वर्षापासून आहे.

३५) बचत गटाच्या २१ महिलांपैकी १४ महिलांना बचत गटासाठी घरातून पाठींबा आहे,तर ७ महिलांना पाठींबा आहे.

३६) सर्वात जास्त (१०)महिला ३ मिटींग तर सर्वात कमी (३) महिला २ मिटींगला हजर राहतात.

३७) बचत गट असलेल्या २१ महिलांपैकी १ महिला अध्यक्ष,१ महिला उपाध्यक्ष तर १९ महिला सदस्य आहेत

३८) एकूण २७: महिलांनी विमा काढला आहे,तर ७२: महिलांनी काढला नाही.

३९) सर्वात जास्त (१२:) महिलांना मैत्रिणींकडून,तर सर्वात कमी (७:) महिलांना सरकारी व्यक्तींकडून विम्याची माहिती मिळाली आहे.

४०) सर्वात जास्त (८५) महिलांचे पती सहकार्य करतात,तर सर्वात कमी (८) सहकार्य करत नाही.व्यसन हे सहकार्य न करण्याचे कारण आहे.

आर्थिक स्थिती

१) सर्वात जास्त (७४:) शेती,तर सर्वात कमी (२:)पशुपालन असे व्यवसाय आहे.

२) सर्वात जास्त (३८)१५०००-३०००० या गटात तर सर्वात कमी (२)३००००-४५००० या गटात वार्षिक उत्पन्न मिळणाऱ्या महिलांची संख्या आहे.

३) एकूण महिलांपैकी ०-१०० रु.पर्यंत ८०: महिलांना तर १००-१५० रु.पर्यंत २०: महिलांना कामाची मजुरी मिळते.

४) सर्वात जास्त (५६:)महिलांना पैशाच्या स्वरुपात तर सर्वात कमी (६:) महिलांना वस्तूच्या स्वरुपात मजुरी घ्यायला आवडते.

५) सर्वात जास्त (६६:) महिलांना मजुरी पुरेशी नाही,तर सर्वात कमी (३४:) महिलांना मिळालेली मजुरी पुरेशी नाही.

६) सर्वात जास्त प्रमाणात (६८:) महिला बचत करत नाही,तर सर्वात कमी प्रमाणात (३२:) बचत करतात.

७) सर्वात जास्त (२०:) महिला २५-५०: पर्यंत ,तर सर्वात कमी (३:) महिला ५०-७५: पर्यंत मजुरीतून बचत करतात.

८) सर्वात जास्त (३०:) मजुरीचा वापर घरखर्चावर,तर सर्वात कमी (४:) मजुरीचा वापर लग्नाच्या खर्चावर होतो.

९) **जोडव्यवसाय (दुग्धव्यवसाय) असणाऱ्यांचे प्रमाण सर्वात कमी (१९:) तर जोडव्यवसाय नसणाऱ्यांचे प्रमाण सर्वात जास्त (८१:) आहे.ग्रामीण भागात बहुसंख्य व्यक्ती शेती व्यवसायावरच अवलंबून आहेत.**

१०) सर्वात जास्त (११) महिलांना ०-३०००रु. तर सर्वात कमी (१) महिलांना ६००१-९०००रु.पर्यत जोडव्यवसायातून (दुग्धव्यवसाय) उत्पन्न मिळते

११) बचत गटात असलेल्या सर्वच महिला (२१) दर महिन्याला ५००रुपयांचा हफ्ता भरतात.

१२) बचत गट असलेल्या कोणत्याच महिलेला वेळेवर पूर्ण रक्कम मिळत नाही.

१३) बचत गटात समाविष्ट नसलेल्या महिलांचे प्रमाण ७९:दिसून आले.

समस्या

१) महिला शेतमजूर अशिक्षित किंवा कमी शिक्षण असल्यामुळे सरकारचे नवनवीन धोरणे किंवा योजना त्यांच्या पर्यत पोहचत नाही.

२) महिला शेतमजुरांपैकी साक्षर प्रमाण कमी आहे.

३) सरकारच्या योजने अंतर्गत घर मिळण्याचे प्रमाण सर्वात कमी आहे.

४) रेशन कार्ड मार्फत मिळणारे इंधन (रॉकेल)खूप कमी आहे.

५) भूमिहीन शेतमजुरांचे प्रमाण जास्त आहे.

६) बागायती शेतीपेक्षा कोरडवाहू शेतीचे प्रमाण जास्त आहे.

७) महिला शेतमजुरांच्या शेतीचे क्षेत्रफळ कमी असल्यामुळे उत्पन्न कमी येते,म्हणून त्याचे जीवनमान उंचावत नाही.

८) महिलांना शेताची सर्व प्रकारची कामे येत असूनही त्या कामाचा मोबदला म्हणून मिळणाऱ्या मजुरीचे प्रमाण कमी आहे.

९) कामाचा वेळ जास्त आहे.

१०) महिला शेतमजुरांना वर्षभर काम मिळत नाही,त्यामुळे त्यांच्या राहणीमानाचा दर्जा खालावतो.

११) कामाच्या ठिकाणी येणाऱ्या अडचणी जसे-मालकाचे चुकीचे वागणेध्बोलणे,ठरलेल्या वेळेपेक्षा जास्त वेळ काम करायला लावणे,वेळेवर मजुरी न मिळणे,मिळाल्यास अपूर्ण स्वरुपात मिळणे,शारीरिक क्षमता नसेल तरीही काम करणे,अशा समस्या खूप जास्त प्रमाणात येतात.

१२) बचत गटाची माहिती असूनही बचत गट असलेल्या महिलांचे प्रमाण कमी आहे.

१३) जोडव्यवसाय नसल्यामुळे उत्पन्नात वाढ होत नाही.

संदर्भसूची

लेखक	पुस्तक	प्रकाशन
प्रा.माधव शंकर सोमण	सामाजिक संशोधनाची तंत्रे	पुणे विद्यार्थी गृह प्रकाशन प्रथमावृत्ती : २९ आँगस्ट १९८४
पु.ळ.भांडारकर	सामाजिक संशोधन पद्धती	
डॉ.आगलावे प्रदीप	संशोधन पद्धती व तंत्रे	विद्या प्रकाशन,नागपूर
देशमुख प्रभाकर	श्रमाचे अर्थशास्त्र	श्री.विद्या प्रकाशन,नागपूर-२ तिसरी आवृत्ती,जानेवारी-१९८७
डॉ.देसाई व भालेराव	कृषी अर्थशास्त्र	निराली प्रकाशन, प्रथम आवृत्ती,जून-१९९५
जिल्हा सामाजिक व आर्थिक समालोचन जिल्हा, जळगाव २००१-०२		अर्थ व सांख्यिकी संचालनालय महाराष्ट्र शासन,मुंबई
भारताचा जनगणना अहवाल-२०११		
प्दंकपंद म्बवदवउल		
मासिक		

Globalization and changing Urban realities in India in Chetan Bhagat's *2 States*

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ABSTRACT:
After 1991,the fast growing cities and the overall urbanization that we have been witnessing across, India are the direct effect of globalization. The day-to-day experience, personal hopes, ambitions and dreams in urban India have almost metamorphosed. Globalization has changed the blood and soul of all these things. The project seeks to present how Krish through his fictional works cited in the title that depicts the changing urban urban realities in India in this globalized world.
Key words: Culture clash, Boyfriend-Girlfriend Relationship, Wedding, Young Love, University Students, IIM Ahmedabad

Introduction

Multiculturalism describes the existence, acceptance, or promotion of multiple cultural traditions within a single jurisdiction, usually considered in terms of the culture associated with an ethnic group. In India there are multiple cultures & traditions and languages etc. which describes India as multi-culture country. Chetan describes the novel 2 States as "The Story of my marriage". One is from Punjab and second is from Tamil Nadu. Both the states have different culture, traditions and language. In the novel 2 States Krish described how he and his wife struggled to convince their families.

Plot Construction and Theme

2 States – The Story of My Marriage' is a novel written by Chetan Bhagat. The novel is based on the story of a couple, who belongs to different states, castes and religion and wanted to get married. How they meet at IIMA campus and the way they convince their parents for their marriage is the actual plot of the novel. Two main characters of the novel are Krish, a north Indian Punjabi boy and Ananya, a Tamilian Brahmin girl. Ananya, who is from an economics background, is the most talked about girl at the campus of IIM Ahemadabad, whereas Krish is an IIT graduate. Soon they become good friends and their friendship turns into love and they start to live together. After the course both of them get job in the companies they have wished. Then Krish proposes to Ananya for marriage. While both of them were ready but not their families as, being from different states opposition from the respective families is obvious in India. Both of them irrespective of their own state and caste specific culture are not stereotyped. They are liberal in their thoughts. In spite of all this, they pick to convince their parents and take turn to win each other's families. For this, Krish asks his company for his placement in Chennai just to remain close to Ananya's family. Then he takes Ananya with him to meet his mother. Except for Krish's father rest of the family accepted her after an incident in which Ananya saves the marriage of Krish's cousin. Again due to cultural difference the marriage is called off and with this Krishgoes into depression. Finally Krish's father convinces everyone for the marriage and they both get married

The entire plot of marriage between individuals from two different states and their cultural differences have been very interestingly depicted. Indians have much fear in accepting the girl or a boy of other clan as in India marriage is not between a boy and a girl but the entire two families. So the fear of that a girl will not adjust in a new culture or she may take a boy along with her is very strong.

The Novel of 2 States:

The story of two states takes us to Ahmedabad, Delhi and Chennai, the cities which are among a selected few as preferred career, destination campuses such as, IIT and IIM helping people avail

themselves of global opportunities. This increasing of such institutions resulted due to liberalization privatization and globalization (LPG.) metropolitans and potential urban zones are the places where foreign direct investment FDI as advocated by international community is being attracted and provided the proper global atmosphere. Globalization has increased the foot of movement of people goods and the economy across the national lines. Bhagat very comfortably describes this atmosphere in the above cited works. The young generation shown in this fiction, possess
a sense of competition at the same time it is quite ambitious and wants to achieve everything that is possible to climb up to the top of their career. Growing awareness of technology and the use of it have definitely exposed India to a new environment. This change has come about due to strong wish of youths for the participation in the technological revolution that is going all around the world. The fiction of Bhagat shows techno-friendly youths participating in the development.

He helps his would-be father-in-Law to make a powerpoint presentation to represent it at his job place. Along with the competitive ambitious, Bhagat fiction is trendy. Due to free incoming of values, costumes, dresses, and the living habits of the western world, the basic Indian cultured has been greatly influenced.

In two States, Krishfinds job in Chennai so Krishget closed to Ananya and consequently would agree to marry both of them. The girl even though only half educated is a humble trend follower in dress design and manner. The female cousins of Krish, when they are in a family marriage event, secretly want to drink Vodka and other alcoholic drinks. They are todays urban youth and this behavior of theirs shows us a new trend coming in female community.

In the Bhagat's fictional novel the attitude of youths towards love marriage and sex is not at all emotional on the contrary, it is quite casual. KrishandAnanya in two states fall in love with each other in a strange way.

At IIM Ahmadabad, they started studying together in Ananya's room. Krishcould not concentrate on his studies as every time his attention would be got by Ananya's looks and the relationship get started quite surprisingly. Particularly in this work, love marriage and sex increase in KrishandAnanya come together in a more mature way. They want to marry each other because they share a mutual understanding, one of the major components of the marriage.

The attitude of this generation towards sex is not laden with guilt. They look at sex as a way of expressing their love for their partner. With growing urbanization and globalization a number of opportunities have opened up all around. Men and women are no more same to the old spectacle which mark men as a superior and women as inferior. In this global atmosphere so far belittle be women are given their due place and respect. With their own intellect and abilities are seen to be working with men. Thus this 21st century is of all men and women equality and similarity. Even in case of marriages now girls assert their own opinions and choices.

Ananya in two states in order to marry Krishtries to convince her parents till the end. In her case her parents deserve a round of applause for their open-mindedness who show the heart to accept the decision of the young generation. Here we noticed that now-a-days, the attitude of the people is quite changes then old time. In the period of this globalization, they think like –

"Why the parents are against all this things?
Thing is not of religion and communities.
Thing is that how we find someone in human"

Today's youth started to strike against their parent if they not agree with their decisions. In two states, both the protagonist Krishand Ananya still love with each other even their parents are not agree with their love.

In two states we noticed that, if the families are not agree with them, then they could get married with elopement. Because they have get jobs or so. But they does not did this thing. They stop till their parents approval.

In case of Ananya, she can't hear any insulting words for her family from Krish's mother. So here we

noticed that Ananya gives first priority to her family. She won't bear any insult of a family. She is ready to sacrifice her love if a Krish's family is insulting her family members.

The youth of now a days have daring to tell their parents about their love. They have also the ability to convince them. They are ready to face all the problem which will come in front of them in the way of their loving life.

In such a way, the mindset of the young generations is changed. They realize that everything is dependent upon their mindset and family decision. Even parents are also changing their behavior about their children's love as we noticed in two states later both the families agree for their marriage.

Chetan Bhagatstates love marriage in India as;

> Boy loves girl. Girl loves boy. They get married.
> In India, there are few more steps:
> Boy loves girl. Girl loves boy.
> Girl's family has to love boy's family. Boy's family has to love girl's family.
> Girl and Boy still love each other.
> They get married.

Conclusion

2 States: The Story of My Marriage is partly autobiographical. The story is about a couple, Krish and Ananya, who hail from two different states of India, Punjab and Tamil Nadu respectively, are deeply in love and want to get married.

The story begins in the IIM Ahmedabad mess hall, where Krish, a Punjabi boy from Delhi sights a beautiful girl, Ananya, a Tamilian from Chennai, quarreling with the mess staff about the food. Ananya was tagged as the "Best girl of the fresher batch". They become friends within a few days and decide to study together every night. In the meantime, they become romantically involved. They both get jobs, and have serious plans for their wedding. At first Krish tries to convince his girlfriend Ananya's parents and at last convinces them by helping Ananya's father to do his first PowerPoint Presentation, her brother, Manju, by giving him IIT tuition and later convinces her mom by asking her to sing in a concert organized by Krish'soffCity at CitiBank. She is convinced as her biggest dream of singing at a big concert comes true. She sings along with S. P. Balasubrahmaniam and Hariharan. Then they try to convince Krish's mom. They say that Krishshould not marry a Tamilian but end up agreeing with them when Ananya tries to help one of Krish's cousin to get married and succeeds to do so. Now as they have convinced both their parents they now try to introduce each other's parents. They go to Goa. But this dream of theirs end as Ananya's parents finds something fishy between Krish's mom and him. Ananya'sfamily end up deciding that Krish and Ananya will not marry each other. But, at last, Krish's father, who was like an enemy for Krish, helps Krish and Ananya to get married as he convinces Ananya's family well. Now Krishrealizes his Dad's love for him. They really do very hard to convince each other's parents and finally make it. The novel ends with Ananya giving birth to twin boys.

Promotion of Ecological Coexistence in Select Short Stories of Ruskin Bond

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ABSTRACT:
Environmental awareness became a major issue. Excess of development has put nature in danger. Ruskin Bond's stories reflect relation between human and nature in foothills of Himalayas. It gives message of love and harmony towards nature.
Key words: Nature, eco-criticism, Ecological Coexistence

Introduction

Ruskin Bond is one of the prominent short story writers of Indian Writing in English. All his stories promote the message of nature conservation and a life of healthy coexistence. The 21st century along with its mesmerizing boons has also brought curses. Devastation of natural order and by extension the problems of Global Warming, decreasing water level, and threat to life and security to numerous living beings are the threatening results of selfishly thoughtless grand enterprise of Globalization. The environmentalists, wild life conservators, policy makers and social workers etc. all have been working hard to halt the destructive march of Liberalization, Privatization and Globalization (LPG) agenda, as it has endangered the environment. The writers such as Jim Corbett, Rudyard Kipling etc. as representative writers from Indian fold have tried to sensitize the people about the issues of environment. Ruskin Bond among all stands out for his sincere call for the healthy coexistence in nature. His short stories talk of inclusive living, which acknowledges the existence all sorts of living beings. The earth is not the property of human beings alone, it equally belongs to ants, squirrels, birds, fishes, foxes, tigers, elephants and all the imaginable and unimaginable beings crawling on the face of earth.

