EFFECT OF EXTRACTS OF VARIOUS PLANT PARTS ON SEED MYCOFLORA AND SEED GERMINATION OF CHILLI VAR. PHULE JYOTI

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ABSTRACT

Medicinal plants were collected from the local places of Nanded District of Maharashtra state. Ten different plant parts extracts i.e. Acacia nilotica, Adhatoda zeylanica, Annona squamosa, Azadirachta indica, Curcuma longa, Lawsonia inermis, Murraya koenigii, Ocimum sanctum, Terminalia bellerica and Terminalia chebula were tested for seed treatment of Chilli var. Phule jyoti.The common and dominant seed borne fungi were found to be inhibitory for seed germination and caused great loss in seedling vigor, seed and seedling rots of the Chilli var. Phulejyoti.Theroot stems, leaf and bark extracts of some common and easily available plants were screened for the Bio-control of the seed mycoflora of the Chilli var. Phulejyoti.Root, stem and leaf extracts of all the test plants were found to be inhibitory in more or less degree for the incidence of seed mycoflora while with a few exceptions, they were found to be stimulatoryfor seed germination.

Keywords:*Capsicum annum,seed mycoflora, seed germination, medicinal plant extracts, Seed dormancy.*

1. Introduction

Solanaceaefamily includes a large number ofannual or perennial herbs, shrubs, small trees and climbers. More than seventy species belonging to twenty-one genera are found in India. Economically the family is fairly important, as it comprises several crops of food value, medicinal value, vegetables and ornamentals. Several plants of this family are cultivated all over the world for their economic importance.

Chilli (*Capsicum annum*.) is grown throughout the Marathwada region. It is consumed by every Indian. There is hardly a vegetable where Chilli is not used as a condiment while cooking. Chillies are used green as well as dry in the powder form. It is rich source of vitamin A and vitamin C among the vegetables. The Chillies are pungent due to the presence of the chemical **capsaicin** and the bright red colour at the ripening stage is due to the pigment **capsanthin.**

2. Materials and Methods

1. Collection of Seed Samples

The methods described by **Paul Neergaard (1973)** have been adopted for the collection of seed samples. Accordingly, seed samples of different var. ofChilli (Half kg each) were collected from ripe dried fruits from field, storehouses, market places and research centers. A composite seed sample for each of the var. was prepared by mixing the individual seed samples together and preserved in gunny bags at room temperature during the studies.

2. Detection of Seed Mycoflora

The seed-borne fungi of different varieties of seeds of **Chilli**were detected by moist blotter (B) and agar (A) plate methods as recommended by **ISTA (1966), De Tempe (1970), Neergaard (1973) and Agarwal et al. (1976).** The procedure of moist blotter (B) and agar (A) plate methods are described as below.

3.Identification of Seed-Borne Fungi

The seed-borne fungi were preliminary identified on the basis of sporulation characters like asexual or sexual spores or fruiting structures. Detailed examination of fungal characters was done under compound microscope and their identification was confirmed with the help of latest manuals **[Subramanian (1971), Neergaard and Mathur (1980), Jha (1993) and Mukadam et al (2006)].** Pure cultures of the identified fungi were prepared and maintained on PDA (Potato Dextrose Agar) slants for further experiments.

4.Effect of Culture Filtrates on Percent Seed Germination, Root Length, Shoot Length and Seedling Emergence.

Production of toxin was studied by growing some common and dominant seed-borne fungi of plants like *Alternariatenuis, Aspergillus flavus, Curvularialunata*and *Fusariummoniliforme*on liquid GN medium of pH 5.6 for ten days.

Twenty-five ml of the medium was poured in 100 ml borosil glass conical flasks, autoclaved and inoculated separately with 2 ml spore suspension of the test seed-borne fungus that was maintained on PDA slants for seven days. The flasks were incubated at room temperature ($27\pm1^{o}C$) for ten days. After incubation, the culture filtrates were collected in pre-sterilized culture bottles from the flasks by filtering the contents through Whatman filter paper No.1 and treated it as crude toxin preparation.

5. Collection of Plant Material for Extracts

During the present studies, ten common and easily available plants in the vicinity like *Acacia nilotica, Adhatodazeylanica, Annonasquamosa, Azadirachtaindica, Curcuma longa, Lawsoniainermis, Murrayakoenigii, Ocimum sanctum, Terminaliabellerica*and*Terminaliachebula*were selected. Their identification was confirmed using the **'Flora of Marathwada' (Naik, 1998)**. The roots, stems, leaves and barks of the selected plants were collected separately, surface sterilized with 0.1 % $HgCl_2$ and washed repeatedly with sterile distilled water for several times and kept for drying in hot air oven (Metalab) at 60°C temperature for 48 hours. After drying, the roots, stems, leaves and barks were preserved separately in polythene bags at room temperature (27± 1°C) during the studies.

The dried roots, stems leaves and bark of selected plants were crushed separately in to fine powder with the help of blender (Remi). 5 gm powder each of the plant parts was dissolved separately in 100 ml sterilized hot distilled water in 250 ml borosil glass conical flasks. The flasks were kept in oven (Metalab) for 24 hours at 60°C and the content was filtered through Whatman filter paper No.1. The filtrates were used as 5% aqueous plant extracts.

6.Effectof Extracts of Various Plant Parts on Seed Mycoflora And Seed Germination

During the present studies, the seeds of Chilli var. Phulejyotiwere placed on blotters in Petri plates as described earlier and irrigated just enough to keep blotters moist separately with the root, stem and leaf extracts (5%) of the selected plants. Percent seed germination and associated seed mycoflora were recorded on seventh day. Seed plates irrigated with sterile distilled water served as control.

3. Results and Discussion

During the present studies, the seeds of Chilli var. Phulejyoti were placed on blotters in Petri plates and irrigated with root, stem and leaf extracts of different plants (Total ten plants). The plates were incubated for seven days at room temperature and the incidence of seed mycoflora and seed germination was studied. The plates irrigated with sterile distilled water served as control. The results are presented in Table 69.

From the results it is evident that, the root, stem and leaf extracts of all the test plants were found to be inhibitory in more or less degree for theincidence of seed mycoflora while with a few exceptions, they were found to be stimulatory for seed germination.

The seeds treated with leaf extracts of *Azadirachtaindica*, leaf and root extracts of *Ocimum sanctum* and leaf extracts of*Murrayakoenigii* showed very reduced incidence of seed mycoflora and maximum seed germination while, the seeds treated with the stem and root extracts of*Lawsoniainermis*and *Acacia nilotica*, leaf extract of *Curcuma longa*showed maximum incidence of seed mycoflora and reduced seed germination.

Table:Effect of extracts of various plant parts on percent seed mycoflora and percent seed germination of Chilli var. Phulejyoti on blotter paper.

Sr.No.	Source plant	Part used for extracts	% Seed mycoflora	% Seed germination
1	*Acacia nilotica*	Root	72	43
		Stem	79	37
		Leaf	66	47
		Bark	68	57
2	*Adhatodazeylanica*	Root	60	33
		Stem	65	51
		Leaf	43	67
3	*Annonasquamosa*	Root	51	55
		Stem	43	62
		Leaf	27	73
4	*Azadirachtaindica*	Bark	15	94
		Leaf	11	96
		Kernel	11	98
5	*Curcuma longa*	Dried rhizome	35	75
		Leaf	61	35
6	*Lawsoniainermis*	Root	57	49
		Stem	80	28
		Leaf	36	64
7	*Murrayakoenigii*	Root	16	89
		Stem	25	79
		Leaf	06	91
8	*Ocimum sanctum*	Root	07	94
		Stem	10	92
		Leaf	04	95
9	*Terminaliabellerica*	Root	50	38
		Bark	54	50
		Leaf	59	27
10	*Terminaliachebula*	Root	47	43
		Bark	44	55
		Leaf	43	31
	Control (sterile distilled water)	--	100	30

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GASTROINTESTINAL PARASITES OF NILGAI (BOSELAPHUS TRAGOCAMELUS) IN THE KATEPURNA SANCTUARY, AKOLA

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ABSTRACT

To study the prevalence of gastrointestinal parasites of Boselaphus tragocamelus, 51 faecal samples were collected from Katepurna Sanctuary during the period from February 2022 to July 2022. Thirty five samples were found to be infected with gastrointestinal parasites and overall prevalence rate was 68.62%. Paramphistomum sp. (23.52%), Ascaris sp. (19.6%) Fasciola sp. (11.76%), stomach worm (11.76%), hook worm (9.80%), Strongyloides sp. (3.92%), Balantidium coli (3.92%) Oesophagostomum sp. (1.96%), Eimeria sp. (1.96%) & Mixed type of infections of Ascaris sp. Was found in 5 different scat samples or droppings.

Seasonal prevalence of gastrointestinal parasites in summer and winter were 80.01% and 17.3% respectively. This study provided a second overview on parasites in Nilgai of the Katepurna Sanctuary, but to evaluate parasite transmission dynamics much more studies were required on livestock and on wild herbivores.

Keywords:*Boselaphus tragocamelus, Nilgai, Faecal sample, Parasite, Scat analysis.*

1. Introduction

TheKatepurna Sanctuary in Akola, Maharashtra is an exotic sanctuary dotted with an abundance of flora and fauna. Positioned in Akola district in Vidarbha region of the state of Maharashtra, the sanctuary lies in close proximity to the catchments area of Katepurna reservoir (Mahan Dam).Its area is geographically located at-20°25'0.54"N 77°10'50.14"E. There is a good amount of population of Nilgai observed in the study area. And as per 2022 census there are total 72 Nilgai reported.

2. Materials and Methods

The material for this study comprises the faecal samples of Nilgai (*Boselaphus tragocameelus*), in and around Katepurna Sanctuary and also the agricultural land. Periods of collection of material extends from February February 2022 to July 2022. A total 51 faecal samples were screened for the study of parasitic infections.

Collection of Faecal Material/ droppings:

To determine the food habits, the faecal samples of Nilgai were collected during study period or field visits during Census. Faecal samples were collected in (Zip-log) polythene bags. Fresh samples were preferred for analysis. The polythene bags containing the faecal samples were labeled with date, time, locality. The bags were properly sealed and were brought to the laboratory. The size and shape of faecal pellets are also noted.

3. Observations and Results

Laboratory analysis of the samples for presence of any parasitic infection:

Every time half of the faecal sample was used for observation of any parasitic infection. It was washed in warm mammalian saline and then sieved through a fine mesh. The contents were centrifuged. The supernatant was discarded and the matter settled down was observed carefully under dissecting microscope and then through compound microscope with photographic attachment of Magnus make.

Identification of the parasite:

The parasitic infections (Whole mounts, Eggs, Cysts) in the faecal sample were identified, separated with needle and their slides (Whole mounts) were prepared for using standard methods. Observations and identification was carried out by using standard keys and incidence was noted.

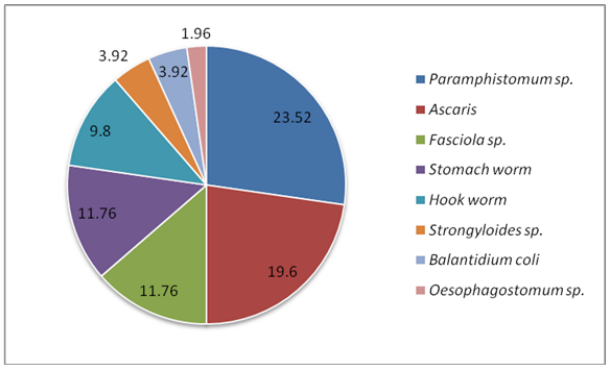
Evaluation of incidence :

During screening the different samples were examined as per their habitat and incidence of parasitic infections and their percentage were noted. Total percent of parasitic forms found in *Cervus* evaluated, overall percentage of parasitic infections of zoonotic importance.

TABLE: 1
Showing details of parasites found in nilgai (boselaphus tragocamelus) and their incidence in %

Sr. No	Name of Parasite	No	% occurrence
1	*Paramphistomum sp.*	*12*	*23.52*
2	*Ascaris*	*10*	*19.60*
3	*Fasciola sp.*	*6*	*11.76*
4	*Stomach worm*	*6*	*11.76*
5	*Hook worm*	*5*	*9.80*
6	*Strongyloides sp.*	*2*	*3.92*
7	*Balantidium coli*	*2*	*3.92*
8	*Oesophagostomum sp.*	*1*	*1.96*
9	*Eimeria sp.*	*1*	*1.96*

Fig 1: Showing incidence in %



4. Conclusions

From the above observations it is concluded out of the 51 faecal samples Thirty five samples were found to be infected with gastrointestinal parasites and overall prevalence rate was 68.62%. *Paramphistomum* sp. (23.52%), *Ascaris* sp. (19.6%) *Fasciola* sp. (11.76%),stomach worm (11.76%), hook worm (9.80%), *Strongyloides* sp. (3.92%), *Balantidium coli* (3.92%) *Oesophagostomum* sp. (1.96%), *Eimeria* sp. (1.96%) & Mixed type of infections of Ascaris sp. Was found in 5 different scat samples or droppings. As these animals are the part of food chain in the ecosystem, further necessary treatments should be opted for the healthy survival of the species in the protected area.Our study provides a second overview on parasites in Nilgai (*Boselaphus tragocamelus*) in the Katepurna Sanctuary and nearby agricultural land, but to evaluate parasite transmission dynamics, much more studies are required on livestock in the area and on wild So, further study may also be conducted to keep restores the ecological balance as well as to assess the losses on economic point of view, due to parasitic diseases of Nilgai.

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THE ROLE OF ENVIRONMENT IN ECONOMIC DEVELOPMENT- AN ANALYSIS

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ABSTRACT

We, animals and birds, trees and plants, the atmosphere and this whole earth, make up the environment, Man is only running ahead in the race of progress. The thinking ability of man has developed immensely over time. It has made great progress in the field of science and technology. Man has made many inventions to make his life comfortable and convenient. Man climbed the ladder of success. Today man has made great progress in the field of industrialization. Man has established millions of factories for the manufacture of goods and materials. Tomorrow, the smoke coming out of factories is polluting the environment. Trees are being cut fast so that man can build his house. Man is cutting trees indiscriminately to fulfill his selfishness. Continuous cutting of trees means destroying the environment. In the era of industrialization, man has developed so much that he has forgotten how dire consequences can be. Deforestation or felling of trees is a serious problem. With respect to environment and economic development, we can say that economic prosperity and development depend on the environment. The economic environment is employment oriented. And it also helps in controlling the progress of the country. If the economic environment is unfavourable, then poverty, unemployment, hunger, public discontent have to be faced which blocks the development of any country. In this revision article, an attempt has been made to throw light on the scenario of the role of environment in economic development.

Keywords:*earth, man, environment, economic development, industrialization, economic environment.*

Introduction

Environment is a collective unit of all those physical, chemical and biological factors that affect an organism or an ecosystem population and decide their form, life and survival. That is, the natural cover around us that allows us to live easily. Helps to do so, is called the environment. Not only humans, but all animals, plants, natural flora etc. are completely dependent on the environment. Life cannot be imagined without environment, because environment is the basis of existence of only life on earth. Environment provides us pure water, pure air, pure food to lead a healthy life.
Economic prosperity and development depend on the environment. The economic environment is employment oriented. And it also helps in controlling the progress of the country. If the economic environment is unfavourable, then poverty, unemployment, hunger, public discontent have to be faced which blocks the development of any country.

Review of Literature

1. A B Saxena
Environmental studies is the process that gives us awareness, knowledge and understanding about the environment, develops a favorable attitude about it and commits us towards its conservation and improvement.
2.Chapman Taylor
Environmental studies develops the citizenship, it brings information, motivation and sense of responsibility in the learner regarding the environment.
3.Yogesh Kumar Goyal
In this era, new research is being published every day on the environment. The governments of most countries are also concerned about the environment. However, in the midst of environmental concern, some countries keep changing their environmental protection policies in view of their interests. That is, our selfishness has also entered the spirit of environmental protection. Perhaps due to this selfishness, even today, a hollow idealism about the environment has spread. On the one hand, due to many flaws in the government policies, no serious work is done

in the direction of environmental protection; on the other hand, due to the apathy of the general public on such issues, the situation of the environment keeps getting worse. In such an environment, senior journalist and author Yogesh Kumar Goel's recently published book 'Pollution Free Sansain' makes a logical analysis on issues like environment and pollution. Published with the financial support of Hindi Academy Delhi, this book is truly a great book making people aware about environment and pollution.

Research Work

i) Relationship of Environment to Economy:

The state of the eco-economy is a compromise by nature. Ecological modernization is a school of thought in the social sciences that argues that… sustainability is a socio-ecological process characterized by behavior in pursuit of a common ideal… Energy Poverty alleviation and sustainable prosperity cannot be achieved without taking care of the environment and natural resources. There is a correlation between the environment and economic growth. Environment and socio-economic development are intertwined in such a way that development cannot be imagined without their impact on the environment.

ii) Contribution of Environment to Economic Development:

A global opinion poll shows that India and indeed all countries are equally committed to sustainable development and its three dimensions – social, economic and environmental. However, given the economic conditions, the challenges in terms of obtaining the required amount of resource are also formidable. It is right to give an important place to climate science in public debate. While climate science is faced with uncertainties, the world is grappling with even more extreme crises. Now the spirit of doing something is being felt in a way that has not been done till date." When the economy develops the potential to grow rapidly, many new challenges also come. We have to decide how the scarce resources will be optimally used from the point of view of economic development and sustainable development. There is a lot of evidence that suggests that overall human welfare may also decrease due to such policies. Economic development should be based on optimum use of natural resources and at the same time development should be kept environmentally balanced. Economic development leads to increase in national income – One of the major features of economic development is that it helps in increasing per capita income which results in increase in national income and if the income of a person of the country increases. If so, the national income of the country also increases and the rate of capital formation and investment increases, various types of industries are established and the mobility of capital increases. The selection area for labor and capital investment is expanded.

iii) To understand how industrial development affects the environment

The credit for spoiling the environment and contaminating them goes to the industrialization of man. In the name of industrial development and progress, we are doing terrible condition of our environment, due to which the atmosphere is getting affected at a rapid pace. Due to industrialization, the amount of carbon dioxide in the atmosphere is increasing more. Many types of gases like methane etc. are responsible for developing extreme heat on the earth. It is called Green House Effect in English. Greenhouse effect is good but due to excessive greenhouse gases the earth is getting warmer. Excessive greenhouse gas traps the heat of the earth. Due to this a situation like global warming has arisen.

Natural resources and raw materials such as water, timber and minerals are used in industrial production and due to this industrial growth becomes the cause of environmental damage. Therefore, it is very important to strike a good balance between environmental protection and sustainability of the economic development agenda. Sustainable development in the environmental, economic and social spheres requires a balanced use of all dimensions. Development can be sustainable only if it preserves the natural balance. The environment can generally be divided into two parts. The first is the geographical and natural environment and the second is the artificial and social environment. Natural and geographical

environment includes water, vegetation, livestock, mineral wealth etc. At the same time, industrial processes can have negative environmental impacts, leading to climate change, loss of natural resources, air and water pollution, and species extinction. These are threats to the global environment as well as to economic and social well-being.

iv) Analyzing the role of the economic environment

The term economic environment refers to all those external economic factors that influence the buying habits of consumers and businesses and therefore affect the performance of the company. These factors are often outside the company's control, and can be either large scale (macro) or small scale (micro).

Economic environment includes the state of the economy, economic rules, beliefs, direction of economic development, etc. Economic environment is related to the economic activities of human beings. It includes all the activities related to earning money and spending it efficiently by human beings. It includes agriculture, industry, trade, commerce, transport, communication, insurance, banking, government income and expenditure and all other statutory economic activities. The economic environment does not remain static. The economic environment is also influenced by the internal and international conditions of the country.

If the economic environment of the country is right and balanced, then the country will move forward on the path of progress and development. Public welfare schemes will also be run in the right direction. The happy life of human also depends on the balanced development of economic environment. Therefore it can be said that the economic environment

v) Evaluate a country's environmental issues and economic development strategy

Major environmental issues include forest and agro-land degradation, resource depletion (water, minerals, forests, sand, stones etc.), environmental degradation, public health, loss of biodiversity, lack of resilience in ecosystems, livelihood security for the poor .

An economic analysis of the relationship between environmental development and the economy necessitates an understanding of environmental problems for the successful launch of developmental efforts.

It is recognized that the interaction between poverty and environmental degradation can be quantified in a self-enhancing process in which people can eliminate vital resources that are most important to their lives.

Environmental degradation, coupled with higher health costs and reduced productivity of resources, can further stifle economic growth. Therefore some fundamental themes can define the development environment.

These topics are:

1. Sustainable Development and Its Linkage with Environment:

Ecologists have coined the term 'sustainability' as an attempt to clarify the balance between economic growth and environmental protection. Sustainability means achieving a pattern of development that does not reduce production and changes its capabilities to satisfy the needs of the present generation without harming future generations.

2. Population, Resources and Environment:

In many poor countries, the increasing density of population has severely destroyed the very means on which their population depends for life. This process has to be stopped in order to increase the productivity of the existing resources, which will benefit more people, especially the poor.

3. Poverty and Environment:

Although it is clear that environmental degradation and high fertility go hand in hand, they are both direct results of a third part, namely absolute poverty. If the government really wants the success of its environmental policies, then it is necessary to address this problem. The problems are compounded by landlessness, poverty, lack of access to institutional resources, insecure land tenure rights, lack of credit and inputs, and the absence of information often prevents the poor from making resource-enhancing investments that help protect those environmental assets.

help from which they get their livelihood. Therefore, it is necessary to set the goals of environmental protection according to the basic needs of mankind.

4. Growth and Environment:

The worst perpetrators of environmental destruction are the millions of the richest and millions of the poorest on earth. Therefore, it would not be correct to say that only poor people are responsible for the damage to the environment, although they are given more blame. This means that if the economic condition of the poorest people improves, then the protection of the environment will be helped. It has been realized that proper environmental management can actually contribute to the growth rate.

5. Rural Development and Environment:

In order to meet the increasing dietary needs of the rapidly growing population in poor countries, it has been estimated that the production of food items in these countries should be doubled.

Considering the enormous pressure on land use in these countries, doubling the production of food items is a very difficult task. For this there is a need for fundamental changes in attitudes, policies, experiments and the amount of resources available to the agricultural sector.

6. Urban Development and Environment:

Due to the rapid growth of population, there has been a division of population on rural and urban basis as poor people migrated from villages and settled in cities in search of jobs and better living conditions. This has led to an unprecedented increase in the population of the cities. The environmental ills arising out of it compel the growing population of people to face extreme health risks. Such conditions disturb the existing urban infrastructure and create conditions that give rise to epidemics and national health crises. These situations are further aggravated by the fact that most of the urban houses are illegal under the present law and order. This makes private domestic investment risky and renders a large section of the urban population unfit for government services.

Congestion, fumes from vehicles and industries, and homes with low light and air further add to the environmental costs of the urban population. Loss of productivity of sick workers, contamination of existing water resources, destruction of infrastructure and in addition fuel expenditure on boiling water for daily use are some of the socio-economic costs that poor countries have to bear.

7. Global Environment:

Universal environmental degradation will worsen as the world population and income increase. Instead of panicking completely, cooperation of all countries should be obtained in universal environmental efforts so that this problem can be faced and this world can become a better place for life. Success in future will depend on the ability of these efforts while poor The country is facing economic difficulties.

Conclusion

Now the time has come for us to understand this warning of natural calamities. Man has to develop in such a way that the environment is not harmed. It is difficult but not impossible at all. To keep the environment away from the toxic gases of the factory tomorrow, man should make it away from the cities, in such a place where people do not have to face its serious consequences. Keep animals safe. The waste from factories should not pollute the water of the cities. People must do tree plantation. It is necessary to spread its awareness among the people at all times. Nuclear power should be banned.

Industrialization has become the priority and necessity of human life. It is difficult to control this. If man establishes harmony between the environment and his development, then the balance of the environment will be maintained. It is necessary for man to protect nature and animals along with reducing pollution. Along with development, necessary and useful steps have to be taken for the protection of nature. Only then we will be able to create a beautiful nature and environment. Now the whole human race is worried about this pathetic condition of

the environment. Now people are forming such societies which can stop the crisis of this environment and save this earth. The greater concern about environmental issues stems from the realization that we have reached the limit of the number of people whose needs can be met by the earth's limited resources.

This may or may not be possible in the presence of potential of new technological innovations but it is clear that present and future generations will face difficulty in meeting their needs while walking on the path of rapid environmental degradation. Therefore, only slowing down the rate of population growth will reduce environmental problems, but for this, national governments will have to create such economic and institutional conditions which are helpful in this work. Due to the rapidly increasing population of third world countries, there has been a shortage of land, water and wood for fuel in rural areas and urban health crisis has arisen due to lack of sanitation and clean water. Therefore, if we continue to increase environmental degradation, it will severely damage the ability to meet the needs of present and future generations. Therefore, it is necessary to formulate an appropriate population policy aimed at reducing the birth rate as it will reduce the intensity of many environmental problems. In many poor countries, the increasing density of population has severely destroyed the very means on which their population depends for life. This process has to be stopped in order to increase the productivity of the existing resources, which will benefit more people, especially the poor.

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THE DEVELOPMENT OF NEW CONCEPTS RELATED TO ENVIRONMENTAL PROTECTION OF INDIA IN COMMERCE

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ABSTRACT

In the last few years, many new schemes have been started by the government to develop in India, due to which the environment is becoming more and more polluted. This is followed by Environmental Impact Assessment (EIA) to estimate the impact of development projects and proposed activities/projects on the environment by the government to preserve the environment around us A framework has been prepared as a study. That is, through Environmental Impact Assessment (EIA), the impacts of various projects, land use, forest protection, industrial pollution, etc. on the environment are fully studied. Now EIA has been made necessary for many projects. Environmental clearance is granted to them only if they fulfill the conditions of EIA and clearance is granted by the Ministry of Environment, Government of India. With time, new concepts related to the environmental protection of India have evolved in commerce. This research paper has been written to study the development of new concepts related to the environmental protection of India in commerce.

Keywords:*Environmental Impact Assessment, Green Audit, Energy Management, Green Marketing*

Introduction

The increasing population, development of new technologies, new projects, and economic development in the world have given continuous encouragement to the exploitation of nature. The problem of environmental degradation has become a major challenge facing the whole world today. Which is faced by the governments and by making people aware. As we become increasingly careless about protecting the environment, Environmental Impact Assessment (EIA) is a tool available to planners to harmonize development activities with environmental concerns to achieve development goals. Environmental Impact Assessment Environmental Impact Assessment is mainly called an important regulation, through which the effects of various projects, land use, forest protection, industrial pollution, etc. on the environment are studied thoroughly. That is, Environmental Impact Assessment (EIA) is defined as a tool used to identify the environmental, social, and economic impacts of a project before making a decision. Overall, we can say that "Environmental Impact Assessment" or EIA can be defined as a study to predict the impact of a proposed activity/project on the environment.

Green audits are a way to show businesses what kind of carbon footprint they are leaving on the earth, while also giving them ways to reduce it. Green audits include inspections of a company to assess its activities or the total environmental impact of a particular product or process. For example, a green audit of a manufactured product looks at the impact of production, including energy use, the extraction of raw materials used in manufacturing, the use of raw materials that may cause pollution, and other hazards. , and waste disposal, potential recycling, etc. Green audits are tools that organizations use to identify their environmental impacts and assess compliance with applicable laws and regulations, as well as the expectations of their various stakeholders. It also serves as a means of identifying opportunities to save money, increase the quality of work, improve employee health, safety and morale, reduce liabilities and achieve other business values.

Energy management is the art and science of using energy optimally to maximize profits (minimize costs) and thereby improve economic competitiveness. Energy must be used efficiently, economically, and optimally. Energy management can also be defined as the science that involves planning, directing, controlling, and controlling the supply and

consumption of energy to maximize productivity and comfort, with judicious and effective use of energy costs and including reducing pollution. Energy management includes strategy, policy, organizational change, energy audit, energy conservation measures, administrative actions, training and awareness programs, monitoring of energy conservation, etc. Energy management is an important management function of every organization (such as production, finance, marketing, planning, and design). The energy organization must have a written energy management policy document and the top management must be committed to implementing the energy policy. Energy objectives should be known to the energy executive and supervisor. Energy must be monitored at production.

An energy audit is the authoritative scientific study of energy consumption of an organization/process/plant/equipment to reduce energy consumption and energy cost without affecting productivity and comfort and to suggest ways of energy saving and energy cost reduction. An energy audit is carried out by every energy-intensive organization/plant management in a planned, authoritative manner.

An environmental audit is a type of assessment with related corrective actions to identify environmental compliance and management system implementation gaps. Environmental auditing may involve evaluating performance in three primary areas of environmental concern: responsibility, management, and activity. An activity or functional audit may focus on issues such as waste management or energy consumption. A management audit compares performance with established objectives as stated in the organization's Environmental Management Strategy (EMS). Financial audits related to compliance with corporate EMS can measure the financial impact of energy savings, improved efficiency, and avoidance of fines and penalties for environmental violations. An EMS is a formal organizational structure established in a company primarily for environmental protection. A typical EMS will include a description of the organization's position toward environmental issues. In addition, the EMS will identify the planning, implementation, and documentation of activities related to the EMS Statement. Suggestions for improving EMS performance are often made through an environmental audit.

The Development of New Concepts Related to Environmental Protection of India in Commerce:

Given the concept of environmental protection, environmental impact assessment is of great importance. Through this process, the potential impact of a project such as mining, irrigation dam, industrial unit or waste treatment plant, etc. is estimated scientifically and the use of scientific measures and the work of providing suggestions to reduce any environmental crisis. is done. It provides a cost-effective means to eliminate or reduce the adverse impact of development-related projects. Environmental impact assessment ensures that any development plan is environmentally sound and sound or not. Is it within the limits of the ecosystem's ability to regenerate? Meaning, that its importance is also more because it is such a decision-making tool through which it can be decided whether a project should be approved or not. One special thing is that under this process, for giving final approval to any development project or activity, the opinion of the general public being affected by that project is also taken into account. That is, EIA takes the advice of the public before taking any decision.

After signing the Stockholm Convention on Environment in **1972**, India enacted appropriate laws to control water (**1974)** and air (**1981)** pollution. Thousands of people died in the Bhopal gas tragedy in **1984.** Given this incident, the country enacted an Umbrella Act for environmental protection in the year **1986.** The first Environmental Impact Assessment (EIA) norms were first notified in the year **1994** under the Environment (Protection) Act, **1986.** Through this notification, a legal framework was established to regulate activities related to access to natural resources, their use, their impact, and activities to control pollution. Every development project through the EIA is required to go through the EIA

process to obtain environmental clearance in advance. The Environmental Impact Assessment (EIA) of **1994** was replaced with a revised draft in **2006.**

According to the government, the draft Environmental Impact Assessment- 2020 has been proposed primarily to make the processes more transparent, but this draft is seen to exclude many activities from the scope of public consultation. proposes. Several projects have been exempted from public scrutiny, categorized into 'A', 'B1', and 'B2' categories. Under this draft, all projects and activities have been divided into three categories- 'A', 'B1', and 'B2' based on social and economic impact and the geographical extent of those impacts. Several projects such as all B2 projects, irrigation, chemical fertilizers, acid manufacturing, bio-medical waste treatment facilities, building construction and field development, elevated roads and flyovers, highways or expressways etc. have been exempted from public consultation. Apart from this, the time allotted for the public hearings has been cut. Public participation is also one of the major steps in the Environmental Impact Assessment Mechanism. In the draft released in the year 2020, it has been proposed to reduce the notice period for a public hearing from 30 days to 20 days. Compliance is necessary after approval. This means that once the project is approved, the proposed projects are required to follow certain rules set out in the EIA report to ensure that no further environmental damage occurs. Along with this, the firms which are violating the conditions of their establishment and if they have to get approval will have to pay a fine. A project which is already in operation before environmental clearance can be regularized. He may be allowed to apply for sanction.

Green Audit This concept has got its origin in recent times and suddenly gained acceleration due to heavy industrial traffic which ends up resulting in unexplained emissions. Due to the increase in population, the needs have increased. The needs of human beings can be fulfilled only by setting up industries. In India, based on frequency, such audits are of two types: Concurrent / Cyclic audits and Single Special Purpose audits. Concurrent/Cyclic Audit This is primarily done by the entity's environmental unit segment/outside consultants or a combination of the two over a defined cycle of events. Single Special Purpose Audit This is for a specific purpose and is normally conducted by external agencies. This type of audit is not done regularly. This is usually done in response to a specific need.

Based on the objectives in India, such audits are classified as risk assessments. Compliance Audit This is the review level of compliance with relevant environmental and safety standards. Performance Audit This program examines the environmental impact of EMS, compliance with environmental laws, etc. Transaction audit It assesses the environmental risks and liabilities of the land/facilities before the acquisition of real estate or the division of the business. This is important because both buyers and sellers want to know the extent of any liabilities due to environmental pollution. Product/Activity Audit This is to determine requirements for making specific products/processes and their distribution environmentally friendly and to confirm that those products are meeting chemical and chemical restrictions.

Issue audit assesses corporate performance in a particular sector (eg the impact on oil and natural gas corporation's habitat). Risk audit considers occupational health and safety/risks to employees and the public. Energy and Waste Audit in India evaluates the use of energy with alternative sources and tracks the causes, risks, etc. of waste. Process and security audit assesses whether policies, procedures, monitoring, evaluation, documentation, etc. are in place. It also considers the potential hazards and risks arising from the procedures. The quality audit examines Total Quality Management (TQM) from an environmental point of view. EMS audit in India checks whether a given facility meets EMS standards (ie, 14001, EMAS). Baseline Audit / Future Scenario Assessment It helps to identify potential environmental problems and seeks to assess the likelihood/intensity of the organization's ability to respond to new challenges.

Environmental audits are conducted in India by the Comptroller and Auditor General. The

International Organization for Apex Auditing Institute (INTOSAI) has provided a framework for environmental auditing. Environmental auditing is not significantly different from general auditing as is the practice of apex audit institutions (SAI). The environmental audit covers all types of audits, viz., financial compliance and performance audit. The three 'E' of economy, effectiveness and efficiency can be included in performance audits. The fourth 'E' i.e., adoption of the environment depends upon the mandate of SAI and the environmental policy of the Government which is desirable but not critical in conducting the environmental audit. The concept of sustainable development can be part of the definition of environmental audit only if it is part of government policy and/or a program to be audited. According to INTOSIAN, the source of the performance audit is as follows.

The main objective of an audit of government monitoring compliance with environmental laws is to provide an idea of the performance of the audited entity concerning compliance with environmental laws already established. Audit of performance of Government environmental programs the main objective is to provide an idea of the performance of specific environmental programs/projects/policies already formulated and being implemented by the Government. The main objective of the environmental impact audit of other government programs is to present an idea on the environmental impact of other programs/projects formulated and implemented by Ministries/Departments/agencies other than the Ministry/Department of Environment. For example, the audit of the impact of mining, road construction, army, etc. on the environment comes under this category. The main objective of the Environmental Management Systems audit is to provide an idea of the audit entity's implementation of Environmental Management Systems (EMS) and/or ISO 14001 standards. Evaluation of environmental policies and programs the main objective of such an audit is to provide an idea of the adequacy or deficiency of the policy framework governing environmental matters. International best practices can form the basis for such comparisons. However, before making such comparisons, the adaptability to local conditions should be considered. In India, environmental audit is conducted at the central level by the Office of the Principal Director of Audit (Scientific Department) and the state level by the State Accountants General (Audit) under the broad framework of compliance audit and performance audit.

India wants to take the members of the United Nations on the platform of the International Solar Alliance so that the attention of all countries can be focused on renewable energy sources to meet their energy needs. As per the Paris Agreement on Climate Change, taking into account our nationally determined contributions and our responsibility toward a cleaner planet, India has resolved that by 2030, 40 percent of our installed electricity generation capacity will be based on clean sources of energy. It has also been stipulated that 175 GW of renewable energy capacity will be installed by 2023. This includes 100 GW from solar power, 60 GW from wind power, 10 GW from bio-power, and 5 GW from small hydropower projects. At present, thermal power accounts for 63.84 percent, nuclear power 1.95 percent, hydropower 13.09 percent, and renewable energy 21.12 percent of the country's total installed capacity in 2018. At the same time, India ranks fifth in the world in terms of total installed renewable energy capacity and solar power and fourth in wind power. To achieve all these set goals, the government is taking many commendable steps, which also becomes important to discuss.

To promote energy conservation, the government has prepared a plan for all industrial, commercial, educational, and private institutions to get their energy audit done. Under this scheme, a grant of up to 50 percent of the cost of conducting an energy audit of all institutions is given. This grant amount will be up to Rs 50,000. Institutions who are willing to get the energy audit of their buildings done, can fill their application in the prescribed format and submit it to the ADC office. An energy audit can be done after the approval of the Renewable Energy Department, Haryana. Half of the grant amount is made available

after the submission of the energy audit report. The remaining amount is given after the institute implements the recommendations of the Energy Audit Report.

India's green industry finds it difficult to hold onto the market because of consumer understanding and preference. Consumers may want to buy durable products, but they tend to buy goods that are made using a more polluting process. There are several reasons behind this: Consumers restrain themselves from the high cost of environmentally sustainable products; There is a lack of creating a conducive environment for better access to green products; Overall lack of information about available green products and their benefits; And there is a lack of trust in companies that they describe as 'green'. This is the reason that green marketing has not developed that much in India.

Conclusion

If India succeeds in creating low energy-consuming 'timber' infrastructure, then this infrastructure can prove to be helpful in successfully building inclusive, green, healthy, safe, and sound cities in India going forward. It cannot be denied that the ever-increasing pollution has given rise to many diseases. Therefore, for its prevention, there has been talking about reducing carbon emissions and preventing the effects of climate change. In such a situation, we have to emphasize the research of alternative fuels. In this, methanol, hydrogen-based fuels, jatropha oil, and shale gas can play an important role. Additionally, policymakers and governments around the world, as well as citizens, must achieve energy goals by keeping in mind the protection of the environment and resources on Earth. Developing a better information management system in India can help in reducing maturity disparity, high cost of borrowing and cost of borrowing at different stages, and efficient allocation of resources.

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(ENVIRONMENTAL IMPACT ON PLANT AND ECOSYSTEM)

ENVIRONMENT IMPACT AND ROLE OF SECONDARY METABOLITES IN PLANTS

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ABSTRACT

Change is a law of nature, due to the continuous change in the environmental parameters it is very difficult to plants to adopt the changing environmental conditions and survive. Due to this many plant species are going to be rare and endangered. Due to human population explosion, urbanization, industrialization the environment is polluted which directly or indirectly impact on the ecosystem and growth of certain plant species. Plants are the basic source of secondary metabolites which plays important role for survival to the plant with the changing environmental conditions. Now a day's the secondary metabolites which are derived from plants are extensively used in modern medicines in the world since they carry out a number of protective functions like boost of immune system, protect the body from free radicals, cardiovascular diseases, controlling microbial infectious diseases of humans and other domesticated animals etc. Cyanide exists various forms in nature as a salts of Sodium, Potassium and Calcium beside these, hydrogen cyanide or hydrocyanic acid or prussic acid is produced by number of plants of the World flora. In plants Cyanogenesis is a own defense mechanism to protect themselves from microbies as well as from herbivore. Amygdalin, Dhurrin, Prunasin Linamarin , Lotaustaralin Cardoispermin etc. are the cyanogenic glycosides present in plants.On hydrolysis these glycosides release hydrogen cyanide. Many Agriculturally and Horticulturally important plants known to contain quite a good amount of hydrocyanic acid in them.Cassava (Manihot esculenta Crentz. -Euphorbiaceae) and ii) Sorghum (Sorghum vulgare Pers. - Poaceae) are the staple food of millions of people in the World. Cassava root is an staple food of Australian and African Countries. Consumption of insufficiently processed cassava roots implicated neurotoxic effects which is a havock in African Countries .In the present paper the role of HCN (Hydrogen Cyanide) a secondary metabolites which plays very important role in the own defense mechanism of plants is discussed.

Keywords:*Secondary Metabolites, plant defense mechanism, microbial infection. Hydrogen cyanide*

Introduction

Hydrocyanic acid or Hydrogen Cyanide **(HCN)** or better known as prussic acid is produced by number of plants of the World flora. At least 2700 species of higher plants have been shown to contain one or more nearly thirty-two compounds capable of producing hydrogen cyanide (HCN) or prussic acid from amino acids **(Seigler 1976,Moller and Seigler 1999, Jones 1998)**. Cyanogenesis is a bio-chemical defence mechanism in plants to protect themselves from microbes as well as from herbivore. Amygdalin, Dhurrin,Prunasin Linamarin , Lotaustaralin Cardoispermin etc. are the cyanogenic glycosides present in cyanogenic plants. After hydrolysis these glycosides release hydrogen cyanide . In the first step, with the help β-glycosidase enzymethe cyanogenic glycoside present in some of the plants can be converted into sugar and an algycone . In the next step with the help of another enzyme this algycone is changed to aldehyde or ketone along with release of hydrocyanic acid.

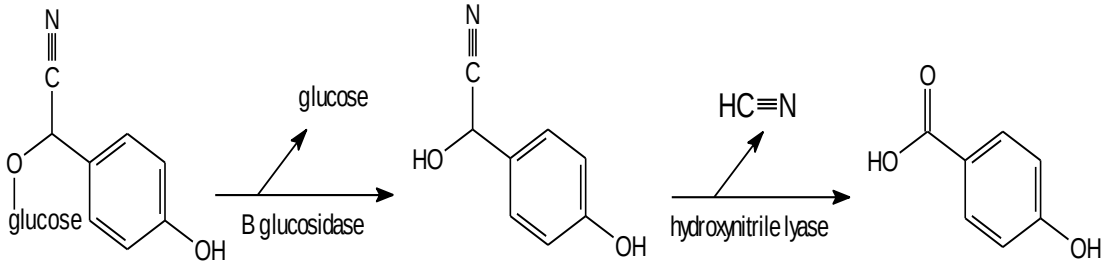

Fig-1 - Process of Cyanogenesis in Plants

Poisoning of prussic acid can be dangerous to the animals that eat cyanogenic plants but also to the plants themselves, to prevent this self poisoning the plants store cyanogenic glycosides in a vacuole of the cell and the enzyme that act to produce hydrogen cyanide in a separate compartment , when a cell is damaged the compartments walls are broken and the reaction takes place and HCN is released.

Many Agriculturally and Horticulturally important plants known to contain quite a good amount of hydrocyanic acid in them.The Grazing animals when they consume the cyanogenic plants, they suffer from the cyanide poisoning.The cyanide-poisoned animals shows an increased rate of respiration, increased pulse rate, gasping, muscular twitching or nervousness, trembling, foam from the mouth, blue colouration of the lining of the mouth and spasms or convulsions, death occurs from respiratory paralysis. Often blood passes from the nostrils and from the mouth near the time of death.

During growth to protect themselves from microbes as well as from herbivore, number of plants of the World flora produces secondary metabolites which plays important role in own defense mechanism. In modern days the traditional system of medicine have global importance where the phytochemicals play a major role in the adaption of plant to their natural environment and represent an important source of pharmaceuticals. **(Ramchandra and Ravishankar 2002)**. In traditional Chinese medicine system, the leaves and flowers of *Nerium indicum* L. have been used to stimulate cardiac muscles and relief pain **(Jangsu 1985)**. Two anticancer drugs etoposide and teniposide are synthesized from *Podophyllum hexaandrum* T.S. Ying and *Podophyllum pettatum* L. Digoxin an important drug for the treatment of cardiac diseases is synthesized by *Digitalis lanata* Earth. (**Martina et al. 1992**).

The specific survey of cyanogenic plants in angiospermic families and genera was thought to be significant from the taxonomic point of view**(Satish Patel et.al.)**as the chemical variation exhibited by the plants, like any other facts of diversity, is therotically a source of character useful in taxonomy **(Smith 1978)**. In fact, in earlier days HCN production by plants was considered as an important chemotaxonomic character **(Gibbs 1974,Hegauner 1958, 1959 a, 1961a)**. Cyanogenic glycosides are common in certain families such as Family - Fabaceae, Rosaceae, Leguminosae, Linaceae and Compositae and identification of their constituents is a useful tool for informative taxonomic markers. **(Vetter J. 2000)**.

Materials and Methods:

For experiment some plants are collected from different season and Identified by using the Flora of Maharashtra and Flora of Marathwada (Almeda (2000); V..N. Naik 1998) and tested for presence of HCN by simple sodium picrate paper test.

The leaf \ fruit \ seed extract suspected for the presence of cyanogenic compounds were taken in 0.2M. phosphate buffer pH 7 and centrifuged at 2000 RPM. The supernatant liquid was placed in a test tube.The strip of whatman filter paper No. 1, 5cm x 2cm was soaked in sodium picrate solution and dried, and it was hanged in the test tube containing the extract. The color of the picrate paper was observed, if the color changed from yellow to reddish brown, it confirmed the presence of prussic acid and the test was positive. If the test is negative, the tube should be left at room temperature for further 24 – 48 hours and then re-examined for any non- enzymatic release of hydrocyanic acid. A strip of yellow picrate paper is inserted and vial is capped. The vial is left for 16-24 hours at 25^{o}C to 35^{o}C. The color is matched against a color chart sheds **(Bradbury et al. 1999)** and the result is summarized in the table No.- 1.

Table No. - 1
List of Cyanogenic Plants with Family and Local Name

Sr. No.	Name of the plant	Family	Local Name
1	*Abrus precatorius* L.	Fabaceae	Gunj
2	*Acacia leucophloea* (Roxb.) Willd..	Mimosaceae	Hiwar
3	*Acacia nilotica* (L.) Willd. ex Del. sp indica (Benth.) Brenan	Mimosaceae	Babhul
4	*Agave americana* (L.) Kektad	Agavaceae	Ghyapat
5	*Albizia lebbeck* (L.) Willd	Mimosaceae	Shirish
6	*Aloe vera* (L.) Burm.f.	Liliaceae	Korpnad
7	*Alstonia scholaris* (L.) R.Br.	Apocynaceae	Saptaparni
8	*Annona reticulata* L.	Annonaceae	Ramphal
9	*Annona squamosa* L.	Annonaceae	Sitaphal
10	*Argemone mexicana* L.	Papaveraceae	Piwla dhotra
11	*Bauhinia racemosa* Lamk.	Caesalpinaceae	Apta
12	*Biophytum sensitivum* (L.) DC.	Oxalidaceae	Lajalu
13	*Butea monosperma* Lamk.Taub.	Fabaceae	Palas
14	*Calotropis gigantea* (L.) R.Br.	Asclepiadaceae	Rui
15	*Canna indica* L.	Cannaceae	Kardali
16	*Cassia tora* L.	Caesalpiniaceae	Tarota
17	*Datura metal* L.	Solanaceae	Kala Dhotra
18	*Datura stramonium* L.	Solanaceae	Dhatura
19	*Passiflora edulis* Sims.	Passifloraceae	Krishnakamal
20	*Physalis pubescens* L.	Solanaceae	Popti
21	*Plumeria alba* L.	Apocynaceae	Pandhara chafa
22	*Polyaltha longifolia* (sonner.) Thw.	Annonaceae	Ashok
23	*Pongamia pinnata* (L.) Pierre.	Fabaceae	Karanj
24	*Ricinus communis* L.	Euphorbiaceae	Aerand
25	*Semicarpus anacardium* L.f.	Ancardiaceae	Bibba
26	*Solanum sisymbrifolium* Lamk.	Solanaceae	------
27	*Solanum torvum* Sw.	Solonaceae	------

Results and Discussion

In humans the low levels of exposer to cyanide is well tolerated, but the higher levels are fatal within few minutes. The lowest reported oral lethal dose for humans is 0.54 mg \ kg body weight. The human body can detoxify 100 mg. of cynide per 24 hours via conversion to thiocyanate **(Ansell and Lewis 1970, Bradbury and Hollway 1988).** Now a days in eastern South and Central Africa due to the prolonged consumption of cyanogenic glycoside (Linamarin) from cassava product (flour), there is a disease called as Knozo which causes irreversible paralysis of legs .The

study is important to understand the tolerance of plant to the particular environmental condition, attack of microbes and herbivores, toxicity of plants and their mechanism to cure the different types of diseases.

Photo Plate No.-1 -Knozo
(Irreversible Paralysis of Legs Due to the insufficiently processed cassava roots implicated the Neurotoxic effects which is a Hawak in African Countries)

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IMPACT OF CLIMATE CHANGE ON AGRICULTURE: IN VIEW OF INDIA

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ABSTRACT

The present reviewed paper focused on the climate change on agriculture. Indian economy is known as Agriculture economy so to know the impact of climate change on Agriculture in India. The studied material revealed that the climate change directly and indirectly influences on the total production of Agriculture which is serious issue. It is recommended that at global level approach towards minimizing affect to atmospheric surrounding of Mother Earth and is also a personnel step ahead to adopt eco friendly practices to ensure healthy environment to future generation.

Keywords:*Climate, change, impact, agriculture, India.*

Introduction

Earth is known as 'Green planet' which makes special among another planet. The earth is blessed with forest, sea, river, soil, living creature etc. Among living creature human which is depended on environment as the progress of science is going on the dependency is also decreases and in the progressing of development humans are going against environment and try to control on it which gives worsen impact which we experienced as global warming, climate change.

Climate is a particularly important driver of food system performance at the farm end of the food chain, affecting the quantities and types of food produced and the adequacy ofproduction-related income. Over decade experienced of heavy rainfall,drought condition, cyclone, tsunami, earthquake occurred due to change in climate.According to IPCC AR5 SYR Glossary 2014, "Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use."Climate change has both direct and indirect impacts on agricultural production systems. Direct impacts include effects caused by a modification of physical characteristics such as temperature levels and rainfall distribution on specific agricultural production systems. Indirect effects are those that affect production through changes on other species such as pollinators, pests, disease vectors and invasive species. These indirect effects can play a major role which are still unknown(FAO 2015).

Agriculture is important for food security in two ways: it produces the foodpeople eat and perhaps even more important.It provides the primary source of livelihood Agriculture, forestry and fisheries are all sensitive to climate. Their production processes are therefore likely to be affected to climate change this will be ultimately affected on food production which also affected food security (Raj Patel, 2013) To know the impact of climate change on Agriculture this review study was undertaken with the help of published research paper.

Methodology

To know the impact of climate change on food securitypublished reports of FAO and related allied authorised government and governmental agencies reports, published research articles were undertaken for study.

Results and Discussion

Climate played crucial role in Agriculture production according to Shivani etal,2020 Weather condition is altered by Climate change which has direct, indirect and biophysical effect on agricultural production. Climate change might have positive or negative impact on human population and crop production.Increase in temperature and reduction in rainfall adversely affects unirrigated areas compare to irrigated areas. Increased or reduced rainfall has impaired the soil fertility and productivity. Rainfall over India is likely to increase by 15- 40%, by the 21st century end. Such changeswill impact agricultural activities and will increase the pressure on Indian agriculture. It can disrupt food availability, affect nutritional quality of some foods and reduced access to food. However, the arid-semi-arid tropics are most vulnerable to climate change. Marginal effect of temperature, kharif as well as rabi is negative, but more pronounced in the kharif season. A 1°C increase in the kharif temperature reduces the gross value of output by 9.2 per cent. The damages due to temperature are partially offset by irrigation. The effect of kharif rainfall is positive and significant in all the zones (Birthal ,2014)

Recent studies done at the Indian Agricultural Research Institute also indicate the possibility of loss of 4 – 5 million tons in wheat production in future with every rise of 1oC temperature throughout the growing period. Rice production is slated to decrease by almost a tonne/hectare if the temperature goes up by 2 o C. In Rajasthan, a 2oC rise in temperature was estimated to reduce production of Pearl Millet by 10-15%. If maximum and minimum temperature rises by 3^{o}C and 3.5 ^{o}C respectively, then Soyabean yields in M.P will decline by 5% compared to 1998. Agriculture will be worst affected in the coastal regions of Gujarat and Maharashtra, as fertile areas are vulnerable to inundation and salinisation(Anupama Mahato,2014).

According to DST report (2016) Climate change can affect agriculture through their direct and indirect effects on the crops, soils, livestock and pests. Increase in atmospheric carbon dioxide has a fertilization effect on crops with C3 photosynthetic pathway and thus promotes their growth and productivity. Increase in temperature can reduce crop duration, increase crop respiration rates, alter photosynthesis process, affect the survival and distributions of pest populations and thus developing new equilibrium between crops and pests, hastens nutrient mineralization in soils, decrease fertilizer use efficiencies, and increase in evapo-transpiration.

Climate change also have considerable indirect effect on agricultural land use in India due to availability of irrigation water, frequency and intensity of inter- and intra-seasonal droughts and floods, soil organic matter transformations, soil erosion, changes in pest profiles, decline in arable areas due to submergence of coastal land, and availability of energy.

Ensuring food for the world's population in the face of climate change is not an easy task, owing to its huge impact on agriculture production. There must be an annual increase in the world's agricultural production by 60% from 2005/2007 to 2050, comprising a rise of 77% in developing and 24% in developed countries, to full fill the food and nutritional requirements of the population by 2050. Climate change is known to have an adverse effect on agricultural production, and is projected to reduce the global cereal production of maize and wheat by 3.8% and 5.5%, respectively. Because of climatic factors, plants have to face several abiotic stresses such as salinity, drought, heat stress, cold stress, etc.. Shortage of water availability, soil fertility loss, and pest infestations in crops are the significant undesirable impacts of climate change.

These studies revealed that on climate change affects agriculture production which is serious issue. According toDr.Venkateshwarlu, former director CRIDA, Hyderabadclimate change has about 4-9 per cent impact on agriculture each year. As agriculture contributes 15 per cent to India's GDP, climate change presumably causes about 1.5 per cent loss in GDP.Thus,Agriculture production play major role in economy of any Country but when there is decline in agriculture production economy of Country may be disturbed because Agriculture sector not only provides foods but also

provides employment and is basic unit of many industries.

Conclusion

The change in climate is directly or indirectly linked with the production of Agriculture which also affect food system because agriculture production is totally depends on climate. It is recommended that at global level approach towards minimizing affect to atmospheric surrounding of Mother Earth and is a also personnel step ahead to adopt ecofriendly practices to ensure healthy environment to future generation.

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PRELIMINARY PHYTOCHEMICAL ANALYSIS OF LEAVES OF THE PLANT MURRAYA KOENIGII FOUND IN LOCAL AREA OF KARANJA (LAD)

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ABSTRACT

Murraya koenigii is commonly known as curry leaf plant. It isalso known in Ayurveda medicine for its variety of pharmacological activities like anticancer activity, antioxidant activity, anti-inflammatory activity, anthelminticactivity, antidiabetic and antimicrobial activity. In the present study we have done the phytochemical screening of its leaves for glycoside,flavonoids, tannin, alkaloid,phenols, terpenoids and steroids and in the prepared hydroalcoholicextracts using Soxhlet extraction method.

Keywords:*Phytochemical Screening, Murraya Koenigii plant.*

Introduction

Murrayakoenigii, commonly knownas curry leaf or karipatta in Indian dialects, belongs to Family Rutaceae which represents more than150genera and 1600 species [1].The plant kingdom is a treasure of potential phytochemicals used in the herbal medicine system. Recently the world is turning towards the most renowned and traditional herbal medicine system i.e. *'Ayurved'* because it doesn't have hazardous side effects on human health. When World Health Organization recognized plant and natural products-based medicinal systems as an alternative and complementary therapy in the year 2002 the use of Plants and its active phytochemical components as medicine get triggered [2]. The use of natural products mainly medicinal plants for human healthcare is well documented in India from the *Vedic* period in 'Charak Samhita'[3].

The traditional system of medicine in eastern Asia mentions important uses of this plant i.e. curry leaf tree. Leaves of Murrya koenigii constitute an important ingredient in the Indian diet to improve appetite and digestion. Some studies indicate that the aqueous extracts of Murrya koenigii leaf confer significant protection to rat cardiac tissue against cadmium-induced oxidative stress probably due to its antioxidant activity. The alterations seen in the levels of lipid peroxidation, reduced glutathione, protein carbonyl content, and changes in the activities of cardiac antioxidant and pro-oxidant enzymes, indicate that cadmium-induced tissue damage was the result of oxidative stress. This antioxidant activity of Murrya koenigii could be beneficial to people who are exposed to cadmium either environmentally or occupationally [4].

Amongst the green leafy vegetable, the total antioxidant activity was the highest in Murrya koenigii as compared to that of methanol extracts of Amaranthus sp., Centella Asiatica, and Trigonella foenum graecum [5]. Murrya koenigii is being used as a stimulant, anti-dysenteric, and for the management of diabetes mellitus. The leaves root and bark possess tonic, stomachic and carminative properties. Antiemetic property too is seen in the leaves. Purgative properties have been demonstrated in the stem distillate of the leaves. External applications of the leaves have been beneficial in bruises, eruption, and treating bites of poisonous animals. The branches of Murrya koenigii are used to strengthen gums, popularly used to clean teeth as datum [6].

The methanolic extracts of Murraya koenigii (L.) leaves had been found to possess analgesic and anti inflammatory activity in acute inflammation in dose dependent manner when experimented on male albino rats [7].

The chloroform extract of the leaves of Murraya koenigii (L.) Spreng.had been found to exhibit hypoglycemic effect of the alloxan

induced diabetes in the rats, which had been due to the protective effects such as preservation of pancreatic cell integrity and showing a decreased oxidative stress in rats [8]. The ethanolic extract of the leaves had been also found to exhibit decreased blood sugar levels in dose dependent manner which also showed a decrease in depression levels in diabetic patients [9]. The ethanolic extract and the nano-particles found in Murraya koenigii (L.) Spreng.leaves also showed reduced blood glucose levels in rats [10].

In the present study we have studied phytochemical screening of Murraya Koenigii leaf for which we prepare extract using Soxhlet method. Then performed phytochemical test on curry leaves extract from ethanolic solvent.

Methods and Materials

The plant leaf extract was prepared by using 25 gm of fresh leaves collected from the local areas. Fresh leaves were washed extensively with water followed by final wash twice thrice with distilled water to remove all the dust and unwanted visible particle. The leaves were cut in to small pieces and then shade driedfor 2-3 days. Leaves were homogenized to a fine coarse powder using mortar and pestle and then stored in fine air tight container for further process.

Preparation of Plant Extract

In round bottle flask add 150 ml of solvent (ethanol) and few porcelain pieces in to avoid bumping fix the round bottom flask in heatingmantle. Make cone leaf powder in it and seal the cone put in to thimble of socketapparatus and connect to condenser which inlet connect to tap switch on the heatingmantle and it about 3 hour. After heating gently remove solvent from sample by evaporation extract remains in round bottom flask used for phytochemical test.

Phytochemical Analysis

Phytochemical analysis were carried outusing standard methods [10-13].

1) **Test for Ketone :**

i. **Resorcinol test:**
Procedure: 2 ml extract + few crystals of resorcinol + equal volume of Conc.HCl + Heating.
Observation: rose colour.

ii. **Seliwanoff's test:**
Procedure: 1ml extract solution + 3 ml Seliwanoff reagent + heated on water bath for 1 min.

Observation: A Red rose colour

2) **Xanthoproteic test:**
Procedure: Plant extract + few drops of Con nitric acid. A yellow Colored Solution.
Observation: Yellow colored solution.

3) **Salkowski's Test (Detection of Phytosteols):**
Procedure: plant extract with chloroform + few drops of Conc. H2SO4, (Shake welland allowed to Stand).

Observation: Formation of Brown Color ring.

4) **Salkowski's Test (Detection of Terpinoids):**
Procedure :Plant extract+Chloroform + few drops of Conc. H2SO4, Shake well and allowed to Stand.
Observation: Reddish brown coloration (at bottom).

5) **Test for Alkaloids:**

i. **Wagner's Test:**
Procedure: 1 ml Plant extract + 2ml Wagner's reagent (Solution of Iodine in Potassium Iodide)
Observation : Brown colored ppt. is formed

ii. **Mayer's test:**
Procedure: 1 ml plant extract with dil HCL +1-2 drops of mayer's reagent (Potassium mercuri iodide solution) Along the side of test tube.
Observation: yellow precipitate formed

6) **Test for Flavonoids:**

i. **NaOH test:**
Procedure:Plant extract + dissolved in 1ml of water + few drops of aqueous NaOH solution.
Observation : A yellow colour

ii. **Conc. H_2SO_4 test :**
Procedure: Plant extract + Conc. H_2SO_4
Observation: An Yellow coloration

iii. **Alkaline reagent test:**
Procedure: 1ml plant extract + 10% ammonium hydroxide solution.
Observation: A yellow colour.

7) Lead acetate test for Phenol:

Procedure: Plant extract is dissolved in 5 ml of distilled water + 3 ml of 10% lead acetate solution

Observation: A White ppt is formed

8) Test for Quinones:

Procedure: 1ml plant extract + few ml alcoholic potassium hydroxide.

Observation: Red to blue colour.

9) HCL Test (Detection of Anthocyanins):

Procedure : 2ml plant extract + 2ml HCL (Few ml ammonia)

Observation : pink-red solution. which turns blue-voilet after addition of ammonia

Result and Discussion

The results for the phytochemical analysis of Murraya Koenigii plant was shown in Table no.1

Sr. No.	Test		Inference
1.	Test for Ketone	Resorcinol test	+ve
		Seliwanoff's test	+ve
2.	Test for Proteins	Xanthoproteic test	+ve
3.	Test for Phytosteols	Salkowski's Test	+ve
4.	Test for Terpinoids	Salkowski's Test	+ve
5.	Test for Alkaloids	Wagner's Test	+ve
		Mayer's test	+ve
6.	Test for Flavonoids	NaOH test	+ve
		Conc. H_2SO_4 test	+ve
		Alkaline reagent test	+ve
7.	Test for Phenol	Lead acetate test	+ve
8.	Test for Quinones		+ve
9.	Test for Anthocyanins	HCL Test	-ve

The result from table no.1 shows that among the analyzed phytochemicals are ketones, Proteins, Phytosterols, Terpenoids, Alkaloids, Flavonoids, and Phenols were found present in the ethanolic extract of leaves of Murraya Koenigii plant. Anthocyanins was found absent in the ethanolic plant extract.

The medicinal properties of the plants are due to the presence of different phytochemicals which are present in the leaves of the plant.

Conclusion

From the result, it is concluded that ethanolic extract of leaves of selected plants contains many active phytochemicals. Therefore the extract of these plants can be used as a drug. Further studies on isolation, purification, and characterization of phytochemicals are suggested for the development of new plant base pharmaceuticals having lesser side effects.

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PROPERTIES OF THE ESSENTIAL OIL, CHEMICAL COMPOSITION & HIGH PROFILE THIN LAYER CHROMATOGRAPHY STUDY OF HYPTIS SUAVEOLENS LEAVES FROM NAGPUR REGION (M.S.)

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ABSTRACT

Plants constitute as major source of drugs for prevention and spread of wide range of pathogenic carriers and also treating various human diseases. Modern people increasingly prefer drugs of natural origin, mostly from plant origin due to abundant accessibility and fewer side effects. To search novel active compounds from plant origin and to access the valuable thereupatic properties with minimum side effects, application of advanced method like GC-MS computational techniques plays an important role in the development of drug of interest. 6 compounds were identified in aerial parts of Hyptis suaveolens . Out of the 6 compounds identified in ethanolic extract, 7-Isopropyl-1,1,4a-trimethyl-1,2,3,4,4a,9,10,10a-octahydrophenathrene,1-Phenanthrene,1,2,3,4,4a,9,10a-Octahydro,1,1,4a-trimethyl-7-(1-methylethyl)-(4aS-trans), 1Phenanthrenemethanol,1,2,3,4,4a,9,10,10a-Octahydro-1,4a-dimethyl-7-(1-methylethyl)-,[1S-(1α,4 α , 10aβ)], Phenanthrenemethanol, 1,2,3,4a, 9, 10, 10 a-Octahydro-1,4a-dimethyl-7-(1methylethyl)-[1R-(1α,4aβ,10aα)],1,5,9-Undecatriene,2,6,10-trimethyl-(Z)-, Squalene. It was found that the constituents differed in quantity of Hyptis suaveolens (L.) in the Nagpur region which may be due to the local geographical difference. The HPTLC chromatograms of different coloured plates show different Rfvalues. Ethnobotanical uses - Juice of leaves is used for athlete's foot, applied daily to interdigital areas, leaf paste is applied on sores and fungal skin infections etc.

Keywords:*Hyptis suaveolens , GC-MS, Chemical compounds.*

Introduction

Fig : 1 -Hyptis suaveolens.

The plant ***Hyptis suaveolens*** commonly known as **"Rantulsi"** belongs to the family Lamiaceae and is an ethonobotanically important medicinal plant. Almost all parts of this plant are being used in traditional medicines to treat various diseases. The plant has been considered as an obnoxious weed. The leaves have been utilized as a stimulant, carminative, sudorific, galatogogue and as a cure for parasitic cutaneous diseases (Mandal *et a*l.,2007).*Hyptis suaveolens*(L.)Poit are considered to be anti inflammatory and also applied as an antiseptic in burns, wounds and various skin complaints (Chatterjee and Pakrashi, 1997). *Hyptis suaveolens*is known to be used in traditional medicines for the treatment of various diseases and has been found to possess significant pharmacologic properties (Kuhnt., *et al* 1995). In addition to above it also has insecticidal properties and said to be mosquito repellent (Mudgal *et al.*, 1997). The aim of the current study is to determine Rf value and chemical compounds or compositions of *Hyptis suaveolens* (L.)Poit collected from Gorewada Lake forest, Nagpur district (Maharashtra state).

Material and Method

1. **Materials**

The leaves of *Hyptis suaveolens* were identified and collected from Gorewada forest areas of the Nagpur district.

2. **Preliminary screening** - The shade dried leaf material was powdered using mortar and pestle. It was continuously extracted with 100ml of petroleum ether, chloroform, acetone, ethyl alcohol and water for 3hrs at 60^0 to 80^0C using Soxhlet apparatus. The condensed extracts were used for preliminary screening of phytochemicals such as alkaloids, tannins, saponins and glycosides.
3. **HPTLC -**
4. The HPTLC studies of secondary metabolites. The extracts to be analysed were spotted on the plate. The plates were placed in TLC chamber and the chromatogram was developed with the solvent mixture. The TLC plates were taken out and visualized in visible light, UV light (254nm & 366 nm) and iodine chamber and spots were marked.
5. **Data analysis** - Rf value of each spot was calculated using the formula, Rf value = Distance travelled by the solute/Distance travelled by the solvent and the values were tabulated.
6. **GC-MS Analysis** - The test plant extracts were subjected to GC-MS analysis at laboratory's (IIT Bombay) Sophisticated Analytical Instrument Facility (formerly RSIC), Indian Institute of Technology, Powai, Mumbai – 400076, India.

Observations

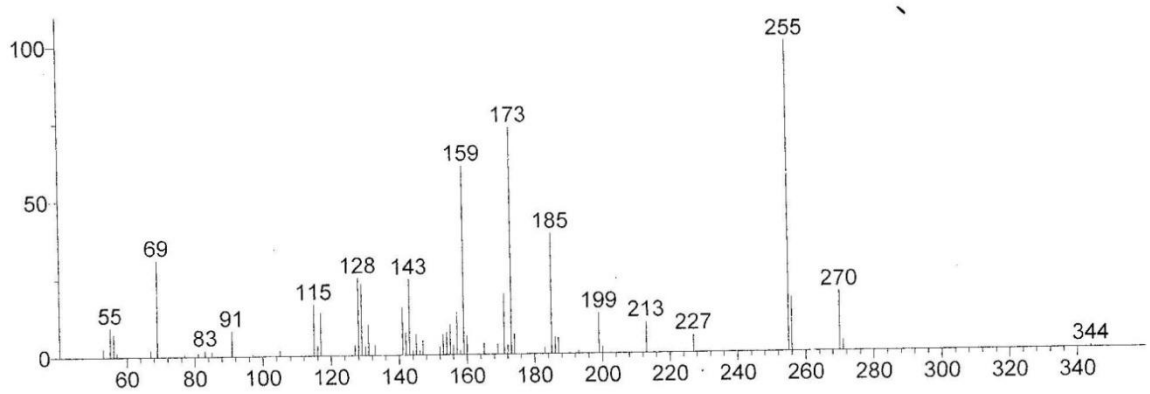
Table No. 1:
The chemical Composition *Hyptis suaveolens*

SN	R.T	Name of compound	Molecular formula	Mol. Weight	Peak Area
1	9.2	7-Isopropyl-1,1,4a-trimethyl-1,2,3,4,4a,9,10,10a-octahydrophenathrene	$C_{20}H_{30}$	270	405668
2	9.2	Phenanthrene,1,2,3,4,4a,9,10a-Octahydrophenanthrene-1,1,4a-trimethyl-7-(1-methylethyl)-(4aS -trans)	$C_{20}H_{30}$	270	405668
3	12.7	Phenanthrenemethanol,1,2,3,4,4a,9,10,10 a-Octahydro-1,4a-dimethyl-7-(1-methylethyl)-,[1S-(1α,4 α , 10aβ)]	$C_{20}H_{30}O$	286	1749455
4	12.7	Phenanthrenemethanol, 1, 2, 3,4a, 9, 10, 10 a-Octahydro-1, 4a-dimethyl-7 - (1 methylethyl)-[1R-(1α,4aβ,10aα)]	$C_{20}H_{30}O$	286	1749455
5	18.9	5,9-Undecatriene,2,6,10-trimethyl-(Z)-	$C_{14}H_{24}$	192	305046
6	18.9	Squalene	$C_{30}H_{50}$	410	305046

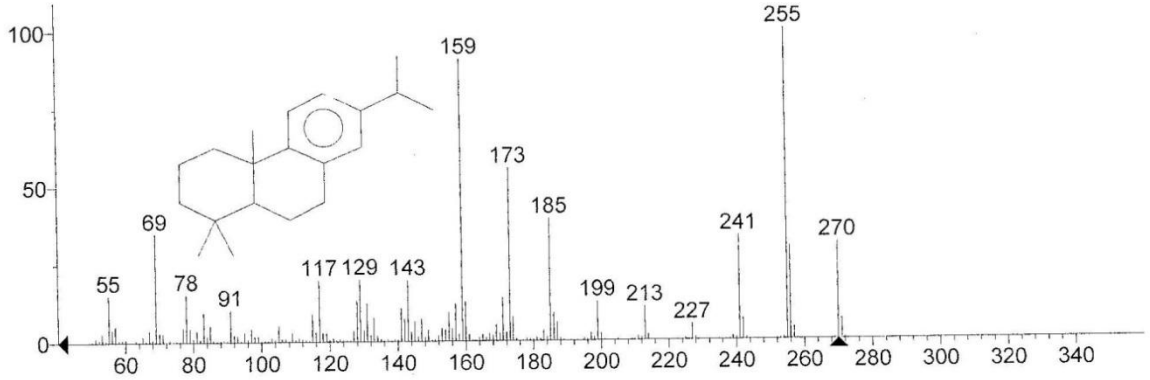
Table No. 2 : Essential Oil Percentage in Leaves of *Hyptis suaveolens* plants.

Sr. No.	Name of the species	Part of the plant used	Resolution factor (Rf.) Value
1	***Hyptis suaveolens***	Leaves	0.53

Unknown: MDT[CTR[1.0000..1.0000,80,Center,15,2.0,Area];BCK[DF];SMT[SA,5]] E111VBMamravati.7fl\e111VB2.7n 91
Compound in Library Factor = 102



Hit 1 : 7-Isopropyl-1,1,4a-trimethyl-1,2,3,4,4a,9,10,10a-octahydrophenanthrene
C20H30; MF: 806; RMF: 806; Prob 96.2%; Lib: mainlib; ID: 166874.



Hit 2 : Phenanthrene, 1,2,3,4,4a,9,10,10a-octahydro-1,1,4a-trimethyl-7-(1-methylethyl)-, (4aS-trans)-
C20H30; MF: 658; RMF: 705; Prob 2.76%; CAS: 19407-28-4; Lib: mainlib; ID: 166983.

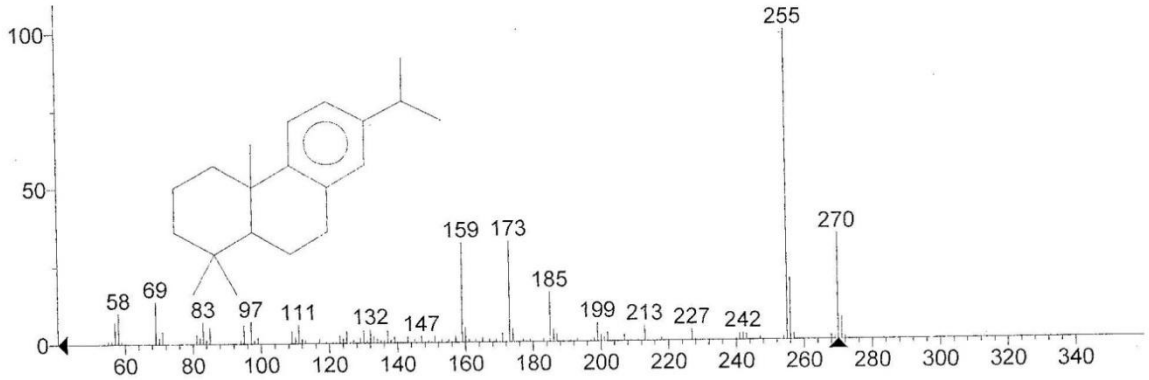


Fig. No. - 2: GC-MS Chromatogram of *Hyptis Suaveolens* Plant.

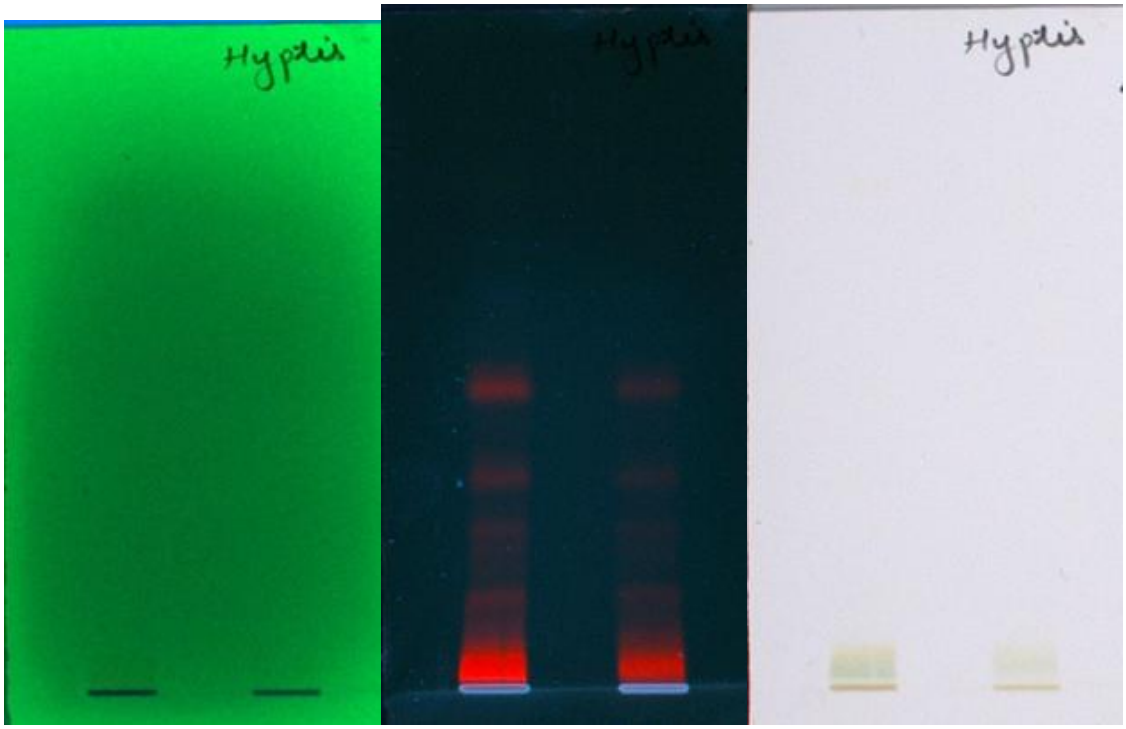


Fig : 3- HPTLC Plates (High profile Thin Layer Chromatography) of *Hyptis suaveolens*

Result and Discussion

The present investigation was carried out on *Hyptis suaveolens* plant of Lamiaceae family to study the presence of medicinally active phytochemicals in the leaves. The chemical composition of the essential compounds from the leaves of *Hyptis suaveolens* collected from Gorewada forest which experienced different climatic and geographic circumstances, were determined by GC-MS. It has been already reported by various workers. (Jennings W and Shibamoto T, 1981, Sharma *et al.,* 2007, Mallavarapu *et al.*,1993) As seen in the table 1, different compounds were determined from the leaves of *Hyptis suaveolens* ,The present investigations concluded that the leaf of *Hyptis suaveolens* contains alkaloids. These chemicals are widely used in Ayurvedic traditional medicines. The presence of tannin in this plant may be the reason, why most of the animals do not graze this plant.

Conclusion

Our study has shown that the qualitative and quantitative properties of compounds of *Hyptis suaveolens* plant of Gorewada forest (Nagpur region) is mainly due to the local geographical differences.

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GREEN SYNTHESIS OF SILVER NANOPARTICLES USING AZADIRACHTAINDICA (NEEM)AQUEOUS LEAF EXTRACT

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ABSTRACT

The silver nanoparticles were synthesized using silver nitrate and Azadirachta indica (Neem) aqueous leaf extract at room temperature. The method used for synthesis is simple, rapid, environmental free and do not involve toxic chemicals. The terpenoids and flavonoids available in neem plant leaf extract act as both capping and reducing agents. The synthesized nanoparticles are characterized UV Visible spectroscopy, X ray diffraction analysis and fluorescence spectroscopy. Results confirmed this protocol as simple, rapid, one step, eco-friendly, nontoxicand an alternative conventional physical/chemical method. Only 15 min wererequired for the conversion of silver ions into silver nanoparticles at room temperature, without the involvement of any hazardous chemical.

Keywords:*Silver nanoparticles,Characterization, FTIR, X RD,Azadirachta indica.*

1. Introduction

In last few years different metal nanoparticles of various shapes, sizes and compositions have different catalytic applications. The metal nanoparticlesof gold, silver, platinum are have significant applications in various field of catalysis and environmental science. One such important metal nanoparticle is silver nanoparticle and it can be prepared by different ways like chemical,electrochemical,radiation and photochemical[1]. Butwith increasing focus on bio mediated preparation of metal nanoparticles is getting more attention.There are number of methods for synthesis of AgNPsusing different plant leaf extract as well as by using microorganisms such as bacteria, fungi and yeast for the synthesis.[2-9] Several reports are available on the green synthesis of AgNPs using plant extract. Different functional groups whichcontain several and present in plant extract works as reducing agents and nanoparticle growth controlling agents.Here we have reported the synthesis of AgNPs using the aqueous leaf extract of Neem plant[10]The biosynthesized AgNPsusing Neem leaf extract showed good catalytic activity for reduction of MB.

2. Experimental

The plant extract-mediated bio reduction involves mixing of aqueous plant extract with suitable amount of silver nitrate solution. The synthesis of silver nanoparticles occurs at room temperature and get completed in few minutes.

2.1 Materials and Methods

Silver nitrate ($AgNO_3$,99.0%), used of AR grade and purchased from SD fine chemicals and fresh Neem leaves are taken from college campus.

2.2 Preparation of plant extract

Fresh neem leaves were collected in summer season and in month of May and identified taxonomically. Leaves were washed carefully with double distilled water and cleaned properly About 20 grams of finely cut leaves were taken in 250 ml beaker containing distilled water and boiled for 15 min to get extract of leaves. The extract was then cooled and filtered by using Whatman filter paper. The filtered extract was then used as a reducing and capping agent for synthesis of AgNPs.

2.3 Green synthesis of silver nanoparticles

The solution of silver nitrate ($1x10^{-3}$M) is prepared using double distilledwater(100 mL). Then 1,2,3 ml of neem extract was added separately to 10 mLsolution of silver nitrate ($1x10^{-3}$M).The set of solutions are kept in dark to avoid action of light on $AgNO_3$ solution. The reduction of Ag^+ to $Ag^0$was confirmed by change in colour from light yellow to dark brown which confirms the reduction of Ag ions. Its formation was also confirmed by using UV-Visible spectroscopy.[11]

Fig. 1 Synthesized silver nano particles with increasing concentration of Neem extract

2.4 Reduction of Methylene blue.

The catalytic efficiency of AgNPs - neem extract was studied for methylene blue reduction by $NaBH_4$.To track this reaction 0.5ml of freshly prepared $NaBH_4$ solution(0.05M) was added to 5ml of methylene blue solution ($1x10^{-3}$M) taken in quartz cell.The 0.5 ml of AgNPs - neem extract was added to start the reaction. The change in the concentration of methylene blue with time was monitored by UV Visible spectrophotometer.

3. Results and Discussion

3.1 Characterization of synthesized silver nanoparticles

UV-Visible spectral analysis was done by using Shimadzu UV-Visible spectrophotometer with a resolution of 1 nm between 300 and 700 nm. One milliliter of the sample was pipetted into a test tube and subsequently analyzed at room temperature. A sharp peak seen at wavelength at 418nm. As the concentration of neem extract increases in colour intensity of the absorbance also increases (Fig.1). These bands are assigned to surface plasmon band that corresponds to the completely or roughly spherical shape of AgNPs. The UV spectra and visual observations reveled that formation of silver nanoparticles occurred rapidly within 15 min.

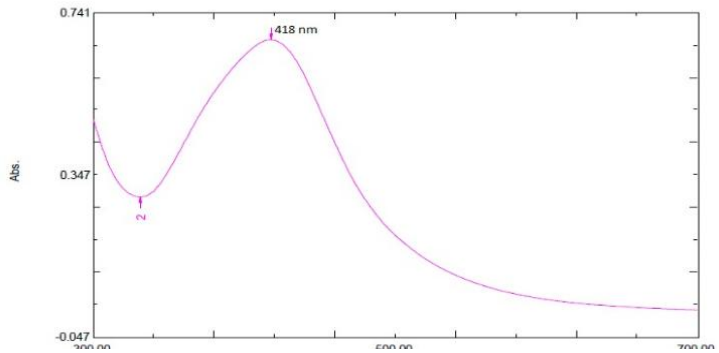

Fig.2 UV Visible spectrum of silver nanoparticles

3.2 FTIR analysis

The plant extract plays dual role and it act as both reducing and capping agent. The presence of functional groups was confirmedby FTIR analysis of AgNPs. A broad band between3421 cm-1 is due to the N-H stretching vibration of group NH2and OH the overlapping of the stretching vibration of attributed for water and A. indica leaf extract molecules. 2922.25 cm^{-1} (C-H stretching vibrations) the alkanes; 2343.59 cm^{-1} (C=N stretching vibrations) the nitriles; The band at1649 cm^{-1} corresponds to amide C=O stretching of COOH group in neem extract. The observed peaks at1157cm^{-1}denote -C=O-C- linkages, or -C=O- bonds. Theobserved peaks are mainly attributed to flavonoids and terpenoids excessively present in plants 608.69 cm^{-1} (C-C stretching vibrations) the aromatics; 1448.59 cm^{-1} (C-H bend stretching vibration) the alkanes; 1238.34, 1157.33 and 1030.02cm^{-1} (C-N stretching vibration) the aliphatic amines; 949.01 cm^{-1} (=C-H bend stretching vibration) the alkenes; These observations were comparable with the previous findings.[12]

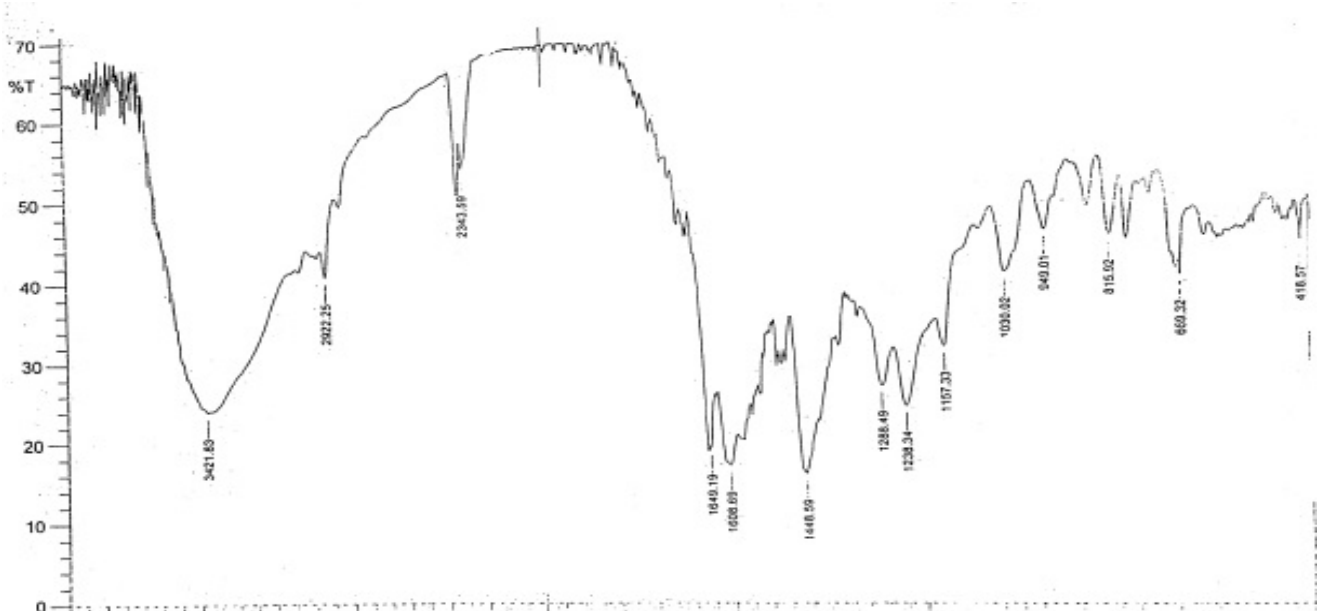

Fig.3 IR spectrum of neem extract

3.3 Xray Diffraction studies

The synthesized of AgNPs showed four diffraction peaks at 2θ values of 38.4°, 44.51°, 64.6°, 77.40 ° which corresponds to the (111), (200), (220), (311) and the different peak intensity profile are characteristic of cubic structure of AgNPs. The peaks at 2θ values corresponding to the Bragg's reflections of planes conforms the FCC crystalline structure of silver. The relatively higher intensity of planes [111] [220] in FCC crystalline structure supports the stability of the green synthesized AgNPs. The XRD pattern study shows that AgNPs are crystalline in nature. The main crystalline phase was silver, and there were no obvious other phases as impurities were found in the XRD patterns.[13]

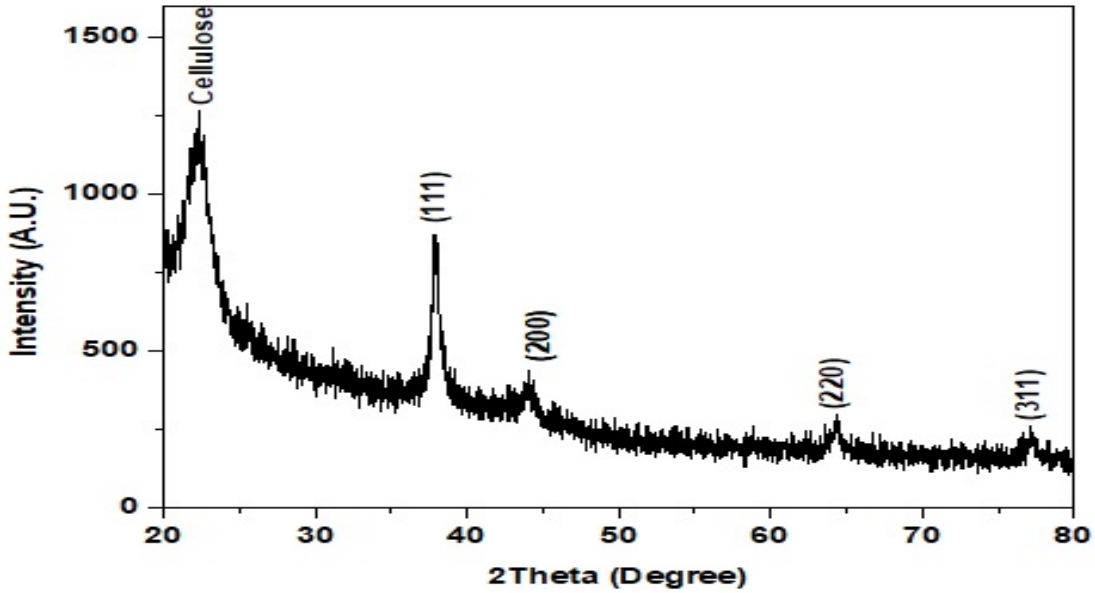

Fig.4 XRD spectrum of Silver nanoparticles

3.4. Fluorescence emission spectrum

Photoluminescence (PL) spectrum is one of the methods to estimate the optical property of silver nanoparticles as photonic materials. The PL of the synthesized bio-inspired AgNPs by Neem leaf extract isstudied by fluorescence emission spectroscopy. The colloidal silver nanoparticles are dispersed in water and the PL emission spectra are recorded for the excitation wavelength at 350 nm. A broad emission is

obtained at 397 nm. (Fig.5) The intensity of fluorescence emission peak is gradually increased up to 397 nm, after which it is slowly decreased up to 650 nm,slight broad emission at 447 nm may be due to presence of biochemical or antioxidants present in plant extract.[14]

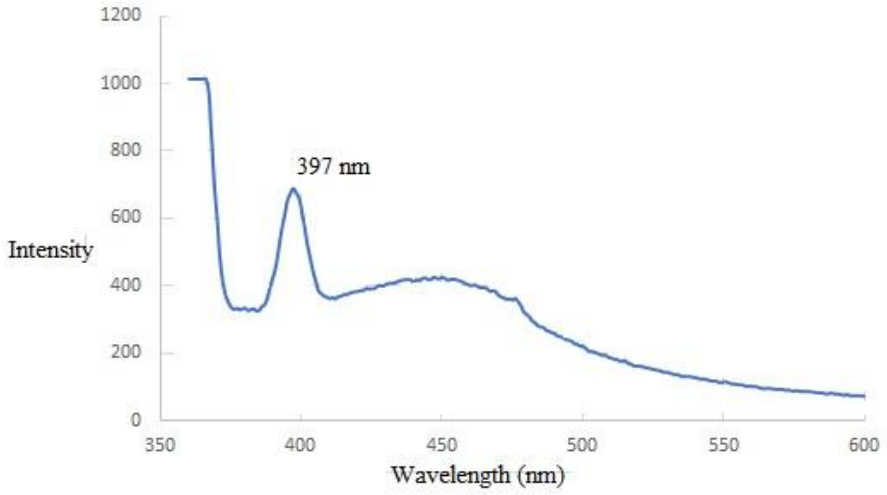

Fig.5 Fluorescence emission spectrumof silver nanoparticles formed at excitation at 350 nm

4 Conclusions

In this work we synthesized silver nanoparticles by green method using*Azadirachta indica* leaf extract. There is no need to use of separate chemicals which act as reducing and capping agent for preparing nanoparticles. The silver nanoparticles are characterized by UV visible spectroscopy, X ray diffraction study, FTIR analysis and fluorescence emission spectroscopy. Synthesized silver nanoparticles act as catalyst for reduction of methylene blue using $NaBH_4$ as reducing agent.The 100%degradation of methylene blue was achieved by ($NaBH_4$+AgNPs) in just 08 minuteswhich highlights the efficient catalytic activity of silver nanoparticles.

5Acknowledgement.

Author is thankful to the Principal of college and Incharge of "Common Instrumentation Center" of college for providing all instrumentation facility for characterization of nanoparticlesand to carry out the research work.

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SYNTHESIS AND THERMAL STUDIES OF CR(III) AND MN (III) COMPLEXES WITH DERIVED FROM THIAZOLE SCHIFF BASE WITH MICROWAVE IRRADIATION METHOD

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ABSTRACT

The newly synthesized thiazole Schiff base have been prepared by microwave irradiation method 2-hydroxy-5-chloro acetophenone and 4-(p-hydroxyphenyl)-2-aminothiazole. The metal complexes were obtained as a result of interaction of Schiff base ligand and metal ions Cr(III), and Mn(III), The complexes have been characterized on the basis of elemental analysis, infrared, molar conductance, magnetic Susceptibilities, and theromogravimetric analysis. The kinetic analysis of the thermogravimetric data was performed by using Broido, Horowitz-Metzger and Freeman-Carroll method, which confirm first order kinetics and kinetic compensation effect.

Keywords:*Thiazole Schiff Base, Molar conductance, Thermal.*

Introduction

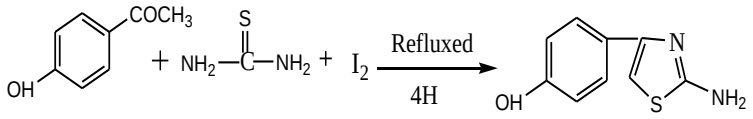
Microwave-assisted synthesis is chemical method, the application of microwave-assisted is useful technology in organic synthesis because it is simple, sensitive, reducing the hazard, often possible to reduce reaction times to a few minutes under solvent free or lower solvent and increase the yields and easier work up as compared to conventional methods. Schiff bases are chemical compounds formed from the condensation reaction of aldehydes or ketones with amines. These compounds are majorly used in industries and also have significant biological activities, including antioxidant, antibacterial, antifungal, antiviral and antitumor. There is synthesis, characterization and biological activities of new Schiff Base Compound and its lanthanide complexe[1]. Antifungal Activity of Some Mixed Ligand Complexes Incorporating Schiff Bases[2] Performance of Schiff Bases Metal Complexes and their Ligand in Biological Activity[3] Spectral and thermal characterization of Mn(II), Ni(II) and Zn(II) complexes containing schiff base ligands.[4] Compounds containing an azomethine group (CH=N), known as Schiff bases, were formed by the condensation of a primary amine with a carbonyl compound. Schiff bases of aliphatic aldehydes were relatively unstable and were readily polymerizable. Schiff bases and their complexes are shows good progress in thermal analysis[5.]

This paper discusses the kinetic of the thermal decomposition and the accompanying compensation effect for Schiff base complexes of Cr(III), and Mn(III)

Experimental

All the chemicals were of A.R. grade and used as received. 2-hydroxy-5-chloro acetophenone (HCA) and 4-(p-hydroxyphenyl)-2 amino thiazole was prepared by known methods[6-8]. The solvents were purified by standard methods[9]

Synthesis of 4-(p hydroxyphenyl)-2 amino thiazole;

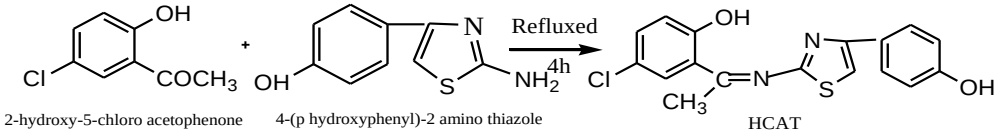


4-hydroxy acetophenone

4-(p -hydroxyphenyl)-2 amino thiazole

Synthesis of 2-hydroxy-5-chloro acetophenone 4-(p-hydroxyphenyl)-2 imino thiazole [HCAT]:

A solution of 4-(p-hydroxyphenyl)-2 imino thiazole (0.02M) in 25ml of ethanol was added to an ethanolic solution(25ml) of 2-hydroxy-5-chloro acetophenone (0.02M) and the reaction mixture was heat in microwave oven for 4h[10]. After cooling a pale yellow coloured crystalline solid was separated out. It was filtered and washed with ethanol, crystallized from DMF and dried under reduced pressure at ambient temperature. The purity of ligand was checked by elemental analysis shown in Table 1. and m.p. It was also characterized by IR and ^{1}H NMR spectral studies. Yield:70%; m.p. 310^{0}C



2-hydroxy-5-chloro acetophenone 4-(p hydroxyphenyl)-2 amino thiazole HCAT

Table1. Analytical data of the Ligands.

Ligand	Molecular Formula	Formula Weight	Color and nature	Elemental Analysis				
				C% found (Cal.)	H% Found (Cal.)	N% Found (Cal.)	Cl% Found (Cal.)	S% Found (Cal.)
HCAT	$C_{17}H_{13}N_2O_2SCl$	344.6	Yellow Crystalline	59.38 (59.19)	03.70 (03.77)	08.5 (08.12)	10.11 (10.30)	09.22 (09.31)

Preparation of complexes:

All the metal complexes were prepared in a similar way by following method. To a hot solution of ligand HCAT (0.02M) in 25ml of ethanol a suspension of respective metal salts was added drop wise with constant stirring. The reaction mixture was in microwave oven for 4-6h. The precipitated complexes were filtered, washed with ethanol followed by ether and dried over fused calcium chloride.

Yield: 45-50%

The complexes are soluble in DMSO and DMF but insoluble in water and common organic solvents. The metal chloride content of complexes were analyzed by standard methods[11]

The ^{1}H NMR spectra of ligand was recorded and obtained from RSIC Chandigarh. IR spectra of the compounds were recorded on Perkin Elmer 842 spectrophotometer in the region 400-4000cm^{-1}, carbon, hydrogen and nitrogen analysis were carried out at RSIC, Punjab University, Chandigarh. The molar conductance of the complexes at 10^{-3}M dilution in DMF were determined using equiptronic digital conductivity meter EQ-660 with a cell constant 1.00 cm^{-1} at room temperature. The magnetic moment measurement were made on a Gouy balance at room temperature using [$HgCo(SCN)_4$] as the calibrant. The thermogravimetric analysis were performed on laboratory set up apparatus in air atmosphere at 10^{0}C min^{-1} heating rate. The molecular weights of the complexes were determined by Rast method are shown in Table 2.

Table 2.Analytical data and molar conductance of the compounds.

Compounds	Colour	Mol. wt.	Analysis % Found (calc.)					μeff B.M.	ΛM (Ω-1 cm2 mol-1)
			M	C	H	N	Cl		
$[CrL_2(H_2O)Cl]H_2O$	Green	810.7	6.32 (6.41)	50.25 (50.32)	3.36 (3.45)	6.81 (6.90)	13.08 (13.13)	3.96	18.9
$[MnL_2(OAc)]H_2O$	Brown	837.1	6.40 (6.55)	51.51 (51.60)	3.60 (3.70)	6.51 (6.68)	8.32 (8.48)	4.8	18.8

Results and Discussion:

The Schiff base ligand HCAT and its complexes have been characterized on the basis of ^{1}H NMR, IR spectral data, elemental analysis, molar conductance, magnetic succeptibility measurements and thermogravimetric analysis data. All these values and analytical data is consistent with proposed molecular formula of ligand . All the compounds are coloured solid and stable in air. They are insoluble in water but soluble in coordinating solvents like DMF and DMSO. The molar conductance values in DMF(10^{-3}M) solution at room temperature (Table 2) shows all the complexes are non electrolytes[11]

The ^{1}H NMR spectra of ligand HCAT shows signals at δ 12.09, (1H, s phenolic OH), δ 9.51 (1H, s, phenolic OH), δ 7.55, 7.54, 7.53 and 7.52 (4H, m, phenyl) δ 6.81, 6.80, and 6.78(3H, s Phenyl), 6.68 (1H s thiophene), and 2.56(3H, s, methyl)[12-15] IR spectra of ligand and metal complexes shows ν(C=N) peaks at 1620cm$^-$ and absence of C=O peak at around 1700–1750cm^{-1} indicates the Schiff base formation.[16-19] IR spectra of complexes are shown in Table 3.

Table 3.IR spectra of ligand and metal complexes.

Compound	ν(O–H) hydrogen bonded	ν(C=N) imine	ν(C–O) phenolic	ν(M–O)	ν(M–N)	ν(C–S)
HCAT	3119	1620	1514	--	--	1122
$[CrL_2(H_2O)Cl]H_2O$	--	1590	1506	475	409	1115
$[MnL_2(OAc)]2H_2O$	--	1562	1462	498	420	1090

Thermogravimetric studies:

An analysis of TG curves of HCAT and its metal complexes show that Cr(III) and Mn(III), complexes decomposed in three stages, the ligand in two stages The Cr(III) and Mn(III) complexes are stable upto 70^{o}C Elimination of one water molecule from Cr(III) complexes upto 130^{o}C have been observed (%wt loss obs./calcd. Cr(III) : 2.32/2.22; The Mn(III) complexes shows percent loss corresponding to two water molecules (%wt loss obs./calcd. Mn(III) : 4.48/4.30 upto 150^{o}C. In the Cr(III) complexes further loss in weight upto 220^{o}C indicating the presence of one coordinated water molecule (%wt loss obs./calcd. Cr(III) : 2.38/2.22)[20&21] While in case of Mn(III) complexes complete decomposition has not been observed upto 800°C. The half decomposition temperature and the basic parameter calculated for the compounds are

tabulated in Table 4. The relative thermal stability on the basis of half decomposition temperature is found to be Mn(III)>Cr(III)> HCAT

The Thermal activation energy (Table 4) was calculated by Freeman-Carroll,[22] Horowitz-metzger[23] and Broido[24] method

Table 4: Thermal decomposition data of the complexes of HCAT

Compound	Half Decomposition Temperature (^oC)	Activation Energy (kJ $mole^{-1}$)			Frequency Factor Z (sec^{-1})	Entropy Change -ΔS (J mol^{-1} K^{-1})	Free Energy Change ΔF (kJ mol^{-1})
		B*	H-M**	F-C***			
HCAT (LH)	260.51	3.27	5.45	4.36	87.25	212.55	117.75
$[CrL_2(H_2O)Cl]H_2O$	550.45	9.08	12.98	12.98	259.74	207.11	183.52
$[MnL_2(OAc)]2H_2O$	710.46	11.11	18.51	11.11	222.32	209.86	217.58

* Broido, **Horowitz-Metzger and ***Freemann-Carroll

Conclusion

The thermal decomposition of the complexes is not simple and involves up to three stage decomposition. It is assumed that dehydration of the complexes containing water occurs within an active reaction interface. The compensation effect of thermal decomposition of the complexes indicating the change of sample mass on the estimated values of activation energy.

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EFFECTIVENESS OF MULTIMEDIA IN TEACHING OF ENVIRONMENTAL ISSUES AMONG SECONDARY SCHOOL CHILDREN

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ABSTRACT

The multimedia play a dynamic role in secondary education. Using multimedia material in education and teaching during delivery of learning material as students to enhance the knowledge & skill at any situation and any place. This paper is based on a research to understand the effectiveness of multimedia supported instructional material adopted by the teacher in a school. In this study questionnaire on effectiveness of multimedia classroom was developed and accurately selected sample of students from a secondary school. Only those schools were selected where multimedia technology has been used in teaching and learning. The sample of the study consists of total 150 students of 8th, 9th and 10th standard. To assess the effectiveness of multimedia in teaching researcher used self administered achievement test in environmental issues. An experimental research design has been selected to conduct the present study. The findings of the study revealed that the multimedia teaching was support to develop innovative approach towards learning on various environmental issues. Results of the study show that the effectiveness of multimedia embedded classroom was found effective for teaching and improved the achievement of the students. Therefore no one students was found in low level of achievement in environmental issues.

Keywords:*Effectiveness, Multimedia, Teaching, Secondary school children, Environmental issues.*

Introduction

The effective use of ICT in education to change the scenario of the traditional form of education. ICTs education develop information and communication technology specially for teaching or learning purposes. Teachers are using different tools to improve their teaching skills.

Accordingly, teachers from all disciplines use ICT to improve their teaching method (Lio, 2011; Liu and Velasquezbryant, 2003; Hew and Brush, 2009, Donnelly *et al.*, 2011).

Effective use of ICT in education create new reforms in teaching and learning process in all faculties/disciplines of education (Pulkkinen, 2007; Wood, 1995).

In India, technology is a useful tool for application in education and teacher help to teach complex concepts in science (NCERT, 2006).

At present situation, several media materials are being used in classroom. Media materials like computer/laptop, smartphones, digital cameras various multimedia softwares supported and enriched classroom (Riodan, 2008). For the purpose of this study classroom are being referred to as multimedia classroom.

In today's scenario there is a need that the school children in India aware and understand major environmental issues. The study focuses on the today's environmental issues and challenges and creates sense of responsibility of students towards protection of environment. Multimedia based teaching enhancing the level of understanding of students the different environmental issues and build up the capacity decision regarding environmental protection.

The present study would be help to the learners and teachers making teaching-learning in environmental education more interesting and understanding. It creates effective learning environment and students encourage self-learning and teachers facilitates current information transmitters.

Review of Literature

The use of multimedia in text comprehension improve the learning and memory retention. (Chiou, Tien & Lee, 2015)

The use of picture and audio is presented at the same time to ensure the teacher can relate both modes of presentation and words are better presented in auditory form

rather than in text form in animation or video (Liu, Lin, Tsai &Paas, 2012).

Modality presenting information in two modes one combination of words and picture or animation and audio narration. Modality helps pupils to learn in easy way and enhancing the higher-order thinking skills (Fiorella, VogetWalcut& Schatz, 2012).

Nasir, Munir&Shafqut (2011) investigated that ICT have effective in improving information and learning aptitudes of their studies and show the changes in proficiency and new approach towards utilization and advantages of ICT.

Ali, Haolader& Muhammad (2013) found that utilization of ICT to make educating and learning successful and bringing the advancement in learning process.

Objectives of the Study

1] To compare the effectiveness of the multimedia teaching method and conventional method of teaching on the achievement of 8th, 9th & 10th standard students.
2] To assess the level of understanding of the students by means of an environmental issues.
3] To study the effectiveness of multimedia classroom in terms of gender.
4] To develop an achievement test on environmental issues for 8th, 9th & 10th standard students.

Hypothesis

1] There will be no significant difference between the pre and post test scores of the control and experimental group students.
2] There will be no significant difference in the achievement of environmental issues between male and female students.

Methodology

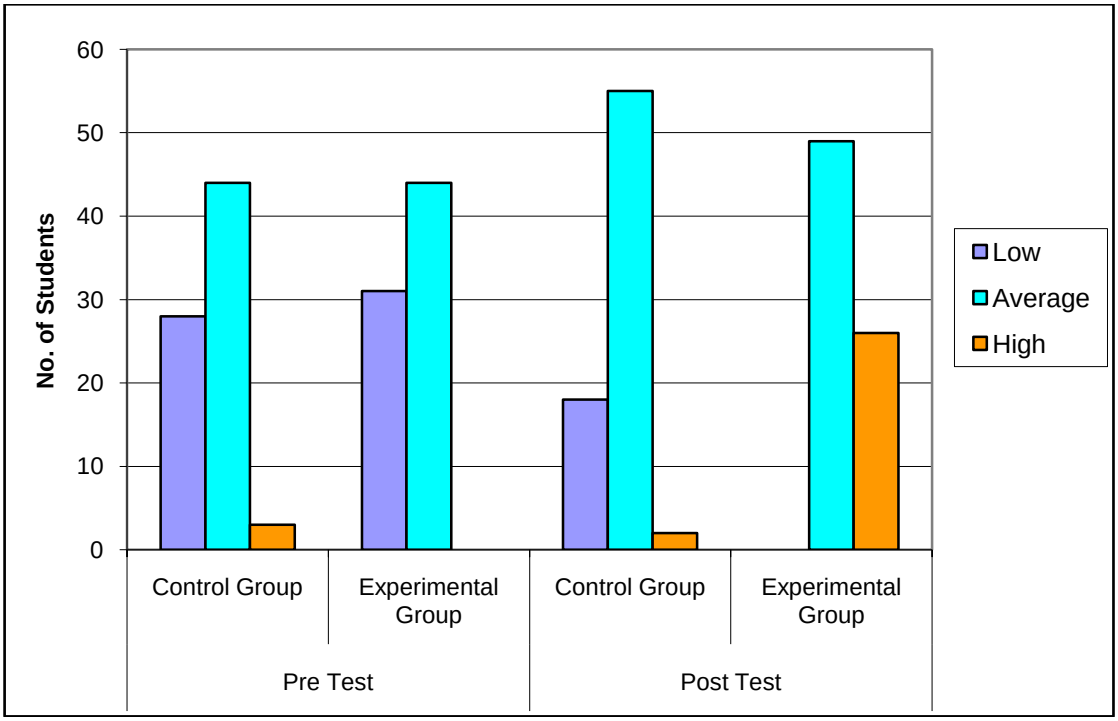
- **Research Design :-**The pre-test, post-test experimental design was used for this study.
- **Sampling and Sampling Techniques :-** The population of the study comprises secondary school level students. The sample was selected from schools in Amravati city, State of Maharashtra. Random sampling technique was adopted for selection of the secondary school students. Total 150 students of 8th, 9th and 10th standard were selected and divided into identical two groups viz. control and experimental. From each class 50 students were selected and divide into two groups, 25 students in control group and 25 students in experimental group.
- **Research Tool Used :-**A self administered achievement test in environmental issues for class 8th, 9th and 10th standard was used for data collection. Achievement test was prepared giving due to consider for areas related to the environmental issues. The test was for 30 marks. It was designed to assess the level of understanding of the students on the concept of environmental issues before and after treatment.
- **Statistical Technique Used :-** The data was analyzed with the help of descriptive statistics and 't' test was used.

Result and Discussion

For the present study total 150 secondary school students were selected randomly. Further they were equally divided into Control and experimental groups. The following Table-1 shows the number of students under the various levels of achievement test in environmental issues at pre and post test from control and experimental group.

Table 1 : Distribution of students according to their level of achievement test in environmental issues

Group	Level	Range	Pre-Test	Post-Test
Control	Low	Upto 10	28	18
	Average	10-20	44	55
	High	21-30	03	02
Experimental	Low	Upto 10	31	00
	Average	10-20	44	49
	High	21-30	00	26



Graph 1 : Number of students from control & experimental group at various levels of achievement test in environmental issues at pre and post test

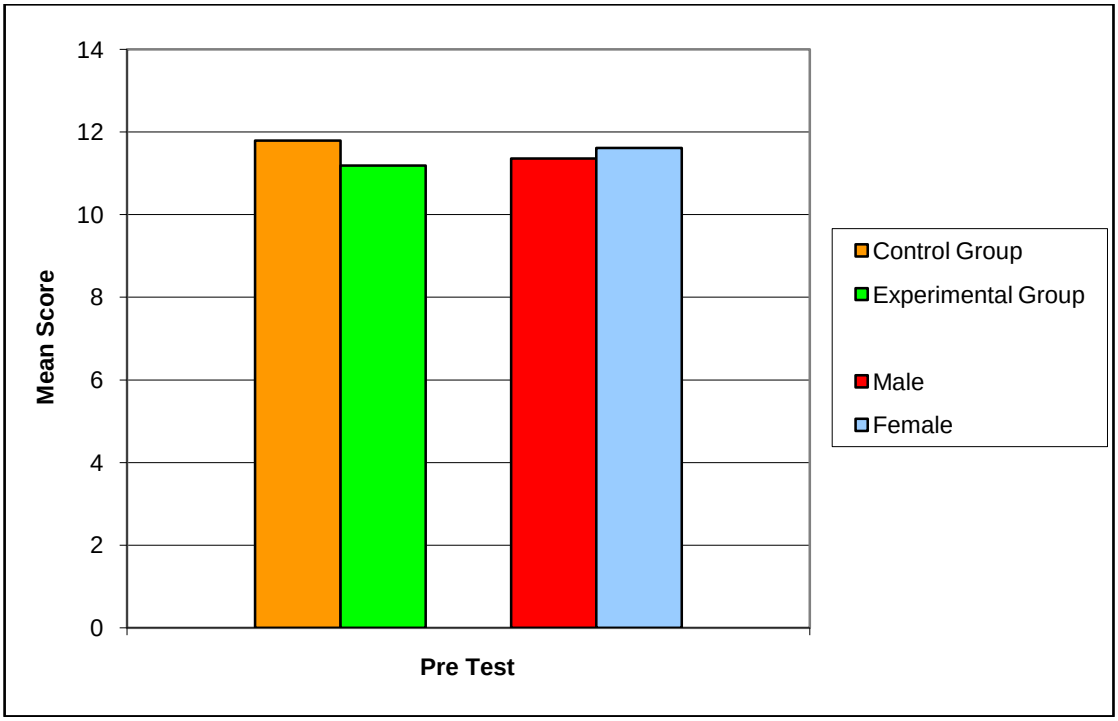
On analysing the pre and post test scores of achievement in environmental issues of 75 students of control group, it was observed that there was not significant increment of students in post-test under high level of achievement in environmental issues. But in the case of experimental group students there is a significant increment in high level of achievement in environmental issues while no one was found in low level category.

Table 2 : Comparison pre-test mean scores of students

Group	N	Mean	SD	df	SEdm	Mean Difference	Table 't' Value	Calculated 't' Value
Control	75	11.79	5.7405	148	0.8857	0.60	1.96	0.667@
Experimental	75	11.19	5.0876					
Male	75	11.36	5.3465	148	0.8868	0.25	1.96	0.282@
Female	75	11.61	5.5138					

(@ - Not significant at 0.05 level of significance)

Table-2 reveals that the calculated t-ratio of the pre-test scores of achievement in environmental issues between control and experimental groups was found to be 0.667 and for male and female it was 0.282. Since both the calculated 't' values were less than tabulated value of 't' 1.96 at 0.05 level of significance, statistically there is no significant difference. It clearly indicate the selected control and experimental groups were identical and there is no significant difference in the pre-test scores of achievement in environmental issues among the male and female students.



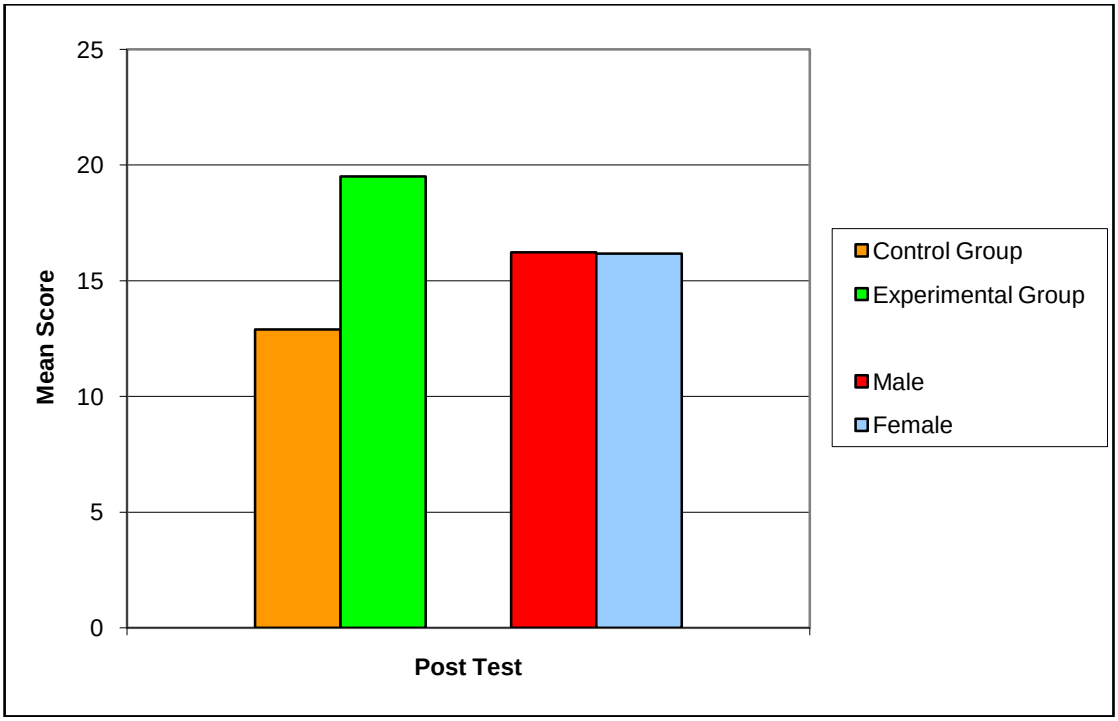
Graph 2 : Comparison of control-experimental group and male-female students with respect to their mean achievement in environmental issues test's mean score in pre test

Table 3 : Comparison post-test mean scores of students

Group	N	Mean	SD	df	SEdm	Mean Difference	Table 't' Value	Calculated 't' Value
Control	75	12.89	4.0322	148	0.7379	6.62	1.96	8.971*
Experimental	75	19.51	4.9576					
Male	75	16.23	5.7200	148	0.9165	0.06	1.96	0.065@
Female	75	16.17	5.5028					

(* - Significant &@ - Not significant at 0.05 level of significance)

Table-3 shows that the calculated t-ratio of the post-test scores of achievement in environmental issues between control and experimental groups was found to be 8.971 which is quite greater than the tabulated value of 't' 1.96 at 0.05 level of significance. Hence, there is a significant difference in the achievement in environmental issues scores of control and experimental group students. Further the mean score of experimental group students is higher than control group indicating there was a great deal of enhancement in achievement in environmental issues instructed through multimedia technology. The multimedia teaching was effective as the result shows that the students of experimental group scored better at post-test in achievement test in environmental issues in comparison to their counterpart, the students of the control group. But there is no significant difference in the achievement in environmental issues scores of male and female students as calculated 't' value 0.065 is less than tabulated value of 't' 1.96 at 0.05 level of significance.



Graph 3 : Comparison of control-experimental group and male-female students with respect to their mean achievement in environmental issues test's score in post test

Conclusion and Implication

Multimedia technology influencing teaching-learning process and redirected the conventional method in a new path of innovation. When the control group students were taught different concepts of environmental issues by traditional method and experimental group of students were taught by multimedia instructional method, it was found that achievement of experimental group was better than the control group in post-test. The multimedia instructional teaching method was effective. The result of the study shows that no one student was found to be under low level of achievement in environmental issues. Multimedia approach enhance for better development of teaching techniques which open a new way of thinking teachers and students. It improve the students' academic achievement in environment science.

The findings of the study shows that multimedia instructional method is useful to various subjects at secondary stage. Multimedia teaching technique enhancing the students learning capabilities and enrich educational activities. Multimedia instructional strategy constructed paradigm in education.

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IMPACT OF E-WASTE ON ENVIRONMENT

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ABSTRACT

Today's world is facing a major problem, electric or electronic waste products approaching the end of their useful life. The current and the future production of e-waste are viewed as risky, as specific elements of some electronic items contain material that are dangerous, in regards to their density and conditions. The harmful content of these materials pose a threat to environment. Its toxic emissions mixed with virgin soil and air and causing harmful effects to the entire biodiversity either directly or indirectly.

The Paper is based on the contents related to the impact of electronic waste on Environment, the need for its appropriate management and options that can be implemented. Improper disposal of these e-waste and other substances reach the soil and groundwater. Most of the e-waste materials can be reused, or recycled in an environmentally sound manner so that they are less harmful to the ecosystem. It was established that there existed immense e-waste generation with lack of proper mange it. Further it was established that e-waste impact heavily on Environment.

Keywords:*E–Waste, Environment, Electrical or Electronic Devices.*

Introduction

Day by day E-waste is a popular name for electronic products nearing the end of their useful life. Electronic industry is the world's largest, innovative and fastest growing industry during the last century which radically changed the people's lifestyle. Although this development
has helped the human race, mismanagement has led to new problems of contamination and pollution.

Electrical and Electronic waste (e-waste) is defined as any discarded, obsolete, or broken electrical or electronic devices. As per current estimates, e-waste is growing almost three times the rate of municipal Solid Waste globally**.** E-waste, being one of the largest sources of heavy metals and organic pollutants in municipal waste and the fastest growing waste stream, has become a serious problem in Asian developing nations**.** These countries not only generate tremendous amounts of domestic e-waste due to their fast consumption rates of electrical and electronic(EE) products, but also receive enormous quantities of used information technology (IT) devices from overseas.

India is a developing county, from the last decades increase in population & change of lifestyle, the demand of using electronic products is increased. In India e-waste generation is growing at 15% & is expected to cross 8000000 tons per year in 2012.A Central pollution control board (CPCB) report said 65 cities in India generate more than 60-70% of the total e-waste in India**.** Most recyclers were exporting the toxic materials such as leaded glass, circuit boards, and mercury lamps usually to China, Africa and India**.** It is an emerging problem as well as a business opportunity of increasing significance, given the volumes of e-waste being generated and the content of both toxic and valuable materials in them. The fraction including iron, copper, aluminum, gold and other metals in e-waste is over 60%, while plastic account for about 30% and the hazardous pollutants comprise only about 2.70%**.** Today, electrical and electronic waste (hereafter referred to as e-waste) is the fastest growing waste stream (about 4 per cent growth a year). About 40 million tons of e-waste are created each year**.** In the last years, there is an increasing acknowledgment of our impact on the environment due to our lifestyle, while the need to adopt a more sustainable approach concerning our consumption habits emerges as of particular significance.

Objectives of the Study

1. To discuss the concept of E-Waste
2. To study E-Waste in India
3. To examine Impact of E-Waste on Environment

Research Methodology

Data Collection: This is a descriptive research paper based on secondary data. Data have been collected through the websites, E-Journals, magazines and Books.

Concept of E-Waste

e-waste or electronic waste are broadly describes loosely discarded, surplus, obsolete, broken, electrical or electronic devices which are at the end of their useful life and need to be disposed or dismantled to recover some valuable components.

The problem of e-waste has become an immediate and long term concern as its unregulated and improper accumulation and recycling can lead to major environmental problems endangering not only human and animal health but also environment health due to toxic and other dangerous materials available in them.

Source

Electrical and electronics devices generating e-waste are from IT & telecommunication equipment and consumer electrical/ electronic products such as refrigerators, washing machines, computer and its accessories, monitors, printers, keyboards, central processing units, typewriters, mobile phones and chargers, remotes, compact discs, headphones, batteries, LCD/Plasma TVs, i-pods, air conditioners, dryers, fridge, VCRs, Stereos, Copiers, fax machines, video games, presenters, music system and other household appliances etc. many of which contain toxic materials.

E-Waste Generation

Individual consumers, private and public sectors contribute to the generation of e-waste with 44.7M tons of e-scrap produced globally in 2016. The Global e-waste monitor explains that only 20% (about 8.9 metric tons) of 44.7Mt of e-waste were recorded to be gathered and recycled appropriately, while the remaining 80% (35.8 metric tons) were undocumented. From these 80%, 4% was disposed in residual waste in higher income nations, while the remaining 74% electronic waste was unknown and it was probably disposed, exchanged or recycled in substandard situations.

Asia recorded the highest quantity of e-waste generated in 2016 of 18.2Mt, then Europe with 12.3Mt, America with 2.2Mt and Oceania 0.7Mt. It was found out that personal consumption, public and private sectors in developed nations such as in Oceania, for instance New Zealand and Australia produce more electronic waste per occupant than developing nations. Oceania is the leading e-waste producer per inhabitant with 6% collection rate, followed by Europe with of 35%, America with 17%, Asia with 15% and Africa's collection rate information is very little. However, it should be noted that only 41 nations have provided official data on electronic waste. This implies that a substantial amount of data on e-waste production, management and trading is lacking.

E-Waste Scenario in India

The electronics age made unprecedented impact on Environment and spectacularly enhanced our connectivity across the globe. The widespread use of electronic items has made communication easier, boosted business activities and created employment opportunities. However, along with the benefits, it has brought into focus many challenges, like the rising problem of e waste that have to be boldly dealt with by society. In the current scenario, it is always possible that environment would be drastically endangered if concerted legislations and actions were not taken efficient management and disposal of e-waste. The main sources of electronic waste in India are:

A. Solder in printed circuit, glass panels & gaskets in computer monitor
B. Chip resistors & Semiconductors
C. Refrigerators & Batteries
D. Mobiles
E. Microwave & Air Conditioners etc**.**

The story of current Indian e-waste management is different from the worldwide. Practices E-waste is a serious issue because of the informal recycling activities. Therefore, quantification of e-waste in India is very

difficult and, there is no mechanism and policy to check the flow of e-waste in the system. In case of PCs, 22% of the e-waste is generated by households and it is the business sector which accounts for the 78% the e-waste, because 83% of household customers are first time buyers. So business sector is mainly responsible for the waste generation. In addition to this, about 1050 tons per year of computer waste come from retailers and manufacturers. This is important to note that in spite of global agreements, e-waste from developed nations is imported to developing nations like India **.**IT and telecom are two fastest growing industries in the country. India, by 2011, has achieved a PC penetration of 95 per 1000 from the 14 per 1000 in 2008. At present, India has 95 million one of the most threatening substances is lead, of which only 5 percent is recycled in India**.**

Pollutants In E-Waste

Pollutants or toxins in e-waste are typically concentrated in circuit boards, batteries, plastics, and LCDs (liquid crystal displays). Pollutants and their occurrence in waste electrical and electronic equipment are:

POLLUTANTS	**OCCURRENCE**
Arsenic	Semiconductors, diodes, microwaves, LEDs (Light-emitting diodes), solar cells
Barium	Electron tubes, filler for plastic and rubber, lubricant additives
Brominated flame- proofing agent	Casing, circuit boards (plastic), cables and PVC cables
Cadmium	Batteries, pigments, solder, alloys, circuit boards, computer batteries, monitor cathode ray tubes (CRTs)
Chrome	Dyes/pigments, switches, solar
Cobalt	Insulators
Copper	Conducted in cables, copper ribbons, coils, circuitry, pigments
Lead	Lead rechargeable batteries, solar, transistors, lithium batteries, PVC (polyvinyl chloride) stabilizers, lasers, LEDs, thermoelectric elements, circuit boards
Liquid crystal	Displays
Lithium	Mobile telephones, photographic equipment, video equipment (batteries)
Mercury	Components in copper machines and steam irons; batteries in clocks and pocket calculators, switches, LCDs
Nickel	Alloys, batteries, relays, semiconductors, pigments
PCBs (polychlorinated biphenyls)	Transformers, capacitors, softening agents for paint, glue, plastic
Selenium	Photoelectric cells, pigments, photocopiers, fax machines
Silver	Capacitors, switches (contacts), batteries, resistors
Zinc	Steel, brass, alloys, disposable and rechargeable batteries, luminous substances

Impact of E-Waste on Environment

Environment is always the host of any waste disposed. High levels of both organic and metallic contaminants have been established in the soil, air and water. Hydro chlorofluorocarbons (HCFCs), polychlorinated biphenyls (PCBs) and polychlorinated biphenyls (PCBs) are additional risky substances in e-waste which promote toxic landfills. Plastics cater for a big proportion of the e-waste and those that are retardant can be dangerous to the environment if not properly disposed.

Lead-acid batteries contain Sulphur that causes acid rain when release to the environment. The European Union banned the sale of Nickel-cadmium batteries that have at

least 6-8% cadmium. This is because cadmium can seep into the soil and not only cause damage to the microorganisms, but also disrupt the ecological setup of the soil if not correctly recycled. Some toxins like persistent organic pollutants are non-biodegradable hence their environmental bioaccumulations signify a long-term health risk. Subsequently, prolonged exposure of soil and water to pollution elements promotes chemical loadings that eventually result in high uptake levels of toxic substances in crop.

Among the informal recycling techniques is the open air burning that is used for component separation such as solder recovery and copper recovery from electric cables. Open air burning has direct ecological effect such as release of several harmful substances into the air, accumulation of pollutants on the soil and water resources. The remaining ash is carried on the surface waters resulting in water pollution. For instance, a research carried out on river sediments and surface soils in Vietnam in areas around and in WEEE places found high levels of toxins of dioxin-like compounds from open burning. Continuous burning of e-waste and PVC cables has an immediate environmental result such that the thick black smoke engulfs the atmosphere and takes long periods to clear.

Conclusion

Changes in people's lifestyles, technological advancements, and ease of accessibility of electronic devices have prompted expanded utilization rates of electronic items. Because of high production of e-waste and the absence of proper disposal frameworks for this sort of waste, it is anticipated that such waste would have some dire consequences on nature. In this way, it is vital that the proper mitigation measures be put in place to curb the pollution levels instigated by e-waste chemicals. Various countries have accessible standardized e-waste guidelines and regulations which can be adopted. The appropriate e-waste management will assist in proficient tracking and collection from extraction to the disposal of material, ensuring that these huge piles of e-waste transform into worthwhile items and business opportunities.

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POLLUTION GENERATING SOURCES ITS EFFECT AND CONTROL

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ABSTRACT

Environment is the natural world, for example the air, water and land in which plants, animal and people live. Contamination of this environment causes pollution of environment. Pollution is a term that covers all the ways pollutants get into the air, water, soil and cause damage to natural resources or all living beings. It can be produced from natural and artificial sources like volcanoes, forest fires, earthquakes, industrial wastes, pesticides, insecticides etc. Pollution can cause respiratory problems, heart diseases, lung cancer etc. It will also lead to water contamination and damage to natural resources is challenging to understand the effects of pollution. It can affect nature, human beings, and animals and play a vital role in adverse climate change. Depletion of natural resources and destroying habitats are significant effects of pollution. Pollution is global problem and it can harm humans by breathing in smoke or consuming contaminated food. Moreover, it can cause health problems such as asthma, cancer, and heart diseases. It also affects nature by destroying plants, animals, and natural habitats.

Keywords:*Pollution, environment, remedies, natural resources.*

Introduction

The activities of human created various environmental issues such as deforestation, global warming, and depletion of scarce natural resources.In the simple terms, pollution is defined as the contamination of the physical and biological constituents in the earth's atmosphere. It affects human life and the natural environment to a very great extent.Due to air pollution, diseases that can occur to human beings are asthma, various skin diseases, cancer, etc. Therefore, it is the essential need of the hour to take serious steps to reduce pollution to its core. In 1997, environmentalist Charles Moore discovered the world's largest collection of floating trash the Great Pacific Garbage Patch ("GPGP") while sailing from Hawaii to California. And in the last 20 years, it's only gotten worse a 2018 study has found that the vast dump of plastic waste swirling in the Pacific Ocean is now bigger than France, Germany, and Spain combined far larger than previously feared. From milk jugs and abandoned fishing gear to polymer molecules small enough to penetrate human skin and be unknowingly inhaled, plastic is now suspected of contributing to a host of ailments, including infertility, autism, thyroid dysfunction, and certain cancers.

Environmental issues continue to attract attention at all levels. It is time now urgent call to action, at a personal level, we can minimize environmental pollution by taking public transport or carpools to reduce vehicular smoke, avoiding firecrackers at festivals and celebrations can also cut down on air and noise pollution, not using fertilizers and pesticides which can cause both water and soil pollution, and switching over to organic farming. The government can also bring strict rules and regulations to lessenindustrial pollution.Pollution degrades our natural resources, from the water we drink to the air we breathe. The different types of pollution listed as follows:

1. **Air Pollution**: Air pollution is the contamination of air in the atmosphere when harmful or excessive quantities of substances such as smoke and harmful gases from industries, CFCs and oxides produced by automobiles, the burning of solid wastes, etc. are introduced into the environment.
2. **Water Pollution**: This refers to the contamination of natural resources of water, due to the addition of harmful chemical, biological or physical materials, which includes industrial wastes, oil spills, domestic and farm wastes, pesticides, as well as mining and agricultural wastes, to water resource which make it unusable.
3. **Soil Pollution**: Land/Soil Pollution occurs due to the degradation of the

earth's surface by different commercial, industrial, agricultural and domestic activities. Causes of soil pollution also include mining, deforestation, dumping of e-waste and other industrial wastes, usage of harmful chemicals such as insecticides, pesticides, etc.

4. **Noise Pollution:** Excess noise due to sounds created by machines, loudspeakers, microphones, loud music, noise from industries, construction and civil engineering works etc. lead to noise pollution.
5. **Less natural resources due to Land occupation**:As the world embraced urbanization, mother nature witnessed the greener lands getting transformed into modern cities and metropolises. What followed is a trail of natural disasters signaling that something is wrong with the planet earth. Consuming more natural resources disturbs the cycle of nature.
6. **Space debris**: Manmade satellites occupied the place in space.Space debris, or space junk, consists of discarded launch vehicles or parts of a spacecraft that float around in space hundreds of miles above the Earth, risking collision with a satellite or spacestation.While space debris is unlikely to affect space travel, it will lead to significant problems for spaceflight around Earth. The risk would be highest for objects orbiting at an altitude of around 1,000 kilometres (620 miles), which is used for communications and Earth observation.

1. Pollution control: Some simple remedies to reduce pollution are listed below

Say no to crackers

Air and Noise pollution caused by fire crackers can increase the impact of pre-existing problems and disorders of patient related to heart, respiratory and nervous system. Radioactive and poisonous elements are used to spread the color in the sky when cracker burst, which can increase the risk of cancer.

Use Public Transportation

Emissions from vehicles account for 40 per cent of the air pollution and using public transportation can help in reducing that. Here, we can reduce emissions by using public transport which can contribute in making the air cleaner.

Turn off the lights, fans and water taps when not in use

Turning off the lights when you leave your room can help save energy. It can also help reduce carbon emission and other harmful greenhouse gases. Hence, turning off your lights is a simple way to help protect the environment and save the planet.

Recycle, reduce and reuse

Learn how reducing, reusing, and recycling can help you, your community, and the environment by saving money, energy, and natural resources. Reducing, reusing and recycling waste helps save landfill space by keeping useful materials out. The amount of energy and natural resources needed to produce the raw materials are limited.

Segregate your waste

The simple ways to practice waste segregation are keep separate containers for dry and wet waste in the kitchen. Also keep two bags for dry waste collection- paper and plastic, for the rest of the household waste.Keep plastic from the kitchen clean and dry and drop into the dry waste bin. Send wet waste out of your home daily.

Say no to plastic

A single plastic bag takes up to 1000 years to decompose as it contains non-renewable petrochemicals. Hence plastic bags will stay for a more extended period and damage our mother nature. Plastic pollution is a problem that the whole world is facing together. We are finding microplastic pieces in our waterways, in the food we eat, and in the water we drink. Collectively, we need to take action and say no to plastic.Plastic waste does not degrade at a sustainable rate. The more we continue to make, the more waste continues to build up.

When plastic waste is not disposed of properly, it ends up in the environment, which is causing devastating impacts. Each single-use plastic item we use today adds to the mass problem of tomorrow and beyond. So say no to use plastic.

Plant more trees

The world's forests absorb a third of global emissions every year. Particles, odors and pollutant gases such as nitrogen oxides, ammonia and sulfur dioxide settle on the leaves of a tree. Trees absorb these toxic chemicals through their stomata, or 'pores', effectively filtering these chemicals from the air. Trees can improve air quality in direct and indirect ways. Indirectly, they can help by shading surfaces and reducing temperatures. If buildings are shaded by trees, it reduces the need for conventional air conditioning, and the emissions of greenhouse gases that come with it.

Use of fans instead of ACs

Researchers also conducted a cost-benefit analysis on the environmental impact and found the total benefit of using fans to reduce air conditioner use from a greenhouse emissions perspective.

Try to recycle industrial waste

Industrial waste should be treated and reused. Use the sustainable industrial development process.

To sum up, any type of pollution is harmful to the environment with serious consequences like global warming, uneven climatic changes, etc. Due to our greediness and illegal human activities, the innocent lives of animals are lost.

Conclusion

Environment pollution is the introduction of harmful materials into the environment that disturb the cycle of nature. These materials are called pollutants. They can be created by human activity like industrial activity, and natural like volcanic ash. Pollutants damage the quality of water, air and land. Air and water carry pollution into the ocean currents and migrating fish. It is among the many things that harm our planet once greener and healthier than it is now. It is a dangerous phenomenon that is contributing to an array of health issues among human and animal.

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TO STUDY THE ADSORPTION OF HEAVY METAL IONS FROM AQUEOUS SOLUTION USING LOW COAST ADSORBENT

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ABSTRACT

The use Dolichos biflorus fruit shells substrate for removal of toxic heavy metals from wastewater has been thoroughly investigated. The results of batch experiments proved that the heavy metal ions could be removed from the solution by the natural polymeric fruit shell substrate. The metal ion adsorption on the fruit shell substrate is very fast. The study indicates that excellent result obtained at pH value between 5-6. However, the present study has been restricted only to pH 5. The effect of initial concentration of heavy metal ions on the adsorption on fruit shell substrate indicates that, at lower concentration adsorption is more. Naturally, adsorption decreases with increasing initial concentration. Similarly, the effect of doses show that the adsorption increases with increasing doses of fruit shell substrate.The effect of contact time show that the adsorption start within 10 minutes and increases up to 1 hour, after that the adsorption remain constant due to blockage of adsorption sites of fruit shell substrate. It was observed that the process of uptake followed first order adsorption rate. The adsorption decreases with increasing temperature & increasing concentration of other light metal ions.

Keywords:*Adsorption, Chromium, Cobalt, Metal removal,batch study, spectrophotometer.*

Introduction

Rapid industrialization and urbanization enhance the use of heavy metals. Industrial waste constitutes the major source of metal pollution in natural water. The heavy metal ions are stable and persistent environmental contaminants since they cannot be degraded and destroyed. Water contaminated by toxic metal ions remains a serious health problem.

The detoxification of metals and metallic pollution of environment is universal problem. In India the situation is very typical. Heavy metals occur in all ecosystem of the world. The total concentration in soils and waters varies at a local, regional and continental scale. Plant species require some amount of heavy metals like Copper, Iron, Cobalt, Chromium, Zinc, Manganese, Molybdenum etc. for their growth and metabolic activities. But, high concentration of heavy metal ions in soil and water cause impotent growth of plants and toxicity in certain crops and also to the animals.

High concentration of heavy metals causes more damage than that of in soil because water is a prime requirement of all living being in the world. The water becomes unfit for use and toxic for living organisms.

Several heavy metal ions have been known to exert their toxic effects particularly on the rapidly growing tissues such as the gastro-intestinal mucosa, bone marrows and on highly specialized cells such as neurons and renal tubular cells. Two commonly used heavy metals namely Cobalt and Nickel have been selected in the study.

Toxic Effects of Cobalt: In human being ingestion of cobalt in excess for produces nausea, vomiting, diarrhea, skin rashes and hot flushes in the short term. It exhibits toxic effects on thyroid, heart and possibly the kidney, in addition to allergic manifestation and occupational lung disease. The maximum permissible limit of cobalt in drinking water is 0.01 ppm.

Toxic Effects of Chromium: Chromium exists in two forms Cr(III) and Cr(VI). The Cr(III) is biologically essential to mammals, as it maintain an effective glucose, lipid and protein metabolism while Cr(VI) oxidizes biological molecules with toxic results. The major toxic effects of Cr(VI) are chronic ulcers, dermatitis and corrosive reaction in nasal septum and lungs. The maximum permissible limit of Cr(VI) in drinking water is 50 microgram/L.

Many techniques applied for waste minimization and removal of heavy metal ions

from wastewater. Several reviews are available on treatment process that have been used for the treatment of wastewater and the removal of harmful metal ions including adsorption, biosorption, chlorination, coagulation, electrodeposition, electrodilysis, electrolysis, filtration, floatation, ion exchange, neutralization, oxidation, precipitation, reduction etc. An ideal method for removing trace metals should be rapid cheap (in terms of the equipment's, chemicals, energy requirement, labour input etc.) and capable of being useful to small intermediate and large scale level.

Adsorption is one of the most effective physical processes for the removal of toxic metal ions from wastewater. The substance which adsorbed on another substance is called adsorbent, while substance which gets adsorbed on the first substance is called adsorbate. It is more commonly referred to us physical and chemical adsorption. Several investigators describe the use of various tree bark, various agricultural byproducts such as peanut skin, onion skin, paddy husk, paddy straw, sugarcane baggage, etc. for the removal of toxic heavy metal ions from wastewater.

Material and Methods

Preparation of fruit shellsubstrate

The *Dolichos biflorus* fruit shellswere dried and finally powdered in an electric grinding machine and sieved through mesh. The powder was then treated with 20 part of aqueous formaldehyde solution (39%) and 5 part by volume of 0.25 N Sulphuric acid. The whole mixture was stirred occasionally for 5-6 hours at 50°C and filtered. The residue was washed several times with double distilled water, till it is free from sulphuric acid traces and then dried in an electric oven at 60°C till it becomes moisture free and then powdered. It was polymerized with formaldehyde in an acidic medium called fruit shell substrate.

Preparation and estimation of Co(II) Solution

20 ml of 0.0001 M solution of Cobalt nitrate was taken in beaker and 2 ml of 2% nitroso R-salt was added in it. In this 1 ml of 1% Sodium acetate trihydrate as added and the content were boiled for few minutes, 1 ml of 1:1 nitric acid was added to stabilize the orange colour complex. Absorbance was measured at 425 nm against the blank spectrophotometrically. Using varying concentrations of Co(II) ion solutions and measuring the absorbance detailed above obtained the standard Beer's law curve for estimation of Co(II) ions by this method. A plot of absorbance against the concentration was made. This plot was fairly linear adherence to Beer's law. Concentration of unknown Co(II) ion solution was found out from this plot.

Preparation and estimation of Cr(VI) ion Solution

Standard solution of 0.0001 M Potassium dichromate was prepared by dissolving requisite amount of potassium dichromate in 1 liter of distilled water. 5 ml of this solution was then transfers in a beaker and to this add 2 mL of 3 M H_2SO_4 and 1mL 0.25% Diphenyl Carbazide solution in acetone. The volume was made up to 25mL with distilled water. A green color complex was formed and its absorbance measure at 540 nm. A standard Beers Law plot for estimation of Cr(VI) ion was obtained by this method using varying concentration of Cr(VI)ion solution and measuring the absorbance as detailed above. This plot was fairly linear showing the adherence to Beers law.Concentration of unknown Cr(VI) ions has been found out using this standard plot.

General Procedure adopted for equilibrium experiment

Equilibrium experiment were conducted by agitating 1 gm of the fruit shell substrate prepare above with 100 mL metal ion solution containing the respective metal ions for predetermine time in BOD bottle until the equilibrium was reached. The mixture was then filtered through Whatmann No. 41filter paper and the solution was analyzed for the respective metal ions by same method as use for preparation for Beers law. The quantity of metal ion adsorbed on fruit shell substrate was calculated by the difference between initial and final concentration of the metal ion solution. Batch experiments were performed for the

study of various parameters such as pH, concentration, dosage, temperature and light metal ions. The initial and final metal ion concentration was found out before and after adsorption by fruit shell substrate and from concentration of metal ion adsorbed,the percent removal calculated. The results have beendepicted in the form of graphs at appropriate places.

Result and Discussion

The result and discussion are given under the relevant paragraph for Co(II) and Cr(VI) metal ions with the *Dolichos biflorus*fruit shell substrate.

1.Effect of pH

The effect of pH on the adsorption of Co(II) and Cr(VI) ions in different solutions has been studied. 1 gm of fruit shell substrate was agitated with 100 ml of 25.34 ppm solutions of Co(II) and 24.58 ppm solutions of Cr(VI) for 1 hour at room temperature. The pH of solutions was varied from 2 – 9. It has been observed that adsorption of metal ions gradually increases up to certain extent and then decreasesas the initial pH of the solution is raise from 2 to 9. The final pH was found to be less than initial pH.The maximum adsorption of metal ions (above 90%) was observed at pH 5, so the pH of both the metal solutions was maintained at 5, in order to prevent possibility of precipitation of the metal hydroxides.

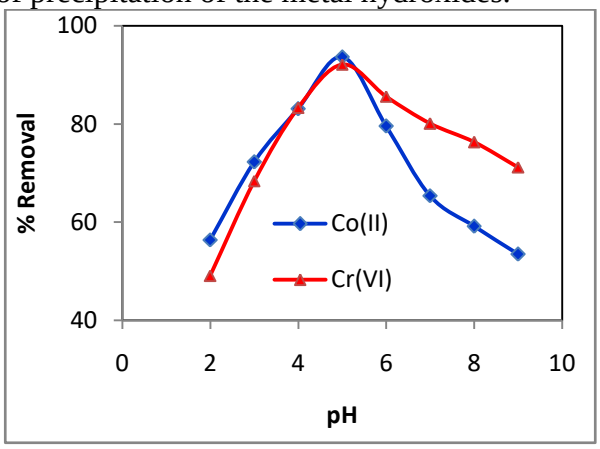

Fig. 1 Effect of pH on Adsorption of Co(II) and Cr(VI)

2. Effect of Agitation/Contact Time

100 ml of metal ion solutions were agitated with 1 gm of fruit shell substrate for different time intervals varying from 10-120 minutes.It is evident from the data that theremoval of Co(II) and Cr(VI) from solutions occurred within 10 minutesshowing that the metal ion adsorption on the substrate was very fast. After contact time of 60 min maximum adsorption obtained, the value remain constant even after the contact time of 120 min. Hence, 1 hour contact time was fixed for further studies.

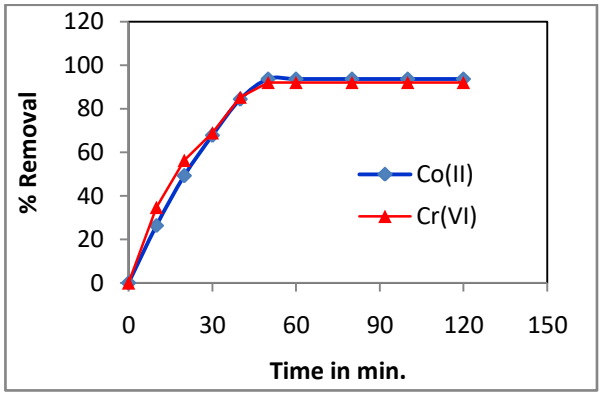

Fig. 2 Effect of Agitation/Contact Time on Adsorption of Co(II) and Cr(VI)

3.Effect of Initial Metal ion Concentrations

100 ml of metal ion solutions were agitated with 1 gm of fruit shell substrate at pH 5 for about 1 hr. at room temperature. It has been observed that metal ion removal from solutions decreased with increase in initial metal ion concentration.

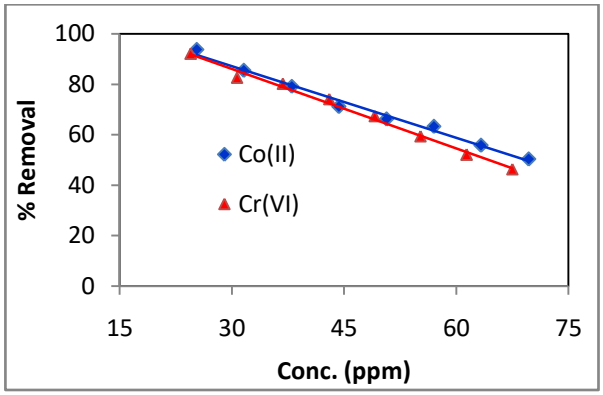

Fig. 3 Effect of Initial Metal Ion Concentration on Adsorption

4. Effect of dosage of fruit shell substrate:

The pH of 100 ml metal solutions of Co(II) and Cr(VI) were adjusted to 5 and varying dosage of fruit shell substrate from1 gm to 4 gm was added. The solutions were agitated for desire time of 1 hr., it was observed that the removal of metal ions increases with increasing dosage of bark substrate, However 1 gm was chosen for further studies. Using the data the

Freundlich adsorption isotherm has been drawn by plotting log Ce vs. log X/M. Where, log Ce is the residual concentration of the metal ion and log X/M is concentration of metal ions adsorbed per gram of adsorbent. The plot is showing straight line.

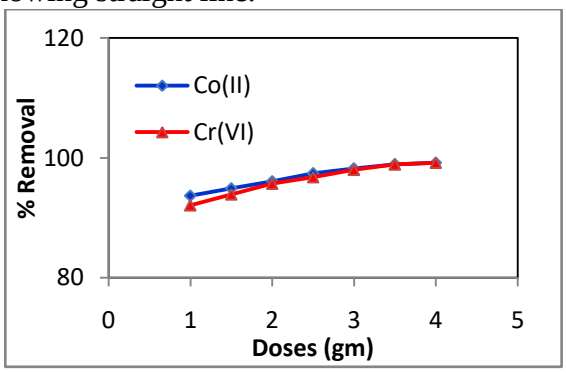

Fig. 4 Effect of Dosages of Substrate on Adsorption of Co(II) and Cr(VI)

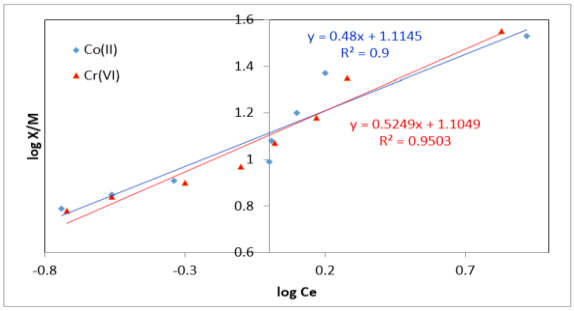

Fig. 5 Freundlich Adsorption Isotherm for Adsorption of Co(II) and Cr(VI)

5. Effect of Temperature

The metal ion solutions were adsorbed on the fruit shell substrate at different temperature of 30, 50, 70 and 90°C. It has been observed that, when 1 gm of the substrate was agitated with 100 ml of metal ion solution at pH 6 for 1 hour at different temperatures, the metal ion removal decreases with increase in temperature. Hence all further studies were performed at room temperature of about 30°C for convenience.

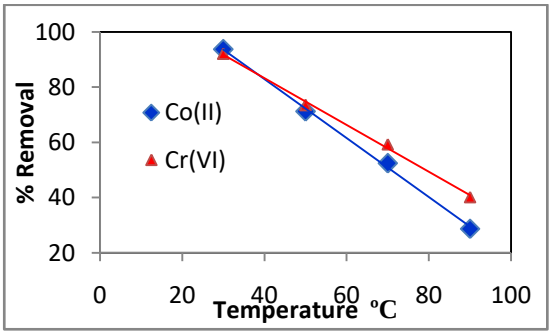

Fig. 6 Effect of Temperature on Adsorption of Co(II) and Cr(VI)

6. Effect of Light Metal Ion Ca(II)

The effect of increasing concentration of light metal ion Ca(II) on adsorption of Co(II) and Cr(VI) has been studied. It was observed that the increase in concentration of light metal ion, adsorption gradually decreases. Maximum adsorption was observed in the absence of these light metal ions.

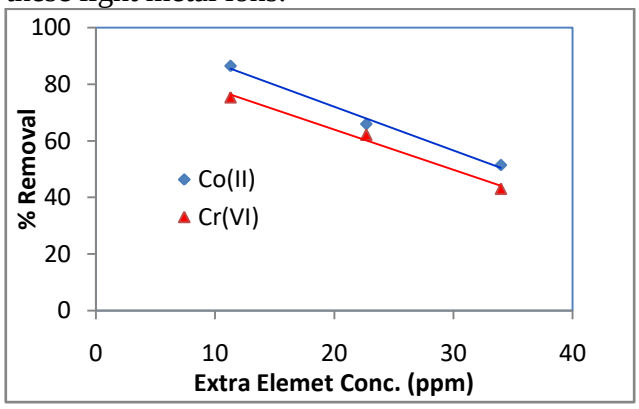

Fig. 7 Effect of Concentration of Extra Element on Adsorption of Co(II) and Cr(VI)

Conclusion

The adsorption behavior is of fruit shell substrate was like a typical cationic exchanger with selective characteristics. Hence, it has different affinity for different metal ions.The metal ions in the solution exchange with the H^+ions of substrate resulting into decrease in pH of the metal ion solution. The fact also has been observed in present study that the final pHof the metal ion solution was less than the initial pH and the useful range of operation is limited by the H^+ concentration, to weakly acidic through basic conditions (say pH 2-9). Infect the metal ions bound by the fruit shell substrate can completely leached back into solution by regenerating it with N/10 mineral acid.

The effect of contact time, initial metal ion concentration, dosage of substrate,temperature and light metal ion on the adsorption efficiency of substrate follow a typical trend as shown by any adsorbent.

Acknowledgement

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MANAGEMENT OF NATURAL RESOURCES

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ABSTRACT

A resource is any factor which can be used to satisfy human wants (any source of raw materials). Resources generally can be described as attributes attaches to things. This leads to trade-off) a resource can be viewed in terms of material e.g. raw materials, land or in abstract terms e.g. Human Knowledge, attributes of labors. In general, resources depend on importance attached to it. Resources are therefore man made. They are created because someone wants something, a goal and hence means of achieving the goal. If man does not make use of something, that thing is not a resource. A resource is therefore employed to meet certain defined objectives. The attribute of labor is because someone wants to hire it. The attribute of land also is because it can be used for certain purposes and someone is willing to use it or take advantage of its fertility, topography, accessibility, scenery etc. The value of resource hence depends on the context in which man takes it. For example, it is the context of forest estate, inland water fisheries, lakes, oceans, mineral resources in the country that really matters. The context in which resources are taken also influenced by social, economic, and cultural backgrounds as well as technological know-how. Therefore, nothing is independent and nothing may be regarded as unmanageable in a vacuum. The concept of a resource therefore varies in time and space due to technological advancement and human wants. For example, the use of saw dust as cooking fuel was not appreciated in some part of the country until the scarcity of the conventional sources such as kerosene and cooking gas sequel to the industrial actions by the Petroleum and Natural Gas Workers.

Keywords:*Ecosystem, rain water harvesting, recycling, segregate, degradation.*

Introduction

Natural Resources, Poverty, and Sustainability.

Natural resources provide fundamental support to life and economic processes. Soils are the foundation of agriculture, which in turn is the basic building block in the livelihoods of all people. Forests help protect water sources, reduce the risks of natural disasters such as landslides and flooding, are home to at least 87 percent of remaining terrestrial biodiversity, and are a major carbon sink that mitigates climate change. More than 7 billion people depend on forests for their livelihood in some way. Water is essential for the sustenance and health of humankind and indeed of all species. It is an important input for agriculture and many industries and a significant sink for waste discharges. Coastal and marine ecosystems include some of the most diverse and productive habitats on earth. Marine fisheries are an important part of the world's food supply. Ecological processes maintain soil productivity, recycle nutrients, cleanse air and water, and regulate climatic cycles. At the genetic level, diversity found in natural life forms supports the breeding programs necessary to protect and improve cultivated plants and domesticated animals and thus helps safeguard food security. Properly managed, natural resources provide the foundation for maintaining and improving the quality of life of the world's population and can make invaluable contributions to sustainable growth.

- **What is Management of Natural Resources?**

Management of natural resources refers to the plan of action related to renewable and non-renewable resources. Natural resources like land, soil, water, plants and animals are affected by global warming, overpopulation, industrial expansion and other related reasons.

- **Why is Management of Natural Resources Important?**

Following are the reasons why the management of natural resources is important:

1. To maintain a balance in the ecosystem.
2. To avoid further destruction of the environment.
3. To avoid over-consumption of natural resources.

Literature Review

The various approaches applied to natural resource management include:

1. **Top-down (command and control)**
2. **Community-based natural resource management**
3. **Adaptive management**
4. **Precautionary approach**
5. **Integrated natural resource management**
6. **Ecosystem management**

Community-based natural resource management

The community-based natural resource management (CBNRM) approach combines conservation objectives with the generation of economic benefits for rural communities. The three key assumptions being that: locals are better placed to conserve natural resources, people will conserve a resource only if benefits exceed the costs of conservation, and people will conserve a resource that is linked directly to their quality of life

Social capital and gender are factors that impact community-based natural resource management (CBNRM), including conservation strategies and collaborations between community members and staff.

This approach includes recognition that adaption occurs through a process of 'plan-do-review-act'. It also recognizes seven key components that should be considered for quality natural resource management practice:

- **Determination of scale**
- **Collection and use of knowledge**
- **Information management**
- **Monitoring and evaluation**
- **Risk management**
- **Community engagement**
- **Opportunities for collaboration.**

Integrated natural resource management

Integrated natural resource management (INRM) is the process of managing natural resources in a systematic way, which includes multiple aspects of natural resource use (biophysical, socio-political, and economic) meet production goals of producers and other direct users (e.g., food security, profitability, risk aversion) as well as goals of the wider community (e.g., poverty alleviation, welfare of future generations, environmental conservation). It focuses on sustainability and at the same time tries to incorporate all possible stakeholders from the planning level itself, reducing possible future conflicts.

Research Work

- **Problems**

i. **Social Problems**

Due to the construction of high-rise dams, a large number of human settlements are submerged in the water of large reservoir formed by the dam and many people are rendered homeless. This creates a social problem. It is, therefore, necessary that all the people who are displaced from the dam site are given adequate compensation by the Government for rehabilitation so as to start their life afresh.

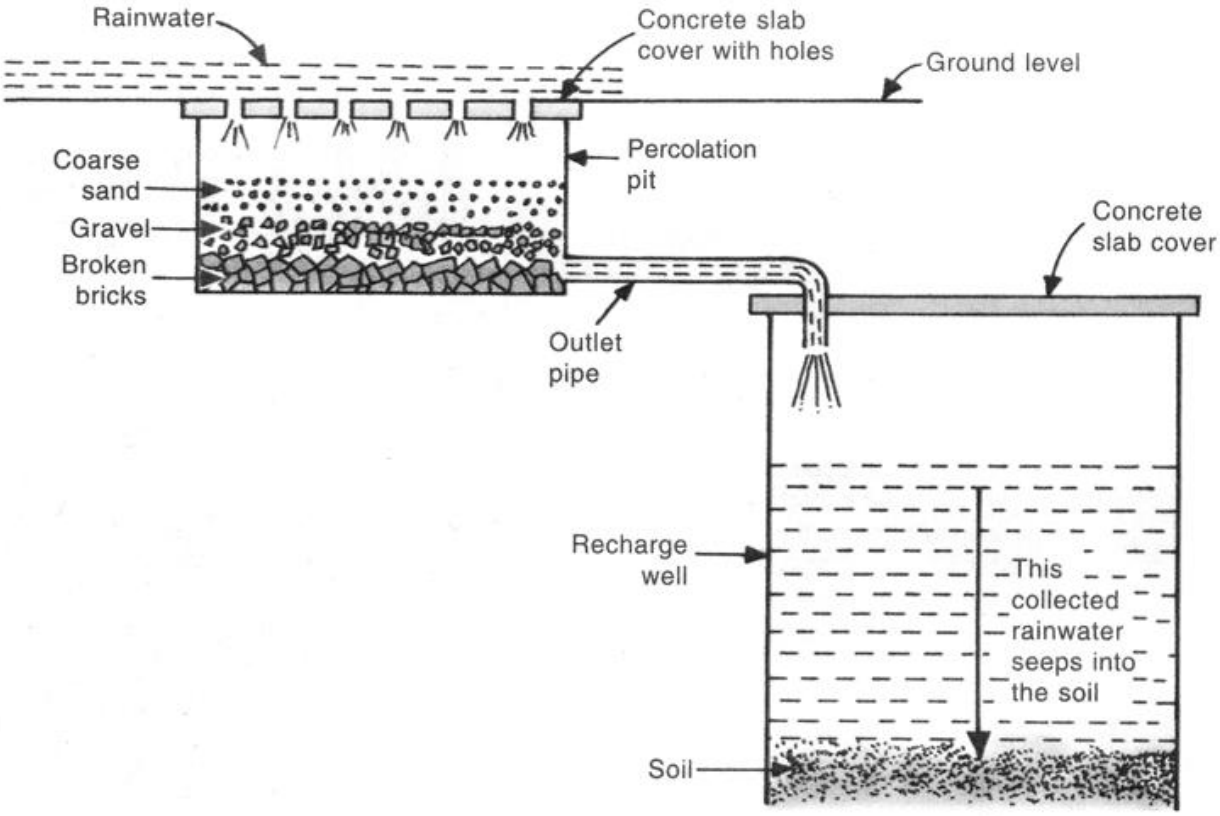
ii. **Environmental Problems**

the construction of high-rise dams on the rivers contributes to deforestation and loss of biodiversity. This is because a vast variety of flora and fauna get submerged in the water of large reservoir formed by the dam and disturb the ecological balance.

iii. **EconomicProblems**

Some people say that the construction of high-rise dams involves the spending of huge amount of public money without the generation of proportionate benefits. On the other hand, others say that there can be no real progress without building dams because they allow us to manage our water resources properlyand at the same time give us much needed electricity. So, whether the construction of dams on rivers is an economic problem or not is a debatable question. Rain water harvesting is an option.

- **Rain Water Harvesting in open spaces**



Need to Manage Natural Resources

Here are the reasons why we need to manage our natural resources:

i. Everything that we use today – food, clothes, house, vehicles, fuel, notebooks, furniture, cooking gas, utensils, toys, roads, etc. is obtained from resources on the earth.

ii. A significant portion of the energy which we use today is obtained from non-renewable sources. This implies that once they are used up, they cannot be replenished. The most important source of non-renewable energy used extensively is the fossil fuels which have taken millions of years to be formed.

iii. Managing the resources would not only ensure their rational use but also put a limit to the degradation it is causing to the environment. For example, the usage of resources in different forms generates a lot of waste which is being disposed of into the water bodies. This, in turn, is polluting the rivers and lakes. Limiting usage will also reduce waste generation and pollution.

POPULATION AND PRESSURE ON RESOURCE UTILIZATION

In 2007, the world population was estimated at 7 billion with a growth rate of 1.9 % per annum. This is projected to reach 9 billion at the end of the century. However, the world's population is unevenly distributed. By the end of 21st century, the dichotomy in demographic processes between developed countries (DCs) and less developed countries (LDCs) was very apparent. While there is rapid rate of urbanization in DCs, birth control in LDC's are beginning to reduce fertility level. Growth rate in DCs have virtually stabilized.

i. Developed Countries: refers to industrialized countries characterized by a population that has realized a high standard of living, good health and long life expectancy.

ii. Developing Countries: are countries that have started to industrialized hut that still contain large segment of

population that live under pre-industrialized conditions.

iii. Less Developed Countries: are characterized by low level of industrialization, poor health care and low life expectancy

Conclusions And Suggestions

ThethreeR'stoSavetheEnvironment

The excessive and indiscriminate use of various types of natural resources is spoiling our healthy environment day by day. We can save our environment by practicing three R's: Reduce, Recycle and Reuse.

This is explained below.

1. Reduce

Reduce means that we use less of the natural resources by cutting down on those practices which lead to their wastage. For example, we can reduce the wastage of electricity by switching off unnecessary lights and fans. Saving electricity means that we are reducing the use of coal. We can reduce the wastage of water by repairing the leaking taps. We can reduce the use of LPG by making use of solar cooker for cooking food. We can reduce the use of petrol by walking or cycling for short distances. And we can reduce the use of water resources and fertilizers by preventing the wastage of food.

2. Recycle

Recycling means that we should collect the used and discarded items of paper, plastic, glass and metals, and send them to the respective industries for making fresh paper, plastic, glass or metal objects.In order to recycle materials, we should first segregate our domestic wastes properly so that the materials which can be recycled do not get dumped along with other household wastes which are to be thrown away.

3. Reuse

Reuse means that, if possible, we should use the same things again. For example, the plastic jars in which we buy various food items like jams and pickles, etc., can be used later on for storing things like salt, spices, sugar, tea-leaves and pulses, etc. And paper envelopes can be reversed inside out and used again. The process of 'reuse' is better than that of 'recycling' because some energy is used to recycle old objects but no energy is required during reuse. The items which can be reused are, however, very limited.

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MEDICINAL PLANTS USED BY THE RURAL PEOPLE OF SAILU TALUKA, DISTRICT PARBHANI, MAHARASHTRA

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ABSTRACT

The medicinal application of plants used by local people, herbal venders and medicinal practitioner were assessed through survey during 2018-2019. The medicinal plants used for the treatment of diseases like Fever, piles, Mouth ulcer, Joint pain, Headache etc. The information on medicinal recipes, mode of administration and dosage etc. was collected from this area. Total 20 plant species belonging to 15 families of angiosperms are used in preparation of medicine has been documented. It is enumerated alphabetically with local name, scientific name and parts used, formulation and mode of administration with doses.

Keywords:*Medicinal Plants, Sailu Taluka, Medicinal Practitioner and Maharashtra*

Introduction

World health organization estimates over 80% of people in developing countries depends on traditional medicines for the treatment of different diseases (Padir, *et.al*., 2020). The sailu taluka of Parbhani district rich in medicinal plants. Rural people and medicinal practitioner use medicinal plants for the treatment of various diseases. Medicinal plants are the essential natural resources. The preservation of traditional knowledge can be effectively documented by the pervasive participation of local herbal- healers (Shete, 2022). Now a day it is essential to make the documentation of such important medicinal information of plants. However, many of these medicinal valuable plants have not yet been studied and its overall medicinal value is ignored. Therefore, the present investigation was carried out to collect the all information of medicinal values from the Local people and medicinal practitioner in Sailu taluka of Parbhani District, Mahrashtra. The traditional knowledge about medicinal plants useful for development of new food sources and drug. The exploration of different natural resources and documentation of traditional knowledge is necessary. (sure and Gaikwad, 2019)

Geographically the Sailu taluka is situated in 19026' 31.20" North latitude and 76025' 44.40" East longitude. The total geographical area of taluka is 682km^2 including 6.77.29 km^2 rural and 4.62 km^2 urban area and its population is 169174. Total number of villages in taluka is 94.

Materials and Methods

Methods of Collection:

Medicinal data was collected between 2018-2019; the information was mainly gathered through interview and discussion. Most of the interviews and discussions were held in Sailu Taluka. In this study medicinal information collected from 6 knowledgeable elders (between the ages of 55 to 60) During the course of the study each informant was visited three times in order to verify the reliability of the obtained data. Repeated visits also helped to get some additional information that was not mentioned during the earlier interviews.

Identification

The collected plants were identified with help of standard floras (Naik, (1979); Naik *et al.*, (1998) and Yadav and Sirdesai (2002).The plants were enumerated alphabetically along with botanical name, family and vernacular name.

Table No.1. Systematic Enumeration of Plants used as Medicine by People of Sailu Taluka

Sr.No	Local Name	Plant Name	Part(s) Used	Disease
1	Tandulja	*Amaranthus tricolor* L.	Leaves	Fever
2	Ramphal	*Annona reticulata* L.	Leaves	Boils
3	Bilayat	*Argemone mexicana* L.	Root	Scorpion sting
4	Hinganbet	*Balanites aegyptica* (L.) Del.	Seed oil	Skin Diseases
5	Apta	*Bauhinia variegata* L	Leaves	Fever
6	Lal Kate shawari	*Bombax ceiba* L.	Stem Bark	Piles
7	Palas	*Butea monosperma* (Lamk.) Taub	Seed and Leaves	Abdominal Pain
8	Devtarota	*Cassia sophera* L.	Seeds	Abdominal Pain
9	Gokarna	*Clitoria ternatea* L.	Leaves	Mouth Ulcer
10	Chubak Kata	*Echinops echinatus* Roxb.	Root	Piles
11	Pisola	*Euphorbia dracunculoides* Lamk.	Leaves	Joint Pain
12	Kusumba	*Goniocaulon indicum* (Klein ex Willd.) Cl.	Leaves	Abdominal Pain
13	Ghaneri	*Lantana camara* L.	Leaves	Skin diseases
14	Deep mala	*Leonotis nepetifolia* (L.) R. Br.	Flower	Skin Diseases
15	Kutri	*Martynia annua* L	Flower	Headache
16	Shevga	*Moringa oleifera* Lamk.	Leaves	Joint pain
17	Tulsai	*Ocimum americanum* L.	Leaves	Cough
18	Utrand	*Pergularia daemia* (Forsk.) Choiv.	Leaves	Indigestion
19	Karanj	*Pongamia pinnata* (L.) Pierre	Seed	Skin diseases
20	Gulwel	*Tinospora cordifolia* (Willd.) Miers.	Stem	Fever

Discussion

The medicinal preparation vary depending upon type of diseases condition and method of administration (Siragvee,2015) In present study about twenty medicinal plant species belongs to 20 genera and 15 family were recorded. For each species latin name, local name, aliments to treated, Part(s) used are mentioned in this paper. The medicinal plant collected form Sailu taluka in this study were used by local people in the treatment of diseases. Medicine is being taken form whole plant or from the plant parts. The most not worthy plants are *Argemone mexicana* L., *Balanites aegyptica* (L.) Del., *Bauhinia variegata* L, *Clitoria ternatea* L., *Leonotis nepetifolia* (L.) R. Br., *Lantana camara* L., *Moringa oleifera* Lamk., *Ocimum americanum* L., *Pongamia pinnata* (L.) Pierre., *Tinospora cordifolia* (Willd.) Miers.. Traditional knowledge of local people on human disease is very important to find out new drugs for human health, also the doses and their administration needs to standardization with scientific way. (Sure and Gaikwad, 2019).