No Room for a Leopard

In this short story a youngboy is the narrator who lives in the cottage above the hill. The ravine of the hill is too steep, so animals are active in day-time.
One day, he found that a leopard came at this stretch. One day he found the barking deer's partially eaten carcass left in open in the forest Soon he got the reason behind it. A party of 'shikaris' came after the leopard to hunt it for his valuable skin worth Rs.1000.

After some days, he climbed to the mountain 'paritibba'. At the top of mountain, the leopard was hidden in the cavern. It didn't harm the boy. Its silent trust made the boy worried about it; because its trust on humans will endanger its life. The next day,it was killed by the 'shikaris'

This short story represents the tension between humans and animals. The greed andthe foolish concepts of status in humans produce conditions for illegal killings of animals. It is dangerous, because if we kill every predator, then the balance of the eco-system will collapse.

Ruskin Bond also showed a light on how animals think about humans. The animals are mostly reluctant to face the humans. The leopard didn't tried to kill him.

The motive behind the story is to appeal reader's minds to stop killing the wild animals. It is our duty to make new laws to stop these atrocities on animals.

A Bouquet of Love

This short story revolves around 2 persons- a boy named Anil and a British spinster Miss Mackenzie. Miss Mackenzie was living alone in a cottage. One day, she saw a boy plucking flowers on a hill and asked him about the reason behind it. He told her that he loves flowers and wants to be a

botanist. She invited him to her home and showed him a book named 'Flora Himaliensis' has information about Himalayan flowers. Then he came to her home several times.

In the month of October, Anil's semester exams ended and he came at her home before leaving. Miss Mackenzie thursted 'Flora Himaliensis' into his hands. He thanked her and promised to meet again after vacation.The weather became bad and unbearable for her. One day old Miss Mackenzie unfortunately died.

This short story had written for the kids. So, the language of the story is light its motive is to germinate the love and affection for nature in the heart of children.

My Tall Green Friends

The short story revolves around author and his tall green friends, trees. His 'Aangan' is filled with trees as many as they can. He considers the walnut tree a tree for all seasons. This year he got very few walnuts. Then he found out the thief behind it.An old woman has age over 60, but she climbs as smoothly as a young man.

Deodar is a dignified tree in the eyes of author. It got its name,it because is used in building temples.

The author's oldest friend is an oak. It has crooked branches that made it perfect for the birds.

This story gives us the joy to read. It shows the coexistence between nature and people. It shows us that the people live with nature live long and healthy than the common people.

The short story reflects the enthusiasm of Ruskin Bond for the trees andhis keen observation of the forest. His perception towards the nature is unique. It helps him to reveal the secrets of the nature.

The Meeting Pool

This short story revolves around a pool and three friends. Anil, Rusty and Somi's favorite place to play was the pool. It had enough water to swim for the boys and the buffaloes. The friends took an oath to meet again after ten tears at this pool.

After the passage of ten years, Rusty comes back but does not find anybody. Now Rusty sees everything changed. His simple-minded friends now become fierce, careerist men. They forgot their oath.

He, on the road to return, finds a pool and some kids enjoying the swimming.Rusty thinks that, it was right for pool to shift where it gets love.

In the short story, the pool represents the love between the friends. As they grown up, they forget each other and the pool also dried like the love between them.

The pool showed ecological coexistence in the hill-stations. Humans and animals share the resources.

The nature plays a big part in the story. The nature always seeks the love. This short story represents a relationship between man and nature on a philosophical and spiritual level. The narrator's has emotional involvement with the pool.

Death of the Trees

This short story revolves around the death of his beloved trees during construction of a new road. The author was grown old with the trees. In one winter, the government decided to build a new road into the mountains.The walnut, the best among all, was one of the first trees felled down. The deodar treealso felled down.

About 1000 oaks were cut down when the road will reach its destination,but nobody thinks it wrong. Now, not a single bird or an animal is living near his Maplehood cottage.

This short story represents the current era of development the human greed is destroying the nature and sometimes it becomes irreversibly damaged. The deforestation is one of them. If we don't take steps, we will not get time to stop the harm.

Ruskin Bond's comparison of the deodar with his brothershows the pain he felt when the trees were cut down.Dehra, its mountains and its people are the prominent subjects in his short stories like his own life. He teaches us about the do's and don'ts in the relationship between humans and ecology, that is the called as 'ecological coexistence'. His life is reflected in his work and his work reflected the beautiful world of Dehra.

References:

Bond, Ruskin. Our Trees Still Grow in Dehra. 1991. New Delhi: Penguin Books, 2010. Print.
"Ruskin Bond". Web. 12th Jan. 2017. <https://en.wikipedia.org/wiki/Ruskin_Bond>

शोधनिबंध

कवी वा.ना.आंधळे यांच्या फर्मान या कविता संग्रहाचा वाङ्.मयीन आणि भाषिक अभ्यास.

प्रस्तूत 'फर्मान' कविता संग्रहात कवी वा. ना. आंधळे यांनी त्यांच्या कविताचा विविधांगी पटच जणू रचलेला आहे. आंधळे यांची कविता बहुआयामी, बहुरुपी आहे. कवी वा.ना. आंधळे यांच्या कवितेवर अनेक संशोधक तसेच विधान अभ्यासकांनी लेखन केलेले आहे.

प्रा.वा.ना.आंधळे हे खानदेशातील प्रतिभासंपन्न कवी असून ते संपूर्ण महाराष्ट्रभर आपल्या साहित्याच्या ताकदीने आणि 'आई मला जन्म घेऊ दे' या लेक वाचवा अभियानाने सर्वांना सुपरिचित आहेत. काव्यातून शब्दांशी मैत्रीचे नाते गुंफून कवी वा.ना. आंधळे यांनी तब्बल ५० कवितांचा फर्मान काव्यसंग्रह रचलेला असून त्यांच्या कवितेतून समाजातील सर्वसामान्य माणसाची वेदना प्रकट होतांना दिसते. त्यांच्या 'फर्मान'या काव्य संग्रहात वेगवेगळे विषय आपणास दिसून येथील उदा.निसर्ग, सण. धार्मिकता तसेच राजकारण समाजकारण, राष्ट्रीय नेते इ. यावर आधारित समाजातील शेतकरी आणि कौटुंबिक नाती-गोती असे आपले स्व-अनुभव निर्भिडपणे कवी आंधळे यांनी मांडलेले आहेत. तसेच कवी आंधळे यांच्या कविता वैविध्यपूर्ण आहेत त्यात प्रामुख्याने गझल, ओवी, अभंग, मुक्तछंद या काव्यप्रकारातील कविता समाविष्ट आहेत. आणि म्हणूनच प्रस्तूत 'फर्मान' या कवितासंग्रहाचा वाङ्.मय आणि भाषिक अभ्यास करणे महत्वाचे ठरेल. कवीचे क्रांतीकार्य हे संवेदनशील मनांना चेतविण्याचे असते. ही जाणीव फर्मान मधील कविता देतात.

कवी वा.ना. आंधळे यांच्या गझलेतून सुरेश भटांची, अभंग-ओवी यातून संत तुकारामांची आठवण यावी इतके सामर्थ्य त्यांच्या कवितेत आहे त्यांच्या या कविता संग्रहात दोन-एक गझल 'प्रेम' या विषयावरील आहेत. तसेच या कविता संग्रहास जेष्ठ साहित्यिक प्रा.डॉ. केशव मेश्राम यांनी सप्तपानी सविस्तर समीक्षावजा प्रस्तावना लिहिली आहे.

'एका मर्यादित अर्थाने बालकवींच्या २१ व्या शतकातील वारशाची कविता म्हणून प्रा. आंधळे यांची कविता वाचकाच्या काळजात आनंदाचा ठसा उमटवते.' १ असे श्री. वाघ. संजय यांनी गौरवोद्गार केलेले आहे. कवी आंधळे यांच्या निसर्ग कवितेत मातीचा ओलावा. राना-वनांची हिरवळ उमटून येते.आणि वाचकांच्या मनाला प्रफुल्लीत व आनंदीत करते. कवी आंधळे यांच्या कवितेतून बालकवी (निसर्गपर कविता-'झाड''माती') सुरेश भट (गझल-'बापू'), अशा अनेक कवींचे प्रतिबिंब उमटतांना दिसते.

वा.ना. आंधळे यांच्या 'झाडं', 'ठस', 'गेले', 'माती', 'वळणावर', 'लेणं' इ. यासारख्या कवितांधून निसर्गातील प्रत्येक घटकाची अनुभूती कविता वाचतांना वाचकास येते. जणू काही आपण शेती शिवारात, निसर्गाच्या कुशीत आहोत असा आभास वाचकास हळूवार स्पर्श करुन जातो त्यांच्या निसर्गप्रतिमांची लवचिकता आणि ग्रामीण जीवनाशी असलेली नाळ अगदी घट्ट आहे. कपटकरी ग्रामीण जीवनातील सुख दुःख, भाव-भावना आणि लोकतत्वीय संस्करांची रांगडी परंतु हदयस्पर्शी जाणीव कवीने आपल्या नेमक्या व मोजक्या शब्दात मांडली आहे. खानदेशी निसर्गाची लयलूट जशी बालकवींच्या काव्यात दिसते. त्याच प्रभाव मान्य करुन ही आपले वेगळेपण जपणारी कवी आंधळे यांची निसर्ग कविता आपले स्वतंत्र स्थान निर्माण करणारी आहे. त्याची साक्ष पटते. आज सर्वत्र गढुळलेले सामाजिक जीवन, भ्रष्ट राजकारण, सामान्य माणसाचा अगतिक सोशिकपणा कवीने अनेक मझलांमधून धारदार शब्दातून समर्थपणे व्यक्त केला आहे. आज देशाला स्वातंत्र्य मिळून इतकी वर्षे झालीत, परंतु कवीला त्याच्या आजूबाजूचे वातावरण इतके अस्वस्थ करते की तो म्हणतो. खरचं आपल्याला स्वातंत्र्य मिळाले आहे. का?

''चटपटीत संवादी गझल हा आंधळेंच्या कवितेचा विशेष सांगता येईल प्रतिमा, प्रतिकांचा वापर करणारी त्यांची गझल असली तरी या प्रतिमा खूप गंभीर विचार करणा-या असतात का ? अशी शंका कधी कधी येते. (गझल-बापू)''२ असे प्रा. डॉ. संभाजी देसाई म्हणतात. कविता समाजाचे दर्शन घडवत असते. कवितेच्या माध्यमातून समाजाला एक नवी शिकवण दिली जाते. त्याच पध्दतीचं काम अतिशय सक्षमरित्या आंधळे यांची कविता करते.आंधळे यांच्या कविता समाजातील अनेक अडचणी, समस्या, वेदना यांच्या संदर्भ घेऊन प्रकटते आणि या चिंतनविाात त्यांची कविता रमते.

''मनोविश्लेषणाबरोबरच आत्मचिंतन आणि चिंतनाने त्यांची गझल व्यापलेली आहे. गझलांचे शीर्षक बघितले तर मशाल फर्मान 'नको' यातून चीड लक्षात येते. तसेच सभोवतालच्या परिस्थितीला पाहून प्रत्येक संवेदनशील मनच उदास होऊ शकते.''३ असे डॉ. शशिकांत पाटील म्हणतात. कवीच्या व्यथेत मानव कल्याणाची आस आहे. तसा राष्ट्रभक्तीचा ध्यासही आहे. पण कवी राष्ट्रप्रेमाचे पोवाडे न गाता व्यथित अंतःकरणाने अगदी मर्मावर बोट ठेवित म्हणतो. डोळसपणे सामाजिक प्रश्नांकडे पहाणे हा कवीचा स्वभाव आहे. अर्थातच कवी जे पाहतो तेच त्याच्या लेखनीतून झिरपते. कवी 'बापू' या कवितेत बापूंजवळच (महात्मा गांधी) आपली खंत, चीड व्यक्त करताना दिसतात.

''बापू तुझी अहिंसा भटटीत जाळणारे
स्वातंत्र्य पाहिले मी आतून पोळणारे
इतिहास छापलेला शिकवू कसा मुलांना
सारे सभोवताली थुंकीस झेलणारे''

असे समाजाचे वर्तन त्यांना अधिक अस्वस्थ करते. कवीच्या व्यथेत मानव कल्याणाची आस आहे. तसा राष्ट्रभक्तीचा ध्यासही आहे. पण कवी राष्ट्रप्रेमाचे पोवाडे न गाता व्यथित अंतःकरणाने अगदी मर्मावर बोट ठेवित म्हणतो.

''कापूस काढणारा श्रीमंत देश माझा
उद्याप नागवा का चौकातला भिकारी''

डोळसपणे सामाजिक प्रश्नांकडे पहाणे हा कवीचा स्वभाव आहे. अर्थातच कवी जे पाहतो तेच त्याच्या लेखनीतून झिरपते. सत्तरीच्या स्वातंत्र्याचे एक मुख्य अपयश कुठले असेल तर ते आहे. शेतक-यांचे आजही न सुटलेले प्रश्न. शेती प्रधान म्हणवणा-या देशात अजूनही शेती आणि शेतकरी उपेक्षित आहे. ही गोष्ट खूप गंभीर आहे देश श्रीमंत होणे म्हणजे काय? तर इथला शेतकरी शेतमजूर, सामान्य माणूस सुखी होणे. भिकारी कमी होणे, पण सत्तरीच्या स्वातंत्र्यात असे काहीही होतांना दिसत नाही.कापूस पिकविणा देशातल्या माणसांवर नागडे रहाण्याची वेळ येणे हा केवढा विरोधाभास आहे. असे विरोधाभास टिपणे हे यशस्वी गझलेचे एक लक्षण आहे.

कवी वा.ना. आंधळे यांच्या कवितेत ग्रामीण बोलीभाषेचा देखील वापर केलेला आढळतो त्यामुळे कवितेतून ग्रामीणत्वाचे दर्शन घडून येते. जसे की -
मध्य - माझं
मनगोत- गणगोत (परिवार), नातेवाईक
ओवी व अभंग हे मराठीतील सर्वांत जुने व परंपरेने चालत आलेले असे लोकप्रिय छंद आहेत. या दोन्ही छंदांत पुष्कळसे साम्य आहे. रचनेच्या बाबतीत अभंग हा अधिक काटेकोर असून ओवीची रचना अतिशय शिथिल आहे. अभंगाचे २ मुख्य प्रकार आहेत. १) मोठा अभंग व २) लहान अभंग मोठ्या अभंगात चार चरण असून पहिल्या तीन चरणांत प्रत्येकसहा अक्षरे व चौथ्या चरणात चार अक्षरे असतात. दुस-या व तिस-या चरणांच्या शेवटी यमक असते. या अभंगाच्या प्रकारात वा.ना. आंधळे यांचा अभंग प्रकार मोडतो.
उदा- ''काटे पदरात। दिवसाचं ऊन
लाज ठिगाळानं । गोंदलेली ।।''
वा.ना. आंधळे यांच्या 'फर्मान' या कवितासंग्रहातील आशय हा सामान्य माणसाच्या व्यथा, वेदना यांच्या केंद्रस्थानी एकवटलेला दिसतो. कवीने स्वतःच्या अंतरंगाशी एकरुप होऊन कवितेची रचना केलेली आहे तसेच त्यांच्या कवितांमधून निसर्ग, सामाजिक राजकीय परिस्थिती यातील सत्य व सद्यस्थिती इ. आशय व्यक्त होतांना दिसतो. त्यामधून समाजाविषयी असलेली तळमळ तसेच देशात होणारा भ्रष्टाचाराबद्दल कवीने थेट गांधींजीजवळ खंत व्यक्त केली आहे. यातून त्यांच्या आजूबाजूच्या परिसराचे, वातावरणाचे चित्र आपल्या डोळयासमोर उभे राहते या त्यांच्या कवितामधून वास्तववादी व समाजातील फसवणूक करणा-या राजकीय नेते व त्यांच्या वृत्तीवर अतिशय मार्मिकपणे बोट वा.ना. आंधळे यांनी ठेवले आहे .