The present study suggested that the information on medicinal uses of plants by local people and medicinal practitioner may be used for botanical and Pharmacological research in future for the discovery of new sources of drugs.

Acknowledgements

I also grateful to all those informers who shared their knowledge about medicinal plants during survey.Author thankful to Dr. V.K. Kothekar Ex-Principal and Dr. M.S. Shinde, Principal, Nutan Mahavidyalaya, Sailu for their constant inspiration.

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GREEN COMPUTING: RECYCLING OF E-WASTE

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ABSTRACT

We can't do anything without electronic devices, especially computers in our daily lives work, and study."Going Green" is a rising trend establishing itself as the chartered way of doing things while saving the environment. This now appears in a large number of aspects of our lives, such as recycling, energy-efficient devices, clean energy sources, eco-friendly vehicles, and green buildings.

Green Computing is an Ascent trend establishing itself as the charteredway of doing things while saving the environment. Computer designers, developers, manufacturing companies,and vendors are investing in developing green computing modules and devices by reducing the use of hazardous materials and improving the recycling process of computing and digital modules.

Keywords:*E-waste, e-scraps, recycling, shredding*

Introduction

Modernity in green computing technologies such as computers, electronics, and computing technologies, Green renewable energy in computers and electronics,developing and manufacturing of energy-efficient computers, Recycling and green disposal of computers and digital devices, Low electricity consumption computers, smartphones, servers, and Tablets, Green production of green computers and digital devices.This paper focuses on the approaches of green computing and how it minimizes the environmental impacts of computers and other electronic devices effectively by e-waste recycling

Step-by-Step process of e-waste recycling

Recycling electronics is an often challenging area. This is because e-scraps are typically refined and manufactured from varied elements such as metals, plastics, and glass. While this process often changes.

Step 1: Collecting and transporting

It is thefirst stage of recycling e-waste. Here, recyclers place bins in specific places. When these bins get filled, the recyclers then transport the e-wastes to recycling facilities and plants.

Step 2: Shredding and classification

After collecting and transporting, the next step is to share and sort the e-waste. The success of separation relies on shredding. Shredding involves breaking e-waste into smaller pieces for proper sorting. With the use of hands, these tiny prices get sorted and then manually dismantled. This is typically labor-intensive as waste items are, at this stage, separated to retrieve different parts.After this, the materials get categorized into core materials and components. Then, these items get sorted into various categories. Typically, these category includes items that you can reuse as they are and those that require further recycling processes.In any case, e-wastes are often manually sorted, while compounds such as fluorescent light, batteries, UPS batteries, and toner cartridges should not be crushed or shredded by hand.

Step 3: Dust extraction

The tiny waste scrap gets smoothly folded via a shaking process on the conveyor belt. Smoothly pieces get broken down and extracted. So that there is no environmental degradation.

Step 4: Magnetic Separation

After this, a strong overhead magnet helps you separate steel and iron from other wastes. This

way, you have successfully recycled the steel from the waste stream.

Step 5: Water Separation

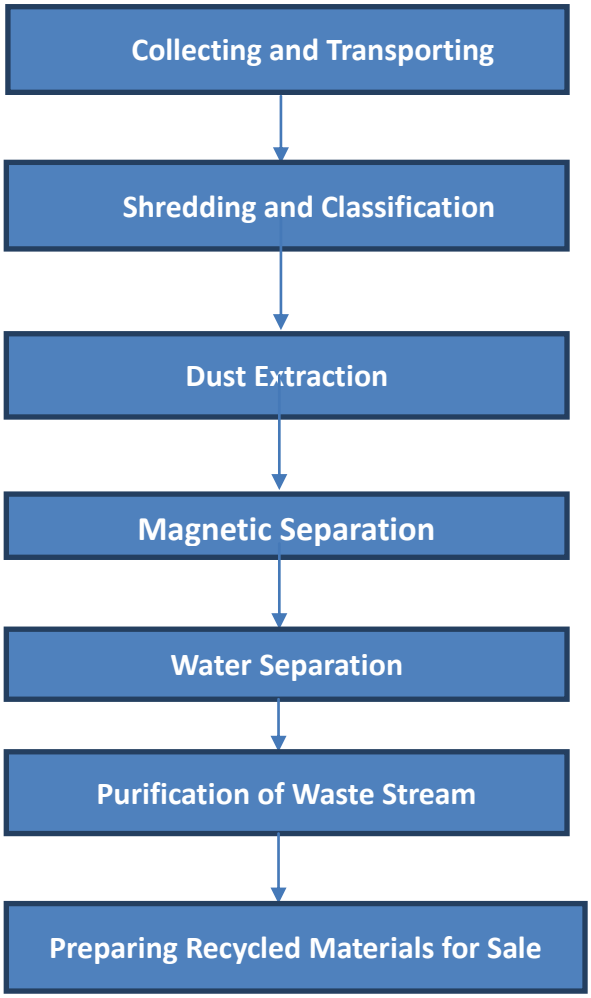
After this, the water separation technique becomes relevant to separate the glass from the plastic.We can then send leads that contain glass to smelters to use in the production of batteries, x-ray tubes, and new CRTs.

Step 6: Purification of the waste stream

The next step is locating and extracting leftover metals from plastics to purify the waste stream further.

Step 7: Preparing recycled materials forsale

The final stage is preparing recycled materials for sale. Here, the materials separated during SSS get prepared for sale as raw materials to produce new electronics.



ECO-friendly approach

The best practices and policies of green computing cover smart power usage, reduction of paper consumption, recommendation of new environment-friendly equipment, and safe recycling of old machines. Government agencies have set up severalenvironmental regulations addressing waste management, recycling, disposal of certain types of waste, industrial emissions, and pollution control. Electronics giants are about to come up with an eco-friendly range of computers (like desktops and laptops) that aim at reducing the e-waste in the environment. Efforts are made to ensure that, besides desktops and laptops, other electronic hardware products also strictly restrictthe use of hazardous substances. They are likely to be free of hazardous materials such as brominated flame-retardants, PVCs,and heavy metals such as lead, cadmium, and mercury, which are commonly used in computer manufacturing. The biggest single challenge before the electronics industries in the use of green materials in a computer is reliability. Here's how designers plan to make future computers more eco-friendly across their entire lifecycle, from manufacture to recycling:

- Energy-intensive manufacturing of computer parts can be minimized by making the manufacturing process more energy efficient
- By replacing petroleum-filled plastic with bio-plastics, plant-based, polymers that require less oil and energy to produce in comparison to traditional plastics with a challenge to keep these bio-plastic computers cool so that electronics won't melt them.
- Landfills can be controlled by making the best use of the device, by upgrading and repairing in time. Making up gradation and repairing processes
- Easier and cheaper and by avoiding the discarding will not only control e-waste out of dumps but also save energy and materials needed for designing and producing a whole new computer.
- High power-consuming display devices can be replaced with green light displays made of OLEDs, organic light-emitting diodes, etc.
- Use of toxic materials like lead can be replaced by silver and copper which makes

recycling expensive and time-consuming. The process can be made more effective by recycling computer parts separately with an option of reuse or resale.

Conclusion

E-waste recycling is a serious global concern for a lot of reasons. It has a strong impact on our immediate environment as humans and life on earth generally. It even promises economic returns for persons, communities, and even nations. What can be done to reduce the impact of wastewe can use our devices much longer to reduce the build-up of waste and come up with safer ways of collecting broken and old devices and direct the companies certified in e-waste recycling. We can even start an initiative in our company, neighborhood, or with our friends to have electronic components that are being used be safely collected in one place for safe recycling. Proper recycling starts with us as it climbs up to the other stakeholders in the electronic industry. If we throwour electronics into the trash or dustbin, they would most likely end up in landfills, which is something environmentalists are trying to avoid.

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A STUDY ON AVIAN DIVERSITY OF CHINTAMONI KAR BIRD SANCTUARY, SOUTH 24 PARGANAS, WEST BENGAL

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ABSTRACT

Birds fulfill many ecological functions in their habitats. For instance, they are bioindicators of healthy ecosystems. In addition, insectivorous species and raptors regulate disease vectors, including mosquitoes and rodents. Scavenger birds, such as the Pied Crow (Corvus albus), contribute to biomass recycling and to some degree reduce levels of disposable wastes. Frugivorous birds play an important role in seed dispersal of fleshy fruit-producing plants. Birds are also important in plant pollination as demonstrated by sunbirds, which participate in crossbreeding of flowering plants, especially those with bird-pollination syndrome. These ecosystem services are important for many communities, and to ensure that birds can fulfill these biological roles at an appropriate level for current and future generations, there is a pressing need to study the dynamics and socioeconomics of bird diversity outside protected areas, especially in urban areas.

1. Birds are heterotrophic and they are tertiary consumer as well as birds are bio-indicator.
2. How human interference affects in bird ecological condition and the health of birds.
3. Decrease of bird species by human and environmental interference.
4. Invasive species affects in local plant species health and composition and that finally effects on birds and its population.

Keywords:*Ecosystem, Birds' diversity, Protected area, Heterotrophic, Birds' population.*

Introduction

Chintamoni Kar Bird Sanctuary is located at the south outskirts of Kolkata Metropolitan near Narendrapur Ramkrishna Mission. Formally known as "Kayaler Bagan", is the home of varieties of Birds, Butterflies, Ferns and Orchids. This is originally given the status of 'Abhayarayna' or 'sanctuary' in year 1982.

Govt. of West Bengal took the initiative to make it open to the public and acquired it from private owners in October 2005 at quite a price. The area was notified as Narendrapur Wildlife Sanctuary vides G O No.3019-FOR dated 8 September 2004. It was later renamed as Chintamoni Kar Bird Sanctuary vide G.O No.4300-FOR/FR/O/L/6C-3/04 dated 21.10.2005. This was an honour to celebrated sculptor Chintamoni Kar, who had for many years fought relentlessly to gain the status 'Kayaler Bagan' for the sanctuary.

Chintamoni Kar Bird Sanctuary (C.K.B.S) is considered a paradise for bird watchers. This place is famous for its wide variety of birds, butterflies, epiphytes, ferns and orchids and is regularly frequented by bird watchers. Some rare species including migratory birds are sometimes spotted in this sanctuary too. The sanctuary also hosts some wildlife which includes the jungle cat, civet cat, monitor lizard, jackal, snakes and few others.

The Components of C.K.B.S. eco systems are as follows:

Abiotic Components:

1. It includes all organic and inorganic substances present in the soil and atmosphere.
2. Light efficiencies are different due to complex stratification of vegetation. The diurnal and seasonal variation of light as the dense canopy due to absence of light influences behavior of animals.
3. Climate: C.K.B.S. has three main climates:

a. Summer: Summers are moderate in C.K.B.S. and ranges about 34-37 degree Centigrade temperature.
b. Winter: During Winter in the day temperature rarely goes over 28 degree Centigrade. The nights are chilling and within the December the wetlands get forest. By mid January some deciduous trees have shed their leaves.

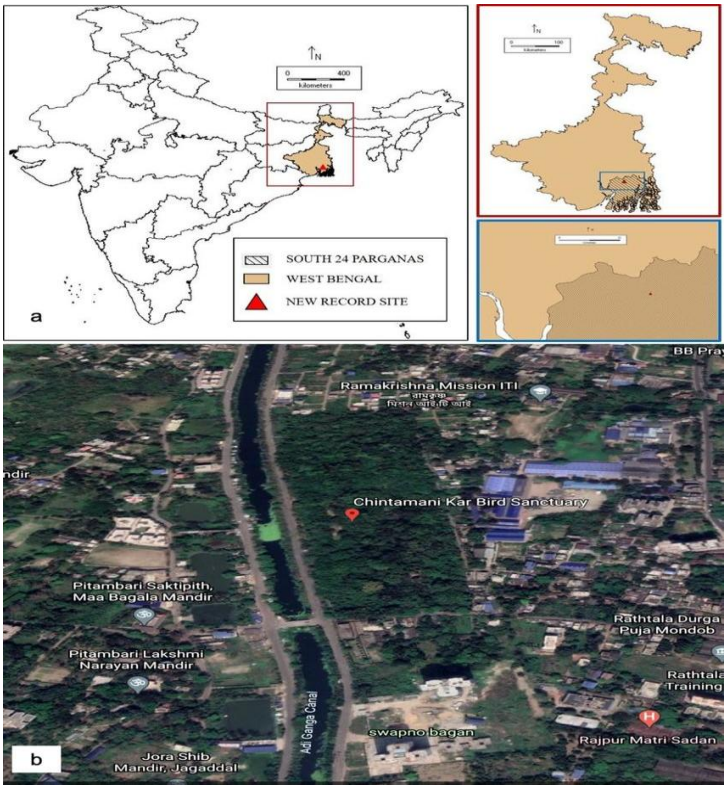
c. Monsoon: Monsoon is the best time at C.K.B.S. Raindrops come and butterflies begin to swarm all over, frogs appear in large number. In search of their prey, reptiles & birds are easy to spot that time. Insect's population flourishes. Grasses sprout and by mid July they are lush greens and are spread out all through the sanctuary. A thick undergrowth of Monocots and creepers cover the floor of the forest.

Biotic Components:

1. Producer: Over 80% of the park is tropical mixed on species such as Bamboo, Mango, Neem, Jackfruit, Guava, Coccinia sp etc and many more ferns, orchids, creepers, climbers are also present. These are autotrophs, responsible for trapping the radiant energy of sun with the help of their pigments.
2. Consumer: It depends on the producers (directly or indirectly) for their nutritional requirement for supply of energy.
   a. Primary consumers : They are :
      i) Herbivorous animals - Squirrels, Rabbits etc.
      ii) Herbivorous birds - Spotted dove, Blue-throated barbet etc.
   b. Secondary Consumer: They include all carnivores that depend on other herbivores.
      i) Carnivorous animals - Jungle cat, Fox etc.
      ii) Carnivorous birds - Rufous treepie, Woodpeckers, Nightjars etc.
      iii) Carnivorous Reptile - Snakes, Chameleon.
   c. Tertiary Consumers: This includes predators preying upon the secondary consumers.
      i) Top Carnivorous animal - Monitor lizards.
      ii) Top Carnivorous birds - Greater coucal, Brown fish owl etc.
3. Decomposer: There are wide varieties of micro-organisms including species of *Aspergillus, Coprinus, Polyporus, Xylophagus, Chironomous, Fusarium, Bacillus, Clostridium* etc. The main decomposer of C.K.B.S.:
   a) Bacteria: e.g. *Pseudomonas, Clostridium* etc.
   b) Fungi:
      i) Wood fungi - e.g. Bascidiomycetes (*Poria* sp.)
      ii) Dung fungi - e.g. Ascomicetes (*Ascobulus* sp.)
      iii) Soil fungi - e.g. *Fusarium oxysporum*.

Methodology

Modified Pollard and Yates (1993) method was followed or recording the birds in both the places in winter season while walking along fixed paths. Birds were observed for 8 hour interval during daytime. Photographs were taken from all possible angles for quick identification. Specimens were not collected but field identification was done with the help of field guides.



MAP OF STUDY AREA (CHINTAMONI KAR BIRD SANCTUARY)
(Source: https://www.researchgate.net/figure/a-Map-of-India-showing-location-of-Chintamani-Kar-Bird-Sanctuary-CKBS-Narendrapur_fig1_345770507)

DATE AND TIME OF DATA COLLECTION

DATE	TIME	PLACE
14/09/2017	8 A.M TO 3:30 P.M	CKBS
15/09/2017	8 A.M TO 3:30 P.M	CKBS
21/09/2017	8 A.M TO 3:00 P.M	CKBS
22/09/2017	8 A.M TO 3:30 P.M	CKBS
12/10/2017	8 A.M TO 3:00 P.M	CKBS
13/10/2017	8 A.M TO 3:00 P.M	CKBS
26/10/2017	8 A.M TO 3:30 P.M	CKBS
27/10/2017	8 A.M TO 3:30 P.M	CKBS

ORIGINAL BIRD CHECK LIST OF CHINTAMONI KAR BIRD SANCTUARY:

SL No	Birds' Name	Scientific Name
1	Lesser whistling duck	*Dendrocygna javanica*
2	Cotton pygmy goose	*Nettapus coromandelianus*
3	Tufted duck	*Aythya fuligula*
4	Yellow-legged buttonquail	*Turnix tanki*
5	Barred buttonquail	*Turnix suscitator*

6	Eurasian wryneck	*Jynx torquilla*
7	Rufous woodpecker	*Celeus brachyurus*
8	Brown-capped pygmy woodpecker	*Dendrocopos nanus*
9	Fulvous-breasted woodpecker	*Dendrocopos macei*
10	Streak-throated woodpecker	*Picus xanthopygaeus*
11	Black-rumped flameback	*Dinopium benghalense*
12	Greater flameback	*Chrysocolaptes lucidus*
13	Lineated barbet	*Megalaima lineata*
14	Blue-throated barbet	*Megalaima asiatica*
15	Coppersmith barbet	*Megalaima haemacephala*
16	Common hoopoe	*Upupa epops*
17	Indian roller	*Coracias benghalensis*
18	Common kingfisher	*Alcedo atthis*
19	Stork-billed kingfisher	*Halcyon capensis*
20	White-throated kingfisher	*Halcyon smyrnensis*
21	Pied kingfisher	*Ceryle rudis*
22	Green bee-eater	*Merops orientalis*
23	Chestnut-headed bee-eater	*Merops leschenaulti*
24	Pied cuckoo	*Clamator jacobinus*
25	Common hawk cuckoo	*Hierococcyx varius*
26	Indian cuckoo	*Cuculus micropterus*
27	Eurasian cuckoo	*Cuculus canorus*
28	Asian koel	*Eudynamys scolopacea*
29	Greater coucal	*Centropus sinensis*
30	Alexandrine parakeet	*Psittacula eupatria*
31	Rose-ringed parakeet	*Psittacula krameri*
32	Asian palm swift	*Cypsiurus balasiensis*
33	House swift	*Apus affinis*
34	Barn owl	*Tytoalba*
35	Collared scops owl	*Otus bakkamoena*
36	Brown fish owl	*Ketupa zeylonensis*
37	Spotted owlet	*Athena brama*
38	Large-tailed nightjar	*Caprimulgus macrurus*
39	Indian nightjar	*Caprimulgus asiaticus*
40	Rock pigeon	*Columba livia*
41	Spotted dove	*Streptopelia chinensis*
42	Emerald dove	*Chalcophaps indica*
43	Yellow-footed green pigeon	*Treron phoenicoptera*
44	Slaty-legged crake	*Rallina eurizonoides*
45	White-breasted waterhen	*Amaurornis phoenicurus*
46	Baillon's crake	*Porzana pusilla*
47	Ruddy-breasted crake	*Porzana fusca*
48	Common moorhen	*Gallinula chloropus*
49	Bronze-winged jacana	*Metopidius indicus*
50	Red-wattled lapwing	*Vanellus indicus*
51	Oriental honey buzzard	*Pernis ptilorhyncus*
52	Black kite	*Milvus migrans*
53	Crested serpent eagle	*Spilornis cheela*
54	Shikra	*Accipiter badius*
55	Little cormorant	*Phalacrocorax niger*
56	Cattle egret	*Bubulcus ibis*

57	Indian pond heron	*Ardeola grayii*
58	Black-crowned night heron	*Nycticorax nycticorax*
59	Indian pitta	*Pitta brachyura*
60	Brown shrike	*Lanius cristatus*
61	Long-tailed shrike	*Lanius schach*
62	Rufous treepie	*Dendrocitta vagabunda*
63	House crow	*Corvus splendens*
64	Ashy woodswallow	*Artamus fuscus*
65	Eurasian golden oriole	*Oriolus oriolus*
66	Black-naped oriole	*Oriolus chinensis*
67	Black-hooded oriole	*Oriolus xanthornus*
68	White-throated fantail	*Rhipidura albicollis*
69	Black drongo	*Dicrurus macrocercus*
70	White-bellied drongo	*Dicrurus caerulescens*
71	Bronzed drongo	*Dicrurus aeneus*
72	Spangled drongo	*Dicrurus hottentottus*
73	Greater Racket-tailed drongo	*Dicrurus paradiseus*
74	Common woodshrike	*Tephrodornis pondicerianus*
75	Black-naped monarch	*Hypothymis azurea*
76	Asian paradise flycatcher	*Terpsiphone paradisi*
77	Common iora	*Aegithina tiphia*
78	Orange-headed thrush	*Zoothera citrina*
79	Verditer flycatcher	*Eumyias thalassina*
80	Blue-throated flycatcher	*Cyornis rubeculoides*
81	Siberian rubythroat	*Luscinia calliope*
82	Bluethroat	*Luscinia svecica*
83	Oriental magpie robin	*Copsychus saularis*
84	Common stonechat	*Saxicola torquata*
85	Brahminy starling	*Sturnus pagodarum*
86	Asian pied starling	*Sturnus contra*
87	Common myna	*Acridotheres tristis*
88	Jungle myna	*Acridotheres fuscus*
89	Great tit	*Parus major*
90	Barn swallow	*Hirundo rustica*
91	Red-whiskered bulbul	*Pycnonotus jocosus*
92	Red-vented bulbul	*Pycnonotus cafer*
93	Zitting cisticola	*Cisticola juncidis*
94	Plain prinia	*Prinia inornata*
95	Oriental white-eye	*Zosterops palpebrosus*
96	Yellow-vented warbler	*Phylloscopus cantator*
97	Common chiffchaff	*Phylloscopus collybita*
98	Dusky warbler	*Phylloscopus fuscatus*
99	Hume's warbler	*Phylloscopus humei*
100	Jungle babbler	*Turdoides striatus*
101	Bengal bushlark	*Mirafra assamica*
102	Thick-billed flowerpecker	*Dicaeum agile*
103	Pale-billed flowerpecker	*Dicaeum erythrorynchos*
104	Scarlet-backed flowerpecker	*Dicaeum cruentatum*
105	Purple-rumped sunbird	*Nectarinia zeylonica*
106	Purple sunbird	*Nectarinia asiatica*
107	House sparrow	*Passer domesticus*

108	White wagtail	*Motacilla alba*
109	Yellow wagtail	*Motacilla flava*
110	Grey wagtail	*Motacilla cinerea*
111	Baya weaver	*Ploceus philippinus*
112	Indian silverbill	*Lonchura malabarica*
113	White-rumped munia	*Lonchura striata*
114	Scaly-breasted munia	*Lonchura punctulata*

RESULTS AND DISCUSSION

PRESENTLY ABSENT BIRD SPECIES OF CHINTAMONI KAR BIRD SANCTUARY:

SL No	Birds' Name	Scientific Name
1	Lesser whistling duck	*Dendrocygna javanica*
2	Cotton Pygmy goose	*Nettapus coromandelianus*
3	Tufted duck	*Aythya fuligula*
4	Yellow-legged buttonquail	*Turnix tanki*
5	Barred buttonquail	*Turnix suscitator*
6	Eurasian wryneck	*Jynx torquilla*
7	Brown-capped pygmy woodpecker	*Dendrocopos nanus*
8	Streak-throated woodpecker	*Picus xanthopygaeus*
9	Pied kingfisher	*Ceryle rudis*
10	Chestnut-headed bee-eater	*Merops leschenaulti*
11	Pied cuckoo	*Clamator jacobinus*
12	Collared scops owl	*Otus bakkamoena*
13	Baillon's crake	*Porzana pusilla*
14	Ruddy-breasted crake	*Porzana fusca*
15	Oriental honey buzzard	*Pernis ptilorhyncus*
16	Indian pitta	*Pitta brachyura*
17	White-bellied drongo	*Dicrurus caerulescens*
18	Bronzed drongo	*Dicrurus aeneus*
19	Spangled drongo	*Dicrurus hottentottus*
20	Greater racket-tailed drongo	*Dicrurus paradiseus*
21	Blue-throated flycatcher	*Cyornis rubeculoides*
22	Siberian rubythroat	*Luscinia calliope*
23	Bluethroat	*Luscinia svecica*

If we compare between Original Bird List and Modern Bird List of CHINTAMONI KAR BIRD SANCTUARY, we find that the number of bird species is decreasing. In this place, the number of original bird species was 114, which was seen formerly in regular basis. But nowadays 23 bird species are absent from here.

So, 23 species are lost out of 114 species.

Therefore, the bird species decreasing percentage is (23/114)*100 = 20.18%

This is a very serious matter.

CURRENT THREATS IDENTIFIED DURING THE STUDY TO CHINTAMONI KAR BIRD SANCTUARY:

- **Road extension threat to bird heaven:** The forest department has raised serious objections to the Kamalgazi – Baruipur extension of the Eastern Metropolitan Bypass along either side of the Adi Ganga, as it overstepped a portion of the ecologically sensitive Chintamoni Kar Bird Sanctuary, better known as Kayaler Bagan, in Narendrapur. The 19 – km road, now which is taking a lot of pressure of Netaji Subhas Chandra Bose Road, is likely to take away a part of the land stretching from daag 2140 to daag 2903. Our apprehension is that a lot of very old trees, which had been home to numerous migratory and

indigenous birds, felled down already due to making of that road. The ecological loss is irreparable in such circumstances.

- **Excessive sound pollution:** The sanctuary is situated at the very critical juncture of the land, which is utilized for a two lane high speed corridor. It is only 2.5 – km away from Kamalgazi. The road for Baruipur-bound vehicles from Kamalgazi is required this land. The road for Garia-bound vehicles on the other bank of Adi Ganga faces no such problem. As the road is a high speed corridor, the vehicles go with high speed and use ear-piercing horns for all the day. This is very harmful for the bird species and their behavior of the sanctuary.
- **Disruption of food web:** As the down lane of the Eastern Metropolitan Bypass is located between this sanctuary and Adi Ganga, during the movement from one side to another side, various mammals such as mongoose, rats and reptiles, insects often get crushed under high speed vehicles and die. As a result, the balance of the food web of this region is lost, which results in the decrease in the number of raptors and other carnivorous birds.
- **Social problem:** Currently, another problem is seen in this sanctuary is that the trees which are getting damaged in various cyclones are being cut down more and more by the people in the vicinity to collect firewood. As a result of this, the shelter of the birds is reduced as well as the food of the frugivorous birds.

Conclusion

The avian population in Chintamoni Kar Birds Sanctuary is remarkably and gradually decreasing year by year for several causes. It seems to me there are some probable reasons for the above problem, those are stated below:

1. The extension of Eastern Metropolitan Bypass passing through Chintamoni Kar Bird Sanctuary areas carries every moment a large numbers of high speed vehicles with their electric horns (high decibel) and creates a vast disturbance to the birds' normal and peaceful life in the quiet areas.
2. The growth of canopy of *Mikania* sp and *Cuscuta* sp over and around the big trees obstructs their normal photosynthesis process and welcomes their untimed and early death, as a result of which the birds are losing their food and shelter.
3. Tough competition among the birds for their affluent food and night shelter in connection with their survival causes to the edge of abolish.
4. The birds are being affected very much by several types of fungal infection created from the atmosphere causing either illness or even death.
5. The quiet and peaceful atmosphere is very much affected by the increasing large number of high-rise apartments and flying dust of building materials coming from the road side open shops and project places.
6. The black smoke of nearly built bakeries gradually polluting the areas too much.
7. Due to drying up of the ponds in CHINTAMONI KAR BIRD SANCTUARY, the water birds lost their interest to be appearing here.

Suggestion

Some points of remedy to retain the existence of the Chintamoni Kar Bird Sanctuary and to save the avian population as well.

1. The adjacent areas of Chintamoni Kar Bird Sanctuary should be considered as silence zone with the help of government administration.
2. No further extension in Eastern Metropolitan Bypass in breadth along this area should be planned.
3. No further high rise constructions should be permitted henceforth.
4. Bushes of *Mikania* and *Cuscuta* could be scavenged out with regular supervision.
5. A special care for the water ponds of Chintamoni Kar Bird Sanctuary could be initialized to save them. So that they do not dry up.
6. Air pollution in the area, adjacent to the Chintamoni Kar Bird Sanctuary could

be stopped by moving far away the bakeries, tea stalls that generate black smoke.

7. Plantation as regular basis should be initialized and organized by the forest department, West Bengal government.

All the points arose in my mind. The acceptability and the effect of those may be discarded.

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PHYSICO-CHEMICAL PROPERTIES OF SOIL FROM SOME FARMS OF KHAPARI, MURALI AND ANJI VILLAGE IN GHATANJI TAHSIL, YAVATMAL DISTRICT (M.S.) INDIA

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ABSTRACT

The soil is the one of the most important constituents to fulfillment of all the basic needs of human being. It is an important component of our farming. Soil properties that are sensitive to change in the management can be used as indicator. The present investigation objectively conducted to analysis the physico-chemical parameters of soil sample in some farms of Khapri, Murli and Anji Villages. The five samples were collected from different farms of the study area of Khapri, Murli and Anji Villages. A physico-chemical study of soil is based on various parameters like soil pH, electrical conductivity (EC), organic carbon (OC), available nitrogen (N), phosphorus (P), potassium (K), and micronutrients (Fe, Mn, Cu and Zn). Five representative samples were obtained and analyzed for its alkalinity content, pH, electrical conductivity, organic carbon, potassium, Calcium. This knowledge will help to the people who are interested to work in agricultural field.

Keywords:*Nitrogen, Organic Carbon, Electrical conductivity, Soil Sample, some villages farms.*

Introduction

The soil forms the intermediate zone between the atmosphere and the rock cover of the earth, the lithosphere. It also forms the interface between water bodies (hydrosphere) and the lithosphere and thus forming a part of biosphere. Soil is the thin layer of material covering the earth's surface and is formed from the weathering of rocks. Soil is the loose surface material that covers most land. It is made up mainly of mineral particles, organic materials, air, water and living organisms. 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. Soil provides the structural support to plants used in agriculture and is also their source of water and nutrients. Soils vary greatly in their chemical and physical properties. Processes such as leaching, weathering and microbial activity combine to make a whole range of different soil types. Each type has particular strengths and weaknesses for agricultural production. Soil is one of the earth's most important natural resources. It underpins human food production systems, supports the cultivation of vegetation for feed, fibre and fuel, and has the potential to help combat and mitigate climate change. It's also a rich and complex ecosystem, accommodating a staggering array of biodiversity. Therefore, the importance of soil on life is vast.

Material and Methods

Study Area:- Khapri, Murli and Anji villages are located in Ghatanji Tehsil of Yavatmal district in Maharashtra, It is situated 5 km away from sub-district headquarter Ghatanji and 35km away from district headquarter Yavatmal. Yavatmal is lies in the Vidarbha region of the state. It is also known as 'Cotton city', because in this area farmer produces a fine quality of cotton.

Data Collection: - Five samples were collected from the study area (farmer's field) in the month of March - April 2021. Soil samples (S-1, S-2, S-3, S-4 and S-5) were collected randomly at 0 to 20 cm depths with five plots, five samples from each plot respectively, in well sterilized polythene pouches.

Physicochemical Analysis of Soil Samples: - The soil samples were Collected and dried for about 24 hrs. grinded more finely. Methods use for estimation of various parameters is as fallows, like Determination of Moisture was by Weighting Method, pH by Digital pH Meter, EC by Conducto meter, OC, Ca, N, P, Ca by Titration Method; Determination of Mg was done by EDTA Titration Method.

Determination of Potassium (K) by Flame Photometry.

Observations & Results

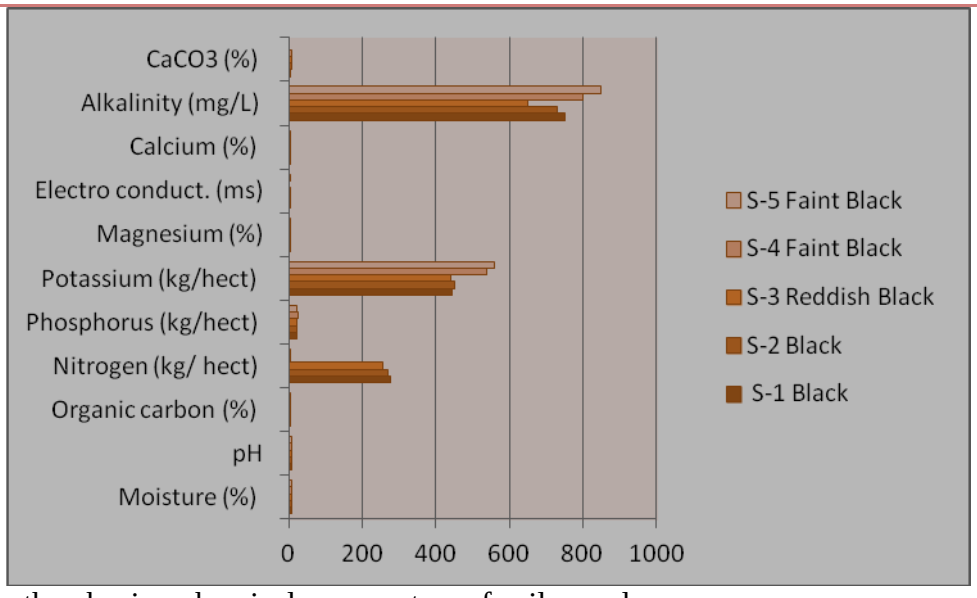
S. No.	Physicochemical Analysis of soil samples	**Results**
1	Color of Soil	The soil sample S-1, S-2 is Black, sample S-3 are Reddish Brown and S-4, S-5 was Faint Black in color.
2	Moisture	Value of moisture contains ranges from 1.7% -8 %. The result shows that the moisture of sample S-3 is more as compared to other samples.
3	pH	The range of pH is found in between 7.40 – 8.30.
4	Organic Carbon	Organic carbon were recorded in the range of 1.35 – 1.60 %. The soil sample S1 has high percentage of organic carbon. sample S4, S5 have moderate and sample S2, S3 has less organic carbon.
5	Nitrogen	Nitrogen content in the soil ranged from 255-294 kg/hect.
6	Phosphorous	Phosphorous content in the soil sample ranged between 20.5- 24.5 kg/hect. The soil sample S4 has more phosphorous content as compare to other sample.
7	Potassium	Potassium content in the soil sample ranged between 440 – 560 kg/ hector.
8	Magnesium	The Magnesium content in the soil sample ranged from 0.854 – 0.872 %.
9	Electric Conductance	The Electric Conductance values varies from 0.5 – 0.7 ms. It is seen that soil sample S3 have less amount of Electric Conductance.
10	Calcium	The Calcium content in soil sample ranges from 0.12 - 0.18 %.
11	Alkalinity	The Alkalinity was observed in the range between 650–850 mg/lit.
12	Calcium Carbonate	The Calcium Carbonate content in soil samples ranges from 5.35-7.25 %. It is seen that soil sample S4 have more amount of Calcium Carbonate as compared to other soil samples.

Discussions

From the above observation and results The Physico-chemical Analysis of soil samples has been found that the color of Soil sample S-1, S-2 are Black, sample S-3 are Reddish Brown and S-4, S-5 was Faint Black in color. Value of moisture contains ranges from 1.7% -8 %. The result shows that the moisture of sample S-3 is more as compared to other samples. The range of pH is found in between 7.40 – 8.30. Organic carbon was recorded in the range of 1.35 – 1.60 %. The soil sample S1 has high percentage of organic carbon. Samples S-4, S-5 have moderate and sample S-2, S-3 has less organic carbon. Nitrogen content in the soil ranged from 255-294 kg/hect. Phosphorous content in the soil sample ranged between 20.5- 24.5 kg/hect. The soil sample S-4 has more phosphorous content as compare to other sample. Potassium content in the soil sample ranged between 440 – 560 kg/ hector. The Magnesium content in the soil sample ranged from 0.854 – 0.872 %. The Electric Conductance values varies from 0.5 – 0.7 ms. It is seen that soil sample S3 have less amount of Electric Conductance. The Calcium content in soil sample ranges from 0.12 - 0.18 %. The Alkalinity was observed in the range between 650–850 mg/lit. The Calcium Carbonate content in soil samples ranges from 5.35-7.25 %. It is seen that soil sample S-4 have more amount of Calcium carbonate as compared to other soilsamples

Table 1: Physico-chemicals parameters of soil samples.

Parameters	S-1	S-2	S-3	S-4	S-5
Color	Black	Black	Reddish Black	Faint Black	Faint Black
Moisture (%)	7.73	8.30	6.75	8.40	7.40
pH	7.6	7.9	8.4	8.30	8.25
Organic carbon (%)	1.58	1.55	1.36	1.50	1.56
Nitrogen (kg/ hect)	275	270	255	2.92	2.94
Phosphorus (kg/hect)	20.5	22.4	22	24.5	20.5
Potassium (kg/hect)	445	450	440	540	560
Magnesium (%)	0.860	0.872	0.866	0.854	0.860
Electro conduct. (ms)	0.6	0.7	0.5	O. 6	0.7
Calcium (%)	0.12	0.14	0.14	0.18	0.16
Alkalinity (mg/L)	750	730	650	800	850
CaCO3 (%)	5.35	6.85	5.85	7.25	6.50



Graph shows the physico-chemicals parameters of soil samples**.**

Conclusion

Thus 5 soil samples were tested this analysis will give us an idea about nutrient requirements of soils. The value of pH found was S3>S4>S5>S2>S1. Moisture content was higher in reddish black soil. In the soil samples magnesium content was found to be equal. In soil sample S-1 and S-5 phosphorus is less as compared to other soil samples. In Sample S-4, S-5 nitrogen is approximately high. Thus analysis of soil samples is very important so that texture of the soil can be determined and we can try to improve it.

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CLIMATE CHANGE AND BUSINESS: IMPACT, CHALLENGES AND MEASURES

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ABSTRACT

Climate change isn't just an environmental problem. The climate is inextricably linked to nearly everything we do as a society. It's already starting to have an impact on businesses around the world, and it will continue to have an even larger effect moving forward. The climate crisis is changing the way we live and the way we work. In 2019, the UN's International Labour Organization reported that 80 million jobs would be at risk if rising temperature predictions materialize, with productivity impacted by unlivable working environments. Almost all industries are threatened by the effects of climate change, either directly or indirectly. One 2019 study has shown that the U.S. alone could lose USD 520 billion across 22 sectors due to global temperature rise. Customers react, both positively and negatively, to businesses that change to environmentally conscious practices. With the advancing impacts of climate change, weather-induced buying patterns stand to evolve in new and unexpected ways. Climate change is introducing new economic risks, phasing out old sources of energy, and creating fresh political challenges. Retailers, such as Walmart, are choosing suppliers who adopt environmentally friendly practices in order to appeal to the final customer. Other businesses are sharing sustainability data with investors because they know it affects profit. Going further, some businesses, such as the European department store Sainsbury's, are imposing regulations on themselves rather than waiting for the government to do so. All these companies are slowly transforming in an effort to remain solvent and viable in a climate-focused market.

Objectives

1. To study the potential Impact of Climate Change on Business.

2. To understand the present Challenges in front of business due to Climate Change.

3. To find out the Measures to tackle the problem of Climate Change.

Methodology of study: - This study is based on the Impact and Challenges of climate change on business in India and measures to overcome that challenges with the help of secondary data collection. The secondary sources of data are books, government report, internet (websites) and research papers etc.

Introduction

Climate change presents a growing threat to Indian businesses. Human activities have warmed the planet by more than 1°C since the 19th Century.1 Temperatures in India rose by 0.5°C in 50 years alone.2 These temperature increases resulted in changes to the summer monsoon in India.3 In the second half of the 20th Century, monsoon rainfall became both less frequent and more intense - increasing the risk of both drought and flood damage to crops.4 Changes to rainfall have reduced India's rice yields since the 1960s.5 In 2014 and 2015 India experienced weak rainfall during the monsoon, and in 2016 a drought led to water shortages and agricultural difficulties that affected a quarter of the population, according to the Government of India.6 Other effects include:

- A 12% drop in tea production in south India in 2016, due to drought; 7 the drought in Tamil Nadu was the worst in 140 years.
- A coal power plant in West Bengal had to shut most of its power-generating capacity for 10 days in 2016 because it did not have enough water for cooling - the first time it had done so in its 30-year history.
- Water storage in India's reservoirs is currently 55% of total capacity, according to the Central Water Commission - compared with 84% on average during the same period over the last 10 years.

Further climate change is likely to mean these problems will worsen. For example, the 2030 Water Resources Group, an international organisation, warns that India "faces a looming water crisis where demand is set to outstrip supply by 50% by 2030".11 Studies suggest climate change will make India's summer monsoon much more unpredictable.12 Businesses are worried about this threat,

according to the results of a survey of a number of India's top companies. The results show that many Indian businesses are already experiencing the consequences of climate change and are concerned about the threat as its effects grow.

Impact of Climate Change on Business

A) Value-chain risks: - The value chain is the process by which a company adds value to a product. This process could include design, production, cost and distribution of a product. For example, a company that extracts raw material from the earth, processes it in a factory, establishes a price and brings the product to market has vested a new value in the original material. Climate change can affect the value-chain at every point along the way.

1. Physical risks: These risks occur when a company's infrastructure, raw materials or other assets are destroyed or rendered useless due to a weather incident. These risks can include climate-related disasters such as floods, tsunamis and droughts. While no company can reverse an oncoming weather disaster, corporations can prepare for physical risks by assessing their vulnerability and taking steps to mitigate the most likely scenarios.

2. Prices: Climate change can cause the prices of commodities and raw materials to rise as weather-related disasters may render these materials rarer or more difficult to access. The result is lower supply, greater demand and higher prices.

3. Product: As climate change progresses, it could affect buying patterns. For example, consumers may turn to new sources of energy or renewable products, putting standard systems and products out of favor. According to Nielsen, 73% of customers say they would change their buying habits just to have a greater positive impact on the environment.

External stakeholder risks: - External stakeholders are the people who hold an interest in, but do not work for, a business. These stakeholders absorb the risks of increasing costs associated with climate change.

1. Ratings risks: These risks emerge from the higher costs associated with capital due to climate change. Severe weather can impact country-level ratings, which in turn affects the market rate of interest. This change is usually negative, according to most research.

2. Regulation: As global governments grow more concerned about the climate, they tend to place greater regulatory requirements on companies. These regulations may complicate a formerly simple business operation or even subsidize a "greener" competitor.

3. Reputation risks: Reputational risks are those risks a company assumes relative to its public image. Actions that the public considers negative or that can worsen climate change will likely make a company's reputation, and ultimately its profits, suffer.

Measures to Control the Impact of Climate Change on Business

1. Measure and Analyze Greenhouse Gas Emissions: - The first step for any company that wants to reduce its impact on the planet and the environment, and therefore help to reduce climate change, is to measure its greenhouse gas emissions (GHG). For this end, there are many private agencies that are carbon footprint certified and can help companies measure their CO2 emissions. Once GHG emissions are known, they must be analyzed to see which of the company's activities the highest pollutants are. Once this analysis is done, companies can then begin to consider solutions to reduce their emissions.

2. Reducing Energy Consumption: - Turning off the lights in the office in the evening, slightly lowering the heating or the air conditioning or taking devices off the plugs when it's not needed are some good actions companies can implement. Moreover, by paying more attention to other daily routine actions, businesses can slightly reduce their energy consumption and, thus, their impact on the climate.

3. Give Renewable Energies A Go: - Today, more and more individuals are choosing renewable energy and this is also an interesting solution for companies. Suppliers such as ekWateur or Enercoop represent an interesting solution for using only 100% renewable energy. Simply put: avoiding fossil fuels significantly reduces the climate footprint.

4. Reduce Waste and Fight Obsolescence: - Another way to reduce the climate footprint of a business is to reduce the amount of waste generated. Whether it is the industrial waste of a large company or the paper waste of a SME of the tertiary sector, all companies produce waste. Avoiding disposable cups, stirrers, and capsules for the coffee machine and giving kitchen crockery instead, reducing the number of prints, reusing papers as drafts, sort waste for recycling correctly. There are plenty of possible solutions depending on the facilities (office or factory) and an organization's core business, and many employees we'll have plenty of good suggestions if they are motivated to adopt an eco-entrepreneur mindset.

5. Optimize Employees' Transportation: - As we know, transportation is one of the largest sectors of greenhouse gas emissions. By encouraging employees to take public transit, to carpool with other colleagues living close by or by giving them discounts on public transportation, companies can significantly reduce their indirect CO2 emissions and therefore their impact on climate change.

6. Choose Greener Infrastructures and Equipment: - It is also possible to choose more environment-friendly infrastructures and equipments. In this way, companies can set up a fleet of hybrid or even electric vehicles to renovate their employees' cars according to the latest environmental standards. Or when the time comes to buy new printers, air conditioners, laptops, screens, bulbs or office materials, if the old ones can't be fixed or more are needed, choose the most efficient (energy-wise) and sustainable (regarding the origin or manpower ethic standards) ones.

7. Choose Sustainable Suppliers: - Each company also has a responsibility regarding the partners it chooses. Choosing a supplier is also an environmentally-friendly choice (or not, depending on the supplier). Therefore, companies should make the effort to choose suppliers who demonstrate they have good environmental practices.

8. Raise Awareness among Employees, Clients And Other Stakeholders: - As an economic agent, companies also play a role in raising awareness on their employees, consumers, media and other stakeholders. Organizing in-house contests, hackathons or campaigns to raise and improve awareness on sustainability issues is a great idea. Partner with outside organizations, do something original, unique, and powerful and that stays top of mind.

9. Promote Environmentally Friendly Ways of Working climate change environment eco-friendly: - Some ways of working are more ecological than others: telecommuting, for example, has many ecological advantages. One can also consider video conferences that avoid employees traveling by car for meetings with clients. Paper works also have a strong environmental impact, as does computer work and the Internet because of servers. Sometimes, avoid copying an entire company in an e-mail that only concerns one department can save a lot of CO2 emissions.

10. Mobilize For the Climate Change Challenge: - Finally, the role of companies is also political. In their territory, at the regional or national level, companies that want to fight climate change must be militant. By pushing politicians and public actors to act on global warming, they can have a huge influence. If companies are active, this can lead to new environmental regulations that can have a significant impact on global warming.

Conclusion

The first step a business needs to take is to conduct an analysis to define how it impacts the environment, as well as the potential risks it faces due to climate change. In addition to risks, businesses should identify opportunities to improve their environmental performance. Companies should examine whether they can source alternative materials and evaluate the feasibility of sing renewable energy4 such as solar, wind and biomass. Businesses can use this information to create an environmental management system5 they use to improve their performance. Climate change is much more than just an environmental issue. It will also have a profound impact on businesses in the years to come. To succeed in the climate of the future, companies will have to adapt.

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GLOBAL ENVIRONMENTAL POLITICS: PROBLEMS AND PROSPECTS

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ABSTRACT

The emergence of global environmental politics unveils different involved policies with problems. As we witnessed catastrophic environmental degradations over the last few years, to analyse this issue becomes imperative. This paper will throw light on different involved issues of the global environmental politics and revolving perspectives at large. The proposed study is basically explorative and explanatory in nature, where observations are made from reviewing of existing literature.

Keywords:*Global environmental politics, environmental degradation, etc.*

Introduction

Until the late 1980s, most governments viewed global environmental problems as minor, marginal issues to their core national interests and to international politics at large. The rise of environmental movements in industrialized countries and the emergence of global environmental threats affecting the well-being of all humanity - such as ozone depletion, Climate change and the dangerous decline of world fisheries have elevated global environmental issues to a higher status in world politics. Today, environmental issues are considered globally important, not only in their own right, but also because they influence other aspects of global politics, including economic development, trade and commerce, human rights, humanitarian action and even security.

Environmental issues do not consider national borders. Transboundary air pollution, degradation of shared rivers, and pollution of oceans and seas are just a few examples of environmental problems on an international scale. The sources, consequences and actors related to an environmental problem can be local, national, regional or global. If the origins or consequences are global, we consider the activities and consequences of it as a global environmental problem. Actors in global environmental policy are states (national governments), international organizations, environmental non-governmental organizations (NGOs), business and industry groups, scientific authorities and famous individuals.

Global environmental problems can be analysed in many ways. From an economist's point of view, environmental problems represent negative externalities - undesirable consequences or side effects of one person's actions that are borne by others. Externalities always exist, but when the use of useful but polluting technologies, such as coal-fired power plants, synthetic fertilizers, pesticides, herbicides, gasoline-powered vehicles and plastics, rapidly expanding, the externalities they create have become a serious global problem. In this sense, negative externalities leading to environmental degradation are like “tragedy of people living together”. For many years, the image of an open grassland, has been used as a metaphor for the over-exploitation of resources.

Navigating the idea of global environmental politics.

Oran Young, a pioneer in the scholarly study of global environmental politics, grouped international environmental problems into four broad themes: commons, shared natural resources, transboundary externalities, and linked issues. Various combinations of factors, including domestic economic and political forces, foreign policy objectives, and the impact of international organizations, NGOs, and corporations, which can influence a state's policy preferences on various environmental issues. Because the actual costs and risks of environmental problems are never evenly distributed, some governments are less

motivated than others to engage in international efforts to address them.

Countries also have different views on what constitutes a fair solution to a particular environmental problem. However, despite often diverging interests, in order to successfully address most international environmental problems, states must strive to reach consensus, at least among those who contribute significantly to a given environment specific problem. The important feature of global environmental policy is veto power. For every global environmental problem, there is one or more countries whose cooperation is essential to reaching a successful agreement to solve the problem that is likely to prevent other environmental problems. When these countries oppose an agreement or try to significantly undermine it, they become veto (or block) states.

The role of veto states is central to the bargaining and negotiating dynamics in global environmental politics. On the issue of a whaling moratorium, for example, four states, led by Japan, accounted for three-fourths of the whaling catch worldwide; they could therefore make or break the effectiveness of a global regime to save whales. Similarly, the major grain exporters (Argentina, Australia, Canada, Chile, the United States, and Uruguay) were in a position to block the initial attempts to reach consensus on a biosafety protocol under the Convention on Biological Diversity (CBD) for fear that the proposed provisions on trade in genetically modified crops would hamper grain exports. Veto power is so important that powerful states are generally not free to impose a global environmental agreement on less powerful states if the latter are both strongly opposed to it and critical to the agreement`s success.

Nevertheless, while less powerful states can play veto roles and sometimes prevent or weaken an effective agreement or bargain for special treatment. In general, the major economic powers wield greater leverage because of their larger role in global production and consumption and their ability to provide or deny funding for a particular regime. A related characteristic of global environmental politics is that the political dynamics within an issue area often reflect national economic interests or the positions of influential interests within a state. States sometimes seek to block or undermine international action due to concerns about its short-term economic impact. However, while economic power, interests, and trade dynamics can influence the outcome of negotiations on environmental issues, military power is not particularly helpful in influencing those results.

Various intergovernmental organizations (IGOs), including major United Nations agencies, global and regional financial institutions, scientific organizations and treaty secretaries, play an important role in global environmental policy. These roles include setting the agenda, providing independent and authoritative information, assisting in the development of standards or codes of conduct (soft law) to guide action on environmental issues. Environmental convention and treaty negotiations, assist in the implementation of global environmental treaties, and provide funding and influence on the environmental and development policies of specific countries.

Another characteristic of global environmental politics is that large global conferences convened by the UN have provided critical venues and marked significant milestones in its overall development. The first of these conferences, the historic 1972 Stockholm Conference on the Human Environment, placed global environmental concerns on the international agenda and established the first global, intergovernmental organization focused on the environment—the UN Environment Programme (UNEP). The foundation of the conference was the growing realization that "many of the causes and effects of environmental problems are global: this is, beyond the jurisdiction and sovereignty of any nation state. Global frameworks and other institutions are necessary in order to help organize and coordinate international action."

Stockholm conferences also marked the beginning of an explosive increase in government agencies, NGOs, IGOs, and multilateral environmental agreements (MEAs) focused on the environment. Twenty years later, in 1992, governments gathered in Rio de

Janeiro for UNCED, often called the Earth Summit.

Countries adopted three important nonbinding, agreements: the Rio Declaration on Environment and Development, which set out a number of important principles that continue to influence global environmental policy; Agenda 21, a voluntary list of actions and sustainability goals for countries and others to pursue during the twenty-first century; and the Statement of Forest Principles. To date, the global community has largely been unable to repeat these breakthroughs at subsequent conferences.

The World Summit on Sustainable Development (WSSD), held in Johannesburg in September 2002, could only test the implementation of the agreements adopted at the Earth Summit. In 2012, the international community returned to Rio to attend the United Nations Conference on Sustainable Development, commonly known as Rio + 20. This meeting has a broader mandate, receiving much attention. and generally took place in a more productive atmosphere than the 2002 conference. It also paved the way for future progress on a number of issues, including a formal proposal on sustainable development goals (SDGs), adopted by the United Nations General Assembly in 2015, in its outcome document, The Future We Want.

Perhaps the most important venues for global environmental policy, however, are the meetings convened to negotiate the creation, expansion and implementation of legally binding agreements and policies. Government officials meet regularly to review and sometimes strengthen global policy on biodiversity, climate change, endangered species, fisheries, hazardous waste, mercury, oceans, stratospheric ozone, toxic chemicals, wetlands, whales and other issues. The preparation and implementation of the outcomes of these conferences can influence not only national and international environmental policy, but also several aspects of economic, trade and development policy.

Today, regimes exist on many global environmental issues, from whale protection to climate change to hazardous waste. Global environmental regimes can vary widely in their history, purpose, rule, strength, and effectiveness. Environmental modes change over time, often expanding and strengthening, but sometimes weakening or varying in scope. The whaling regime was created in 1946 to perpetuate commercial whaling by establishing international regulation, but evolved into a ban on commercial whaling in 1985. Public policies and regimes are shaped not only by political and economic interests, scientific development, and technological innovation, but also by broad sets of beliefs held by people and society at a whole.

Conclusion

The emergence of environmental issues in global politics reflects a growing awareness of the cumulative stress that human activities place on different resources. Much of global environmental policy focuses on efforts to negotiate and implement multilateral agreements or other cooperative mechanisms to protect the environment and natural resources. Some of these agreements are at the heart of various effective global environmental regimes intended to regulate or guide the behaviour of nations. Legitimate differences in economic, political and environmental interests make it a political and external challenge to reach consensus among countries responsible for or directly affected by an environmental issues. One or more countries often have the ability to block or undermine a multilateral agreement, and finding a way around that bottleneck is a major concern. For a regime to take shape and be effective, veto states must be persuaded to give up their objections or at least compromise. Despite the overall growth and prospects of different environmental policies many concerns are still prevalent. Initiating smoother north-south dialogue can make the ways more globally sustainable.

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EFFECT OF SELECTED EXERCISES ON THE VO2MAX, HIP MOBILITY AND PERFORMANCE OF KABADDI PLAYERS

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ABSTRACT

The primary goal of the research is to determine the influence of selected exercises on physical as well as physiological variables of the Kabaddi players. For this purpose 40 subjects from Kabaddi west zone Interuniversity or state level Kabaddi competition players are selected by using simple purposive sampling method and the age group of subjects was ranged between 21-30 years. All the subjects were equally distributed in two groups one control group (N=20), the experimental group (N=20). The experimental groups were given 42 days of training and no training is given to the control group. It has been observed from the analysis of data that there is found no significant difference on maximal oxygen intake and performance of Kabaddi players but on the other hand there is found least significant difference in the joint mobility of Kabaddi players. Joint mobility is the only characteristic of the body which is the main concern as per as Kabaddi game is concerned.

Keywords:*Kabaddi, VO2max, Hip Mobility, west zone Kabaddi.*

Introduction

Today the games and sports have plays a vital role in the development of physical fitness and wellness of an individual because it maintains the coordination between mental and physical health. It is only the profession which leads to the development of sound body which intern leads to the development of sound mind. Everyone wants to win and stood first. With the enhanced status of sports in the society, the provision of sports training has become very important although the need for competent training has long been recognized. Without provision of effective sports training the sportsperson's potential will never be fulfilled. As it has been rightly said, the comprehensive sports training programme is the key factor in producing skillful high performers.

Scientific knowledge has revolutionized the standards of human performance in the sports discipline. Scientists and physiologists have been of the view that the physiological parameters of on athlete have to do with their performance, more than the techniques and tactics of the players. Most of the sports and games demand greater amount of oxygen, movements of the different kinds of joints and also needs highly skillful performance. These physical and physiological variables are very important for giving outstanding performance in any sports activity by a player or an athlete. So, research scholar selected effect of selected exercises on some physical and some physiological parameters.

The data is collected before and after the end of six weeks training programme by administrating following tests:

1. Stepping test for Maximal Oxygen Intake.
2. Flex meter or Goniometer is used to measure Joint mobility.
3. Johnson Kabaddi test is used to measure performance of the Kabaddi players.

It was hypothesized that there will be significant effect of selected exercises on Maximal oxygen intake, Joint mobility and performance of Kabaddi players. (Physical fitness components and Physiological parameters). To find out the significant effect of selected exercises the mean difference is and t-test was applied between pre and post test scores of experimental and control group and the level of significant is kept at 0.05.

Depending on the sort of project suggested, variables such as chronological age, grade level, socioeconomic position, sex, race, I.Q, mental level age, academic performance level, and other relevant aspects of the target population are typically included. The number of subjects desired from the population and how they will be selected are also included in

this section. The reader should be able to understand exactly from where and how the subjects are to be selected so as to make replication possible.

Purpose of the study

The main purpose of the study is to find out the effect of selected exercises on physical as well as physiological variables of the Kabaddi players.

Hypothesis

On the basis of available literature and researcher's own experience and understanding about the problem, it hypothesized that:

H_1: There is found significant effect of selected exercises on maximal oxygen intake, joint mobility and performance of Kabaddi players.

Selection of Subjects

Forty male subjects will be selected for this study. The selected subject was participated minimum in Kabaddi west zone Interuniversity or state level Kabaddi competition players.

Sampling Method

The subjects will be selected by using simple purposive sampling method.

Selection of variable:

Maximal oxygen intake, joint mobility and performance will be selected as variables for this study.

Selection of tests

Stepping test will be used for measuring $VO_{2\ Max}$; Goniometer will be used for measuring joint mobility of Kabaddi players.

Table 1: Training Schedule for Experimental Group

Day	Exercise	Time	Training Load
Monday	1. Jogging 2.General Warming-up 3.Interval Training Method 4.Upward and Downward Hill Running 5.Rest 6.Forward and Backward Running 6. Forward and Backward Stepping 7.Stepping up and Down 8.Relaxation	5 Min. 5 Min. 10 Min. 5Min. 5 Min. 10 Min. 5 Min. 5 Min. 10 Min.	Load should be given according to the capacity and potentiality of players
Tuesday	1.Jogging 2.General Warming-up 3.Side Stretching 4.Side Bending 5.Static Flexibility Exercise 6. Rest 7.Dyanamic Flexibility Exercise 8.BallisticExercise 9.Passive Flexibility Exercise 10. Post Isometric Stretch Exercise 11. Relaxation	3 Min. 3Min. 4 Min. 5 Min. 10 Min. 5Min. 5 Min. 5 Min. 5 Min. 10 Min. 5 Min.	Load should be given according to the capacity and potentiality of the players
Wednesday	1. General Warming-up 2. Semi hook shot	5 Min. 5 Min.	Load should be given according to the capacity and

	3.Board Tapping 4. Two hands cross pass 5. One hand set shot 6. Rest 7.Two hand set shot 8. Lay up shot 9.Dribbling in Zigzag Motion 10. Flip and Base pass 11.Relaxation	5 Min. 5 Min. 5 Min. 5 Min. 5Min. 5 Min. 5 Min. 10 Min. 5 Min.	potentiality of the players
Thursday	1. Jogging 2.General Warming-up 3.Interval Training Method 4.Upward and Downward Hill Running 5.Rest 6.Forward and Backward Running 7. Forward and Backward Stepping 8.Stepping up and Down 9.Relaxation	5 Min. 5Min. 10 Min. 10Min. 5 Min. 10 Min. 5 Min. 5 Min. 5 Min.	Load should be given according to the capacity and potentiality of the players
Friday	1.Jogging 2.General Warming-up 3.Side Stretching 4.Side Bending 5.Static Flexibility Exercise 6.Rest 7.Dyanamic Flexibility Exercise 8.BallisticExercise 9.Passive Flexibility Exercise 10. Post Isometric Stretch Exercise 11. Relaxation	3 Min. 3 Min. 4 Min. 5 Min. 10 Min. 5 Min. 5 Min. 5 Min. 10 Min. 5 Min. 5 Min.	Load should be given according to the capacity and potentiality of the players
Saturday	1. General Warming-up 2. Semi hook shot 3. Board Tapping 4. Two hands cross pass 5. One hand set shot 6. Rest 7.Two hand set shot 8. Lay up shot 8.Dribbling in Zigzag Motion 9. Flip and Base pass 10.Relaxation	5 Min. 5 Min. 5 Min. 10 Min. 5 Min. 5 Min. 5Min. 5 Min. 5 Min. 5 Min. 5 min.	Load should be given according to the capacity and potentiality of the players
Sunday	Rest		

Level of Significance

To test the hypothesis the level of significance was set at 0.05 level of confidence which was considered adequate and reliable for the purpose of this study.

Findings

The information was obtained from 40 male subjects before and after a six-week training programme on maximal oxygen intake, joint mobility, and performance. The collected data was then statistically analysed by comparing the means of pre and post-test of control and experimental groups and was statistically analysed again by using t-test to check for a significant difference between selected variables. Therefore separate tables and graphs have been presented for each variable. Each table gives the mean of pre and post-test of control as well as experimental group. Also the researcher can find the standard deviation of both control and experimental group and also their mean difference is also been given in the table. The level of significance for the present study is kept at 0.05 level of significance and also the degree of freedom is also be kept in mind for the calculation of tabulated 't' which is then compared with the calculated 't'. This is used for testing of hypothesis which was given by the researcher previously.

If the value of the calculated 't' is more than the tabulated 't' then the hypothesis of the researcher will be accepted and if the value of the calculated 't' is less than the tabulated 't' then the hypothesis of the researcher will be rejected. Acceptance or rejection of hypothesis does not matter.

Statistical Analysis

Table 2: Vo_2 Max Between Post Test Of Control andExperimental Group

Group	Mean	S.D.	M.D.	D.F.	O.T.	T.T.
Control	65.20	1.81	0.83	38	1.44	2.04
Experimental	66.03	1.80				

***Level of Significance = 0.05 Tabulated 't' 0.05 (38) = 2.04**

Table-2 reveals that there is difference between means of post test of control and experimental group, because mean of post test of control group is 65.20 is slightly less than mean of post test of experimental group which is 66.03, and their mean difference is. 0.83. To check the significant difference between post tests of control and experimental group the data is again analyzed by applying't' test. Before applying't' test, standard deviation is calculated between post tests of Control and Experimental group which is 1.81and 1.80 respectively. There is found no significant difference between post tests of control and experimental group because value of calculated 't' (1.44) which is less than tabulated' (2.04) at 0.05 level of confidence, which shows no significant improvement was found in experimental group after six weeks training schedule.

Graph 1: Graphical Representation Of Mean Difference Between Pre and Post Test Of Control And Experimental Group for VO_{2Max}

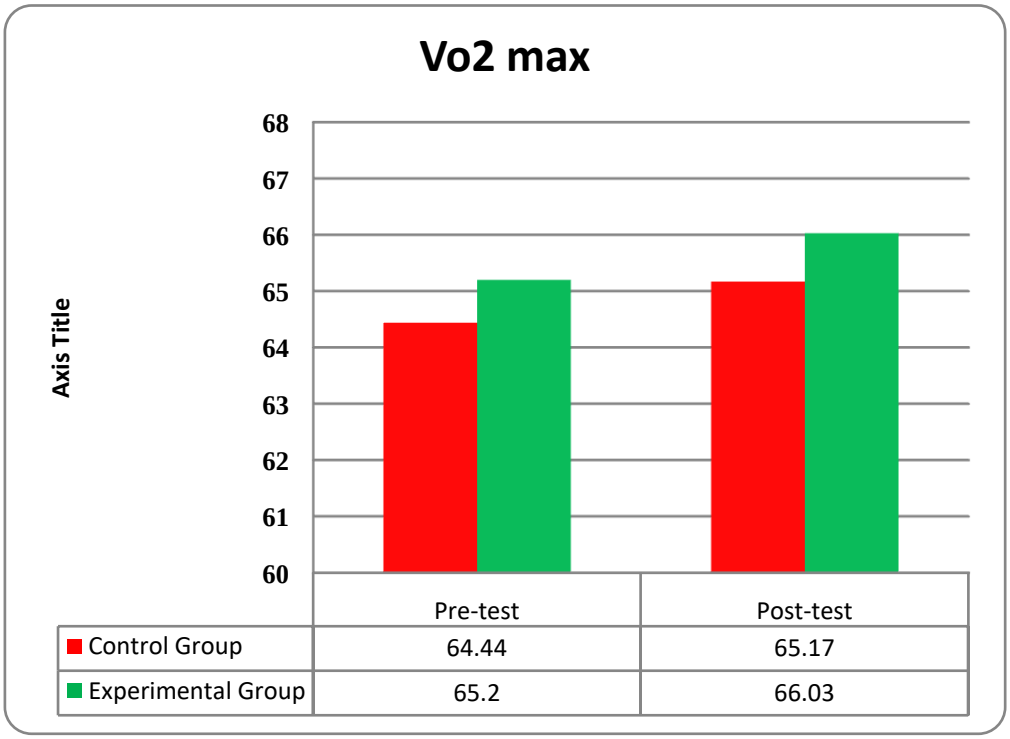


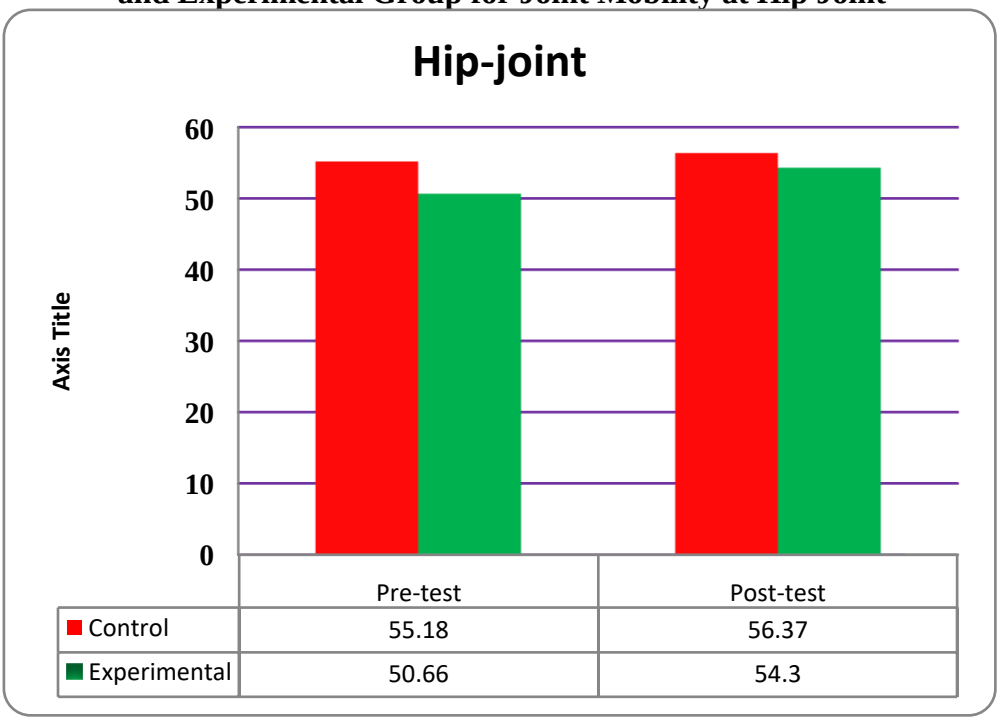
Table 3: Mobility of Hip Joint between Post Test of Control and Experimental Group

Group	Mean	S.D.	M.D.	D.F.	O.T.	T.T.
Control	56.37	10.68	2.07	38	0.65*	2.04
Experimental	54.3	9.13				

***Level of Significance = 0.05** **Tabulated't' 0.05 (38) = 2.04**

Table-9 reveals that there is found difference between means of post test of control and experimental group, because mean of post test of experimental group is 56.37, slightly less than mean of post test of control group which is 54.33 and their mean difference is 2.07. To check the significant difference between post tests of control and experimental group, the data is again analyzed by applying' test. Before applying't' test, standard deviation was calculated between post tests of both control and experimental group which is 10.68 and 9.13 respectively. There is no significant difference between post tests of control and experimental group because value of calculated't' (0.65) which is less than tabulated 't'(2.04) at 0.05 level of confidence, which shows no significant improvement has been found in experimental group after six weeks training.

Graph 2: Graphical Representation of Mean Difference between Pre and Post Test of Control and Experimental Group for Joint Mobility at Hip Joint



Discussion on Findings

It has been observed from the analysis of data that there is found no significant difference on maximal oxygen intake and performance of Kabaddi players but on the other hand there is found least significant difference in the joint mobility of Kabaddi players. Joint mobility is the only characteristic of the body which is the main concern as per as Kabaddi game is concerned.

Conclusion

Within the limitations of the study and from statistical analysis the following conclusion was drawn. There is found no significant difference on Maximal oxygen intake and performance of State level or West Zone Kabaddi players but it is least effective for range of motion of Kabaddi players.

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BARLEY GRASS POWDER ADDITION TO A PLANT-BASED FEED IMPROVED GROWTH AND FLESH QUALITY OF INDIAN MAJOR CARP CATLA CATLA (HAMILTON, 1822)

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ABSTRACT

The present investigation aimed to evaluate the effects of barely grass added plant based feed on growth and flesh quality of Indian major carp Catla catla (Hamilton, 1822). The growth performance of fish showed increased total length, total weight, specific growth rate, body weight index, relative growth rate increases and health condition factor with increased in barley grass level. The improved survival rate was also observed in groups fed with high level of barley grass added plant based feed. The flesh quality analysis showed that moisture, crude lipid and ash content do not represent any significant change except the crude protein level was observed to be improved with increased barley grass content in plant based diets. In considering the overall performance, barley grass supplementation (10%) in plant based diet is recommended for successful aquaculture of this important fish species

Keywords:*Barley grass, Catla catla, carp, fish feed, flesh quality, growth.*

Introduction

The fresh water fish culture is one of the most important fish production systems. It refers to the commercial cultivation and rearing of the fish in freshwater system such as tank, ponds and other enclosure as the food production. Fish is a highly nutritive and rich source of animal proteins. For the improvement of fisheries and to achieve maximum yields from resources of fresh water, it is necessary to provide an artificial feed, by which fish grow rapidly and attain maximum weight in shortest possible time. One approach is to include new substances into fish diets to improve feed conversion efficiency or elevate general conditions for fish growth and maintenance (Bhosale *et al.*, 2010; Shrivastava *et al.*, 2012; Joshi *et al.*, 2015).

Fish feeding is one of the most important factors in commercial fish farming because feeding regime may have consequences on both, growth performance and feed wastage (Azzaydi *et al.*, 2000). Hence nutrient composition of feed, such as protein, carbohydrate, lipid, vitamins, and minerals are the most important factors affecting the health and growth of fish; hence, properly balanced supplemental feeds with a reliable feeding rate can be helpful to enhance survival and growth (Ammar, 2008; Alina *et al.*, 2013; Lee *et al.*, 2016; Shabana *et al.*, 2019). In recent years, plant products (leaf, root, stem, bark, etc.) have been used as a natural growth promoters and immunostimulant instead of antibiotics in aquaculture feed formulations. It is due to their eco-friendly and cost-effective properties compared to synthetic drugs.

Barley grass (*Hordeum vulgare*) refers to young grass of the common barley plant, which belongs to Poaceae family. This is one of the most commonly found herb in India which is freshly juiced or dried into powder for animal and human consumption. According to Yawen *et al.* (2018), barley grass powder is the best functional food that provides nutrition and eliminates toxins from cells in human beings; however, its functional ingredients have played an important role as health benefit. Barley grass is rich in active phytochemicals with variety of pharmacological properties. The recent studies supported that barley grass may be one of the best functional foods and the best raw material of modern diet structure. It will help in promoting the development of large health industry as barley grass have preventive and therapeutic role for chronic diseases (Panthi*et al.*, 2020). These potential varieties of barley grass suggested the effective utility in fresh water fish culture.

In this concern, present study aims to evaluate the dietary barley grass induced growth

performance and flesh quality of Indian major carp *Catla catla* (Hamilton, 1822).

Materials and Methods

Experimental diets

For the experiment, barley grass from conventional organic farm was used. A crop of mature barley grass (8 inches) trimmed to 1/2-inch above the soil. It took 6 to 9 days for barley grass to be mature. The harvested grass blades lay on a clean baking sheet. The oven temperature was set to 150^{O} F and inserted the baking sheet. The blades were allowed to dry out in oven. After two hours onward, the blades were dried and brittle. The barley grass grinded in a clean grinder once the blades of grass were dry and brittle. The developed powder was stored in dry airtight container for experimental use. For the diet preparation, ingredients were sun dried, weighed, mixed and then grinded in food processor. At first, control feed mixture was prepared. The experimental feed mixtures were prepared by combining the required proportion of control feed mixture and barley grass powder. The grinded mixtures were pelleted with size of 2.5 mm die. After pelleting, the feeds were air dried and put in an air-tight container. The composition of experimental diet is given in Table 1.

Table 1: Composition of barley grass powder added plant- based fish feed

	Control	**Experimental**				
Ingredients (%)	**BG0**	**BG 1**	**BG 2**	**BG 3**	**BG 4**	**BG 5**
Sunflower meal	20	Control feed				
Wheat	20					
Barley	15	98	96	94	92	90
Soybean	10					
Peas	10					
Oats	10					
Corn	10					
Rapeseed	05					
Barley grass powder	---	02	04	06	08	10

Fish farm and stocking of fish

The culture experiment of *Catla catla* was carried out at the fish farm. The farm has three tanks in premises, a nursery pond (9mx5mx2m), a stocking pond (18Mx9mX2m) and a plankton culture pond (5mX3Mx1m). Water requirement of all these ponds is fulfilled from the rain water harvesting project of the college. About six nylon net happa of size 4X2X3 ft were installed in a water tank for stocking the fingerlings (Jayakumar *et al.*, 2014). The Indian major carp *Catla catla* of average weight 32.68±3.10 and length 11.11±0.74 grams were stocked in the happas at the density of 40 fishes.

Maintenance and feeding

The Indian major carp *Catla catla* were obtained from the Government Fish Seed Farm at Mahan for the experiment. The fingerling of about 8-10 cm in size was selected. They were transported in large plastic bags containing pond water in which oxygen pumped prior to transport. The fingerling brought to the laboratory for observation for any pathological symptoms. The collected fishes were disinfected with 1% $KMNO_4$ solution to avoid fungal infection. Then fingerlings were rinsed in water and acclimatized for one week. Tanks were aerated by air pump for supply of oxygen to individuals. The drain settled in tanks is collected by filtration net. Water quality was maintained during the feeding trials. The specimens were fed on control diet during acclimatization. The experiment was performed for 60 days. During the acclimatization, fish were fed the control diet to satiation twice a day at 09:00 and 15:00 hours. During experiment, the fishes were fed on experimental diet to satiation thrice a day at 08:00, 12:00 and 16:00 hours.

Water quality standards

Water quality was maintained during the feeding trial with light: dark cycle of 12:12 h during study. The water analysis is performed according to APHA (2000). The water composition and characteristics were maintained within the effective range (Bhatnagar and Devi, 2013). During the experimental period, water temperature was

28.5±2.5^{O}C; pH 8.1±0.5; total dissolved solids 240.5±19.5 mg/L; dissolved oxygen 4.42±0.24 mg/L; biological oxygen demand 1.70±0.20 mg/L; free CO_2 13.4±1.3 mg/L; alkalinity 65.3±5.0 mg/L; hardness 123.20±16.76 mg/L; ammonia 0.55±0.01 mg/L; nitrate 0.136±0.28 mg/L; nitrite 11.39±0.37 mg/L; salinity 0.3±0.1 ppt in the experimental tanks.

Growth performance analysis

The growth performances of experimental fishes were carried out at the end of 60 days. The total lengths of randomly sampled fish were measured with considering that the total length is the length from the tip of snout of fish to the end of caudal fin. Similarly, total weight of fish was measured by using electronic balance. Records were analyzed by using the formulae suggested by Altorre-Jacome *et al.*, (2012) with some modification. Results were recorded as Mean ± Standard Deviation of triplicate.

a) Total Length Increase (TLI) = Final Length – Initial length
b) Total Weight Increase (TWI) = Final Weight – Initial Weight
c) Specific growth rate (SGR) = $[(\ln W_t - \ln W_0) / T] \times 100$
d) Relative Growth Rate (RGR)= Weight gain (g) / Time (Days)
e) Body Weight Index (BWI)= Weight (g) / Length^3(cm)
f) Health Condition Factor (HCF)= BWI × 100
g) Average Survival Rate (ASR)= [No. of fishes survived / No. of fishes stocked] × 100

Flesh quality analysis

Flesh quality analyses were performed according to AOAC (1995) procedures. Water content was determined by drying samples at 105±2 °C until a constant weight was obtained. Dried samples were used for determination of crude protein, lipid and ash contents (Bake *et al.*, 2016). Results were recorded as Mean ± Standard Deviation of triplicate.

Result and Discussion

Table 2 shows the growth performance of Indian major carp *Catla catla* fed on control and barley grass added plant based formulated fish feed. It shows that the total length of fish increases from 2.11±0.16 to 7.06±0.58 cm; total weight increased from 43.47±3.02 to 96.09±2.74 g; specific growth rate increased from 0.658±0.037 to 0.908±0.097; body weight index increases from 0.021±0.008 to 0.035±0.013; relative growth rate increases from 0.725±0.14 to 1.602±0.09; health condition factor improved from 2.100±0.229 to 3.500±0.296 and average survival rate increased from 75.0±2.65 to 92.5±1.53 %.

Table 2: Growth performance of *Catla catla* fed on barley grass added feed

Parameter		BG0	BG1	BG2	BG3	BG4	BG5
Total Length Increase (cm)	Mean	2.110	3.200	3.330	3.700	5.880	7.060
	±SD	0.160	0.130	0.210	0.400	0.320	0.580
Total Weight Increase (g)	Mean	43.47	44.70	51.27	59.47	94.90	96.09
	±SD	3.020	3.710	4.980	5.730	4.630	2.740
Specific Growth Rate	Mean	0.658	0.617	0.713	0.776	0.97	0.908
	±SD	0.037	0.037	0.077	0.057	0.047	0.097
Body Weight Index	Mean	0.021	0.022	0.026	0.031	0.034	0.035
	±SD	0.008	0.012	0.014	0.011	0.016	0.013
Relative Growth Rate	Mean	0.725	0.745	0.855	0.991	1.582	1.602
	±SD	0.140	0.110	0.110	0.100	0.160	0.090
Health Condition Factor	Mean	2.100	2.200	2.600	3.100	3.400	3.500
	±SD	0.229	0.177	0.201	0.178	0.180	0.296
Average Survival Rate (%)	Mean	75.0	77.5	80.00	85.0	90.0	92.5
	±SD	2.65	2.52	1.53	1.53	1.53	1.53

Kumar *et al.* (2004) and Cho and Cho (2009) reported that formulated feed is more recommendable than a readily available feed for the growth performance in aquaculture. It is well documented that formulated feed pellets have superior water stability, better floating properties, and higher energy content among the ordinary pelleted diets (Ammar, 2008). Aqua feed technology is moving in tandem with the aquaculture growth with the usage of formulation procedures for the improvement of digestibility (Umar *et al.*, 2013). Chang and Wang (1999) stated the advantages of feed formulation for aquaculture feed production including improved feed conversion ratio,

control of pellet density, feed stability, production efficiency and versatility (Kannadhason *et al.*, 2011; Hazem *et al.*, 2017; Mishre *et al.*, 2018).

The use of plant based feedadditives are beneficial in increasing fish production. The nutritional values of feeds are influenced not only by their nutrient content, but also by many other factors. These include the feed presentation, hygiene, digestibility, and effect on intestinal health (Diatin *et al.*, 2021). The present experiment clearly demonstrated the beneficial effects of barley grass added plant based pellet quality on the growth performance of fish. Interestingly, a lower growth performance was observed in control group than experimental group. The barley grass contained several bioactive compounds. It is also a rich source of protein. Protein rich diet is responsible of improvement of growth performance of fish (Nath *et al.*, 2014; Islam *et al.*, 2017; Uraiwan *et al.*, 2019; Abdus *et al.*, 2020; Daniela *et al.*, 2020; Rana *et al.*, 2020). These findings are also in well agreement with Nabela *et al.* (2011) on effects of barley grass powder (*Horidium Vulgare*) on Behavioral and Histological alterations of Nile Tilapia.

The use of feedadditives is beneficial in increasing fish production. A feedadditive are also the supplements for farm animals that cannot get enough nutrients from regular meals that the farmers provide and include vitamins, amino acids, fatty acids, and minerals. In some cases if an animal does not have some specific nutrition in its diet it may not grow properly. The nutritional values of animal feeds are influenced not only by their nutrient content, but also by many other factors. These include feed presentation, hygiene, digestibility, and effect on intestinal health. Even with all of the benefits of higher quality feed, most of a farm animal's diet still consists of maize, wheat and soybean meal because of the higher costs of quality feed. Hence feed and feeding are among the most important factors influencing growth, feed utilization and tissue composition of the fish in aquaculture. In the present study, quality of barley grass powder added feed increased the average feed intake and feed efficiency while reduced the feed conversion ration. It was one of the reasons for increased growth performance and survival of the fish. These results are in well agreements with Nath *et al.* (2014), Islam *et al.* (2017), Uraiwan *et al.* (2019), Abdus *et al.* (2020), Daniela *et al.* (2020), Rana *et al.* (2020) and Pradhan *et al.* (2021).

Table 3: Flesh quality of *Catla catla* fed on barley grass added feed

Parameter		BG0	BG1	BG2	BG3	BG4	BG5
Moisture (%)	Mean	83.35	84.08	83.85	82.02	82.29	82.16
	±SD	1.08	0.54	0.68	0.20	0.30	0.31
Crude Proteins (%)	Mean	10.15	10.40	11.05	11.07	11.19	11.36
	±SD	0.46	0.38	0.39	0.17	0.19	0.22
Crude Lipids (%)	Mean	3.96	2.95	3.48	3.21	3.94	3.01
	±SD	0.38	0.26	0.36	0.19	0.12	0.29
Ash (%)	Mean	2.54	2.58	2.50	2.70	2.58	2.47
	±SD	0.13	0.08	0.18	0.08	0.02	0.04

Table 3 shows the carcasses composition of *Catla catla* fed on control and barley grass powder added plant based formulated fish feed. It shows that the moisture content ranges between 82.02±0.20 and 84.08±0.54 %; crude protein contents increased from 10.15±0.46 to 11.36±0.22 %; crude lipid contents ranges between 2.95±0.26 to 3.96±0.38 %; ash content was ranges between 2.47±0.04 and 2.70±0.08 %. Among these all, only the crude protein contents of control and test feed groups were significantly different ($P<0.05$) from each other.

The flesh quality in control and all experimental groups were generally similar. Only the crude protein contents of control and test feed groups were significantly different. The parameters, such as moisture, crude protein, crude lipid and ash are the qualitative physiological indicators of fish health, and the nutritive value of fish depends upon their biochemical constituents. In the present study, the significant improvement in muscle biochemical composition suggested that the synthesis and the storage of the biochemical compositions in fish were promoted due to supplementation of barley grass in the diet. Similar results have also been reported in previous studies of Acar *et al.* (2015) and Xiaohong *et al.* (2017). However, changes in the body composition are probably affected by

various factors such as age, feed quality, feeding frequency, water quality etc. (Karun *et al.*, 2017; Shabana *et al.*, 2019; Marian *et al.*, 2022).

Conclusion

An experimental study was carried out to evaluate the effect of barely grass added plant based feed on growth and flesh quality of Indian major carp *Catla catla* (Hamilton, 1822). The results indicated that the increased level of barley grass in diet improved the growth and advanced the survival rate. The flesh quality analysis showed the enriched crude protein level. In considering the overall performance, barley grass addition in plant based diet is recommended for successful aquaculture of this important fish species.

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EFFECTS OF HIGHWAY SIDE POLLUTION ON ASSEMBLAGE OF NEPHILA PILIPS AROUND THE YAVATMAL CITY OF MAHARASHTRA

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ABSTRACT

The impact of human actions on Natural resources became clear with the beginning of the Industrial Revolution. The present study reveals how ecological conditions in variously polluted regions of Yavatmal city may control metabolic activities of Nephila species which fluctuate the way of hunting, web construction, behavior, spatial allotment and systematic position. Concentration impact of pollutants in spiders collected at five polluted areas and one control site around Yavatmal city.

In present study spiders were observed for two years around Yavatmal City, few of them transplanted spiders from study areas to localized garden to study their persistence in the new environment and considered a group of environmental variables at local and landscape scales. The abundance of prey was closely linked with spider persistence, in both the survey and the transplant areas.

Keywords:*Assemblage, Environment, Nephila, Pollutants, Yavatmal*

1. Introduction

Arthropods can be used as indicators of environmental revolutionize more quickly than the vertebrates (Scherm et al. 2000; Gregory et al. 2009).For observational purposes, indicator assemblages should reveal unstable sensitivities to ecological alteration, and displays variety of life-history and ecological relations. Climate change comprise most important effect on geographic distribution of insect pests, and lowtemperatures are frequently more important than high temperatures in determining geographical distribution of insect pests (Hill 1987). Spiders are the most abundant and diverse group of organisms (Kannan and 2009; Gregory et al. 2009). Arthropods are the most important and diverse component of James terrestrial ecosystems and occupy a wide variety of functional niches and microhabitats (Kremen et al. 1993). The Nephilids are one of the largest spiders found in India. They can build webs with a typical diameter of more than 1 meter and can be identifying characters of the existence of spiders in or between trees. Females are extremely huge evaluated up to 45 mm while the males are smaller as compared to female which measures only up to 6 mm. Males are regularly found in or approximately around the web of the female. At the same time along with males of Nephilids members of other family and genera like *Argyrodes* was also sheltered on boarders of webs. Spiders from family Nephilidae are the biggest web-weaving spiders living today and are common and spectacular inhabitants of tropical and subtropical regions (Kuntner, M. & Coddington, J. A. 2009). Nephila females weave among the largest orb webs known with distinctive golden silk. Nephila males are relatively diminutive compared with their conspecific females, providing an example of extreme sexual dimorphism (Vollrath, F. 1998)

Material & Methods

A. Study Area

Yavatmal is a district of the state Maharashtra. It is situated in the region of Vidarbha, in the east-central part of the state. Yavatmal is located in the Vidarbha region of the eastern part of the state. The land offers a wide magnitude of natural diversity with river valleys bordering drier plateau. Two major rivers runs along the district namly Penganga and Wardha with their many rivulets framing this land of Cotton and Jowar.for observation of spiders five different areas around were selected namely 1. Madkona Forest Zone; 2. Dhumnapur Forest Zone; 3. Chapdoh Forest

Region; 4. Mandev Forest Region; 5. Karalgaon Forest Region

B. Method

For the above study, the spiders of all the five wild habitats were monitored continuously for 6 months by marking the trees on which they live, while on the other hand, one spider from each site was kept in a protected area in Shivaji Garden and Dhumnapur Forest Park, and they were observed daily by labeling them from where Sudha was brought. Special attention was also paid to whether the gingers leave their native habitats; care was taken not to harm any species during the above study.

Result & Discussion

A decade ago Yavatmal, Maharashtra, surrounded with huge vegetation and it was a famous tourist attraction due to its beautiful forestry, lakes dams and flora and fauna .All four sides of Yavatmal city are covered with forest and Yavatmal city has got such abundant forest wealth, and these forests are of unique importance in the diversity of spiders. But since the last few years, the rapid development of Yavatmal city is having an adverse effect on the environment due to felling of trees and growing industrial estates, and due to the construction of the Cement highway, an extraordinary increase in pollution has been recorded in the city and the surrounding area. Madkona forest located on the Yavatmal to Nagpur highway has reduced the number of spiders remarkably and before the construction of the highway i.e. until 2017, Madkona forest was known as the habitat of spiders. However, there have been reports of an increase in cases of them leaving their natural habitats and migrating elsewhere. A close study of all the five sites revealed that the roadside forest has been adversely affected by human encroachment on a large scale, with vehicular noise and light, free movement of wood chips and felling of trees frequently displacing spiders in their natural habitats. During above study of all the five sites revealed that the roadside forest has been adversely affected by human encroachment on a large scale, with vehicular noise, light, free movement of wood chips and felling of trees, frequently displacing spiders in their natural habitats. But in one of these places i.e. Chapdoh, there is less human interference and pollution and because it is less compared to other places, the breeding and free range of spiders is more.

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E-WASTE: IMPACT ON SUSTAINABLE DEVELOPMENT AND ITS MANAGEMENT RULES

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ABSTRACT

Rapid innovation and digital technologies have dramatically increased access to electronic products. This led to an increase in the use of electronic devices which led to consequence of electronic and electrical waste which is known as E-Waste. E-Waste is the fastest growing stream in the world. The improper e-waste is disposal in landfills or other non-dumping sites which poses serious threats to current public health and also pollute our ecosystems. The E-waste produces toxic and hazardous chemical which harm our sustainable environment. According to International Telecommunication Union (ITU) e-waste is one of the largest and most complex waste streams in the world. This paper describes the impact of E-waste on our sustainable environment and the future of sustainable development.

Keywords:*E-Waste, Sustainable Development, Equipment, Technology, Electronic.*

Introduction

E-waste is discarded products with large numbers of battery or plug, also features toxic and hazardous substances which pose severe risk. E-Waste is nothing but any electrical electronic equipment that's been discarded which includes working and broken items that are thrown away i.e., thrown in the garbage. Electronic products are a complex mixture of several tiny components which contains hazardous chemicals. E-waste is disposed of unsafely in developing countries, which leaves an environmental and health problem in regions.According to the Global E-waste Monitor, in 2019 the world generated 53.6 Mt of e-waste, from which only 9.3 Mt (17%) was recorded as recycled. E-Waste is growing because global consumer demand continuously increases. Moreover, rapid increase in new technology uptake and shorter replacement cycles are contributing to the growth of e-waste.

Types of E-Waste

Electronic scrap materials consist of harmful substances like lead, beryllium, cadmium, etc. The recycling and disposal of electronic waste involve great risk. A lot of care is taken to prevent hazardous exposure in recycling electronic scraps.

The E-Waste are classified into following groups:

1. Temperature exchange equipment.
2. Screens, monitors.
3. Lamps.
4. Large equipment.
5. Small equipment.
6. Small IT and telecommunication equipment.

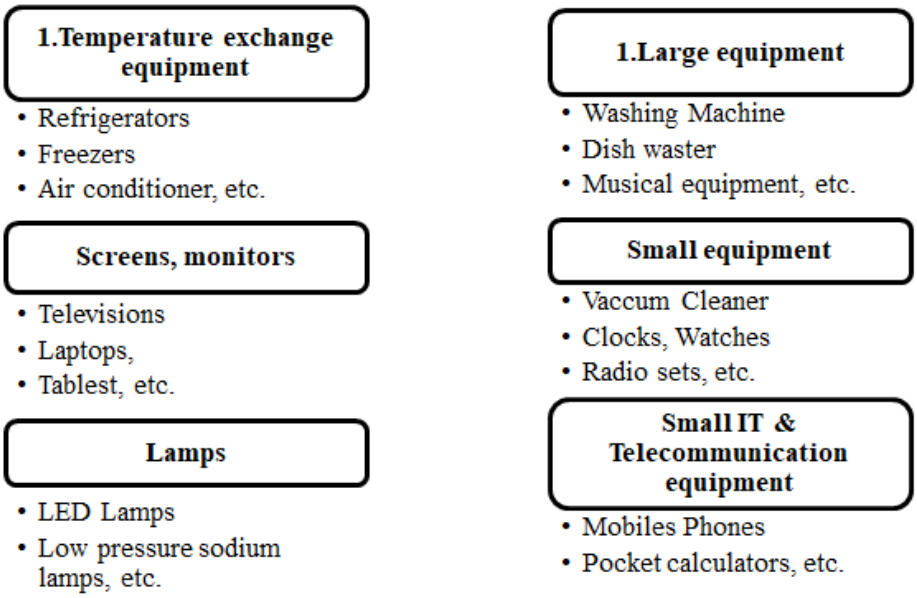

Table: Shows the types of E-waste with their examples

Impact of E-Waste on Sustainable Development

E-waste can be toxic, is non-biodegradable which accumulates in the environment i.e., in the soil, air, water. According to the report "A New Circular Vision for Electronics – Time for a Global Reboot", the improper handling of e-waste results in a significant loss of scarce and raw materials, which includes metals such as neodymium, indium and cobalt. These metals are found in batteries, motors and TV panel so on which leads to irreversible health effects and affects sustainable environment. Amounts of lead and the chemical contain in the E-waste can damage the nervous system, kidney, bones and so on. It also causes damage to the reproductive and endocrine systems.

Due to burning of e-waste air pollution can cause at higher risk which can lead to chronic diseases and cancers. Burning e-waste harms the species and biodiversity which are chronically polluted.

Disposing of e-waste in to the landfills can directly harm the contamination of underlying groundwater, crops that can be planted nearby that area in the future. This will release toxic chemical in to crop through underlaying water or contaminated crop which can cause illness in human being, species, environment and so on. To avoid toxic effects of e-waste, the items should be recycled, refurbished, resold, or reused.

E-Waste Management Rules

The Environment, Forest and Climate Change Ministry has announced the E-Waste Management Rules in 2016. Which are replaced from the earlier E-Waste Management and Handling Rules of 2011.

According to the Act, 1986 the central government makes the following rules to amend the E-waste (Management) Rules:

1. The e-waste collection targets under EPR have been revised. The phase-wise collection targets for e-waste in weight shall be 10% of the quantity of waste generation as indicated in the EPR Plan during 2017-18, with a 10% increase every year until 2023. After 2023 onwards, the target has been made 70% of the quantity of waste generation as indicated in the EPR Plan.
2. Separate e-waste collection targets have been drafted for new producers. Producer Responsibility Organizations (PROs) shall apply to the Central Pollution Control board (CPCB) for registration to undertake activities prescribed in the Rules.

3. Responsibilities of the manufacturer are given to collect e-waste which is generated during the manufacture of any electrical and electronic equipment.
4. Responsibilities of collection centers is to collect e-waste on behalf of producer, recycler, refurbisher. Provided the collection centers established by producer can also collect e-waste.
5. Every producer of electrical and electronic equipment and their components or consumables shall ensure that, new Electrical and Electronic Equipment and their components do not contain Lead, Mercury, Cadmium, Hexavalent Chromium, etc beyond a maximum concentration value of 0.1% by weight in homogenous materials.

Conclusion

Waste can pollute oceans, air, environment but e-waste can take over landfills, and releases toxic chemicals into the earth. Sustainability is important for all the developmental activities by integrating economic, environmental, technological, etc. Recycling E-waste gives many benefits to environment, industries, IT companies, and so on. Recycling E-waste helps to protect the environment. When E-waste is recycled, they can be reused to develop products. As a result, we should know the ways of disposing the waste with the help of the availability of new technology for betterment of our environment.

"We have been getting ready to recycle more e-waste by investing in infrastructure, providing grants to local government and working with industry."

- Jay Weatherill

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SUSTAINABLE DEVELOPMENT AND INDIA

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ABSTRACT

As a concept of societal growth, sustainable development involves a few issues that demand careful attention. They deal with overcoming the technical constraints of specific systems, minimising environmental damage, promoting social inclusion, advancing a green economy that involves all stakeholders, eliminating the negative effects of human activity, etc. Due to the increasingly severe effects of climate change over the past few years, an increasing number of studies have focused on these issues and emphasised the significance of sustainable development. Therefore, the answers to the issues that diverse stakeholders are currently facing and which collectively help to preserve the environment for future generations are the key to sustainable development.This is now the responsibility of the entire generation and is no longer dependent on the goodwill of particular people. This article provides an overview of current scientific developments in the area of sustainable development as well as some examples of remedies to issues caused by sustainable development.Sustainable development is a popular and commonly used term, yet one that also arouses fierce debate and controversy.

Introduction

A guiding principle in sustainable development is maintaining the capacity of natural systems to continue providing the natural resources and ecosystem services that are essential to the economy and society. A state of society where living circumstances and resources are used to meet human needs while maintaining the integrity and stability of the natural system is the desired outcome. According to the Brundtland Report from 1987, sustainable development is "development that satisfies the present generation's requirements without jeopardizing the capacity of future generations to meet their own needs." As the idea of sustainable development evolved, it shifted its emphasis more toward the protection of the environment for future generations as well as the economic and social progress of society.

The 1992 Rio de Janeiro Earth Summit launched the Rio Process, which was the first attempt to institutionalize sustainable development. The Sustainable Development Goals (SDGs) (2015 to 2030) were established by the UN General Assembly in 2015, and they were described as being interconnected and indivisible in order to achieve sustainable development on a global scale. They deal with issues including poverty, inequality, climate change, environmental degradation, peace, and justice as well as other global problems.

Sustainable Development Dilemma

Should we prioritise lowering carbon dioxide emissions over protecting the livelihoods of small-scale farmers in developing nations, even if their livelihoods depend on air freight, despite the negative impacts on those farmers' livelihoods, economies, and societies? The answer to that question is heavily influenced by human attitudes, values, and beliefs, many of which are very debatable and subjective.Small-scale farmers in developing nations would likely contend, if pressed, that air freight of organic produce is a critical component of their development strategy, that addressing the short-term effects of poverty is a higher priority than addressing the long-term effects of climate change, and that, in any case, a large portion of the blame for reducing carbon dioxide emissions lies with the developed nations that are largely to blame for the issue. In contrast, an environmental activist in a wealthy nation would assert that combating climate change should come first since, absent a significant reduction in carbon dioxide emissions, extreme climate events could endanger people's lives all over the world.

This example also shows how complicated economic, social, and environmental issues can come up in discussions about sustainable development. Reducing the greenhouse gas emissions caused by the transport of food may seem like a simple solution, but it could actually spark a great deal of debate and controversy. It's possible to classify the Soil Association's proposal to restrict all air-freighted organic produce as protectionism because it would have helped UK farmers at the expense of farmers in developing nations.From another angle, the degree to which producers in developing nations depend on export sales revenue could be seen as evidence of neo-colonialism. This is because small-scale producers in developing nations are forced to live in precarious, marginalised situations and are denied opportunities for greater self-determination and freedom, while wealthy consumers in developed nations have year-round access to exotic goods that are sourced from all over the world.

This scenario also raises issues of participation and governance. Some people contend that in this scenario, strict control is necessary to guarantee a decrease in greenhouse gas emissions. Others would contend that the free market should determine which goods are purchased and sold, that economic factors should determine the most suitable mode of transportation, and that consumers should be allowed to choose the goods they wish to purchase, a decision that could be aided by more comprehensible food labelling. Fair trade proponents contend that small-scale producers should have a bigger say in deciding the conditions of trade for their goods, as well as a bigger cut of the profits, since if they did, they would have a bigger impact on the world.

From still another angle, some might contend that the unending demands of wealthy consumers in developed nations, rather than the (false) choice between farmers' livelihoods and climate change, are the real problem. A fundamental political question who has the authority to determine which economic, social, or environmental aspects are the most crucial underlies all of these factors.

Discussions on sustainable development centre on the connection between the environment and development. Conflicts between those who prioritise environmental aims and those who prioritise development goals can frequently be seen in these discussions.

Sometimes a circumstance may call for making challenging decisions between environmental and development goals; these decisions should ideally be made in a transparent, accountable way. The current state of sustainable development is a crucial concern. Its importance has considerably expanded as a result of the looming risks of climate change.

India's Sustainable Development Goals

According to India, a single set of aims for the Sustainable Development Goals must incorporate both development and environmental goals. The imbalance between environment and development is the problem, as it always is in international summits. The SDGs and the post-2015 agenda could also be seen as a chance to review and improve the MDG framework and sustainably refocus on developmental challenges.

India as a nation is vast, diversified, and complex in terms of its topography, climate, cultures, and population. Because of this, organizations frequently struggle to put even thoroughly designed solutions into action. In order to effect change, we need the government, business, and NGOs to work together. Each of these parties possesses particular strengths that, when combined, can significantly alter the situation. Corporate India has the financial resources, organizational strength, and planning abilities to create efficient public interventions, while the government adds scale to the table. The civic society brings with it local connections and expertise in putting public welfare programs into action. They are able to implement effectively and produce impact because they have the networks and the support of the community.

Without a doubt, India needs a rapid improvement in access to livelihood, education, healthcare, and nutrition in order to reduce poverty. To make this happen, the

major players' governments, businesses in India and civil society organizations must eliminate the trust gap and collaborate closely in order to boost the success of public welfare programs and help more people escape poverty more quickly and permanently.

A few of focused, highly effective initiatives that can quickly have an influence on the population as a whole are required. Technology has the solutions. India has developed solid public data stacks on banking account ownership, mobile phone penetration, citizen enumeration, education, and health. We can design scalable interventions with the aid of innovation using these digital stacks to have an impact as soon as possible.

India made a point of highlighting the significance of rapid and inclusive economic growth in lifting a sizable number of the poor out of poverty. Additionally, it has been noted that while much has been achieved in terms of infrastructural development, it is still very difficult to bring development to all facets of life. These problems still exist in all emerging nations worldwide. According to India, a development agenda must include the SDGs. Although eliminating poverty and promoting development through inclusive economic growth remain the top development priorities, these significant obstacles will need for additional funding and capacity-building initiatives.

India needs sustainable development

Of course, this acknowledgment is understatement. The ecological situation is nothing short of catastrophic, according to all available evidence. Agricultural biodiversity has decreased by over 90% in many regions, over half of the available water bodies are polluted beyond drinking and often beyond agricultural use, two-thirds of the land is degraded to various levels of sub-optimal productivity, and air pollution in several cities is among the worst in the world. Natural ecosystems are under stress and declining across most of the country. According to a 2008 assessment by the Global Footprint Network and Confederation of Indian Industries, India has the third largest ecological footprint in the world. Its resource consumption is already twice as high as its bio-capacity, which has decreased by half in recent decades.

Conclusion

The SDGs represent a massive undertaking that calls for the participation of all societal levels and sectors. The experiences of the pilot nations show how the platform can help India establish significant and long-lasting state-philanthropy relationships in order to realise the prime minister's goal of collaborative, inclusive growth.

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ECO-FRIENDLY ONE-POT FOUR COMPONENT SYNTHESIS OF PYRIDO[2,3-D:6,5-D′] DIPYRIMIDINES IN WATER

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ABSTRACT

An efficient and convenient one-pot four-component green synthesis of pyrido [2,3-d:6,5-d'] dipyrimidine derivatives were achieved using Zinc triflate catalyst in water. Aromatic aldehyde, 2-thiobarbituric acid and ammonium acetate are the components which take part in this multi-component reaction. The protocol was carried out under mild reaction conditions with operational simplicity, affording excellent yield of the corresponding products. High product yield, high atom economy, usage of water as a green reaction medium and simple work-up procedure is some important advantages of this protocol.

Scheme 1: *Reagent and conditions: (i) 10 mol% $Zn(OTf)_2$, 5 mL water, Rt, 22-50 min.*

Keywords:*Pyrido[2,3-d:6,5-d'] dipyrimidine, green media, multi-component reaction*

Introduction

The developments in the chemical reactions would like to make changes in the conventional ways in synthesis by green chemistry with more efficiency of synthetic approach. These are to reduce the synthetic stages, use of less toxic and cheap solvents, lower the energy use and increase in efficiency with higher yields and to minimize waste. The change in the methodologies of synthesis can reduce toxicity [1]. To achieve these goals chemists have adopted water as the chosen solvent in organic synthesis. Water offers many practical advantages over conventional organic solvents such as easy availability, cheap, non-corrosive, non-toxic, non-flammable, easy work up and environmentally acceptable [2-5]. Multicomponent reactions (MCRs) have high importance in synthetic organic chemistry which provide an opportunity for the coupling of three or more different starting materials in one pot operation. A series of final products containing diverse substituents from all of the reactants [6-7] can be synthesised. Low reaction time, easy operation, isolation of the product, low energy consumption, elimination of the isolation of unstable intermediates is some advantages of MCRs [7-12]. Over the last few decades, with increasing environmental concerns, the design of new MCRs with eco-friendly, green procedures have become increasingly useful tools, especially in the fields of drug discovery, organic synthesis, and material science [13, 14].

The heterocyclic compounds containing Pyrido-pyrimidines motif form the core of a large family of natural products and drug molecules with interesting structural features and a wide range of useful pharmacological and biological properties [15,16]. For instance, some representative pyrido[2,3-d]pyrimidine derivatives are shown in Fig 1. The pyrido [2,3- d] pyrimidine carboxylate (I) a significant anti-cancer or cancer-causing agents properties [17] and pyrido[2,3-d:6,5-d']dipyrimidine (II) were reported to show antibacterial activity

[18] and in 2,4-dioxo pyrido[2,3-d]pyrimidine (III) has been found antitumor activity [19].

Moreover, the scaffolds bearing pyrido-pyrimidine motif have been shown to possess important biological activities like antiallergic [20], antitumor [21,22] antifolate [23], fibroblast growth factor receptor 3 (FGFR3) [24,25], tyrosine kinase inhibitors [26,27], antimicroibial [28], dihydrofolate reductase (DHFR) inhibitory activity [29,30], calcium channel antagonists [31], antibacterial [32], anti-inflammatory [33], analgesic [33], antihypertensive [34], antileishmanial [35], tuber-culostatic [29], potassium sparing [36], anti-HIV [37]. Due to the such activities of pyrido[2,3-d]pyrimidine, several methods for synthesis of these compounds have been reported [18,38-40].

Therefore different methodologies have been developed for the synthesis of these derivatives by one pot multi-component reaction of barbituric acid with aromatic aldehydes and ammonium acetate in presence of Fe-MCM-41-ionic liquid [41], $CuFe_2O_4$ nanospheres [42], [H-NMP]+[HSO_4] [44], nano $CuFe_2O_4$ [44, 45] and nano-[SiO_2-$RNMe_2SO_3H$][Cl] [46]. Other methods include reaction between aldehyde, thio-barbituric acid and 6-amino uracil which produces pyrido[2,3-d:6,5-d]dipyrimidines catalyzed by MWCNTs@L-His/Cu(II) [47], DBU [48] and p-TSA [49]. 6-amino uracil and aldehyde to afford the corresponding derivatives using SBA-15 supported sulfonic acid [50] and microwave irradiation in acetic acid [51]. 6-Amino uracil, aldehydes and dimedone on reaction in the presence of encapsulated-γ -Fe_2O_3 [γ -Fe_2O_3@HAp-SO_3H] afford these derivatives [52]. Recently Diisopropylethylammonium acetate (DIPEAc) catalyst was employed for such synthesis [53]. The reactions catalysed by zinc are found to be sustainable alternative to use of more precious or toxic transition metals[54] Zinc triflate [Zn(OTf)2] is an inexpensive catalyst having thermal stability, ease of availability, low cost and addresses problem associated with the toxicity of metals up to a great extent. It is known as an efficient catalyst used in various chemical transformations [55-57].

The above reported methodologies for synthesis of pyrido-dipyrimidine derivatives have shown good results in many instances. However, some of the synthetic strategies also have limitations in terms of expensive reagents, long reaction time, environmentally hazardous, harsh reaction conditions, tedious work-up procedure and unsatisfactory yield. Therefore, in order to overcome these disadvantages of previous methods I have developed a simple, highly efficient and environmentally benign method for the synthesis of prido-dipyrimidine derivatives catalysed by zinc triflate [Zn(OTf)2] in solvent water. The product can be separated by filtration of the reaction mixture after completion of the reaction. Hence, this method provides a green and much improved protocol over the existing methods. Thus, herein I report a green and simple approach for the synthesis of pyrido-dipyrimidine derivatives from various substituted aromatic aldehydes, 2-thio barbituric acid and ammonium acetate catalyzed by zinc triflate [Zn(OTf)2] **(Scheme 1)**.

Scheme 1: *Reagent and conditions*: (i) 10 mol% $Zn(OTf)_2$, 5 mL water, rt.

Experimental:

General details

All chemicals were purchased from Sigma Aldrich and Spectrochem companies and used without further purification. The reactions were monitored by TLC using aluminum sheets 20 x 20 cm, Silica gel 60 F254, Merck grade. Products were characterized by ^1H and ^{13}C NMR spectra recorded on a Bruker spectrometer using $CDCl_3$& DMSO-d6 as a solvent and tetramethylsilane as an internal standard. Mass spectrometric data was recorded by an electron spray ionisation (EST) technique on a Q-tof-micro quadruple mass spectrometer (Micro mass). Melting points were determined on DBK-programmable melting point apparatus.

General procedure for the synthesis of 2,8-dithioxo-2,3,7,8,9,10-hexahydropyrido- [2,3-d:6,5-d'] dipyrimidine-4,6(1H,5H)-dione derivatives:

In a 25 mL round bottom flask aromatic aldehyde (1 mmol), 2-thio barbituric acid (2 mmol) and ammonium acetate (1 mmol), 5mL water and Zinc triflate (10 mol%) were stirred at room temperature for 35 to 60 minutes. The progress of reaction was monitored by TLC. After completion of reaction; confirmed by thin-layer chromatography (TLC) using eluent petroleum ether– ethyl acetate (7:3), the reaction mixture was then filtered. The product as residue was washed with water thrice. The crude product obtained was recrystallised using ethanol to afford the products in good yields. The structure of the product was confirmed by Mass and 1H NMR specta.

Results and discussion

Herein, I reported synthesis of 2,8-dithioxo-2,3,7,8,9,10-hexahydropyrido- [2,3-d:6,5-d'] dipyrimidine-4,6(1H,5H)-dione derivatives in good to excellent yields via one pot reaction between aromatic aldehyde (1 mmol), 2-thio barbituric acid (2 mmol) and ammonium acetate (1 mmol). All reactions were performed by the use of zinc triflate $Zn(OTf)_2$ as catalyst in water at room temperature. The products were obtained in good to excellent yields.

To determine the suitable reaction conditions, a solvent-free reaction of benzaldehyde (1 mmol) 2-thio barbituric acid (2 mmol) and ammonium acetate (1 mmol) was performed at room temperature **(entry 1, Table 1)**. Low yield was observed in this case. Then, the reaction mixture was heated for 8h and below 50% yield was found. So, I studied the effect of solvent and various amounts of zinc triflate catalyst on the model reaction **(Scheme1)**. The reaction was performed by using different solvents such as CH_2Cl_2, EtOH and CH_3CN at room temperature and under heat for about 40-90^0C with more time and low yield **(entry 1-4, Table 1)**. The same reaction was performed in presence of 10 mol% at 70- 80^0C water **(entry 6-7, Table 1)**. More result was obtained using 10 mol% of the catalyst at room temperature **(entry 5, Table 1)**.

Table 1: Optimization of reaction conditions

Entry	Solvent	Catalyst (mol %)	Temperature (^{0}C)	Time (min.)	Yield (%)
1	None	-	70-80	08 hr	<40
2	CH_2Cl_2	10	Rt	60	65
3	EtOH	10	70-80	70	75
4	CH_3CN	10	80-90	85	60
5	**H_2O**	**10**	**Rt**	**28**	**90**
6	H_2O	05	70-80	40	70
7	H_2O	20	70-80	30	88

Thereafter, a series of reactions were carried out using diversely substituted aromatic aldehydes under identical reaction conditions. All these reactions afford good to excellent yields of 2,8-dithioxo-2,3,7,8,9,10-hexahydropyrido- [2,3-d:6,5-d'] dipyrimidine-4,6(1H,5H)-dione derivatives (4a-4i), **(entries 1-9, Table 2).** All these reactions resulted in good to excellent yields **(Table 2)**.

Table 2: Synthesis of 2,8-dithioxo-2,3,7,8,9,10-hexahydropyrido- [2,3-d:6,5-d']

dipyrimidine-4,6(1H,5H)-dione derivatives catalyzed by zinc triflate.

Entry	Aldehyde	Product	Time (min.)	Yield	MP (^{0}C)
1	Benzaldehyde	4a	28	90	210-212[44]
2	2-Nitro benzaldehyde	4b	36	88	230-232[44]
3	4-Nitro benzaldehyde	4c	22	85	330-332[44]
4	3-Anisaldehyde	4d	40	88	240-242[44]
5	4-chloro benzaldehyde	4e	32	86	256-258[44]
6	2-Fluoro benzaldehyde	4f	25	84	238-240[44]
7	4-Dimethyl amino benzaldehyde	4g	50	82	278-280[44]
8	Terphthaldehyde	4h	44	82	298-300[44]
9	Pyridine 2-carbaldehyde	4i	30	85	278-280[44]

[a]substituted aldehyde (1 mmol), 2-thiobarbituric acid (2 mmol), ammonium acetae (1 mmol), water (5 mL), Rt, 22 -50 min.
[b]isolated yield.

Characterization data:

5-Phenyl-2,8-dithioxo-2,3,7,8,9,10-hexahydropyrido[2,3-d:6,5-d']dipyrimidine-4,6(1H,5H)-dione (4a);
IR (KBr) ν (cm-1): 3452 (NH), 3054 (C-H, sp2 stretch), 2898 (C-H, sp3), 1637 (C=O), 1440, 1559 (C=C, Ar). **^{1}H NMR** (DMSO-*d6*, 400 MHz) δ (ppm): 5.90 (s, 1H), 7.00 (d, 2H,), 7.05 (s, 1H), 7.10 (s, 2H), 7.65 (s, 1H), 7.90 (s, 1H), 12.00 (s, 3H).

5-(2-Nitrophenyl)-2,8-dithioxo-2,3,7,8,9,10-hexahydropyrido[2,3-d:6,5-d']dipyrimidine-4,6(1H,5H)-dione (4c);
IR (KBr) ν (cm-1): 3450 (NH), 3175 (C-H, sp2stretch), 1600 (C=O), 1430, 1510 (C=C, Ar). **^{1}H NMR** (DMSO-d6, 400 MHz) δ (ppm): 6.1-6.2 (s, 1H), 6.90 (s, 1H), 7.05 (s, 1H), 7.20 (s, 1H), 7.30 (m, 1H), 7.40 (m, 1H), 7.5 (d, 2H), 11.6-12.0 (s, 5H). **^{13}C NMR** (DMSO-*d6*, 100 MHz) δ (ppm): 29.20, 95.20, 124.1, 127.1, 129.8, 131.6, 136.05, 150.15, 163.2, 173.5. Anal. Calcd for $C_{15}H_{10}N_6O_4S_2$: C-44.77, H- 2.50; N- 20.88, %; Found C- 44.81; H- 2.53; N-20.91%.

Conclusion:

In summary, I report an efficient synthesis of pyrido-dipyrimidine derivatives by the reaction of various aromatic aldehydes, 2-thio-barbituric acid and ammonium acetate using zinc triflate $Zn(OTf)_2$ catalyst. Non-hazardous reaction condition and the use of water as the reaction solvent makes the present protocol an environmentally benign and green approach for the synthesis of pyrido-dipyrimidine derivatives.

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STUDY ON ZOOPLANKTON'S DIVERSITY IN THE WAGHADI RIVER AROUND GHATANJI REGION OF YAVATMAL DISTRICT, MAHARASHTRA.

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ABSTRACT

Present study was carried out during june to August 2022 for to know the diversity of zooplanktons in four different stations from Waghadi river around Ghatanji region which is one of the taluka of Yavatmal district. During the investigation we reported 11 different zooplankton species out of which 4 species from Rotifers i.e., Branchionus calyciflourus, Brachinous caudatus, Ascomorpha saltans, Horaella brehmi spp., 4 species from Copepoda are Acanthocyclops capillatus, Diacyclops navas, Oithona davisae, and Oithona spp., 1 species belonging Cladocera is Cypris spp. and 2 species from Ostracodas are Candona foviolata and Candona parvula. Observations clearly indicated that Rotifers and Copepods had good numbers compared to Cladocera and Ostracodas. Primarly work is started from the Ghatanji region and we were focusing on only one season i.e., monsoon then it will be observed in the different regions and seasons.

Keywords:*Assemblage, Environment, Nephila, Pollutants, Yavatmal*

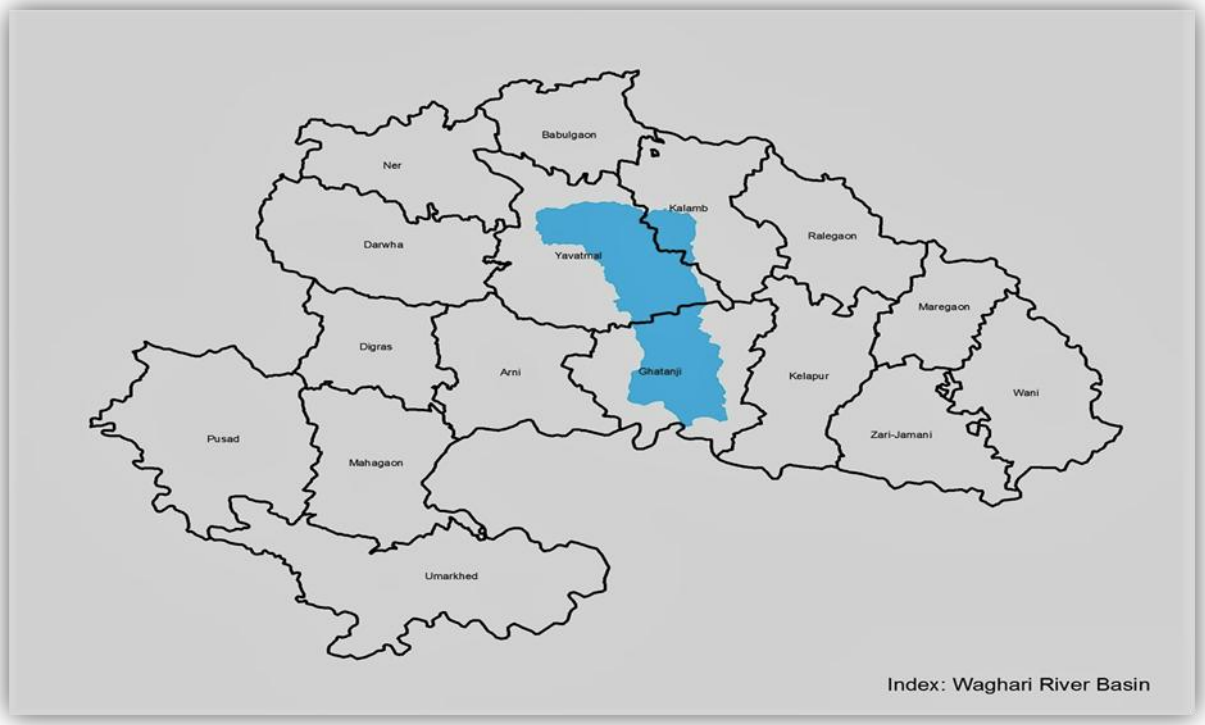
Introduction

Zooplanktons are small, aquatic microorganisms in the water column. The zooplankton community is composed of both primary consumers, which eat free-floating algae, and secondary consumers, which feed on other zooplankton. Zooplanktons are the control trophic link between primary producers and higher trophic level. The freshwater zooplankton comprises protozoa, rotifers, cladocerans, copepods, and ostracods. Most of them depend to a large extent on various bacterioplankton and phytoplankton for food. Zooplanktons are the main food source for fishes and aquatic organisms. Zooplanktons represent the biological condition of water bodies and also work as an indicator of water bodies, also performing a major role in fishery development. Zooplanktons serve as an intermediary species in the food chain, transferring energy from planktonic algae (primary producers) to the larger invertebrate predators and fish who in turn feed on them. Various researchers carried out work to study the zooplanktons of different fresh water bodies. Recent Study reveals that the diversity of zooplanktons were carried out in the various places of Vidarbha region like in Buldhana district, Washim region (Tayade S.N. and D.S.Dabhade, 2015): and Katepurna reservoir in Akola District (Pawar R.J and Dabhade D.S.,2016).

Material and Method:

Study Area:

Waghadi river is one of the most important tributaries of river Painganga, and flows through the cities of Kelapur, Ghatanji and Yavatmal Also River covers different villages near these cities. Waghadi river Covers almost 80 Km distance. There is a Waghadi dam near Ghatanji, Yavatmal district in state of Maharashtra. Waghadi Project and Dam's Official Designation is Waghadi: D-01427. Waghadi Dam was constructed as part of irrigation projects by the Government of Maharashtra in the year 1978. It is built on and impounds Waghadi River , nearest city to dam is Ghatanji in Yavatmal District of Maharashtra The purpose of studying in Waghadi river from Ghatanji region is to collect data and study of Zooplankton diversity along with population so it directly reflects the aquatic condition of river and also indicate the fishery development. Waghadi River is seasonal river, so it will be very important to collect data of Zooplanktons diversity at different season interval.



Sampling method and Analysis:

During the present study the water sample was collected directly from each selected sampling station from Waghadi River. The samples were transferred to the bottle and brought to the laboratory without disturbances samples were collected from monthly intervals from June 2022 to august 2022 at four different stations (Station A, Station B, Station C, Station D) of Waghadi river in Ghatanji region. Samples were collected at mostly morning sessions. Plankton hand net made of nylon bolting cloth (mesh size 25µm) was used for sampling purpose. Planktonic networks as a filter; it is the most common method for collection. After collection of concentrated plankton samples were fixed and preserved as early as possible in 4% formalin, 2 to 3 drops of glycerine were added to it. A pinch of detergent powder was also added to avoid the aggregation of zooplankton. Samples were collected in separate glass phials with labels containing name of site, date of sampling, time of sampling, etc. Identification of zooplankton was done with the help of a compound microscope. A dissecting microscope is also used for sorting and counting and for identification and its monographs as well as keys which were suggested by APHA (1985); Tonapi (1980); Dodson and Frey (1991) and Williamson (1991) and following the systematic key by Battish (1992) and Altaff (2004). Photos were taken with the help of the sony digital camera which is attached to a microscope.

Population density was quantified by Drop count method of Lackey (1938) and was calculated using the following formula of Lackey (1938):

$N = n \times v / V$

Where,

N = Total no. of organisms/ lit of water filtered,

n = Number of zooplankton counted in 1 ml plankton sample,

v = Volume of concentrate plankton sample (ml),

V= Volume of total water filtered through (L)

Photoplate I: Sampling sites in Ghatanji Region (Waghadi River)

Result and Discussion:

Zooplanktons are one of the most important organisms having a main role in aquatic ecosystems. Planktonic diversity plays a major role in aquatic food chains. Population of zooplankton reflects the indication of water body, because zooplanktons are the major food source for small and some large fishes. During the present investigation total 11 species of Zooplanktons recorded from Waghadi River in Ghatanji region among 4 species belonging to Rotifera, 4 species belonging to Copepoda, 1 species from Cladocera, and 2 Species belonging to Ostracoda. Identified rotifers are: I. Branchionus calyciflourus, II. Brachinous caudatus,
III. Ascomorpha saltans. IV. Horaella brehmi spp., 4 species from Copepoda are: I. Acanthocyclops capillatus, II. Diacyclops navas, III.Oithona davisae, IV. Oithona spp., 1 species belonging to Cladocera are: I. Cypris spp. And 2 species from Ostracoda are: I. Candona foviolata, II. Candona parvula. All these species are recorded in different stations of Waghadi River in Ghatanji region. Photographic evidence helps to understand that all these zooplanktons are morphologically different (Photoplate II). Occurrence of species changes in number during different month intervals because of climate change and change in food pattern. Water pollution is also responsible for changes in Zooplankton's Diversity. Overall, all these factors depend on the health of the water body. Population density also depends on the health of the water body and population changes from season intervals according to food pattern availability and climate conditions. Monthly diversity of zooplankton (Rotifers) population density recorded in June month was 34 org/10 liters of water and in July was 30 org/10 liters of water and in August it was 29 org/10 liters. The number of Rotifers increased in summer which may be due to the higher population of bacteria and organic matter of dead and decaying vegetation (Majagi and Vijaykumar, 2009). Copepods populations recorded during June month was 10 org/10 liters of water and in July was 8org/10liters of water. and in August it was 17 org/10 liters. Cladocera population recorded during June month was nil. In July it was 3org/ 10 lit. and in August was 2 org/10 liters. The Ostracoda population recorded during June month was 9 org/10 liters. During July it was 12 org/ 10 liters. and in August it was 6 org/10 liters (From Table.1)

Phylum	**Genera**	**June**	**July**	**August**
Rotifera	*Branchionus calyciflourus (Pallas, 1834)*	10	9	10
	Brachinous caudatus (Barrois and Daday, 1894)	9	7	8
	Ascomorpha saltans (Bartsch, 1870)	6	8	7
	Horaella brehmi spp. (Segers,2007)	9	6	4
Copepoda	**Genera**	**June**	**July**	**August**
	Acanthocyclops capillatus (Sars,1863)	4	3	6
	Diacyclops navas (Herrick,1882)	-	3	5
	Oithona davisae (Ferrari &Orsi, 1984)	3	2	4
	Oithona spp. (Baird,1843)	3	-	2
Cladocera	**Genera**	**June**	**July**	**August**
	Cypris spp.(O.F.Mullar,1776)	-	3	2
Ostracoda	**Genera**	**June**	**July**	**August**
	Candona foviolata (Dobbin,1941)	5	4	-
	Candona parvula (G.O. Sars,1926)	4	8	6

Table I: Monthly diversity of zooplanktons from Waghadi river in Ghatanji region from June 2022 to August 2022

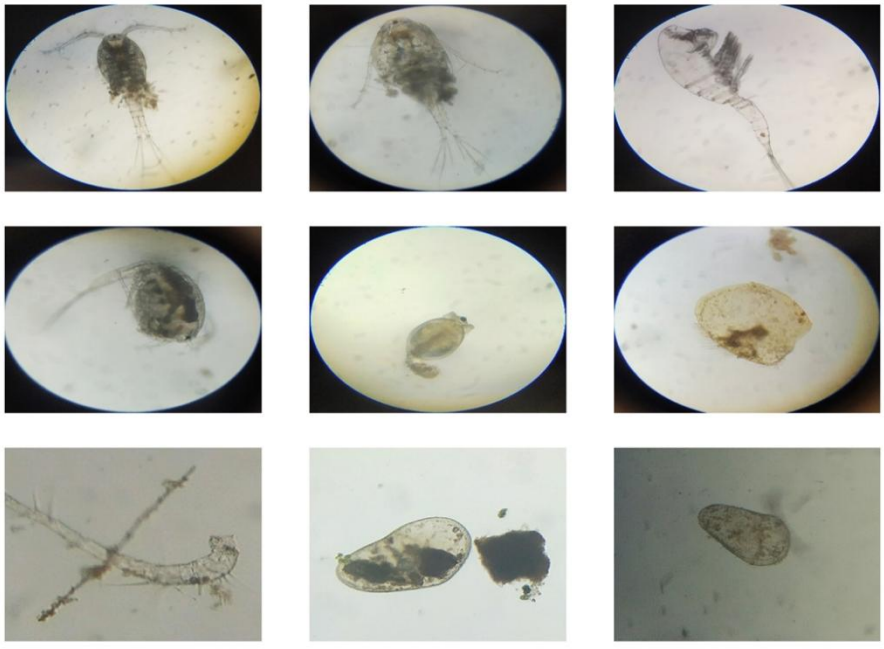
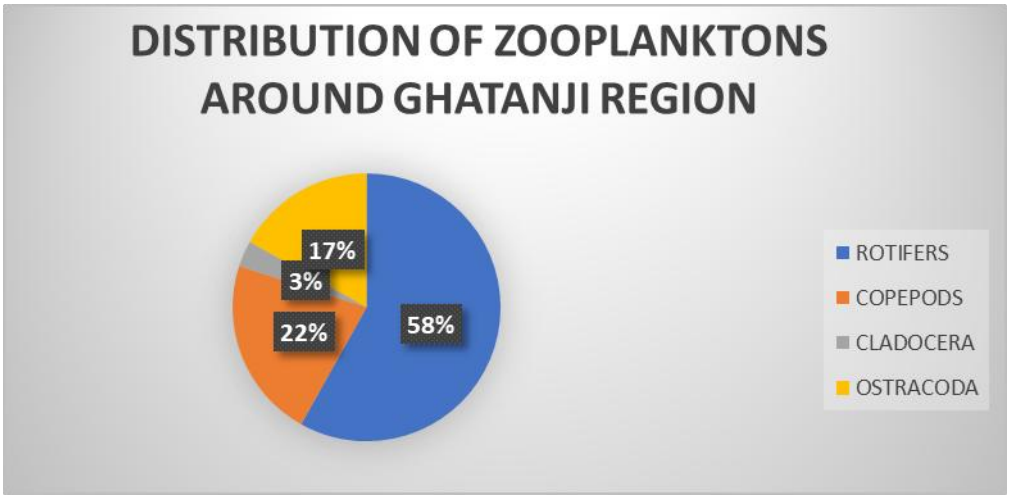


Fig1. Acanthocyclops capillatus Fig.2 Diacyclops navas Fig.3 Oithona davisae
Fig.4 Oithona spp Fig.5 Horaella brehmi spp Fig.6 Cypris spp.
Fig.8 Candona foviolata Fig.9 Candona pervula

Photoplate II: Some Different Zooplanktons found in Waghadi river around Ghatanji region



Graph plate I: Distribution pattern of zooplanktons around Ghatanji region.

Conclusion:

The aquatic ecosystem depends on climatic condition, pattern of water body and pollution that give adverse effects on devolvement of aquatic organisms. Zooplanktons are an intermediate part of the food chain in aquatic ecosystems; it also represents the condition of the water body according to their population. Present investigation shows that the Rotifers are an important group of the zooplankton community which play a vital role in aquatic ecosystems. During present work we recorded a total of 11 species of Zooplankton community amongst which 4 belong to Rotifera, 4 belong to Copepoda, 1 belongs to Cladocera, And 2 belong to Ostracoda. Rotifers and Copepods represent the most dominant group in Waghadi River around Ghatanji region and Cladocera represent the least number of species. As we consider population density then most zooplanktons are found in Rotifers < Copepoda <Ostracoda <Cladocera. Population density of zooplanktons represents the presence rate of Fishes in particular water bodies because zooplanktons are the primary food source for small and some large fishes. The Zooplankton diversity and population density information helps for Fishery development and it also helps for different Government projects related to riverine ecology development.

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A STUDY OF WATER SOLUBLE FERTILIZERS AND MICRONUTRIENTS ON NUMBER OF LEAVES PER PLANT OF BANANA (CV. GRAND NAIN)

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ABSTRACT

During the present studies different treatments of water soluble fertilizers were applied to the plants of test banana cultivar during two trial years. From the results it is clear that application of all treatments of the water soluble fertilizers found to be stimulatory for the emergence of increased number of leaves per plant during both the trial years at (three, six and nine months after planting) at every growth stage. Application of M_2 treatment of water soluble fertilizers with micronutrients was found to be superior treatment for the emergence of leaves per plant than the other treatments. It was interesting to note that at the end of the growth stage of nine months after planting, the plants applied with M_2 treatment of water soluble fertilizers with micronutrients showed emergence of more number of leaves

Introduction

The banana (*Musa paradisiaca* L.) an important fruit crop of the world. It is consumed by human beings since centuries long back. It is known to be mans first food and hence called it as Adams fruit. It is highly nutritious. It is cheap and hence nicknamed as **poor man's apple**. Apart from using banana as food, the fruit, leaves and other plant parts are used in several occasions and religious purposes. It is evident from the literature that there are about 250-300 cultivated banana varities in India. About 90 per cent farmers in Nanded district used to grow grand nain cultivar. Grand Nain is suitable for Nanded region in terms of vigour, yield, quality and long shelf-life. The yield and quality of banana requires vegetative growth and good vegetative growth requires recommended dose of macro and micronutrients. The macronutrients (Nitrogen, Phosphorous and Potassium) promote vegetative growth and production. The micronutrients in small dose promote enzymatic activities and synthesis resulting into high yield and quality (Kumar, 2002, Das, 2003). Considering these facts the research topic entitled **Effect of Water Soluble Fertilizers and Micronutrients on number of leaves per plant of Banana (*Musa paradisiaca* L.) is** selected for the present studies.

Materials and Methods

During the present studies different treatments of water soluble fertilizers were applied to the plants of test banana cultivar during two trial years. The plants under conventional method of application of fertilizers were served as control during both the trial years. The number of emergence of leaves per plant was recorded after three, six, and nine months after planting during first and second year. The fully opened uppermost leaves per plant were counted at three months after planting and tagged. Similarly the leaves per plant were counted after six and nine months of planting and tagged. The sum of leaf count at third, sixth and nine months for both the trial years was considered as the total number of leaves per plant during growing period of the test cultivar.

Treatment Details

The details of application of fertilizers scheduled during the research work are presented in table–V.

Table-V: Details of application schedule of fertilizers

Treatmetns	**Treatment Details**
I. Main Plot treatments	
M_1	50 % RDF through WSF (12:61:00, 13:0:45 and Urea)
M_2	75 % RDF through WSF (12:61:00, 13:0:45 and Urea)
M_3	50% RDF through WSF (Urea, Orthophosphoric acid and White potash)
M_4	75% RDF through WSF (Urea, Orthophosphoric acid and White potash)
M_5	100 % RDF through soil application (Urea, SSP and MOP)
II. Sub-Plot treatments	
S_0	Without micronutrients
S_1	With micronutrients
Replications	4 (Four)
Design	Split plot Design (SPD)
Year (Seasons)	Two (2015-16 and 2016-17)
Location	A/P Pardi (Mukta) Tq. Ardhapur Nanded district of Maharashtra state
Crop and Cultivar	Banana Cv. Grand Nain
Spacing	Row to row 1.8 meters and plant to plant 1.5 meters
Number of plants/treatment	16
Total number of plants	640
Total number of treatments	10 (Main plot treatments 5 x Sub-plot treatments 2)

WSF = water soluble fertilizers through fertigation
RDF = Recommended Dose of Fertilizer (200:160:200 grams NPK per plant)
NPK=Nitrogen, Phosphorous and Potasssium
SSP=Single Super Phosphate
MOP=Murate of potash

Results and Discussion

From the results presented in table-1& 1a it is clear that application of all treatments of the water soluble fertilizers found to be stimulatory for the emergence of increased number of leaves per plant during both the trial years at (three, six and nine months after planting) at every growth stage. Application of M_2treatment of water soluble fertilizers with micronutrients was found to be superior treatment for the emergence of leaves per plant than the other treatments.

It was interesting to note that at the end of the growth stage of nine months after planting, the plants applied with M_2 treatment of water soluble fertilizers with micronutrients showed emergence of more number of leaves (15.06) which is followed by M_4 (14.44) and M_1 (13.38) where as the plants applied with M_3 treatment of water soluble fertilizers and micronutrients showed emergence of very less number of leaves (12.38) during both the trial years as compared to the controlled M_5 treatment (12.50).

The work on the same line is carried out by different workers like Modi et al (2012),

Kumar et al (2012), Selim et al. (2012), Patil and shinde (2013), Krishnamurthy et al . (2013),Eiada and and Mustafa (2013), Kapoor et al. (2014), Venkataramana et al. (2014), Kumar and Ahmad (2014), Marina et al. (2016), Belen et al. (2016), Chongtham et al. (2016) and Hussain et al. (2017).

Table-1: Studies on application of water soluble fertilizers and micronutrients in relation to number of leaves per plant during growing period of Grand Nain cultivar of Banana.

Number of leaves per plant										**Total number of leaves**		
Treat-ments	**3rd MAP**			**6th MAP**			**9th MAP**					
	I year	**II year**	**Pooled**	**Iyear**	**II year**	**Pooled**	**Iyear**	**II year**	**Pooled**	**Iyear**	**II year**	**Pooled**
Main Plot treatments: Water soluble fertilizer treatments (M)												
M_1	10.13	10.25	10.19	11.88	12.00	11.94	13.88	12.88	13.38	35.88	35.13	35.50
M_2	11.88	12.13	12.00	13.00	13.13	13.06	15.13	15.00	15.06	40.00	40.25	40.13
M_3	9.63	10.75	10.19	11.25	11.13	11.19	12.63	12.63	12.62	33.50	34.00	33.75
M_4	10.63	10.75	10.69	12.50	12.50	12.50	14.38	14.50	14.44	37.50	37.75	37.63
M_5	9.25	9.38	9.31	10.63	10.75	10.69	12.38	12.13	12.27	32.25	32.75	32.50
S.Em. ±	0.36	0.24	0.23	0.40	0.42	0.23	0.34	0.34	0.23	0.76	0.77	0.45
CD@5 %	1.11	0.73	0.66	1.22	1.28	0.67	1.03	1.04	0.65	2.33	2.36	1.27
Sub Plot treatments: Micronutrient treatments (S)												
S_0	10.15	10.30	10.23	11.70	11.65	11.68	13.45	13.10	13.28	35.30	35.05	35.18
S_1	10.45	11.00	10.73	12.00	12.15	12.08	13.90	13.75	13.83	36.35	36.90	36.63
S.Em. ±	0.15	0.27	0.15	0.16	0.11	0.14	0.16	0.11	0.14	0.27	0.36	0.28
CD@5 %	NS	NS	0.42	NS	0.34	NS	0.49	0.33	0.41	0.82	1.07	0.80
Interactions												
M×S												
S.Em. ±	0.34	0.60	0.33	0.36	0.25	0.32	0.36	0.25	0.32	0.61	0.79	0.63
CD@5 %	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Y×M												
S.Em. ±			0.32		0.31			0.32				0.63
CD@5 %			NS		NS			NS				NS
Y× S												
S.Em. ±			0.21		0.20			0.20				0.40

CD@5 %			NS			NS			NS			NS
Y×M× S												
S.Em. ±			0.46			0.45			0.46			0.89
CD@5 %			NS			NS			NS			NS
CV.	8.25	8.73	8.86	7.78	7.05	7.59	8.12	8.37	8.72	9.69	9.23	9.99
GM.	**10.30**	**10.65**	**10.48**	**11.85**	**11.90**	**11.86**	**13.68**	**13.43**	**13.55**	**35.83**	**35.98**	**35.90**

Table-1a: Significance and at par values of number of leaves per plant based on statistical analysis resulted by the treatments of water soluble fertilizers and micronutrients during growing periods of Banana cultivar Grand Nain

No. of leaves

Month	**Year/ Pooled**	**Main Plot**					**Sub Plot**		**Interactions**
3	I Year	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		11.88	10.63	10.13	9.63	9.25	10.45	10.15	
	II Year	M_2	M_4	M_3	M_1	M_5	S_1	S_0	NS
		12.13	10.75	10.75	10.25	9.38	11.00	10.30	
	Pooled	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		12.00	10.69	10.19	10.19	9.31	10.73	10.23	
6	I Year	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		13.00	12.50	11.88	11.25	10.63	12.00	11.70	
	II Year	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		13.13	12.50	12.00	11.13	10.75	12.15	11.65	
	Pooled	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		13.06	12.50	11.94	11.19	10.69	12.08	11.68	
9	I Year	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		15.13	14.38	13.88	12.63	12.38	13.90	13.47	
	II Year	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		15.00	14.50	12.88	12.63	12.13	13.75	13.10	
	Pooled	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		15.06	14.44	13.38	12.38	12.50	13.83	13.28	

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POLLUTION: SOURCES, EFFECTS AND CONTROL

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ABSTRACT

We undoubtedly hear the word "pollution" every day at school, college, and the office. Newspapers, internet journals, and other types of media also use the word. What is it, then, and why is it considered harmful? When pollutants poison the natural environment, it results in changes that have a negative impact on our everyday lives. The primary constituents or parts of pollution are pollutants, which are typically waste products in a variety of forms. Our ecosystem and the balance of the environment are both disturbed by pollution. Our lives have developed and modernized to the point where pollution is at an all-time high, contributing to both global warming and human illness. According to the polluter-pays principle, whomever causes pollution should be held accountable for the harm they cause. It has to do with financial responsibility. Any company or person is in charge of handling and caring for the garbage they produce, and they should be held liable for any harm it may cause. Imagine a factory that generates a variety of wastes that may harm the earth, water, and air. The factory is encouraged to treat the trash before releasing it thanks to the polluter pays principle. The factory is responsible for making up for any environmental harm brought on by its trash, including any deaths, health problems, property losses, and environmental harm.

1. Introduction

The poisoning of water bodies by hazardous chemicals is one of the main causes of water pollution. As can be seen from the aforementioned example, discarded plastic bottles, cans, and other garbage damage aquatic bodies. These lead to water contamination, which hurts the entire environment in addition to people. These pollutants release toxins that move up the food chain and finally reach humans. In most instances, the result is harmful only to the local population and species, but it can also have an effect on a larger scale. The oceans receive over 6 billion pounds of trash each year. Other types of undesired materials are discharged into different water bodies in addition to industrial effluents and untreated sewage. These can include everything from oil spills to nuclear waste, the latter of which can make large areas inhabitable.

2. Water pollution:

The polluting of water bodies is referred to as water pollution. Water pollution occurs when industrial and agricultural effluents contaminate water bodies such as rivers, lakes, oceans, groundwater, and aquifers. All lifeforms that depend on water, whether directly or indirectly, suffer when it is polluted. Years may pass before you notice the impacts of tainted water.

2.1. Sources of Water Pollution

Urbanization, deforestation, industrial effluents, social and religious practices, use of detergents and fertilizers, and agricultural run-offs-use of insecticides and pesticides-are the main causes of water pollution in India.

2.2. Effects of Water Pollution

The type of contaminants present and their concentration determine the impact of water pollution. In determining the amounts of pollution, the location of water bodies is also crucial. Urban areas' surrounding water bodies are very polluted. This is the outcome of industrial and commercial facilities discharging trash and hazardous materials. Aquatic life is significantly impacted by water pollution. It alters their behaviour and metabolism, which results in disease and eventual death. Dioxin is a toxin that affects many processes, including reproduction, unchecked cell development, and cancer. Fish, chicken, and meat all bioaccumulate this compound. Before reaching the human body, toxic chemicals move up the food chain. The food chain may be significantly impacted by water contamination. The food chain is thrown off. Lead and

cadmium are two toxic substances that can continue to cause problems at higher concentrations after they enter the food chain through animals (fish eaten by humans or other animals). Humans are impacted by pollution and are at risk of catching diseases like hepatitis from faeces in water sources. An outbreak of infectious diseases like cholera and others can always be brought on by improper drinking water treatment and unfit water. Because of water pollution, the ecology may be severely impacted, altered, or disorganised.

2.3. Control Measures of Water Pollution

There are numerous ways to reduce water contamination on a broader scale. Treatment of sewage waste prior to release is preferable to discharging it into aquatic bodies. By doing this, the water body itself can breakdown and render harmless any compounds that are still there, reducing their initial toxicity. Water that has undergone secondary treatment may be used in sanitary systems and agricultural fields. The Water Hyacinth is a very unique plant that can take up harmful compounds like cadmium and other such substances that are dissolved in water. The negative impacts will be greatly diminished by establishing these in areas vulnerable to these types of pollution. Precipitation, ion exchange, reverse osmosis, and coagulation are a few chemical techniques that aid in the management of water pollution. Reusing, reducing, and recycling whenever possible will go a long way toward addressing the consequences of water pollution on an individual basis.

3. Land pollution:

The degradation of the earth's land surfaces, both above and below the surface, is referred to as land pollution. The build-up of waste materials—both solid and liquid—that contaminate soil and groundwater—is the reason. Municipal solid waste (MSW), which encompasses both hazardous and non-hazardous waste, is a common term for these waste items. The permeability of the soil formations beneath the garbage can raise or decrease the risk of land pollution when waste is dumped onto a piece of land. There is a direct correlation between soil permeability and the likelihood of land pollution. Land pollution has been greatly reduced because to the use of the natural shale and clay in the area. For the TDS Austin dump to comply with strict environmental protection laws, both natural and artificial barriers are used. The leachate collection system, thick re-compacted clay sidewall liners, and performance-based liner system are all included in the landfill construction. The EPA and TCEQ's current performance-based landfill liner system requirements are easily met by the liner system.

3.1. Causes of land pollution:

3.1.1. Litter

Unfortunately, incorrect garbage disposal, or littering, happens frequently. According to a research by Litter in America, the cost of cleaning up litter in the United States exceeds $11.5 billion annually. Every food wrapper or cigarette stub that is thrown out a window contributes in some tiny way to this enormous problem. Keep America Beautiful claims that 76% of the litter observed on roads comes from drivers and pedestrians. But not all litter is deliberate. Unsecured objects that fall out of trash cans or the backs of cars also contribute significantly to litter. Land contamination is further exacerbated by illegal dumping. In lieu of authorised dumping facilities, waste is frequently dumped illegally in locations including forests, open fields, and ditches. Asbestos, automobiles, and recyclable or reusable rubbish are examples of materials that are frequently illegally discarded. Whether it is done on purpose or not, all litter pollutes the environment by breaking down and releasing chemicals and tiny particles. To find out more about the harm caused by littering and how to stop it in your neighbourhood, see our blog on the subject.

3.1.2. Urbanization and Construction

Urbanization alone does not constitute littering, but a dense population that produces rubbish and leaves behind litter will certainly result in land pollution. Construction work is being done to accommodate this growing population,

which generates a lot of waste materials including bricks, metal, plastic, wood, and other building materials. These materials add to the area's land pollution when they are not disposed of appropriately. Work with partners who provide full builder solutions to establish cost-effective construction recycling and trash disposal strategies in order to lessen the environmental impact of construction sites.

3.1.3. Agriculture

The basis of both daily life and the economy as a whole is agriculture. However, it can also have a significant impact on the environment. Agricultural pollution is when a significant amount of contamination produced as a by-product of raising animals and cultivating food crops is released into the environment.

3.2. Effects of Land Pollution

Almost every aspect of the living world is impacted by land contamination, including: water that is unsafe to consume. Polluted soil results in the loss of agriculturally productive land. Climate change brings forth a plethora of terrible issues, such as flash floods and erratic rains. The extinction and endangerment of natural species. Habitat shifting is the process through which some animals must leave their homes in order to survive. An increase in flames as a result of dry conditions in contaminated areas increased air pollution, which is a result of garbage burning. Increased soil contaminants can affect one's health by getting into the body through the food chain.

3.3. How to Prevent Land Pollution

Given the severe implications of land pollution, it is imperative to take preventative actions to lessen its effects in the future. Lessening the Use of Chemicals and Pesticides in Agriculture. Finding alternatives will aid in minimising the impact on the environment because the use of pesticides and other chemicals in farming and agriculture significantly contributes to land pollution. By switching from bio-fertilizers to manure, farmers, for example, can use natural ingredients. Supporting local, environmentally conscious farmers at your neighbourhood farmer's market or grocery shop can encourage them to adopt more environmentally friendly farming methods. Contributing to or helping out in an urban garden in your neighbourhood is an additional choice.

3.3.1. Reforestation

Reforestation entails planting new trees in a location. For example, this may be required in places that have recently had wildfires or where trees have been felled and processed. By helping to bond the soil, this process shields it from land contamination, reduces soil erosion, and reduces flooding.

3.3.2. Solid Waste Treatments

When solid waste is not correctly handled, the amount of toxins and dangerous compounds in the soil might grow. Land pollution can be decreased with the aid of chemical treatment techniques used in a controlled setting. This method of treating solid waste also involves neutralisation. Before being placed into landfills, trash undergoes this treatment to change its pH level.

3.4. Reduce, Reuse and Recycle

There are numerous things we can do personally to lessen our contribution to land contamination. Reusing or recycling products is one of the simplest ways to accomplish this and prevent the creation of waste from materials or objects that still have useful lives. It has never been simpler to recycle thanks to rising recycling awareness and an increase in recycling bins in many cities. Composting is another approach to lessen land pollution. Food scraps and yard waste together currently account up more than 30% of what we toss away but might be composted, according to the United States Environmental Protection Agency. Environmental waste is avoided by reducing and reusing waste goods. Read our blog post on how to be an environmental steward in your neighbourhood if you want to make a difference on a local level.

4. Discussion and concluding remarks

Environmental pollution is defined as the wasteful discharge of waste into the planet's natural resource reservoirs, such as the air or

water, which has continued nonstop and caused both temporary or permanent harm to living organisms and their surroundings. Environmental contamination has an adverse influence on the ideal environmental systems by revealing the contaminated physical and biological aspects of the planet. Pollutants may cause significant or minor destructions, with the big devastation being measurable and its efficacy being tracked. However, the little degradation only becomes apparent after a very long time as a very slight disruption to the fragile stable natural food web pyramid offset. Fish and other aquatic life may be harmed as a result of deoxygenation caused by the biodegradation of organic materials, which takes oxygen out of the water. Eutrophication is the term used to describe high nitrogen levels in water. As a result of this process, the density of algae and other plants increases, which can decrease light penetration into the water and result in deoxygenation when the plants decompose. The steady build-up of substances in living things' bodies is known as bioaccumulation. Bio amplification is the process of increasing accumulation up a food chain. Human health will suffer if bioaccumulated toxins are consumed in food sources like fish. Through consumption of water and food, inhalation through breathing, and skin absorption, humans are exposed to contaminants. Preventing pollution refers to stopping or reducing waste generation before it is released into the environment. Measures are taken to limit the harm that pollutants can cause. Principles like the polluter pays principle, the precautionary principle, and the duty of care concept, as well as pertinent legislation and policies, all assist pollution reduction.

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STUDY OF DIVERSITY AND THEIR DISTRIBUTION OF SNAKES AROUND GHATANJI REGION OF YAVATMAL DISTRICT, MAHARASHTRA (INDIA)

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ABSTRACT

This study is about the diversity and distribution of venomous, semi-venomous and Non-venomous snakes Ghatanji region of Yavatmal District. Snakes play an important role in the natural environment and ecological food chains in the ecosystem. The snakes may be aquatic, burrowing and arboreal. The snakes are distributed in various kinds of habitats that includes grasslands, wetlands, deserts, forests, agricultural fields and residential areas of urban and rural villages and cities. Snakes are of different size, shape and colour according to their mode of life. A total number of 21 different species of Snakes reported from Ghatanji region of Yavatmal District. out of the 21 species 05 species were venomous, 02 species were semi-venomous and 14 species were Non-venomous

Keywords:*Snakes, diversity and distribution, Venomous, Semi Venomous &Non-venomous, Ghatanji, India.*

Introduction

The term biodiversity refers to the variety of life on Earth at all its levels, from genes to ecosystems, and can encompass the evolutionary, ecological, and cultural processes that sustain life. The distribution of species in an ecosystem gives a conception of belief that how species are interconnected. Snakes are extremely well adapted to their habitats and plays important role in food chain and food web. The snakes are integral part of a forest ecosystem as their position in the food chain as predators making them important in the nutrients flow.Snakes belong to the animal class reptiles. This group also includes crocodiles, lizards, and turtles. Reptiles are cold-blooded animals that raise their body temperature by lying in the sun or lower it by crawling into the shade. Their body temperature changes to the temperature of its surroundings. Because of this, snakes that live in colder climates must hibernate through the winter. They will find burrows or caves and fall into a deep sleep until the weather becomes ware enough for them. There are near about 3000 species of all kinds of snakes around the world. They live almost everywhere, in deserts, forests, oceans, streams, and lakes. Snakes live on the ground, in trees, and in water.Snakes occurs in sea are deadly poisonous, even the antidotes of several sea snakes are not presently known. Species of Viper, Cobra and indian Krait are generally poisonous snakes occurs in Maharashtra with their species variety. Water snake (Pandivad), Rat snakes (Dhaman), Boa's (Mandul, Durkya Ghonas) , Grass snake are non- poisonous snakes and some snakes have semi poisonous type of ability.There are different local, regional and common names of snakes in different parts of country and the world but the scientific name doesn't change throughout the world. Some species of snake may show slight or major diverse colour pattern with change in habitat however the body coloration Shape and size of scales on head, abdomen and; dorsal body surface; tail shape presence of particular features on the head region are some of the important features taken in to consideration in categorizing the snake species and that has more importance in the classification of Snakes. Snakes are present in tropical and temperate environments, starting from oceans to mountain to oceans and upto deserts (Pauwels et al., 2008).

Snakes are well known for their hibernation and aestivation. it is possible due to their ability to survive without feeding for long duration. Snakes are said to be friends of farmers because they are natural predators of harmful rodents, and insects in agriculture fields, but in India the lack of awareness

among the farmers and people in rural area hundreds of snakes are killed by the people. The venom apparatus in the mouth of venomous snakes include a pair of fangs is an effective structure useful for the snakes to kill their prey animal. Due to human mistake of careless work in the fields in the agriculture fields without protection measures the snake bite happens. Without knowing the snake species as venomous or non-venomous it is killed.All over the world people fear and dislike the snakes moreover inadequate knowledge of people about snakes results into killing whenever and wherever they are seen.

Importance of snake

Snakes are the important part of the ecosystem. They are the essential part of complex food web help to maintain a population balance. They help to control prey species like rats to the natural level. They are the natural paste controllers. Also they are the food to predators who eat snakes. Venomous snakes are used for making anti venom which is used to save the life of a snake bite victim.

Material and method :-

Study Area: -

Ghatanji taluka located at 20°8'37.2768" N latitude and 78°18'42.0048" E longitude is neighbourhood of the Yavatmal district of Maharashtra state in India. Yavatmal district lies in the Vidarbha region of the state and is popularly known as the cotton city because in this area farmer produces a fine quality of cotton. Total numbers of villages in Ghatanji taluka is 112. There is ample water resource due to river 'Waghadi' and Dam over there. It is having ample forest area, consisting Teak Wood, Nilgiri Trees and many other spices trees. Various types of animals and snakes are living in these forests.

Methodology:-

To determine diversity & distribution of snake species in various habitats in Ghatanji region, the data was collected from snake friends volunteers reports from forest offices and locals. It is found that snakes were seeing mostly during day time and rarely at night time. The photographs were captured at their natural habitat then they were release. snakes were found at residential areas, forests, agricultural field and even at road side. It is found that most of species were killed due to human activities, road accidents and encounter during tracking.

Result and Disscussion :-

This study highlights the diversity of snakes in the Ghatanji region of Yavatmal district Maharashtra state. During this study A total 21 species were recorded from different areas of Ghatanji. among these 21 species of snake 05 species were found to be venomous, 02 species were found to be Semi-venomous and 14 species were found to be Non-venomous (Figure 1).

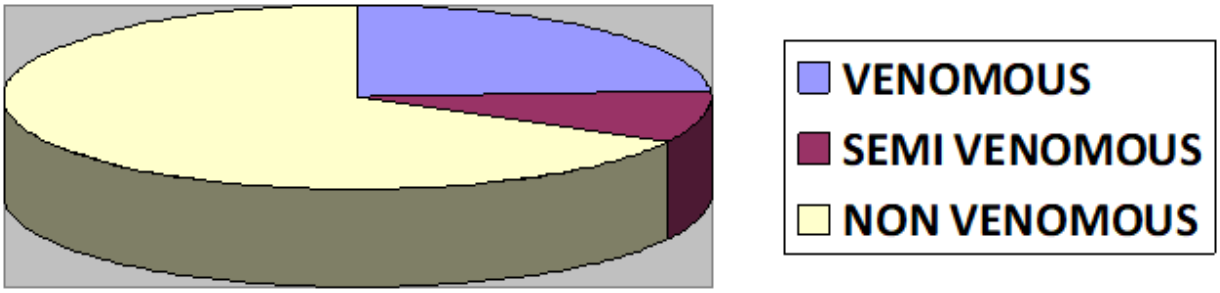

Fig.1 Graphical representation of Snakes diversity found around Ghatanji region

Table 1. List of Venomous, Semi-Venomous and Non-Venomous Snakes Species observed in Ghatanji region of Yavatmal District, Maharashtra

Sr. No	Vernacular Name	Common Name	Scientific Name	Types
1	Naag	Spectacled Cobra	*Najanaja*	Venomous
2	Manyaar	Indian common Krait	*Bungarus caeruleus*	Venomous
3	Ghonus	Russell's viper	*Daboia russelli*	Venomous
4	Furse	Saw scaled viper	*Echis carinatus*	Venomous
5	Powla	Coral snake	*Calliophis melanurus*	Venomous
6	Manjrya	Cat snake	*Boiga trigonata*	Semi-venomous
7	Harnatol	Green vine snake	*Ahaetulla nasuta*	Semi-venomous
8	Dhul nagin	Banded Racer	*Argyrogena fasiolata*	Non-venomous
9	Kavdya	Indian wolf snake	*Lycodon aulicus*	Non-venomous
10	Ajgar	Indian rock python	*Python molurus molurus*	Non-venomous
11	Taskar	Trinklet snake	*Coelognathus helena helena*	Non-venomous
12	Kukri	Banded kukri	*Oligodon arnensis*	Non-venomous
13	Durkya ghonus	Sand Boa	*Gongylophis conicus*	Non-venomous
14	Gawatya	Greenkeel back	*Macropisthodon plumbicolor*	Non-venomous
15	Andi khau saap	Egg eater snake	*Elachistodon westermanni*	Non-venomous
16	Naneti	Buff striped keel back	*Amphiesma stolatum*	Non-venomous
17	Pandivad	Checkered keel back	*Fowlea piscator*	Non-venomous
18	Wala saap	Worm of blind snake	*Ramphotyphlops ligatus*	Non-venomous
19	Zadpya saap	Bronze back tree snake	*Dendrelaphis tristis*	Non-venomous
20	Mandool	Red sand Boa	*Eryx johnii*	Non-venomous
21	Dhaman	Indian Rat snake	*Ptyas mucosa*	Non-venomous


1. Spectacled Cobra (Najanaja) **2. Indian common Krait (Bungarus caeruleus)**


3. Russell's viper (Daboia russelli) **4. Saw scaled viper (Echis carinatus)**


5. Coral snake (Calliophis melanurus) **6. Cat snake (Boiga trigonata)**


7.Green vine snake (Ahaetulla nasuta)8.Banded Racer (Argyrogena fasiolata)

9.Indian wolf snake (Lycodon aulicus) **10. Indian rock python (Python molurus molurus)**

11.Trinklat snake (Coelognaphus Helena helena) **12. Banded kukri (oligodon arnensis)**

13. Sand Boa (Gongylophis conicus) **14.Greenkeel back (Macropisthodon plumbicolor)**

15. Egg eater snake (Elachistodon westermanni) **16. Buff striped keel back (Amphiesma stolatum)**


17. Checkered keel back (Fowlea piscator) **18. Worm of blind snake (Ramphotyphlops ligatus)**


19. Bronze back tree snake (Dendrelaphis tristis) **20. Red sand Boa (Eryx johnii)**

21. Indian Rat snake (Ptyas mucosa)

Conclusion

It is concluded that in all 21 species of Snakes were recorded which include 05 species were found to be Venomous, 02 species were found to be Semi-venomous and 14 species were found to be Non-venomous in Ghatanji region. Most of the snakes were reported from the residential area and farmers field. lack of knowledge, fear of bite, misunderstanding &careless behaviour were the main reasons behind the snake killing.

The present work thus provides the useful information regarding the Identification, conservation and the awareness about the snakes found in the Ghatanji region of yavatmal district of Maharashtra. And the study can also be useful for providing proper Guidance to people so that we can reduce snake killings. We can remove misconceptions

about snakes. We can also make aware them about snake bite preventions and remedies.

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ECO-FEMINISM AND RECENT PROTEST MOVEMENTS AND ITS CONNECTION

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ABSTRACT

In the West many intellectuals on eco-feminism relates gender and environment ideologically. However, in India protest against environmental destruction and struggles for survival and subsistence point to the fact that caste, class and gender issues are profoundly interconnected. In this paper, I will look at the basic tenets of eco-feminism within the Indian environmental movement and highlight the interconnections of caste, class and gender issues in it. Furthermore, I will attempt to show whether the issue of environment has been taken up by the Indian women's movement and how the Indian women's movement would benefit and become more broad based by taking up issues that concern women of different caste and class, and simultaneously to attempt how the environmental movement would benefit by taking up a feminist perspective.

Introduction

As we all know, Nature is a provider and giver of basic resources like water and food and that's why we often think of nature in terms of "Mother Earth" and "Mother Nature". Basically it is possible that women and nature are closely related to each other. As Rousseau says "Human is born free, but everywhere is in chain"; of course but what if there is a close relationship between both nature and women. Eco-feminism as a movement acknowledges these links that connect the exploitation and domination of both nature and women under a patriarchal society.But one has to understand that Eco-feminism wasn't just one single movement that arose out of a single place and then went on to spread across the world. It was actually India's Chipko Movement in the early 1970s, the Green Belt Movement in Kenya later that some decade women's participation in anti-nuclear, pro-environment movement in the west in the 1980s and 1990 collectively form the Philosophy of Eco-feminism which believe that women and nature are interconnected in their domination and exploitation and that nature could only be saved by what is traditionally considered a feminist practice of healing and nurturing.

This relationship between environmental damage and the subjugation of women can take different forms. The two major forms of Eco-feminism turn out to be radical and cultural Ec0-feminism. Eco-feminism can be defined as a value system, a social movement and a practice which also offers a political analysis that explores the environmental destruction. It is an awareness that begins with the realization that the exploitation of nature is intimately linked to Western man's attitude toward women and tribal culture. All eco-feminists are of the view that it is the logic of domination in association with value hierarchical thinking and value dualisms that sustains and justifies the twin domination of women and nature. For economists, therefore, the domination of women and nature is basically rooted in ideology.

Eco-feminist literature portrays the historical exploitation and domination of women and nature as going hand in hand and both are seen as victims of development. It is taken as self evident that any harm to nature harms women equally, since women are seen as closer to nature than men. It locates the domination of women and nature mainly in ideology, thereby neglecting the interrelated material sources of dominance based on economic advantage and political power as well as the gender division of labor and distribution of opportunity.

Eco-feminism in India

One of the leading pioneers of the Eco-feminist movement in India and in the world, Dr. Vandana Shiva agrees that women do share a special relationship with nature and this relationship is reciprocal and un-exploitative.

Shiva holds colonialism responsible for the "destruction of nature and women's work". Pursuing this model of development has meant a shift away from traditional Indian Philosophy, which sees Prakriti as a living and creative process, the feminine principle, from which all life arises. Under the grab of development, the nature has been exploited mercilessly and the feminine principle was no longer associated with activity, creativity and sanctity of life, but was considered passive and as a resource. This has led to marginalization, devaluation, displacement and ultimately the dispensability of women. Women's special knowledge of nature and their dependence on it for staying alive, were systematically marginalized under the onslaught of modern science. Shiva, however, notes that Third World women are not simply victims of the development process, but also possess the power of change. She points to the experiences of women in the Chipko movement of the 1970s in the Garhwal Himalayas where women struggled for the protection and regeneration of the forests. Like the western eco-feminists, she implicitly essentializes Third World women and sees them as being closer to nature. Besides, the notions of Shakti and Prakriti are posed as representative of Indian philosophy as a whole. However, the feminine principle is largely expressed in Hindu terms which are close to Sankhya Philosophy, which is mainly popular in the North. Dietrich wonders what the feminine principle would imply for Dalits, Tribals, Muslims, Christians, Sikhs and other minority communities. Furthermore Shiva does not analyze religious controls over women and when she discuss the "shakti" aspects of religion.

Through her analysis Shiva points out the critical links between the different development perspectives, the process of change brought about by the development and its impact on the environment and the people dependent on it for their subsistence. Further, she argues with Maria that whenever women have protested against ecological destruction or nuclear annihilation, they were aware of the connections between patriarchal violence against women, other people and nature. These movements were informed by the eco-feminist principles of connectedness, wholeness, inter-dependence and spirituality, in opposition to capitalist patriarchal science that is engaged in disconnecting and dissenting. It is argued that the eco-feminist position i.e. a subsistence production of women the world over. This struggle of women and men to conserve their subsistence base can become the common ground for women's liberation and preservation of life on earth. However, some of the problems with Vandana Shiva's argument is as follows: Shiva's analysis in *Staying Alive* in 1988 relates to the study of rural women in Northwest India, but she tends to generalize her analysis to cover all Third World women. Like the western eco-feminists, she implicitly essentializes Third World women and sees them as being closer to nature. Besides, the notions of Shakti and Prakriti are posed as representative of Indian philosophy as a whole. However, the feminine principle is largely expressed in Hindu terms which are close to Sankhya philosophy which is mainly popular in the North. Dietrich wonders what the feminine principle would imply for Dalits, tribals, Muslims, Christian, Sikhs and other minority communities.

In discussing the pros and cons of eco-feminism one would like to advocate Bina Agrawal's feminist environmental perspective. The perspective is rooted in material reality and sees the relation between women and nature as structured by gender and class organization of production, reproduction and distribution. As Bina Agrawal points out women's relation to the environment is socially and historically variable. Women, particularly in poor rural households, are both victims of environmental degradation as well as active agents in movements for the protection and regeneration of the environment.

However, before few months another protest was begun by women i.e. Shaheen Bagh protest. Shaheen Bagh was sit-in peaceful protest led by women that began in response to the passage of CAA ensuing police intervention against students at Jamia Milia Islamia who were opposing the amendment. Protest agitated not only against citizenship issues of CAA, but also against police brutality, unemployment, poverty and women's

safety. This was the first ever women's movement in India and especially by minorities women's. In which women's were protesting by using creative methods such as public lecture, public debate, art's including graffiti, poster, scale model, poetry, storytelling, street dances and puppetry etc. Now it is halt for lockdown imposed for curbing Corona virus pandemic. So I think from this protest it is clear that women's still possesses power to change beyond their religious boundary. For highlighting their pain, struggle and suffering I have written a poem called "The Sapling Keeper", so that you can understand it. It is written after reading Fawad Turky's "The Seed Keeper" Palestinian poem. And also read by Vandana Shiva on Green Seed Movement.

According to Bina Agrawal, Professor of Development Economic and Environment at Global Development Institute at the University of Manchester, Shiva's theory put all women in developing countries under one category and that it doesn't take into account other factors such as India's historical, cultural and social process that have impacted the relationship between women and nature in India. Agrawal argues that the Shiva doesn't talk about the impact of pre-colonial structures such as caste and class inequality that also shaped the environment's destruction and the suppression of women.

Women are more closely related to the nature because of female tendency to be a giver and gentle is echoed in nature's qualities to provide everything necessary for the survival. By presenting men as a conqueror and women as gentle givers it undoubtedly creates a divide between men and women. Eco-feminism itself is contradicting the feminist movement of equality. Recently in Maharashtra (India) to save trees in Thane (district in Maharashtra state), citizens go back to Chipko movement and it was started from two of young residents of Thane in which the first person who was started this was a woman named Aarati Tamore disturbed with the scale of deforestation for the Metro-3 project took a stand to protect the green lungs of Thane. She told to one of reporter that "I am not a big nature lover. I am just a regular human being. We want the High Court to constitute an unblessed committee that will take a call on re-plantation and transplantation of these trees, and make someone accountable". She is the member of Aarey Conservation Group(ACG). So these incidents still shows that the Shiva was right to told that under the name of development nature and women both were exploited mercilessly and still it is true.