'डॉ. जितेंद्र गिरासे लिहितात की, कवी आंधळे यांनी घाव या कवितेतून जिवंत माणसांना जनावरांपेक्षाही तुच्छ लेखले जाते. असे शब्दांच्याही पलीकडे दुःख येथे कवीने अभिव्यक्त करुन सामान्य माणसाविषयीचा मानवताधर्म इथे त्यांनी लक्षात आणून दिला आहे. असे ते म्हणतात.'' ४ प्रा. डॉ.तुषार चांदवडकर व प्रा. सौ. चारुता गोखले.

संदर्भ सुची :-

१. वाघ. संजय, डॉ. श्रीपाल सबनीस प्रणीत प्रतिमा-संगम, प्राजक्ता प्रकाशन, नाशिक २०१३,पृ.४९.
२. प्रा. डॉ. देसाई संभाजी, खानदेशातील साहित्य व समाजदर्शन, प्रशांत पब्लिकेशन, २०१६,पृ.५९.
३. डॉ. पाटील शशिकांत, खानदेशचे मराठी साहित्यरुप, चिन्मय प्रकाशन, औरंगाबाद २०१६, पृ.८५.
४. प्रा. डॉ. चांदवडकर तुषार व प्रा. सौ. गोखले चारुता, नव्वदोत्तरी मराठी साहित्य आणि समाज, कुसुमाग्रज प्रकाशन,नाशिक २०१६,पृ.४९६.

शोधनिबंध
जैत रे जैत या कादंबरीतील निसर्गवर्णन

जैत रे जैत ही गो. नी. दांडेकर यांची महत्वपूर्ण कादंबरी आहे. या कादंबरीत चित्रित झालेल्या निसर्ग वेगळा आहे.
जैत रे जैत या कादंबरीतीतल गो. नी. दांडेकर यांनी रेखाटलेला निसर्ग हा कादंबरीचे एक महत्वपूर्ण असे वैशिष्टय आहे.
ठाकरवाडीला विपुल असा निसर्ग लाभला आहे. करवंदाची तोरण तर संपतच नाही आणि ओव्याची झाडे सुध्दा विपुल प्रमाणात आहे आणि त्यांना बहार सुध्दा चांगला आहे म्हणजे एका वेळेस जर दगड मारला तर सात आठ कैऱ्या खाली पडतात.

लिंगोबाचा डोंगर हा सहयाद्रीच्या माळात बराच आत दडलेला आहे. त्याच्या भोवतालचे रान हे राखीव जंगल आहे. तेथे बाजुलाच वृध्दकालीन लेणं सुध्दा आहे. स्तुप नाही, नुसत्या खोल्याच काढलेल्या आहेत. शेजारी खडकात खोदलेली पाण्याची टाकी आहेत. उन्हाळयात जेव्हा सगळया राहाळाज पाण्याचा खडखडाट होतो तेव्हा त्या टाक्यातून थंडगार पाणी भरलेलं असते. अगदी दातात शिळ्ळक भरेल, इतक गार कधी, क्कचित त्याच्यावर हिरवी साय येते. पण तेवढी बाजुला सारली, की खाली आरशासारखं गंगाजळ निर्मळ पाणी असते. १

ठाकरवाडीमध्ये दहावीस वर्षापूर्वी खुप मोर होते असा उल्लेख देखील येतो. ठाकरवाडीत जेव्हा वर्षाच्या सुरुवातीला पाऊस पडला तेव्हा पटापट झाडावळ गळू लागली. पाणी फांदयावर उतरले तिथुन ते खाली खोडावरुन धावू लागले मग चैतन्यमय वातावरण पसरलेल दिसते.

एके दिवशी ज्यावेळेस नाग्या आणि चिंधी डोंगराच्या दिशेने रात्री निघतात तेव्हा वर्णन येते की, आकाश स्वच्छ होते. अगदी स्वचित. कुठ ढगाचा एखाददुसरा तुकडा तरंगत होता. सगळया चांदण्या जिथल्या तिथं बसुन लकाकत होत्या. त्यांच्या प्रकाशात झावळं झावळं दिसत होते. झाडावर बसलेले रानकिडे सुर धरुन बोलत होते. खाली कुठं तरी चोंढयात कोल्हं आरडत होते. लिंगोबाचा डोंगर समोर आकाशाशी भिडला होता. २

डोंगराच्या ठिकाणी सोनकीची रोपी, चवेणीची झुंबाड, काडेसांबरीचं झुडुप. भुसभुशीत भाग मरमारी मनास लोभणारं होते. वाटेत पाणी वाहात होते. खेकडे तरतरत होते. खडक झरत होते. शेवाळले होते. उजव्या हाताला आकाशाशी भिलेला बुधला उभा होता. त्यावरुन पाणी झिरपत होत चांदिणं त्यावर उतरत होतं. रुपेरी दिसत होतं. महादेवाच्या जटेतून गंगा खाली उतरती होती. ते बारकेबारकें असे बुधलाभर पसरले होते. महादेवाच्या नाकावरुन, गालांवरुन, ओठांवरुन खाली उतरत होतं. पोळी कडयाच्या पोटाशी होती. ती ओली होत नव्हती. त्यांच्यावरुन वाहुन ससे खाली उडी घेत होते. खाली पसरलेल्या दगडाळ काटवणात वरचं हे वाहतं पाणी ठिपकत होतं. कुठे थेंबथेंब कुठं सुतासारखी धार. कुठं तीहुन अधिक मोठी. कुठे चांगला मनगटाएवढा पन्हळी असे सुंदर वर्णन कादंबरीत बघायला मिळतं.

डोंगराच्या खालती सोंडेवर बसलेली ठाकुरवाडी दिसते. डोंगराचा दुसरा फाटा लांबपर्यंत धावलेला. पुढल्या डोंगराला मिळालेल्या त्याच्या लवणात भाताची शेते होती. डोंगराच्या पोटाशी असलेली घनदाट झाडी आस्वलीच्या केंसासारखी भासत होती. तेथें सुंदर असं रान होतं. त्या रानात फुलांचा नुसता कल्लोळ होता. क्कचित कुठं एखादे कांडेसाबरीचे रोपटे, त्यांच्या भवताली जर सहा लहानमोठे धोंडे होते. त्या धोंडयामधून अन् भवताली हिरवं कच्च गवत होते. गवतामधुन डोकीवर काढणारी तेरडयाची रोपी. खालपासून वरपर्यंत फुलांनी केंवळ बहरलेली लांबसडक पानं, त्याच्या देहाशी पेलेदार फुलांचा मांड. त्या पेल्यामधून मधले केंसर बाहेर डोकावत असलेले. आपले सगळे सामर्थ्य रंगावाटे उधळुन देणारा तेरडा.

डोंगराच्या उतरतीला आपटयाचे रान होते. रानात कोंभाळयाचा वेल होतो तेथे ती बेहेडयाचं झाडं उंच पोहोचलं होते. अन त्यावरुन कोंभाळयाचे दोर खाली लोंबत होते. पावसाच्या धारा उतराव्या याप्रमाणे.

अशा प्रकारे ' जैत रे जैत ' कादंबरीतील ठाकरवाडीच्या आजुबाजुचा परिसर हा निसर्गाने व्यापलेला आहे. कादंबरीतील निसर्ग हा आपल्याला एक सुखद अनुभव प्राप्त करुन देतो. आपण देखील कादंबरी वाचतांना त्या निसर्ग वर्णनाशी एकरुप होतो

' जैत रे जैत ' कादंबरीतील निसर्ग हा अनेक रित्या परिणाम साधून जातो. संदेश देऊ पाहतो.

ठाकरवाडीत अनेक करवंदाची झाडे आहेत. अनेक लोक त्या करवंदी तोडतात. त्याच्याकडे बघितल्यावर वाटते की, त्या विचारतात, किती फळं तोडाल ? आम्ही बहरामागं बहर बाहेर फेकु जणु काही संदेश देऊ इच्छितात की तुम्ही तुमचं तोडण्याचे कर्म करा पण आम्ही सुध्दा आमचं बहरण्याचं कर्म सोडणार नाही.

मावळतीकडील काळे ढग भरभरुन यायचे कमी झाले की, भाताची खाचरं जोगावली त्यांच्या बांधांवरुन शेदवलेलं हिरवट शेवाळे दिसू लागलं. तरोप्याची फुलं गळुन शेंगा जुनाट झाल्या. कुर्डुच्या तु-यांमधुन बी धरलं. बिळातले खेकडे मरुन गेले त्यांच्या कवटया जागोजाग आढळु लागल्या. अश्विन महिना उलटून जायला आला.३

कार्तिक महिना अर्धा उलटल्यानंतर सोनकीच्या रोपटयांवरली पिवळी धम्मक फुल गाळू लागली होती. पावसाभर पाणी पिऊन झुडुपांची हिरवी पाने काळपटु पाहात होती. रुखांच्या बुंध्यांवर पावसाळयात जमलेलं शेंवाळ रंग बदलीत होते. आकाशात कुठं एकटं दुकटं ढगाची चिंधी उरली होती. ती वगळता सगळं आकाश लख्ख मोकळं होतं.४

उन्हाळयाच्या दिवसामध्ये कडयाच्या पोटाशी उगवलेलं गवत वाळुन कोळ होऊन जाई वाऱ्याच्या लोटांबरोबर ते भुरुभुरु उडत असे. पुन्हा स्थिरावत असे. जणु काही ते महादेवाच्या अंगावरले केंस दर उन्हाळयात महादेव म्हणजे डोंगर म्हातारा होई त्याच्या डोळयाच्या पापण्या पिकू लागत. त्याच्या मुखावर रुखंपण दिसू लागे. जणु ध्यान धरुन तो थकुन गेला. वरच्या झाडाची पाने पार गळुन जात. महादेवाची शेंडीही पिकें. केंस पांढरे होत.

ज्यावेळेस चंद्र डोंगराच्या मध्यावर यायचा तेव्हा डोंगराच्या ती बाजुंनी आकाश कातलं जायचं. चांदण्यांनी ते गच्च दाटलं

असायचं. सगळच मोहोरवाणं दिसत होतं. पौर्णिमेच्या रात्री नाग्या झाडांच्या कवळया शेंडयावरुन हात फिरवतो. फुलं गोंजारतो फळं न्याहाळतो. तुळशीच्या मंजिऱ्यांचा वास घेतो कारण त्याचा निसर्गाप्रती असलेला त्यांचा मोह त्याला आवरला जात नाही.

अशा प्रकारे ऋतु बदलला वातावरण बदलले की त्याच्या परिणाम हा निसर्गावर होत असे.

गो. नी. दांडेकर यांनी ' जैत रे जैत ' कादंबरीत प्रदेशातील वर्णन करतांना काही निसर्गप्रतिमांच स्पष्टीकरण केेले आहे. त्यातलीच सर्वात महत्वाची नैसगिक प्रतीमा म्हणजे लिंगोबाचा डोंगर. या कादंबरीत महादेवाच्या रुपाचे वर्णन लिंगोबाचा डोंगर करंगळी उभारुनचं उभा आहे. या डोंगराभोवती इतिहास कालीन गडेकोट रचला आहे. भवताली राखीव रान (जंगल) आहे.५

लवण उतरुन लिंगोबाचा घस चढतांना वाटेत आइनाच्या झाडावर कोंभाळयाचा वेल आहे. त्याचे दोर खाली लोंबत आहे. जणुकाही झाडावर कुणी झोपाडाच टांगलाय. बुंधल्याच्या लेण्याकडे चढतांना एका ठिकाणी कडा कोसळला आहे. भल्या थोरल्या दगडींचा ढासळ खालपर्यंत दगडाळ उतार होता. काटवणानं भरलेला. रस्त्यान कुठ येकली कुठ करवंदी तर कुठं चीलाटी होती. बुंधल्याच्या मध्यापासुन जवळ जवळ पाऊणशे हात वरपर्यंत ओबडधोबड भिंत होती. त्याच्या काही थोडया अंतरावर एखाद विश्वर होत बाकी सगळीकडून कडा होता चढुन जायची मुळीच सोय नव्हती.

नाग्या ज्या वाडीत रहायचा त्या वाडीशेजारी एका शेजारी तांबडी हिरवी आलवणं लटकलेली होती. पलीकडच्या टेकडीवर वाघाटीच्या बेलाखाली वाघदेव होता.

गो. नी. दांडेकरांची ' जैत रे जैत ' ही प्रादेशिक कादंबरी महत्वाची ठरते. यामध्ये निसर्गवर्णन दिसून येते.

निसर्ग हा खरच प्रादेशिक कादंबरीचा आवश्यक भाग आहे का ? निसर्ग असावा हे प्रादेशिकतेचे मूल्यमापन मुळात चुकीचे आहे. प्रादेशिक कादंबरीचे मूल्यमापन करतांना निसर्ग हा आवश्यक घटक समजला गेला अशा काही प्रादेशिक कादंबऱ्या असु शकतात की, ज्यात वैशिष्टयपुर्ण निसर्ग असु शकत नाही.

गो. नी. दांडेकरांच्या कादंबरीत व्यक्तीरेखांचा देखणेपणा आणि भोगवादीवृत्ती चितारलेली दिसते आणि तशीच जैत रे जैत मध्ये देखील आहे. जैत रे जैत ही कादंबरी वास्तव जीवनदर्शनाचा आविष्कार स्पष्ट करते. या कादंबरीमध्ये अंधश्रद्धा देखील दिसून येते व अंधश्रद्धेला बळी पडलेला समाज देखील दिसतो. पण ज्याप्रकारे अंधश्रद्धा दिसुन येते ते वैज्ञानिक दृष्टिकोन असलेल्या वाचकाला पटू शकत नाही.

' जैत रे जैत ' मध्ये चिंधी आणि नाग्या यांच्यातील उत्कट आणि रांगडया प्रेमाचा आविष्कार करतांना अंधश्रध्दा, परंपरा आणि देवभोळेपणा याविरुध्द दिलेल्या लढयाचे चित्रण दांडेकर करतात. कादंबरीतील नाग्या हा चिंधीच्या वयापेक्षा लहान असतो. परंतु ती त्याच्या कलेवर, त्याच्या ढोल वाजवण्यावर भाळली असते. एकीकडे ही गोष्ट चुकीचे वाटते की तो तर तिच्यापेक्षा लहान आहे. परंतु पुढील कथानकात कळते की नाग्याच्या डोळयाला मधमाशी चावल्यामुळे त्याचा डावा डोळा निकामी होतो तरीदेखील चिंधी त्याचा स्विकार करते कारण तिने त्याच्या रुपापेक्षा त्याच्या कलेवर जास्त प्रेम असते. वास्तविक जिवनात अशा घटना कमी प्रमाणात बघायला मिळतात.

आयशी सुरुवातीला चिंधी चा तिरस्कार करतांना दिसते कारण तिचे पहिले लग्न झाले असते. परंतु नंतर एकीकडे तिची चिंधीवर असलेली दया, प्रेम दिसुन येते तर दुसरीकडे आपल्या मुलाचा डोळा निकामी झाला आहे म्हणून त्याला साथ होईल, मदत होईल या भावनेतुन स्वार्थी दृष्टीकोन देखील दिसून येतो.

कादंबरीच्या कथानकामध्ये विविध ठिकाणी अशा शब्दांचा प्रयोग केेला आहे की तो सर्वसामान्यांना समजेलच असे नाही. कादंबरीतील विविध पात्रे ही समाजातील पात्रे आहे असे नक्की वाटते. कोणी त्यांच्या संस्कारांनी धरुन चालतं, कोणी प्रथा– परंपरांना, कोणी आपलं मित्रत्व जपतं, तर कोणाला एकमकांविषयी असलेली कळवळ दिसून येते.

' जैत रे जैत ' मध्ये ठाकर या आदिवासी जमातीतील नाग्या आणि चिंधी यांची ती कथा करुणरम्यतेने चित्रीत झाली आहे. आदिवासी जनजीवन आणि निसर्गदृष्टी कादंबरीच्या कथानकात पार्श्वभूमी म्हणून आलेली आहे. आदिवासी ठाकरांची लोकसंस्कृती या कादंबरीच्या रुपाने प्रथमच मराठीत आली आहे. लोकश्रध्दा, लोकसंस्कार, लोकविधी, निसर्गशरणता आणि सनातन प्रितीचा आदिबंध ' जैत रे जैत ' मध्ये आहेत.