Conclusion

Protest movements against environmental destruction and struggles for survival highlight the fact that caste, class and gender issues are deeply meshed in it. It is the poor, lower class and lower caste, and within them, the peasant and tribal women, who are worst, affected and hence, they are the most active in the protests and with above two example that happened in India is evident for that matter. Women, therefore, cannot be homogenized into the category as the Eco-feminist tends to do, either within the country or across the globe. Women as women have a special relationship with nature as Eco-feminists argue, is proved wrong when one analyzes the various protest movements. Women are victims of environmental degradation as well as active agents in the regeneration and protection of the environment. The adverse class gender effects of these processes are reflected in the erosion of indigenous knowledge systems and livelihood strategies on which poor, rural women depend. The nature and impact of environmental degradation and the appropriation of natural resources by a small minority are based in the dominant ideas about development, gender division of labor as well as on differentials of property, power and so on. Environment and gender issues need to be taken together and the new social movements in India seem to provide the ray of hope for change.

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ENVIRONMENTAL ATTUNEMENT IN YOGA, PHYSICAL EDUCATION AND SPORT

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ABSTRACT

Environmental attunement is necessary in the everyday actions and settings that relate to philosophers, Philosophies, histories and future of health, sports, physical education and yoga. Here the intention is not to burden teachers with additional demands or seek to change the behavior of students so that they becomes good environmental citizens, health and physical education that appears to be of increasing concern in current times and thus poignant material for more focused theoretical and epistemological inquiry. Informal sports, exercise and the environment eco-motricity, outdoor education and sustainability has included in the notions of the environment and nature as a unique and important intersection with movement and physical education sports and yoga.

Keywords:*environmental attunement, yoga, physical education and sports.*

Introduction

Environment attunement:

Environmental attunement in yoga, physical education and sports as a basic concepts which describes in the aggregate of all the external forces, influences and conditions, which affects the life, development and malnutrition of living organism. It engage with a range of different insights and practices of nature-culture and embodied connections by place across health, sports and physical education, utilizing the notion of attunement helped us to explore the 'epistemplogical' 'habits' or learning in to notion of environment that focus on a body-mind culture-nature connection to the lands and waters in a deep sensory and even spiritual sense of care for others.

Yoga:

Yoga is considered as few postures only these days. But it is not so. Practicing postures and making body stronger and flexible is important to start with the yoga. Yoga needs a greater patience and stamina.

Physical education and sports:

Physical and mental well being are very closely interrelated, physical activity enhances mental development of person in physical education and sports.

Objective of the study:

To understand the basic concepts of environmental attunement in yoga, physical educational and sports.

Review of literature:

Albert (2015) recommends that success in motor skill depends upon physical fitness research findings showed that participation in running programme contributed to development of cardiovascular fitness. Many studies conducted outside India have advised for physical fitness has positive effect on sport performance capacity. Norms of physical fitness are essential for formulation, control and assessment of training of sportsman. Apart from many other factors, the heath, environment attunement and performance of an individual in general and sports persons in particular affects because of physical fitness. ***Khambete and Yogendra (2018)***reveals that good health has traditionally been viewed as freedom from disease. While everyone aggress that the absence of illness is one part of being healthy, it doesn't indicate whether you are in a state of wellbeing. Lack of recreational activity is mainly responsible for much health complication in children young and old age persons. To prevent these health troubles, a proper fitness is essential for everyone. Fitness should be a key component in anybody's life simply for the fact that it makes your feel better. Living a healthier life can not only

extend our life, it can also improve the quality. Feeling physically better and having control over our own life can greatly increase our mental health as well. Although there are some aspects of physical and mental health that are beyond an individual's (and science's) control. There are many things that peple can do to improve their quality of life.

Environmental attunement in physical education and sports:

Recreational activity:

Recreational activity as an physical activities of and through human movement where many of physical and educational objectives are achieved by means of big and small muscles activities involving sports, games, gymnastics, dance and exercise.

Need of Recreational activity:

1. Recreation activity teaches us the values of physical fitness and how to become physically fit.
2. Recreational activity also teachers us the value of ethical behavior in sporting situations.
3. Recreational activity teaches us various physical activities that can be practiced now in later life such as motor skills for the games and sports of volleyball, tennis, swimming and so on.
4. During the age, recreation activity is important to prevent and treat various ailments and disease.
5. Recreational activity is needed throughout the life for proper growth and development.
6. Recreation activity is needed because due to advanced technology, the lifestyle of proper becomes sedentary and they become passive entertainer.

Importance of recreational activity:

Recreational activity provide a unique opportunity for individual to acquire physical, social and personal benefits that can help them throughout their lives, individuals athletes generally do better in school.

Playing of recreational acidity:

1. Improve physical fitness.
2. Improve confidence though learning skills and success
3. Help individuals learn to contrl their impulses this is necessary for success in sport as well as social relationships.
4. Help build friendships
5. Start lifetime interest
6. Help individuals learn about rules and fair play
7. Help individuals to cope with winning and losing
8. Help individuals do better at a school work.
9. Children and young people can enjoy the competition and still be learning skills. Some children at 11-12 years age are showing special talent and interest in a particular sport and can benefit from individual coaching.
10. Children and young people need to learn about how to behave when playing winning and losing

Environmental attunement in yoga:

Yama:

Yama is the attitude towards others the world around us these are the initial steps to start up with the Yoga. Yama comprises five parts.

1. **Ahimsa or non violence:** This Yama does not only mean not doing harm to others in though and in deed, but also to practice acts of kindness to their creatures and to one's own it self.
2. **Satya or truthfulness:** Satya is the Yama that is about living a truthful life without doing harm to others. To practice Satya, one must think before he speaks and consider the consequence of his action. If the taught could harm others, it might be better to keep silent.
3. **Asteya or non stealing:** This Yama is not only concerned about the non stealing of material objects but also the stealing of other's ideas and other forms of possession. Using power for selfish motives or telling someone else about confidential information that had been entrusted with is against Asteya.
4. **Bramacharya or non lust:** Bramacharya means to move toward

the essential trust or to achieve self control, abstinence or moderation especially regarding to sexual activity. It is about not giving in not our ego's excessive desires or taking nothing in excess.

5. **Aparigraha or non possessiveness:** This Yama is about living a life free from greed or taming only what is necessary and do not take advantage of someone or of a situation. It is about using out powers correctly and appropriate and not exploiting others.

Niyama:

Niyama is how one treats themselves or their attitude towards themselves. The following are the three important Niyamas:

1. **Saucha or cleanliness:** This Niyama is concerned on both the outer and inner cleanliness. The practice of paranayamas, asanas and yogic cleansing practices detoxify and cleanse the physical body are necessary to achieve inner cleanliness. The mind must also be kept clean or pure. Outer clean environment or surroundings.
2. **Santosha or contentment**: Santosha is to practice humility, modesty and finding contentment.
3. **Tapas or austerity:** This Niyama refers to keeping the body in good condition. Taps is practiced though disciplining the body. Speech and mind like eating only when hungry and maintaining a good posture.

Asana:

Asanas are special exercises which have specific effects on the endocrine glands, joints, muscles, specific nerves and neural plexuses. Thousands of years ago sages used to observe the animals of the forest. They noticed that each animal had certain qualities and that the animals often assumed different poses. By imitating these poses they began to notice important effects on the human body.

Pranayama:

Pranayama is made by two words- Prana + Ayama where Prana stands for the energy of life, the vital energies and Ayama tells way to master this energy. Pranayama is a procedure, with controls this energy of life. It's in all out flow in our body enables our body to do its daily activities.

Pratiyahara:

The word "pratyahara" means "removing indriyas from material objects" Pratyahara is the stage at which an adept learns how to control the "tendacles" of consciousness that are called "indriyas" in Snskrti. Pratyahara is derived from two Sanskrit words: prati and ahar, with ahara meaning food or anything taken into ourselves, and prati a preposition meaning away or against, together they mean weaning away from ahara, or simply ingestion. This allows him to achieve the ability to see in the subtle and the subtlest layers of multidimensional space, as well as to exit of his material body into them and to settle in them, accustoming him to their subtlety, tenderness and purity.

Conclusion:

Health, physical education, sports and yoga knowledge need to be integrated via. holistic and participatory approaches that recognize shifting social and cultural practices in both built and natural environment. They offers a unique intersection of multidisciplinary learning through embodied and social cultural pedagogies that connect to self, place, space, community and more than human life.

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NANOMATERIALS FOR REMEDIATION OF ENVIRONMENTAL POLLUTION

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ABSTRACT

Conventional materials used in electrochemical sensors are being replaced now days with nanomaterials such as carbon nanotubes, graphene, metal nanoparticles and luminescent metal-organic frameworks. Nanocomposite based nanomaterials have gotten the attention of human beings due to their amazing selectivity, stability, sensitivity, processability and repeatability. These properties have rendered nanocomposites with effective analytical performance against food contaminants and environmental pollutants. Modification in nanomaterials with various effective inorganic and organic materials has been made to get the required properties. Large surface area, microporosity, scalable synthesis, excellent chemical stability, crystallinity and substantial biocompatibility of metal-organic frameworks enhance electroanalytical sensing properties, catalytic activity and electrical conductivity.

Keywords:*Environment, pollutants, Nano sensor, heavy metal, water pollution.*

Introduction

The nanosensors effectively detect heavy metal contaminants in the environment as the discharge of heavy metals into natural water as a result of human activity has become a global epidemic. Exposure to these toxic metals might induce many health-related complications, including kidney failure, brain injury, immune disorders, muscle paleness, cardiac damage, nervous system impairment and limb paralysis. Therefore, designing and developing novel sensing systems for the detection and recognition of these harmful metals in various environmental matrices, particularly water, is of extremely important. Emerging Nano technological approaches in the past two decades have played a key role in overcoming environmentally-related problems. Nanomaterial-based fabrication of chemical nanosensors has widely been applied as a powerful analytical tool for sensing heavy metals. Portability, high sensitivity, on-site detection capability, better device performance and selectivity are all advantages of these nanosensors. The detection and selectivity have been improved using molecular recognition probes for selective binding on different nanostructures. The evaluation of the sensing properties of various nanomaterial such as metal-organic frameworks, fluorescent materials, metal-based nanoparticles, carbon-based nanomaterial and quantum dots and graphene-based nanomaterials and quantum dots for heavy metal ions recognition. All these nano-architectures are frequently served as effective fluorescence probes to directly or by modification with some large or small biomolecules sense heavy metal ion for improved selectivity. However, efforts are still needed for the simultaneous designing of multiple metal ion-based detection systems, exclusively in colorimetric or optical fluorescence nanosensors for heavy metal cations.

The dangerous and carcinogenic effects of heavy metals have always drawn the attention of scientists and toxicologists to detect them and explore new methods to remove them. Atomic absorption and inductively coupled plasma mass spectroscopies are the classic analysis techniques utilized for the recognition of heavy metals. Many drawbacks are linked with these techniques, such as time consumption, expensive and complex instrumentation. Electrochemical methods have also been developed to overcome the shortcomings of such techniques. They offer many benefits which are related to simplification of the instrument, in-field application, and cost-effectiveness. Most commonly used electrochemical methods include potentiometric and voltametric techniques. Voltametric technique uses initial zero-current perturbation by either applying time-varying potential, while in potentiometric technique, the sample composition is determined by potential changes on the two

electrodes. Now days nanotechnology is prominently used to control pollution. For the last two decades, nanotechnology, defined by the particle size 1-100 nm, has provided prospective solutions to the problems in many fields. Nanotechnology helps develop better techniques for pollution control on a molecular level that can separate specific elements and molecules from a mixture of atoms and molecules. A nanofiber catalyst made of manganese oxide is used to speed up chemical reactions and remove volatile organic compounds from industrial smokestacks [1]. The University of Queensland experimented with another popular nanomaterial, carbon nanotubes (CNT), to trap greenhouse gas emissions caused by coal mining and power generation [2]. CNT traps gases up to a hundred times faster than other methods, allowing promising integration into the large-scale industry

The various nanosensor were used to control pollution. The enhanced selectivity and sensitivity of a nanosensor is originated from its size-dependent property, high functionality, large surface-to-volume ration, high reactivity, organic ligand anchorage and covalent functionalization. Sensitive and robust nanosensors based on organic and inorganic nanomaterials have been developed worldwide for environmental sensing of transition metal ions and heavy metal ions [3]. The nanomaterials used in chemical sensors have significantly improved their detection limit and reproducibility for selective identification of the metal ions.

Conclusion

Continue discharge of heavy metal contents beyond their threshold levels in the environment causes serious toxicity to life by contaminating food chains. Aquatic life is disturbed adversely by the bioaccumulation of these heavy metals in riverine ecosystems. Heavy metals are potential neurotoxins to fish. The accumulation of heavy metals in fish can cause damage to human beings on consumption as food. Heavy metals are well-thought-out to be the key pollutants because they cannot be degraded while other organic pollutants can be broken down into other less-lethal compounds. Nanosensor used to detect and collect these heavy metals presence.

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ENVIRONMENT CHALLENGES OF INDIAN SOCIETY AND VALUE BASED EDUCATION

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ABSTRACT

In India Value Based Education is the real need of the hour. As we see how the Society is diminishing in case of values day by day. It is necessary to develop the programs for inculcating values in the society. Today"s Indian youths are little bit confused because of the bombarding of the new technological devices, information explosion and violent news by the press & media. To inculcate the value system in their confused minds and make them value-oriented-powerful leaders, educational institutions should take the initiative to impart Value Based Spiritual Knowledge to this new generation. "Imbibing the qualities of good conduct, self-confidence and high values would help students earn a significant place in society. Education without values is like a flower without fragrance. Students should realize that character building is equally important as career building. A good character in life is ultimate thing that stretches person"s self-realization". In conclusion, mere desire or aspiration to progress in life is not enough; success should be based on values. And for that value-based education must be imparted in today"s institutions. So that the students may emerge as good leaders in their chosen fields.

Keywords:*Value-Based Education, Values, Society, Education, Vedanta.*

1. Introduction

Education has long been known as a vital aspect in progress. It is considered as an essential factor for social and economic development for developing countries especially India. Education spreads the knowledge, skills, habits, values, or attitudes and understanding of the people so it is important for the development of any society and backbone of the growth of any country. Education helps people to live more satisfying lives and become a useful member of the society thus, there must be a great deal of concern in the ways in which the education conveys the necessary knowledge and information to the students. There is an acute need for values to be inclusion in the areas of religion, education, social services, business and politics in India. The term “Value” refers to a development of your soul, your heart. It is not enough to be more modern, independent, developed, secular, technological hub or advance society if, in this process we have lost soul, our heart.

"Education based on the value is very necessary in our modern society because our life has become despondent." The quantity of education has increased significantly, but the quality has declined. The number of educated people has reached a high level, however murder, hatred and selfishness have spread throughout the building. Many organizations are open, but few people are civilized products. Degrees have been awarded for all but the dignity has gone down. Skilled people are produced by many institutions, but sincere people are very few. Many books are written, much research is done, many professional achievements are achieved, but humanity is threatened. Therefore, we need education based on value. An educated person must have all kinds of qualities. Education must make every individual physically, mentally, intellectually, emotionally and spiritually capable. Therefore, some universal ideals of "love, peace, respect, tolerance, forgiveness, coexistence and non-violence" should be accepted by all the educators worldwide. These values are truly indispensable, devoid of which, our society cannot sustain itself and people will forget humanity. The real difficulty is that people have no idea what education is exactly. Nous evaluates the value of education in the same way that we value the value of the land or of stocks on the stock market. We want to provide such education that allows the students to earn more. We are not concerning character improvement of educated one. The girls, we

say, do not have to earn; so why should they be educated? As long as such ideas exist, there is no hope to know the true value of education.

2. Objective of the Study

The objective of this study is to review different opinion about Values given by the different scholars and their use and importance in education as well as the todays education system and need and role of Value-based education in the Society.

3. Research Methodology

Secondary data collected from various reference books and web resources.

4. Goal of Education

Each society wants their children to acquire a desirable set of values. The goal of education in any country is the development of desirable values. Obviously, it is important to know what values are held by students. What kind of values do they possess? Such knowledge is important in order to allow curricular experiences to achieve the educational goals that the society would formulate. Today we see decadence in society. One of the reasons for the decline is conflicting values. If we go through history, we find that the society is changing rapidly. The impact of the West has led to changes. The western way of thinking, dressing and behaving influenced the Indians. This embargo effect is seen in any large society and likely to increase.

The values have social, psychological, economic, spiritual and philosophical aspects. They have a broad effect. One cannot say that life-long steps in a person's life are worthless. So if the values are good, life will be quiet and useful, if the values are not desirable, life will be difficult and undesirable.

5. Value-Based Education

Sri. Prakash, Dr. Mudolia Azad, Dr. Kothari, Mahatma Gandhi, Dr. Radha Krishnan, etc. has already advocated value education. It is not a new concept for India. Education not only develops morality, but also makes an individual capable of leadership and intelligent companionship. Concerning the need of introducing religious values, Peters (1979, p.473) writes that the religious values are arraigned and sternly censored in authoritarian or socialist. Peters further states that the progress of various types of awareness, abilities and skills are demands of the education and in a democratic set up, one should specified some form of proposal to inculcate religious values in the trust that he may develop them. Peters (1973, p. 473) reveals that in democracy broadminded view of the role of religious values is taken because of the importance attributed to freedom and acceptance and because shrinking in transmitting cultural heritage. But certainly religious values are not idiosyncratic of democracy. Morality, knowledge and understanding of human condition, self-fulfillment of the individual, preparation of work satisfaction are engendering as the aims of education.

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8. GOAL OF EDUCATION

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and likely to increase. The values have social, psychological, economic, spiritual and philosophical aspects. They have a broad effect. One cannot say that life-long steps in a person's life are worthless. So if the values are good, life will be quiet and useful, if the values are not desirable, life will be difficult and undesirable.

9. CONCLUSIONS

In conclusion, mere desire or aspiration to progress in life is not enough; success should be based on values. And for that value-based education must be imparted in today‟s institutions. So that the students may emerge as good leaders in their chosen fields. As Swami Chinmayananda in his "We Must" booklet states "All our success entirely depends upon ourselves. Let us never look outside ourselves for help. Let us not fall into the delusion that the influence of others would enable us to do better or accomplish more." He firmly says : "Spiritual education and religious practices make us realize that we are a part of a whole scheme, and the essential creativeness behind the whole universe is the essential Essence ruling in the heart of each one of us : ShivohamShivoham ". Incorporating Value-Based-Education in society will result in growth of character, growth in virtues like self-control, tolerance, selfless service, practice of prayer, harmony, to love all people, to help them in need & respect them etc… Man being the „cast in the mold of God‟ cannot easily deny Him. Even the great scientists like Newton and Einstein have believed in the existence of God as an intelligent power regulating and guiding the destinies of the universe. In the words of Swami Vivekananda Religion is nothing but a manifestation of the divinity already in man. Man is not just the body or even the combination of the body & the mind. He is essentially the spirit. The aim of our teaching should be to help manifest this spirit in every thought, word and action.26 So, it should aim at a full and harmonious development of the body & the intellect and tune it to the spirit within. In other words, value-based-education should help build up an integrated personality, a perfect character.

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FLOWERING PHENOLOGY OF COTTON PLANT IN DIFFERENT CLIMATIC CONDITION

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ABSTRACT

A phenological record depends on parameter chosen by the various investigators and depends on the research levels, the aim of the research, and the type of analysis. Plants reproductive characteristic can affect the flowering phenology, mode of seed dispersal and fruiting seed set efficiency. From the observations on flowering phenology, it is noticed that the flowering phenology is related with seasonal variations and environmental conditions and has an impact of different environmental factors. phenology are opening of flower, anther dehiscence, pollen presentation and stigma receptivity. Flower opening in all cotton varieties starts during 06.45 to 09.45 hours followed by anther dehiscence, which starts, from 07.00 hours depending on the weather conditions. During cloudy and rainy days flowers starts to open after 07.30 hours depending on prevailing temperature.

Keywords:*Cotton varieties, Flower, climatic condition, Phenology.*

1. Introduction

Cotton is one of the most commercial crops playing a key role in economic, political and social affairs of the world. Chiefly as a fiber crop cotton is cultivated in about 60 countries of world. India grows cotton on a commercial scale. Cotton belongs to mallow family, or Malvaceae, which has representatives in nearly all parts of the world, but its species are most abundant in the tropics and in warm regions. Cotton is a tropical and subtropical crop grown on a variety of soil. The predominant types of soil on which the crop is grown are the black cotton soil and red sandy loams to loams found in the state of Gujarat, Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka and Tamilnadu. The sowing season of cotton varieties differs considerably in different regions for obtaining maximum yield of cotton. The crop yield is depending on reproductive success of the plant. During the process of reproduction the pollen grains plays very important role.

Phenology is the study of timing of vegetative activities, flowering and fruiting and their relationships to environmental factors (Mori and Prance, 2005). "Flowering Phenology" refers to the seasonal timing of flowering.

A phenological record depends on parameter chosen by the various investigators and depends on the research levels, the aim of the research, and the type of analysis. The main events are the timing, duration, sequence, intensity and timing of flowering, which can determined by the physical environment factors like temperature, rainfall and day- length (Dafni, 1992). Plants reproductive characteristic can affect the flowering phenology, mode of seed dispersal and fruiting seed set efficiency. A wide variety of environmental factors may select for one or more reproductive characteristic in plant population (Smith *etal*, 1986) and such factors include seasonal climatic events (Schemske, 1977).

2. Materials and Methods

For the collection of phenological data of selected cotton varieties, field trips were undertaken daily or on alternate days. Events and the changes of the single flower are recorded to study the flowering phenology in relation to geographical (latitudinal and altitudinal) and climatic variables, the time and duration of pollen exposure and the interrelations among environmental variables (temperature and humidity) and flower development were noted.

Plants were observed from the beginning of flowering stage up to the opening of last flower. Flowering period was taken as the period from the opening of first flower up to the opening of last flower. The timing of

onset, progress, termination and blooming of selected varieties under study were noted.

OBSERVATION

In all selected varieties of cotton, it is observed that the flowering starts during 1st to 19th of September and full blooming was from 9th October to 28th November (Table No.01). Full blooming in all cotton varieties was observed when the temperature was in the range of 23^0C to 30^0C and 21.1^0C to 27.7^0C. The range of % humidity during full bloom period was 74.6 to 82.0 and 55.4 to 87.7. In all varieties the flowering stands to terminate towards the end of month of December (Table No.01).

Flower opening in all varieties starts during 06.45 to 09.45 hours depending on the weather conditions. During cloudy and rainy days flowers starts to open after 07.30 hours depending on prevailing temperature. The anther dehiscence in all varieties was observed during 07.00 to 08.30 hours. The stigmas become receptive before anther dehiscence. The stigmas were viscid and shiny and remained receptive for about 8 hrs. After 03.00 hours it become blackish in color indicating loss of receptivity. The opened flowers start to withered by the evening on same day.

At the full bloom time the plants of cotton variety Ajeet-11 were with maximum height of 111 cm having up to 150 leaves per plant, however, in Ankur-651 height was 72 cm with 80 leaves. The number of leaves, more or less correlates with the height of plant. For each variety parameters like height, number of leaves, number of balls, number of flowers open per day, and number of anthers per flower showed variations for each parameter (Table No.02).

3. Result and Discussion

In all selected varieties of cotton, it is observed that the flowering starts during 1st to 19th of September and full blooming was from 9th October to 28th November during the year. Full blooming in all cotton varieties was observed when the temperature was in the range of 23^0C to 30^0C and 21.1^0C to 27.7^0C. The range of % humidity during full bloom period was 74.6 to 82.0 and 55.4 to 87.7 In all varieties the flowering stands to terminate towards the end of month of December.

Flower opening in all varieties starts during 06.45 to 09.45 hours depending on the weather conditions. During cloudy and rainy days flowers starts to open after 07.30 hours depending on prevailing temperature. The anther dehiscence in all varieties was observed during 07.00 to 08.30 hours. The stigmas become receptive before anther dehiscence. The stigmas were viscid and shiny and remained receptive for about 8 hrs. After 03.00 hours it become blackish in colour indicating loss of receptivity. The opened flowers start to withered by the evening on same day.

From the observations on flowering phenology, it is noticed that the flowering phenology is related with seasonal variations and environmental conditions and has an impact of different environmental factors.

During the present investigations flowering in different varieties of cotton starts from the first or second week of September when the prevailing temperature was found to be in the range of minimum 21.1^0 C to 24.2^0 C and maximum 24.2^0 C to 30.0^0 C and the relative humidity minimum 55.4 to 87.7% and maximum 55.4 to 82% (Table No. 01). Number of flowers opened per day was 3-9 flowers on each plant in different varieties of cotton. Full bloom period was during the month of October to November.

Another events under phenology are opening of flower, anther dehiscence, pollen presentation and stigma receptivity. Flower opening in all cotton varieties starts during 06.45 to 09.45 hours followed by anther dehiscence, which starts, from 07.00 hours depending on the weather conditions (Table No. 01). During cloudy and rainy days flowers starts to open after 07.30 hours depending on prevailing temperature.

Moreover, Krishnaswamy and Mathuda (1954) have divided the factors influencing phenology into two, that is: Internal and External ones. Internal factors control the development of the species and in determining the pattern of its phenological behavior while external factors modify the influence of internal factors and accounts for fluctuation.

From the observations on flowering phenology, it is noticed that the flowering phenology is related with seasonal variations and environmental conditions and has an impact of different environmental factors (Table No. 01). Flowering phenology of different plant species studied by Subba Reddi and Reddi (1982), Herrera (1986), Shimida and Dafni (1989), Struck (1992) and Tidke and Dharamkar (2003) also supported the present findings.

Another events under phenology are opening of flower, anther dehiscence, pollen presentation and stigma receptivity. Flower opening in all cotton varieties starts during 06.45 to 09.45 hours followed by anther dehiscence, which starts, from 07.00 hours depending on the weather conditions (Table No. 01). During cloudy and rainy days flowers starts to open after 07.30 hours depending on prevailing temperature. Delay in flower opening and anther dehiscence due to weather conditions in other plant species is also reported by Tidke and Dharamkar (2003), Tidke and Gawande (2005) and Tidke (2005). Das *et al* (2007) stated that the anthesis is delayed on cool and/or cloudy days; the length of delay from the scheduled time is subject to the degree of coolness and ranged from one to two hours. Overcast sky and/or rainy weather may delay the process of anther dehiscence for thirty minutes.

The anther dehiscence in all varieties of cotton was observed during 07.00 to 08.30 hours, synchronizing with the period of anthesis. Thus the pollen mass is made available to the flower visitors especially to bees. Tidke and Dharamkar (2003), Thorat (2007) and Dahat (2008) studied the flower visitors from this region, including several bees, butterflies bugs, birds etc. Amongst the flower visitors of cotton as the bees were frequent visitors; it is obvious that the pollen mass released will be made available for bees, consequently rendering their services as a dominant and faithful pollinators.

Table No. 01: Phenological data of cotton varieties.

Sr. No.	Variety	Timing of flower opening (anthesis)	Time of anther dehiscence	Date of last flower	Time of stigma receptivity	Reward	Range of Temp. (^{0}C)	Range of Humidity (%)
1	NHH-44	7.30 to 9.15 7.20 to 9.00	7.20 am 7.00 am	29/12/03 20/12/05	Before Anthesis	Pollen	27.0 – 24.0 27.7 – 24.2	76.7 – 78.3 55.4 – 55.4
2	Ankur-651	7.00 to 8.30 8.00 to 9.45	7.30 am 8.30 am	15/12/03 18/12/05	Before Anthesis	Pollen	30.0 – 23.0 24.2 – 22.0	82.0 – 74.9 55.4 –80.0
3	AKH-081	7.00 to 8.30 7.25 to 9.15	7.30 am 7.30 am	18/12/03 28/12/05	Before Anthesis	Pollen	30.0-24.0 27.0-24.0	82.0 – 78.3 76.7 – 78.3
4	DHY-186	7.15 to 9.15 7.10 to 8.45	7.30 am 7.20 am	18/12/03 26/12/05	Before Anthesis	Pollen	30.0-24.0 26.6-21.1	82.0 – 78.3 68.8 – 78.5
5	PA-348	7.30 to 8.15 7.15 to 9.05	8.00 am 8..00 am	15/12/03 20/12/05	Before Anthesis	Pollen	30.0 - 24.0 27.7 – 22.0	82.0 – 78.3 55.4 – 80.0
6	Renuka-143	7.15 to 9.30 6.45 to 8.35	7.30 am 7.20 am	29/12/03 17/12/05	Before Anthesis	Pollen	30.0 – 23.0 26.6 – 22.0	82.0 – 74.9 68.8 – 80.0

7	H-10	7.05 to 9.00 7.30 to 9.00	7.45 am 8.00 am	12/12/03 28/12/05	Before Anthesis	Pollen	27.0 – 24.0 24.2 – 22.4	76.7 – 78.3 55.4 – 87.7
8	PKV-hy-2	7.15 to 9.30 7.15 to 9.00	8.00 am 7.35 am	18/12/03 28/12/05	Before Anthesis	Pollen	27.0 – 24.0 24.2 – 22.0	76.7 – 78.3 55.4 – 80.0

Table No. 02: Plant morphology of cotton varieties.

Sr. No.	Name of variety	Plant height	No. of leaves	No. of bolls	No. of flowers	No. of anther/ flower
1	NHH-44	92cm	80	10	7	70
2	Ankur-651	72cm	80	15	7	95
3	AKH-081	87cm	50	5	9	82
4	DHY -186	90cm	79	16	8	86
5	PA-348	101cm	89	14	9	77
6	Renuka-143	80cm	60	12	4	89
7	H-10	85cm	86	15	8	93
8	PKV-hy-2	90cm	70	13	6	89

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CORPORATE INITIATIVES IN INDIA TOWARDS ENVIRONMENT CONSERVATION AND SUSTAINABLE DEVELOPMENT

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ABSTRACT

Due to the production process in various industries huge effluents, fumes, gases mixes in environment, which affects badly on quality of water, air, forests, crops etc. Sustainable development focuses on balancing the line between our need and the needs to protect the environments in which we and others live. Many organizations came forward with initiatives for conservation and protection of environment. Corporate consider themselves as an integral part of society and accordingly act in a social responsible way by incorporating green issues in their business practices and contributing towards sustainable development through their corporate social responsibility (CSR) initiatives. The role corporation play in achieving sustainable development has to be understood. This study aims to discuss the initiative of the selected Indian corporate in the area of environmental pollution control, environment management and sustainable development. This study provides an initial understanding of current corporate practices for environment conservation and sustainable development.

Keywords:*Corporate Social Responsibility, Environment Conservation, Sustainable Development, Industry, Initiatives.*

Introduction

Sustainable development is referred to as the idea that human beings should sustain by meeting their basic needs, while also making sure that the future generations are able to meet their basic needs. United Nations has developed its five- component i.e. People, Partnership, Peace, Planet and Prosperity, from which the goals of SD emerge.

The environment contains both renewable (air, water, land) and non-renewable (fossil fuels) resources. Economic activities generate waste which the environment absorbs through natural processes. The environment comprises abiotic components that aid the living of biotic components. The mountains, oceans, seas, landmasses and other scenery of the environment enhance the quality of life. So, concerted efforts are required to deal with the global environmental crisis. The concept of sustainable development, thereby, comes into play. Some of the measures that can be undertaken to control the crisis include **Pollution Control**: Air, water, noise, soil are some of the major forms of pollution plaguing the environment. **Forest Conservation**: Increased industrialization has come at the cost of deforestation. So forest conservation regulations must be seriously implemented. **Social Awareness**: Until people are made aware of the graveness of the situation, the problem of environmental degradation cannot be dealt with. **Waste Management:** Solid waste management must be carefully managed in urban areas. **Water Management**: Rainwater harvesting and conservation of water can help with the long-term potent problem of scarcity of water. By considering these issues the corporate are working.

The idea of environmental conservation gains real momentum if we are able to conserve resources and use them in a manner that they are sufficiently available for the coming generation as well. The **United Nations Conference on Environment and Development (UNCED)** defines this using the concept of **sustainable development**. It explains sustainable development as a process that provides for the present generation without compromising on the needs of the future generations.

Environmental sustainable development implies meeting our current needs without jeopardizing the right and the ability of future generations to meet theirs. Opportunities should be identified and taken to reduce the

production of wastes and the use of toxic materials, to prevent soil, water, and air pollution and to conserve and reuse resources, as feasible. Environmental pollution with its health impacts is a key issue for sustainable environment (United Nations General Assembly 1987).

Sustainable development has become a wide-ranging term that can be applied to almost every facet of life on Earth, from local to a global scale and over various time periods. Long-lived and healthy wetlands and forests are examples of sustainable biological systems. Invisible chemical cycles redistribute water, oxygen, nitrogen, and carbon through the world's living and non-living systems and have sustained life since the beginning of time. As the earth's human population has increased, natural ecosystems have declined and a change in the balance of natural cycles has had a negative impact on both humans and other living systems. Prevention is the first priority within an environmental management hierarchy that includes prevention, recycling, treatment, and disposal or release.

According to the Economic Survey 2018-19 of Ministry for Finance and Corporate Affairs, India maintain its economic growth, by introducing and implementing various policies and measures relating to sustainable development, climate change, resource efficiency and air pollution.

The survey states that in adoption of 2030 global agenda, countries are moving forward for achieving a world free from poverty, gender inequality and economic inequality and thereby ensuring a healthy planet for future generations. India follows a holistic approach towards its 2030 Sustainable Development Goals (SDGs) by launching various schemes. The **Namami Gange Mission**- a key policy priority towards achieving the SDG 6 - was launched as a priority programme. Major components include sewerage project management, urban and rural sanitation, tackling industrial pollution, water use efficiency and quality improvement, ecosystem conservation.

Godrej Consumer Products Limited:

Godrej Consumer Products Ltd. (GCPL) spent Rs. 34.08 crores on CSR initiatives in financial year 2020-21. GCPL achieved zero waste-to-landfill and water positivity. The company takes back the post-consumer plastic packaging waste equivalent to the plastic packaging it sends out. As part of Greener India, company adopting renewable energy technologies like solar, wind and biomass within our manufacturing operations. It also exploring rainwater harvesting techniques. Company reducing the amount of waste consumed in a process by adopting a 3R strategy (reduce, reuse and recycle).

MAHAGENCO (Maharashtra State Power Generation Co. Ltd):

MAHAGENCO strives to maximize power generation from all its Themal, Gas, Hydro and Solar Power plants. It is working on conservation of natural resources through maximum recycling of resources. It has ash water recovery systems, recycling of Effluent from ETP/STP etc. MAHAGENCO has installed 130 MLD sewage water reuse & recycling project at Bhandewadi, which supplies treated sewage water of Nagpur city to Koradi supercritical Plant. Rainwater Harvesting and artificial lake formations are also practiced to support water criticality.

Wipro Limited:

Wipro spent Rs. 251 crores for CSR in the financial year 2020-21. It generates 42.6% (73.7 million units) of our total Energy Consumption from Renewable Energy. Three biodiversity projects completed by the company.Viz. Butterfly Park, Wetland Zone and Thematic Garden in Bengaluru and Pune.

ITC Limited:

ITC's Social Forestry program greened 30,439 acres of land. ITC's waste recycling programme, 'Well Being Out of Waste (WOW)', was responsible for collection of the quantum of dry waste collected during the year was about 70,900 MT from 1,067 wards. In total, the company spent Rs. 353.46 crores on its CSR initiatives in 2020-21. The company targeted 50% of total consumption by 2030

Meet 100% of purchased grid electricity requirements from renewable sources. To achieve 40% reduction in specific water consumption by 2030, company creating rainwater harvesting potential equivalent to over 5 times the net water consumption. The company is trying to ensure 100% of the Company's packaging is reusable, recyclable or compostable. Company has target to promote Climate Smart Village approach in core Agri Business catchments covering over 3 million acres and supporting sustainable livelihoods for 10 million people by 2030.

Infosys Limited:

Infosys Limited has been undertaking most of its CSR initiatives through Infosys Foundation. In the year 2020-21, the company spent Rs. 325.32 crores on its CSR initiatives. Infosys is decreasing carbon emissions through energy efficiency and conservation while moving to renewable energy, minimizing waste going to landfills, and conserving freshwater along with water recycling. Infosys received the 2019 UN Global Climate Action Award. It also received 2020 Green Buildings Leadership Award by the US Green Building Council. The company 44% of energy needs met through renewable, they had 43% reduction in carbon emissions footprint since 2008 and 100% of wastewater reused and recycled. 12 Million sq. ft. of corporate real estate certified as the highest rated 'green' buildings.

Tata chemicals:

Tata chemicals have launched projects to conserve the environment. The Company spent Rs. 21 crores on its CSR programs in 2020-21. Under its greening programme the company has planted 1.15 lakh mangroves across various sites along with conservation of local plant biodiversity at Mithapur. Tata Chemicals has commissioned a solar photo-voltaic plant. Company teamed up with the Wildlife Trust of India and the Gujarat State Forest Department to launch the 'Save the Whale Shark Campaign' which has resulted in the rescue and release of 585 whale sharks.

Vedanta Limited:

Vedanta spent over Rs. 331 crores on social development activities in 2020-21.
Vedanta has zero waste and zero discharge vision. Company recycled 94% of total waste and recycled 30.71 % of total water. The group has introduced measures to decrease its GHG emissions. Company has vision to produce some of the most low-impact metals and minerals on the planet in keeping with overall vision of Zero Harm, Zero Waste, Zero Discharge.

Grasim Industries Limited:

Grasim Industries Limited has spent Rs. 84.66 crores in 2020-21 on CSR.
The company reduced 50% in water consumption by the pulp and fibre business. It also reuse output material. Grasim's VSF unit at Nagda is the lowest consumer of water globally.

UPL Ltd.:

UPL is a global provider of agricultural products and solutions. The company spent Rs. 100 crores on CSR in India. The company has installed 120 solar lights in Barmer- Rajasthan and 95 solar lights in Singhbara and Morena in Madhya Pradesh. UPL is supporting the Gandhian Village Project in Palitana of Bhavnagar district. UPL has partnered with Nature Club Surat and forest department to preserve the wildlife of Dang forest. It also planted over 3000 fruit trees. UPL has been working towards conservation of the Sarus crane which is categorized as vulnerable on the IUCN's (International Union for Conservation of Nature) Red List. Rural Sarus Protection Groups (RSPGs) have been formed. by 7%. It also commissioned 2 new solar installations that increased our renewable energy consumption by 19%. Company 22 locations are certified Zero Waste to Landfill.

Mahindra & Mahindra Ltd.:

Mahindra & Mahindra Ltd. invested Rs. 92.78 crore in various CSR projects across India during 2020-21. M&M actively undertakes initiatives to protect and restore water resources of communities to support sustainable development. To increase the

groundwater levels, M&M entered a Private Public Partnership (PPP) with the Government of Madhya Pradesh in Bhopal, and with the National Bank for Agriculture and Rural Development (NABARD) in Hatta, benefitting 48 villages. M&M has also partnered with NABARD for a watershed project in Igatpuri, Maharashtra, covering 20 villages. M&M also initiated a climate-proofing project in 3 micro watersheds to develop climate change resilient practices impacting over 3,453 beneficiaries.

JSW Steel Limited:

JSW Steel Limited spent an amount of Rs. 78.32 crores towards CSR expenditure.

As 6-7% of total Greenhouse Gas (GHG) emissions by industry in India originate from integrated iron and steel manufacturing, company devised a strategy to help reduce emissions, which involves: progressively leveraging raw material quality improvements, enhancing energy efficiency, increasing steel-making via EAF process, and exploring possibilities in carbon capture and storage/utilization. Company having CO2 injection system to save water daily. It has water sprinkler/wind net, dry and wet fog system in raw material handling areas at Salem to reduce fugitive emissions. At Dolvi, company mangrove restoration project has covered an area of 5000 hactors across 5 villages wherein company planted over 1 lakh nursery plants. Company bolstered water conservation and security by introducing dry steel-making technology. Company is building a 30 million m3 reservoir at Vijayanagar, and has installed a Zero Liquid Discharge facility at Salem on top of rainwater harvesting efforts in Dolvi.

Tata Power Company Limited:

Tata Power has spent Rs. 3.45 crore on CSR in 2020-21. Company use ***30% clean energy. Company s***witchover the energy efficient lighting likes CFLs and standardizing the AC temperatures to 24oC. It replacing the electric water heaters with solar water heaters at canteens. It also set solar based LED lighting in selected areas; LED based street lighting. Company uses Electric Vehicles for internal transport within plant premises.

Conclusion

The environment is an important pillar within sustainable development. Researchers stressed the importance of a decoupling of economic growth from any negative environmental impacts that may result from that growth so that the latter can continue with no harm to the former. Economic and environmental performance must go hand in hand. Thus the two must be positively coupled as a healthy environment supports livelihood and wellbeing. This has been understood by the corporate and they brought the environmental policies. The basic understanding of the concept of corporate social responsibility (CSR) lies within the core belief that corporations have a moral obligation towards the community and the society from where they garner their success. CSR is a way of conducting business, by which corporate entities visibly contribute to the social good. Socially responsible companies integrate economic, environmental and social objectives with the company's operations and growth. Giving back to the society has followed by most of corporate. They have taken various initiatives for environment conservation, sustainable development. Clean energy, rain water harvesting, tree plantation etc. are some of it. The corporate focusing on 3 R viz. reduce, reuse and recycle, which will definitely help for environment conservation and sustainable development.

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EFFECT OF ISOLATION MEDIA COMPOSITION ON SPORULATION OF COLLETOTRICHUM GLOEOSPORIOIDES PENZ AND SACC. CAUSING POST-HARVEST ANTHRACNOSE DISEASE IN MANGO

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ABSTRACT

Colletotrichum gloeosporioides Penz and Sacc.is one of the most important causal pathogens for anthracnose disease of mango. various culture media on growth of the fungus as well as sporulation and colony characteristics of the fungus needed to be developed for suitable management strategies of the disease and may help in taxonomical and physiological study of the fungus. In Isolation of Colletotrichum gloeosporioides modified method are used by Kinkel and Andrews, 1988, C.V. Chudhary, 2006, G. Sharma and R. R. Pandey,2010. Pathogen were isolated from infected mango fruit parts on Potato Dextrose Agar (PDA) medium. Results showed that composition of media with 1% dextrose for isolation of fungi, Colletotrichum gloeosporioides Penz and Sacc. influenced growth, heavy sporulation and dry weight of mycelium on 8th day inoculation at 27±2 °C temperature.

Keywords:*Colletotrichum gloeosporioides Penz and Sacc, Potato Dextrose Agar (PDA), Sugar sources, Sporulation and dry weight mycelium growth in mg etc.*

Introduction

Fungi require different nutrient source for their growth and reproduction development and critical knowledge of nutritional patterns and factors influencing the growth of fungi is a prerequisite for any study leading to the understanding of host-pathogen relationship. Not much attention has been given on the culture and growth media parameters of the pathogen. Hence, thorough knowledge on the influence of various culture media on growth of the fungus as well as sporulation and colony characteristics of the fungus needed to be developed for suitable management strategies of the disease and may help in taxonomical and physiological study of the fungus. A wide range of media are used for isolation of different groups of fungi that influence the vegetative growth and colony morphology, pigmentation and sporulation depending upon the composition of specific culture medium, pH, temperature, light, water availability and surrounding atmospheric gas mixture (Northolt and Bullerman, 1982; Kuhn and Ghannoum, 2003; Kumara and Rawal, 2008). However, the requirements for fungal growth are generally less stringent than for the sporulation.

therefore, present investigation on Mango (*Mangifera indica* L.) belonging to Family *Anacardiaceae* is the most important commercially grown fruit crop of the country. It is called the king of fruits. India has the richest collection of mango cultivars. Cultivation of mango is believed to have originated in South East Asia. Mango is being cultivated in southern Asia for nearly six thousand years. The fruit is very popular with the masses due to its wide range of adaptability, high nutritive value, richness in variety, different cultivar of mango varieties contains 20% of total soluble sugars. The acid content of ripe desert fruit varies from 0.2 to 0.5 % and protein content is about 1 % it's totally defended upon the quality of fruit. But other mango producing countries in the world major production losses due to different pest attacks and diseases.*Colletotrichum gloeosporioides* Penz and Sacc.is one of the most important causal pathogens for disease of mango. About 25 to 30% loses of total mango production has been reported due to anthracnose and stem end rot which can spread with rain drops. Several pre-harvest and post-harvest management approaches has been used to control this anthracnose disease of mango

fruits including chemical treatments. Introduction have been reported in Bangladesh. Anthracnose disease of mango is one of the major pre- and post-harvest disease of mango fruit throughout the world and also in Bangladesh which is caused by Colletotrichum gloeosporioides (Ploetz RC,2003).

Anthracnose attacks flowers, young fruits, leaves and twigs, even this disease can also appear in the storage of mature fruits (Chowdhury MNA and MA Rahim,2009). Disease symptoms appear as slightly, black, sunken irregular shape lesions, which gradually enlarge and developed, leaf spotting, blossom blight, fruit staining and rot. So, present study focused on isolation of *Colletotrichum gloeosporioides* Penz and Sacc. from infected mango fruit in different sugar sources in isolation media and this work are helpful in taxonomical and physiological studies of fungi and also, help in use any single culture medium a combination of two or more media will be more appropriate for routine cultural and morphological characterization of fungi to observe different colony features (G. Sharma and R. R. Pandey,2010).

Material and Methods

The present experiment conducted *In Vitro* at Department of Botany, Maulana Azad College for Women, Navkhanda, Aurangabad, Maharashtra, India. During this experiment, sample were collected from infected mango fruit are collected from local market of mango infected by Anthracnose disease caused by *Colletotrichum gloeosporioides* Penz and Sacc.fungi in growing track of Marathwada region.

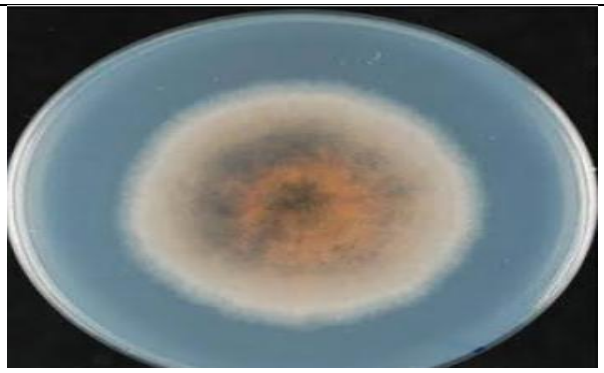
In Isolation of *Colletotrichum gloeosporioides* modified method are used by Kinkel and Andrews, 1988, C.V. Chudhary, 2006, G. Sharma and R. R. Pandey,2010. Pathogen was isolated from infected mango fruit parts on Potato Dextrose Agar (PDA) medium. Diseased parts were cut into small pieces with the help of sterilized blade. Pieces were washed with sterilized distilled water and disinfected with 70% ethanol for 1 min, then transferred with 1 per cent $HgCl_2$ solution for 10 seconds. Thus, obtained disinfected tissues were immediately washed thrice with sterilized distilled water and aseptically transferred on PDA plates. Inoculated Petri plates were incubated at room temperature (27±2 °C). *Colletotrichum gloeosporioides* Penz and Sacc.were identified according to Sutton's key (Sutton, 1992). The obtained culture was purified by using hyphal tip culture method, and maintained on same medium for the further investigations.

Inoculation of Pathogen on Various Sugar sources were incorporated molecular weight in Richard.s broth. The quantity of nitrogen required in each case were determined on the basis of their so as to provide equivalent amount of Sugar as that of potassium nitrate present in the basal medium. The Sugar sources were Mannose, Dextrose, Sucrose, Fructose, D-xylose, Galactose, Mannitol, Lactose, Arabinose and control (no sugar) C.D.AT 0.05&0.01 All the above Sugar sources were mixed thoroughly and the pH of medium was adjusted to seven by using 0.1 N sodium hydroxideor 0.1 N hydrochloric acid. The growth of fungus was studied as described under studies of carbon sources. 30 ml of each of the medium was taken in 100 ml flasks, sterilized and then inoculated with 5 mm discs taken from 9 days old culture of *Colletotrichum gloeosporioides* Penz and Sacc. incubated at 27±1°C for 8 days. Three replications were maintained for each treatment. According to H. S. Nagaraj Rao *et al*., 1964 to Dry weights of the mycelium were estimated after filtering, washing and drying of the harvested mats. (K. T. Arunakumara *et al*., 2015).

Results and discussion

Isolated fungi *Colletotrichum gloeosporioides* Penz and Sacc dense, white aerial mycelium with pink, white, grayish colony colour which carry oil globule pale grey in centre these shows on Potato Dextrose Agar (PDA) medium.

Anthracnose symptoms caused by Colletotrichum gloeosporioides Penz. on Mango Fruit.



Colletotrichum gloeosporioides Penz and Sacc.

Effect of isolation media composition on sporulation of *Colletotrichum gloeosporioides* Penz and Sacc.On 8th day of inoculation period.

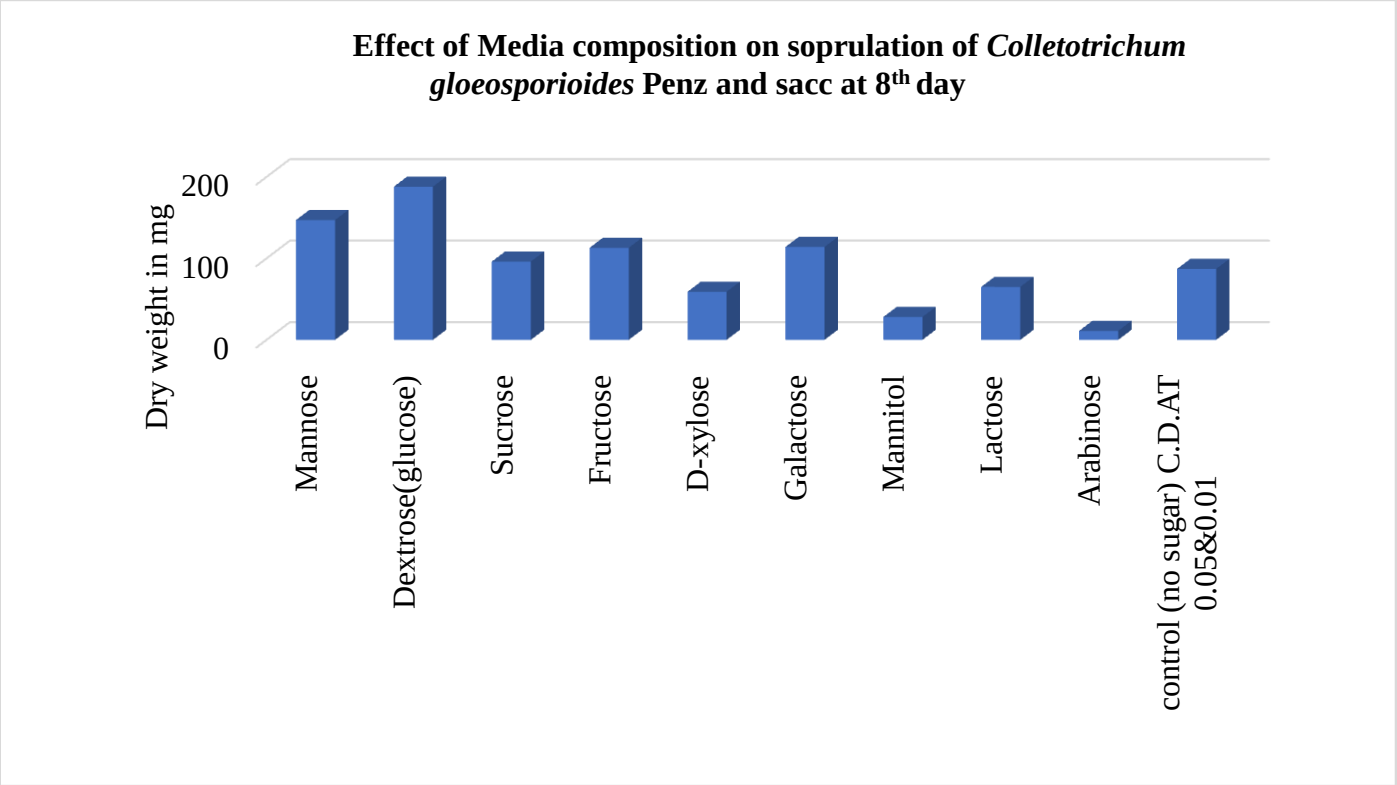
Effect of isolation media composition on sporulation formation of *Colletotrichum gloeosporioides* Penz and Sacc. On 8th day of inoculation period basically were use different sources of sugar Mannose, Dextrose, Sucrose, Fructose, D-Xylose, Galactose, Mannitol, Lactose, Arabinose and Control Containing only Culture media among Dextrose source of sugar were maximum utilization by fungi and produce maximum sporulation because maximum utilization of carbon and energy source for growth and reproduction then next were Fructose, Mannose And Galactose utilized source of sugar for production of mycelium of fungi and followed by Sucrose, Mannitol And Least In Control And Arabinose Was Poor Sugar Sources For the growth *Colletotrichum gloeosporioides* Penz and Sacc, All Results Summerized In below Table. The Results Indicates That Dextrose Was Significant Effect on Growth of *Colletotrichum gloeosporioides* Penz and Sacc.

Generally, for isolation of fungi use Potato dextrose agar culture because it is easy for preparation and formulation and good formulation help in growth of fungi, according to Maheshwari *et al*., 1999; Saha *et al*., 2008 PDA media suitable for isolation fungi but most fungi grow on PDA and produce maximum sporulation or mycelium. According to G. Sharma and R. R. Pandey in 2010 rich nutrient can affect on sporulation of fungi but in present study showed that 1% of sugar Dextrose in isolation media given maximum sporulation and dry weight of mycelium. Also, author find out effect of sugar sources On Growth of *Alternaria Solani* the Utilization of Sugars as Carbon Sources Has Been Investigated in Several Ectomycorrhizal Fungi (Martin *et al*., 1998; Deveau *et al*., 2008). Effect of nitrogen and carbon sources on the mycelia growth depends on species, culture media, and growth conditions supported by work of (Lin and Yang ,2006) who also reported similar findings. All the six species studied showed better mycelial growth (measured as dry mass) when nitrogen was supplied in the ammonical form instead as nitrate. Ammonium is generally recognized as 395 the most readily utilizable N source for the most of ECM fungi (Rangel-Castro *et al*. 2002).

Effect of isolation media composition on sporulation of *Colletotrichum gloeosporioides* Penz and Sacc.On 8th day of inoculation period.

Sr. no.	Sugar /concentration 1%	Dry weight in mg
1	Mannose	147
2	Dextrose(glucose)	188
3	Sucrose	96

4	Fructose	113
5	D-xylose	59
6	Galactose	114
7	Mannitol	28
8	Lactose	65
9	Arabinose	11
10	control (no sugar) C.D.AT 0.05&0.01	87



Conclusion

Results showed that composition of media with 1% dextrose for isolation of fungi, *Colletotrichum gloeosporioides* Penz and Sacc. influenced growth, heavy sporulation and dry weight of mycelium on 8th day inoculation at 27±2 °C temperature and also found that visible colony character so, it is concluded that the media composition with appropriate concentration of sugar source will be suitable for daily practices in culture preparation for isolation of causal organism of disease by plant pathologist.

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MEDICINAL PLANTS USED BY THE RURAL PEOPLE OF SAILU TALUKA, DISTRICT PARBHANI, MAHARASHTRA

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ABSTRACT

The medicinal application of plants used by local people, herbal venders and medicinal practitioner were assessed through survey during 2018-2019. The medicinal plants used for the treatment of diseases like Fever, piles, Mouth ulcer, Joint pain, Headache etc. The information on medicinal recipes, mode of administration and dosage etc. was collected from this area. Total 20 plant species belonging to 15 families of angiosperms are used in preparation of medicine has been documented. It is enumerated alphabetically with local name, scientific name and parts used, formulation and mode of administration with doses.

Keywords:*Medicinal Plants, Sailu Taluka, Medicinal Practitioner and Maharashtra.*

Introduction

World health organization estimates over 80% of people in developing countries depends on traditional medicines for the treatment of different diseases (Padir, *et.al*., 2020). The sailu taluka of Parbhani district rich in medicinal plants. Rural people and medicinal practitioner use medicinal plants for the treatment of various diseases. Medicinal plants are the essential natural resources. The preservation of traditional knowledge can be effectively documented by the pervasive participation of local herbal- healers (Shete, 2022). Now a day it is essential to make the documentation of such important medicinal information of plants. However, many of these medicinal valuable plants have not yet been studied and its overall medicinal value is ignored. Therefore, the present investigation was carried out to collect the all information of medicinal values from the Local people and medicinal practitioner in Sailu taluka of Parbhani District, Mahrashtra. The traditional knowledge about medicinal plants useful for development of new food sources and drug. The exploration of different natural resources and documentation of traditional knowledge is necessary. (sure and Gaikwad, 2019)

Geographically the Sailu taluka is situated in 19026' 31.20" North latitude and 76025' 44.40" East longitude. The total geographical area of taluka is 682km^2 including 6.77.29 km^2 rural and 4.62 km^2 urban area and its population is 169174. Total number of villages in taluka is 94.

Materials and Methods

Methods of Collection:

Medicinal data was collected between 2018-2019; the information was mainly gathered through interview and discussion. Most of the interviews and discussions were held in Sailu Taluka. In this study medicinal information collected from 6 knowledgeable elders (between the ages of 55 to 60) During the course of the study each informant was visited three times in order to verify the reliability of the obtained data. Repeated visits also helped to get some additional information that was not mentioned during the earlier interviews.

Identification

The collected plants were identified with help of standard floras (Naik, (1979); Naik *et al.*, (1998) and Yadav and Sirdesai (2002).The plants were enumerated alphabetically along with botanical name, family and vernacular name.

Table No.1. Systematic Enumeration of Plants used as Medicine by People of Sailu Taluka

Sr.No	Local Name	Plant Name	Part(s) Used	Disease
1	Tandulja	*Amaranthus tricolor* L.	Leaves	Fever
2	Ramphal	*Annona reticulata* L.	Leaves	Boils
3	Bilayat	*Argemone mexicana* L.	Root	Scorpion sting
4	Hinganbet	*Balanites aegyptica* (L.) Del.	Seed oil	Skin Diseases
5	Apta	*Bauhinia variegata* L	Leaves	Fever
6	Lal Kate shawari	*Bombax ceiba* L.	Stem Bark	Piles
7	Palas	*Butea monosperma* (Lamk.) Taub	Seed and Leaves	Abdominal Pain
8	Devtarota	*Cassia sophera* L.	Seeds	Abdominal Pain
9	Gokarna	*Clitoria ternatea* L.	Leaves	Mouth Ulcer
10	Chubak Kata	*Echinops echinatus* Roxb.	Root	Piles
11	Pisola	*Euphorbia dracunculoides* Lamk.	Leaves	Joint Pain
12	Kusumba	*Goniocaulon indicum* (Klein ex Willd.) Cl.	Leaves	Abdominal Pain
13	Ghaneri	*Lantana camara* L.	Leaves	Skin diseases
14	Deep mala	*Leonotis nepetifolia* (L.) R. Br.	Flower	Skin Diseases
15	Kutri	*Martynia annua* L	Flower	Headache
16	Shevga	*Moringa oleifera* Lamk.	Leaves	Joint pain
17	Tulsai	*Ocimum americanum* L.	Leaves	Cough
18	Utrand	*Pergularia daemia* (Forsk.) Choiv.	Leaves	Indigestion
19	Karanj	*Pongamia pinnata* (L.) Pierre	Seed	Skin diseases
20	Gulwel	*Tinospora cordifolia* (Willd.) Miers.	Stem	Fever

Discussion

The medicinal preparation vary depending upon type of diseases condition and method of administration (Siragvee,2015) In present study about twenty medicinal plant species belongs to 20 genera and 15 family were recorded. For each species latin name, local name, aliments to treated, Part(s) used are mentioned in this paper. The medicinal plant collected form Sailu taluka in this study were used by local people in the treatment of diseases. Medicine is being taken form whole plant or from the plant parts. The most not worthy plants are *Argemone mexicana* L., *Balanites aegyptica* (L.) Del., *Bauhinia variegata* L, *Clitoria ternatea* L., *Leonotis nepetifolia* (L.) R. Br., *Lantana camara* L., *Moringa oleifera* Lamk., *Ocimum americanum* L., *Pongamia pinnata* (L.) Pierre., *Tinospora cordifolia* (Willd.) Miers.. Traditional knowledge of local people on human disease is very important to find out new drugs for human health, also the doses and their administration needs to standardization with scientific way. (Sure and Gaikwad, 2019).

The present study suggested that the information on medicinal uses of plants by local people and medicinal practitioner may be used for botanical and Pharmacological research in future for the discovery of new sources of drugs.

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STUDY OF VARIOUS ASPECTS E-WASTE AND THEIR EFFECT ON ENVIRONMENT

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ABSTRACT

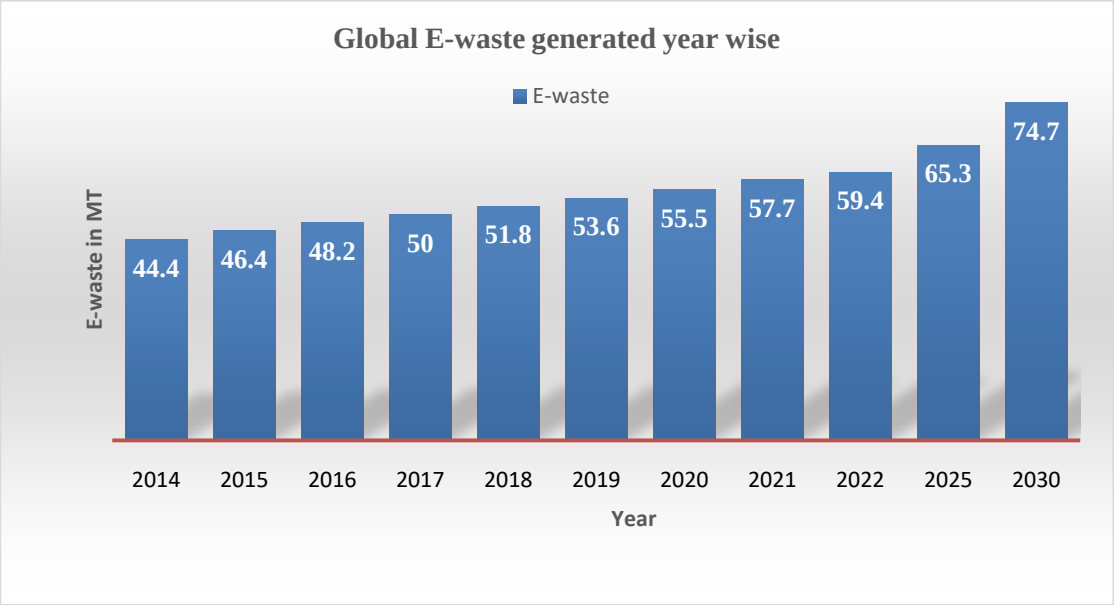
Today the world's largest and fastest growing industry is electronic industry. Electrical and electronic equipment demand increased due to urbanisation, globalisation, population growth and increased income. As the development of human takes place day by day, e-waste problem increased by same way. E-waste contains variety of toxic chemical substances such as Lead, Arsenic, Mercury, Cadmium, Barium, Beryllium, CFC's, Dioxins and Polyvinyl Chloride (PVC) which are responsible for degradation of environment and create problems for human health. These chemicals are not biodegradable and accumulated in the soil, water, air and living things. In 2021 57.4 Million Metric Tonnes of e-waste was generated globally. From 2014 to 2022 every year it is growing by an average of 2 MT.

Introduction

E-waste means discarded electrical or electronic devices or component whenever an electronic or electrical component or device whose working life has expired or damaged or no longer used by people due to technological advancements. In the last few years technology changes day by day. There is very large demand of new and updated electronic devices in the market. That's why electronic industry is the largest and fastest growing industry in recent few years. Electrical and electronic equipment demand increased due to urbanisation, globalisation, population growth and increased income. As we know, technology changes day by day due to which a large amount of electronic or electrical devices are turning into waste.

E-waste contains variety of chemical substances such as Lead, Arsenic, Mercury, Cadmium, Barium, Beryllium, CFC's, Dioxins, Brominated flame retardants and Polyvinyl Chloride (PVC) which are responsible for hazardous effect on living beings including neurological disease, cancer, miscarriage, multiple organ failure etc. These hazardous e-waste gets buried at a landfill, it can dissolve in microscopic traces into the soil that permeates at the landfill. Eventually, these traces of toxic materials pool into the ground below the landfill. The more E-waste and metals at the landfill, the more of these trace toxic materials show up in the groundwater. Electronic waste is also responsible for human made global warming. Because every electronic device ever produced has a carbon manufacturing of tonne of laptops and potentially 10 tonnes of CO_2 are emitted. When the carbon dioxide released in the encironemnt, it predominantly occurs during production, before consumers buy a product.

Globally, remarkable increase of e-waste takes place every year. Following table shows that how e-waste increased per year from 2014. According to global e-waste monitor data, screen and monitor generates 12.5%, temperature exchange equipment 20.1%, large equipment's 24.4%, telecommunication equipment 8.8%, small equipment 32.5%, lamps, LEDs 1.7% e-waste produced. In 2014, 44.4 metric tonnes of e-waste generated. And in 2022 it increases up to 57.7 metric tonnes. On average, the e-waste generation has increased by 2 MT annually over the last decade. Around 7.8 kg per capita e-waste generated globally. Global electronic waste volume is expected to grow to 74.7 Mt by 2030 – means it will have almost doubled in only 16 years.



India is the third largest E-waste generator country followed by USA and China. According to The Hindu survey, annually, computer devices account for nearly 70% of e-waste, telecom sector produces 12%, nearly 8% from medical equipment and 7% from electric equipment. The government, public sector companies and private sector companies generate nearly 75% of electronic waste, with the contribution of individual household being only 16%. According to Associated Chambers of Commerce and Industry of India report, in the year 2020 India's e-waste from old mobiles and computers rises by about 1800 percent from the year 2007. About 80 percent e-waste workers suffer from respiratory system related disease due to lack of proper safety standards. According to Ministry of Environment, Forest and Climate Change of Indian Government, generation of e-waste from 2017-18 is given below. The data available from Financial Year 2017-18 to 2019-20.

Sr. No.	Financial Year	Generation (Tones)
01	2017-18	708445
02	2018-19	771215
03	2019-20	1014961.2

Effect of E-waste on Environment

Electric or Electronic waste contains hazardous chemical substances which causes severe effect on living beings. These chemicals also shows adverse impact on the ecosystem.

- **Impact on Climate:** E-waste powerfully shows its impact on climate. Most of the electric and electronic manufacturing industries emits carbons, CFCs which are responsible for global warming.
- **Impact on Air, Soil & Water:**These e-waste when dumped in the soil, they pollute the soil and ground water and releases toxic heavy metals. When these heavy toxic metals penetrated in the soil and water, they influence the plants and trees. And finally they enters into the human body through food supply which are responsible for various chronic diseases.
- **Impact on human health:** The toxic heavy metals and chemicals enters in the human body through air, soil or through water by inhalation, skin absorption or ingestion. Once these heavy metals and chemicals penetrate in the human body, they shows adverse effect such as – reproductive system issues, damage of immune system, kidney damage, may lead to lung cancer, damage to nervous system, skin related problems, even they also damage DNA.

Sources of Heavy Metals and Chemicals from e-waste and their hazardous effect

Uncontrolled electronic waste produced serious environmental pollution which are responsible for hazardous effect on ecosystem. These heavy metal electronic waste pollutants emitted in vegetables, rice, fish and seafood, and persistent organic pollutants (POPs) in livestock. It is observed that toxic chemicals emitted from e-waste are causing a number of major illnesses related to cardiovascular, digestive nervous and respiratory systems. These toxic heavy metals and chemicals includes – Lead, Mercury, Cadmium, Beryllium, Barium, Sulphur, Polyvinyl chloride, Brominated Flame Retardants etc. The sources of these metals and chemicals and their effect on human body are discussed below.

Sr. No.	Component	E-waste Source	Hazardous effect on human
01	Mercury (Pb)	Source of mercury is fluorescent tubes, switches, doorbells and ccfl backlights in screen monitor	Hazardous effect include memory loss, muscle weakness, reduced fertility, slower growth and development etc.
02	Cadmium (Cd)	Most commonly found in Nickel-Cadmium batteries. These batteries contain 6 – 18% Cadmium. It also found in light-sensitive resistors, corrosion resistant alloys etc.	Cadmium causes severe damage to lungs and kidney. It also related with deficits in cognition, learning behaviour and neuromotor skills in children.
03	Sulphur (S)	Mostly found in Lead acid batteries	Hazardous effect includes kidney, liver, heart damage, eye throat irritation. It also create sulphuric acid through sulphur dioxide when released in environment.
04	Lead	Used in glass panels and gaskets in computer monitors, solder in printed circuit board and other components.	Lead causes damage to the central and peripheral nerous systems, blood systems, kidney and reproductive system in humans. It also effects the endocrine system and impedes brain development among children.
05	Chromium VI (Cr)	It is used as corrosion protector of untreated and galvanized steel plates and as a decorative or hardener for steel	Chromium VI can damage to DNA and is extremely toxic in the environment.
06	Barium (Ba)	It is soft silvery soft metal that is used in computers in the front panel of CRT to protect users from radiation	Short-term exposure to barium causes brain swelling, muscle weakness, damage to the heart, liver and spleen.
07	Beryllium (Be)	Beryllium is commonly found on motherboards and finger clips. It is also used as copper beryllium alloy to strengthen connectors and tiny plugs while maintaining	Exposure to beryllium causes lung cancer and designated as carcinogenic. It also responsible for skin disease.

		electrical conductivity.	
08	Carbon Black	Found in the plastic printed cartridge containing black and color toners	It is related with respiratory diseases. Carbon black has been classified as a class 2B carcinogen possibly carcinogenic to humans.
09	Brominated Flames Retardants	Used as flame retardants in plastics in most electronics	Hazardous effect includes impaired development of the nervous system, liver and thyroid problems.
10	Polyvinyl Chloride (PVC)	PVC commonly used insulation for electronic instruments and electrical cables.	During the production of PVC, it releases dioxins that pollute air which causes respiratory system related diseases.

Conclusion:

E-waste is generated by different ways, such as – in IT industries, Household equipment's, medical and sports sector, educational sector, electric and electronic sectors etc.As the technological advancement takes place day by day electronic waste generation also increases. E-waste is a relatively new component in the global problem of waste management. It is one of the fastest growing section worldwide in discarded waste. This growing problem in the world is largely neglected. Many people do not understand what it is or how it affects human health, the world, or the environment. E-waste generated by inappropriate disposal of any type of electronic devices. These electrical or electronic devices include computers, televisions, cell phones, home electrical appliances or most other electronic equipment. Consumers in India like country are quick to replace their devices because of continuous technological advances. This upgrading leads to an excess of unused electronic devices. The improper disposal of old computers and phones is what is contributing to the e-waste problem.

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SYNTHESIS OF α -AROYL KETENE DITHIOACETALS USING SUBSTITUTED ACETOPHENONES

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ABSTRACT

Simple, efficient and facile synthesis of different α- aroyl ketene dithioacetals by using substituted acetophenones.

Keywords:*α-aroyl ketene dithioacetals ,acetophenone, carbon disulfide ,methyl iodide, sodium tert.butoxide.*

Introduction

Ketene dithioacetals are versatile intermediates in organic synthesis. Large amount of work, since the last decade, has given rise to new view in their chemistry. The theme of this article is having two objectives , first is to highlight the new prospects in the chemistry of useful ketene dithioacetals, and second, to provide an internal link between ketene dithioacetal groups and a variety of other functional groups, which has brought out many new facts that will help in future designs. A ketene is an organic compound of the form $R'R''C{=}C{=}O$. The term is also used specifically to mean ethen one, the simplest ketene, where R' and R'' are hydrogens. The reactions of ketene dithioacetals always governed by alkylthio functionality have been found to be useful. Ketene dithioacetals can be classified on the basis of their substitution patterns at the α-position of the ketene dithioacetal functionality[1-3]. For instance, α-oxo ketene dithioacetals, which bear a carbonyl group at the α-C atom, are versatile intermediates in organic synthesis and their preparation and diverse applications, especially serving as 1,3-electrophilic three-carbon synthones have been reported[4-7]. Based on the structural features, the α-C of ketene dithioacetals is reactive towards electrophiles and this electrophilic susceptibility makes the a functionalization of ketene dithioacetals a convenient tool for the construction of diverse ketene dithioacetal scaffolds and other useful building blocks[8-9]. These arylketones are well known for their use as a building block for the synthesis of various pharmaceutical and pharmacologically important compounds[10-11]. They are also in use for dye, fragrance and agrochemical industries[12-13]. α-Amino-aryl ketone and closely related skeletons are reported as antitubulin agents[14-15] and also exhibit better anti-tumor activity against human cancer cell than colchicine[16-17]. Functionalized α-aminated-diarylketones were used as an intermediate for synthesis of various natural products and biologically useful compound. As these α-aroylketene dithioacetals areuseful three carbon synthones extensively employed for the synthesis of a wide variety of heterocyclic compounds and also in several aromatic ring annulation reactions. These are α,α-unsaturated carbonyl compounds with two electron-donating alkyl sulafanyl groups on one end and an electron-withdrawing aroyl group at the other end of the double bond, i.e., they are"push-pull" alkenes. Depending on the nucleophile and the reaction conditions either 1,2- or1,4-nucleophilc additions onare possible[18-19]. Since alkylsulfanyl groups are good leaving groups, subsequent to the attack of a nucleophile, one of the alkylsulfanyl groups of the intermediate leave to regenerate the conjugated system. Being polarized alkenes these also react with bi-functional molecules having nucleophilic and electrophilic centers to furnish cyclic compounds[20-21]. Generally, the reaction centers in α-oxo ketene dithioacetals could be the carbonyl group, the double bond, or sulfur atoms, and deprotonation can occur at several sites, which really depend upon the structure of the α-oxo ketene dithioacetals[22-23]. The presence of two α-alkylthio substituents in

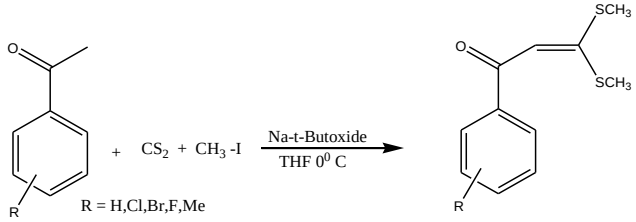
α-oxo ketene dithioacetals affords a higher level of oxidation in manipulation of functional groups and in many cases, generates a product containing an S-functionalized group, which can be further employed in additional synthetic transformations. Numerous one-pot transformations, involving a cascade of 1,2- and 1,4-nucleophilic addition reactions to α-oxo ketone dithioacetals, have been widely employed to synthesize a variety of heterocyclic compounds, suggesting that α-oxo ketene dithioacetal compounds can act as an extremely versatile three-carbon synthon for the manipulation of functional groups and the construction of C–C bonds[24-25].

Material and Methods

IR spectra were recorded on a Shimadzu FTIR using KBr discs. 1H NMR spectra were recorded in DMSO-d6 at 400 MHz using TMS as an internal standard. Mass spectra were recorded on Shimadzu GC-MS using electrospray ionization technique. The elemental analysis was carried out on Flash EA-1112, 50/60 Hz,CHNS analyzer. The progress of the reactions was monitored by TLC.

General Procedure:

In a clean conical flask take substituted acetophenone (10 mmole) then add THF as solvent then sod.tert.butoxide as strong base (2 mole equi.to acetophenone) stirr at 0^0 C.then add CS_2 (10 mmole) at the end add CH_3I (20 mmole) . Stirr this mixture strictly at 0^0 C for 5-8 hours and then workout in ice cold water.

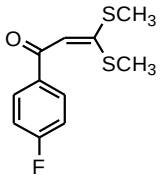
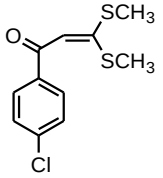
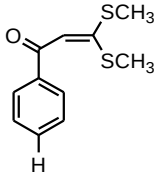
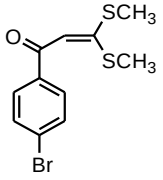
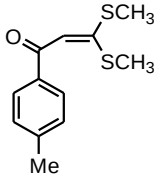


Scheme: Synthesis of α-aroyl ketene dithioacetal

Results and Discussion

The different and substituted α-aroyl ketene dithioacetals were prepared means simply one pot synthesis by using simple and cheap techniques reprted this synthesis. The all products given in table below synthesized under very low temperature on stirring for about 5-8 hours by using basic conditions due to sodium tertiary butoxide. The base used 2 mole equivalent to the weight of substituted acetophenones.

Table: 1

Sr. No.	Product	Reaction Time (hr.)	Melting Point (^{0} C)	Yield (%)
1.		5-6	112	67
2.		6-7	101.4	62
3.		5-6	103.9	71
4.		6-7	87.8	70
5.		4-5	112.5	66

Spectral Data:

1)1-(4-fluorophenyl)-3-3bis(methylthio) prop-2-en-1-one:

Orange Solid, IR (KBr): 3058, 2920 ,1620, 1239, 1157, 520 cm^{-1}; ^{1}H NMR(DMSO) : 7.34(d, 1H), 7.28(d, 1H), 6.85(s, 1H), 2.48(s, 6H) ;^{13}C NMR (DMSO) :188.2,165.4,132.2, 115.4,107.8,18.1 ; Mass (m/z): 243.3($m^{+\cdot}$), 146.1; $C_{11}H_{11}FOS_2$ C-54.52, H-4.58, F-7.84, O-6.60, S- 26.46.

2)1-(4-chlorophenyl)-3-3 bis (methylthio) prop-2-en-1-one:

Red Solid, IR (KBr): 3047, 2985 ,1616, 1469, 1230, 783, 478, 401 cm^{-1}; ^{1}H NMR(DMSO) : 7.66(d, 1H), 7.44(d, 1H), 6.56(s, 1H), 2.31(s, 6H) ;^{13}C NMR (DMSO) :186.9,170.4,140.1, 108.3,17.1 ; Mass (m/z): 259.1($m^{+\cdot}$), 260.6(m+2) ; $C_{11}H_{11}ClOS_2$ C-51.05, H-4.28, Cl-13.70,O-6.18, S- 24.78.

3)3-3 bis(methylthio)-1-phenylprop-2-en-1-one:

Brown Solid, IR (KBr): 3012, 2916 ,1696, 1473, 779, 590, 513 cm^{-1}; ^{1}H NMR(DMSO) : 7.75(d, 1H), 7.31(t, 1H) 7.42(t, 1H), 6.45(s, 1H), 2.18(s, 6H) ;^{13}C NMR (DMSO) : 187.5,171.1,131.8,122.6,107.4,17.8 ; Mass (m/z): 223.1($m^{+\cdot}$) ; $C_{11}H_{12}OS_2$ C-58.89, H-5.39, O-7.13, S- 28.59.

4)1-(4-bromophenyl)-3-3 bis(methylthio) prop-2-en-1-one:

Reddish brown Solid, IR (KBr): 3067, 2923 ,1677, 1238, 547, 462 cm^{-1}; ^{1}H NMR(DMSO) :7.59(d, 1H), 7.41(d, 1H), 6.29(s, 1H), 2.33(s, 6H) ; ^{13}C NMR (DMSO) :188.4,172.2,131.7, 127.9,16.9 ; Mass (m/z):303.3.5($m^{+\cdot}$), 305.2(m+2) ; $C_{11}H_{11}BrOS_2$ C-43.57, H-3.66, Br-26.35,O-5.28, S- 21.15.

5)3-3 bis(methylthio)-1-p-tolylprop-2-en-1-one:

Yellow Solid, IR (KBr): 3024, 2912 ,1688, 1238, 775, 585, 474 cm^{-1}; ^{1}H NMR(DMSO) : 7.54(d, 1H), 7.18(d, 1H), 6.44(s, 1H), 2.32(s, 6H), 2.28(s, 3H) ;^{13}C NMR (DMSO) : 188.4, 170.9, 141.2, 128.4, 107.9, 17.8 ; Mass (m/z): 237.8($m^{+\cdot}$) ; $C_{12}H_{14}OS_2$ C-60.46, H-5.92, O-6.71, S- 26.90.

Conclusions

In summary, a convenient base mediated simple, non hazardous strategy has been developed by using simple on pot synthesis. Instead of methyl iodide we can use dimethyl sulphate also. To workout above mixture into distilled water is also very easy. In short we have developed easy and cheap method for synthesis of substituted ketene dithioacetals.

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MICROBIAL ANALYSIS OF SOIL FROM MUNICIPAL SOLID WASTE FOR WASTE DEGRADATION

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ABSTRACT

The word "waste'' refers to useless, unwanted or discarded materials which are no longer considered of sufficient value and are thrown away by the processor.[H. K. Zaved. M. Mizanur R.] .Wastes includes solids, liquid and gases. Every day a huge quantity of waste generate in all the developed and developing countries. [World Bank–1998 Washington D.C.]

Most of the waste is subjected to dumping in a specified disposal yard. The greatest challenge to the environmentalists is the ecofriendely management of this waste and application of micro- organisms. [Amrita Saha – May 07. 2014].

So, the purpose of this study was to investigate microbial strain from waste dump site of Latur, Maharashtra, India. Also find out effective micro-organisms which take part in waste degradation and its optimum cultural condition, morphological and Biochemical characterization, antagonisticity, metal tolerance, antibiotic susceptibility and Production of extracellular enzyme of isolated organisms were documented.

Keywords:*Municipal Solid Waste, Organisms, Extracellular enzyme, Metal tolerances.*

Introduction

The greatest challenge of the environments is the eco friendly management of the waste.

There are few problems of Municipals such as Treatment, Disposal, & Recycling of sewage sludge. Basically the solid waste from a municipality contains the biodegradable organic matter with significant amount of inorganic material which is responsible for creating pollution.(Szymanski and Patterson ,2003).These Waste is consumed by the Bacteria.

Bacteria are present in diverse ecological habitats. Number of microbes play a vital role for solid waste degradation .therefore the effective bacteria can be employed for planned decomposition of solid organic waste.(H.K.Zaved ,2008)

The present study was aimed to investigate bacteria strains from waste dumping site with the ultimate object of waste degradation.

Study Area:

Soil sample was collected from waste disposal site of MIDC area of Latur city in Maharashtra, in India.

Sample Collection:

Soil Sample Was Collected during Aug- Sept Period in sterile Plastic bags & Stored at 4°C temp.

Preparation of Soil Sample:

1 gm soil sample was weighed & added into 10 ml of sterile D/W. Dilution was spread on NA & czapek Dox Agar plates. The plates were incubated at 37^0c for 1 -2days. After incubation plates were observed for morphological characters and the isolates was identified.

Chemical analysis of soil:

Chemical analysis of soil were analyzed for total N(%),P(%)K(%) which is determined by using soil testing kit which is perches from market

NO_3N (Nitrogen) =Low about 04-10
NH_3N (Amonical Nitrogen) =Low about 15
K_2O (Potassium) =Very high
P_2O_6 (Phosphate) =Less than 22
P^H=7.5

Determination of Soil Moisture Content:

Freshly collected soil sample were kept in filter paper and the initial weight was recorded. After that these soil sample were kept inside the hot air oven at 110 c temp. sample were weighed

for several time until a constant weight was achieved .Sample moisture content was calculated using following formula ,provided by AWPA(1986)(Amrita Saha and Subhas Santra-2014) .

Mc (%) =W–w/wX100
= 3–2.550/2.550X100
=17.64

Where,
Mc=Moisture content.
W= Original wt.
w= Const.wt. After oven drying.

Isolation of microorganism:

Dilution tequcnique was used for isolation of microorganism .In it diluted soil sample was streaked on nutrient agar plates for isolation of bacteria and on czapek Dox Agar plates medium for isolation of fungi. Both plates were incubated at 37°c temp for 24hrs.