रविंद्र ठाकुर यांच्या मते, नाग्या, चिंधी आणि त्याच्या अवतीभवतीची सर्व माणसे आदिम पातळीवरचे जीवन जगतात. त्यांची म्हणून एक वेगळी संस्कृती आहे. वन तेथील देवदेवता आणि तद्जन्य धर्मविषयक कल्पना यांनी त्यांचे जीवन नियत झाले आहे. त्यांचे परस्परांशी अतूट नाते जडलेले आहे. या सर्व बाबींचे नेटकें चित्रण दांडेकरांनी केेले आहे.

शोधनिबंध
पावरा जमातीच्या लोकपरंपरा व बोलीचा अभ्यास

पूर्वपिठीका व सद्यस्थिती–

पावरा जमाती ही आज रोजी आदिवासी म्हणून ओळखली जात असली तरी तिचा इतिहास किंवा पूर्वपिठीका खुपच वेगळी आहे असे संशोधकाचे मत आहे आणि या जमातीतील लोकदेखील या मताला दुजोरा देतांना आढळतात.

पावरा जमातीचे लोक सांगतात की, आमचे पूर्वज राजस्थानातून महाराष्ट्र, गुजरात आणि मध्यप्रदेशाच्या काही भागात आले आहेत. आमचा राजा समशेरसिंग असून ते चितोडगढाला राहायचे असे आमचे भाट आम्हाला सांगतात.

आमचा मुळ वंश राजपूत असून नंतरच्या काळात बरेच राजकीय स्थित्यंतरे झाली आणि उदरनिर्वाहासाठी आम्हाला इकडची वाट धरावी लागली आणि बहुतांशी खरे असेलही असे त्यांच्या वागण्यावरून किंवा त्यांच्या जीवन जगण्याच्या पद्धतीवरून अंदाज बांधता येवू शकतो.

ते जर स्वत:ला राजपूतवंशीय मानत असतील तर ते क्षत्रिय होते हे निश्चित आणि क्षत्रिय असतील तर ते धनुर्धारीही असतील यात दुमत नाही. ते धनुर्धारी होते म्हणूनच त्यांच्या त्या पूर्वकाळातील गुण त्यांच्यात आज देखील दिसतात हे मान्य करावे लागेल. कारण आजही त्यांच्या घरात तिरकामठा दिसतो आणि तो तिरकामठा ते धनुर्धारी होते म्हणजेच क्षत्रिय होते याचीच साक्ष देतो. उदाहरण म्हणून सध्या त्या जमातीतील ७०–८० च्या पुढे वय असणाऱ्या माणसात १० पैकी ७ लोक उत्तम धनुर्धारी होते असे दिसते. पावरा जमात क्षत्रिय असल्याचे उदाहरण सांगता येईल.

पूर्वीच्या काळात क्षत्रिय लोकच राजे महाराजे होते असे इतिहास सांगतो. या जमातीचा इतिहास जर क्षत्रियांशी जोडला तर यांचे पूर्वजदेखील राजे महाराजे होते असे गृहीत धरता येईल. त्या काळात राजे महाराजे बहूपत्नीत्वाला प्राधान्य देत असत हा देखील इतिहास आहे याच पुराव्याचा आधार घेवून सद्यस्थितीचा विचार केल्यास असे दिसून येते की आज देखील त्यांच्या बहुपत्नीत्व हा रिवाज सुरु आहे. म्हणूनच त्यांचे स्वत:ला क्षत्रिय समजणे हे देखील तितकेच खरे आहे.

काही संशोधकांच्या मते पावरा जमातीला चितोड्या राजाने निष्कासित करून हाकलून लावले आणि ते इकडे तिकडे विखुरले गेले असे मत मांडले आहे. तर काही संशोधकांच्या मते महाराणा प्रतापांचा पराभव झाला आणि त्यांची बहीण 'आक्काराणी' हिचे संरक्षण पावरा जमातीने केले असे मत मांडलेले आहे. आज तिच अक्काराणी त्यांच्या नावावरून धडगाव तालुक्यील 'अक्राणी महल' त्यांच्या इतिहासाची साक्ष देणारी जिवंत खुण उभी आहे. पावरा जमातीचा धर्म हिंदू असून बऱ्याच चालीरिती त्यांच्या हिंदू धर्माशी निगडीत आहेत.

जीवनमान:

पावरा जमातीचा व्यवसाय सुरुवातीच्या काळात वन्यजीवांची शिकार करणे तसेच वन्य सृष्टीशी संबंधीत व्यवसाय आणि नंतरच्या काळात शेती आणि शेतीपूरक व्यवसाय अशा स्वरूपात सांगता येईल.

या जमातीतील स्त्रीयांचा पेहराव वैविध्यपूर्ण स्वरूपाचा आहे. त्या जी साडी वापरतात तिला 'नाटी' असे म्हणतात. ती नेसण्याची विशिष्ट अशी एक पद्धत आहे. जिच्यामुळे या जमातीतील स्त्रीचे इतर स्त्रियांपेक्षा वेगळेपण दिसून येते.

या जमातीतील स्त्रीया अतिशय कर्तबगार असतात. त्या पुरुषाला शोभतील अशी कामे लिलया पार पाडतात. उदाहरणार्थ– बैलगाडी हाकणे, औत करण्याचे कामे करणे इ. यावरून असे लक्षात येते की, या जमातीतील महिलांनी फक्त चुल आणि मूल ही संकल्पना कधीचीच मोडीत काढलेली दिसून येते.

या जमातीतील स्त्रियांनादेखील अंगावर दाग–दागिने घालण्याची हौस आहे. त्या हातात चांदीच्या येल्या व पायात चांदीचे कल्ले वापरतात आणि गळ्यात एक रुपायाच्या नाण्याची पोत घालतात.

या जमातीतील पुरुषमंडळी डोक्याला उपरणे गुंडाळतात किंवा म्हातारी माणसं पगडी बांधतांना दिसतात. तसेच कमरेला धोतर किंवा लुंगी गुंडाळतात. काही मंडळी धोतर नेसतात. पांढरी टोपी घालतात, पांढरा सदरा घालतात. म्हातारी माणसे बंडी घालतात आणि आताची तरुण मुले पँट–शर्ट घालू लागली आहेत पण पूर्वी त्यांचा पेहराव पारंपरिक पद्धतीचा असायचा.

तरुण मुली परकर आणि ब्लाऊज वापरतात पण अलिकडच्या काळात त्या देखील ड्रेस परिधान करू लागल्या आहेत. या जमातीत देखील देवता आणि त्यांचे पुजनीय स्थान आहे.

१) व्याकरणिक शब्द–

नाम

पावरा	मराठी	पावरा	मराठी
खुपडी	झोपडी	घोर	घर
नोंदी	नदी	खासडा	बुट
खुद्रा	नाला	चाट्या	चप्पल

कुँवा	विहीर	वटवी	कळशी
उलन	भाजी	वटवा	हंडा
रोटला	भाकर	बाल्टी	बादली
कुद्री	खिचडी	कवशी	तांब्या
खटलरे	खाट	टुपली	टोपली
डोगला	शर्ट	टोगारी	तगारी
तोल्यू	रुमाल	डोबू	डबा
कोंगी	केंगवा	गिलास	ग्लास
आहरु	आरसा	बायरा	बाई
खेत	शेत	नहार	वाघ (सिंह)
डोबल	म्हैस	कुकडा	कोंबडी
बुकडा	बकरी	डेडरो	बेडूक
घोडसू	साप	माहने	माणसं

सर्वनाम

पावरा	मराठी	पावरा	मराठी
मेसेक (मेंह)	मला	च्यो	तो
तुसेक (तोहं)	तुला	ची	ती
इनाक	याला (हिला)	च्य	ते
तिनाक	त्याला (तिला)	तुम	तुम्ही
आमू	आम्ही		

या बोलीत विविध विषयांवरील शेकडो गीते अस्तित्वात आहेत. या गीतांमधून या जमातीने आपली संस्कृती जपण्याचा प्रयत्न केलेला आहे.

निष्कर्ष–

१) पावरा जमातीची लोकसंस्कृतीत वैविध्य पूर्णता आढळते.
२) पावरा जमात निसर्ग पूजक असून तिच्यात भुतदया हा गुण देखील आढळतो.
३) पावरा जमातीत स्त्रीयांचा सन्मान केला जातो. स्त्री–पुरुष विषमता त्यांनी नाकारली आहे.
४) पावरा जमातीने स्वातंत्र्य आणि समता या मूल्यांची जोपासना केलेली आढळून येते.
५) काही अनिष्ट रूढी वगळता त्यांनी समृद्ध अशा परंपरांचा ठेवा जतन केलेला आहे.
६) पावरा जमातीच्या बोलीभाषेत गोडवा, तरलता आढळून येते.
७) पावरा बोलीवर हिंदी, मराठी, गुजराती या भाषांचा प्रभाव जरी असला तरी तिचे स्वतंत्र अस्तित्व तिने टिकवून ठेवले आहे.
८) पावरा बोली बोलायला नि ऐकायला मधूर वाटते एक स्वतंत्र गोडवा तिच्यात जाणवतो.
९) पावरा बोलीत लोकसाहित्य विपूल प्रमाणात आहे.
१०) पावरा जमातीच्या लोकपरंपरा आणि सांस्कृतिक ठेवा जतन करून ठेवण्यासारखा आहे.

पावरा लोकसंस्कृती आणि लोकपरंपरा आदर्शवत असून, पावरा बोलीतील लोकसाहित्य जतन केल्यास आदिम संस्कृती टिकवून ठेवणे शक्य होईल.

संदर्भ ग्रंथ–

१) भारतीय भाषांचे लोकसर्वेक्षण– संपादक, अरुण जाखडे, डॉ. गणेश देवी, पद्मगंधा प्रकशन, पुणे, २०१५
२) बोलीभाषा संशोधनाच्या नव्या दिशा– डॉ. म.सु. पगारे, प्रशांत पब्लिकेशन्स, जळगाव, २०१२.
३) परिवर्तनीय आदिवासी पावसा समाज– डॉ.भरतसिंग अमरसिंग पाटील, अथर्व पब्लिकेशन्स, जळगाव.
४) आदिवासी साहित्यविचार– डॉ. माहेश्वरी गावीत.

बदलत्या ग्रा'जीवनातील संघर्ष आणि 'पाडा' कादंबरी (गोषवारा)

प्रस्तावना

'पाडा' कादंबरी ही अशोक कौतिक कोळी यांची कादंबरी असून खान्देशातील अल्पभुधारक केळी उत्पादक शेतकऱ्याच्या वाट्याला येणाऱ्या जीवनाचे वास्तव चित्रण करणारी आहे. शेतकऱ्याच्या मनात निर्माण होणारे प्रश्न, त्याच्या समस्या, जगण्यासाठी त्याला करावा लागणारा संघर्ष, भ्रष्ट शासन-प्रशासन व व्यापार्याकडून त्याचे होणारे शोषण, समाजातील अनिष्ठ रूढी, प्रथा, परंपरा तसेच राजकारण याचे वास्तव चित्रण 'पाडा' मध्ये प्रभावीपणे दिसून येते.

'पाडा' कादंबरीचाआशय

'पाडा' ही अशोक कौतिक कोळी यांची कादंबरी आहे. चांगदेव तापीकर हा कादंबरीचा नायक आहे. चांगदेवच्या मुलीच्या लग्नाच्या बैठकीच्या प्रसंगाने कथानकास सुरुवात झाली आहे. आर्थिक अडचणींमुळे मुलीचे लग्न ठरल्यावर चांगदेव अस्वस्थ होतो. रमेश तापीकरने हुंड्याची रक्कम जास्त असतानाही होकार दिला. हे त्याच्या लक्षात येते. दिवसेंदिवस त्याची अस्वस्थता वाढत जाते. या विषयावर त्याचे त्याच्या पत्नीशी संभाषण देखील होते. कमळाबाई त्याला समजावते, धीर देते व केळीचा पाडा विकला की विवाह होऊन देखिल पैसे उरतील अशी आशा व्यक्त करते. तरी देखील त्याच्या मनातील विचार जात नाहीत. चांगदेव शेतात जाणे टाळतो व बाबूशेटच्या हॉटेलवर जातो. तिथे पेपर वाचतो केळीचा भाव विचारतो, वेगवेगळ्या व्यापाऱ्यांनी वेगवेगळ्या किमती दिलेल्या असल्याने तो जास्तच बिथरतो व याविषयी शेतकऱ्यांना जागृत करण्याचा प्रयत्न करतो.

शेतकरी संघटीत झाला पाहिजे असे त्याला वाटत असते. त्याङ्कष्टीने तो पावले उचलतो. एक दिवस सर्वांना एकत्र बोलावतो आणि व्यापारी, शासन-प्रशासन यांच्या कडून कशा प्रकारे शेतकऱ्याची पिळवणूक केली जाते, शेतकऱ्यांसमोर कोणकोणत्या समस्या आहेत, आपणच पिकवलेल्या शेतमालाची किंमत आपण ठरवू शकत नाही, हे सर्व प्रश्न तो शेतकऱ्यांसमोर मांडतो तेव्हा सर्व त्याच्याशी सहमत होतात. व दुसऱ्या दिवशी शेतकरी हातात 'शिंगाडे' घेऊन चांगदेवला साथ देतात. ते वीज महामंडळाच्या कार्यालयासमोर जाऊन आपली समस्या मांडतात व चांगदेवचा हा 'शिंगाडे मोर्चा' यशस्वी होतो.