Identification of organism:

The organisms were identified on the basis of morphological observations, gram staining and sugar fermentation test. Biochemical test also performed using Catalase test, Urease test , indol test . Results were compared with Bergey's manual of systematic bacteriology,in case of fungi morphological observations and by wet mounting method used for identification.

Metal tolerance assay:

Metal tolerance was carried out by using Cu, Pb, Zn, Ag, Fe with various concentration (0.5 M,1M,0.1M,2M) on Mullar Hintane Agar plate through well method. The plates were inoculated with bacterial suspension through spread plate method. On each plate wells were made by sterilized borer. Various concentration of each metal was poured on pre inoculated plates. For each metal concentration separate Petri plate with pre inoculated bacteria were used. All plates were incubated at 37°c temp for 48 hrs.The diameter of zone of inhibition (Mm) around the well were measured against each concentration and also against each bacteria .Controls also prepared using without any metal concentration.

Extracellular enzyme production:

All isolated bacterial strain were screened for qualitatively for the production of industrial important enzymes such as oxidase, lipase, DNase, gelatinase, amylase, protease, catalase. Each bacterial strain was streaked on the plate which containing respective substrates such as tributyrin ,toludine,gelatin,starch,milk,and for oxidase discs were used .Plates were incubated at 37°c temp. For 24 hrs. Then plates were flooded with indicator solution and the development of clear zone around the growth of organism was considered positive test for enzyme activity.

Antibiotic sensitivity test:

The disc method was used for antibiotic sensitivity test .MHA plates were inoculated with each bacterial suspension through spread plate method. For Antibiotic sensitivity test 10 ug discs of each antibiotic (Streptomycin, Ampicillin, Penicillin, Gentamicin, Tetracycline, and Ciprofloxacin) were used. For each antibiotic preinoculated bacterial plates were used .All plates were incubated at 37°c for 24 hrs .The zone of inhibition around the antibiotic discs were observed against each bacterium. Plates with ought any antibiotic concentration were treated as reference plates.

Result and Discussion:

The isolation and characterization of microbial strains from MIDC latur city municipality area of MIDC latur city site was undertaken in this study .Bacterial growth depends upon various physicochemical condition such as media, P^H ,temp, incubation period etc .so different conditions upon which bacteria grown in natural habitat should be studied before going to massive multiplication for using as decomposer.

Physical and chemical characteristics of soil collected from municipal solid waste:

Bacteria can grow in a wide range of moisture level .In this study; it was found that the moisture content of the collected soil sample from MIDC Latur city municipality area was about 17.64%.

The maximum bacterial density was found to be in high moisture content. In this study we

find out 5 microorganisms, in it 3 are bacterial cultural and two are fungal cultural. (*Bacillus spp. Staphylococcus spp,Actinomycetes,A.flavus, A.niger).*

Isolation and identification of microorganism:

In our study MSWB1,MSWB2,MSWB3 and MSWF1 andMSWF2 strains were isolated in cultural medium.Czapek dox agar and Nutrient agar were selected to determine the best suitable media. Based on Bergey's manual, microorganism that should be obtained from municipal soil waste are *Bacillus spp. Staphylococcus spp,Actinomycetes*, in case of fungi plates were observed for morphological characters and, the isolate was identified as A.flavus ,A.niger by wet mounting method and authenticated by Dr.C.S. Swami, Head ,Dept.of Batany, Dayanand Science college ,Latur ,India.(Table No.1).

Table No.1

Biochemical characteristic of isolated bacteria			
Test	**MSWB1**	**MSWB2**	**MSWB3**
Starch Hydrolysis	-	+	+
Casien Hydrolysis	+	-	-
Urea Test	-	+	-
Cimen Citrate t est	+	-	+
Methyl Red Test	-	+	-
H2S Production	-	-	+

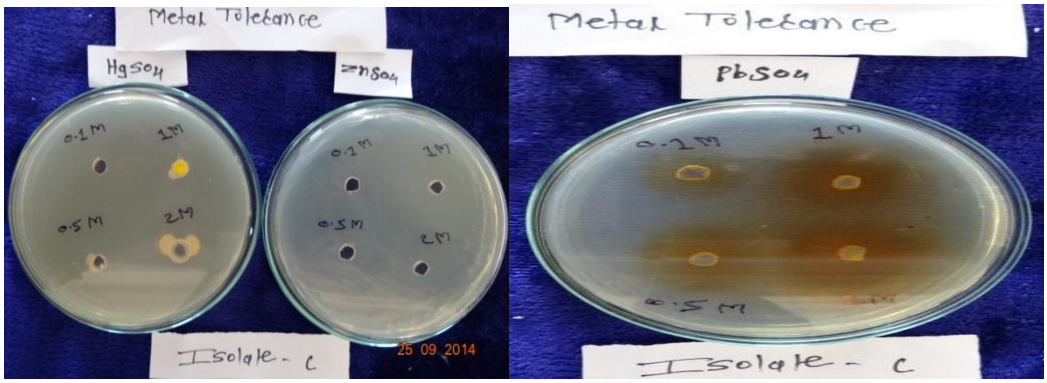
Metal tolerance assay:

In heavy metal tolerance test, we study effect of $CuSO_4$, $ZnSO_4$,$HgSO_4$ $FeSO_4$ Obtained result was shown in table No.2 .out of these 2M $CuSO_4$ shows 20mm maximum zone of inhibition to MSWB1 and MSWB2 isolates but in case of MSWB3, 1 M CuSO4 observed 15 mm zone of inhibition.

Table No.2

Metal Tolerance Test				
Metal	Concentration(M)	Bacterial Strain		
		MSWB1	MSWB2	MSWB3
Cuso4	0.1	5mm	5mm	7mm
	0.5	10mm	8mm	8mm
	1	15mm	13mm	15mm
	2	20mm	17mm	10mm

Znso4	0.1	T	5mm	T
	0.5	6mm	8mm	3mm
	1	13mm	11mm	5mm
	2	9mm	16mm	7mm
Hgso4	0.1	-	-	-
	0.5	-	-	-
	1	-	-	-
	2	-	-	-
Feso4	0.1	3mm	6mm	4mm
	0.5	8mm	9mm	7mm
	1	11mm	12mm	13mm
	2	13mm	14mm	15mm
Pbso4	0.1	6mm	4mm	6mm
	0.5	9mm	9mm	9mm
	1	10mm	10mm	11mm
	2	12mm	12mm	12mm



Extracellular enzyme production:

In this study 3 isolates were subjected to enzyme production such as Protease,gelatinase,DNase,Lipase,Catalase,Oxidase, Obtained result was observed in zone of hydrolysis and and shown in table no. 3

Table No.3

Qualitative assay for Enzyme Production						
Enzymes						
Strain	Protease	galatinase	Dnase	Lipase	Catalsse	Oxidase
MSWB1	-	-	+	+	+	-
MSWB2	-	-	-	-	+	+
MSWB3	-	+	-	+	+	-

Antibiotics Susceptibility test:

Antibiotics Susceptibility test helps to determine how effective on antibiotics against the organism .in our study streptomycin and Ciprofloxacin shows maximum zone of inhibition against MSWB2 and MSWB1respectively .But in case of Ampicillin shows resistance to all isolates. (Table No.4).

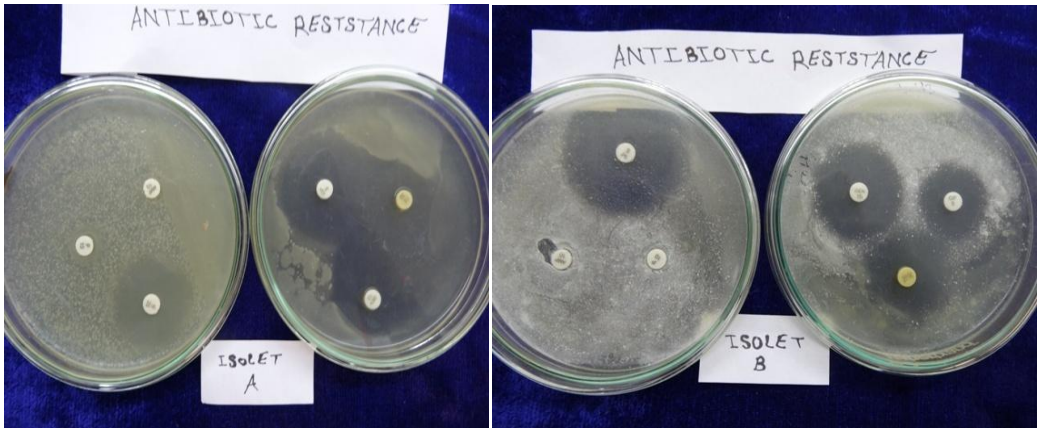


Table No.4

Antibiotic Susceptibility test (Zone of inhibition in mm)			
Antibiotics	**Bacterial Strain**		
	MSWB1	MSWB2	MSWB3
Streptomycin	10mm	20mm	15mm
Ampicillin	---	---	--
Gentamicin	16mm	11mm	18mm
Tetracycline	10mm	10mm	15mm
Ciprofloxacin	20mm	10mm	12mm
Penicillin	----	---	05mm

Conclusion

Our present study evidently revealed that soil sample from municipal waste dump site is a potential source for wide spectrum of antibiotic susceptible, enzyme producing ,metal tolerate microorganism . Used for degradation of waste.

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SUSTAINABLE RURAL DEVELOPMENT IN GONDIA DISTRICT THROUGH MGNREGA

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ABSTRACT

The Mahatma Gandhi National Rural Employment Guarantee Act (MG-NREGA) seeks to ensure the health of interconnected aspects of human growth, such as the environment and the economy, by looking to the future. The MGNREGA scheme is critical to the development of rural communities. The research paper's case study will provide information about the impact and incidence of the MGNREGA plan on the socioeconomic lives of the common people in a backward area of Gondia district. According to the study's findings, the MGNREGA programme has a positive impact on both the production of individual assets and the creation of community assets in the Gondia District. In fact, the study's findings indicate that the impact of the MGNREGS programme on asset production is highly variable, depending not only on location-specific criteria but also on the nature of the activities carried out in each of the respective block's sites.

Keywords:*Environment, Economy, Socioeconomic, Community Assets, Rural Communities*

Introduction

1.1 Sustainable development: a Definition

The initial concept of sustainable development was presented in a study published by the United Nations in 1987 titled Our Common Future. This report is now commonly known as the Brundtland Report of the World Commission on Environment and Development 1987. It defined sustainable development as development that satisfies the requirements of the present without compromising the capacity of future generations to satisfy their own requirements for development (United Nations 1987).
Additionally, the National Sustainable Development Strategy defines sustainable development as a process that is targeted, long-term, comprehensive, and synergistic. This type of development I affects the conditions and all aspects of life at all levels; (ii) satisfies the biological, material, spiritual, and social needs and interests of people; (iii) eliminates or significantly reduces interference that endangers, damages, or destroys conditions and forms of life; (iv) does not burden the country.

1.2. MGNREGA and Sustainable Development:

An evaluation of the part that the Mahatma Gandhi National Rural Employment Guarantee Act (MG-NREGA) played in achieving environmental sustainability according to the criteria established by the Ministry of Environment and Forestry (MOEF) is as follows:

Climate Change:

Problems- Temperature shifts, shifts in water availability, and shifts in water quality will all have an effect on agricultural production, human habitation, and health, as well as biodiversity and animal migration patterns**.**
Executed by MG-NREGA lowering of sensitivity to climate change; adaptation to drought; reforestation and horticulture; carbon sequestration; various operations involving the planting of trees; etc.

Food security:

Problems- Malnutrition and hunger, health problems like the risk of diseases, infections, and death, the death of children, changes in the prices of basic food items, and the risk of unfair trade.

Executed by MG-NREGA Increased agricultural output and cropping intensity; Soil conservation; New Rural Employment Guarantee Act (NREGA) use as a supplement to income during off-seasons for farming; New land use practises Planting trees and flowers, etc.

Water security:

Problems- Water-borne infections; Sanitation and hygiene; Impact on food security; Land subsidence; Flooding; Landslides; Droughts.

Executed by MG-NREGA Increased irrigation using ground water; convergence with agriculture; and pisciculture. Water harvesting and irrigation; groundwater improvement; and water conservation are some examples.

Energy security:

Problems- The production of energy results in an increase in the release of CO2. The production of more greenhouse gases.Emission of NO2, as well as SO2.Particle Pollution (PM10) (PM2.5). Increase the amount of pressure that is being applied to the global market for oil and gas. Cause an increase in the overall price level.

Executed by MG-NREGA -Preference for tasks that require physical labour (abandonment of machines at work places).

Managing Urbanization:

Problems- Diseases, poor sanitation

Executed by MG-NREGA- Migration due to economic hardship has decreased in the majority of rural areas; the bargaining power of labour has improved; purchasing power has increased; multiplier effects, including improvements in food and education, have led to a reduction in rural-to-urban migration.

3. Literature Review

Bhat, Jahangir &Yadav, Dr. (2015). Sustainability in development is becoming one of the most essential themes in our modern world. The goal of the Mahatma Gandhi National Rural Employment Guarantee Act (MG-NREGA) is sustainable development, which involves looking to the future to ensure the health of interconnected aspects of human growth, such as the environment and the economy. For the advancement of the economy, agriculture, forests, income, health, and many other objectives and principles of sustainable development, MG-NREGA is not merely an act against unemployment. To that end, MG-NREGA aims to fill the gap left by a lack of other work opportunities for those from disadvantaged backgrounds. Through the implementation of rights-based law and innovative approaches to occupation, it serves as a driving force for the long-term success of the agricultural sector and the uplift of the rural poor. The government has proposed the notion of "convergence" to address such concepts as the necessity to maximise efforts towards inter-sectoral methods for poverty alleviation and sustainable development. MGNREGA can use convergence as a tool for ensuring long-term sustainability by combining efforts across different industries. Additionally, this article emphasises the challenges and opportunities of sustainable development in relation to MG-NREGA.

Ozili, Peterson. (2022). Sustainability and development research globally. The study analyses global research on sustainability and sustainable development. The paper defines sustainability and sustainable development. Next, the paper discusses sustainable development and sustainability based on the literature. This paper highlights the link between sustainability and sustainable development. The article indicates that each region of the world has achieved some progress toward sustainable development, but each region also has distinct problems that affect reaching sustainable development goals in the region. They're social, political, structural, institutional, and economic. Although sustainable development is broadly accepted in academia, its applicability in policy circles has been questioned. Studies suggest that integrating sustainability or sustainable development into corporate or environmental management is beneficial. Finally, research gaps are identified.

Tripathy, Arun. (2021). In the context of the progression of the nation as a whole, the concept of rural development is currently held

in significantly higher esteem in the country than it was in times gone by. It is a strategy that aims to achieve increased levels of socioeconomic equality and ambition, as well as stability in the growth of the social and economic system. The MGNREGA scheme plays a vital part in the process of rural community development. The case study provides us with information about the impact and incidence of the MGNREGA plan in the socioeconomic lives of the common mass in a coastal area of Odisha.

4. Objective

1. To study weightage of MGNREGA on Rural sustainable development at Gondia district.
2. To examine the total assets created by MGNREGA for rural sustainable development in the Gondia District.
3. To study how MGNREGA's tree plantations contribute to rural sustainable development in the Gondia District.

5. Research Methodology

The majority of the data included in the study is secondary data that was gathered from a variety of different sources. MGNREGA Public Data Portal', Ministry of Rural Development, was the source for collecting district-wise data relating to the number of households that were covered by MGNREGA, the proportion of job cards issued, the proportion of SC, ST, and others in job cards issued, the total person-days worked, the average person-days worked per household per year, the share of SC, ST, others, and women in total person-days worked under MGNREGA, state-wise wage rates under MGNRE For the purpose of providing a more comprehensive understanding of the outcomes of the study, the data collected district-by-district were aggregated into regional statistics. The Gazette of India was consulted in order to compile information on the MGNREGA wage rates for each state.

6. Data Analysis

6.1. Weightage of MGNREGA on Rural sustainable Development at Gondia district

Table No.1: MGNREGS daily report on drought related works (as per e-muster issued as on 03/09/2022)

Sr. No	Financial Year	Total Works	Drought related Work					
			Water Conservation and Water Harvesting	Renovation of traditional water bodies	Drought Proofing	Micro Irrigation Works	Total	Percentage (%)
1	2020-21	1218	1	0	135	0	136	11.17

Source:https://nrega.nic.in/Nregahome/MGNREGA_new/Nrega_home.aspx

In the fiscal year 2020-2021, the total amount of work that was related to drought was 1218. This included water conservation and water harvesting work that had been completed 1, renovation of traditional water bodies work that had not yet taken place, drought proofing work that had been completed 1350, and micro irrigation works that had not yet begun. The total Drought related Work was done in number 136.The percentage of drought-related Work to the total amount of work was 11.17.

Table No.2

MGNREGS daily report on drought related works (as per e-muster issued as on 03/09/2022)

Sr No	Financial Year	Total Workers	Drought related Work					
			Water Conservation and Water Harvesting	Renovation of traditional water bodies	Drought Proofing	Micro Irrigation Works	Total	Percentage (%)
	2020-21	5231	6	0	780	0	786	15.03

Source:https://nrega.nic.in/Nregahome/MGNREGA_new/Nrega_home.aspx

In the fiscal year 2020-2021, the total number of workers for drought-related work was 5231, with Water Conservation and Water Harvesting work completed 6, Renovation of traditional water bodies work yet to be completed, Drought Proofing work completed 780, and Micro Irrigation Works yet to begin. The total Drought related Work was done in number 136. The percentage of Drought related Work to total work was 11.17 percent.

6.2. Total assets created by MGNREGA for rural sustainable development in the Gondia District.

Table 3. Asset Created Gondia District

Sr.No	Type of work	Work completed GP+ZP+PS
	Anganwadi/Other Rural Infrastructure	**36**
	Coastal Areas	**--**
	Drought Proofing	**138**
	Rural Drinking Water	**--**
	Food Grain	**--**
	Flood Control and Protection	**137**
	Fisheries	**--**
	Micro Irrigation Works	**12**
	Works on Individuals Land (Category IV)	**8545**
	Land Development	**120**
	Other Works	**--**
	Play Ground	**--**
	Rural Connectivity	**414**
	Rural Sanitation	**230**
	Bharat Nirman Rajeev Gandhi Sewa Kendra	**--**
	Water Conservation and Water Harvesting	**221**
	Renovation of traditional water bodies	**154**

Source:https://nrega.nic.in/Nregahome/MGNREGA_new/Nrega_home.aspx

The data on the asset creation through MGNREGA in the Gondia District showed that the Anganwadi /Other Rural Infrastructure asset creation work done in number 36, Drought Proofing asset creation work done in number 138, Flood Control and Protection asset creation work done in number 137, Micro Irrigation Works asset creation work done in number 12, Works on Individuals Land (Category IV) asset creation work done in number 8545, and Rural Connectivity asset creation work done in number Under the MGNREGA, work has not yet begun on the Coastal Areas, Rural Drinking Water, Food Grain, Fisheries, Play Ground, or Bharat Nirman Rajeev Gandhi Sewa Kendra in the Gondia District. Works on Individuals Land (Category IV) asset creation work done in number 8545 was the most work done overall, while Micro Irrigation Works asset creation work done in number 12 was the least amount of work done overall, and both of these types of work need to be given special attention.

6.3. MGNREGA's tree plantations contribution to rural sustainable development in the Gondia District

Table 4. Progress on Roadside Tree Plantation: Gondia

Sr.No	Length of Road planted in Km	Number of Plants planted	Number of Beneficiaries identified for providing Tree Plantation
1	28.1	15190	7444

Source:https://nrega.nic.in/Nregahome/MGNREGA_new/Nrega_home.aspx

According to the information that can be seen on the MGNREGA website, the total length of road that has been planted in kilometres is 28.1 kilometres, the total number of plants that have been planted is 15190, and the total number of beneficiaries for whom rights have been identified is 7444.

7. Conclusion and Suggestion

1. Concerning issues relating to a sustainable environment, the MGNREGA helps to improve ecological foundations through the planting of trees and the establishment of forests. It eliminates the feeling of being cut off from the outside world in isolated villages by increasing connectivity between rural and urban areas. Work such as the excavation of ponds and the rehabilitation of historic water bodies are two examples of activities that contribute to the reduction of water pollution.
2. The supply of work by the state to those persons who are unable to obtain alternative employment is the central component of the MGNREGA programme. This serves as a type of social safety net for those who are unemployed and living in rural areas.
3. The goals of the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) are to provide rural residents with a reliable source of income by increasing the number of wage jobs available in the sector and by increasing the number of productive assets in rural areas. Over time, efforts have been undertaken to develop high-quality content.
4. More of these profitable, long-lasting, and agriculturally related assets need to be developed in a conducive setting. This will be very helpful in demonstrating that MGNREGA is serious about its mission to create wage jobs by building long-lasting infrastructure.
5. Desilting of village ponds, clearing of bush, and construction of canals were some of the community projects that were completed as part of the MGNREGA programme. Since the beginning of the programme, the Desilting of the tanks in the Gondia District village have been carried out on a consistent basis nearly every year. According to the findings of the study, the programme has a good influence, both on the production of individual assets and on the creation of community assets in the Gondia District. In point of fact, the findings of the study indicate that the impact of the MGNREGS programme on the production of assets is highly variable, depending not only on location-specific criteria but also on the nature of the activities carried out in each of the sites.

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PHYLOGENOMIC ANALYSIS REVEALS HIGH DIVERSITY IN OMICRON VARIANT SEQUENCED FROM AMRAVATI DISTRICT OF MAHARASHTRA

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ABSTRACT

The study presented in this paper deals with the phylogenomics of omicron variant from Amravati district of Maharashtra which cast light on phylogenomics and genomic diversity. In this study, a total of 35 genomes sequenced and deposited from Amravati were used to investigate the genomic diversity indices, while a genome deposited from Botswana was used as reference genome for phylogenomic reconstruction. Pangolin COVID-19 Lineage Assigner was used to identify the lineages of all genomes. The haplotype diversity calculated in DnaSP confirmed 34 unique haplotype found in Amravati, with haplotype diversity i.e. HD: 0.9984. The llineage assignment analysis reveals the dominancy of BA.2 lineage in the Amravati District. A Maximum likelihood (MLE) tree construction reveals the splitting of genomes into two major clades with various sister clades confirming the high genomic diversity of omicron variants from Amravati. High haplotype diversity was observed with a total of 34 haplotypes revealing a high mutation rate and rapid evolution of the virus. In the future, the information generated in this study will be used as a management unit to track the ongoing epidemic on a district level.

Keywords:*Omicron, Phylogenomics, Amravati, SARS-CoV-2.*

1. Introduction

SARS-CoV-2 is a member of the family Coronaviruses, characterized by the viral RNA as a genetic material, known to cause respiratory infections in mammals and birds (Ksiazek et al. 2003; Peiris et al. 2003; Marra et al. 2003; Rota et al. 2003). Sometimes they cause mild respiratory illnesses in humans and birds including the common cold, while some variants have the potential to cause more lethal effects like SARS, MERS, and COVID-19, which is causing the ongoing pandemic. The zoonotic origin of SARS-CoV-2 in the Wuhan province of China is responsible for the emergence of Severe Acute Respiratory Syndrome Coronavirus 2, which later turned into to global pandemic. The novel coronavirus is characterized by a single-stranded, positive-sensed RNA genome with approximately 29.9-kilo base pairs, with some important protein-coding genes like the spike (S), envelope (E), membrane (M), and nucleocapsid (N) structural proteins with other non-structural proteins (Naqvi 2020; Lu 2020; Wu 2020). The life cycle of the SARS-CoV-2 has initiated after the binding of viral S protein to ACE2 (Angiotensin Converting Enzyme 2) receptors, which is followed by the transfer of the viral genome inside the host cell. They are able to adapt to a range of environments due to their fast mutation and recombination rates and they are capable to alter broader host range and also tissue tropism efficiently (Graham 2010; Li 2016).

A total of five subvariants (Alpha, Beta, Gamma, Delta, and Omicron) of SARS-CoV-2 have been identified to date after the onset of this pandemic (WHO). Omicron is declared a Variant of Concerned after the emergence of a new SARS-CoV-2 variant discovered in four individuals in Botswana while traveling from South Africa to Hong Kong (Viana et al. 2022). This variant was declared as the 5th Variant of Concerned by WHO and was named an Omicron. After the discovery of Omicron and since the beginning and the of 2022, over 5,839,151 genomes of Omicron have been sequenced and deposited into the GISAID from different countries of the world out of which 104,648 genomes were sequenced and contributed from India. Hence it is the urgency of time to explore SARS-CoV-2 genetically to mitigate the long-term threats by understanding the molecular epidemiology of this notorious virus. Current advances in next-generation sequencing technologies made it easier to produce the genomic information of viruses and recent development in the field of

bioinformatics including high throughput computation facilities enable researchers to understand the molecular epidemiology of SARS-CoV-2 from different parts of the world. The study presented in this research endeavour deals with the phylogenomic analysis and genomic diversity of the Omicron Variant of SARS-CoV-2 sequenced and deposited from the Amravati District of Maharashtra.

2. Material and Methods

A total of 35 whole genome sequences of omicron variants from Amravati and 1 genome deposited from Botswana were retrieved for downstream analysis. The sequence from Botswana was used as a reference genome for phylogenomic reconstruction. All the genomes were aligned using MAFT version 7 (Katoh & Standley, 2013), and haplotype diversity along with other diversity indices was estimated in DnaSP v624 (Rozas et al. 2017). The maximum likelihood tree was constructed in PhyML 3.0 (Guindon, et al. 2010).

3. Result and Discussion

Current analysis of Omicron genomes from Amravati reveals high genomic variation with haplotype diversity HD: 0.9984. A total of 34 different haplotypes and 1 haplogroup comprising two haplotypes were identified from Amravati district, reveals high genomic diversity of omicron variant, which could be the result of the high mutation and evolutionary rate of the variant as compared to another variant. A total of 135 synonymous and non-synonymous mutations were identified in 35 genomes comprising 26,159 bps, reconfirms high nucleotide diversity and variability in the omicron genome. The result of lineage assignment reveals a high prevalence of BA.2 lineage in the Amravati District and all the isolates from Amravati belongs to BA.2 lineage. The maximum likelihood tree (MLE) constructed using 35 genomes and 1 reference genome from Botswana reveals the splitting of isolates into two major clades with various minor and sister clades. This spitting of isolates in smaller sister clades depicts very high diversification and evolution of omicron variant. Due to high genomic variation, there is no distribution of isolates in tightly bound clades, which also supports the hypothesis of rapid evolutionary rate of omicron variant. Though omicron causes mild symptoms as compared to other variants like Delta, such high diversity, with higher mutation rates, makes it more vulnerable to evolve in various sub-lineages in the future. The information generated in this study will cast a light on the phylogenomic status of the Omicron variant from neglected and unexplored districts like Amravati from highly affected states like Maharashtra. In the future, the information generated in this study will be utilized by concerning stakeholders as a management unit to plan strategies and monitor the ongoing epidemic on a district level.

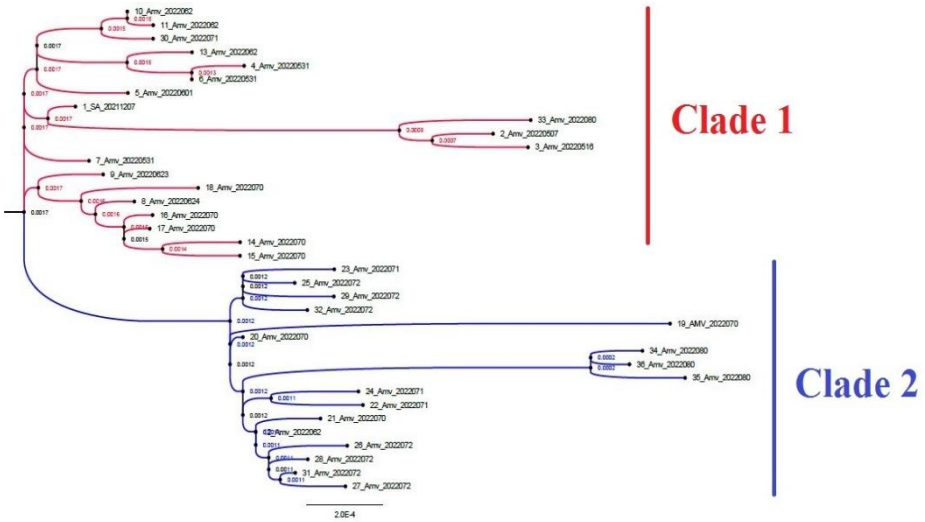

Figure 1. Maximum Likelihood Tree constructed using 35 Omicron isolates sequenced as deposited from Amravati district of Maharashtra.

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EFFECT OF AIR POLLUTION ON PREGNANCY

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ABSTRACT

Exposure to atmospheric pollutants in both open and close environments has an adverse effect upon the early development of the fetus leading to premature deaths. The most Frequently studied pollutants are Sulphur dioxide (so_2), nitrogen dioxide (NO_2), particulate matter and polycyclic aromatic hydrocarbons (PAHs). The effect of air pollution on placental during pregnancy are not fully understood. The present cross - sectional study was conducted to know the effects of air pollution on placenta / during pregnancy and the impact of these effects on the fetus and the nervous system by taking 373 women volunteer participants with normal pregnancy from different regions of Odisha. The effect of are pollutants on the developing fetus was studied by using neonatal anthropometric measures the tools for the assessment of anthropometric measures include physical examination and matemal questionnaire. Maternal venous blood was collected prior to and cord blood placental tissue was collected immediately after delivery.

Keywords:*Air pollutants, Pregnancy, SO_2, NO_2, cigarette Smoke, Various disorder.*

Introduction

Low Birth Weight- The ideal pregnancy delivers six to nine-pound babies at 38–40 weeks. Babies under five pounds eight ounces are considered “low birth weight.” On average, one in every 12 babies in America is born underweight for a variety of reasons- but exposure to air pollution while pregnant is speculated to cause this complication. Population growth, Rapid industrialization and increased vehicular load are the main causes of increasing pollution load in ambient air pollutants enter the human body through several routes such as inhalation of contaminated air, consumption of contaminated air, consumption of contaminated water and food. exposure to contaminated soil and industrial waste

(1) Exposure to ambient organic air pollutants like: Sulphur dioxide (so_2) nitrogen dioxide (NO_2), particulate matter and polycyclic aromatic hydrocarbons (PAH s) has been reported to
be inducing birth defects and abnormal brain development.

(2) PAH s are widespread environmental pollutants and classified under hazardous genotoxic
Compounds. The trans placental transfer of PAH to the fetus can have a significant impact on fetal development such as inducing an increased risk of intrauterine growth restriction (IUGR), small - for - gestational age (SGA) and preterm delivery

(3) Benzo (a) pyrene (B(a)P) is a prototype of PAH and is mainly produced due to incomplete combustion of Organic matters.

4) The B (a) P reacts and binds with DNA through it' s metabolite to form Benzo pyrene dial
Epoxide (BPDE) which results in mutations, various disorders and diseases.

5) Daily exposure to B(a) p is mainly through air / pollution, food and cigarette smoke,
However, the role of this toxin in pregnancy has not been extensively evaluated.

Effect of Air Pollution on Pregnancy

The effects of Extreme air pollution on a pregnant mom are closely intertwined with its effect
on her baby and several experts are in agreement with the findings of various studies.

1) The Environment Protection agency (EPA) says that “prenatal exposure to pollutants can increase the risk of preterm delivery. And low birth weight.”

2) A study conducted at the university of British Columbia and published in the European

Respiratory Journal Found that perinatal exposure to air pollution can increase the odds of
asthma in children 0-5 years of age.
3) In severe cases, exposure to toxic air can also lead to stillbirths or sudden infect Death syndrome (SIDS)

Ways to Protects from air pollution

1) Skip the early morning walk:
Unless you live near a park located away from the main roads, you should reschedule your early morning walks. The air Quality in Delhi is the worst at early morning and evening, which means outdoor activity should be restricted. If possible, try and walk around noon.
2) Wear a Mask:
In a city like Delhi, wearing a mask is an easier step to take than waiting for air pollution level to come down and mask are effectively at filtering pollutants out of the air we breathe Invest in an N 99 or N 95 Mask and make Sure it Fits.

Ways to Protect Yourself from Air Pollution While Pregnant:

It's impossible to avoid every potential threat to your health and that of your baby, but there is a lot you can do to decrease your exposure to air pollution.
Read the Air Quality Index (AQI) – In 2014, the World Health Organization determined that 92 percent of the world's population lived in regions where air quality is unsafe. Even if the air looks clear, it might be contaminated. Make it a habit of looking up your zip code's air quality index report each day. It'll tell you particulate pollution levels and whether you should be concerned.
Get an Air Purifier – Outdoor air pollution isn't the only thing you need to worry about. According to the EPA, Americans spend 90 percent of their lives indoors where pollutants are two to five times higher than outdoors. Solve this problem by purchasing air purifiers for your home. These devices remove everything from smoke to allergens to mold and germs from your air—helping you and your baby grow in a healthier environment.
Protect Your Air – Anytime you cook, use hair spray, paint, or have a fire, you introduce contaminants to your household air. Create a healthy environment by using natural household cleaners, using your vent hood when cooking, doing routine checks for mold, and using carbon monoxide detectors.
Stay Inside – Your skin is your largest organ—absorbing 60–100 percent of whatever it comes into contact with. Pregnant women share everything with their babies; what you eat, drink, breathe, and come in touch with impacts your fetus. Even if you're wearing a gas mask, your skin will be affected by outdoor air pollution like particulate matter. Example: If the forecast is telling you to watch for outdoor air pollution, stay indoors with your air purifiers on.
Get Air-Purifying Plants – Plants can naturally filter your air and help you and your growing baby breathe healthier air. Certain varieties of the spider and snake plants remove volatile organic compounds from the air and replace carbon dioxide with fresh/clean oxygen. Get one plant for every 100 square feet to maintain cleaner air.
Pregnancy is a delicate balance. While many things can influence the health of you and your baby, air pollution is something you can learn to avoid. Use these tips to keep your newborn and loved ones safe.

Conclusion

The present study provides evidence that the exposure of pregnant women to ambient air particulate pollutants adversely affect the growth and development of fetus exposure to particulate pollutants like PAH may induce oxidative stress in the pregnant mother reduced birth weight or low birth weight. It also showed reduced body mass index, placental weight and head circumference of the new born baby, which may be due to significantly increased lipid peroxidation by production of reactive oxygen species. Ambient air exposure is associated with an increased Serum homocysteine concentration in maternal and cord blood as a biomarker of exposure effects.

Thus, exposure of air pollutants during pregnancy should be avoided for substantial health benefits of newborns and the subsequent neural development.

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USE OF NANOTECHNOLOGY IN MEDICAL SCIENCES

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ABSTRACT

One of the largest and most diverse fields of science and technology is forming between nano systems and biosystems, bringing together physics, chemistry, biology, and biochemistry as well as various branches of engineering and technology, biotechnology, and medicine. The main cause of disease and poor health during the Covid-19 pandemic is at the molecular or cellular level because oxygen levels were so low at the time. By manipulating matter on an atomic and molecular scale, nanotechnology—often referred to as "the manufacturing technology of the 21st century"—allows us to create a wide variety of intricate molecular devices.

Keywords:*Nanotechnology, Nanoparticles, Quantum dots, Nanomedicine, Drugs, Nano shells, Smarts drugs etc.*

Introduction

Nanotechnology is the method of producing valuable products, systems, and devices by manipulating matter at the atomic, molecular, and supra-molecular levels on a scale of 1-100 nanometers. The physical, chemical, and biological characteristics of materials differ fundamentally and advantageously from those of individual atoms and molecules or bulk matter at the micro scale. In a very constrained space, it allows for the most efficient alignment of atoms. With this method, extraordinary devices can be produced. The alignment of molecules may provide the desired outcome in terms of strength, ductility, reactivity, conductivity, and capacity. This concept makes it possible to design structures and technologies that, despite their tiny size, offer innovative characteristics and capabilities. Nanomedicine is the term used to describe the application of nanotechnology in the medical field. Potential uses for nanoparticles in the realm of medical sciences include

Nanotechnology is the formation of valuable materials, devices and system through the handling of matter on an atomic, molecular, and supra-molecular level in the length scale of 1-100 nanometre size.

Nanomedicine is the term for the use of nanotechnology in the medical field. New diagnostic tools, imaging agents and techniques, targeted drug delivery, medicines, bio implants, and tissue engineering are just a few of the possible uses for nanoparticles in the field of medical sciences.

The word "ogy" is derived from the Greek word "nano," which means "dwarf" (short man). Utilizing nanotechnology for the improvement of human health and wellbeing is known as nanomedicine. One billionth of a metre is a nanometer. Consider something that is only 1/80,000 the breadth of a human hair. It is difficult to imagine anything so tiny. In one nanometer, ten hydrogen atoms might be arranged side by side. The width of a red blood cell is roughly 7000 nm. Numerous molecules, including several proteins, have a size of 1 nanometer or greater. Through the manipulation of matter at this minute size, nanotechnology enables the development of valuable materials, systems, and equipment.

Scientists from a variety of scientific fields, including physicists, chemists, engineers, and biologists, are involved in .Although the term "nanotechnology" is still relatively new, the "natural form" of nanotechnology was already dominant thousands of millions of years ago with the creation of life itself. The nanoscale serves as the basis for all natural substances and systems. The basic .components of life are nano-entities, each of which has specific properties based on its size, folding, and pattern at the nanoscale. Deoxyribonucleic acid

(DNA), the genetic material, is made up of four nucleotide bases that range in size from the C the rapidly developing field of nanotechnology.

Nanomechanical Sensors as (NMS)

The development of ever-smaller mechanical transducers that can detect the forces, motion, mechanical characteristics, and masses that originate in biomolecular interactions and basic biological processes is made possible by breakthroughs in micro- and nanofabrication technologies. As a result, biosensors based on nanomechanical systems (NMS) have become increasingly important over the past ten years. Some mechanical phenomena that exhibit a biological response result from the biological adsorption or interactions between the analyte (material of interest, such as a specific chemical component, virus, or micro-organism) and surface of the cantilever. On this idea, nanoscale cantilevers operate. A bioreceptor/biorecognition element is coated on the cantilever's surface. Using semiconductor lithographic methods, nanoscale cantilevers; microscopic, flexible beams that resemble a row of diving boards—are created. A bioreceptor and a bioelectrode are the two parts of a biosensor.

The bioreceptor, a biomolecule, detects the target analyte and produces a significant surface stress, which bends the cantilever downward. The transducer then transforms the recognition event into a quantifiable signal. They are additionally referred to as nanoelectromechanical systems (NES). Figure depicts a nanocantilever and how it works. The binding event causes the cantilevers' physical characteristics to alter. Researchers can track this shift in real time and report on the concentration of various molecular expressions in addition to their presence or absence. When built as a component of a broader diagnostic tool, nanoscale cantilevers can offer quick and accurate detection of cancer-related.

Medical Research and Development (MRD):

Nanotechnology-based research and development (R&D) of improved medication delivery systems is being tested for diseases like cancer, diabetes, fungal infections, viral infections, and gene therapy. The targeting of the medicine and improved safety profile are this therapy modality's key benefits. As contrast agents, fluorescent dyes, and magnetic nanoparticles, nanotechnology has also been used in diagnostic medical procedures. A list of nanoparticles and their applications in the life sciences . The following is a list of some of the biological and medical uses for nanomaterials:

- Biological markers that are fluorescent .
- Gene and medication delivery .
- Pathogen biodetection .
- Protein detection .
- DNA structure investigation .
- Engineering of tissue .
- Cancer Hyperthermia, which causes destruction.
- Cells and biological substances are separated and purified
- A contrast-enhanced MRI
- Phagokinetic research
- Advantages of Nanomaterials
- Less intrusive devices are smaller.
- They are implantable into the body.
- The speed of biochemical reactions is substantially faster.
- Devices administer drugs more quickly and accurately than conventional methods. Nanomaterials' characterization When applied in materials science, the term "characterization" refers to the broad and generic process how the structures and characteristics of a material are examined and gauged.

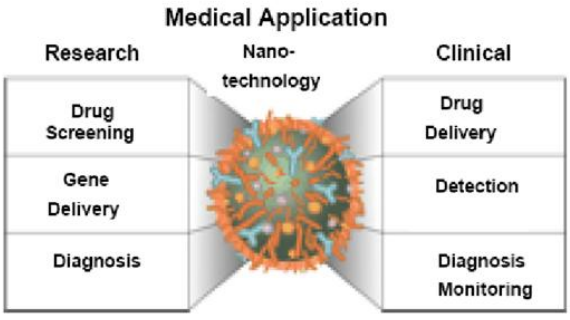

Figure 1 Medical Application

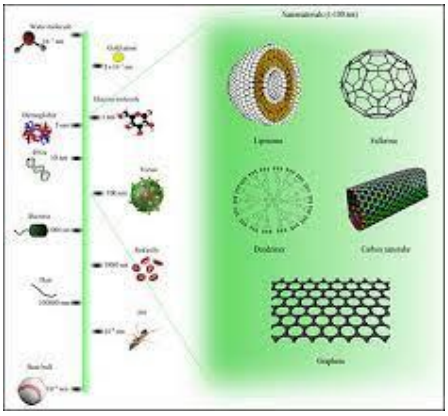

Figure 2Dimenssions of nanotechnology

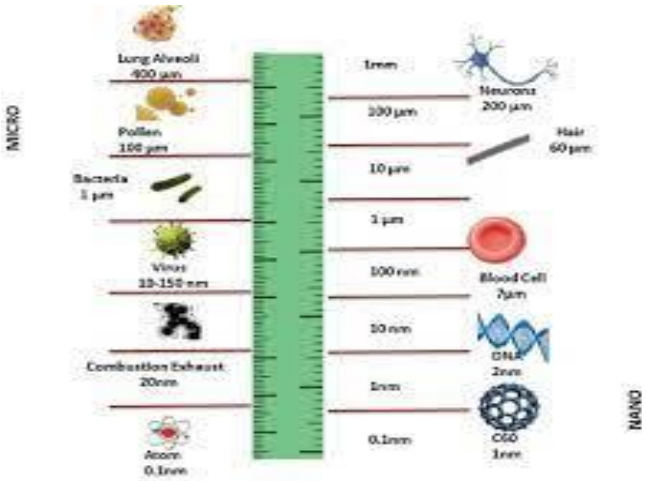

Figure 2 Nanotchnology Helth clear

Quantum dots -Nanocrystals:

Researchers have developed sensors that emit varied colours and light intensities by mixing different-sized quantum dots into a single bead. Each bead generates light that acts as a form of spectral bar code, identifying a specific section of DNA, when the crystals are triggered by UV light. A nanoscale quantum dot is seen entering a cell . Quantum dots also have the benefit of removing the necessity for biopsies because they can be used inside the body. 20 times more light is produced by quantum dot.

Nanoshells:

The first artificial nanomaterial to undergo human testing are nanoshells, which are microscopic glass spheres coated in gold. Excellent optical absorbers are metal nanoshells. Gold in particular, due to the metal's significant optical absorption when exposed to light. Similar to quantum dots, the diameter, size, and thickness of a nanoshell are crucial factors in the optical tuning of a particular wavelength. Nanoshells can be coupled to therapeutic drugs, radioisotopes, oligonucleotides, fluorophores, targeting ligands, polymers, and antibodies to accomplish more accurate and superior diagnostic and therapeutic purposes. In biomedical imaging, target therapy, gene delivery, tissue welding, drug delivery systems, therapeutic applications in general, and cancer imaging and treatment in particular, nanoshells (particularly gold nanoshells) show promise . An intravenous injection of nanoshells is given to a cancer patient as treatment, and over the course of a day, 1% build up in a tumour site. Because they are so little, the majority of the rest wash out. The tumour is then illuminated by an infrared light by a doctor. While neighbouring healthy cells are undamaged, the tumour is burned away by an intense heat produced by the nanoshells' absorption of light. The term "hyperthermia" is another name for this heat-related fatality , no advantage

Cancer Treatment :

Nanoparticles' small size can be highly advantageous in oncology, especially in imaging. When used with magnetic resonance imaging, quantum dots can create remarkable images of tumour sites [49]. Fluorescent quantum dots could provide a higher contrast image and at a lesser cost than current organic dyes used as contrast media since they are significantly brighter than organic dyes and only require one light source for excitation. The disadvantage is that quantum dots are typically constructed of highly hazardous materials. Another characteristic of nanoparticles is their high surface area to volume ratio, which enables numerous functional groups to be attached to them and enables them to target and bind to specific tumour cells. In addition, the diminutive size of they can preferentially assemble at tumour locations thanks to nanoparticles (10 to 100 nanometers in size) (because tumours lack an effective lymphatic drainage system). Another

application is with sensor test chips with thousands of nanowires that can identify proteins and other biomarkers (a "biomarker" is any molecule in the body that may be analysed to determine your health). You can get molecules from your blood,body fluids or tissue.

Conclusion:

Almost every aspect of life is impacted by nanotechnology. One can find limitless potential and possibilities of the material's fundamental building component (particle) when one delves into it, which is different from what is seen for the same substance when it is in bulk. In addition to material confinement in a small space and the rise in surface area per volume, the behaviour of a material at the nanoscale is altered primarily by quantum mechanics. Physics, chemistry, biology, material science, and engineering all converge on the same principles and instruments at the nanoscale. Therefore, advancements in nanoscience have a very broad impact. Nanoparticles have prospective uses in the realm of medical sciences, including new imaging agents, diagnostic tools, and procedures.

medicines, tissue engineering, bio implants, and targeted medication delivery. With the aid of nanotechnology, medications with a high potential for toxicity, such as cancer chemotherapy drugs, can be administered with a higher level of safety. To lessen the negative effects of the dose and its amount, a single medication molecule can be helped to reach the targeted spot. MRI with quantum dots can create stunning images of a tumour. By heating the nanoparticles, gold nanoshells can be utilised to locate, gather, and possibly eliminate the tumour. We can picture a day in the future where people have medical nanodevices injected or even implanted into their bodies. To provide such advantages to humanity, research and development may require a global viewpoint and teamwork. (Navalakhe, 2007)

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ENVIRONMENT OF INFORMATION COMMUNICATION TECHNOLOGY IN LIS PROFESSION

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ABSTRACT

This paper discusses the different dimension of the ICTs. It gives an environment of technology in library and why there is a need to understand the use of ICT in the library for rendering enhanced library services and information to users. The current study highlights the areas where ICT can be applied. Basically, the paper explains different technologies and their use in the library operation. How library services are prompted with the use of technology like RemoteXs, RFID Technology, QR Code, etc. have discoursed in the study.

Keywords:*Information Communication Technology (ICT); Housekeeping Operation; Library Service; Library Automation; Library Operation; QR Code; RFID Technology; Social Media; Digital Libraries*.

Introduction

Tremendous development has been seen in the field of Library & Information Science due to the faster growth in technology. In past few decades, with the use of internet and technology, the library work has become very fast. To satisfy the needs of library users, speed and accuracy is the most two important dimension. Basically, Information and Communication Technology (ICT) enhances the workflow of the library which helps reducing manual work, with this, it proliferates the library services. One of the most prominent advantages of ICT is to provide ICT-based information services to meet the users' demands. Emerging ICTs have changed traditional libraries into knowledge centres and librarians function more like consulting information engineers or knowledge managers . The modern technology has carried momentous changes in different aspects of library

Use of ICT Tools

The emergence of the information revolution as championed by information and communication technology (ICT) has enabled libraries to devise viable strategies for improved service delivery. Library uses various technologies to provide information to its users. Followings are the some of the ICT tools which are basically used for different communication purposes:

Communication Technology: Email is the most effective way of formal communication; it is the best system to exchange the messages and information in electronic format. Revolutionary changes have been seen in communication, because different types of information such as personal message, letter, article, computer programming files, pictures, sound, etc. are being possible to send or receive from any corner of the world within some fraction of second.

- **Voice mail** is the new and innovative emergence of mail technology. We can also say it as an alternative to email technology. It helps to send the mail immediately through the voice.
- **Telephone** is used for personal contact of the users. Generally, users ask their queries regarding the resources and availability of the reading room. Even, they use the telephone for advance booking of carrels for reading and research purpose.
- **Videoconferencing** (or video conference) is explained as a "means to conduct a conference between two or more

participants at different sites by using computer networks to transmit audio and video data. This tools is used for the various purpose of the library activities, such as to conduct user orientation for students available at remote places. Basically, when students are out of the campus and they study in other universities under the student exchange programme, that time, it is essential to use this technology to guide them about the use of resources.

- **Internet:** This is the most important component of ICT. It is basically a network of networks that performs the connectivity among the computers. Internet provides the medium for communication using different online tools.

Social Media: Social media like Facebook, Twitter, Blogs, etc. have become the central focus for quickest information dissemination. Most of the libraries are using these social media for the promotion or marketing of their e-resources. Basically, Blogs are used to disseminate short communication of library, whereas Facebook has become most useful ICT tool for every kind of information dissemination. Now, Facebook live plays a very significant role for telecast the current ongoing programme.

RFID Tehnology: New technology has changed the way of library transaction (check-in and check-out). Libraries are providing ICT-based library services to increase the possible ways of fast and user-friendly services. One of the best invention of technology for library is the 'Radio Frequency Identification' (RFID). Nowadays, libraries are adopting RFID technology to provide enriched and efficient library services. This technology achieves the fourth law of library science, (i.e. 'save the time of the users') by providing quick and effective services (Ranganathan, 1931).

Closed-Circuit Television (CCTV): CCTV stands for Closed Circuit Television and also known as video surveillance (Kumar & Svensson, 2015). This technology plays an important role in the library management. Through the help of CCTV librarian can supervise the whole activities of libraries. It helps to look after the staffs as well as the users.

Quick Response (QR) Code Technology: Walsh (2009) has discussed as "QR codes can be used to encode various sorts of data when used for mobiles, most typically text; uniform resource locators (URLs); phone numbers (prompting your phone to call the number); text message and number (prompting your phone to text the number); and contact details (vcard). The QR readers most reliably work with the text and URL options, particularly as some of the providers of the software also provide hosting services. In hosted solutions, QR codes generated through their software link to a re-direction link on their site, providing data on traffic from a particular code to their customers". Xu (2014) has described the method as "generating a single QR Code is simple. There are many free QR Code generators available online, such as Kaywa, Qrstuff, Goqr, Qurify, Delivr and Invx. Many online QR Code tools, like Qrstuff, allow batch creating QR Codes, but they usually require users to pay subscription fee". QR code is very simple to use; at present days, it is indispensable to use for quick retrieval of library materials.

Digital Library: The base of digital library is computer and computer network because the reading material cannot be processed in the digital material without the computer and even no published books can be modified to digital form. In digital libraries the entire reading material like PDF, HTML, Audio, video, and services etc. also depend on computer and network.

Use of Library Automation Software: Library automation is the excellent way of reducing the human involvement for library services. The aims of the current automation technology is to provide maximum services in minimum time and lowest cost. Library automation is the application of ICTs to library operations and services. Many library

automation softwares are available for library operation such as Libsys, Koha, SLIM21, etc. The functions of the software are to automate the library systems which covers acquisition, cataloguing, circulation, serials management, stock verification, etc. ICT is used in various library housekeeping operations as well as for different library activities and services. The details use of ICTs are as follows:

Acquisition: With the help of web, acquisition work has become very much simplified. Order placing, duplication checking, price checking etc. are done very effectively using ICT technique. Receiving suggestions or demands and placing the order for purchasing library materials have become easy through the online. As publishers and vendors are available through the website, such as Amazon, Flipkart, etc. the quantity of workload has reduced and due to this the time can be saved and make it applicable to the other services. Invoices can be downloaded from the Websites that make service faster and avoids postal delay. E-mail helps in sending reminders to the publishers, vendors and even to the borrowers of the books.

Cataloguing: There has always been awareness among librarians that without cataloguing and classification, the goal of making materials and information resources available would have been difficult. The advent and use of ICT has made it possible for remote libraries to access the huge databases of big libraries in developed countries for the purpose of adopting or adapting their bibliographic data for their own library use; and indeed the online catalogues have transformed the landscape of cataloguing and classification

Classification: With the technological development, the classification work has been possible through online tool. There are many online catalogue records available from where one can get the whole bibliographic record of the library resources. Along with the record, we can also get the classification number in the catalogue record. British Library catalogue, Trove-National Library of Australia's catalogue, Library of Congress's online catalogue can be used to search the catalogue record and data can be copied for own catalogue preparation. These libraries provide classification details in their catalogue record, but there are also some online resources where library resources/materials can be classified. OCLC classify, LOC classification web and WebDewey are the examples of online classification tools.

Serial Control: Serials or periodicals are the backbone of the library. Automated serials management gives quickest information access about the particular resources. Below mentioned tasks can be accomplished through the software for serial control:

- Current holdings status
- Tracing missing *volume and issue*
- Preparation of budget for periodical subscription
- Preparation of periodicals list and its verification
- Online Letters to publishers, vendors, etc.
- Processing of online electronic magazines and receiving copies of the periodicals
- Preparation of New arrivals

Circulation: The use of electronic gadgets such as computer, barcode scanner and the library management software helps to perform circulation routine operations in an easiest and quickest way. After the invention of barcode technology, library transaction has become faster. Nowadays, for any type of communication we depends on the internet, email, telephone, etc. These technologies are also used in the library for the day to day activities of the circulation. Basically, the following duties are performed in the circulation by using ICT:

- Issue, returns
- Overdue reminder
- Renewal
- Reservation of books/documents
- Membership registration
- User guides
- Daily check-in and check-out statistics

Stock-taking/Verification: The use of the computer in stock verification is the most

important. The verification of the stock is carried out with the storage of library through the database in the computer. Stock available in the library is scanned through RFID reader/barcode scanner and data are collected. These collected data are compared with the available data in automation software. In this way, how many books have lost we can find out.

ICT and Library Services: The following library services can be rendered using information and communication technology (ICT):

On-Line Public Access Catalogue (OPAC):ICT has revolutionized the practice of cataloguing in the library. Using OPAC users can see the holdings of the library collections. It reduces the cost of maintaining a library catalogue. It also eliminates pen and paperwork, along with it helps in the preparation of union-catalogue. OPAC is the easiest way to get the information of collection, weekly new arrivals and other recent addition to the libraries.

Conclusion

Effective application of information technology in library transmits users' satisfaction. The present scenario demands the updated technology for the faster and approachable library services. Gradually, new technologies are developed, consequently there is the need to develop our skills and capacity to provide enhanced library services. Library resources must be used at a large amount. The successfulness of a library and the library professional always depends on the quality of the service. The emergence of ICT is the new paradigm to extend the level of library operation and services. So, it is inevitable for the library professionals to be updated with the technology for the own existence.

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GRAPHENE/POLYMER COMPOSITE BASED MEMBRANES FOR WATER PURIFICATION

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ABSTRACT

Graphene exhibits extraordinary characteristics, which are considered as a promising material for many other applications such as photovoltaic cell, supercapacitor, gas sensor including water purification due to its unique physical and chemical characteristics. Herein present brief review article comprises the discussion on recent reports available on water purification techniques based on graphene/polymer composite. The review covers the discussion on the origin of the problem, international status, national status, cost effectiveness and energy efficiency in the context of water purification technology.

Keywords:*Graphene; Polymer; Membranes; Water Purification*

1. Introduction

Nowadays availability of fresh drinking water is becoming a burning issue in various parts of the country and also becoming a scarce commodity. A safe water supply is the backbone for any healthy economy. In India, the waterborne diseases have an economic burden close to 600 million USD each year.

It is a very serious issue that only 50 per cent of the population in India has access to fresh drinking water. Due to unregulated industrialization, chemical contamination of water is a great issue and due to the fluoride and arsenic contaminated water close to 1.96 million dwellings. According to JMP-UNICEF 2017, in India excess fluoride water problem affects the 19 states and excess arsenic water problem affects the 15 million peoples in West Bengal. Maharashtra continues to face preventable water borne diseases like cholera, viral hepatitis, gastroenteritis and diarrhoea. Similarly, fluorosis (Fluoride in drinking water) which affects the teeth and bones. Chemical treatment of water like adding bleach, chlorine, or aluminum hydroxide is practiced by most of the households in the village followed by filtration through a cloth. A few households also use water filters, boiling and "stand and settle" treatment. While boiling and chemical treatment effectively reduce microbiological contamination, the other treatments are only effective in decreasing the turbidity and in removing the particles. Chlorine solution is obtained free of cost from the gram panchayat, while the other interventions have to be carried out by households themselves.

Most of the families do not follow water purification treatment as it varies with seasons. A significant number of households have an open sewage system, which increases the possibility of contamination of water sources. Therefore, a simple water purification technique which is efficient to remove almost all hazardous minerals as well as organic matter is very much necessary. Water purification is the burning issue of the present, so energy efficient and cost effective set up of water purification is essential. Graphene based atomic mesh will be the deliverables of present research work.

2. Research and Development Status in the Subject

2.1 International Status

New technologies are continuously evolving to lower the cost of water purification for agriculture and industry. Much research across the globe is focusing on graphene-based water purification techniques for elimination of bacteria and other contaminants. Actually, graphene has a tendency to repel water molecules, but if we create pores on its surface, it rapidly purifies the water. This idea is

presently used by many researchers for filtration and desalination of water. The micro-pores on the graphene surface can easily be created by chemical methods. The graphene-based water purification components are lightweight, energy efficient and environmentally friendly.

At present, water purification technology does not have membranes to remove a wide range of pollutants and it is the major unresolved issue. Seo et al demonstrate water desalination using the membrane of graphene allowed by nanochannels of multilayer, mismatched and partially overlapping graphene grains [1].

Chandio et al reported a unique class of GO based composite membranes with large interlayer spacing from graphene oxide by serine amino acid as a cross-linker and reducing agent using simple strategy. The serine amino acid as a cross-linker membrane (~280 ± 20 nm) showed an outstanding separation efficiency for several organic dyes with ultrafast permeability [2].

Khaliha et al demonstrated that defect-rich graphene oxide can be recovered from treated water by ultrafiltration, thus preventing secondary contamination risks and enabling safe use of graphene nanosheets for water purification. Further, it is also studied that defect-rich graphene oxide was used as sorbent for organic contaminants of emerging concern in tap water, including drugs and dyes, and the performance compared to those of lower defects graphene types [3].

Janjhi et al prepared graphene oxide-based lamellar membranes from graphene oxide and ginger plant extractive with various thicknesses by using vacuum filtration method. This lamellar membrane (~280±10 nm) showed an excellent separation efficiency for various organic dyes with ultrafast permeability [4].

Zhu et al reported an easy and effective means of modifying GO lamellar with a phytic acid (PhA) molecule as both an inserter and a surface modifier were developed to fabricate high-performance GO-based membranes. It possessed the ability to reject different charged dye molecules with a rejection rate higher than 99.88%. This composite based membrane also showed good structural stability under different pH conditions. This study not only provides a method to simply design GO-based membranes by introducing multifunctional small molecules but also sheds light on using such GO composite membranes in practical water separation applications [5].

Zhong et al reported the magnetically ultra-stabilized GO-based membrane filter, unlike conventional approaches such as chemical cross-linking. The graphene oxide filtration membrane filter not only has a separation performance comparable to commercial ultrafiltration membranes, but also enables effective inactivation of waterborne pathogens (e.g., E. coli). This simple strategy that magnetically stabilizes functional engineered nanomaterials on a substrate surface opens up new opportunities for developing nano enabled filters, with minimized leakage and health risks, for point-of-use water purification [6].

Park et al also prepared the graphene-based membrane for water purification based on weakly oxidized and nano-porous few-layer graphene. The outcomes of this work show that use of graphene membranes dramatically decreases the high energy requirements of water purification by reverse osmosis. In addition, these thinner graphene membranes archive separation of metal ions from water in concentrations of few ppm at differential pressures [7]. Song et al also explored the notable ionic sieving properties of graphene-based members. It is observed that nitrogen doped graphene membrane has excellent performance for ion sieving for water purification [8]. Liu et al studied water treatment capabilities of graphene oxide, which has good hydrophilicity. In addition, various methods for the preparation methods of graphene oxide membrane are also reviewed, which includes vacuum suction filtration, spray coating, spin coating, dip coating and the layer-by-layer method [9]. By studying various reports, it is confidently considered that graphene, a carbon-based material invented in 2004 at Manchester University has great potential to deliver huge quantities of clean water by desalination and the removal of pollutants [10]. The scalability of this technique is facing major issues presently.

Therefore, the graphene required for the preparation of atomic mesh for water purification is quite easy. During literature survey, it is also observed that very few reports on graphene-based water purification are present in literature. In India, it is an unexplored area of research. Therefore, it is necessary to start work in this area, as it has huge potential.

2.2 National Status

Motivational research experiments were carried out in our country by various research groups. Some notable news are discussed in this section. Pawara's research group at the Indian Institute of Technology Bombay working on water purification using a graphene-covered microporous carbon membrane since 2016. This group synthesized a 3Dporous network of oxidized graphene for seawater purification. Membranes made using these structures are hierarchically interconnected internally defective oxidized graphene sheets with long microchannels and capable of filtering small ions such as Na^+ and Cl^-. They are easy to manufacture, reusable and economically viable, especially for point-of-use applications. This group fabricated a device using a membrane made of these 3D networks of oxidized graphene [11]. Tewari et al reported a green and cost-effective synthesis of 2D and 3D graphene-based nanomaterials from drepanostachyum falcatum for potential water purification applications. A cost market analysis has shown the huge industrial potential of these materials, which also makes them inevitable and promising candidates for futuristic growth in their respective application in water treatment [12]. Yadav et al reported a series of novel polysulfone (PSf)/GO-vanillin nanofiltration membranes with high permeability, selectivity and fouling resistance. The membranes consist of two-dimensional (2D) layers of graphite oxide (GO) doped with vanillin as the porogen and PSf as the base polymer. The optimized PSf16/GO0.15-vanillin0.8 membrane demonstrated 92.5% and 25.4% rejection rates for 2000 ppm magnesium sulfate (MgSO4) and sodium chloride (NaCl) solutions, respectively. The experimental work evaluated the antifouling properties of prepared membranes for wastewater treatment from landfills. Results showed 84-90% magnesium (Mg^{+2}) and calcium (Ca^{+2}) rejection with 90.32 FRR. The study experimentally demonstrated that the addition of GO and vanillin to the polymer matrix significantly improves the fouling resistance and membrane performance. Future research will focus on molecular sieves for industrial separations and other applications using mixed matrix membranes [13]. Another report by the Yadav research group demonstrated that CNT intercalation between GO nanosheets and CNT/GO-PVA cross-linking significantly improved the separation performance. In a blind filter unit, the CNT5/GO15-PVA0.5 composite membrane shows a high rejection of 94.2% for sodium sulfate (Na_2SO_4) and 85.86% for sodium chloride (NaCl), accompanied by a high permeate rate of 14.2–13.45 LMH at an operating pressure of 5 bar. Salt rejection studies were evaluated for continuous operation for 72 hours for all membranes. Due to the synergistic effect of CNTs, GO and PVA, the prepared membranes demonstrated potential for practical water separation applications with the required permeability and selectivity [14].

2.3 Energy Efficient:

The graphene-based mesh is energy efficient due to following reasons,

- Water flux across a membrane is inversely proportional to its thickness. Thus, the atomic thinness of graphene (d≈0.34 nm) can lead to larger water permeability than the polyamide active layer in thin film composite membranes (d≈100 nm).
- The design of nanoporous semipermeable membranes that contain continuous channels allows a greater volume of water to pass at a pressure far lower than that required by conventionally used membranes in RO.
- The fast flow rate of water is justified by the atomic thickness of graphene membrane; it has been concluded that a reduction of thickness to approximately

10 nm increases the level of performance by 100 times when compared to RO technologies.

- In addition, graphene shows better tolerance to chlorine than polyamide, that is, an important advantage in hindering membrane fouling without degradation.
- Graphene as graphene oxide (GO) shows antimicrobial properties, thus lowering membrane biofouling, that is, improving the membrane lifetime and energy consumption of the water purification processes.
- Graphene can readily be processed into a membrane for application as RO and nanofiltration (NF) (a low-cost and highly efficient separation technique between ultrafiltration and RO) desalination membranes.

2.4 Challenges:

- Few critical challenges are associated with graphene-based membranes in realizing real-world application. The instability of the inter-layer spacing between adjacent GO nanosheets is a great challenge for utilizing graphene-based membranes as selective aqueous separation barriers. This is because graphene-based membrane easily disintegrated in water over time due to the highly hydrophilic nature of the graphene sheets.
- Thus, it is very much necessary to enhance the structural stability of graphene-based membrane by forming stable bonding between graphene nanosheets to realize real-world applications of graphene-based membranes in aqueous environment.
- This is possible by introducing various cross-linking interactive forces, including electrostatic interactions and covalent bonds between adjacent graphene nanosheets or by reducing graphene membranes.
- From 2012, our laboratory develops more than six potential graphene-based nanocomposite prepared by decorating graphene by metal oxide quantum dots. To decorate graphene surface with quantum dots, various cross-linking interactive forces are used. To resolve this issue of disintegration of graphene-based materials in pressure driven water purification, our laboratory has sufficient knowledge and experience.
- The fast flow rate of water is justified by the atomic thickness of graphene membrane; it has been concluded that a reduction of thickness to approximately 10 nm increases the level of performance by 100 times when compared to RO technologies.

2.5 Cost Effectiveness

- The main difficulty behind the non-cost effectiveness and non-industrial scalability, delocalized electron clouds of the π orbitals block the gap that would be found in the atomic rings of graphene, which restrains the passage of even the smallest molecular species.
- The channel pores must be carefully designed to obstruct the passage of ions; the precise control of pore size in a nano-porous graphene membrane remains one of the challenges in membrane design, which is very costly process.
- Fine control of pore sizes in sub-nanometer range on a large surface area of graphene is challenging. Nanopores of controlled pore size can be created in graphene using focused electron beam.

Conclusions

In summary, it is concluded that graphene/polymer composite based materials systems are appropriate for water purification application. The technology based on graphene/polymer composite are energy efficient and cost effective. The limitation of this technique is that large areas of high pore densities cannot be formed by this technique; alternatively, chemical, or oxidative etching is used for larger surface areas. The drawback of this technique is the damage and defects that could form in the graphene sheet. As a result,

producing a large-area, damage-free single layer graphene on a porous support is the next challenge to be addressed, taking into account both the economic and technical implications.

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THE GROWING ENVIRONMENTAL RISKS OF E-WASTE

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ABSTRACT

Electronic waste and e-scrap are terms often used to describe used electronics components that are useless, donated or given to a recycler. Whole the world is facing various problems due to e-waste. For this paper primary and secondary data collected. The main objective of the research is to take review of impact of e-waste on the environment. Descriptive method of research is used for the study. United Nations and other NGOs are taking efforts to aware people about e-waste and its side effects.

Keywords:*E-waste, Environment, Recycle, Health*

Introduction

E-waste means any surplus product with a battery or plug, and features noxious and hazardous substance such as mercury, that can cause severe threat to human and environmental wellbeing.

As per united nation, in 2021 each person on the earth will produce on average 7.6 kg of e-waste, meaning that a very big 57.4 million tons will be generate all-inclusive. Only 17.4% of this electronic waste, containing a combination of dangerous substance and valuable materials, will be recorded as being properly collected, treated and recycled. Many initiatives are undertake to attempt this growing problem, but none of them can be fully effective without the active role and correct education of consumers.

The International Telecommunication Union also indicates that e-waste is one of the major and most difficult waste streams in the civilization. As per the Global E-waste observe 2020, the world generate 53.6 Mt of e-waste in 2019, only 9.3 Mt (17%) of which was recorded as being collected and recycled. E-waste contains valuable materials, as well as harmful toxin, which make the efficient material recovery and safe recycling of e-waste tremendously important for economic value as well as environmental and human health. The difference in the amount of e-waste produced and the amount of e-waste that is properly recycled reflects an urgent need for all stakeholders.

The effects of disgusting disposal of this E-waste on the environment are little known; these impacts however cause very real pressure and dangers to the universal environment at large. Unsuitable disposal of electronic wastes affects the soil, air, and water components of the environment.

Environmental Risks

E-waste can be poisonous, is not environmental and accumulates in the environment, in the soil, air, water and living things. For example, open-air flaming and acidic baths being used to recover valuable materials from electronic components release poisonous materials release into the environment. These practices can also depiction workers to high levels of contaminants such as lead, mercury, beryllium, thallium, cadmium etc.

The inappropriate conduct of e-waste is resulting in a significant loss of insufficient and valuable raw materials, including such valuable metals as neodymium, indium and cobalt. Almost no rare earth minerals are extracting from informal recycling; these are polluting to mine.

Climate Change

It is also demand allowing for the effects electronic goods have on climate change. Every mechanism ever produced has a carbon hoof marks and is contributing to human-made global warming. Produce a tone of laptops and potentially 10 tones of CO2 are emitted. This

makes lower carbon processes and inputs at the developed stage and product lifetime key determinants of overall environmental collision.

Lack of Recycling

Recycling rates worldwide are low. Even in the EU, which leads the world in e-waste recycling, just 35% of e-waste is formally reported as properly collected and recycled. Internationally, the average is 20%; the remaining 80% is undocumented. The lack of recycling weighs a lot on the global electronic industry and as devices become more plentiful, smaller and more difficult, the issue escalate.

The growing footprint of digitalization

A new vision for the manufacture and utilization of electronic and electrical goods is needed. It is easy for e-waste to be framed as a post-consumer problem, but the issues cover the lifecycle of the devices everyone uses.

Changes in technology such as cloud computing and the internet of things could hold the prospective to "dematerialize" the electronics industry. Material effectiveness, recycling infrastructure and scaling up the quantity and quality of recycled materials to meet the needs of electronics supply chains will all be essential.

Methodology

Descriptive method of research used for this research. The main objective of the research is to study the impact of e-waste on environment and planet. The primary and secondary data used for this study. Primary data collected through interviews conducted of the shopkeepers of mobile shops, battery shops, mobile repairing shops, mechanics etc. Secondary data collected through internet and books. The scope of the study is limited up to Akola city. The sample of 40 respondents selected randomly. X^2 test of statistics used to prove the hypothesis.

Analysis and Interpretation of Data

Table No. 1
Awareness of E-waste

Sr. No.	Particulars	No. of Respondents	Percentage
1.	Always	05	12.5
2.	Sometimes	09	22.5
3.	Seldom	18	45.0
4.	Never	08	20.0
	Total	40	100

The above table shows that, 12.5 percent respondents are always taking efforts to aware people for e-waste. 22.5 percent respondents are sometimes taking efforts to aware people for e-waste. 45 percent respondents are seldom taking efforts to aware people for e-waste. 20 percent respondents are never taking efforts to aware people for e-waste. 35 percent respondents are taking efforts to aware people for e-waste regularly.

Calculation of X^2 test:

Degree of Freedom=3 Value of X^2= {(O-E^2/ E):2.5+0.1+6.4+0.4} = 9.4

Hypothesis: There is no association between E-waste and awareness efforts taken by respondents.

Conclusion: The table value of 3 degree of freedom is 7.82 and the calculated value 9.4 is more than the table value. It means that there is association between E-waste and awareness efforts taken by respondents. Hence, our hypothesis is wrong.

Table No. 2
Measures

Sr. No.	Particulars	No. of Respondents	Percentage
1.	Always	02	5.0
2.	Sometimes	04	10.0
3.	Seldom	03	7.5
4.	Never	31	77.5
	Total	40	100

The above table represents that, 5 percent respondents are always follow the measures of e-waste. 10 percent respondents are sometimes following the measures of e-waste. 7.5 percent respondents are seldom following the measures of e-waste. 77.5 percent respondents never follow the measures of e-waste.

77.5 percent respondents never follow the measures of e-waste.

Calculation of X^2 test:

Degree of Freedom=3 Value of X^2= {(O-E^2/ E):6.4+3.6+4.9+44.1} = 59

Hypothesis: There is no association between e-waste and measures of e-waste.

Conclusion: The table value of 3 degree of freedom is 7.82 and the calculated value 59 is more than the table value. It means that there is association between e-waste and measures of e-waste. Hence, our hypothesis is wrong.

Table No. 3
Handling of E-waste

Sr. No.	Particulars	No. of Respondents	Percentage
1.	Always	04	10.0
2.	Sometimes	06	15
3.	Seldom	09	22.5
4.	Never	21	52.5
	Total	40	100

The above table indicates that, 10 percent respondents are always handling e-waste in a proper way. 15 percent respondents are sometimes handling e-waste in a proper way. 22.5 percent respondents are seldom handling e-waste in a proper way.52.5 percent respondents are never handling e-waste in a proper way.

52.5 percent respondents never handling e-waste in a proper way. The respondents who are not handling e-waste in a proper way they create various problems.

Calculation of X^2 test:

Degree of Freedom=3 Value of X^2= {(O-E^2/ E):3.6+1.6+0.1+12.1} = 17.4

Hypothesis: There is no association between E-waste and handling e-waste. **Conclusion:** The table value of 3 degree of freedom is 7.82 and the calculated value 17.4 is more than the table value. It means that there is association between E-waste and handling e-waste. Hence, our hypothesis is wrong.

Table No. 4
Recycling

Sr. No.	Particulars	No. of Respondents	Percentage
1.	Always	02	5.0
2.	Sometimes	03	7.5
3.	Seldom	02	5.0
4.	Never	33	82.5
	Total	40	100

The above table represents that, 05 percent respondents are always sending the scrap of e-waste for recycling. 7.5 percent respondents are sometimes sending the scrap of e-waste for recycling. 05 percent respondents are seldom sending the scrap of e-waste for recycling. 82.5 percent respondents are never sending the scrap of e-waste for recycling.

Maximum respondents are never sending the scrap of e-waste for recycling and its percentage is 82.5.

Calculation of X^2 test:

Degree of Freedom=3 Value of X^2= {(O-E^2/ E):6.4+4.9+6.4+52.9} = 70.6

Hypothesis: There is no association between E-waste and recycling.

Conclusion: The table value of 3 degree of freedom is 7.82 and the calculated value 70.6 is more than the table value. It means that there is association between E-waste and recycling. Hence, our hypothesis is wrong.

Table No. 5
Climate Change

Sr. No.	Particulars	No. of Respondents	Percentage
1.	Always	15	37.5
2.	Sometimes	11	27.5
3.	Seldom	10	25.0
4.	Never	04	10.0
	Total	40	100

The above table shows that, 37.5 percent respondents are always knows that, due to e-waste there is effect on climate change. 27.5 percent respondents responded that, sometimes there is effect on climate change.25 percent respondents responded that, seldom there is effect on climate change. 10 percent respondents responded that, never there is effect on climate change.

Calculation of X^2 test:

Degree of Freedom=3 Value of X^2= {(O-E^2/ E):2.5+0.1+0+3.6} = 6.2

Hypothesis: There is no association between e-waste and climate change.

Conclusion: The table value of 3 degree of freedom is 7.82 and the calculated value 6.2 is less than the table value. It means that there is no association between e-waste and climate change. Hence, our hypothesis is correct.

Table No. 6

Problems

Sr. No.	Particulars	No. of Respondents	Percentage
1.	Agree	09	22.5
2.	Fully agree	16	40.0
3.	Disagree	13	32.5
4.	Fully Disagree	02	5.0
	Total	40	100

The above table indicates that, 22.5 percent respondents are agree, they are facing problems due to e-waste. 40 percent respondents are fully agree, they are facing problems due to e-waste. 32.5 percent respondents are disagreed with the statement they are facing problems due to e-waste. 5 percent respondents are fully disagreed with the statement they are facing problems due to e-waste.

Maximum respondents are facing problems due to e-waste.

Calculation of X^2 test:

Degree of Freedom=3 Value of X^2= {(O-E^2/ E):0.1+3.6+0.9+6.4} = 11

Hypothesis: There is no association between e-waste and problems.

Conclusion: The table value of 3 degree of freedom is 7.82 and the calculated value 11 is more than the table value. It means that there is association between e-waste and problems. Hence, our hypothesis is wrong.

Table No. 7

Involvement of Society

Sr. No.	Particulars	No. of Respondents	Percentage
1.	Always	03	7.5
2.	Sometimes	05	12.5
3.	Seldom	14	35.0
4.	Never	18	45.0
	Total	40	100

The above table represents that, 7.5 percent respondents responded that always there is involvement of society in solving the problems of e-waste. 12.5 percent respondents responded that sometimes there is involvement of society in solving the problems of e-waste. 35 percent respondents responded that seldom there is involvement of society in solving the problems of e-waste. 45 percent respondents responded that never there is involvement of society in solving the problems of e-waste. Maximum respondents responded that, there is involvement of society in solving the problems of e-waste.

Ways to solve the problem

1. Examination with the local government on laws and rules guiding ethical and safe removal of this waste. As a result of the increasing threat that e-waste pose to the environment, some communities have begun to suffer local programs in which residents of such communities take unnecessary electronics to elected drop-off location.

2. With the role of electronics, some of the e-waste prepared can actually be reused, and by doing this, one can reduce toxic waste caused by e-waste and also give access to people who

would not otherwise have access to these procedure.

3. With the use of a certified E-waste recycler, one can find a right and safe recycler certified through the Basel Action Network (BAN), a non-profit organization. Regionally, in Africa E-Terra, a Nigerian company specializes in recycling, and safe and ethical harm of these electronics.

With all the above said, we all can be responsible people by being mindful of the dangers posed by E-waste to the environment and do as much as we can to protect our environment, because finally e-waste does not just affect the environment, it in the end affects us humans too.

Efforts on International Level

Basel Convention

The overarching goal of the Basel conference on the control of Transboundary activities of harmful waste and their disposal is to guard human health and the environment against the unfavorable effects of unsafe wastes. Under the basel conference, parties and other stakeholders have also been working on a set of universal policies on specific challenges. The guidelines focus on clarifying aspects related to transboundary activities of e-waste and used tools that may or may not be waste.

E-Waste Coalition

In addition, on 21 March 2018 at the world meeting on the information society forum, seven United Nations entities signed a Letter of Intent concrete the way for greater collaboration in the area of e-waste managing in developing a UN E-Waste Coalition. Its aims include a promise by the signatories to increase cooperation, building joint venture and supporting member states to tackle the worldwide WEEE challenge.

International Electrotechnical Commission (IEC)

IEC provides a stage to companies, industries and governments for meeting, discussing and developing the International Standards they require. All IEC International Standards are fully consensus-based and stand for the needs of key stakeholders of every nation participating in IEC work.

International Labour Organization (ILO)

ILO's green idea aims to scale up the understanding, policy response and capacity to manage a just conversion toward greener economies and a sustainable future. The green jobs programme signals ILO's promise to act on environment change and to promote resource competent and low-carbon societies. Decent work is a keystone for useful policies to green economies for achieving sustainable development.

International Telecommunication Union (ITU)

This agency undertaking proper evaluation of the size of e-waste and in initiating lead projects to achieve environmentally sound management of e-waste through e-waste compilation, dismantling, refurbish and recycling." ITU, in collaboration with the United Nations University (UNU), have joined services to form the Global E-waste Statistics Partnership (GESP). Its main objectives are to recover and collect international statistics on waste electrical and electronic utensils.

International Trade Centre (ITC)

The conversion to a digital world is present extraordinary opportunities for innovation, entrepreneurship and growth, and how the universal utilization of electrical and electronic utensils is generating unexpected amounts of e-waste. Large dumps sites around the globe have been created due to the e-waste generated. One of the key challenges for the more environmentally sound management of e-waste in developing countries is linking the casual and official e-waste processors and providing coaching opportunities to small and medium-sized enterprises .

The ITC has a growing center of attention on environmental sustainability and social insertion as important fundamentals for SME competitiveness and for fostering Good Trade. ITC will contribute with these experiences to the important work of the e-waste union.

United Nations Environment Programme (UNEP)

UNEP has provided few reports and regulation manuals on dealing with e-waste. The Chemicals and Health Branch is leading UNEP's activities on chemicals and waste and is the main catalytic force in the UN system for concerted global action on the environmentally sound management of chemicals and waste.

World Health Organization (WHO)

A WHO report on e-waste and child health Children and Digital Dumpsites, released in June 2021, calls for urgent effective and obligatory action to protect the millions of children, youngsters and hopeful mothers worldwide whose health is endanger by the casual processing of useless electrical or electronic devices.

As many as 12.9 million women are working in the casual waste region, which potentially exposes them to poisonous e-waste and puts them and their unborn children at risk.

Children exposed to e-waste are particularly defenseless to the poisonous chemicals they contain due to their smaller size, less developed organs and rapid rate of growth and progress. They understand more pollutants relation to their size and are less able to metabolize or destroy poisonous substances from their bodies.

Switzerland and the Canton of Geneva

Retailers, manufacturers and importers are thankful to accept used items of electrical and electronic tools, in which they agreement, free of charge. This commitment also applies if the customer does not purchase a new tool. Consumers, in turn, are grateful to return apparatus. The removal of used utensils through municipal solid waste or bulk waste collections is banned. These rules are restricted in the Ordinance on the Return, Taking Back and Disposal of Electrical and Electronic Equipment (ORDEE).

The dismantling and division of tools into fractions is mainly carried out in Switzerland. The other dealing out stages are often carried out in a foreign country because non-ferrous metals processing systems, in particular, are not available in Switzerland.

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A STUDY OF NATURE IN RUSKIN BOND'S OUR TREES STILL GROW IN DEHRA

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ABSTRACT

Literature has long been interested in the various moods of the nature. Literature takes the readers out of their sphere and brings them into the writer's world. It Nature has always been a source of inspiration for many poets, writers and many professionals for a long time. Many of them have nature as a soul in their writings. For some writers like Ruskin Bond nature is the only life giving force. Bond's various writings make one realizes that all trees and plants, mountains and valleys, rain drop and streams are not only the source of life but the preserver of life as well. His ethical and environmental consciousness is reflected in his writings. This study has been undertaken to explore and assess a study of nature in Ruskin Bond's collection of short stories, Our Trees Still Grow in Dehra.

Keywords:*Literature, Nature, Ethical, Environmental.*

Introduction

In Indian English fiction, natural and ecologicalconcernshave been seen in many fictional writings. Authors like, Mulk Raj Anand, Raja Rao, R. K. Narayan, Kamala Markandaya, Arundhati Roy, Anita Desai, Kiran Desai and many others describe holy rivers, jungles, environmental discourse, local culture and lifestyle in their writings. Indian philosophy is wealthy in natural ideas and rich in biodiversity. As far As Ruskin Bond is concerned nature and ecology is one of the major themes in his writings. He has exceptional talent in writing about nature and children. Bond' early age has built up a strong emotional bond between him and nature. He is worried about destroy of the natural environment in the name of development. His characters are also drawn from the society of people who live in close association with Mother Nature. His entire life speaks of a bond of human with his immediate Nature. His stories are simply engaging and full of vivid description. Reading Ruskin Bond is like travelling through the foothills of the Himalayas with his straightforward, upbeat characters.

Nature Reflected in Ruskin Bond's Writings:

Ruskin Bond was born in Kasauli, Himachal Pradesh on 9th May 1934. His father was an Englishman and his mother was an Anglo-Indian. He grew up in Jamnagar, Dehradun and Shimla which are under the foot hills of Himalayas. His first novel was written when he was seventeen years old. He has explored different avenues regarding writing novels, he has composed few expositionspoetry, essays and short stories and delighted readers of all ages with his words. Like with the romantic poets his love for nature shows in his writing and inspires others to appreciate the beauty of natural world.

In his novel, *Delhi is Not Far*, he quotes,

Live close to nature and your spirit will not be easily broken, for you learn something of patience and resilience. You will not grow restless, and you feel never feel lonely." (Bond, 2017)

He has also written more than thirty books for children. His novel *Our Trees Still Grow in Dehra* made him won 'Sahitya Academy Award' for English writings in India in 1992. He was awarded the 'Padma Shri' by the Government of India in 1999, a 'Lifetime Achievement Award' by the Delhi Government in 2012 and the 'Padma Bhushan' in 2014 for his contribution to the Indian English Literature. He writes about ordinary people living in small towns of Himalayas and stories related to their ordinary and common life.