यादरम्यानच्या काळात चांगदेवचे आपल्या घराकडे पूर्णपणे दुर्लक्ष झालेले असते. मोर्चा यशस्वी झाल्यावर सर्व चांगदेवला भेटायला येतात, वर्तमानपत्रातून बातम्या छापून येतात, चांगदेवची पत्नी(कमळाबाई) शांतपणे घर व शेत दोन्ही सांभाळत असते. तिला चांगदेवशी बोलायचं असत पण तिची हिम्मत होत नाही. कमळाबाईचा भाऊ मधुकर आल्यावर ती यासंदर्भात चांगदेवशी बोलते की, 'येल्हे ना पोरच्या लगनाची कायजी ना केळीच्या पाड्याची' असा संताप ती चांगदेववर करते. मधुकर सुनीताच्या सासरकडून लवकर बस्ता करण्याचा निरोप घेऊन आलेला असतो. चांगदेव त्याला तारीख देऊन पाठवून देतो. सर्व सुनीताच्या लग्नाच्या तयारीला लागतात त्यासाठी दुसऱ्याच दिवशी केळीचा पाडा काढला जातो. चांगदेव ट्रॅक्टर घेऊन तालुक्याच्या गावाला केळी विकायला घेऊन जातो. तिथे गेल्यावर समजते की व्यापाऱ्यांनी केळीचा भाव इतका कमी केला आहे की त्यातून मुद्दल देखील निघत नाही. वर्षभर पिकासाठी केलेला खर्च घेतलेली मेहनत यांचा काहीही फायदा नाही. त्यामुळे सर्व शेतकरी निराश होतात, हतबल होतात व चांगदेवला काहीतरी करावे, मार्ग काढावा अशी विनंती करतात. तिथेच, चांगदेवच्या नेतृत्त्वाखाली सर्व शेतकरी 'केळी फेको' आंदोलन करतात.हे त्याच्या पत्नीला समजल्यावर ती फार दुरूखी होते. आत्ता पुढे काय होईल? कसे होईल? याची तिला चिंता लागलेली होती. त्याच वेळी मधुकर घरी येतो व वरपक्षाकडील मंडळीने लग्नास नकार दिला आहे हे सांगतो. त्यावेळी चांगदेव आपल्या बहिणीला सुनीता(मुलगी) सून म्हणून द्यावी असा प्रस्ताव मांडतो.लग्न मोडले हे ऐकून सुनीता दुरूखी होते.ती तिचे दुरूख मनी(मांजर) जवळ व्यक्त करतांना दिसते. काशीबाईचा मुलगा गणेशसोबत सुनीताच्या लग्नाचा प्रस्ताव घेऊन मधुकर व चांगदेव काशीबाईच्या घरी जातात. तेव्हा काशीबाई ह्या लग्नाला नकार देते. पण गणेशच्या हट्टापायी ती या लग्नाला तयार होते. चांगदेवकडून गणेशच्या नोकरीच्या वेळी जितका पैसा लागेल तितका देणार असेल तरच हा विवाह होईल, असे सांगते. चांगदेव होकार देतो व लग्नची बोलणी होते. कमळाबाई व काशीबाई यांच्यातील वैर देखील या लग्नामुळे मिटते. सुनीताचं लग्न होऊन ती नांदायला जाते. इकडे कमळाबाईची तब्बेत जास्त खराब होते.तिचा आजार वाढत जातो. गावातील डॉक्टरांचे उपचार घेऊनही तिच्या तब्बेतीत सुधारणा होत नसल्याने तिला जळगावला नेल जात. परंतु तेव्हा त्याच्याकडे पैसे नसतात. पैशांअभावी डॉक्टर तिला दाखल करून घ्यायला तयार नसतात. तेव्हा तो त्याने केलेल्या आंदोलनाची आठवण करून देऊन दोन दिवसात पैसे आणतो, असे सांगून कमळाबाईला दवाखान्यात दाखल करतो. कैलासला(मुलगा) तिच्या जवळ ठेवतो व तो गावाकडे पैशांची व्यवस्था करण्यासाठी जातो. पैसे कुठून मिळतील याचा तो विचार करतो. घरची म्हैस विकून पैसे येतील असा तो विचार करत असतो पण तो घरी जाण्याअगोदरच म्हैस मरून गेलेली असते.म्हैस मेल्यामुळे बैल विकणे हा शेवटचा पर्याय त्याच्या समोर असतो. कारण सुनीताच्या लग्नासाठी त्याने सोसायटीकडून कर्ज घेतलेले असते. बैल विकून पैसे घेऊन तो दवाखान्यात येतो तर त्याच्या पत्नीचा मृत्यू झालेला असतो. तिच्या इलाजासाठी आणलेला पैसा तो तिच्या उत्तरकार्यासाठी वापरतो. काही दिवसानंतर पाडा निघण्याची वेळ येते पण सोसायटी कडून गाडी येत नाही. तिकडे काशीबाई मुलाच्या नोकरीसाठी पैशाची मागणी करते तेव्हाच, मनीचा जळून मृत्यू होतो. चांगदेव सोसायटीच्या चेअरमनकडे(बाबासाहेब पाटील) केळीचा पाडा काढण्यासाठी गाडीची मागणी करण्यासाठी जातो. बाबासाहेब त्याला होकार देतात, गाडीही पाठवतात. पण ऐनवेळी सुपरवाझयर येऊन ती गाडी रमेश तापीकरला देतो हे बघून चांगदेवचा संताप अनावर होतो. मजुरांना थांबवण्यासाठी तो हातात कोयती उचलतो तितक्यात पोलीस येवून त्याला अटक करतात. जेलमध्ये त्याला

कुणी सोडवण्यास किंवा भेटण्यास देखील येत नाही. पैशांसाठी काशीबाईने दिलेली आठ दिवसांची मुदतही संपते. बरोबर आठव्या दिवशी सुनीताचा जळून मृत्यू झाल्याची बातमी त्याला मिळते. अशा प्रकारे चांगदेवचे संपूर्ण कुटुंबच उध्वस्त होते.

'पाडा' कादंबरीतील व्यक्तिरेखा

चांगदेव तापीकर

चांगदेव तापीकर हा 'पाडा' या कादंबरीतील मुख्य व्यक्तिरेखा आहे. खान्देशातील शेतकरी जीवन, व्यापारी, दलाल यांच्याकडून शेतकऱ्यांची होणारी पिळवणूक, येथील राजकीय व्यवस्था इत्यादी प्रश्नांना वाचा फोडणारा शेतकरी आहे. खान्देशातील अल्पभूधारक शेतकऱ्याचे प्रतिनिधित्व करणारा आहे. कादंबरीचा नायक चांगदेव तापीकर अशोक कोळी यांनी पाडा मध्ये केंद्रस्थानी साकारला आहे.

कौटुंबिक प्रश्नांपेक्षा सामाजिक प्रश्न त्याला जास्त महत्वाचे वाटतात. त्याचवेळी कुटुंबही त्याच्यासाठी महत्वाचे आहे. त्याचे त्याच्या शेतावर, बैलांवर नितांत प्रेम आहे. चांगदेव तापीकरच्या जीवनात अनेक कठीण प्रसंग एकामागून एक येत असतात पण तो त्या सर्व प्रसंगाना धैर्याने व सहनशीलतेने सामोरा जातो.

कमळाबाई

कमळाबाई ही चांगदेवची पत्नी आहे. कमळाबाई ही आपल्या घरासाठी सतत काळजी करणारी स्त्री आहे. चांगदेवने सतत निवडणुका, राजकारण संघटन करून मोर्चा काढणे तिला आवडत नाही. आपल्या पतीने घरात लक्ष द्यावे अशी तिची अपेक्षा असते. कमळाबाईची मुलगी सुनीताचे लग्न केळीच्या पाड्याच्या भरवश्यावर ठरलेले असते पण भावाअभावी चांगदेवने केळी रस्त्यावर फेकली हे जेव्हा तिला कळते तेव्हा तिचा खूप संताप होतो. मुलीच्या लग्नाच्या चिंतेने तिची प्र

ती बिघी लागते. अशा साधारण अपेक्षा असणारी सामान्य ग्रामीण स्त्रीचे प्रतिनिधित्व करणारी ग्रामीण स्त्री लेखकाने कमळाबाईच्या व्यक्तीरेखेतून साकारली आहे.

सुनिता

चांगदेव तापीकर व कमळाबाई यांची मुलगी सुनिता ही सुशिक्षित तरुणी आहे. मुक्या प्राण्यांवर तिचा जीव आहे. मनी(मांजर) तिची जीवलग आहे. कादंबरीत तिचा संवाद मनीशीच होताना दिसतो. घडणाऱ्या घटनांवर ती काहीच स्पष्ट बोलत नाही. लग्न ठरल्यावर घरातील वातावरण बदलते.वडील सतत तणावपूर्ण मनस्थितीत असतात ते तिच्यावर ओरडतातही हे सर्व आपल्यामुळेच घडते आहे असे तिला वाटते. पुढे शिक्षकाशी ठरलेले तिचे लग्न मोडते व काशीबाईचा(आत्या) मुलगा गणेश याच्याशी तिचा विवाह होतो. परंतु शेवटी तिचा जळून मृत्यू होतो.

मधुकर

मधुकर हा चांगदेव तापीकरचा शालक आहे व कमळाबाईचा भाऊ सुनीताचा मामा असल्याने त्याला सुनीताच्या लग्नाची काळजी तर आहे. तिचे लग्न जमवण्याचा प्रयत्न करणे ही आपली जबाबदारी आहे असे तो समजतो. मधुकर हा कर्तव्यदक्ष व निस्वार्थी आहे. चांगदेव व कमळाबाई मध्ये होणारी भांडणे सोडविण्याचे कामही तो पक्षपात न करता प्रामाणिकपणे करतांना दिसतो.

काशीबाई

चांगदेव तापीकरची बहिण व नंतर सुनिताची सासू म्हणजे काशीबाई. काशीबाई ही कडक स्वभावाची आहे. गणेश व सुनीता लहान असतानाच तिने आपल्या आई कडून सुनीताला सून करून घेण्याचं वचन घेतलेलं असतं. परंतू कमळाबाईला हे मान्य नसल्यामुळे या संबंधाला ती नकार देते आणि तेव्हा पासून काशीबाई भावाच्या घरी येणे जाणे बंद करते.ती फारच क्रूर स्वभावाची स्त्री आहे.

रमेश तापीकर

हा चांगदेवचाचुलत भाऊ आहे. रमेश हा राजकारणी व धुर्त आहे. फ्रुटसेल सोसायटीचे चेअरमन बाबासाहेब पाटील यांच्या विरोधात रमेश 'परिवर्तन पॅनल' उभारतो. त्याच्यामध्ये चांगदेव त्याला साथ देत नाही. म्हणून सुनीताच्या लग्नाच्या ठरावाच्या वेळी हुंड्याची रक्कम जास्त असताना देखील तो ठरावास मान्यता देतो सुनीताच्या लग्नासाठी चांगदेव जेव्हा रमेशकडे पैसे मागायला जातो तेव्हा तो चांगदेव कडून शेत लिहून मागतो. परंतु चांगदेवला हे माहित असते की, त्याने लोकांचे पैसे आणि शेती अशीच अनेक वेळा बळकावली आहे. यावरून रमेशची स्वार्थी, आपमतलबी अशी प्रतिमा लेखकाने वाचकासमोर मांडली

या 'पाडा' कादंबरीतील प्रमुख व्यक्तिरेखांव्यतिरिक्त बाबासाहेब पाटील हे 'जय भगवती' फ्रुटसेल सोसायटीचे चेअरमन, चांगदेवचा मुलगा कैलास, चांगदेवचाभाऊ नामदेव अशा गौण व्याकीरेखाही 'पाडा' कादंबरीतून आल्या आहेत.

'पाडा' कादंबरीतील संघर्ष

'पाडा' ही कादंबरी शेतकऱ्यांच्या जीवनातील संघर्षावर आधारलेली आहे. कादंबरीच्या अर्पण पत्रिकेतही ते दिसून येते. लेखकाने ही कादंबरी शेतकऱ्यांवर सतत होणाराअन्याय मग तो निसर्गाकडून असेल, शासन-प्रशासनाकडून असेल किंवा व्यावसायिकांकडून असेल त्यांच्या विरुद्ध आवाज उठवणाऱ्या शेतकरी वर्गाला अर्पण केली आहे. अशोक कोळी यांच्या कादंबरीतील नायक आत्मचिंतन करणारा आहे. परिस्थितीचा डोळसपणे विचार करून अन्यायाविरुद्ध उभे राहून संघर्ष करणारा नायक लेखकाने चित्रित केला आहे.

कादंबरीचा नायक चांगदेव तापीकर हा खान्देशातील एक अल्पभूधारक शेतकरी आहे. कादंबरीच्या कथानकाप्रमाणे चांगदेवला कौटुंबिक संघर्षाला सामोरे जावे लागते. चांगदेवच्या मुलीच्या लग्नाचा ठराव झाल्यावर चांगदेवच्या मनाची स्थिती बदलते, त्याच्या वागण्या बोलण्यात फरक जाणवतो.

त्याबद्दल कमळाबाई चांगदेवशी बोलते.

न्नकधी व्हनार हे तुम्हची तोंड मिळवणी ? किती साल, किती हंगाम गेल्हे सरले का आरथडे ? दरसाल निघतसं काही न काही धुंडूक. मायथी नाही का तुम्हाले ? काही शिल्लक पडत नही. कस पडीन ? तुम्ही जर एकस धरून बसले. दुसऱ्या पिकाच नाव घेता नाही. लोक हावा पाहून उपनता...प्या संवादावरूनच शेतकऱ्यांच्या दयनीय अवस्थेचे दर्शन वाचकाला घडते. शेतकऱ्यांना काय संघर्ष करावा लागतो हे कमळाबाईच्या वरील संवादावरून दिसते. अनेक वर्षापासून ते कष्ट आणि मेहनत करत असूनही त्यांना त्यांच्या कष्टाचं फळ मिळत नाही शेतकऱ्यांनी एकत्र येवून येथील व्यापाऱ्यांविरुद्ध आंदोलन करावे यासाठी तो सर्वासमोर या प्रश्नांची मांडणी करतो सर्वाना समजून सांगण्याचा प्रयत्न करत असतो. त्यातूनच 'शिगांडे मोर्चा' होतो. हा मोर्चा करण्यासाठी चांगदेवला खूप संघर्ष करावा लागला. घरची काम सोडून त्याने इतर शेतकऱ्यांना समजावले, जी परिस्थिती आहे त्याविषयी शेतकऱ्यांना जागृत करण्याचे कार्य केले.

मुलीच्या लग्नाचा बस्ता फाडण्याची वेळ येते तेव्हा चांगदेव केळीचा पाडा विकण्यासाठी जातो, तेव्हाही योग्य बाजारभावाअभावी 'केळी फेको' आंदोलन केले जाते. पैशाच्या अभावीच सुनीताचे लग्न तुटते व सुनीताचे गणेश सोबत लग्न होते. त्यानंतर कमळाबाईचे आजारपण वाढत जाते. त्यासाठी लागणारा खर्च व तो खर्च भागवण्यासाठी चांगदेवचा म्हैस विकण्याचा विचार असतो पण म्हैस पण मरते. मग तो बैल विकून पैशाची व्यवस्था करतो परंतु बायकोला वाचवू शकत नाही. त्यानंतर सुनिताचा देखील मृत्यू होतो तोही पैशाची मागणी पूर्ण न केल्यामुळेच. असे संघर्षमय प्रसंग एका मागून एक चांगदेव तापीकरच्या जीवनात येतात.

'पाडा' कादंबरीचे निष्कर्ष

१) जागतिकीकरण, खाजगीकरण, व उदारीकरणाच्या धोरणामुळे ग्रामीण जीवन प्रभावित झालेआहे. या प्रभावातून ग्रामीण जीवनाने अनेक बदल स्वीकारले आहेत.

२) बदलत्या ग्रामजीवनाचा प्रभाव नव्वदोत्तरी मराठी ग्रामीण कादंबरीवर झालेला दिसून येतो.

३) बदलत्या ग्रामजीवनातील संघर्षाचे चित्रण 'पाडा' कादंबरीत प्रभावीपणे मांडले आहे.

४) ग्रामजीवनात झालेल्या बदलांचे परिणाम 'पाडा' कादंबरीच्या आ
ृतिबंध, आशय, अभिव्यक्ती, प्रतिमा, प्रतीके, भाषाशैली इत्यादी बाबींवर देखील झालेला दिसून येतो.

५) 'पाडा' ही नायकप्रधान कादंबरी आहे.

६) 'पाडा' ही कादंबरी ग्रामीण परिसरातील शेतकऱ्याचा संघर्ष चित्रित करणारी आह

७) 'पाडा' कादंबरीत जळगाव जिल्ह्यातील तावडी बोलीचा प्रभावी वापर केला आहे. या बोलीतील म्हणी, वाक्प्रचार, विशिष्ट शब्द यांमुळे 'पाडा' कादंबरीच्या भाषिक सौंदर्यात भर पडलेली आहे.

८) खान्देशातील सामाजिक रिती-रिवाज व परंपरांचे दर्शन 'पाडा' कादंबरीतून वाचकाला घडते.

९) 'पाडा' ही कादंबरी आजच्या शेतकऱ्याला संघटीत होऊन अन्यायाविरुध्द संघर्षप्रवण होण्यास प्रवृत्त करते.

१०) ग्रामीण भागातील समाजकारण, राजकारण व अर्थकारण याचे चित्रण 'पाडा' कादंबरीतून प्रभावीपणे आले आहे.

संदर्भ ग्रंथ-

१) 'पाडा' (कादंबरी) - अशोक कौतिक कोळी.

२) मराठी ग्रामीण कादंबरी - डॉ. रवींद्र नारायण ठाकूर.

३) ग्रामीण साहित्य स्वरूप व दिशा - डॉ. वासुदेव मुलाटे.

४) ग्रामीण साहित्य आणि संस्कृती - मोहन पाटील.

५) ग्रामीण कादंबरी : बदलते स्त्री जीवन - डॉ. पंढरी डोईफोडे.

६) ग्रामीण साहित्य स्वरूप आणि शोध - डॉ. नागनाथ कोतापल्ले.

७) ग्रामीण साहित्यरू चिंतन आणि चर्चा - डॉ. वासुदेव मुलाटे.