Ruskin Bond is an Indian author with British descent. Most of his writings have evolved the scent of Himalayan Region. He was brought up in such area and thus signifies the influence of nature o him. He finds a companion in nature.

He loves nature so much that he can't be divorced from it. He speaks in an interview,

"For me nature is very personal. That's because I have lived very close to it up in the mountains for the last 35 years…. In India, and particularly in the Hindu religion, there's a very strong element of nature…. Many of my books and stories have for the last many years had the strong element of the natural world."

Some of his best collection of nature works are *The Blue Umbrella, Rusty the Boy from the Hills, Time Stops at Shamli and Other Stories, Roads to Mussoorie, Rain in the Mountains: Notes from the Himalayas, Angry River, Death under the Deodars, Dust in the Mountain, All Roads Lead to Ganga, A Song of Many Rivers, The Cherry Tree, Book of Nature* etc.

A Study of Nature in Ruskin Bond's *Our Trees Still Grow in Dehra:*

Ruskin Bond's collection of fourteen moving stories, *Our Trees Still Grow in Dehra*, includes tales from the author's youth to the present. Homecoming is the primary theme of the majority of the short stories. Other than homecoming; you will also find stories about the 'death of nature' in Dehra and surrounding areas. Since he always felt and said that hills have always been friendly to a struggling writer like him, Ruskin has always been concerned about the nature of the hills. From this collection of stories you will come across the relationship that Ruskin shares with Dehra.

Ruskin Bond describes the forest surrounding Maplewood Cottage in Mussoorie in his introduction to the book. The story *All Creatures Great and Small* narrates Bond's grandfather is fond of animals and has a menagerie of pets that he keeps adding to. The story celebrates the gifts of nature and coexistence. The forest, the ropeway, the carriage and the river adjoining Dehra have also been described with ease in the story. In the story *Coming Home to Dehra*the theme of the second marriage and the result of it are also critically projected. Along with that, the beautiful northern India with its natural beauty has been captured with almost Wordsworthian serenity. The following passage from the story will justify this:

"Dehra was always a good place for trees. The Valley soil is very fertile, the rainfall fairly heavy; almost everything grows there, if given the chance, The roads were lined with neem and mango trees, eucalyptus, Persian lilac, jacaranda, amaltas (laburnum) and many others. In the gardens of the bangalows were mangoes, litchis and guavas; sometimes jackfruit and papaya. I did not notice all these trees at once; I came to know as the time passed." (Bond, 2011)

In the story *Binya Passes By*Bond is mesmerized by the 'music in the hills' which is a melodious song by Binya while she takes her animals to graze the fields. In the story *Death of the Trees* Bond describes the short story speaks about the horrors of modernization and accompanied deforestation. Bond discusses how the convenience of building roads has resulted in the eradication of trees and the peace and tranquil of village life. In *Death of the Trees*, Ruskin Bond depicts nature as a friend and a living thing that is just as significant as people. In this story, he describes the act of cutting down trees as their death. This shows that he mourns their death as loss of any human life is mourned. Ruskin Bond expressed his concern for nature which has been exploited and directly affects human life and living space by human beings itself in the name of development through the story.

Conclusion:

Ruskin Bond is commonly respected as an author of short stories. The portrayal of nature in his books is very appealing. He always hated cities which are like a concrete jungle. He takes us around the unexplored and the mythical Himalayas where human life rejoices in an idyllic paradise. The trees, birds, mountains, streams and the somber people add to the mysticism of mountain life. He has a simple outlook on life as a result of the natural beauty. A true son of Indian soil, Ruskin Bond investigates in his writings the relationship between humans and other living things while being impacted by a variety of ecological concerns. In his 2009 book *'The Room of Many Colours'*, he quotes,

"For every tree that's felled, we must plant two. Otherwise, one day there'll be no forests at all, and the world will become one great desert." (Bond, 2009)

In short we all must understand that, you have to show mercy to nature or nature will not show mercy to you. Otherwise it will not take long for everything to be destroyed. Taking care of the entire nature has become the primary need of today and if it is not done, it will be difficult for the coming generation to survive.

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THE ROLE OF ENVIRONMENT IN ECONOMIC GROWTH

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ABSTRACT

Environment is most important for development and the growth of every sector. Hence, economic growth is also depending on environment. Environmental degradation not only affects human resources but also productivity, intellectual activity, survival of humanity and many more factors. Environmental damage results in depletion of ozone layer, which in turns increases global warming and ultimately various hazardous effects can be observed. Which are curse for economical growth Bad impact of Environmental degradation can also be seen on various species on earth. Deforestation is one of the reasons of environmental damage. Hence, planting as many trees as possible, Avoiding for quailing global warming, Controlling manmade disasters for Saving environment & ultimately saving Society are some of the ways to control environmental damage, Hence, favorable environment is very essential for economical growth as economic growth & environment are co-factors. By observing various factors, the ultimate way for achieving economic growth and development is saving environment.

Keywords:*Economic Growth, Environment Development, Global Warming, Small Species & Animals, Societies, Controlling the Disaster &Saving flora-fauna.*

Introduction

Today the economic growth of a country is depended upon the environment social environment political environment as well as the economic environment and environment of the globe as well as environment of the society atmosphere etc so that this all will contribute in the economic development as well as the economic growth of a country because whenever the particular circumstances will not be suitable for development of a particular sector it will not take place well because the other factors as like the environment is most favorable as well as important for development and the growth of that particular sectors.

Objective

Environment in economic growth is very important topic as the environment is very favorable for all type of development that may be economic political as well as socials because society are surrounded by environment and Environment degradation particularly the soil water and air are affecting the human resource as well as their productivity and intellectual activity also where as the environment is very important for survival of the humanity survival of the company growth as well as survival of the habitats natural habitats also the small Species animals as well as the surrounding peoples also depended upon the environments and it is favorable that every insect every kinds of peoples are supportive in the development of a country the ozone layer is the main factor for survival of the globe if the Environment degradation remain continuously hazardous and become becoming deteriorating situation of our environment then what will happens that global warming will increase automatically and then rainy seasons as well as the water requirement will be affected , situation of drought like condition will come fourth and the farmers will face the lot of problem for taking their productions so Environment protection is very important for the total development as well as growth of initials the environment is very favorable how the political situation as well as situation of a country as the environment is very important for social economic as well as all type of productive activities as like agriculture as like company enterpreurship may be.

Demerits

The environment protections wrong effect is very degrading natures for example hazardous gases hazardous waters as well as sewage as well as the degraded fumes as well sewage wastages as well as the plastic are more

degrading for the environment for example flora as well as small species and animals as well as the human resource also affecting the environment for the economic developments so environment is very protected natures and it also saves the small species flora fauna as well as the small insect which is very important for the growth of this globe as well as the protection of environment so environment protections should be legalise it should save the whole human resource as well as the small species also which is very important for protecting the environment there is lot of lot of degradation or continuously going on mainly most of the companies are pouring out the sewage into the rivers flowing out the most of the wastage into the social water bodies for example medical equipments and medical stages of taking into the rivers and that's why degradation are taking places into the Environment.

Importance

Saving the societies very important as the society is depended up on the companies in growth and development of a particular economy development of economy environment is very important for favorable situations if the environment is very favorable than the economic activities will flourish the productivity of a particular labors as well as human resources as well as the productivity of a particular ingredient natural resources as well as the raw materials will increase automatically otherwise the environment is affected then the productivity as well as the efficiency will effect on the human resource and if human resource is very degraded then the productivity as well as the quality will affect automatically and if the quality and the quality and productivity will affect it will naturally the growth and development will environment is very protective nature and it is very important for the saving the life of a company as well as the human society and the another important very important things regarding environment is that the total cost will not increase if the lot of productions and the prices of the company prices of the humans and materials will fall down and at the low materials are there the total cost of production will be very less and total cost of production is very less growth as well as the profit will increase and total growth and development of a company will take place.

Global Situations

Today at the global level various countries are cutting the trees as well as the erecting the cement jungles as well as the urbanizations of villages as well as road development company creations also taking the lands of a forest and if the forest becoming less and less the extra Oxygen will not come into the environment and if the Oxygen will not come into environment that environment pollution will take place and environment effect the society with wrong effect and it will be very effective for the rainy seasons various type of droughts as well as wetland output will come for and farmers as well as the small enterprises will affect the business and it will affect the economic development and the growth today diseases also and most of the poor countries one country to another country and another country to another country making the global situations very effective so it should be control and it should be very stopping nature today Environment protection is very nature so that populations is main factor effect to importance by the increase if the increase of population are growing the requirement of the basics needs will increase but the land as well as the native will be very less of population the lands as well as habitats will be finish and it should be very clear Environment protection will be very dangerous situation

Action

Today the Environment protection act the laws and the various rules and regulations are not efficient or not sufficient for the production of the environment but the awareness of the society awareness of the companies as well as various ethics and social media as well as the environment education is very important for the awareness of the people so that they will not declared the environment and the good environment at the good functionality will save for the another space so that next generation will see the first type of situation so which is

not will be existed for them for existence of such environment as well existence of such type of peoples should protect the environment so that the most of the space is most of the important monuments most of the human resource also most of the intellectual peoples also traditional process traditional culture old culture old society will survive otherwise the environment will bad environment degrading environment will all finish from this countries as well as globe also this is the ultimate warning for the future generation that is very important.

Scope of Environment for Economic Development:

1) **Education Sector:** Today environment education are spreading most among the students as well as most of the higher education are also providing education towards the environment protection awareness but the projects rules regulation and practical Education is needed for it.
2) **Sustainable Development:** Whether the prevailing resources will service for future for next generation will the sustainable development take place or not if it will not then we are in danger position and we should change it for sustainable development controlling the environment degradation.
3) **Controlling the Disaster, Drought:** The rainy flood, dry draught, wet draught as well asthe,cloud bursting is very dangerous for economic development it finish the all economic activities special farming and farming is base of economy.
4) **Calamities & Danger:** Natural calamities like**s**unami, earthquake as electrocution as well as danger for dieses is degrading nature for economic development.
5) **Global Economy:** Global economy depended upon the economic development of a particular country if the country is not flouring well the global trade will not take place.
6) **Controlling the viral Dieses as like Covid:** Viral dieses is gift for the human from its actives which come for degradation of soil water gases and plant trees and day to days of activities and factories pollution of water bodies.
7) **Global Warming:** Global warming is also another gift of the environment degradation if the global environment of favorable situation for its survival will finish it will automatically show the sign for global warming the plants trees flora fauna small species and oxygen is needed for global warning protection.
8) **Saving Flora Fauna and Culture for next generation:** it is very important for sustainable development every natural situation as small species is important as it continues the life cycle

and protect the environment by their ways.

9) **Science, Technology and Export:** The Environment is very important for science technology and export as well as also as the technology is not update the export to globe will not take place,
10) **Physical Infrastructure and Small Business Development:** The physical infrastructure and small business is today's need the small entrepreneurship can increase the employment at lot and create the balance of economic development and growth of business among all population which is very important for monitory situation a as the people having high standard of living the purchasing power will increase and economic development take place.

Conclusion

The Economic growth and environment is co-factor for economy and though one is affected the other side effect is observed so for economic growth and development the favorable economic development the favorable environment is essentials so that the agriculture sector as well as industrial sector and the natural resources and last but most the rains and natural calamity and natural environment is essential for development of overall growth and so for economic growth the favorable environment is essential.

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STUDY OF GAS SENSING PROPERTIES OF SnO2 DOPED WITH TiO_2

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ABSTRACT

TiO_2 skinny film was deposited onto n-Si substrate at a 100 °C by employing a sputtering methodology, and therefore the film was hardened in air atmosphere at vary of 500 °C– 1000°C. The structural and morphological properties of the all films were investigated by X-ray diffraction and atomic force magnifier. The gas detector with interdigitated platinum electrodes was invented with photolithographic techniques using the as-deposited and hardened TiO_2 skinny films as a lively material. The sensitivity of the detectors decided by fixing the conduction of the sensormaterial underneath gas gas with numerous concentration completely different operating temperatures. It had been determined that the invented detector victimization as-deposited TiO_2 thin film with 10-nm particle size has high sensitivityand quick response/recovery time. The detector operated at 50°C had conjointly sensitive to the methane gas and its detection performance multiplied with temperatures. it had been discovered that the fabricated sensors exhibited stable results. [1]

Introduction

Tin(IV) chemical compound, conjointly called metal chemical compound, is that the compound with the formula SnO_2. The mineral style of SnO2 is termed mineral, and this can bethe main ore of tin. With several different names,this chemical compound of tin is Associate in Nursing importantmaterial in tin chemistry. it's a colourless, magnetism, amphoteric solid.

Titanium dioxide (TiO2)

Titanium dioxide nanoparticles, additionally known as ultrafine pigment or nanocrystalline pigment or crystalline pigment, are particles of pigment (TiO_2) with diameters but 100 nm.Ultrafine TiO_2 is used in sunscreens thanks to its ability to dam actinic ray radiation whereas remaining transparent on the skin. it's in mineral crystal structure and coated with silicon oxide and alumina to forestall photocatalytic phenomena. The health risks of ultrafine TiO_2 from dermal exposure on intact skin square measure thought of very low, and it is considered safer than alternative substances used for actinic ray protection.

The TiO_2 nano-particles are space of interest thanks to their distinctive technological properties and applications like memory devices, sensors, photograph chemical change and solar cells Nanostructure TiO_2 has been investigated as a prospective material for dye-sensitized photovoltaic cell (DSSC) during this manuscript, we tend to reportable solely potency of the TiO2 thin film based mostly photovoltaic cell. The nanostructures TiO_2 exists in 3 polymorphic part viz. rutile, anatase and brookite. Amongst these 3, anatase & mineral are most thermally stable phases of TiO2Anatasestructure of TiO_2 belongs to D144h-P42/mnm area group(lattice constant a = zero.4584 nm, c = 0.2953 nm, c/a = 0.664),while mineral structure belongs to D194h-I41/amd area group(lattice constant a = zero.3733 nm, c = 0.937 nm, c/a = 2.51) These 2 structures have nice importancein the preparation of dssc, thanks to its high surface area. TiO2nanoparticles take up a lot of amounts of dye molecules, which ends into the rise gauge boson to current conversion potency, as a result of a TiO_2 nanoparticles-coated photoelectrode sometimes has higher transparency, that cause to transmission of a big quantity of actinic ray, the smaller particle size of the TiO_2 nanoparticles solely permits negligible quantity of sunshine scattering .The several technique for preparation of nanocrystallite titania ar well reportable, most of them happiness to wet chemical technique. the advantages of the wet chemical technique are well studied .The best decisions of wet chemical ways ar hydrothermal and sol–gel . The Sol–gel technique is that the easy, economical, and accomplished and most frequently used ways of synthesizing

TiO_2nanoparticles. The sol–gel method provides accessibility for synthesizing TiO_2 nanoparticles with totally different morphologies like sheets, tubes ,particles, wires, rods, mesoporous and aerogels. The main aim of gift study is to synthesize the TiO_2 nanoparticles through hydrolysis method of metal (IV) isopropoxide and examine gauge boson to current conversion potency of the ready film.we synthesized TiO_2 nanoparticles through the chemical reaction method of metal (IV) iso- propoxide, that was followed by. [4] Self-hydrolysis of metal (IV) iso- propoxide is one in every of the effective processes to synthesize TiO_2 crystalline powders byone step. The Synthesized TiO2 nanoparticles properties werestudied through XRD, FE-SEM, and UV-Visible spectrum analysis and DSC-TGA characterization techniques. [2,3]

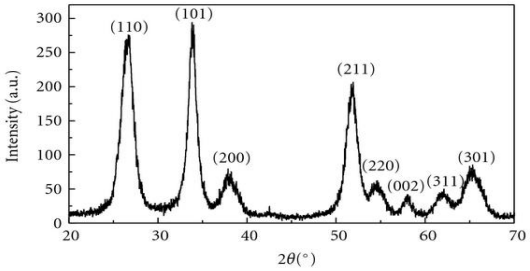
Experimental Section

titanium tetra iso- propoxide [Ti(OCH(CH3)2)]4, Sigma-Aldrich, 97%], iso-propanol [(CH3)2CHOH, Sigma-Aldrich,99.7%] and acid [HNO3] were used as received with none more purification. A 20 metric capacity unit of resolution Ti characin isopropoxide was additional drop in drop into the twenty two metric capacity unit of resolution containing 10ml of iso-propanol and twelve metric capacity unit deionised water underneath constant stirring at 80º C into the into the round bottom beaker. After 1 h, concentrated HNO3 (.8 ml) mixed with deionised water was additional into the TTIP solution and keep it underneath constant stirring at 60 ºC for 6 h extremely viscous sol gel was obtained. The ready sol- gel was heated at 300ºC for two h within the open atmosphere. when hardening, the TiO_2 nanocrystalline 2g powder was obtained. more preparation of TiO_2 film, the ready powder was added within the quantitative relation of 1:10 of the answer of iso-propanol. The TiO_2 nanoparticles deposited on titanium substrate (0.5 cm2) mistreatment the dip coating methodology. Further optical studies, The TiO_2 film were ready on the 2 glass substrates. The crystallite structure of the TiO_2 powder were evaluated by AN X-ray diffractometery [6] (XPERT-PRO, 2 Ajay Sharma, R.K. Karn, S.K. Pandiyan Journal of Basic and Applied Engineering analysis (JBAER)Print ISSN: 2350-0077; on-line ISSN: 2350-0255; Volume one, variety 9; Gregorian calendar month, 2014PW 3071/xx Bracket) mistreatment cu mountain peak radiation, moreover the grain size of TiO_2 was calculated by Scherrer's formula. The particle copper and nanostructure of particles were studied by a emission scanning microscopy (FE-SEM, Jeol,jsm 6701 F).[7,8] The absorbance and transmittance spectrum was obtained for the nanocomposite coatings within the wave length vary of 200–1200 nm through a UV–Visible photometer by employing PerkinElmer lambda-35.DSC-TGA studies were examined through TG- DTA SDTQ600 instrument used by metal instruments (U.S.). DSCTGA studies were examined from 0 ºC to 1000 ºC with a heating rate 10 ºC/min [5]

Results

The structural analysis of TiO_2 particles was dole out exploitation XRD instrument. The diffractograms were recorded within the 2_range of 10-80º. Figure 1 shows representative XRD patterns taken from Sol residues heated at 300º C for 2h. The crystalline nature was determined within the powder XRD ofTiO2 TiO_2 and optical phenomenon peaks belong to mineral and anatase part of TiO2The broad lines were comparatively broad representing nano size crystal. The XRD patterns exhibited diffraction peaks at 25.44º, 36.16º, 47.91º and 54.43º, 63.4ºindicating TiO2 in anatase part with the corresponding (101),(103), (200) and (105), (204) planes respectively. The peaks observed at 27.47º, 41.20º, 56.62º, 69.35º indicating TiO_2 in mineral part with the corresponding (110), (111), (220) and(301) planes severally. All determined peaks are in smart agreement with the quality spectrum (JCPDS no.: 21-1272 and 21- 1276). Average particle size was calculable by victimisation scherrer equation. Grain size D = .wherever 9 = metallic element Go dwin Austen radiation Wavelength 1.549Aº

K =form issue, The Avg. particle size was calculated to be around 15 to 20 nm.



XRD Graph for TiO2 powder (300 ºC).

Further structural study of the ready TiO_2 powder was studied victimization FE-SEM image analysis. The fig. (a) and (b)shows the FE-SEM pictures of synthesized TiO_2 powder, which his heated at 300 ºC. From FE- SEM pictures aggregative spherical TiO_2 particle size was obtained ~25 nm. the dimensions obtained in FE-SEMis considerably beyond that calculated victimization the Sherrer formula. The FE-SEM pictures show the high degree of crystallinity of the TiO_2 nanoparticles. The FE-SEM image as shown in fig. (b), Particle was found spherical in form and surface morphology was found solid in specific regions. The agglomeration of the particles was seen within the FE-SEM pictures

Conclusion

Figure 4.1 shows the XRD spectra of the TiO_2 films, as deposited, when tempering at 500◦C for 24 h, and doping with totally different Co ratios. As deposited samples are basically amorphous and characteristic peaks are detected adore Titania anatase section when tempering at 500◦C for 24 h. The films are in anatase crystalline state with a discriminatory orientation of (101). (200) and (211) peaks additionally appeared within the tempered samples that confirm the anatase crystalline state. Intensity of the optical phenomenon peak (101) decreases and also the other two (200) and (211) peaks disappear with the doping by Co ions that reveals the Co ions getting in the structure and substitutes for Ti and crystalline structure distorts a lot of anymore with the rise of Co quantity within the resolution.

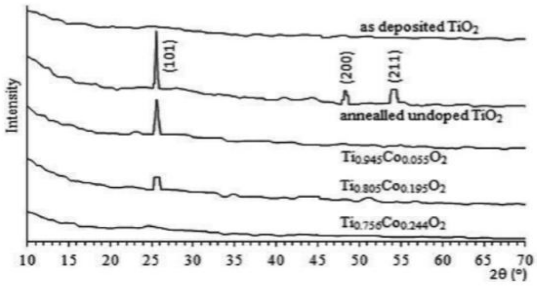


Fig. XRD patterns of anatase Ti02 films as deposited, annealed and doped.

Estimation of the typical grain size in TiO_2 film as applied victimization the complete dimension ties of SnO_2 doped with TiO2 fifty-three at [*fr1] most (FWHM) values of the (101) peak (Fig. 2) and also the Deb ye–Scherrer formula Here is that the wavelength (= 1:5405 Å for metal K), D is that the angular line dimension at half most intensity and is that the general angle. These calculations showed that the average grain sizes of the tempered TiO2 and Co doped TiO_2 (Ti1 xCoxO2for x = 0:055) structures were thirty-four.5 nm and twenty.7 nm, severally. So the doping of Co (for x = 0:055) within the TiO_2 film stimulates the formation of Ti0:945Co0:055O2 with smaller average grain size than that for the TiO_2 film. Supported XRD knowledge, we determined the lattice constants a and c of tempered TiO_2 sample to be three.7692 Å and 9.1870 Å, severally.

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A STUDY ON SOME CHEMICAL PARAMETER OF ADOL DAM IN WASHIM DISTRICT

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ABSTRACT

Water is a crucial substance for all living organism, it is integral part of living world. Water is an organic, transparent, bland, neutral and nearly colorless chemical substance which is the main constituent of Earth hydrosphere. The chemical formula is H2O meaning that each of its molecules contains one oxygen and two hydrogen atoms connected by covalent bonds. The different water parameters such as Dissolved oxygen, carbon dioxide, carbonate, bicarbonate, were studied during the study period June to September 2022. The mean and standard deviation recorded on the different site during the study period. The observed chemical conditions are reported to be suitable for planktonic and fish growth. The water quality of Adol dam is best for human consumption. According to agricultural needs the water quality most favorable to plant growth and productivity.

Keywords:*Dissolved oxygen, carbon dioxide, carbonate, bicarbonate.*

Introduction

Water is a crucial substance for all living organism, it is integral part of living world. Water is an organic, transparent, bland, neutral and nearly colorless chemical substance which is the main constituent of Earth hydrosphere. The chemical formula is H2O meaning that each of its molecules contains one oxygen and two hydrogen atoms connected by covalent bonds. Due to human and mechanical exercises the ground water is sullied. Typically, the genuine issue presently a day. In this way the analysis of the water quality is exceptionally vital to protect and administrator the common eco framework. (Dohare, Deshpandeand Kotiya,2014).

Limnology

The limnology in which the study of physical, chemical parameters and biological study of any water body.Aimed to assess the water quality and its interaction with biotic and biotic factors, limnology investigations used on water bodies. The pH and dissolved oxygen are parameters of chemical characteristic of water quality and also to study another physical and chemical parameter of water bodies. Seagoing biodiversity is threatened essentially by human mishandle and fumble of both living assets and the biological systems that back them. Most of the lakes are getting contaminated due to residential waste, sewage, mechanical and rural effluents, (H. V. Wanjari, 2016).

Chemical Paremeter

Oxygen dissolved in water is a very vital parameter in water analysis as an indicator of the physical, chemical and biological activities of the water body. The two-primary source of broken-down oxygen are dissemination of oxygen from the discuss and photosynthetic movement. Dissemination of oxygen from the discuss into water depend on the solvency of oxygen, and is affected by numerous other figures like water development, temperature, saltiness, etc. Photosynthesis, a natural wonder carried out by the autotrophs, depends on the tiny fish populace, light condition, gasses, etc. Oxygen is considered to be the major restricting calculates in water bodies with natural material. Hardness is overwhelmingly caused by divalent cations such as calcium, magnesium; antacid soil metal such as press, magnesium concentrations, both communicated as $CaCO_3$ in mg/L. Carbonates and bicarbonates of calcium and magnesium cause brief hardness. Sulfates and chlorides cause changeless hardness. The nearness of chloride in normal water can basically be credited to disintegration of salt stores within

the frame of particle (Cl^-). Something else, tall concentration may shows contamination by sewage, mechanical squanders, interruption of seawater or other saline water. It is the major frame of inorganic anion in water for oceanic life. High chloride substance encompasses a pernicious impact on metallic channels and structures, as well as rural plants. They are calculated by Argent metric strategy. Natural oxygen request (BOD) is the sum of oxygen required by microorganism for stabilizing naturally decomposable natural matter (carbonaceous) in water beneath oxygen consuming condition. The test is utilized to decide the contamination stack of wastewater strategies. 5-Day BOD test being a bioassay method (included estimation of oxygen expended by microbes for debasing the natural matter beneath oxygen consuming condition) requires the expansion of supplements and keeping up the standard conditions of pH and temperature and nonattendance of microbial development restraining substances. The carbonate is defined as quantitative capacity to neutralize an acidic solution, the alkalinity to natural waters is mainly imparted by three predominant bases; carbonates (CO_3), bicarbonates (HCO_3) and hydroxides (OH). Thus, alkalinity is estimated as total or due to individual base. pH range produced by bicarbonate ions is indicated by the methyl orange. The sample containing HCO_3 when titrate against an acid (0.02N H_2SO_4), the quantity of acid required to reduce the pH from alkaline to acidic direction, is proportional to the strength of HCO_3.

Review of Literature

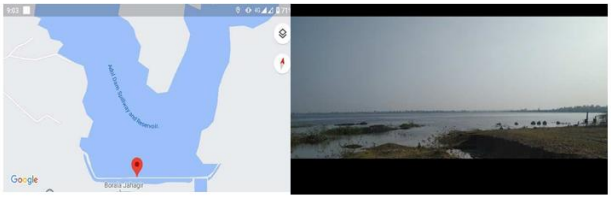
Tandale M.R. and D.S. Dabhade (2014) studied the physic-chemical parameter of loner lake in India. The cavity physical setup, its relative topographical and environmental confinement has advanced limnological status in a one of a kind ways. Limnological aspect of Kurala Dam of Washim district, Maharashtra were studied by Wanjari H.V.(2016). water quality parameter of ground water were analyzed by Devendra Dohare, Shriram Deshpande and Atul Kotiya(2014)studied 27parameters such as pH, color, electrical conductivity, alkalinity, hardness, calcium, chromium, zinc, manganese, nickel. U.E. Chaudhari (2014) analyzed physic-chemical parameter of dam water in different site around warud region. M. N. Uddin, M. S. Alam, Mobin M. N. and M.A. Miah (2014) studied water quality parameter of Jamuna river. A number of physiochemical water quality parameters counting Temperature, pH, EC, TDS, DO, BOD, COD, Nitrate (NO2- and NO3-), Ammonia, Sulphates, Chlorides, and Calcium were measured in research facility base investigation. N. S. Thakare, Bhagat S.D. And R.M.Jumale (2015) studied physico-chemical parameter and seasonal variation in Poha dam reservoir. the quality of dam water is in spite of the fact that fit for domestic, irrigation reason additionally for drinking reason after a few treatments require nonstop observing of physico-chemical parameters to make strides the quality of water. Mahajan V.S. and S.S. Pokale(2017)analyzed physico-chemical parameter in Mahabala lake close to Bhadravati, district Chandrapur. lakes perform the capacities specifically related to their physical, chemical and organic keenness to choose quality status of water. ZubiaMasood, Hameed Ur Rehman, A.B Baloch, Noor Ul Akbar, Muhammad ZakirIrumGul, NailaGul, NeloferJamil, Nighat Din, BibiAmbreen, IrfanaShahid, Tauqir Ahmad, Tilawat Shah Muhammad Masab and Abdul Haseeb (2015) studied sediment collect from Rawal dam in Islamabad and also analyzed physicochemical parameter of water. Water quality of Rawal dam Islamabad is helpful for both aquatic life and household purposes. Physicochemical parameters of soil were too inside the typical extending.

Materials and Methods

Site selection:

Borala dam are the site selected for to check water quality chemical parameter. The official name of Borala dam is Adol dam. The dam is Earth fill dam. The water source of dam is Adol River and hence also called Adol dam. The height of dam is constructed as 18.47 m (60.60 ft). The length of dam is 1725 m (5,659

ft). The total surface area is 3,141km^2. The volume of dam is 479 km^3.



Dissolved oxygen (DO) (Winkler's method)

Principle:

When Winkler's A (MnSo or $MnCl_2$) and Winkler's B (strong alkaline iodide azide) are added to a sample, Mn ($OH)_2$ is formed which reacts with DO to form bron ppt. of Mn $(0H)_3$. On acidification the liberated iodine which is equivalent to original DO in the sample, is titrated against N / 80 Hypo ($Na_2S_2O_3$) (Winkler's C)with starch as indicator.

$MnCl_2$ + 2NaOH = 2 NaCl + $Mn(OH)_2$

$Mn(0H)_2 + H_2O + 1/2\ O_2 = Mn(0H)_3$

$2Mn\ (OH)_3 + 2KI + 6HC1 = 2\ MnCl_2 + 2KC1 + 6H_2O + I_2$

Procedure:

1. Fill 300ml BOD bottle with water sample. Add 2 to 3ml of Winkler's A and Winkler's B.
2. A brown ppt. will be formed. Allow it to settle, (it could take 5 to 10 minutes. Keep the bottle away from the direct exposure to light).
3. Dissolve the brown ppt. by adding minimum quantity (add every time a few drops) of the acid so as to dissolve the ppt. by inverting stopper bottle.
4. Sometimes black brown flakes are formed in the case of highly turbid.
5. water which does not dissolve further. Take supernatant clear brown colour sample for titration in this case.
6. Titrate 100 ml of the sample against Hypo with starch as the indicator (it is better to add the indicator half- way through the titration when the brown colour starts fading).
7. End point - Blue colour just disappears.

Calculations:

1 ml of Hypo = 0.1 mg of DO

DO in Mg / L = 0.1 X ml of titrant X 1000 /100

Carbon dioxide (CO_2)

Principal

The sample containing free CO_2in the form of $H_2CO_3$is titrate against an alkali (0.22N NaOH) and resultant change in pH from acidic to neutrality to alkalinity is detected by phenolphthalein.

1 ml of 0.2272 N NaOH= 1 mg of CO_2

Procedure:

1) In 500 ml sample add a few drop of phenolphthalein indicator. Development of pink color indicates absences of CO_2.
2) If sample remains colorless (sample is acidic due to the formation ofH_2CO_3 titrate against 0.2272 N NaOH).
3) End point: Pink colour develops.

Calculation:

Free CO_2 mg/L= ml titrant × 1000/ml of sample

Bicarbonates (HCO3) or methyl orange alkalinity:

Principal: pH range produced by bicarbonate ions is indicated by the methyl orange. The sample containing HCO3 when titrate against an acid (0.02N H2SO4), the quantity of acid required to reduce the pH from alkaline to acidic direction, is proportional to the strength of HCO3.

Procedure:

1) The 50 ml sample after estimation of CO_3, is used for determination of HCO3 or Methyl orange alkalinity.
2) In the sample add 2 to 3 drops of methyl orange and titrate against 0.02N H2SO4.
3) End point: Yellow to orange.

Calculations:

HCO_3 alkalinity mg/L= ml titrant into 1000/ml of sample.

= ml titrant into 20 mg/L.

Carbonate (CO3) phenolphthalein:

Principal:

The acid titrant (0.02N H2SO4) converts carbonates into bicarbonates effectively reducing pH neutrality. The reduction in pH proportional to the strength of CO3 is detected by phenolphthalein.

Procedure:

1. In 50 ml sample add 2 to 3 drops of phenolphthalein. Development of pink colour indicates absences of free CO2 and alkalinity due to CO3 and OH.
2. Titrate the sample against 0.02N of H2SO4.
3. End point: Pink to colourless.

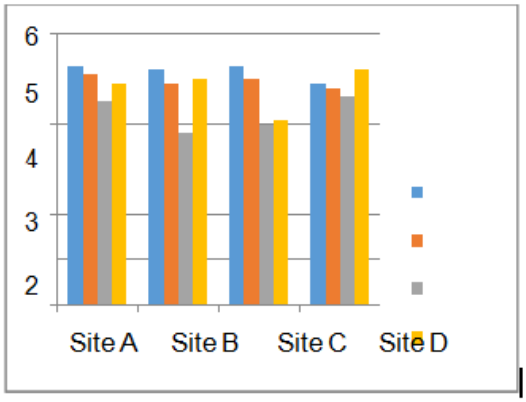
Calculation:

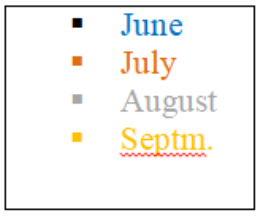
1 ml of 0.02 N H_2SO_4= 1 mg of $CaCO_3$.

CO_3 alkalinity mg/L = ml titrant into 1000/ml of sample.

= ml titrant into 20 mg/L.

Result and Discussion





Chemical parameter studied on water sample. The different chemical parameter studied such as dissolved oxygen, carbon dioxide, carbonate, bicarbonate. The above parameter studied on water sample of Adol dam in Washim district in Maharashtra. The study period month June to September 2021-22 was selected.

Dissolved oxygen (DO):

During study period, the dissolved oxygen was found in the range 3.8 to 5.3. The maximum value recorded at June at the site A and site C was 5.3 mg/l and the minimum value were recorded at august on the site B. table-I show the comparative study of dissolved oxygen value recorded in given water sample during study period, and below table show the comparative study of dissolved oxygen..

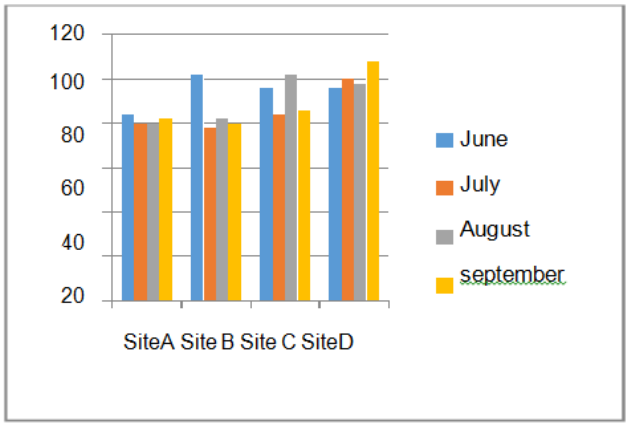
Dissolved oxygen	Site A	Site B	Site C	Site D
June	5.3	5.2	5.3	4.9
July	5.1	4.9	5.0	4.8
august	4.5	3.8	4.0	4.6
September	4.9	5.0	4.1	5.2

Carbon dioxide (CO_2)

Carbon dioxide present in various form depend upon the biological factor and pH. The free co_2 convert to carbonate and bicarbonate with rise in the pH. During study period the carbon dioxide present in very less amount or absent in Adol dam.

Carbonate or phenolphthalein alkalinity (CO_3)

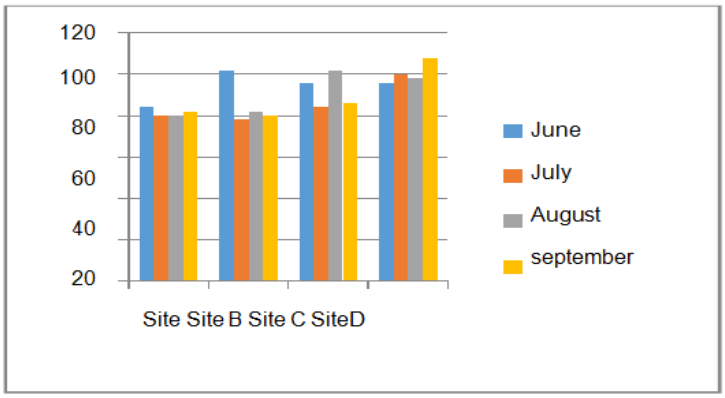
During study period June to September on the Adol dam, the carbonate value was found to be range between 12-34 mg/L. The maximum value of carbonate was found to be 34 mg/L on the site D in September and minimum value was found to be 12 mg/L on site C in June.



Carbonate	Site A	Site B	Site C	Site D
June	24	20	12	20
July	18	24	16	20
August	20	16	18	24
September	24	26	18	34

Bicarbonate or methyl orange alkalinity (HCO_3)

Carbon is present in the form of bicarbonate (HCO_3). During the study period on Adol dam, the value of bicarbonate was found to be range between 78-108 mg/L. The maximum value was found to be 108 mg/L on the sampling site D in the month September and the minimum value was found to be 78 mg/L on the site B in the month July.



Bicarbonate	Site A	Site B	Site C	Site D
June	84	102	96	96
July	80	78	84	100
August	80	82	102	98
September	82	80	86	108

Mean and Standard deviation

The mean value and standard deviation value of the parameters studied in the study period June to september was recorded on the different site. The mean and standard deviation value of the given data shown in the following table.

Parameter	Site A	Site B	Site C	Site D
Dissolved oxygen	4.95 ±0.3415	4.72 ±4.4347	4.6 ±0.6480	4.87 ±0.25
Carbon dioxide	Abs	Abs	Abs	Abs
Carbonate	21.5 ±3	21.5 ±4.4347	16 ±2.8284	24.5 ±6.6080
Bicarbonate	81.5 ±1.9148	85.5 ±11.1205	92 ±8.4852	100.5 ±5.2599

Conclusion

The observed chemical conditions are reported to be suitable for planktonic and fish growth. The water quality of Adol dam is best for human consumption. According to agricultural needs the water quality most favorable to plant growth and productivity.

Adol dam wetland provides food, shelter and breeding places to many birds. The fishery potential of Adol dam is good and there is suitable amount of food available for their growth, the physico chemical parameter are suitable for fishery.

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THE STUDY OF THE ROLE AND CHALLENGES OF GREEN MARKETING IN INDIA

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ABSTRACT

Today the whole world is sitting on the landfill of environmental pollution. Everyone is very concerned about the harm caused by environmental pollution. Considering the concern of every person, traders in India not only expressed their concern about environmental pollution but also started making their products in such a way that they do not harm the environment in any way. Along with this, efforts are being made to make the packaging of many products in India eco-friendly. Along with this, the Government of India is trying to make people aware of the danger of environmental pollution. Traders in India are adding greenery i.e. such green items in their marketing so that people's attention can be attracted to it. This type of marketing is known as green marketing or eco marketing. This type of marketing in India has yielded very good results. Environmental awareness has also increased among the people. People have started taking interest in green marketing. This research paper has been written to study the role and challenges of green marketing in India.

Keywords:*Green Goods, Green Marketing, Eco Marketing, Environmental Pollution, Eco Friendly*

Introduction

Green marketing was born between the **1980**s and **1990**s when industries began to express their concern about increasing environmental pollution. Green markets have become one of the most popular ways of doing business today, given the ever-increasing environmental conditions that have since been impacted by the deteriorating climate change. With the campaign of green marketing, companies of various products show their interest to save the environment and also show their efforts for environmental protection.

Green marketing is unique marketing in itself. In this type of marketing, the products are promoted among the people based on their environmental benefits. The main purpose of using the word green is that the products are produced without causing any harm to the environment and the material and packaging of those products are also environmentally friendly.

Green marketing is this type of eco-friendly marketing, where products and services are promoted based on their environmental benefits. Green marketing can also be defined as the marketing of eco-friendly products i.e. eco-friendly products. Which is not harmful to the environment and they are produced using eco-friendly production processes.

Green marketing is not just limited to advertising to attract customers, but it includes many important things such as producing eco-friendly products, using sustainable business practices, using eco-friendly packaging, and marketing campaigns. Creating that promotes environmental protection. Due to all these changes, green marketing becomes expensive marketing. Despite this, green marketing can prove to be beneficial for the company and can also provide a competitive edge over the competitors. The reason for this is that in today's era, most people have become very aware of the environment and they are becoming concerned about the damage caused to the environment. That's why such people like to buy eco-friendly products more. Are also ready to pay a little more to buy eco-friendly products. Green marketing is the right choice for marketing for an organization and it also has many benefits.

The Study of the Role and Challenges of Green Marketing in India

The Role of Green Marketing in India

The first and most important benefit of green marketing in India is that the reputation of the company or organization is increasing. Any organization or company needs a good image to earn good profits in the long run. A company not only attracts more and more

customers in the market with its positive attitude but also attracts business partners with its increasing credibility. Due to the cost of green marketing, not every company in India can afford to adopt this marketing. Therefore, to take advantage of this, the number of competitors of the company which is moving ahead in the path of green marketing is very less. Choosing an eco-friendly green marketing method may be costly in the beginning but it has proved to be profitable marketing in the long run. The main reason for this is that in the present time more and more people are preferring eco-friendly products and in the coming time the number of such people in India is likely to increase quadruple day by day.

Green marketing in India is opening new market doors for any organization or company. To produce and sell green products, companies have to change the production process of their products, and the materials used in the production have to be changed to make them environmentally friendly. Apart from this, it's packaging also has to be made eco-friendly. Greenmarket is a new market with less competition. Where Indian businessmen are getting an opportunity to enter new markets using green marketing.

It costs more to manufacture eco-friendly products in India. For this, the businessman has to keep the rates of his product high. Along with this, it is also necessary to keep in mind that the quality of its product should be very good. With this, people who want to buy eco-friendly materials do not hesitate to pay a little more money. In the beginning, it may take some time to recover the cost of the goods made with an eco-friendly system but after a time businessmen can get ahead of their competitors because people are facing the danger of environmental pollution and prefer to buy only eco-friendly products. And the number of such people is increasing day by day.

By adopting green marketing, there is a need to make the production process afresh and make changes in the raw material of your product in the form of eco-friendly material, then it is allows making Indian product innovation.

You are not only getting the benefit of earning money from green marketing, but you are also earning the benefit of protecting the environment from it. Today you are not only doing human service by protecting the environment and at the same time you are also doing a great job for the coming generations. Green marketing is having a positive impact on the environment and the health of individuals. Due to green marketing in India, people are preferring to buy pure products. Green marketing is minimizing the use of plastic and plastic products. Herbal products are being promoted due to green marketing in India and their popularity is also increasing rapidly. Green marketing has been having an impact on the market as well as it is also affecting agriculture. Farmers are using organic fertilizers instead of chemical fertilizers in the fields. There is no harm to the environment due to the recycling of the goods after use in the green market for packing etc. Measures to control environmental pollution are gaining importance.

The Challenges of Green Marketing in India

Green marketing is a new idea i.e., a new concept in India. People are not able to understand this concept quickly. It will take some time to understand and explain this. When people will come to know about the benefits of this green marketing and the benefits to the environment, then this concept will start becoming popular among the people and only then the benefits of green marketing will start getting. The kind of recyclable and renewable materials that green products require are very expensive. Not every company or product manufacturer can use it. Green marketing is not getting full support from established industries. People are not ready to pay the cost of more expenditure on green marketing. Most of the people of India are more attracted to foreign products. Research and development of green marketing i.e., research and development require huge investment. The production of herbal products is not given importance by most companies.

People in India are unaware of the importance of green marketing and people do not even want to know about it because they do not care about environmental pollution. Water purification technology i.e., water treatment technology is also expensive. There is a big problem with people ignoring green marketing.

Conclusion

Green marketing takes time to set up. Recycling is one of the best strategies to impact the cost of green marketing. Many big companies adopt this strategy and they are successful today. Not only this, but these companies also have a good reputation among the customers. For green marketing, the company should pay special attention to its packaging. In today's time when most people order goods online. In this, companies should use eco-friendly packaging. This will reduce the use of carbon-emitting plastics and packaging made of plastic. Those doing green marketing will have to make efforts differently from those doing other businesses. They also have to take some risks among the customers. All kinds of information will have to be given between them. At the same time, to build your credibility, you have to be completely honest and also adopt transparency in each of your strategies. Green marketing includes a wide range of activities, including product modification, production process changes, packaging changes, as well as modifying advertising. Green marketing refers to the process of selling products and/or services based on their environmental benefits. Such a product or service may itself be environmentally friendly or may be produced and/or packaged in an environmentally friendly manner. With green marketing, we can make our earth healthy and beautiful. If we do not adopt green marketing, then we will not be able to provide a safe place to live neither for ourselves nor for the generations to come.

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PHYTOCHEMICAL SCREENINGS OF HIBISCUS ROSA-SINENSIS L. FLOWERS EXTRACT IN POLAR AND NON- POLAR SOLVENTS.

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ABSTRACT

Hibiscus rosa-sinensis is a plant native to China. It is a shrub widely grown in the tropics as an ornamental plant and has many varieties with different colors of flowers. Red flower varieties are preferred in medicine. Many species of Hibiscus are grown for their attractive flowers or used as landscape shrubs. Hibiscus also has medicinal properties and is part of many herbal teas. The present study performed to explore preliminary secondary metabolites and active biomolecules such as TPC and TFC from flowers of Hibiscus rosa-sinensis. Extraction of flower in different polar and non-polar solvents naked that presence of flavonoids, phenols saponins, tannins and terpenoids.

Keywords:*secondary metabolites, TPC & TFC*

Introduction

Hibiscus rosa-sinensis is a plant native to China. It is a shrub widely grown in the tropics as an ornamental plant and has many varieties with different colors of flowers. Red flower varieties are preferred in medicine. The leaves and flowers have healing properties (Kurup et al., 1979; Nadkarni, 1954; Ali and Ansari, 1997). Flowers have been shown to be effective in the treatment of arterial hypertension (Dwivedi et al., 1977) and have significant anti-inflammatory effects (Singh et al., 1982; Sethi et al., 1986). Many species of *Hibiscus* are grown for their attractive flowers or used as landscape shrubs. *Hibiscus* also has medicinal properties and is part of many herbal teas.

The leaves and flowers of *Hibiscus rosa-sinensis* promote hair growth (Adhirajan et al., 2003). It has been reported that plants of the genus Hibiscus have the ability to provide biologically active compounds that act as antioxidants, as well as are cardio protective and are able to prevent the spread of malignant cells. Thus, *Hibiscus* descent as a provider of chemo inhibitory agents deserves additional evaluation. Therefore, *Hibiscus* sp. could be a great natural resource for the development of new drugs and could provide an effective tool for treating cancer and other diseases in the developing world (Maganha et al., 2009). In most of India, traditional people prefer whole herbs, leaves, stalks and roots for various ailments but flowers also play an important role in medicine (Shaikh and Pund 2014)

Material and Methods

Vigorous flowers of Hibiscus rosa sinensis were collected throughout flowering season from different locality of Nanded. Plant was taxonomically dissected and all floral characters were described and identified with the help of Flora of Marathwada (Naik, 1998). The herbarium voucher specimen deposited in Herbarium center of Botany PG Department, Yeshwant Mahavidyalaya, Nanded (MS).

Extraction of Plant Material

Petals of flowers were shaded dried, seldomly sterilized with $Hgcl_2$ to avoid microbial contamination. Dried biomass of petals coarsely grinded to fine powdered form using a blender (Bosch Pro 1000W Mixer) 100 gm of powdered form of dried biomass were used for extraction in polar solvent Viz., water and methanol and non-polar solvent Viz., chloroform and Hexane solvent, crude extract was concentrated in hot air oven and collected in Eppendorf tube in deep freezer at 4^0C for further bioassay.

Percentage Yield of Crude Extract

Soxhlet extraction was performed to extract crude bioactive compound from dried biomass of petals of Hibiscus rosa sinensis in different solvent as per their polarity Viz., water, methanol, chloroform and hexane respectively. The percentage yield of crude extract was determined by using formula. Percentage Yield = Final weight of crude extract / initial weight of dry Biomass of sample X 100. The obtained crude extract of the flower was transferred in the Eppendorf tube and stored at 4°C in the refrigerator for future bioassay.

Phytochemical Screenings

Preliminary qualitative phytochemical screening was analyzed by using standard protocol (sofowora 1993; Kokate1994; Harborne 1998;) with slight modification (Kharat and Shinde 2021)

Phytochemical Tests

1. Test for Flavonoids (Shinoda test): Take 2 to 3 ml plant extract, add few magnesium turnings and a few drops of concentrated hydrochloric acid and boiled for five minutes. Red coloration identifies the presence of flavonoids.

2. Test for Saponins (**Frothing/Foam test**): Three milliliters (3 mL) of the aqueous solution of the extract were mixed with 10 mL of distilled water in a test-tube. The test-tube was stoppered and shaken vigorously for about 5 minutes, it was allowed to stand for 30 min and observed for honeycomb froth, which was indicative of the presence of saponins.

3. Test for Tannins (Braymer's test): 2 to 3 ml of extract was treated with 10% alcoholic ferric chloride solution and observed for formation of blue or greenish color solution.

4. Test for Terpenoids (Salkowki's test): 2 ml of chloroform was added to 3 ml of each extract followed by a few drops of concentrated H_2SO_4. A reddish-brown precipitate produced immediately indicated the presence of terpenoids.

5. Test for Cardiac glycosides (Keller-Killani test): Add an aliquot of 5 ml of extract and its various fractions (10 mg/ml in methanol) in the sequence of 2ml glacial acetic acid and one drop of $FeCl_3$ solution. Then add concentrated 1ml H_2SO_4 to it. Formation of brown ring at the interface is a confirmative test for the presence of cardiac glycosides.

6. Test for Sterols (Liebermann-Burchard test): 1 to 2 ml of extract was treated with one to two drops of chloroform, acetic anhydride and concentrated H_2SO_4 and observed for the formation of dark pink or red color.

7. Test for Phlobatannins (Precipitate test): **W**hen 2 ml of extract was boiled with 1 ml of 1% aqueous HCl was taken, deposition of a red precipitate is evidence for the presence of phlobatannins.

8. Test for Alkaloids (Mayer's Test): Take one ml of extract plant sample and mix in 8 ml of 1% hydrochloric acid. Gently warm the mixture and then filter. Take 2 ml of the filtrate and treat separately with Mayer's and Dragendorff 's reagents. Observe for the appearance of turbidity or precipitate formation for the positive test of alkaloids.

Preparation of Maeyer's reagent: Dissolve 0.355 g of mercuric chloride in 60 ml of distilled water. Dissolve 5.0 g of potassium iodide in 20 ml of distilled water. Mix both the solutions and volume was raised to 100 ml with distilled water.

Preparation of Dragendorff's reagent: Solution A: Dissolve 1.7 g of basic bismuth nitrate and 20 g of tartaric acid in 80 ml of distilled water. Solution B**:** Dissolve 16 g of potassium iodide in 40 ml of distilled water. Both solutions (A and B) were mixed in 1:1 ratio.

9. Test for Phenols (Ferric chloride test): 1 to 2 ml of plant extracts was treated with aqueous 5% ferric chloride and observed for formation of deep blue or black color.

Quantitative Estimation of Total Phenols Content TPC:

The flower extracts were estimated for total phenol content by using Folin- Ciocalteu reagent with Galic acid as standard. The total phenol content was estimated according to method of (Bray and Thorpe, 1954). The oxidizing agent Phosphomolybdate present in the reagent Folin-Ciocalteu reacted with the substrate present in the flower extracts of different solvent produce blue color complex.

The reaction mixture contained 1 ml of extract of plant sample, 2 ml of DW, and 0.5 ml of Folin -ciocalteu reagent add 2 ml of sodium carbonate (20%). Allow reaction mixture for incubation for 1 min in boiling bath and after cooling, the absorbance was measured at 660 nm by using UV-Vis Spectrophotometer against blank reagent. The total no. of phenols was calculated by preparing a calibration curve using different dilutions of Gallic acid (0.5 mg/ml) and the unknown amount of phenolics were estimated as mg/gm of plant samples. The result was determined from the standard curve and was expressed as gallic acid equivalent (GAE) (mg/gm of the extracted compound) (Gacche and Dhole, 2011).

Quantitative Estimation of Total Flavonoids Contents TFC

The individual flower extracts were estimated for total flavonoid content by using the $AlCl_3$ method previously described by Chang et al., (2002). The reaction mixture contained 1 ml of flower extracts, 3 ml methanol, 0.2 ml of 10% of $AlCl_3$, 0.2 ml (1M) of potassium acetate, and 5.6 ml of DW was added. The reaction mixture was incubated for half an hour at room temperatureand absorbance was measured at 415 nm by using UV- Spectrophotometer. Quercetin (0.1mg/ml) was used for preparing the standard curve with serial dilution. The total concentration of flavonoids in individual flower extract was calculated using standard curve and the amount was expressed in quercetin equivalent mg/gm (Gacche and Dhole, 2011).

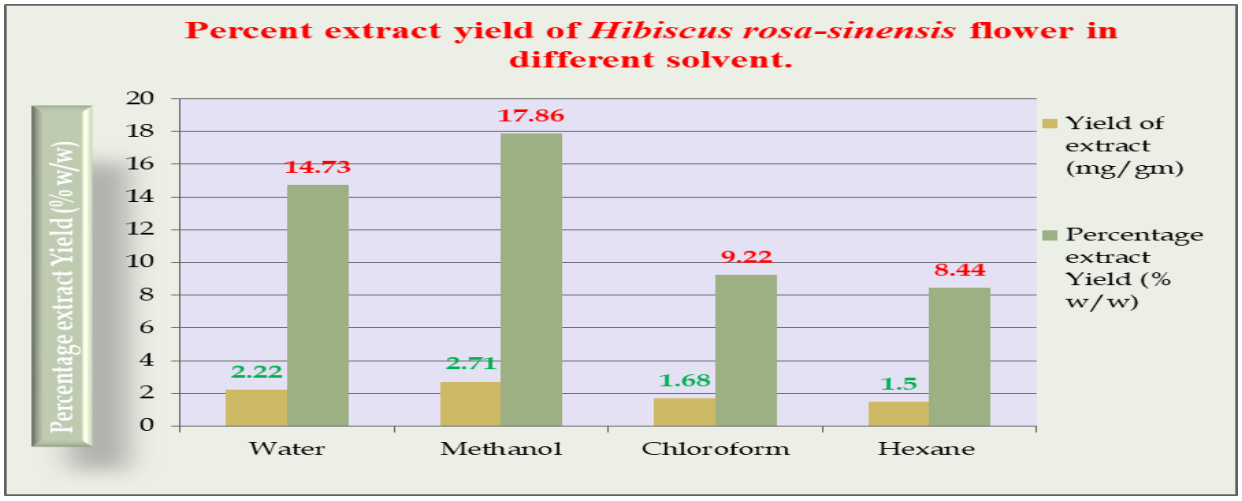
Results and Discussion:

The extracts of *Hibiscus rosa-sinensis* flower were prepared by applying four different solvents. The extract yield and percent extract yield of *Hibiscus rosa-sinensis* flower is presented in (% w/w) Table 1. The maximum percent extract yield of 17.86% w/w recorded in methanol extract of *Hibiscus rosa-sinensis* flower followed by water extract 14.73% w/w and chloroform extract 9.22% w/w. Hexane extract of flower exhibited the least yield (8.44% w/w). Graphical representation of extract yield and precent extract yield of *Hibiscus rosa-sinensis* flower in different solvent is depicted in Figure 1.

Table 1. Percent extract yield of *Hibiscus rosa-sinensis* flower in different solvent.

Sr. No.	Name of Plants	Solvents	Extract Yield (mg/gm)	Percent extract Yield (% w/w)
1	*Hibiscus rosa-sinensis*	Water	2.22±0.04	14.73±0.12
		Methanol	2.71±0.06	17.86±0.10
		Chloroform	1.68±0.14	9.22±0.21
		Hexane	1.50±0.09	8.44±0.12

Figure 1. Percent extract yield of *Hibiscus rosa-sinensis* flower in different solvent.



In all solvent extracts tested, methanol extract showed the highest concentrations of flavonoids, terpenoids, tannins and phenols content, followed by chloroform extract showed flavonoids, terpenoids and phenols content in high concentration than other contents. Water extract was found to contain flavonoids and phenols in high concentration while saponins and tannins were present in moderate concentration where as phlobatannin and alkaloids were found in low concentration. The terpenoids, glycosides and steroids were not found in water extract. Hexane extract was found to contain terpenoids in high concentration while flavonoids and phenol content were present in moderate concentration, others were found low in concentration whereas tannins, steroids and alkaloids were absent. The results of the qualitative phytochemical analysis showed that Hibiscus rosa-sinensis flower has good source of flavonoids, phenols saponins, tannins and terpenoids (Table 2)

Table 2.Qualitative phytochemical analysis of *Hibiscus rosa-sinensis* flower in different solvent extract.

Phytochemicals	**Test**	**Solvents**			
		Water	**Methanol**	**Chloroform**	**Hexane**
Flavonoids	Shinoda test	+++	+++	+++	++
Saponins	Frothing	++	++	++	+
Tannins	Braymer's test	++	++	++	-
Terpenoids	Salkowski	--	+++	+++	+++
Glycosides	General Test	-	++	++	+
Steroids	Lieberman-Buchard's	-	+	-	-
Phlobatannin	Precipitate test	+	-	+	+
Alkaloids	Mayer's	+	+++	++	+
Phenol	Ferric chloride	+++	+++	+++	++

Where: - Absent, + Present in low concentration, ++ Present in moderate concentration, +++ Present in high concentration.

The results of total phenolic content in *Hibiscus rosa-sinensis* flower extracts are shown in Table 33. Our results with the methanol extract showed significantly higher phenolic content in the flower extract of*Hibiscus rosa-sinensis*. The phenolic content in *Hibiscus rosa-sinensis* flower in methanol extract was 0.600 mg/ml followed by water extract 0.526 mg/ml, hexane extract showed 0.456 mg/ml. The chloroform extract exhibited least 0.448 mg/ml phenolic content. Graphical representation of total phenolic content of *Hibiscus rosa-sinensis* flower in different solvent extract is depicted in Figure 2.

The results of total flavonoid content of *Hibiscus rosa-sinensis* flower extract are shown in Table 34. Our results with methanol flower extract in *Hibiscus rosa-sinensis* showed a significant increase in total flavonoid content. Total flavonoid in methanol extract of *Hibiscus rosa-sinensis* flower was highest in all tested solvent extract 0.624 mg/ml followed by water extract 0.568 mg/ml and chloroform extract showed 0.478 mg/ml. The hexane extract exhibited least 0.423 mg/ml flavonoid content. Graphical representation of total flavonoid content of *Hibiscus rosa-sinensis* flower in different solvent extract is depicted in Figure 2.

When we compared total phenol content with total flavonoid contents in *Hibiscus rosa-sinensis* flower by using water, methanol, chloroform, and hexane extract with standard Gallic acid and Quercetin respectively, it was found that flavonoid content in water, methanol and chloroform extracts was found more on other hand in hexane extract showed least flavonoid content than phenol content.

Table 3: Total phenol content of *Hibiscus rosa-sinensis* flower (mg/ml).

Sr. No	Name of Plants	Solvents	Total phenol content (mg/ml)
1	*Hibiscus rosa-sinensis* L.	Water	0.526±0.0042
		Methanol	0.600±0.0014
		Chloroform	0.448±0.0083
		Hexane	0.456±0.0035
	Standard Gallic acid	Distilled water	0.995±0.0013

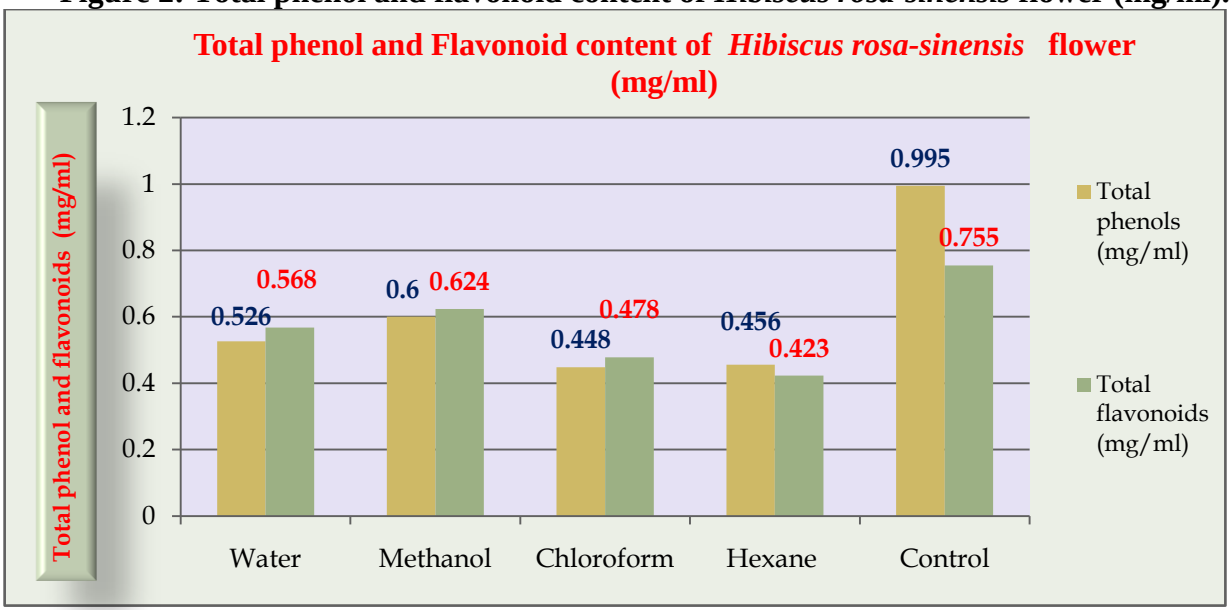
The values are mean of three experiments± SE. Statistical data shows a significant difference at ($P < 0.002$). SE: Standard Error.

Table 4: Total flavonoid content of *Hibiscus rosa-sinensis* flower (mg/ml).

Sr. No	Name of Plants	Solvents	Total flavonoid content (mg/ml)
1	*Hibiscus rosa-sinensis* L.	Water	0.568±0.0047
		Methanol	0.624±0.0086
		Chloroform	0.478±0.0033
		Hexane	0.423±0.0011
	Standard Quercetin	Distilled water	0.755±0.0015

The values are mean of three experiments± SE. Statistical data shows a significant difference at ($P < 0.002$). SE: Standard Error.

Figure 2: Total phenol and flavonoid content of *Hibiscus rosa-sinensis* flower (mg/ml).



Conclusion:

The maximum percent extract yield of 17.86% w/w recorded in methanol extract of *Hibiscus rosa-sinensis* flower followed by water extract 14.73% w/w and chloroform extract 9.22% w/w. The results of the qualitative phytochemical analysis showed that Hibiscus rosa-sinensis flower has good source of flavonoids, phenols saponins, tannins and terpenoids.(Sontakke, K. S., & Shinde, S. L. (2020) When we compared total phenol content with total flavonoid contents in *Hibiscus rosa-sinensis* flower by using water, methanol, chloroform, and hexane extract with standard Gallic acid and Quercetin respectively, it was found that flavonoid content in water, methanol and chloroform extracts was found more on other hand in hexane extract showed least flavonoid content than phenol content.

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ENVIRONMENTAL ISSUE - CLIMATE CHANGE AND INDIAN AGRICULTURE

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ABSTRACT

Hibiscus rosa-sinensis is a plant native to China. It is a shrub widely grown in the tropics as an ornamental plant and has many varieties with different colors of flowers. Red flower varieties are preferred in medicine. Many species of Hibiscus are grown for their attractive flowers or used as landscape shrubs. Hibiscus also has medicinal properties and is part of many herbal teas. The present study performed to explore preliminary secondary metabolites and active biomolecules such as TPC and TFC from flowers of Hibiscus rosa-sinensis. Extraction of flower in different polar and non-polar solvents naked that presence of flavonoids, phenols saponins, tannins and terpenoids.

Keywords: *secondary metabolites, TPC & TFC*

Introduction

Agriculture plays a vital role in India's economy. Over 58 per cent of the rural households depend on agriculture as their principal means of livelihood. As per the 2nd advised estimates by the Central Statistics Office (CSO), the share of agriculture and allied sectors (including agriculture, livestock, forestry and fishery) is estimated to be 17.3 per cent of the Gross Value Added (GVA) during 2016-17 at 2011-12 prices.

The Indian food industry is poised for huge growth, increasing its contribution to world food trade every year due to its immense potential for value addition, particularly within the food processing industry. The Indian food and grocery market is the world's sixth largest, with retail contributing 70 per cent of the sales. The Indian food processing industry accounts for 32 per cent of the country's total food market, one of the largest industries in India and is ranked fifth in terms of production, consumption, export and expected growth. It contributes around 8.80 and 8.39 per cent of Gross Value Added (GVA) in Manufacturing and Agriculture respectively, 13 per cent of India's exports and six per cent of total industrial investment.

Structure and Structural Transformation of Indian Agriculture

The agriculture sector in India has undergone significant structural changes in the form of decrease in share of GDP from 30 percent in 1990-91 to 14.5 percent in 2010-11 indicating a shift from the traditional agrarian economy towards a service dominated one. This decrease in agriculture's contribution to GDP has not been accompanied by a matching reduction in the share of agriculture in employment. About 52% of the total workforce is still employed by the farm sector which makes more than half of the Indian population dependent on agriculture for sustenance (NSS 66th Round). However, within the rural economy, the share of income from non-farm activities has also increased.

With the declining share of agriculture to GDP, the continuing high pressure of population on agriculture and the increasing fragmentation of land holdings leading to decreasing availability of cultivated land area per household, the agriculture sector alone would hardly be in a position to create additional employment opportunities to sustain the livelihood of the rural households. This calls for creation of additional employment opportunities in the non-farm and manufacturing sector, especially in agro based rural industries which have area specific comparative advantage in terms of resources endowment and development possibilities. This would require suitable skill development of the people so as to gainfully employ them in non-farm activities. This alone would be able to make agriculture viable in a sustainable manner. In addition, by creating more employment and absorbing some of the surplus labour in agriculture, this will contribute to achieving our objective of inclusive growth.

With the declining share of agriculture to GDP, the continuing high pressure of population on agriculture and the increasing fragmentation of land holdings leading to decreasing availability of cultivated land area per household, the agriculture sector alone would hardly be in a position to create additional employment opportunities to sustain the livelihood of the rural households. This calls for creation of additional employment opportunities in the non-farm and manufacturing sector, especially in agro based rural industries which have area specific comparative advantage in terms of resources endowment and development possibilities. This would require suitable skill development of the people so as to gainfully employ them in non-farm activities. This alone would be able to make agriculture viable in a sustainable manner. In addition, by creating more employment and absorbing some of the surplus labour in agriculture, this will contribute to achieving our objective of inclusive growth.

Growth Performance of Agriculture : Overall Growth

The growth performance of the agriculture sector has been fluctuating across the plan periods . It witnessed a growth rate of 4.8 per cent during the Eighth plan period (1992–97). However, the agrarian situation saw a downturn towards the beginning of the Ninth plan period (1997–2002) and the Tenth plan period (2002–07), when the agricultural growth rate came down to 2.5 percent and 2.4 percent respectively. This crippling growth rate of 2.4 percent in agriculture as against a robust annual average overall growth rate of 7.6 per cent for the economy during the tenth plan period was clearly a cause for concern. The trend rate of growth during the period 1992-93 to 2010- 11 is 2.8 percent while the average annual rate of growth in agriculture & allied sectors GDP during the same period is 3.2 percent.

The Eleventh Plan had sought to reverse the deceleration of agricultural growth which occurred in the Ninth Plan and continued into the Tenth Plan. It has had some success in that food grain production touched a new peak of 250.42 million tons in 2011-12. Agricultural GDP growth has accelerated to an average 3.9 percent growth during 2005-06 to 2010-11, partly because of initiatives taken since 2004. As per the latest advance estimate of National Income released by the Central Statistics Office (CSO), agriculture and allied sectors are likely to grow at 2.5 percent during 2011-12 as against 7 percent during the previous year at constant (2004-05) prices. The Approach Paper to Twelfth Plan drafted by Planning Commission estimates that with a revision of the farm sector GDP growth rates for 2010-11 and the expected good harvest in 2011-12, the average growth in agriculture & allied sectors in the Eleventh Plan may be higher at 3.3-3.5 percent per year against a target of 4 percent.

The increasing divergence between the growth trends of the total economy and that of agriculture & allied sectors suggests an under performance by agriculture. It is also significant that unlike the overall economic growth pattern, agricultural performance in India has been quite volatile (the Coefficient of Variation (CV) during 2000-01 to 2010-11 was 1.6 compared to 1.1 during 1992-93 to 1999-2000). This is almost six times more than the CV observed in the overall GDP growth of the country indicating that high and perhaps increasing volatility is a real challenge in agriculture, which is likely to increase in the years to come in the wake of climate change.

Irrigation, Seeds, Fertilizers and Credit

There is no doubt that the overall size, quality, and efficiency of investment are always the key drivers of growth in any sector. In case of public investments in agriculture, as defined in the National Accounts Statistics, more than 80 percent is accounted for major and medium irrigation schemes. Even in the case of private investments in agriculture, almost half is accounted for by irrigation (minor, primarily through groundwater, but also now increasingly drip, etc.). So irrigation remains the most dominant component in the overall investment in agriculture. Without proper use of water, it is difficult to get good returns on better high yielding seeds and higher doses of fertilizers. Water will remain a critical

input for agriculture in the decades to come until science develops seeds that can thrive in dry climate with very little water. The net sown area has remained around 141 million hectares during the last 40 years. The cropping intensity, i.e., the ratio of gross cropped area to Indian Agriculture: Performance and Challenges net cropped area has however, gone up from 118 per cent in 1970-71 to 138 percent in 2008-09.

Emerging Demand—Supply Imbalances

With the Indian economy growing at 8 percent and higher expenditure elasticity of fruits & vegetables and livestock as compared to cereals, there is an increasing pressure on the prices of such high value perishable commodities. The per capita monthly consumption of cereals has declined from 14.80 kg in 1983-84 to 12.11 kg in 2004-05 and further to 11.35 kg in 2009-10 in the rural areas. In the urban areas, it has declined from 11.30 kg in 1983-84 to 9.94 kg in 2004-05 and to 9.37kg. in 2009-10. The agricultural production basket is still not fully aligned to the emerging demand patterns.

Government Initiatives

Given the importance of the agriculture sector, the Government of India, in its Budget 2017–18, planned several steps for the sustainable development of agriculture-

- Total allocation for rural, agricultural and allied sectors for FY 2017-18 has been increased by 24 per cent year-on-year to Rs 1,87,223 crore (US$ 28.1 billion). A dedicated micro-irrigation fund will be set up by National Bank for Agriculture and Rural Development (NABARD) with a corpus of Rs 5,000 crore (US$ 750 million). The government plans to set up a dairy processing fund of Rs 8,000 crore (US$ 1.2 billion) over three years with initial corpus of Rs 2,000 crore (US$ 300 million).
- The participation of women in Mahatma Gandhi National Rural Employment Gurantee Act (MGNREGA) has increased to 55 per cent and allocation to the scheme has been increased to a record Rs 48,000 crore (US$ 7.2 billion) for FY2017-18.
- Short-term crop loans up to Rs 300,000 (US$ 4,500) at subsidized interest rate of 7 per cent per annum would be provided to the farmers. An additional incentive of 3 per cent is provided to farmers for prompt repayment of loans within due date, making an effective interest rate for them at 4 per cent.

Some of the recent major government initiatives in the sector are as follows:

- With an aim to boost innovation and entrepreneurship in agriculture, the Government of India is introducing a new AGRI-UDAAN programme to mentor start-ups and to enable them to connect with potential investors.
- The Government of India has launched the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) with an investment of Rs 50,000 crore (US$ 7.7 billion) aimed at development of irrigation sources for providing a permanent solution from drought.
- The Government of India plans to triple the capacity of food processing sector in India from the current 10 per cent of agriculture produce and has also committed Rs 6,000 crore (US$ 936.38 billion) as investments for mega food parks in the country, as a part of the Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters (SAMPADA).
- The Union Cabinet, Government of India, approves Rs 9,020 crore (US$ 1.4 billion) as Extra Budgetary Resources (EBR) for execution of projects under Accelerated Irrigation Benefits Programme (AIBP) and their command area development (CAD) works under PMKSY.
- A new platform for selling agricultural produce named e-RaKam has been launched by the Government of India and will operate as a joint initiative of Metal Scrap Trade Corporation Limited

and Central Railside Warehouse Company Limited (CRWC).

- The NITI Aayog has proposed various reforms in India's agriculture sector, including liberal contract farming, direct purchase from farmers by private players, direct sale by farmers to consumers, and single trader license, among other measures, in order to double rural income in the next five years. The Ministry of Agriculture, Government of India, has been conducting various consultations and seeking suggestions from numerous stakeholders in the agriculture sector, in order to devise a strategy to double the income of farmers by 2022.
- The Government of India has allowed 100 per cent FDI in marketing of food products and in food product e-commerce under the automatic route.
- The Maharashtra State Agriculture Marketing Board (MSAMB) has operationalised 31 farmer-to-consumer markets in the state, and plans to open 100 more such markets in the future, which would facilitate better financial remunerations for the farmers by allowing them to directly sell their produce in open markets.
- The Ministry of Labour and Employment plans to amend the Minimum Wage Act to raise the daily minimum wage of unskilled agricultural labour in C-class towns to Rs 350 (US$ 5.2) in the central sphere, from the current wage of Rs 160 (US$ 2.4) per day.
- The Government of India and the Government of Israel have expressed their commitment to further strengthen bilateral relations in the field of agriculture and allied sectors, as well as enhance cooperation at the government-to-government and business-to-business levels between the two countries, in a bid to further enhance the relationship.
- According to the Agriculture Ministry, 50,000 hectares of area is available for coconut cultivation in Bihar, the Coconut Development Board plans to equip the farmers thus making India the world leader in production, productivity, processing for value addition and export of coconut.

Market Size

India's GDP is expected to grow at 7.1 per cent in FY 2016-17, led by growth in private consumption, while agriculture GDP is expected to grow above-trend at 4.1 per cent to Rs 1.11 trillion (US$ 1,640 billion).$ It ranks third in farm and agriculture outputs. As per the 2nd Advance Estimates, India's food grain production is expected to be 271.98 MT in 2016-17. Wheat production in India is expected to touch an all-time high of 96.6 MT during 2016-17.! Production of pulses is estimated at 22.14 MT. India has been the world's largest producer of milk for the last two decades and contributes 19 per cent of the world's total milk production. India is emerging as the export hub of instant coffee which has led to exports of coffee reaching 177,805 tons valued at US$ 447 million between April-August 2017, as against 162,641 tons valued at US$ 363.1 million during the same period last year.

India topped the list of shrimp exporters globally, as the value-added shrimp exports rose 130 per cent year-on-year to 23,400 tons in 2016. The production of food grains in India reached a record 275.68 million tonnes (MT) during FY 2016-17, as per the Fourth Advance Estimates (AE) released by the Department of Agriculture, Cooperation and Farmers Welfare, Government of India. The total sown area for kharif crops was 68.53 million hectares as on July 2017, compared to 67.34 million hectares on July, 2016.

India is the second largest fruit producer in the world. India's horticulture output, is estimated to be 287.3 million tonnes (MT) in 2016-17 after the first advance estimate.

Agricultural export constitutes 10 per cent of the country’s exports and is the fourth-largest exported principal commodity. India's exports of basmati rice may rise to Rs 22,000-22,500 crore (US$ 3.42-3.49 billion), with volume to around 4.09 MT in 2017-18, backed by a rise in average realisations. Groundnut exports

from India are expected to cross 700,000 tonnes during FY 2016-17 as compared to 537,888 tonnes during FY 2015-16, owing to the expected 70 per cent increase in the crop size due to good monsoons. India's groundnut exports rose to 653,240 MT during April 2016-February 2017.@ India is the largest producer, consumer and exporter of spices and spice products. Spices exports from India grew by 9 per cent in volume and 5 per cent in value year-on-year to 660,975 tonnes and US$ 1.87 billion respectively, during April-December 2016. The online food delivery industry grew at 150 per cent year-on-year with an estimated Gross Merchandise Value (GMV) of US$ 300 million in 2016. The Indian gourmet food market is currently valued at US$ 1.3 billion and is growing at a Compound Annual Growth Rate (CAGR) of 20 per cent. India's organic food market is expected to increase by three times by 2020.

Conclusion

Agriculture plays a vital role in India's economy. Over 58 per cent of the rural households depend on agriculture as their principal means of livelihood. As per the 2nd advised estimates by the Central Statistics Office (CSO), the share of agriculture and allied sectors (including agriculture, livestock, forestry and fishery) is estimated to be 17.3 per cent of the Gross Value Added (GVA) during 2016-17 at 2011-12 prices. The Indian food industry is poised for huge growth, increasing its contribution to world food trade every year due to its immense potential for value addition, particularly within the food processing industry. The Indian food and grocery market is the world's sixth largest, with retail contributing 70 per cent of the sales. The Indian food processing industry accounts for 32 per cent of the country's total food market, one of the largest industries in India and is ranked fifth in terms of production, consumption, export and expected growth. It contributes around 8.80 and 8.39 per cent of Gross Value Added (GVA) in Manufacturing and Agriculture respectively, 13 per cent of India's exports and six per cent of total industrial investment.

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ANTIMICROBIAL ACTIVITY IN STEM BARK OF FICUS HISPIDA L

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ABSTRACT

Most of the world population relies on plant medicine for treatment of skin infections. Fine stem bark powder of Ficus hispida can be applied on fresh cut or wounds for prevention of blood loss and to cure wound infection. Skin infections are mainly causes by bacteria. In the present investigation the benzene extract of stem bark of Ficus hispida was studied for antimicrobial activity against different fungal and bacterial isolates. It has been reported that the zone of inhibition of 13 mm against pathogen Pseudomonas aeruginosa was observed in benzene extract. The antimicrobial activity of Benzene, extract could be attributed due to Pirenzepine, 8-sulfamoyl, α-Amyrin, 1-Monolinoleoylglycerol trimethylsilyl, ester.

Keywords: *Infections, Antimicrobial activity, zone of inhibition.*

Introduction

The genus *Ficus* belongs to the family Moraceae is from an important group of trees and with religious value, is having over 700 species. Among the genus *Ficus, Ficus hispida* Linn.is an important plant due to its various pharmacological activities. *Ficus* mainly grown in evergreen forest, also found in moist areas, near banks of many stream, in deciduous forest. It is mainly cultivated for its edible fruits in places like India, Andaman Island, Myanmar, and Srilanka etc. (Ripu *et al.*, 2006).
The skin as the largest organ of the body, play a number of vital role such as in protection, thermoregulation, percutaneous absorption, sensory and secretory activity. The acidic sebaceous secretions and surface of skin are aggressive to many pathogens. Skin infections may be attributed to a variety of micro-organisms such as viral, parasitic, bacterial and fungal. In addition to this, when the integrity of the skin is compromised, many characteristic diseases either inflammatory or non-inflammatory may result, and these may range from mild skin rashes, eczema, psoriasis, acute erythema, vitiligo and deep wounds (Van Hees *et al.*2001).
Bacterial pathogens are commonly responsible for skin infection. The management process in skin infections depends upon the chronicity of the illness, investigations done to identify the disease, and the appropriate medications given. Plant medicines prove to be very effective in simple as well as chronic dermal disease. Thus in present work the antimicrobial activity of benzene extract of *Ficus hispida,* used in the treatment of skin disease was studied against fungal and bacterial isolates.

Material and Methods

Preparation of plant extracts

The stem bark of *Ficus hispida* used in medicine was collected from different forest area. Cleaned and disinfected stem bark was dried in shade and crushed to prepare a fine powder. The powder was extracted in benzene solvent with the help of Soxhlet's extractor.

Collection of fungal and bacterial isolates

The test micro-organisms used for the antimicrobial activity were selected on their pathogenicity against different skin diseases in human beings. The micro-organisms selected were fungal isolates of *Candida albicans, Microsporum audouinii*, *Trichophyton rubrum*, *Trichophyton mentagrophytes* and the bacterial isolates of *Staphylococcus aureus, Streptococcus pyogenes, Pseudomonas aeruginosa* and *Bacillus pumilus.* The collected microbial culture were revived

Disc Diffusion Method

Fungal isolates and the bacterial isolates were subculture overnight at 37^0C on potato dextrose agar and nutrient agar plates

respectively. Six plates per organism. The suspension of each bacterial and parasitic isolates were prepare as described by John *et al* (1999) in isotonic sodium chloride solution. Solidified petridishes, for each microorganism for benzene solvent on Muller- Hinton agar were flooded with the appropriate suspension of bacterial isolates respectively.

Sterile 10 mm diameter absorbent filter papers disc (punched out from Whatman filter paper No.1) were impregnated with benzene solvent of plant extracts. It was placed on inoculated lawn. All the plates were kept for incubation period, i.e. for 24 hrs at room temperature. Results were noted down in terms of sensitivity zone around the disc which was measured in millimeter (mm) and results were sequentially recorded in the tabular form.

Result and Discussion

Antimicrobial activity of stem bark extracts of***Ficus hispida***L.

Benzene extract of stem bark of *Ficus hispida* showed positive microbial zone of inhibition against pathogen *Pseudomonas aeruginosa*. Benzene extracts was found non- reactive to other test organisms. The zone of inhibition of 13 mm against pathogen *Pseudomonas aeruginosa* was observed in Benzene extract. (Plate 1.1).

Similar results was observed by Dewan Md. et al., with ethanolic fruit and leaf extracts of *Ficus hispida* which showed antimicrobial activity against *Pseudomonas aeruginosa.* Shariar et al., also studied the thrombolytic and antimicrobial activity of *Ficus hispida*.

Table 1.1 Antimicrobial activity of stem bark extracts of *Ficus hispida*L. by disc diffusion method (Zone of Inhibition in mm at 100 µg / disc)

S. N.	Micro-organism	Benzene
1	*Staphylococcus aureus*	00
2	*Streptococcus pyogenes*	00
3	*Pseudomonas aeruginosa*	13 mm
4	*Bacillus pumilus*	00
5	*Trichophyton rubrum*	00
6	*Trichophyton mentagrophytes*	00
7	*Microsporangium audouinii*	00
8	*Candida albicans*	00

Conclusion

In the present investigation antimicrobial activity of benzene extract of *Ficus hispida* was analysed against 8 clinically significant organisms by using disc diffusion method. It was observed that *Ficus hispida* L. (Stem bark) extract was positive against*Pseudomonas aeruginosa*. Thus it was concluded that the pathogen *Pseudomonas aeruginosa* was positive to plants which is used in skin diseases. Findings of this study will concrete scientific belief to the indigenous uses of *Ficus hispida* L. evaluated for the treatment skin diseases.

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GC-MS ANALYSIS OF BENZENE EXTRACT OF FICUS HISPIDA L

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ABSTRACT

Ficus hispida L.belongs to family Moraceae is used to treat psoriasis, anaemia, piles, jaundice and haemorrhage. In present investigation GC-MS analysis of stem bark extract of Ficus hispida was carried out and the chromatogram obtained clearly shows the presence of twelve peaks indicating presence of twelve phytochemical compounds detected. The Benzene extract of Ficus hispida L. stem bark analyzed by GC-MS shows the presence of compounds like Cyclopentasiloxane, decamethyl-, Pirenzepine,8-sulfamoyl, 9,12,15-Octadecatrienoic acid, α-Sitosterol, Trilinolein, Spirost-8-en-11-one,3-hydroxy-,(3a,5a,14a,20a,22a,25R), α-Amyrin,Glycine, N(3a,5a,7a,12a)-24oxo-3,7,12-tris(trimethylsilyl)oxy(cholan-24yl-methyl ester, 1-Monolinoleoylglycerol trimethylsilyl, ester Psi.,psi,-Carotene,, Lycoxanthin, Milbemycin b.