८) लोकराज्य जानेवारी-फेब्रुवारी २०१२

समलिंगी संबंधातील लैंगिक वर्तन आभिवृत्तीचा अभ्यास

सादरकर्ते

प्रफुल ताराचंद रायसिंग, स्वीटी सुहास सपकाळे
द्वितीय वर्ष कलाशाखा
मानसशास्त्र विभाग, मु. जे. महाविद्यालय जळगाव

प्रस्तावना :-

समलिंगी सांबांधातील लैंगिक वर्तन अभिवृत्तीचा अभ्यास हा संशोधनाचा विषय असून या माध्यमातून त्यांच्या लैंगिक वर्तन अभिवृत्तीचा अभ्यास आणि त्यांच्या या सामाजिक समस्येचा अभ्यास करण्यात आला आहे . उत्तर महाराष्ट्र विभागातील १५ समलिंगी मुले आणि १५ समलिंगी मुली यांचा समावेश असून संशोधनाचे अभ्यासक्षेत्र हे उत्तर महाराष्ट्र विभाग आहे . प्रस्तुत संशोधनात लैंगिक वर्तन अभिवृत्ती चाचणीच्या माध्यमातून संशोधन पूर्ण करून समस्येवर उपयोजन आणि शिफारशी मांडण्याचा प्रामाणिक प्रयत्न करण्यात आला आहे .

प्रस्तुत संशोधन प्रबंधकात समलिंगी संबंधातील लैंगिक वर्तन आगिअभिवृत्तीचा अभ्यास यावर संशोधनपर अभ्यास करण्याचा हेतूने हे संशोधन करण्यात आले आहे. मुळात लैंगिक वर्तन म्हणजे काय तर लैंगिक वर्तन म्हणजे लैंगिक आकर्षणाने केलेली कृत्यात्मक प्रतिक्रिया तसेच लैंगिक वर्तन अभिवृत्ती म्हणजे व्यक्तीचा लैंगिक वर्तनाबद्दल असलेल्या दृष्टीकोन होय. लैंगिक वर्तनाचे एकूण प्रमुख तीन प्रकार पडतात विषमलिंगी (हेटरोसेक्सुअल) ,उभायालिंगी (बायसेक्सुअल) समलिंग 'होमोसेक्सूअल' असे प्रकार पडतात.त्यापैकी समलिंगी 'होमोसेक्सूअल' या लैंगिक वर्तनाच्या अभिवृत्तीचा अभ्यास करण्यात आला आहे.

समलिंगी लैंगिक वर्तन म्हणजे लैंगिक समाधान या अर्थाने समान लिंगाच्या व्यक्ती बद्दल असलेले लैंगिक आकर्षण आणि त्याला दिली जाणारी प्रतिक्रिया होय. समलिंगी संबंध म्हणजे कुठल्याही वयातल्या समानलिंग असणाऱ्या दोन व्यक्तींच्या लैंगिक संबंधांना समलिंगी संबंध असे म्हणतात.

समलिंगी संबंधांमध्ये एकूण प्रमुख चार प्रकार आहेत. जे पुरुष समलिंगी आहेत.त्यांना 'गे' किंवा 'क्वीर' असे संबोधले जाते तसेच महिला समलिंगी 'लेस्बियन' किंवा 'डाईक' उभयालिंगी आणि लिंग परिवर्तीत असे मिळून समलिंगी समाज तयार होतो त्यालाच (एल.जी.बी.टी.)असे हि म्हणतात हे सांगणे कठीण आहे कि किती लोक समलैंगिक आहेत परंतु समलैंगिक अस्तित्त्व सर्व संस्कृतीत आणि देशांमध्ये आहे.

प्राचीन संस्कृती पासूनच समलैंगिक संबंध अस्तित्त्वात होतो असे प्राचीन चित्रलेखातून सर्वाधिक प्रमाण प्राप्त होते. ज्यात दोन पुरुषांचा अंतरंग किंवा यौन क्रिया मध्ये दर्शविले आहे.

समाजाची समलिंगी कडे बघण्याची अभिवृत्ती हि नकारात्मक असते त्यांचे हे लैंगिक वर्तन हे अनैसर्गिक आहे किंवा ते मनोविकारग्रस्त आहे पुर्वाग्रह व गैरसमजुतीने आणि समाज भेदभाव करत असल्याने किंवा अपमानित करत असल्यामुळे ते आपले लैंगिक प्राधान्य सांगण्याचे जोखीम घेत नाहीत व संकोच करतात. काही लोक आपली स्वत:ची ओळख हि गुप्त ठेवतात. काही समलिंगी आपल्या सीमितपरिस्थिती पर्यंत प्रकट करतात तर काही खुल्या पध्दतीने जगजाहीर पणे प्रकटीकरण करण्याचा निर्णय घेतात आणि आपली स्वता:ची लैंगिक वर्तन अभिवृत्ती स्पष्ट करतात. " समलिंगी संबंधातील लैंगिक वर्तन आभिवृत्तीचा अभ्यास "या विषावर हवे तेवढे संशोधन झाले नाहीत. समलिंगीचा लैंगिक वर्तन अभिवृत्ती हा महत्त्वाचा विषय आहे कारण त्यातून त्यांच्या लैंगिक वर्तन आणि अभिवृत्तीची अचूक व शास्त्रीय माहिती आणि निष्कर्ष हे सर्वांना कडावे या कल्पनेने यावर व्यवस्थित अभ्यास करून चर्चा करून आणि या समस्येचे गांभीर्य लक्षातघेता यावर संशोधन करणे आम्हाला महत्त्वपूर्ण वाटले.

संशोधनाची गरज :-

" समलिंगी संबंधातील लैंगिक वर्तन अभिवृत्तीचा अभ्यास " या विषयावर पाहिजे तेवढ्या प्रमाणात संशोधने किंवाअभ्यास झालेला नाही. परंतू पाश्चात्त्य देशात यावर नियमित संशोधने होत असतात. एकोणविसव्या शतकापासून पाश्चात्त्य देशात यावर अभ्यास होतांना दिसतात म्हणून त्यांचा कडे समलिंगी लैंगिक वर्तन अभिवृत्ती सामान्य समजली जाते. तेथे समलिंगी लैंगिक अभिवृत्ती हि खूप संपन्न व सकारात्मक आहे.यावर संशोधन झाल्यावर तेथील या संबंधाना कादेशीर परवानगी मिळाली आहे. त्यामुळे तेथील समलिंगी समाजाला किंवा समलैंगिक कल असलेल्या समाजाची हि समस्या दूर झाली आहे. उलटपक्षी आपल्या देशात हि एक

महत्त्वाची समस्या आहे. कारण धार्मिक व सामाजिक दुष्टया आपल्या देशात समलिंगी लैंगिक वर्तन अभिवृत्तीकडे अनैसर्गिक म्हणून बघितले जाते व समलिंगी धारणा असलेल्या समाजाकडे मनोविकृत समजले जाते कारण त्यावर पाहिजे तेवढे संशोधन झालेच नाही. त्यामुळे हि समस्या वाढीस लागली. आपल्या देशात याबाबत अनेक पुर्वाग्रह व गैरसमजुती आहेत. व ते दूर करण्याच्या हेतूने आणि या विषयावर जास्त संशोधन होत नसल्याने एकूणच दुर्मिळ समस्या आहे म्हणून यावर अभ्यास होवून ते समस्या सोडवता येईल म्हणून समलिंगी लैंगिक वर्तन अभिवृत्तीचा अभ्यास होणे गरजेचे आहे.

तसेच मुळात आपल्या देशात लैंगिक समसेवर नियमित संशोधने झालीत व होत असतात परंतु समलिंगी लैंगिक वर्तन अभिवृत्तीवर मात्र होत नाही. त्यामुळे समलिंगी समाजाचा समस्या सोडवण्यासाठी यावर हे संशोधन महत्त्वाचे ठरेल आणि त्याच बरोबर त्यांचा लैंगिक वर्तन अभिवृत्तीचा अभ्यास होईल तसेच समलिंगी संबंधांमधील लैंगिक वर्तन अभिवृत्ती हा फार कुतूहलपूर्व अभ्यास आहे.समाजाचा समलिंगी संबंधाकडे बघण्याची अभिवृत्ती आणि समलिंगीची समाजाकडे बघण्याची अभिवृत्ती हि सकारात्मक असावी. समाजाला समलिंगी लैंगिक वर्तना बद्दल शास्त्रीय माहिती मिळावी हि या संशोधनाची खरी गरज आहे. यावर संशोधने झाली नाहीत वा या समस्येवर उपाय योजले नाहीत तर समाजाला या बद्दल चे पुर्वाग्रह कायम असतील म्हणजेच समाजाची अभिवृत्ती त्यांचा बद्दल नकारात्मक असेल त्यातून त्यांचा मानसिक व शारीरिक पिळवनुकीतू त्यांचे आत्महत्येचे प्रमाण अधिक वाढेल.त्यांच्या या नैसर्गिक इच्छाचे दमन होईल त्यातून प्रतिकूल परिस्थिती निर्माण होईल. समलिंगी लैंगिक वर्तन अभिवृत्तीचा अभ्यास झाला नाहीत या बद्दलची शास्त्रीय माहिती उपलब्ध राहणार नाही. त्यामुळे त्यातून पुढील संशोधन कळून येणार नाहीत व त्यामुलभूत अशा दुर्मिळ समस्यावर तोडगा काढता येणार नाही म्हणून त्यामुळे हे संशोधन खूप गरजेचे आहे.

संशोधनाचे व समस्येचे महत्त्व :-

" समलिंगी संबंधातील लैंगिक वर्तन अभीवृत्तीचा अभ्यास " हा अत्यंत महत्त्वाचा विषय आहे कारण यावर संशोधनमुळे समलैंगिकतेकडे कल असलेला समाजाचा समस्येवर अभ्यास होईल त्यांचा लैंगिक वर्तन अभिवृत्तीच्या वेगळेपणाचा अभ्यास होवून शास्त्रीय माहितीस्त्रोत मिळेल.

समलिंगी संबंधामधील वर्तन अभिवृत्तीचा अभ्यासातून त्यांचा वर्तनाचा आणि सदपरिस्थितीचा सहसंबांचा अभ्यासाचा दुष्टीने महत्त्वाचे आहे कारण त्यातून योग्य निकष निघुन पुढील महत्वाचे संशोधने होवू शकतील. भारतात यावर संशोधन होत नसल्याने हि समस्या अधिक अधिक-अधिक पसरली आहे त्याच बरोबर समलिंगी व्यक्तीकडे समाजाची अभिवृत्ती हि पूर्वग्रहदुषित आहे कारण या विषयावर अभ्यास नसल्याने व संशोधने न झाल्याने या बाबत म्हणजेच समलिंगी लैंगिक वर्तनाबाबत अज्ञान आहे. समाजाला त्या परिस्थीतिची आणि अस्तित्त्वाची ओळख व्हावी त्यामागील मानसशास्त्रीय ,जीवनशास्त्रीय सत्यता कळावी म्हणून यावर हे संशोधन होणे महत्त्वपूर्ण आहे. यावर संशोधन न झाल्याने समाजाची त्यांच्या प्रती असलेली अभिवृत्ती नकारात्मक व व्देषदायक होते. समाज त्यांना समाविष्ट करत नाही. समाज त्यांच्या लैंगिक वर्तन अभिवृत्तीला मानसिक विकारग्रस्तम्हणून ग्राह्य ठरवतात त्यातून त्यांचे मानसिक खच्चीकरण होते व त्यातून ते आत्महत्या करतांना दिसतात अशा अनेक अडचणी निर्माण होतात यासर्व गोष्टीचा विचार करता समाजाला त्यांच्या या संशोधनाव्दारे समलिंगी वर्तन अभिवृत्ती कळावी त्यातील मुळ गाभा समजावा ह्या दुष्टीने हे संशोधन व समस्येवर अभ्यास करणे महत्त्वाचे ठरते. " समलिंगी संबंधातील लैंगिक वर्तन अभीवृत्तीचा अभ्यास "यावर संशोधनानंतर अनेक यावरील समस्या सुटतील त्यांच्यावरील अभ्यास कमी प्रमाणात असल्याने अधिक नाविन्यपूर्ण व शास्त्रीय माहिती मिळेल ज्या दुष्टीने पुढील संशोधक व पुढे संशोधन करता येईल. तसेच त्यामुळे त्या बद्दल मानसशास्त्रीय सत्यता समाजालाकडू लागली कि समाज त्यांच्या अभिवृत्तीला स्वीकारेल किंवा समलिंगी लैंगिक वर्तन अभिवृत्तीचा बद्दल पूर्वग्रह दूर होतील भारतात आता पर्यत यावर मोजकेच किंवा बोटावर मोजने येवढे संशोधक अभ्यास करत असतील आता या संशोधना नंतर अनेक या वरील तत्सम समस्या घेवून त्या सोडवण्यचा प्रयत्न करील ज्याने समाजाला त्या बद्दल ज्ञात होत राहील ज्यामुळे एकूणच समाजाला समलिंगीकडे पाहण्याची अभिवृत्ती सकात्मक राहील ज्यातून पुढे त्यांच्या लैंगिक धारणेस परवानगीमिळून त्यांचा लैंगिक इच्छाचे दमनहोणार नाही. म्हणूनच हे संशोधन अत्यस महत्त्वाचे आहे.

) संशोधनाची उदिष्टे :-

१) समलैंगिक संबंधातील 'गे' आणि 'लेस्बियन' विद्यार्थी – विद्यार्थीनिमध्ये लैंगिक वर्तन अभिवृत्तीची स्वीकार्यता या घटकाबाबत अभ्यास करणे

२) समलैंगिक संबंधातील 'गे' आणि 'लेस्बियन' विद्यार्थी-विद्यार्थीनिमध्ये लैंगिक वर्तन अभिवृत्तीची प्रतीकात्मक या घटकाबाबत अभ्यास करणे

३) समलैंगिक संबंधातील 'गे' आणि 'लेस्बियन' विद्यार्थी- विद्यार्थीनिमध्ये लैंगिक वर्तन अभिवृत्ती कोणता फरक आढळतो या घटकाबाबत अभ्यास करणे

संशोधनाची गुहीतके /अभ्यास :-

१) समलैंगिक संबंधातील 'गे' आणि 'लेस्बियन' विद्यार्थी- विद्यार्थीनिमध्ये लैंगिक वर्तन अभिवृत्ती स्वीकार्यता या घटकाबाबत

कोणताहि फरक आढळून येणार नाही.
२)समलैंगिक संबंधातील 'गे' आणि 'लेस्बियन' विद्यार्थी-विद्यार्थीनिमध्ये मधील लैंगिक वर्तन अभिवृत्तीची प्रतीकात्मक या घटकाबाबत कोणताही फरक आढळून येणार नाही.
3) समलैंगिक संबंधातील 'गे' आणि 'लेस्बियन' विद्यार्थी-विद्यार्थीनिमध्ये मधील लैंगिक वर्तन अभिवृत्तीचा कोणताही फरक आढळून येणार नाही.

संशोधनातील सक्रीयात्मक व्याख्या :-

१) समलिंगी लैंगिक वर्तना बद्दल असलेला दुष्टीकोन त्यालाच समलिंगी संबंधांतील लैंगिक वर्तन अभिवृत्ती असे म्हणतात''
२) पुरुष समलिंगी लैंगिक वर्तन अभिवृत्ती "पुरुषाची-पुरुषाशी लैंगिक वर्तन बद्दल असलेले वृत्ती म्हणजेच समलिंगी लैंगिक वर्तन अभिवृत्ती असे म्हणतात
३)स्त्री समलिंगी लैंगिक वर्तन अभिवृत्ती "स्त्रीची-स्त्रीशी लैंगिक वर्तन बद्दल असलेले वृत्ती म्हणजेच समलिंगी लैंगिक वर्तन अभिवृत्ती असे म्हणतात

संशोधनातील परिवर्तके :-

१)स्वतंत्र परिवर्तके :-

ज्यात संशोधन निवडीव्दारे उद्दीपक निश्चित केला जातो त्यांचा समावेश स्वतंत्र परीवर्तकात होतो.

स्वतंत्र परिवर्तक

- पुरुष समलिंगी (गे)
- स्त्री समलिंगी (लेस्बियन)

२)परतंत्र परिवर्तक :-

स्वतंत्र परिवर्तक केलेल्या बदलामुळे ज्या दुसऱ्या एखाद्या घटकामध्ये बदल होतो त्यास परतंत्र परिवर्तक असे म्हणतात.

लैंगिक वर्तन अभिवृत्ती चाचणी

नमुना निवड :-

प्रस्तुत संशोधनासाठी उत्तर महाराष्ट्र विभागातील विविध ठिकाणांची मुले व मुली समलिंगीची निवड करण्यात आली आहे.संशोधनासाठी नमुना म्हणून ३० समलिंगी मुल व मुलींची निवड करण्यात आली आहे. यामध्ये १५ स्त्री व १५ पुरुष आली आहे.

संशोधनातील आराखडा :-

SINGAL FACTORIAL DESIGN अशा पाद्धातीते संशोधन आराखडा काढण्यात आला आहे.

		नमुना निवडीचा संशोधन आराखडा
समलिंगी संबंधांतील प्रकार	समलिंगी पुरुष	एकून -१५
समलिंगी संबंधांतील प्रकार	समलिंगी स्त्रीया	एकून -१५
		एकून समलिंगी स्त्री-पुरुष -३०

संशोधनातील साहित्य :-

" समलिंगी संबंधातील लैंगिक वर्तन अभिवृत्तीचा अभ्यास '' यात संशोधनासाठी मानसशास्त्रीय चाचणी हि यशवीर सिंग यांची निर्मिती केलेले. 'SEX BEHEVIOURATTITUDE'वापरण्यात आली आहे. प्रत्येक विधानाला प्रत्येकी पर्याय आहे जसे कि हो आणि नाही इत्यादी.

यशवीर सिंग यांच्या चाचणीव्दारे लैंगिक वर्तन अभिवृत्तीचा अभ्यास करण्यासाठी होकारात्मक आणि नकारात्मक स्वरुपाची विधाने आहेत. यात असलेले विधाने ५ संचामध्ये विभागले आहेत.ज्यात प्रत्येक संचात विशिष्ट हेतूनेच प्रश्न नमूद आहेत त्याचं वर्गीकरण हे अ,ब,स,द,य,असे स्वरूपाचे आहे.

वरील चाचणीसाठी होकारार्थी पर्यायाला २ गुण तर नकारार्थीला १ गुण
या पद्धतीने गुण दिलेले आहे. त्यातील २०प्रश्न हे स्वीकार्यता असून २०प्रश्न हे प्रतीकात्मक आहे.

प्रेम संबंधाचा महाविद्यालयीन विद्यार्थ्यांच्या मानसिक आरोग्यावर होणारा परिणाम अभ्यासणे

सादरकर्ते

तुषार दिलीप सूर्यवंशी, द्वितीय वर्ष कलाशाखा, मानसशास्त्र विभाग, मु. जे. महाविद्यालय जळगाव
मार्गदर्शक डॉ. सौ. पी. लभाणे, प्रा. बालाजी राउत, मानसशास्त्र विभाग

प्रस्तावना : -

प्रस्तुत संशोधनात संशोधकाने महाविद्यालीन विद्यार्थ्यांच्या प्रेम संबंधांचा त्यांच्या मानसिक स्वास्थावर होणाऱ्या परिणामांचा अभ्यास केला आहे. सद्यस्थितीत महाविद्यालीन वातावरणात प्रेम संबंध, मैत्री, आकर्षण या गोष्टीकडे विद्यार्थी जास्तीत जास्त आकर्षित होत असतात व त्यांच्या या प्रेमसंबंधांचा त्यांच्या मानसिक स्वास्थावर काय परिणाम होतो हे तपासून पाहण्यासाठी संशोधकाने प्रस्तुत विषयाची निवड केली आहे.

ढोबळ मानाने जर प्रेमाची व्याख्या केली तर ती अशी असेल, "मुलगा आणि मुलगी यांच्या परस्परांविषयीच्या परिपक्व भावनेतून किंवा शारीरिक भावनेतून तयार होणारं नातं म्हणजे प्रेम''. परंतु 'वार्चेल' आणि 'कुपूर' { १९९७ } यांनी मानसशास्त्रीय दृष्ट्या आकर्षणाची व्याख्या करतांना असे म्हटले आहे कि ,
"आकर्षण म्हणजे एका व्यक्तीची दुसऱ्या व्यक्तीबद्दल धनात्मक अभिवृत्ती होय" "घनिष्ठ आकर्षण युक्त संबंध किंवा अंतर्गत संबंध म्हणजेच प्रेम".
प्रेमप्रकरण किंवा love affair हा शब्द अगदी सहजरीत्या आपण नेहमीच वापरत असतो. तितक्याच सहजतेने हि प्रकरणे होतात तितक्याच सहजतेने तुटतात देखील. एका बाजूला गहन प्रेम { deep love } तर दुसऱ्या बाजूला गहन द्वेष { deep hate } आहे. प्रेम हे बहुदा दोन व्यक्तीमधे निर्माण होत असते. ते नैसर्गिक हि असू शकते आणि समवयस्काच्या प्रभावामुळे देखील घडते.'तुजी आणि त्यांची जोडी फार सुंदर दिसते', ती खरच खूप सूट होते तुला, बघ विचार कर'.असे उद्गार आणि चर्चेमध्ये देखील प्रेम प्रकरण घडतांना दिसतात
मानसिक आरोग्य म्हणजे काय? मानसिक आरोग्य व मानसिक स्वास्थ्य ह्या दोन संकल्पना समान नसून भिन्न आहेत, मानसिक स्वास्थाचे मुख्य उद्दिष्टे मानसिक आरोग्य मिळविणे हे आहे. ह्याचा अर्थ मानसिक आरोग्य हे साध्य तर मानसिक स्वास्थ्य हे साधन होय. ह्यावरून मानसिक आरोग्य हि व्यापक संकल्पना असून मानसिक स्वास्थ्य हि तुलनेने संकुचित शक्यता संकल्पना आहे. मानसिक आरोग्य हे एक शास्त्र असून त्यामध्ये मानसिक स्वास्थ्याच्या व मानसिक विकृतीच्या उपाय योजनांचा अभ्यास केला जातो. "मानसिक आरोग्य म्हणजे व्यक्तीच्या मानसिकतेचे परिपक्व होय" हि एक शारीरिक दृष्ट्या परिपक्वतेची अवस्था होय. मानसिक परिपक्वता हे व्यक्तीमहत्वाचे सापेक्षत सातत्यपूर्ण टिकाऊ स्वरूपाचे एक कार्य आहे आणि याच व्यक्तिमत्वावर आणि परिणामी आरोग्यावर प्रेम प्रकरणाचा परिणाम होतांना दिसतो.

पूर्व संशोधनाच्या आढावा-:

१) ननिता डेका, आर. के. जगीड, कमला डेका, पी. के. चौधरी, बितुवान कलिता, मयुरी बेरोगोहीनिया, (२०१४) यांनी "आसाम मधील वेदैकीय शास्त्रातील विध्यार्थ्यांच्या अडचणी व जीवन जगण्याचा दर्जा" या विषयावर संशोधन केले असून सदर संशोधनाच्या निष्कर्षत २३.९३ विध्यार्थ्यांच्या अडचणी माघे प्रेमभगांचा परिणाम दिसून आलेला आहे.

२) झियोडॉग यांनी १९९४ बीजिंग मधील विद्यार्थ्यांच्या ताणाच्या नियोजनाच्या धोरणाचा अभ्यास ह्यावर संशोधन केले त्यात त्यांना ९.१०% विद्यार्थ्यांच्या श्रृंगारिका प्रेमात वैफल्य असल्याचे आढळून आले.

३) डेविड ज्याक जियांग यांनी प्रेम संबंध महाविद्यालीन विद्यार्थ्यांना कसे प्रभावित करतात यावर संशोधन केले त्यात त्यांना असे आढळून आले कि महाविद्यालीन विद्यार्थ्यांनमधे होणारे प्रेमसंबंध चांगले किंवा वाईट नसून विद्यार्थी परत्वे बदलणारे असते.

ध्येय :

प्रेम संबंधांचा महाविद्यालीन विध्यार्थ्यांच्या मानसिक आरोग्या वर होणारा परिणाम अभ्यासणे.

उद्दिष्टे :

१} महाविद्यालीन विद्यार्थ्यांच्या प्रेमसंबंधांचा मानसिक स्वास्थ्यावरील परिणाम अभ्यासणे.

२} प्रेम संबंध असलेल्या विद्यार्थी व विद्यार्थिनी यांच्या प्रेम संबंध असलेल्या मानसिक स्वास्थ्याचा अभ्यास करणे.

3} प्रेमभंग झालेल्या विद्यार्थ्यांच्या मानसिक स्वास्थ्याचा अभ्यास करणे.

गृहीतके :

१) प्रेमभंग झालेल्या विध्यार्थ्यापेक्षा प्रेमसंबध असणारे विध्यार्थ्याचे मानसिक स्वास्थ चांगले आढळून येईल.

२) प्रेमभंग झालेल्या मुलीपेक्षा प्रेमसंबंध असणाऱ्या मुलींचे मानसिक स्वास्थ चांगले आढळून येईल.

३) प्रेमभंग झालेल्या मुलांपेक्षा प्रेमसंबंध असणाऱ्या मुलांचे मानसिक स्वास्थ चांगले आढळून येईल.

परिवर्तके :

स्वतंत्र परिवर्तक – १) प्रेम संबंध असणारे विद्यार्थी व विद्यार्थिनी.

२) प्रेमभंग झालेले विद्यार्थी व विद्यार्थिनी.

परतंत्र परिवर्तके – मानसिक स्वास्थ्य

नमुना :

प्रस्तुत संशोधनात १५ विद्यार्थी व १५ विद्यार्थिनीप्रेम संबंध असणारे, आणि १५ विद्यार्थी व १५ विद्यार्थिनी प्रेम भंग झालेले. असे एकूण ६० विद्यार्थी यांची निवड केली.

साहित्य :

प्रस्तुत संकलनासाठी 'मिथीला मानसिक आरोग्य शोधिका' या चाचणीचा उपयोग करण्यात आला. सदर चाचणीत एकूण ७० विधाने आहेत.

संकलनाची पद्धत :

प्रस्तुत संशोधनासाठी मुळजी जेठा महाविद्यालय कला, वाणिज्य, विज्ञान, शाखेतून एकूण ६० विद्यार्थ्यांची निवड करण्यात आली. यात प्रेम संबध असणाऱ्या १५ विद्यार्थी व १५ विद्यार्थीनि तर प्रेम भंग झालेले १५ विद्यार्थी व १५ विद्यार्थीनि यांची निवड केली.

संशोधन आखणी-:

प्रस्तुत संशोधनात द्वी घटकिय संशोधन आखणीचा उपयोग केला आहे.

प्रेमसंबंध	मुल	मुली	एकूण
प्रेमसंबंध असणारे	१५	१५	३०
प्रेमभंग झालेले	१५	१५	३०
एकूण	३०	३०	६०

विवेचन :

संख्या शास्त्रीय विश्लेषणाकरिता मध्यमान प्रमाण विचलन आणि टी(t) चाचणी या संख्या शास्त्रीय तंत्राचा उपयोग करण्यात आला.

गृहीतके-:

1) प्रेमभंग झालेल्या विध्यार्थ्यापेक्षा प्रेमसंबध असणारे विध्यार्थ्याचे मानसिक स्वास्थ चांगले आढळून येईल.

तक्ता क्र. १

मानसिक स्वास्थ	न.	मध्यमान	प्रमाण विचलन	D.F	(t)	मूल्य सार्थक पातळी
प्रेम संबंध	३०	१२७.१०	११.७०	५८	०.०८५	नाही
प्रेमभंग	३०	१२६.७७	१८.१६			

वरील तक्ता क्र. १ नुसार प्रेमसंबधात असणाऱ्या विद्यार्थ्यांच्या मध्यमान १२७.१० तर प्रमाण विचलित ११.७० तसेच प्रेमभंग झालेल्या विद्यार्थ्यांचा माध्यमान १२६.७७ तर प्रमाण विचलित १८.१६ असून त्याचे 't' मुल्य ०.०८५ आहे. हे 't' मूल्य कोणत्याही पातळीवर सार्थक नाही. म्हणून प्रेमसंबध असलेल्या व प्रेमभंग झालेल्या विद्यार्थ्यांच्या मानसिक स्वस्थात कोणताही लक्षणीय फरक आढळून आला नाही.

2) प्रेमभंग झालेल्या मुलीपेक्षा प्रेमसंबंध असणाऱ्या मुलींचे मानसिक स्वास्थ चांगले आढळून येईल.

तक्ता क्र. 2

मानसिक स्वास्थ	न.	मध्यमान	प्रमाण विचलन	DF	(t) मूल्य	सार्थक पातळी
प्रेमसंबध असणाऱ्या मुली	१५	१२३.६०	१४.७३	२८	१.६३	नाही
प्रेमभंग झालेल्या मुली	१५	१३२.९३	१६.६२			

वरील तक्ता क्र. २ नुसार प्रेमसंबधात असणाऱ्या मुलींचे मध्यमान १२३.६० तर प्रमाण विचलन १४.७३ तसेच प्रेमभंग झालेल्या मुलींचे मध्यमान १३२.९३ तर प्रमाण विचलन १६.६२ असून त्यांचे 't' मूल्य १.६३ आहे हे 't' मूल्य कोणत्याही पातळीवर सार्थक नाही. म्हणून प्रेमसंबअसलेल्या व प्रेमभंग झालेल्या मुलींच्या मानसिक स्वास्थात कोणताही लक्षणीय फरक आढळून आला नाही.

3) प्रेमभंग झालेल्या मुलांपेक्षा प्रेमसंबंध असणाऱ्या मुलांचे मानसिक स्वास्थ चांगले आढळून येईल.

तक्ता क्र. 3

मानसिक स्वास्थ	न.	मध्यमान	प्रमाण विचलन	D.F	(t) मूल्य	सार्थक पातळी
प्रेमसंबध असणारे मुल	१५	१३०.६०	६.८१	२८	२.०४	०.०५
प्रेमभंग झालेले मुल	१५	१२०.६०	१८.०३			

वरील तक्ता क्र. 3) नुसार प्रेमसंबधात असणाऱ्या मुलाचा माध्यमान १३०.६० तर प्रमाण विचलित ६.८१ तसेच प्रेमभंग झालेल्या मुलांचा मध्यमान १२०.६० तर प्रमाण विचलित १८.०३ असून त्यांचा 't' मूल्य २.०४ आहे. हे 't' मूल्य ०.०५ या पातळीवर सार्थ आहे. म्हणून प्रेमभंग झालेल्या मुलांपेक्षा प्रेमसंबध असलेल्या मुलांचे मानसिक स्वास्थ चांगले दर्ज्याचे आढळून आले.

निष्कर्ष-:

१) प्रस्तुत संशोधनात प्रेमसंबध असलेल्या विध्यार्थ्यांचे मानसिक स्वास्थात कोणताही लक्षणीय फरक आढळून आले नाही.

२) प्रेमसंबध असलेल्या मुलींच्या व प्रेमभंग झालेल्या मुलींच्या मानसिक स्वास्थात कोणताही लक्षणीय फरक आढळून आला नाही. परंतु प्रेमसंबध असणाऱ्या मुलींपेक्षा प्रेमभंग झालेल्या मुलींचे मानसिक स्वास्थ चांगले आढळून आले.

३) प्रेमभंग झालेल्या मुलांपेक्षा प्रेमसंबध असणाऱ्या मुलांचे मानसिक स्वास्थ चांगल्या दर्ज्याचे आढळून आले.

प्रौढ वयातील मुले – मुली यांच्या भावी जोडीदारांविषयीच्या अपेक्षा

*** संशोधक ***

अमोल लाले ,संतोष पजई ,कोमल पाटील ,मानसशास्त्र विभाग

मार्गदर्शक

डॉ. सी. पी. लभाणे, प्रा. बालाजी राउत, मानसशास्त्र विभाग

*** प्रस्तावना ***

अपेक्षा हा शब्द आशा हया शब्दाचा पर्यायी शब्द म्हणुन देखिल वापरला जातो आणि हया शब्दाच्या माध्यमातुन आपण, व्यक्ती, वस्तु, ठिकाण यांच्याकडून आपल्या काल्पनिक प्रतिमेची आपल्या आशेची पुर्तता व्हावी म्हणुन आपण त्याकडे बघत असतो. आणि यातुनच अपेक्षेची निर्मिती होते.

आता विवाह आणि जोडीदार यांच्या बाबतीत म्हटल्यास आपला जोडीदार कसा असावा, त्याच्या आवडी निवडी कशा असाव्यात तो आपल्यासाठी कशा अनुरुप असेल याची खातरजमा आपण विवाहापुर्वी करत असतो आणि अधिकाधीक तो जोडीदार आपल्याला अनुरुप कसा असेल याचा विचार करत असतो.

आपल्यापैकी प्रत्येकाला खरे तर दोन प्रकारच्या सामाजिक नात्यांची गरज असते. आपला ताण कमी करण्यासाठी व आपल्या विविध गरजा भागवण्यासाठी आपल्याला माणसांची गरज असते. यासाठी काही माणसांची आपण वरवरचे तात्पुरते नाते जोडले, तरी आपल्या विशिष्ट गरजा भागतात. परंतु आपल्याला आणखी एक प्रकारचे नाते आवश्यक असते. ते नाते म्हणजे मैत्रीचे होय. आपली काळजी घेणारे आपल्यावर प्रेम करणारे असे कोणेतरी खास जवळचे माणुस आपल्याला हवे असते. मग ती जवळची मैत्री असो वा मित्र किंवा आपला नवरा असो वा बायको जी व्यक्ती आपल्याला निश्चित पणे समजुन घेईल जी आपल्याला आपल्या दोषांसह स्विकारेल आणि जिच्यापाशी आपले मन आपण मोकळे करु शकु असा मित्र किंवा अशी मैत्रीण आयुष्यात असणे गरजेचे असते आणि त्यांच्या बद्दलच्या अपेक्षांचे रुपातरंण मग विवाह होण्यात आपल्याला दिसते.

दोन व्यक्तींचा परस्परांशी किती संबंध येतो, एकमेकांची परस्परांशी किती व कशी आंतरकिया होते यावरही परस्परांना एकमेकांविषयी आकर्षन वाटेल की नाही हे अवलंबुन असते, सहवासामुळे दोन व्यक्ती एकमेकांना आवडु लागतात व त्यांच्यात मैत्री निर्माण होते.

या व्यक्ती तुमच्या जवळपास राहतात किंवा या व्यक्ती तुमच्याच शाळा – कॉलेजात शिकत असतात किंवा या तुमच्याच ऑफीसमध्ये काम करतात, अशा व्यक्तीशी तुमचा संबंध अधिक येतो. त्यामुळे तुमची एकमेकांशी असलेली ओळख वाढत जाते व तिचे मैत्रीत रुपांतर होते. हा संबंध उलटया प्रकारचाही असतो. म्हणजेच जी व्यक्ती आपल्याला आवडते तिच्याशी संबंध ठेवतो, त्यांच्या गुणांना आपण महत्व देतो व त्यांचे दोष आपण लक्षात घेत नाही. शेजारी व सहकारी यांना सहकार्य करावे अशी समाजही आपल्या कडून अपेक्षा करतो. त्यामुळेच आपण त्यांच्याशी जुळवुन घेण्याचे अधिक प्रयत्न करतो.

आपल्यापैकी क्वचितच एखादी व्यक्ती संन्याशाचे जिवन पसंत करते. आपणा सर्वानाच इतरांशी संबंध जोडणे व ते टिकवुन ठेवणे आवडते. या व्यक्तीमध्ये सहवासाची गरज उच्च असते अशा व्यक्ती कथावस्तु असंवेदन चाचणीतील कथांमध्ये देखील मैत्री टिकवुन ठेवण्यावर अधिक भर देतांना आढळतात. त्या व्यक्ती इतरांशी संबंधाच्या बाबतीत अत्यंत संवेदनशील असतात. सहवासाची प्रेरणा असणा–या व्यक्तीला एकटेपणापेक्षा जास्तीत जास्त वेळ इतरांमध्ये राहणे अधिक आवडते. मग त्या व्यक्ती स्त्रिया किंवा पुरुष कोणही असोत. मित्र मैत्रीणीसोबत त्या अधिक वेळ राहणे पसंत करतात असा एका संशोधनाचा निष्कर्ष आहे.

सुसंस्कृत व्यक्तीमत्व आपल्याला विकसित करायचे असेल तर सुसंस्कृत मानवाने मानवी मुल्यांची जोपसना केली पाहीजे. प्राचीन गुरुकुल पध्दतीपासुनच सर्वानीच चारित्र्य संवर्धनावर आणि उच्च दर्जाची नैतीक मुल्ये प्रस्थापीत करण्यावर भर दिला आहे.

आपल्या भावी जोडीदाराच्या निवडीवर आपल्या अभिवृत्ती आणि प्रेरणा (Attitude & Motivation) यांचा खुप मोठा प्रभाव पडत असतो. अभिवृत्ती व प्रेरणा या दोन्ही संकल्पना हेतु केंद्रीत असुन बोधनात्मक आणि भावनात्मक दृष्टीने दोघांमध्ये साम्य आहे. हेतु पुर्ण होताच प्रेरणा नष्ट होतात पण अभिवृत्ती नष्ट होत नाहीत. अभिवृत्तीचा संबंध दृष्टीकोनाशी किंवा मतांशी अधिक निकट असतो. अभिवृत्ती वर्तनाचा कल दर्शवितात.

या सर्व गोष्टींचा सारासार विचार करुन या संशोधनाचा माध्यमातुन मुले आणि मुली यांच्या भावी जोडीदारांविषयीच्या अपेक्षा यांचा परामर्श घेण्याचा प्रयत्न यातुन करण्यात आला आहे.

जोडीदार निवडी विषयी मानसशास्त्रीय दृष्टीने महत्व :–

शिक्षण पुर्ण केल्यानंतर नोकरी व्यवसायाची निवड करुन वैवाहीक जिवन सुरु करण्याच्या तयारीला तरुण मुले – मुली लागतात. वैवाहीक जोडीदार निवडण्याच्या प्रकियेत मुलींना फारसा वाव आढळत नाही. आई–वडिल म्हणतील, ठरवतील त्याच तरुणाशी विवाहबद्ध होण्याची जुनी परंपरा अजुनही मोठया प्रमाणात समाजात प्रचलित असल्याचे आढळते.

जोडीदार निवडण्याचे स्वातंत्र्य मुलींना दिले जात नाही, काही अपवादात्मक परिस्थितीमध्ये जोडीदार निवडण्याचे स्वातंत्र्य मुलांनाही असत नाही. कित्येकदा विवाह म्हणजे वैयक्तिक निर्णन न रहाता तो कौटुबीक निर्णय म्हणुन त्याकडे पाहीले जाते. कुटुंबातील आई वडिल, प्रौढ, मोठया व्यक्ती कडूनच विवाह निश्चित केले जातात.

हल्लीच्या तरुण मुलामुलींने शारिरीक आकर्षन हा विवाहाचा पाया मानु नये, आवडी निवडी, दृष्टीकोन विचार जिवनाकडे पाहण्याची दृष्टी यांसारख्या मानसिक पार्श्वभुमीवरील परस्परांची अनुरुपता महत्वाची मानली जावी.

*** संशोधन पध्दती *** (Research Methodology)

या संशोधनासाठी आम्ही वर्णणात्मक पद्धतीचा वापर केला. या संशोधनासाठी वर्णणात्मक संशोधन पद्धतीचा उपयोग करण्या बरोबरच नमुना निवडीसाठी असंभाव्यता नमुना निवड केली. त्याच बरोबर माहिती संकलनासाठी प्रश्नावली पद्धतीचा वापर केला.

संशोधन पद्धती शास्त्रात प्रौढ मुले - मुली यांच्या भावी जोडीदारांच्या अपेक्षा यांच्या चाचणीच्या माध्यमातुन घेतलेल्या सांखिकीय नोंदी, संकियात्मक व्याख्या, गृहीतके, उद्दिष्टये, संशोधन साहीत्य, आराखडा, प्रदत्त संकलनाची पध्दत, परिवर्तके, चर्चा, निष्कर्ष आणि संदर्भ इ.घटकांचा समावेश करण्यात आला आहे.

*** उद्दिष्टये ***

१) मुले - मुली यांच्या भावी जोडीदारांविषयीच्या अपेक्षांचे प्रमाण असभ्यासणे.
२) मुले - मुली यांच्या व्यक्तीमत्वाचा भावी जोडीदारावर कसा परिणाम होते हे अभ्यासणे.
३) मुले -मुली यांच्या भावी जोडीदारांच्या अपेक्षाचे मानसशास्त्रीय दृष्टीने महत्व अभ्यासणे.
४) मुले - मुली यांच्या भावी जोडीदारावर व सामाजिक आणि सांस्कृतीक नियामके यांचा कसा परिणाम होतो ह अभ्यासणे.

*** गृहीतके ***

१) मुलांपेक्षा मुलींच्या भावी जोडीदारविषयीच्या अपेक्षाची पातळी अधिक आढळुन येईल ?

*** संशोधन साहीत्य ***

प्रस्तुत संशोधनासाठी स्वरचीत मुला-मुलींच्या भावी जोडीदारांविषयीची अपेक्षा चाचणी वापरली.
या चाचणीत एकुण २५ विधाने आहेत, प्रत्येक विधानासमोर एक चौकट दिली आहे. विधानांच्या समोर होय नाही असे दोन परिणामे आहेत. प्रयुक्त आपली प्रतिक्रीया त्या परिणामांच्या खाली ( ) अशा प्रकारे देतो.

* परिवर्तके (Variables)
* स्वतंत्र परिवतर्क (Independent Variables):-
(A) लिंग - १) मुले २) मुली
* परतंत्र परिवर्तके (Dependent Variables) :-
(B) जोडीदाराच्या अपेक्षा
* आराखडा *

गट	प्रयुक्तांची संख्या	वयोगट	विधानांची संख्या	मापन
मुले	३०	२१-२५	२५	अपेक्षा मापण

*** संख्याशास्त्रीय विश्लेषण ***

Gender	N	Mean	SD	df	t	SL
Male	30	14.43	1.71	58	3.06	0.01
Female	30	15.30	2.69			

मुले आणि मुली यांच्या तुलणात्मकरित्या सांख्याकिय विश्लेषणावरुन असे दिसुन येते की, मुलांच्या अपेक्षा हया मुलींच्या प्रमाणात जास्त आहेत.

मुलांचे मध्यमान १७.४३३३ व प्रमाण विचलन १.७१५७२ इतके आले आहे तर मुलींचे मध्यमान १५.३००० व प्रमाण विचलन २.६९२९० इतके आले आहे. तसेच df value ५८ t ३.०६५ इतके आले आहेत. तसेच ०.०१ आले आहेत.

निष्कर्ष *

संशोधनाच्या सांख्यिकीय विश्लेषणावरुन मुलांच्या भावी जोडीदाराविषयीच्या अपेक्षा उच्च प्रतीच्या आढळुन आल्या मुळे संशोधनाचे गृहीतक नाकारले गेले आहे.

शोधनिबंध
१८ ते ५० वयोगटातील योगसाधकांच्या स्व–संकल्पनेवर योगाचा होणारा परिणाम अभ्यासणे.

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संचालक, सोहम डिपार्टमेंट ऑफ योग ॲण्ड नॅचरोपॅथी
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भूमिका :– स्वत:च स्वत:ला जाणून घ्यायचे तरी कसे ? हा प्रत्येक व्यक्तीला भेडसावणारा प्रश्न आहे. त्या दृष्टीने स्व–संकल्पना महत्वाची आहे. स्वत:विषयीची समजूत स्वत:च स्वत:ला ओळखण्याचा केलेला प्रयत्न अगदी अलिप्त राहून तिऱ्हाईताच्या नजरेने आपण एखाद्या वस्तूचे ज्याप्रमाणे निरिक्षण परिक्षण करतो तसेच त्या व्यक्तीने स्वत:च केलेले स्वत:चे परिक्षण, निरिक्षण म्हणजेच स्व–संकल्पना होय. स्वत:विषयी नि इतर व्यक्ती समूह व स्वत:विषयीच्या समजूती, मूल्ये, अभिवृत्ती यांचे संकलन 'स्व' मध्ये असते. अशा या 'स्व'ला जाणण्यासाठी संशोधकाने योगातील प्रक्रिया जसे सूर्यनमस्कार, आसन, प्राणायाम, शुध्दिक्रिया व ध्यान (ओंकार) या घेतल्या आहेत. स्वत:वर चांगले संस्कार घडविण्यासाठी योगशास्त्र हे फार महत्वाची भूमिका बजावते. योगाभ्यासामुळे बर्हिमुखतेतून अंर्तमुखतेकडे साधक वळतो. अशाप्रकारे नित्य योगाभ्यासाच्या माध्यमातून अंतरंगाची साधना आणि अंतरंगाच्या साधनेतून साधकांच्या आत्मतत्वावरील काजळी दूर होऊन 'मी' चे खरे स्वरूप त्याला योगसाधनेमुळे प्राप्त होते. साधक सुख–दु:खाच्या पलिकडे जाऊन स्व–स्वरूपाच्या अनुभूतीने तृप्त होतो. या आत्मस्वरूपाच्या म्हणजेच 'स्व' च्या प्राप्तीमध्ये साधकाच्या सर्व स्वाभाविक इच्छा पूर्ण होतात आणि त्याला मिळविण्यासाठी काहीच शिल्लक राहत नाही तो कृतकृत व धन्य होतो.

उद्देश :– १८ ते ५० वयोगटातील योगसाधकांच्या स्व–संकल्पनेवर योगाचा (सूर्यनमस्कार, आसने, प्राणायाम, शुध्दिक्रिया, ध्यान (ओंकार) यांचा होणारा परिणाम अभ्यासणे.

परिवर्तक :– सोहम् डिपार्टमेंट ऑफ योग ॲण्ड नॅचरोपॅथी येथील १८ ते ५० वयोगटातील ४५ साधक, वेळ – सकाळी ६ ते ७ व ७ ते ८ यांना ३ महिने कालावधीपर्यंत सूर्यनमस्कार, आसने, प्राणायाम, शुध्दिक्रिया, ध्यान यांचा अभ्यास देण्यात आला.

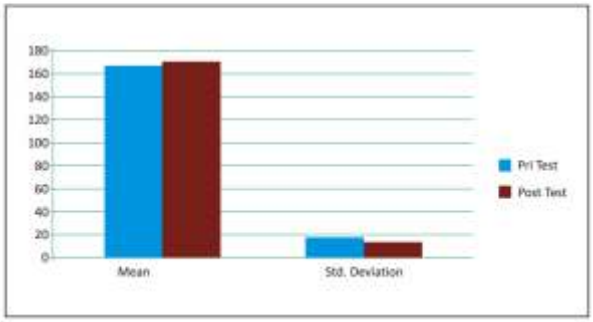
मानसशास्त्रीय चाचणी :– संशोधनासाठी प्रायोगिक पध्दती वापरली आहे. Self-concept Rating Scale ही डॉ. कु. मुक्तारानी रस्तोगी, आग्रा सायकोलॉजिकल रिसर्च सेल या चाचणीच्या आधारे पूर्वोत्तर चाचणीच्या सांख्यिकीय विश्लेषणाद्वारे अनुमान काढण्यात आले.

सांख्यिकिय विश्लेषण :–)

उपसंहार :– पूर्वोत्तर चाचणीच्या आधारे काढण्यात आलेल्या सांख्यिकिय विश्लेषणाच्या आधारे योगसाधकांच्या स्व–संकल्पनेवर योगाचा सकारात्मक परिणाम आढळून आला.

निष्कर्ष :– १८ ते ५० वयोगटातील योगसाधकांच्या स्व–संकल्पनेवर योगाचा सकारात्मक परिणाम आढळून आला.

Total	Mean	N	Sd	df	t	SL
Pre test	167.66	45	18.50	44	2.02	0.05
Post test	170.66	45	16.32			



उपसंहार :– पूर्वोत्तर चाचणीच्या आधारे काढण्यात आलेल्या सांख्यिकिय विश्लेषणाच्या आधारे योगसाधकांच्या स्व–संकल्पनेवर योगाचा सकारात्मक परिणाम आढळून आला.