Keywords: *Zone of inhibition, Psoriasis, Chromatogram, Haemorrhage.*

Introduction

Skin infections have increased dramatically in the last few years, due to increase in the numbers of immune-suppressed and immune compromised patients, who frequently develop opportunistic systemic and superficial mycoses such as candidiasis, dermato-mycosis, fungal infections etc. Allopathic drugs do not provide long term recovery from infections and there is tendency of recurrence of disease after such treatment.

Thus, traditional medicinal resources, especially plants, have been found to play a major role in managing dermatological ill conditions. The demand for herbal medicines is increasing rapidly due to their lack of side effects. Further as the health care costs continue to rise, there is attraction for low-cost remedies. This has stimulated consumers and the author to work over the potential of alternative medicine. The need of the hour is to screen a number of medicinal plants for promising biological activity against skin diseases. Hence in order to find out the chemical components present in stem bark extract of *Ficus hispida* L., GC-MS analysis was carried out.

Materials and Methods

Preparation of plant extracts

The stem bark of *Ficus hispida* used in medicine was collected from different forest area. Cleaned and disinfected stem bark was dried in shade and crushed to prepare a fine powder. The powder was extracted in benzene solvent with the help of Soxhlet's extractor.

GC-MS (Gas Chromatography and Mass Spectroscopy) of Stem bark of *Ficus hispida* L. used in Skin diseases.

The benzene extract of stem bark of *Ficus hispida* L. was subjected to GC-MS analysis from Central Instrumentation Laboratory (CIL), Panjab University Chandigarh and results were obtained.

The stem bark extract obtained from *Ficus hispida* L. was subjected to Gas Chromatography and Mass Spectroscopy for the determination of bioactive volatile compounds. GC-MS analysis of the samples were carried out using Perkin Elmerclarus 680 with mass spectrometer clarus 600 (EI) using TurboMass ver 5.4.2 Software with NIST – 2008 Library ver. Helium was used as the carrier gas and the temperature of programming were set with initial oven temperature at 60^0C and held for 2 min and final temperature of the oven was 300^0C with the rate at 10^0C per min. A 2-µL sample was injected with split 50:1. Mass spectra were

recorded over 35-650 amu range with electron impact ionization energy 70 eV; a scan interval of 2 min and fragments from 50 to 600 Da. The chemical components from the benzene extract of *Ficus* were identified by comparing the retention times of chromatographic peaks using Quadra pole detector with NIST Library to relative retention indices. Quantitative determinations were made by relating respective peak areas to TIC areas from the GC-MS.

Result and Discussion

GC-MS was carried out to study and to determine the possible chemical components from Stem bark of *Ficus hispida* L. The chromatogram of Benzene extract clearly shows the presence of twelve peaks indicating presence of twelve phytochemical compounds detected was shown in Figure below. The twelve phytoconstituents were characterized and identified on comparison of the mass spectra of the constituents provided by NIST library. The Benzene extract of *Ficus hispida* L.Stem bark analyzed by GC-MS shows the presence of compounds like Cyclopentasiloxane, decamethyl-, Pirenzepine,8-sulfamoyl, 9,12,15-Octadecatrienoic acid, α-Sitosterol, Trilinolein, Spirost-8-en-11-one,3-hydroxy-,(3a,5a,14a,20a,22a,25R), α-Amyrin,Glycine, N(3a,5a,7a,12a)-24oxo-3,7,12-tris(trimethylsilyl)oxy(cholan-24yl-methyl ester, 1-Monolinoleoylglycerol trimethylsilyl, ester Psi.,psi,-Carotene,, Lycoxanthin, Milbemycin b. The active compound with their retention time (RT), % peak area, compound analyzed, molecular formula, functional group, probable structural formula and activity reported are presented in Table 1.1.

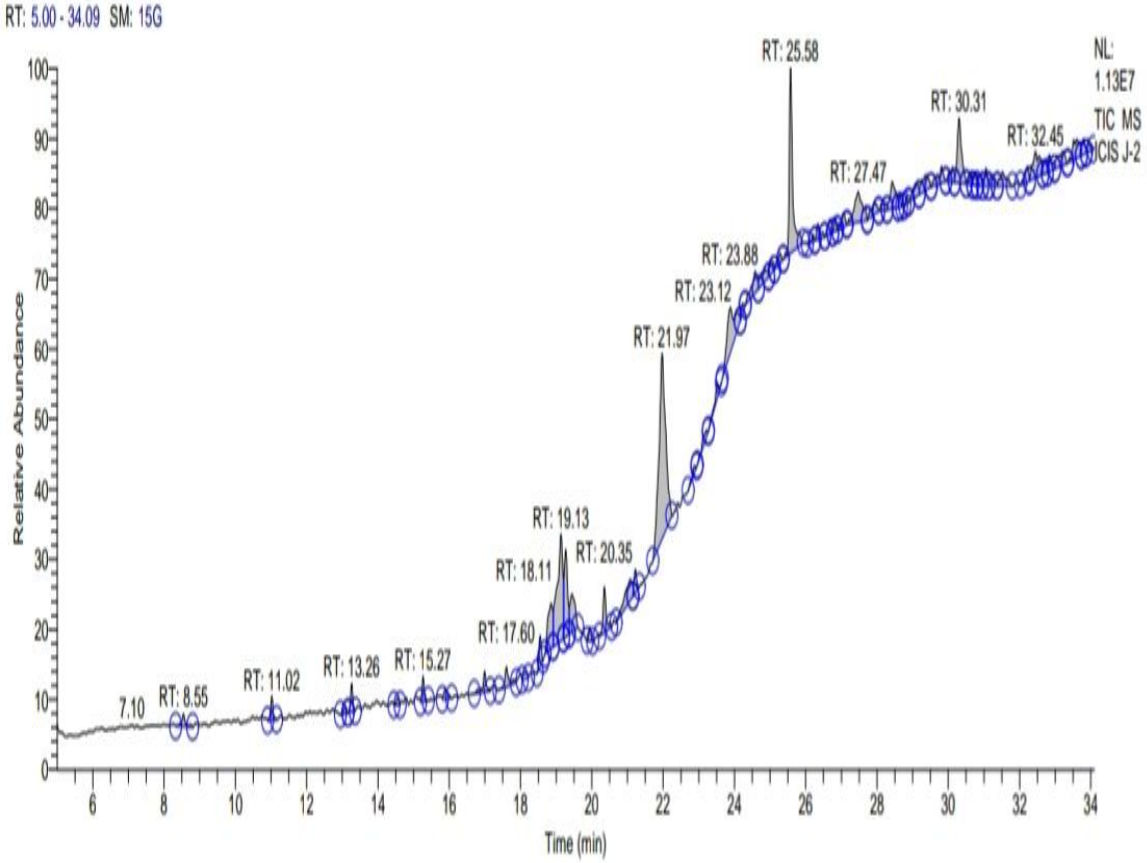
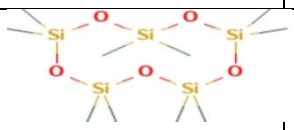
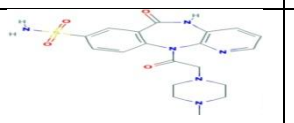
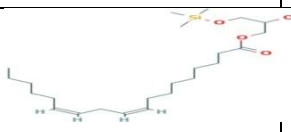
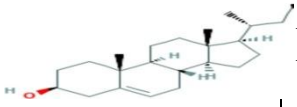
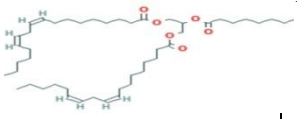
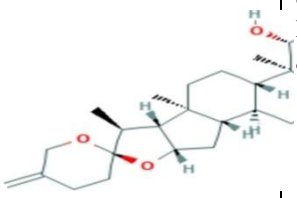
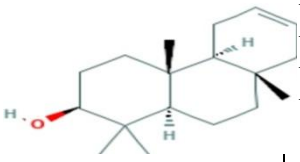
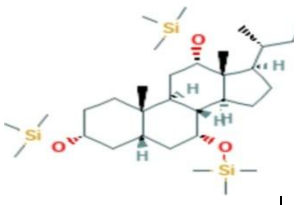


Fig. 1.1: GC-MS chromatogram *Ficus hispida* L.

Sr. No.	Retention Time	Peak area%	Compound Analyzed	Molecular formula	Probable Structural Formula	Activity reported
1	8.55	0.69	Cyclopentasiloxane, decamethyl-	$C_{10}H_{30}O_5Si_5$		Suncreen, Skin and hair conditioner
2	14.55	0.75	Pirenzepine,8-sulfamoyl	$C_{19}H_{22}N_6\ O_4S$		Antibacterial
3	17.60	1.06	9,12,15-Octadecatrienoic acid	$C_{27}H_{52}O_4Si_2$		Antisclerotic, Antispsoric
4	19.13	8.32	α-Sitosterol	$C_{29}H_{50}O$		Antispsoric, Antiallergic, Alopecia
5	20.35	1.89	Trilinolein	$C_{27}H_{44}OBr_2$		Antioxident
6	21.06	2.36	Spirost-8-en-11-one,3-hydroxy-,(3a,5a,14a,20a,22a,25R)	$C_{27}H_{40}O_4$		Decreases endothelial leukocytic adehesion
7	21.97	16.81	α-Amyrin	$C_{30}H_{50}O$		Antiaging, antifungal, Antidermatic, Anticandidosis, Antibacterial, Antiseptic
8	22.86	0.34	Glycine, N(3a,5a,7a,12a)-24oxo-3,7,12-tris(trimethylsilyl) oxy(cholan-24yl-methyl ester	$C_{36}H_{69}\ NOSi_3$		Anti-inflammatory

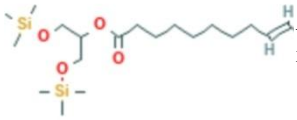
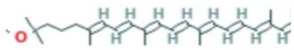
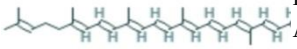
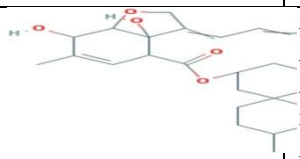
9	23.51	0.77	1-Monolinoleoyl-glycerol trimethylsilyl, ester	$C_{27}H_{54}O_4Si_2$		Antimicrobial, Anti-inflammatory
10	23.88	4.88	Psi.,psi,-Carotene	$C_{42}H_{64}O_2$		Anticacer
11	27.05	0.68	Lycoxanthin	$C_{40}H_{56}O$		Anti-inflammatory, Antioxidant
12	32.45	2.60	Milbemycin b	$C_{33}H_{46}ClNO_7$		Antiallergic, Antidermatic, Anti-inflammatory, Antiitching

Table 1.1 - GC-MS Analysis of *Ficus hispida* L.

Conclusions

The data obtained after GC-MS analysis of plant used in skin diseases revealed the presence of chemical constituents like properties. Lycoxanthin, obtained from GC-MS analysis of plants used as anti-inflammatory, antiallergic, absorbent, demulcent, antiitch and antidermatic agents. α-Amyrin, Glycine, obtained from GC-MS analysis of plants used as antiaging skin and hair conditioner, lubricant, antiperspirant scalp treatment, deodorant and skin lightener agents. 9,12,15-Octadecatrienoic acid, Cyclopentane, 2-(1-methylpropyl)-, Cyclopropanecarboxylic acid, Pirenzepine,8-sulfamoyl are antimicrobial. antiviral, antibacterial, antifungal, anticandidosis, antiabscess, antiseptic, antieczemic, antikeratolic, antivertilago, acnegenic and alopecia.

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SYNTHESIS OF SM^{3+}DOPED $YAL_3(BO_3)_4$ ORANGE-RED EMITTING PHOSPHOR FOR LED

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ABSTRACT

A red-orange emitting $YAl_3(BO_3)_4:Sm^{3+}$ phosphors have been synthesized by a aldo-keto gel synthesis method. The photoluminescent (PL) properties have been studied over the 200-450 nm excitation range. The excitation and emission spectra of these phosphors were measured by fluorescence spectrophotometer. The emission spectrum of Sm^{3+} in $YAl_3(BO_3)_4$ phosphor monitored for 402 nm excitation composed of 564, 600, and 648 nm emission peaks, and the excitation spectra monitored at 600 nm emission shows peaks at 345, 362, 375, 402, 421 and 445 nm.

Keywords: *Aldo-keto gel synthesis, $YAl_3(BO_3)_4:Sm^{3+}$, fluorescence.*

1. Introduction

In recent years, white light-emitting diodes (WLEDs) are better replacement for conventional incandescent and fluorescent lamps. the advantages of WLEDs have high luminous efficiency, energy-saving, reliability, safety, fast response, environmental-friendly and so on [1]. Generally, white light is based on the combination of an InGaN blue LED chip with a yellow emitting phosphor YAG:Ce^{3+} [2]. But drawback of YAG:Ce^{3+} is that, low luminous efficiency and poor color-rendering index due to the deficiency of red emission [3, 4]. White light made-up by using combination of three colours (Red, Green and Blue) for this we required three efficient phosphors such as ZnS:(Cu, Al) for green, $BaMgA_{l0}O_{17}:Eu^{2+}$ for blue, and $Y_2O_2S:Eu^{3+}$ for red [5]. Among these phosphors, the efficiency of $Y_2O_2S:Eu^{3+}$ is much lower than that of green and blue phosphors. Therefore, in order to improve the stability and efficiency of the phosphor. Thus, the development of new chemically stable and efficient phosphors for UV LED applications is highly desirable. Doped rare-earth ions such as borates have been widely reported in the application of luminescence materials due to their advantages of a low synthesizing temperature and high chemical and physical stability [6].

In this paper, we prepared $YAl_3(BO_3)_4:Sm^{3+}$ phosphor for solid state lightning (SSL) synthesized by using aldo-keto method.

2. Experimental

The phosphor $YAl_3(BO_3)_4:Sm^{3+}$ was prepared for the first time by a novel method of gelation named as aldo-keto gelmethod; offering a comparatively low temperature route [7]. The starting chemicals Y_2O_3 (99.99%, AR) and Sm_2O_3 (99.90%, AR) were mixed together in a china clay basin. A small quantity of double distilled water was added and paste was formed. HNO_3 was added drop by drop and mixture was heated slowly under observation to 50°C till the paste dissolved completely. The solution was further heated till the excess of acid was boiled off. Little quantity of double distilled water was again added and slowly evaporated to dryness. The resulting powder was $Y(NO_3)_3$:Sm after that soluble solution of $Al(NO_3)_3$ and H_3BO_3 (AR) were added. The dried precursor was finally milled. Acetone (2M, AR) and benzaldehyde (2M, AR) were added to the nitrate. The pale brownish yellow mixture obtained was stirred continuously and slowly heated to 130°C. The mixture became dark brownish yellow and then dark reddish brown between 80°C to 120°C with evolution of brownish gases. The process of gelation started at near about 130°C with the evolution

of dark yellowish brown fumes. The mixture was then allowed to cool. Red gel was formed after cooling. It was further heated slowly to 300°C. Dark red foam was formed with evolution of yellowish brown fumes. On further slow heating, pyrolysis of foam was started at 450°C and shining black foam was formed at 600°C, which started burning from 900°C. Final product appears as white crystalline powder of $YAl_3(BO_3)_4:Sm^{3+}$.

3. Result and discussions

3.1 Photoluminescence properties

Fig. 1.shows the excitation spectra of $YAl_3(BO_3)_4:Sm^{3+}$. The excitation spectrum for the band at 600 nm. The spectra of $YAl_3(BO_3)_4:Sm^{3+}$ consist of six bands in the range 300 to 450 nm (peaking at 345, 362, 375, 402, 421 and 445 nm). These sharp peaks are due to the 4f-4f inner shell transitions of Sm^{3+}. Among these peaks, we are interested in the excitation band peaking at 402 nm due to $^6H_{5/2} \rightarrow (^6P, ^4P)_{5/2}$, $^4L_{13/2}$, $^4F_{7/2}$, $^6P_{3/2}$ transitions of Sm^{3+}. In Fig. 1. the emission spectra of $YAl_3(BO_3)_4:Sm^{3+}$ demonstrate from Sm^{3+} was composed of 564, 600, and 648 nm emission peaks, corresponding to the $^4G_{5/2} \rightarrow {}^6H_J$ (J =5/2, 7/2, and 9/2) transitions, respectively. The 600 nm emission band corresponding to the $^4G_{5/2} \rightarrow {}^6H_{7/2}$ transition is the most intense [8].

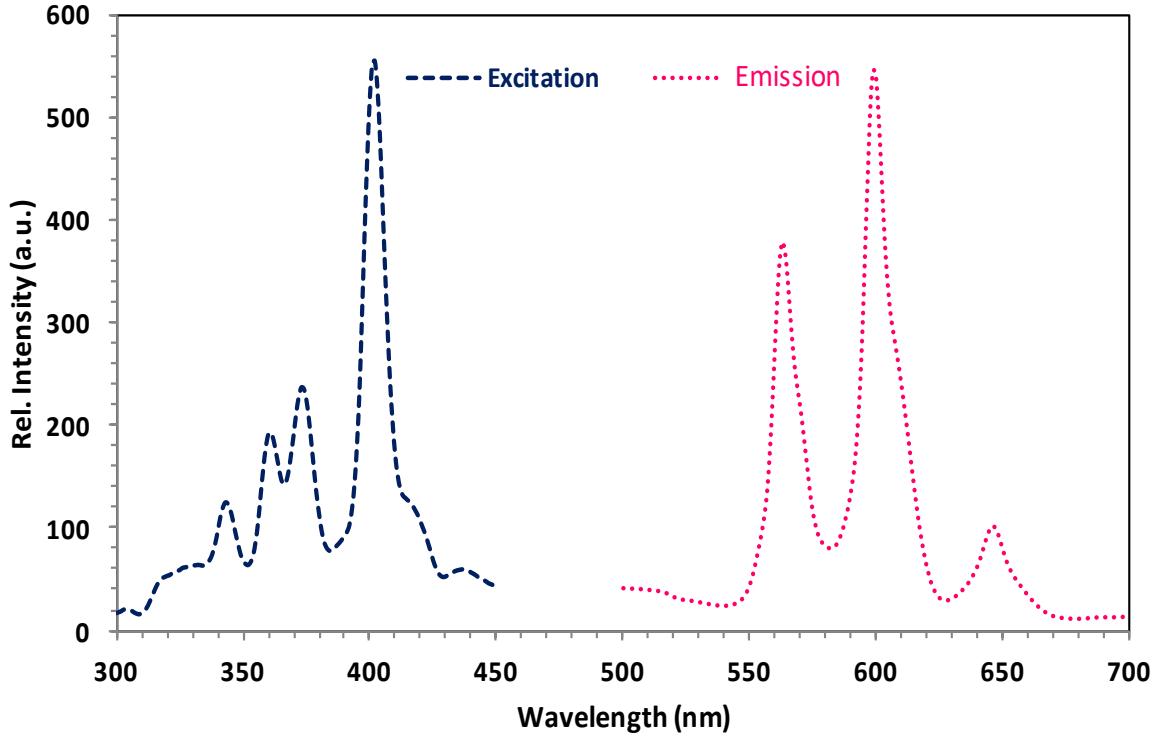

Fig.3: Excitation (monitored at 600 nm) and emission (monitored at 402 nm) spectra of $YAl_3(BO_3)_4:Sm^{3+}$.

Conclusions

The inorganic orange-red emitting $YAl_3(BO_3)_4:Sm^{3+}$ phosphor was successfully prepared by aldo-keto method. The $YAl_3(BO_3)_4:Sm^{3+}$ phosphor can be effectively excited by at 402 nm, emitting orange-red colour at optimum intensity 600 nm. Therefore $YAl_3(BO_3)_4:Sm^{3+}$ can be used for SSL application.

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ECOLOGY OF MICROBES: A REVIEW OF THE ECOLOGICAL EFFECTS OF BIODEGRADABLE PLASTICS

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ABSTRACT

This paper reviews the toxicological effects of biodegradable plastics on species and ecosystems, and contextualizes these impacts with those previously reported for conventional polymers. Bio plastics do produce significantly fewer greenhouse gas emissions than traditional plastics over their lifetime. There is no net increase in carbon dioxide when they break down because the plants that bio plastics are made from absorbed that same amount of carbon dioxide as they grew, as global production of biodegradable polymers continues to increase, further evaluation of their Eco toxicological effects on organisms, impacts of biodegradable plastics and their co-contaminants across levels of biological organization are poorly researched compared with conventional plastics, evidence suggests that individual-level effects could be broadly similar. Biodegradable plastics are those that can decompose naturally in the environment. The makeup structure of biodegradable plastics makes them easily break down by natural microorganisms, giving an end product that is less harmful to the environment.

Keywords: *Biodegradable plastics, Bio-based plastics*

Introduction

Every year, plastic products are produced in massive quantities, many of them for packaging. In 2020 for example, global plastics production reached nearly 370 million tons. Without a doubt, no one today can imagine life without plastics, those extraordinary materials that have surrounded us with lightweight, high-performance products for decades.

However, much of that plastic ends its life in aquatic ecosystems that are consequently affected by the material's presence in various ways. In fact, approximately 12 million tons of plastic enter Earth's oceans each year, most of which is waste from single-use packaging. Whereas fishing gear and other resources lost at sea, industrial losses, and illegal dumping represent only a fifth of marine litter, the other 80% comes from land, excessive use of single-use plastics, including personal protective equipment (e.g. gloves and masks) consumed during the COVID-19 pandemic, many of which have ended up in bodies of water.

Literature Review

The search includes all papers published between 1990 and 2022. TITLE-ABS-KEY ("Biodegradable plastics" OR "green packaging" OR "bio plastics" OR "bio-based plastics") are the words used in the study. The initial search criteria were limited to the article's title, abstract, and keywords. Six hundred and seventy-five pages were first created using three keywords. In addition to articles, the first search result contained conference papers, books, and book chapters. Except for the articles, all (conference papers, books, and book chapters) were finally withdrawn.

United States published the most articles (567), followed by China (437). Japan and India are next, with 340 and 275 articles published, respectively. Malaysia is ranked 10th, accounting for 119 articles published. The literature on bio-based and biodegradable plastics has clearly shown that Asia, America, and Europe dominate.

Research Work

As a result, this research focuses on identifying important problems with biodegradable plastics' sustainability, such as social, environmental, and economic hotspots, as well as the metrics used to measure their sustainability .The scope of the research under consideration, differs in terms of product systems, measurement processes, and indicators that are being studied, among other things. This will necessitate a thorough

examination of both procedures and scopes, which is outside the scope of this research.

Bio plastics are used in various agricultural applications, including nets, grow bags, and mulch films. Using bio plastics-based nets as a substitute for high-density polyethene (HDPE), which has traditionally been used to increase crop quality and output while protecting it from birds, insects, and the weather, is becoming more popular. Grow bags, also known as planter bags or seedling bags, are made mostly of low-density polyethene, which is readily available. On the other hand, grow bags made of polyhydroxy alkanoate (PHA) would be biodegradable, root-friendly, and non-toxic to surrounding water sources.

Additionally, the following search phrases were used for a complete search of biodegradable items' social, environmental, and economic aspects: commodities manufactured from renewable resources. There are social elements of biodegradable products, biodegradable plastics sustainability indicators, the economic aspects of biodegradable plastics, and the environmental aspects of biodegradable plastics.

Conclusion

Biodegradable plastics have shown to be quite useful in irradiating medical devices and food. Many issues might be handled, and a green environment could be preserved for a long time, thanks to the manufacture of biodegradable plastics. Biodegradable plastics can be used to replace conventional plastics to improve the environment while also ensuring the long-term availability of petroleum resources. The main difficulties that must be effectively solved are the high production costs and low performance of some biodegradable plastics, which require more study to prevent competing with other environmental effects

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USE PLANT EXTRACTS IN SYNTHESIS OF NANOPARTICLES: A REVIEW

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ABSTRACT

Use nanoparticles Green synthesis has many potential applications in environmental and biomedical fields. Green synthesis aims in particular at decreasing the usage of toxic chemicals. For instance, the use of biological materials such as plants is usually safe. Plants also contain reducing and capping agents. Green synthesis of nanoparticles involves the use of plant or plant parts for the bio reduction of metal ions into their elemental form in the size range 1–100 nm. The process of green synthesis is more efficient, simpler, and economical, and can easily be scaled up to perform larger operations. Here we present the principles of green chemistry, and we review plant-mediated synthesis of nanoparticles and their recent applications. Nanoparticles include copper, zinc oxide.
Therefore, biological entities or their extracts are used for the green synthesis of metallic nanoparticles through bio-reduction of metallic particles leading to the synthesis of nanoparticles. These biosynthesized metallic nanoparticles have a range of unlimited pharmaceutical applications including delivery of drugs or genes, detection of pathogens or proteins, and tissue engineering.

Keywords: *Nanoparticles, Waste treatment, Green synthesis.*

Introduction

The green chemistry and or green chemical technology should prevent waste formation; provide maximal incorporation of all raw materials and chemicals into production of final product; strive to use the renewable raw-materials; reduce the energy consumption, in particular to strive to implement the processes without heating and increased pressure; apply cheap and effective catalysts; avoid the use and production of toxic materials, substances, solvents and products; develop and seek to use biodegradable materials, substances and products to avoid pollution of the environment; to avoid the unnecessary derivatization; prevent to use chemicals, which can cause explosion, fires and dangerous emissions; implement the real-time production monitoring; and some others. As is known, plant biomass involves wood and some other species of terrestrial plants, as well as residues of forest and agricultural plants, industrial residues of textile, pulp and paper, municipal paper waste, etc.

Nanotechnology is amongst the most widely used technologies in translational research. The development of metallic nanoparticles employing biological materials by an eco-friendly approach has attracted significant attention. Nanotechnology deals with particles of a size ranging from 1 to 100 nm, their synthesis strategy, and manipulation. This knowledge domain naturally commingles all the fields of natural sciences together with chemistry, physics, biological sciences, engineering, materials science, and computational sciences for the formulation of nanostructure

Moreover, huge amounts of aquatic plants also can be used as appropriate feedstock for biomass processing The plant biomass is inexpensive, abundant and renewable natural material, resources of which increase by 100 billion tons annually as a result of the photosynthesis reaching 1.5 trillion tons [3, 4]. Although biomass is a renewable and biodegradable source, the chemical technologies of its processing, such as production of pulp, microcrystalline cellulose, Nano cellulose, bio products and some other products are accompanied by a large amount of harmful sewage and gas emissions polluting the environment.

Literature Review

The formation of nanoparticles is the “consequence” of the resistance mechanism of an organism in contrast to a specific metal (Figure 2). The synthesis of “Natural” biogenic

metallic nanoparticle synthesis is split into two categories.

Organisms have advanced to endure in environments of high concentrations of metals (Bisen et al., 1987, 1996; Khare and Bisen, 1991). These organisms may alter the chemical nature of the toxic metals by lowering their toxicity or making them non-toxic (Singh et al., 1989, 1993; Sharma and Bisen, 1992; Sharma et al., 2001).

Research Work

There are two general strategies for the synthesis of nanomaterial's: the top-down approach, wherein a larger structure is broken down into smaller pieces using chemical, physical, and biological energy; and the bottom-up approach, in which material is synthesized from the atomic level using various chemical, physical, or biological reactions to make a large nanostructure (Das et al., 2017). The chemical and biological methods are primarily accustomed to build nanostructured carriers (NC) employing this approach

Conclusion

As a result, lignin and hemicelluloses are removed, while cellulose is separated, washed, and dried. However, the existing industrial pulping methods have a number of significant problems. Soda and sulfite processes are expensive and accompanied by high volume of harmful liquid waste that pollutes the environment and must be purified using complex and costly chemical and biological methods.

Consider the following examples of green chemical technology of plant biomass. Green Pulping Technology To isolate the cellulose, a plant raw-material is heated within closed vessels under pressure in the presence of caustic soda (soda process), mixture of sodium hydroxide with sodium sulfide (Kraft process), or sulfurous acid and salts thereof (sulfite process).

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DIVERSITY, POPULATION AND HABITAT USED BY SPIDERS IN COTTON AGRO-ECOSYSTEM

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ABSTRACT

In all 8891 spiders were collected from 14 families, 39 genera and 46 species per acre from Cotton agro-ecosystem by using visual search and pitfall trap method. In the Collection 63.55% specimens were adults and 36.45% spiders collected were immature. Lycosids dominated the collection with 1957 (22.01%) specimens followed by Araneids 1588 (17.86%), Oxyopids 1288 (14.48%), Tetragnathids 989 (11.12%) and then Salticids 929 (10.44%). The species abundance was in the order Araneidae > Salticidae > Theridiidae > Lycosidae. The population of hunters and web builders was 66.67% and 33.32%, showing clear dominance of hunters. Sparrasids were not reported and thomisid spiders were just 0.95% of the total population. 15 new species were recorded (Table-1) which includes Cyclosa gossypiata sp. nov., Cyclosa moonduensis(male), Lipocrea epeiroides, Clubiona foliata sp. nov., Schizocosa sp. nov., Oxyopes tiengianensis , Myrmarachne sp., Scytodes sp., Scytodes sp., Phoneyusa sp.nov., Nesticodes rufipes, Theridion sp. nov. , Theridion sp. nov. , Thomisus okinawensis, Uloborus walckenaerius. A new genus Phoneyusa (for India) from Theraphosidae was recorded from cotton agro-ecosystem.

Keywords: *Spider, Cotton fields, agro-ecosystems*

Introduction

Cotton is one of the most important commercial crops playing key role in economic and social affairs of the world. Although, it is cultivated in more than 80 countries of the world, ten countries viz – USA, China, India, Brazil, Pakistan, Turkey, Mexico, Egypt and Sudan account for nearly 85% of the total production. There are four cultivated species of cotton, viz. *Gossypium hirsutum*, *G. arboreum*, *G. herbaceum* and *G. barbadense*. India is the only country where all the 4 cultivated species are grown. However, the crop output is affected due to insect pests on them. In India over 160 species of insects and non insects pests have been reported to damage the cotton crop (Agrawal, 1978). Important insect-pests of cotton are American bollworm, pink bollworm, spotted bollworm and spiny bollworm), cutworm (*Agrotis* sp), aphids (*Aphis gossypii*), white fly, red cotton bug, spider mites, cotton jassids and thrips.

Dippenaar-Schoeman *et al.* (1999) studied spiders in South African cotton fields with respect to diversity and abundance (Arachnida: Araneae). Van den Berg *et al.* (1990) investigatedthe effect of pesticides on spiders in South African cotton fields. Spiders are generalist predators that can function as biological control agents within agroecosystems (Moulder and Reichle, 1972; Nyffeler and Benz, 1987; Riechert and Bishop, 1990; Young and Edwards, 1990; Kajak *et al.*, 1991; Kajak, 1997).Mellet, *et al.* (2006) investigated the effect of Bt-cotton cultivation on spider populations in Marble Hall, South Africa.According to them neither Bt-cotton nor the application of endosulfan had apparent negative effects on ground or plant dwelling spiders in the field. Spiders should therefore be able to continue playing a role in biological control in Bt-cotton fields. Ghavami *et al.* (2007) investigated the spider fauna of cotton fields in Iran during 2003-2004. The mean populations of spiders in cotton fields from three different places like Thayilpatti, Madathuppatti and Vembakkottai, Virudhunagar district, Tamil Nadu, India were studied by Jeyaparvathy *et al.* (2012). Jeyaparvathi *et al.* (2013) also investigated the biological control potential of spiders on the selected cotton pests and found that the three species of spiders like (*Peucetia viridana*, *Oxyopes birmanicus* and *Peucetia latikae* were predominant in the cotton fields of

Achamthavirthan, Virudhunagar district, Tamil Nadu, India.

Spiders are one of the major predatory groups within the agro-ecosystem, and are intrinsic in maintaining the ecological balance of pest species (Wise, 1993). Their diversity within this system is therefore important in providing a stable and natural method of pest control. Considering their role in the agro-ecosystem, the present study was undertaken to know the diversity, population structure and habitat use by the spiders in cotton agro-ecosystem from Purna river basin.

Absolutely no work has been done on spider diversity in cotton agro-ecosystem from Vidarbha and Maharashtra. The present study was an effort to make an inventory of spiders along with the details about the microhabitats used by the spiders

METHODOLOGY

Study area

The present work was carried out in agricultural fields from Purna river basin which originates in Pokharni Village 21° 30'N 77° 46'E which is 2 km away from Bhainsdehi (Betul district Madhya Pradesh adjoining Amravati district of Maharashtra).

Rain fall

The basin receives most of the rainfall from the South-West monsoon during June to September. The weighted mean maximum, minimum and average annual rainfall of the basin during last 10 year were 2599 mm, 654 mm and 1431 mm respectively.

Temperature

The mean monthly temperature varies from 12.7 ^{o}C during December to 42 ^{o}C in April.

Humidity

The humidity during winter season is as low as 42% in the month of February and as high as 89% in the month of August.

Wind speed

The mean daily wind speed is maximum (12.33 km/hr) in the months of June and minimum (4.3 km/hr) in the month of December.

Cropping pattern: The crops are dominated by cotton and orange in the three districts of Vidarbha and banana plantations in Jalgaon district. Hence spider diversity is studied from various cotton fields. This includes both irrigated and non irrigated fields; throughout the basin.

Spider collection:

Todocument a comprehensive inventory of spiders from cotton agro-ecosystemwell established sampling protocols for spider collection were adopted in different selected sampling plots, which included pitfall trap and hand collection.

Pitfall Trapping - Wet pitfall trap method was used to study the ground dwelling spiders. The pitfall traps consisted of a 9 cm wide by 16 cm deep plastic jar, one-third filled with 30% ethyl acetate and a few drops of liquid soap/detergent. The pitfall traps were left open for a period of four days. The distance between two adjacent jars was 1 meter.

Collecting by Hand -A soft paintbrush was used to gently knock the specimen into a collecting vial. Many a times after observing the spider it was gently pick off by hand. Remains of webs and the curling leaves of plants were examined for any spiders in them and were collected in plastic vials. Many a time's stones were unturned for spiders hiding there. This method of sampling was used to collect the spiders, which were found on the ground, under the litter, mulch etc. Web-building and free-living spiders on the foliage and stems of living or dead shrubs etc. were also collected by hand picking.

Post collection work

After coming to the laboratory, the spiders were sorted according to the family and thenphotographs were taken by using the camera, then the legs and palps of the spiders were manipulated and made straight by dipping them in warm water and after making their legs straight they were immediately transferred to 70% ethyl alcohol in a petridish. Legs and palps were again made straight and properly oriented. Plastic U- pins were kept on spider legs and palps as weight, so that they are not folded back. All the mature specimens were

identified by dissecting their genitalia upto the species level. A help of relevant literature from India and abroad was taken for proper identification. While survey and collection of spiders from cotton fields microhabitat used by them were noted.

Analysis

Spiders captured by pitfall traps and hand picking methods were pooled for each site for quantitative analysis. Species richness was estimated for each cropping type. Similarity of spider species among different crop zones was examined using the diversity indices including Shannon – weiner index, Simpson index and Margalef richness index. The diversity, richness, and evenness indices for spiders were calculated using the Biodiversity calculator (www.
Alyoung.com/labs/biodiversity_calculator.
html) .
Voucher specimens are deposited at Arachnology Museum, Forest Training Institute, Chikhaldara.

Observations and Results

In all 8891 spiders were collected from 14 families, 39 genera and 46 species per acre from Cotton agro-ecosystem by using visual search and pitfall trap method (Table No.1). In the Collection 63.55% specimens were adults and 36.45% spiders collected were immature. Lycosids dominated the collection with 1957 (22.01%) specimens followed by Araneids 1588 (17.86%), Oxyopids 1288 (14.48%), Tetragnathids 989 (11.12%) and then Salticids 929 (10.44%). The species abundance was in the order Araneidae > Salticidae > Theridiidae > Lycosidae (Fig.No.1). The population of hunters and web builders was 66.67% and 33.32%, showing clear dominance of hunters. Sparrasids were not reported and thomisid spiders were just 0.95% of the total population.

15 new species were recorded (Table-1) which includes *Cyclosa gossypiata* sp. nov., *Cyclosa moonduensis*(male), *Lipocrea epeiroides, Clubiona foliata* sp. nov., *Schizocosa* sp. nov., *Oxyopes tiengianensis* , *Myrmarachne* sp., *Scytodes* sp., *Scytodes* sp., *Phoneyusa* sp.nov., *Nesticodes rufipes, Theridion* sp. nov. , *Theridion* sp. nov. , *Thomisus okinawensis, Uloborus walckenaerius*. A new genus *Phoneyusa* (for India) from Theraphosidae was recorded from cotton agro-ecosystem.

The orb weavers like *Eriovixia excelsa, Neoscona theisi,Neoscona vigilans,Guizygiella indica,Leucauge decorata* and*Tetragnatha mandibulata* were seen constructing web of small size depending on the space available and were successful to capture enough prey. The ability of these spiders to construct webs of small sizes with suitable inclination in Cotton agro-ecosystem. Thus the distribution of spiders in Cotton agroecosystem is very typical, vertically stratified so that the crop is protected from all types of pests. The present observation thus supports the earlier observations made by Nyffeler *et al.* (1989); Hayes and Lockley (1990); Van Den Berg *et al.* (1990), Ghafoor (2002) and Bundy (2005). In one study, Dippenaar-Schoeman *et al.* (1999) observed Thomisids as dominant predators in Cotton fields, but in the present study Lycosids were the dominant predators in Cotton- agroecosystem. Thomisids represented only 0.95% population.

While survey and collection of spiders from cotton fields microhabitat used by them were noted and accordingly the detail observation are given in (Table.2).
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Table: 1 Spider species collected (Per acre) from Cotton agro-ecosystem.

Spider Species	Female	Male	Immature	Total
Family : Araneidae Clerck, 1757			671	1588
Cyclosa confraga (Thorell,1892)	1	0		
Cyclosa gossypiata sp. nov. Keswani, 2013	61	0		
Cyclosa moonduensis Tikader,1963	59	34		
Cyclosa spirifera Simon,1889	30	14		
Cyrtophora citricola (Forsskål,1775) *	55	16		
Eriovixia excelsa (Simon,1889)	101	65		
Larinia chloris (Audouin,1826)	79	0		
Lipocrea epeiroides (O. P.-Cambridge,1872)	49	32		
Neoscona theisi (Walckenaer,1841)	189	51		
Neoscona vigilans (Blackwall,1865)	55	26		
Family : Clubionidae Wagner,1887			220	560
Clubiona foliatasp. nov.	263	77		
Family : Gnaphosidae Pocock,1898			288	617
Drassodes luridus (O. P.-Cambridge,1874)	99	21		
Sergiolus singhi Tikader & Gajbe,1976	9	0		
Zelotes shantae Tikader,1982	139	61		
Family : Lycosidae Sundevall,1833			779	1957
***Hippasa*greenalliae** (Blackwall,1867)	102	70		
Lycosa poonaensisTikader & Malhotra,1980	436	0		
Pardosa pseudoannulata(Bösenberg & Strand,1906)	429	124		
Schizocosa sp. nov.	17	0		
Family : Miturgidae Simon, 1886			180	320
***Cheiracanthium* inornatum** O. P.-Cambridge,1874	72	68		
Family : Oecobiidae Blackwall,1862			7	20
Oecobius putus O. P.-Cambridge,1876	8	5		
Family : Oxyopidae Thorell,1870			366	1288
Oxyopes pankaji Gajbe & Gajbe, 2000	437	173		
Oxyopes tiengianensis Barrion & Litsinger,1995	235	75		
Peucetia latikae Tikader,1970	0	2		
Family : Salticidae Blackwall,1841			266	929
Hasarius adansoni (Audouin,1826) *	54	45		
Hyllus semicupreus (Simon,1885)	0	95		
Myrmarachne sp.	9	6		

Phintella vittata (C. L. Koch,1846)	117	26		
Plexippus paykulli (Audouin,1826) *	34	88		
Rheneflavigera (C. L. Koch,1846) *	0	44		
Telamonia dimidiata (Simon,1899)	89	31		
Thyene imperialis (Rossi,1846) *	13	12		
Family : Scytodidae Blackwall,1864			45	150
Scytodes sp.	51	0		
Scytodes sp.	54	0		
Family : Tetragnathidae Menge,1866			285	989
Guizygiella indica (Tikader & Bal,1980)	215	86		
Leucauge decorata (Blackwall,1864)	200	61		
Tetragnathamandibulata Walckenaer,1841	71	71		
Family : Theraphosidae Thorell,1869			0	2
Phoneyusa sp.nov.	1	1		
Family : Theridiidae Sundevall,1833			83	336
ArgyrodesargentatusO. P.-Cambridge,1880	30	24		
Parasteatoda mundula (L. Koch,1872)	60	0		
Theridula gonygaster (Simon,1873)	34	0		
Nesticodes rufipes (Lucas,1846) *	19	6		
Theridion sp. nov.	9	0		
Theridion sp. nov.	71	0		
Family : Thomisidae Sundevall,1833			41	85
Indoxysticus minutus (Tikader, 1960) *	21	15		
Thomisus okinawensis Strand,1907	8	0		
Family : Uloboridae Thorell,1869			10	50
Uloborus walckenaerius Latreille,1806 *	22	18		
14 FAMILIES, 39 GENERA, 46 SPECIES	**4107**	**1543**	**3241**	**8891**

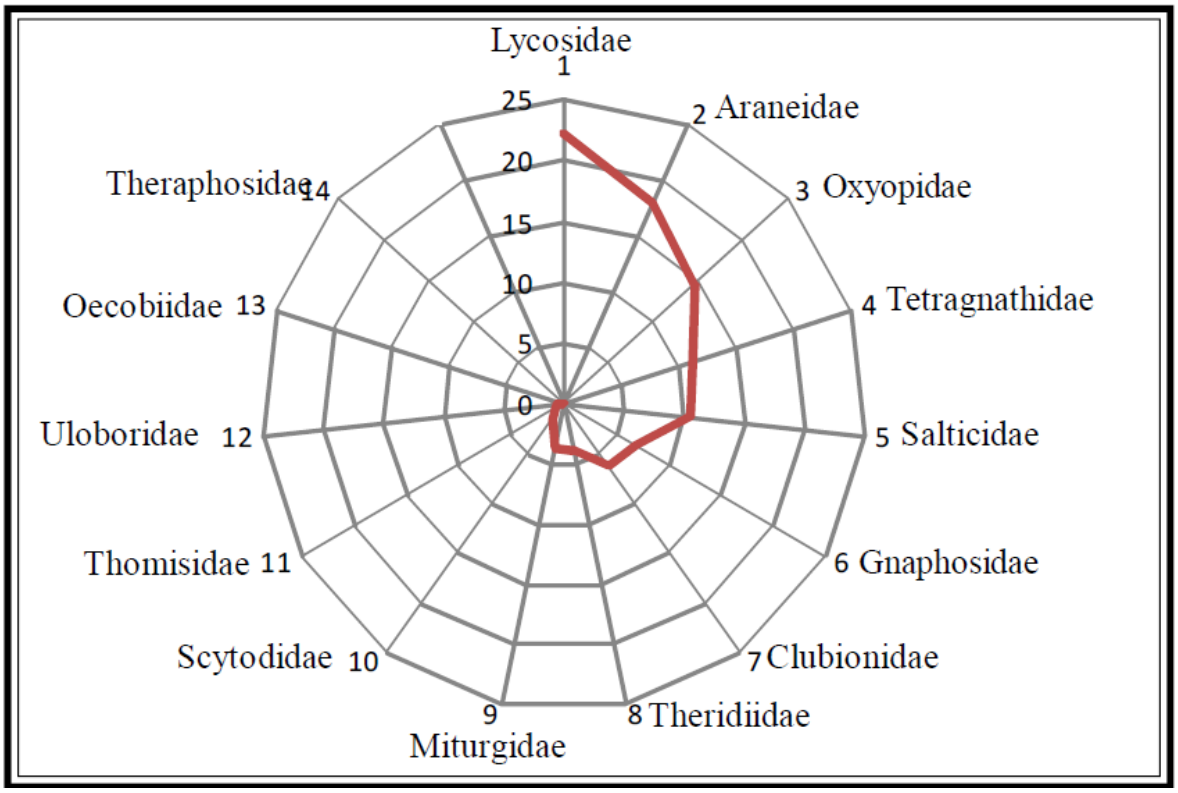

Fig.1, Familywise percent occurrence of spider population per acre of Cotton agro-ecosysten

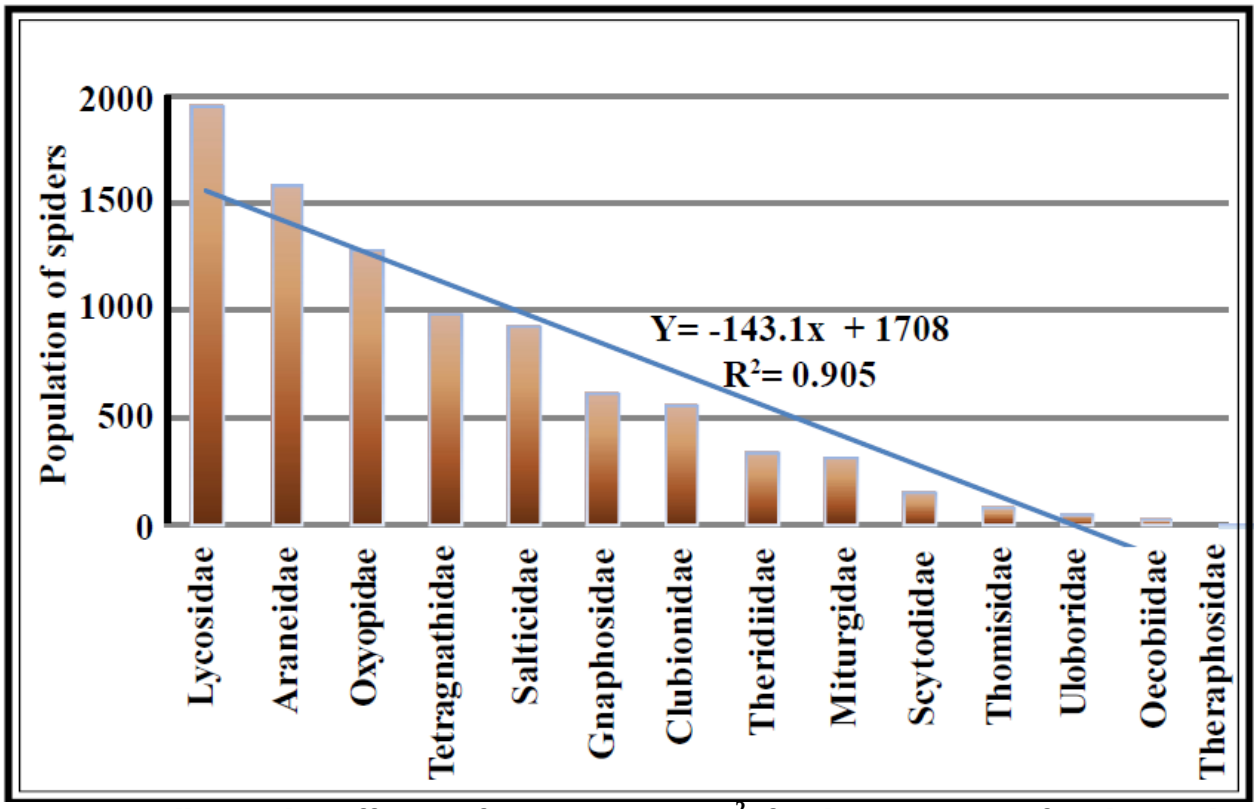

Fig.2, Trendline and Coefficient of Determination (R^2) for the occurrence of spiders in the cotton agro-ecosystem from Purna river basin

Table: 2. Microhabitat used by spiders in Cotton agro-ecosystem.

Species	Microhabitat used by spiders in Cotton agro-ecosystem
Cyclosa confraga (Thorell,1892)	Scattered throughout the plant structure
Cyclosa gossypiata sp. nov. Keswani,2013	Scattered throughout the plant structure
Cyclosa moonduensis Tikader,1963	Scattered throughout the plant structure
Cyclosa spirifera Simon,1889	Scattered throughout the plant structure
Cyrtophora citricola (Forsskål,1775) *	In webs towards the periphery
Eriovixia excelsa (Simon,1889)	On the web between adjacent plants and branches
Larinia chloris (Audouin,1826)	Scattered throughout the plant structure
Lipocrea epeiroides (O. P.-Cambridge,1872)	Scattered throughout the plant structure
Neoscona theisi (Walckenaer,1841)	On foliage, on the web build between adjacent plants and branches
Neoscona vigilans (Blackwall,1865)	On foliage, on the web between plants and branches
Clubiona foliata sp. nov.	Inside curled leaves, on foliage, at the base of cotton fruit, inside open cotton boll
Drassodes luridus (O. P.-Cambridge,1874)	On ground surface, in leaf litter
Sergiolus singhi Tikader & Gajbe,1976	On ground surface, in leaf litter
Zelotes shantae Tikader,1982	On ground surface, in leaf litter
***Hippasa*greenalliae** (Blackwall,1867)	At the base of plant inside sheet web provided with tunnel
Lycosa poonaensis Tikader & Malhotra,1980	On ground, soil crevices
Pardosa pseudoannulata (Bösenberg & Strand,1906)	On ground, soil crevices
Schizocosa Sp.nov.	On ground
***Cheiracanthium* inornatum** O. P.-Cambridge,1874	On foliage, under leaf litter
Oecobius putus O. P.-Cambridge,1876	On the surface of stones towards the boundry of field
Oxyopes pankaji Gajbe & Gajbe,2000	On foliage, on ground
Oxyopes tiengianensis Barrion & Litsinger,1995	On foliage, on ground
Peucetia latikae Tikader,1970	On foliage, in grass
Hasarius adansoni (Audouin,1826) *	Among leaf litter, foliage, on ground
Hyllus semicupreus (Simon,1885)	Among leaf litter, foliage, on ground
MyrmarachneSp.	On foliage, ground
Phintella vittata (C. L. Koch,1846)	On foliage, on ground, in leaf litter
Plexippus paykulli (Audouin,1826) *	On foliage, on ground, among leaf litter
Rheneflavigera (C. L. Koch,1846) *	On foliage, on ground, among leaf litter
Telamonia dimidiata (Simon,1899)	On foliage
Thyene imperialis (Rossi,1846) *	On foliage, ground, among leaf litter
***Scytodes* Sp.**	Inside dried leaves, on ground
***Scytodes* Sp.**	Inside dried leaves, on ground
Guizygiella indica (Tikader & Bal,1980)	Inside rolled up leaves, on web between plants and branches
Leucauge decorata (Blackwall,1864)	Between plants and branches close to the ground
Tetragnathamandibulata Walckenaer,1841	On web between plants and branches near the ground, on the open cotton boll, on the basal branches
Phoneyusa sp.nov.	Ground
Argyrodesargentatus O. P.-Cambridge,1880	Inhabiting webs of *Cyrtophora*
Nesticodes rufipes (Lucas,1846) *	In the webs towards the periphery of field
Parasteatoda mundula (L. Koch,1872)	Inside the dried leaf entangled in the web

Theridion sp. nov.	Throughout the cotton plant structure
Theridion sp. nov.	Throughout the cotton plant structure
Theridula gonygaster (Simon,1873)	On foliage
Indoxysticus minutes (Tikader, 1960) *	On foliage
Thomisus okinawensis Strand,1907	On foliage, on flowers
Uloborus walckenaerius Latreille,1806 *	Underside of the leaf in the middle of the plant

DISCUSSION

The present study dealts with the spider diversity in a specific locality like agro-ecosystem, that too in a specific region of Vidarbha that is Purna River Basin. In cotton agro-ecosystem Lycosid population was the highest (22.01%) followed by Araneids (17.86%) and then Oxyopids (14. 48%) and Salticids (10.44%) indicating major population of hunting spiders.

The Shannon index calculated for cotton agro-ecosystem was 4.777. This is confirmed further by calculating Margalef richness index. The Margalef richness index is 5.209 for spider diversity in cotton agro-ecosystem. The R-Squared value calculated for cotton agro-ecosystem is 0.905. In Cotton agro-ecosystem Lycosid rearing can be taken up at priority for pest control.

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FISH DIVERSITY OF SONALA DAM (MAHARASHTRA), INDIA

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ABSTRACT

Fish contributes the half of total number of the vertebrates in the whole world. They live in almost all possible aquatic habitats and show enormous diversity of size, shape and biology. About 21,730 species of fishes have been recorded in the world of which near about 11. 7 % are found in India. In the present study fish diversity of sonala dam (Maharashtra), India was studied. The given study reveals the presence of 8 species of fishes belonging to 3 orders, 3 families and 8 genera from the study area.

Introduction

Water is a crucial for the alive of the living organism. The most of the organism are complete their life cycle in water. And the most of the activities are done in the water The water is one of the most significant liquid material which helps most of the organisms to complete their metabolic activities and the most of the organisms are stay the water or they are the aquatic organisms. There are many sources of water sources we see in environment surround us. Such as bore wheels, wheels and most vital source is rain water But for their storage we need some space and the good quality of ground. There are some artificial as well as some are natural present in our surrounding environment India is endowed with a vast spread of open inland water. There are about 11.53.366 hectare reservoirs, 202.213 hectare lakes, 2200,000 hectare ponds, besides 29,000 km length of rivers (Sugunan, 1999).

About 21.730 species of fishes have been recorded in the world of which, about 11.7% are found in Indian waters. Out of the 2546 species so far listed, 73 (3.32%) belong to the cold freshwater regime, 544 (24.73%) to the warm fresh waters domain. 143 (6.50%) to the brackish waters and 1440 (65 45%) to the marine ecosystem. The Indian fish fauna is divided into two classes, viz., Chondrichthyes (cartilage fishes) and Osteichthyes (bony fishes). The endemic fish families form 2.21 per cent of the total bony fish families of the Indian region 223 endemic fish species are found in India, representing 8.75 per cent of the total fish species known from the Indian region.

Ichthyodiversity talk about to variety of fish species, depending on context and scale, it could refer to alleles or genotypes in piscian population, to species of life forms within a fish community, and to species of life forms across aquaregimes (burton, 1992). Biodiversity is alsoimportant for the maintenance and for the stabilization of ecosystems, protection of an environmental quality, for understanding intrinsic value of all species on the earth (Ehrlich and Wilson, 1991) Positive association between biomass production and species abundance has been recorded in various earlier studies (Nikolsky, 1978).

Fish diversity: Fish in the whole world contribute the half of the total number of the vertebrates. They live in almost all possible aquatic habitats. They show enormous diversity of size shape and biology, and in the habitats they occupy. Of the 39.000 species of vertebrates in the world, Nelson (1984) estimated 21.723 extant species of fish under 4,044 genera 445 families and 50 Orders in the world, compared to 21,450 extant tetrapod. Of these 8,411 are freshwater species and 11,650 are marine. Other researchers have arrived at different estimates, most of which range between 17,000 and 30,000 for the numbers of currently known fish species. The consequent number of living fish species may be close to 28,000 in the world. Day (1889) described 1418 species of fish under 342 genera from the British India. The fish fauna of the major

tropical regions, southern Asia, Africa, South and Central America are generally different with respect to genera, but, some families have members in two or all of the continents. In southern Asia the major fish group is carps (Cyprinidae) and the cat fishes (Berra, 1981).

Artificial sources: The artificial sources of water are basically prepared by man power. The artificial or manmade sources are having limited quantity of capacity to retain water in them. The sources are dam, ponds, hand pump, canal, etc.

Natural sources: Natural sources of water present on earth surface and the natural sources are not made by human and the natural sources quantity capacity of water retain in that source we cannot calculate. The natural sources are lakes, river, water fall, natural fountain, sea, ocean, etc. Water is stable and also in the form of moving or flowing it depends upon the source in which it is present. According to the fisher man water sources are have more significance role in their life because the one of the business is done by the fisherman that is fishing it may be from stable water source or may be from the moving or flowing water source that sources are lakes, rivers, ponds dams, etc. Fish depends upon food for their survival and that is nothing but the zooplanktons, phytoplanktons, fungi, algae, and many more aquatic microorganisms.

Review of literature

A. G. Thakare, Somatkar J. R. and D. S. Dabhade (2016) Studied on diversity of fresh water fishes from the Washim district of Maharashtra, India. They found 22 species of fishes belonging to 06orders, 11 families and 19 genera from the study area. **Sabujkumarchaudhuri (2004)** has reported in their research Freshwater Fish Diversity. The paper highlights some features and impacts of erosion of this biodiversity.

Devashishkar, A.V. Nagarathna, Ramachandra T.V. and S.C. Dey (2006) has studied fish diversity and conservation aspects in an aquatic ecosystem In northeastern India, The study revealed the occurrence of 69 species of fishes in the lake belonging to 49 genera, 24 families and 11 orders. Of these fishes, 84.2% belonged to the primary freshwater group (Cyprinids 35.39%), while the rest to the peripheral class. **Christopher M. Taylor, Thomas L. Holder, Riccardo A. Fiorillo, Lance R. Williams, R. Brent Thomas, and Melvin L. Warren, Jr. (2006)** studied Distribution, abundance, and diversity of stream fishes under variable environmental conditions; their results illustrate how the integrity of local stream fish assemblages is dependent on local environmental conditions, regional patterns of species distribution, and landscape continuity.

M. Venkateshwarlu, K. Honneshappa, Shahnawaz A. and N.V. Cinchana (2009) Studied Fish diversity of Sogane and Santhekadur tanks, Shimoga, Karnataka, About 17 fish species were identified in these tanks which were represented by 4 orders, 11 families and 14 genera. **A.T. Kamble and L.M. Mudkhede (2009-10)** studied fish fauna and productivity of Loni reservoir, Tq. Kinwat (Maharashtra). **Wazir Singh Lakra, Uttam Kumar Sarkar, Rupali Sani Kumar, Ajay Pandey, Vineet Kumar Dubey and Om Prakash Gusain (2010)** studied Fish diversity, habitat ecology and their conservation and management issues of a tropical River in Ganga basin, India and study shows that the river supports considerable diversity of the fishes and is important for conservation and about 34% fish fauna is threatened being either vulnerable or endangered. **Sarwade J. P. and Y. K. Khillare (2010)** Studied fish diversity of Ujani wetland, Maharashtra, India and their investigation revealed the occurrence of 60 fish species belonging to 6 orders, 15 families and 36 genera. **A. Senthil Muruganand C.Prabaharan (2011)** Studied Fish Diversity In Relation To Physico-Chemical Characteristics of Kamala Basin of Darbhanga District, Bihar, India 35 fish fauna identified during the study belongs to 22 family few includes Cyprinidae 31 species, Cobitidae 4 species, Ophiocephalidae 4 species, Bagridae 6 species etc. **Patel Y.E., Shaikh H.M. and N.G.Patel (2015)** studied Diversity Of Ichthyofauna In Waghur Dam Near Jalgaon District (M.S.) India. During study 25 species Identified which are belongs to 6 orders. In the

study Ichthyofauna population is found abundance and majority of the fishes are used for human consumption. **Ram Negi (2013)** studied Species Diversity, Abundance and Distribution of Fish Community and Conservation Status of Tons River of Uttarakhand State, India in the present investigation, habitat ecology, species diversity, distribution and different indices of fish diversity management were studied in Ton river, a tributary of Yamuna river, located in Uttarakhand, India to recommended conservation management measures.

S. S. Patole (2014) studied lchthyofaunal diversity of Nandurbar District (Northwest Khandesh Region) of Maharashtra (India).**Bapurao V. Jadhav, Sanjay S. Kharat, Rupesh N. Raut, Mandar Paingankarand NeeleshDahanukar (2014)** studied Freshwater fish fauna of Koyna River, northern Western Ghats, India We recorded 58 species belonging to 16 families and 35 genera. Eleven out of the 22 fish species endemic to the Western Ghats are restricted to the Krishna River system. Eight endemic fish species are known to be threatened because of various anthropogenic activities. **Sakhare V. B. and A. D. Chalak (2014)** Studied Ichthyofauna of Wan Reservoir. **S. R. Sheikh (2014)** was studied Studies on Ichthyofaunal diversity of Pranhita River, Sironcha, Dist: Gadchiroli, Maharashtra. The result of the present investigation reveal that occurrence of 37 species belonging to 21 different genera, in 11 families 08 order were recorded. **Sabuj Kumar Chaudhuri (2016)**Was studied Freshwater Fish Diversity Information System as a basis for Sustainable Fishery. The paper highlights some features and impacts of erosion of this biodiversity. **S.N. Tayade (2016)** studied Fish diversity of Morna River. A total of 30 fish species were recorded during the study belonging to 10 families and 5 orders. Among these, Ophisternonbengalense was first time reported from Maharashtra on West coast of India.

Mirgane A.P. and A.C. Kumbhar (2016) studied A checklist of freshwater fishes at Katphal Lake, Tal- Sangola, Dist- Solapur (M.S.) India. Total 21 species of fishes were collected and identified during the study period, which belongs to 6 orders, 12 families and 17 genera. **R.N. Khade, D.S. Dabhade, Chondekar R.P. and S.N. Tayade (2017)** Studied lchthyofaunal diversity of wan river, tributary of Tapi River. **Gulhane R. A. (2017)** Studied Checklist Of Ichthyological Fauna Of Washim District, Maharashtra, India. Total of 36 species belonging to 11 families were recorded. **Tayade S.N., Dabhade D.S. and R.N. Khade (2018)** studied on Fishery status of upper Morna reservoir, Medshi (M. S.) The reservoir was found to be more productive as compared to the national average fish production from the reservoirs which is 29.7 kg/hector.

Materials and methods

Study Area: Sonala Dam is an earth fill dam on Aran River near Mangrulpir, Washim district in the state of Maharashtra, India. It is located at 20.3230174 and 77 206496°E The height of the dam above lowest foundation is 19.6 m (64 ft.) while the length is 1,114 m (3,655 ft.). The volume content is 698 km' (167 cu mi) and gross storage capacity is 20,270,00 km (4,863.03 cu mi) main purpose of this dam is irrigation but now days the catchment of fishery activities are takes place rapidly now days. And the fishing is done in this dam by some of the local fisherman of that region.

Method of Collection of fishes: Fishes are collected by using various types of nets such as gill nets, cast net, drag net, bhorjal. Gill netting was installed over night and cast netting during day time. The fishes are collected from that sonala dam for the present study and the market places near of the dam such as Washim fish market and Mangrulpir fish market and Malegaon fish market of Washim district. The fish samples are collected from sonal dam and the market place near about the sonal dam using various types of fishing methods such as cast nets (16mm, 22mm), gill nets (32mm, 38mm, 64mm, 78mm, 110mm), drag nets (4mm, 15x3 meters), scoop nets and other local contrivances.

Identification of fish sample: Collected fish samples were preserver in 10% formalin for detailed examination and identified by using

standard literature of Day (1878) and Talwar and Jhingran (2001). And also some fishes are identified by using some of the research paper information. The length and weight of fish were recorded together with photography of fish.

Result and discussion

Sr. No	Phylum	Class	Order	Family	Genus	Species	Common Name
1	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Labeo	L.rohita	Rohu
2	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Catla	L.catla	Katla
3	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Cirrhinus	C.mrigala	Mrigal
4	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Oreochromis	O.mosum bicus	Talapia
5	Chordata	Actinopterygii	Siluriformes	Bagridae	Sperata	S. aor	Catfish
6	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Salmostoma	S.phulo	Chandni
7	Chordata	Actinopterygii	Synbranchiformes	Mastacembelidae	Mastocenbelus	M.armatus	Baam,bami
8	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Cirrhinus	C.reba	Reba

Table I: Taxonomic Summery of Fishes in Sonala Dam

Fig. 1 *Labeo rohita*

Fig.2.*Catla catla*

Fig. 3 *Cirrhinus mrigala*

Fig.4.*Tilapia mosumbica*

Fig. 5 *Sperataaor*

Fig.6.*Salmostomaphulo*

Fig.7. *Mastocembelusarmatus*

Fig. 8.*Cirrhinus reba*

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STUDIES ON EZYMATIC BIOPROSPECTION OF MICROBIAL ENDOPHYTES ISOLATED FROM EMBLICA OFFICINALIS

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ABSTRACT

Endophytes are the microbe includes Bacteria, Fungi and Actinomycetes that colonize in internal plants tissues devoid of any immediate over negative effects on host plants. Endophytes of medicinal plants are the exclusive source of bioactive compounds for Pharmaceutical, Leather, Detergents, Agriculture and Textile importance. However their trait of producing the digestive enzymes has scarcely exploited. Hence, in the present investigation microbial endophytes were isolated from different plant parts of matured Emblica officinalis. All the Bacterial, Fungal and Actinomycetal endophytes were identified and further evaluate for Amylase, Protease and Lipase production. The enzyme activity of endophytic microorganism was determined by substrate digestion on solid medium adopting spot inoculation method. The study indicates that microbial endophytes viz. bacteria, fungi and actinomycetes existed in different plant parts of Emblica officinalis. The outcome of the study is also progressive for the ability of isolated endophytes to produce digestive enzymes. Theseindicates the possible opening to use isolated endophytes as production strain for human digestive enzymes production inindustry over wounding the plant resources.

Keywords: *Endophytes, Extracellular Enzyme, Substrate digestion, Emblica officinalis.*

Introduction

Endophytes are classically defined as the plant associated microorganisms includes Bacteria, Fungi and Actinomycetes that are present in living tissues of plants without causing any symptom of diseases. Almost all 3,00,000 vascular plants species that exist on the earth examined to date are the host to one or more endophytes (Strobel G.A and Daisy B.,2003). However, only least of them have been described (Petrini 1991). They promotes the plant growth by nitrogen fixation, phosphate solubilization , producing plant growth promoting substance (phytoharmones) and developing resistance to stress conditions(Hasegawa *et al*., 2000; Kumar *et al*., 2011; Nimnoi*et al*., 2010 and Azevedo*et al*, 2000). Endophytes keep a check on the growth of plant pathogen through enzyme production,antibiotics ,siderophores and due to the competition with the pathogen for plant nutrients and colonization sites. They may also exibit direct antagonism towards pathogens (Ryan *et al*., 2008; Quecine*et al*., 2008;). Endophytes have evidenced to be the capable sources of bioactive metabolites. These metabolites are of unique structure, including alkaloids, benzopyranones, chinones, flavonoids, phenolic acids, quinones, steroids, terpenoids, tetralones and xanthones (Tan *et al*, 2001). Hence, the endophytes may offer enormous opportunities for discovering products with impending applications in agrochemicals, pigments, antibiotics (antibacterial, antifungal, antiparasite), immune-suppressants, immune-modulators, anticancer compounds, antiviral, biocontrol, antidiabetic, antioxidant, antineurodegenaratives etc. (Cheng *et al* 2009, Sicilian*et al*, 2000, EI-Tarabily and Sivasithamparam 2006 ,Pande *et al*., 2008 and Gunatilaka,2006). Besides, the antibiotics and agrochemical, enzymes are most important product of endophytes.

Kumaresan and Suryanarayanan (2002) have reported the assemblage of endophytic fungi in young mature secant leaves of *R. apiwlata* and screened for the production of extracellular enzymes.Some endophytes are known to produce hydrolytic cell wall-degrading enzymes such as cellulases, hemicellulases, chitinases, amylases and glucanases. Other strains are also known for their ability to produce enzymes that degrade the lignin, cellulose and hemicellulose of higher plants. *Streptosporangium sp*. isolated from leaves of maize was reported to produce glucoamylase,

which is expected to improve industrial processes of starch degradation (Hasegawa *et al*, 2006).

Amla (*Emblica officinalis*)commonly known as Indian gooseberry is one of the most important medicinal plants in Indian traditional systems of medicine (Ayurveda, Unani and Siddha). It is a well-known fact that all parts of amlaare useful in the treatment of various diseases.The research on Amla(*Emblica officinalis*) has proved that it has anabolic, antibacterial, antidiarrhoeal, antidysenteric, expectorant, antispasmodic, antipyretic, antioxidative, antiviral, antiemetic, antihepatotoxic, immunomodulator and resistance building properties. Amla extract possesses anticancer, antisclerotic, lipid lowering, hepatoprotective and anti human immunodeficiency virus activities(Mekkawy*et al*, 1995 and Khan*et al*, 2002). In folk medicine, the fruits which are sour, astringent, bitter, acrid, sweet and anodyne exert several beneficial effects include cooling, ophthalmic, carminative, digestive, stomachic, laxative, dyspepsia, aphrodisiac, rejuvenative, diuretic, antipyretic and tonic(Swetha and Krishna 2014). However, the digestive importance of amla has less traced. Microbial endophytes mimics bioactive compounds produced by the plant itself, thus making them a promising source of novel molecules(Salini 2014).Hence, the present investigation was carried out to isolate microbial endophytes from different plant parts of matured *Emblica officinalis* and evaluate them for production of extracellular enzymes viz amylase,protease and lipase.

Materials and Methods

Collection of Plant Material

The plant materials *viz* leaves, stem, root and fruit of mature and healthy plant of *Emblica officinalis* werecollected in sterile plastic bags from Saraswati Agrotech farm, Dist; Washim(M.S),India.and transported aseptically to Microbiology research laboratory.Thereafter, all these plant materials were properly washed in running tap water to remove soil and dust and finally washed with distilled water.

Isolation of Endophytic Microorganism

Isolation of endophytes from plant materials have a need of surface sterilization. It was performed to remove the epiphytic microorganism. Surface sterilization was executed by immersingall the plant materials in 70% ethanol for 2minutesseparately.Further, the samples were washed in 2% sodium hypochlorite for 1 min followed by rewash in sterile distilled water for 2 min. and then dried aseptically at room temperature(30^0 C +/-5.) for 30minutes,so as to dry the plant surface (Khanwar*et al*., 2008).The efficiency of surface sterilization was confirmed by inoculating 1ml of final washed water from each plant material into liquid broth separately and incubated (Raviraja 2005). All the Surface sterilized plant materials *viz*, leaves, stem, root and fruits were crushed separately in fractionally sterile distilled water by using mortar and pestle. 1 ml of each crushed sample was serially diluted and 0.1 ml of each dilutionswere aseptically spread on Nutrient agar ,Potato dextrose agar and actinomycetal agar plates for the isolation of Bacterial, Fungal and Actinomycital endophytes respectively.The Nutrient agar plates were incubated at 28^0 C for 5 days. whereas, Potato dextrose agar and Actinomycital agar plates were incubated at room temperature for 7 day **(**Hallmann*et al*.,2006**)**. After incubation, morphologically distinct Bacterial, Fungal and Actinomycetal colonies were considered as endophytes only after observing the absence of growth in efficiencytested broth.Further all the Bacterial, Fungal and Actinomycetal isolates were subculture on nutrient agar plates, Potato dextrose agar plates and Actinomycetal agar plates respectively and incubated. After incubation the pure cultures of Bacterial, Fungal and Actinomycetalendophytes were preserved on the slants at 4^OC in refrigerator and all the slants were labeled with specific code of plant material and isolates number.The sub culturing of preserved endophytic isolates were done on specific media as per the requirement of the study.

Identification of Endophytic Microorganisms

The preliminary identification of the endophytic bacterial isolates were carried out on the basis of morphological ,biochemical properties by adopting the method of (Gayathri ;2010).The morphological characters of fungal isolates were studied macroscopicallyby examining the of colony featuresviz. Color, Shape and Texture on potato dextrose agar plates. Whereas, microscopic examination was performed by adopting lacto phenol cotton blue staining method(Kong And Qi 1985 ;Suryanarayanan and V Kumaresan; 2000).The identification of fungal isolates were confirmed by comparingmorphological characterswith standard literature. Endophytic actinomycetes were identified by studying their colonial,biochemical characteristics and their microscopic morphology as described by Bergey's Manual of Systematic Bacteriology and with published descriptions(Tan ;2006).

Evaluation of Enzyme Activity

The extracellular enzymes production was assessed qualitativelyby measuring digestion of dissolved substrate in solid agar medium. Amylolytic , Proteolytic and Lypolytic activity of all the bacterial endophytes was determined by cultivatingthem separately on starch,casein and tween 20supplemented nutrient agar(Swetha and Nachiyar 2013).Amylase and Proteaseactivity of Fungal and Actinomycetalisolate were assessed by inoculating them separately on starch and casein amended glucose yeast extract peptone (GYP) agar plates (Pavithra*et al* ,2012).Whereas, lipase activity of fungal and actinomycetal isolate was performed by growing them separately on tween 20 containing Peptone agar plates(Tan *et al*; 2001; Maria *et al*.,2005).All the nutrient agar plates were incubated at 37^{o}c for 24hrs. While,glucose yeast extract peptone (GYP) agar and Peptone agar plates were incubated at room temperature for 5 days. After incubation allthe starch agar plates were flooded with ligules iodine and observed for clear zone around colony against dark blue background. Protease activity was assessed by observing zone of clearance around colony on casein agar plates. Whereas, Lipase activity analyzed by observing zone of opalescence around colony growth on tween 20 agar medium.

Results and Discussions

Isolation of Endophytic Microorganisms

The results of present study indicates that the endophytic microorganisms viz Bacteria, Fungi and Actinomycetes harbor all plant parts of *Emblica officinalis*. The microbial endophytes also showed variations in the populationwith respect to plant parts.The results on isolation of microbial endophytes were presented in table 1.Total 87endophytic microorganisms were isolated from different plant parts of *Emblica officinalis*. It was observed that the maximum number of organisms present in Root (42.52%) followed by Stem (32.18%), Leaves(22.98%) and Fruit (2.29%). Similarly, among all the endophytic isolates; Fungal isolates were found to be a predominantly exist in *Emblica officinalis*.It was maximum(43.67%) throughout the plant system. Whereas (33.33%)endophytic Actinomyceteswere found in the plant. The bacteria showed minimum occurrence in *Emblica officinalis* among all the isolates. It wasonly (24.13%)all over the plant parts tested. The results of present investigation on isolation of bacterial endophytes found accordance with the experimental findings ofAhamad (2012).Who had isolated Bacterial, Fungal andActinomycetalendophytes from Stem, Root, Fruit and leaves of four ethnomedicinal plants viz.*Digitalispurpurea,Digitalislanata,Plantago ovate* and *Dioscoreabulbifera* of Jammu and Kashmir.Similarly,Rosenblueth and Romeo (2006) isolated the bacterial endophytes from soybean and analyzed for phosphate solublization. Maria *et al* (2005) also isolated 14 fungal endophytes from *Acanthus ilicifolius*and *Acrostichumaureum*and investigate their antibacterial potential.The results obtained from this study on isolation of actinomycetal endophytes were also correlated with the findings of Gayatri and Murlikrishan(2013).They determined the antimicrobial activity of endophytic actinomycetes isolated from mangrove

plant.However, the motive of present study was to assess the extracellular enzyme production of endophytic microorganisms isolated from *Emblica officinalis*.

Identification of Endophytic Microorganisms.

The results on identification of bacterial endophytes were tabulated in table 2. The results showed thatbacterial isolates were belonging to *Bacillus spe, Pseudomonas spe,Burkholderia spe* and *Xanthmona sspe.* It was observed that *Bacillus spe* predominantly exist in leaves, stem and root of*Emblica officinalis*. Whereas, *Pseudomonas spe, Burkholderia spe* and *Xanthmonas spe.* were only found in root of *Emblica officinalis.* The bacterial endophytic isolates(BEL1, BEL2, BEL3, BEL4, BEL5, BES1, BES2, BES3, BES4, BES5,BES6,BER3,BER4,BER5 and BER7) identified as *Bacillus spe.*The morphological and biochemical characters of (BER1& BER9),(BER2& BER8) and (BER6) were matched with *Pseudomonas spe, Burkholderia spe* and *Xanthmonas spe* repectively. Similar results were reported by Omerji*et al*(2004).They were isolated bacterial endophytes from tomato plants and reported that the predominant genera were belongs to *Bacillus spe,Pseudomonas spe, Burkholderia spe* and *Steneromorphomonas*. Hence, these results were found accordance with the experimental findings of present investigation. However, *Steneromorphomonas* was not traced in this investigation.

The identifications of endophytic fungal isolates were confirmed by comparing their morphological characters with standard literature. Table 3 represents the identification of fungal isolates. It was observed that all the isolated fungal endophytes belong to ten different genera viz., *Aspergillus, Penicillium, Fusarium , Xylaria, Cladosporium, Colletrotrichum,Alternaria,Phomopsis,Acremonium,* and*Nigrospora.*The fungal endophytic isolates (FEL1, FEL6, FES2, FES12, FER4, FER9, and FER15) identified as *Aspergillusspe.*The morphological characters of (FEL2, FEL7, FES3, FES7, FER1, and FEP13)were found similar with *Penicillium spe.* The fungal isolates (FEL3,FES4,FES8&FER11), (FEL5,FES5,FER5&FER10) and (FEL8,FES1,FER2& FER2)were identified as *Fusarium, Xyleria*and *Cladosporium* respectively. The morphology of (FEL4, FES6L&FES13), (FER9,FER16&FEF1) and (FES11,FER3&FER6)were matched with *Colletrotrichum,Alternaria* and*Phomompis.* Whereas, the identification of(FES10&FER14) and (FER8&FER12) isolates were confirmed as *Acromonium* and *Nigrospora*after observing their growth on Potato dextrose agar and compared with standard literature. The results of present study about identification of endophytic fungi were found in correlation with the experimental findings ofSandhu (2014). He has isolated the fungal endophytes from *Ricinus communis* and successfully identified as *Aspergillus fumigates, Aspergillus japonicas, Aspergillus niger, Fusarium semitectum,Curvularia pallescens, Phoma hedericola, Alternaria tenuissima, Fusarium solani, Drechsleraaustralien* and *Aspergillu srepens*. Similarly, Nath*et al* (2012). They were reported endophytic fungi *Xyleria, Diporthy ,Phomopsis* and *Epacris*in root, stem and leaves of *Embica officinalis.*Whereas, in present study other fungal species viz *Penicillium, Aspergillus, Alternaria, Fusarium, Cladosporium, Colletrotrichum,,Acremonium,* and *Nigrosporas* were also isolated along with *Xyleria* and *Phomopsis.* However,*Diporthy*and*Epacris spe* were not observed in this study.Hence,the results of present investigation was not completely correlates with the experimental finding of Nath*et al* (2012).

The results of table 4 represents the identification of endophytic actinomycets of *Emblica officinalis.* From the study it was observed that all the actinomycetal endophytes belongs to *Streptomyces, Micromonospora, Microbispora, Actinoplanes,*and *Nocardiaspecies.*It was observed that the actnomycetal isolates viz (AEL1, AEL2, AEL3, AEL4, AEL6, AES1,AES2, AES4, AES5, AES7, AES9 ,AER2 ,AER3 ,AER6, AER8, AER11 and AEF1) were identified as *Streptomyces spe*. Whereas the actinomycetal

isolates (AEL5,AEL6,AES3& AER4), (AES6,AES8,AER5 &AER9), (AER7,AER10&AER12) and (AER1) were found similar with *Micromonospora, Microbispora ,Actinoplane and Nocardiaspe*respectively.The results of present investigation was concord to the experimental outcomes of Gangwar*et al* (2015). Whohad reported the existence of endophytic actinomycetes of the genera *Streptomyces, Micromonospora* and *Microbisporaspe* in *Emblica officinalis* and investigate their antagonistic potential against fungal plant pathogens as well as plant growth promotion.

Evaluation of Enzyme Activity

The experimental facts presented in table 5 displayed the enzymatic bio prospection of endophytic bacterialisolates of *Emblica officinalis*. The results revealed that 65% of bacterial isolates were found amylase producer. Protease activity was recorded among 55% of bacterial isolates. Whereas, about 40% of isolates were found capable to digest tween 20 in solid agar media indicate lipase production. It was also observe that 35% isolate found positive for amylase and protease production.25 % of the isolates were produces amylase and lipase enzymes and the protease and lipase production was recorded in 25 % bacterial isolates.Whereas, 20% isolates were able to produce Amylase, protease and Lipase.The results obtained in this present study about the enzyme production was found in correlation with the experimental findings of Jalgaonwala and Mahajan(2011). They isolated endophytic bacteria from *Pongamiagabravint* and evaluate their enzyme production for amylase, lipase, catalase, laccase, cellulase, protease and urease. Similarly, the bacterial endophytes of *Brassica oleracea* found significant producer for amylase,protease and cellulase (Sunkar and Nachiyar;2013). These results were found in accordance with present study. However, production of catalase, laccase, cellullase and urease was not carried out in present work.

Table 6 represents the results of amylase,protease and lipase activity of endophytic fungal isolates.Theresults showed that 63.15 % fungal isolates were exhibit amylolytic activity. About 52.63% of the fungal isolates were able to digest casein in solid agar medium and the lipase activity recorded in 42.10% of isolates.It was also observed that 15.78% of isolates were able to produce all three enzymes.26.31% fungal isolates were produce amylase and protease. Protease and Lipase production was recorded in 21.05% of fungal isolates. Whereas,34.21% isolates able to produceAmylase and Lipase.

Pavithra*et al* (2012)also reported enzyme analysis of endophytic fungi isolated from *Centellaasiatica*. Their study revealed thatendophytic fungi*Penicilliumspe*niranjjan 22has ability to produce various secondary metabolites vizalkaloids, phenols, flavonoids, tannin which will be useful for various human ailments. However,*Penicilliumspe*niranjjan22 has the ability to produce cellulase enzyme. But the results for amylase, protease, lipase and laccase enzymes were not obtained .Whereas, in present investigation amylase, protease, lipase production was recorded in all the endophyticP*enicilliumspe*. Here, the results of present study on extracellular enzyme production was not completely correlated with the observations of Pavithra*et al* (2012). Similarly, the fifty fungal endophytes from medicinal plants viz (*Alpiniacalcarata*, *Bixaorellana*, *Calophylluminophyllum* and *Catharanthusroseus*) were screened for extracellular enzymes and found capable in production of amylase, cellulase, laccase, lipase, pectinase and protease on solid media (Sunitha*et al* 2013). The experimental findings ofMonila*et al* (2012)showed that the endophytic fungi isolated from Baru fruits were able to produce amylase and lipase. However, protease activity was not determined in their investigation. The results of present study was also found in accordance with the experimental findings of (Yadav*et al* 2015). Their investigation showed the antimicrobial and enzymatic potential of endophytic fungi isolated from leaves, stem and roots of *Ocimum sanctum* and *Aloe vera*.Simmilarly, Job *et al*(2015) also isolated the endophytic fungi from *Avicennia officinalis* to explore their antimicrobial and enzymatic potential.

These results were in agreement with present investigation.

The facts presented in table 7 exposed the enzyme activity of endophytic Actinomycetes of *Emblica officinalis*. The obtained results indicates that (55.17%), (44.82%), and (48.27%) of endophyticactinomycetal isolates were found potent in the production of amylase,protease, and lipase respectively. It was also observed that 24.13 % isolates were able to produce amylase and protease. The protease and lipase activity recorded in 20.68% of isolates and 34.48 % of actinomycetal isolates were found positive for amylase and lipase.Whereas,17.24% isolates produces all three tested enzymes.This results were in conformity with research investigation of Minatto*et al* (2014).Their study clearly suggests that endophytic actinomyces of tomato plant hold good potential of producing diverse range of extracellular enzymes viz amylase, lipase, Gelatinase, caseinase. cellulose, Esterase and. Pectinase. However,Gelatinase, cellulose, Esterase and Pectinase production was not performed in present investigation. Whereas,proteolytic activity was analyzed in terms of casein hydrolysis on solid agar medium in present study.

Conclusion

The study concluded that the endophytic microbes viz Bacteria ,Fungi and Actinomycetes harbor the plant part of *Emblica Officinalis*. It was also observed that fungi predominantly existing in all plant parts followed by Actinomycetes and bacteria. Endophytic isolates found significant in production of tested enzymes. This study can also offer the source of enzymes for Medical, Agriculture, Industrial applications etc. over wounding of plant resources.

Table1. Isolation of microbial endophytes from different plant parts of *Emblica officinalic*(L).

Sr.no	**Plant parts**	**Microbial Endophytes**			**Total**
		B	**F**	**A**	
1	Leaves	05	08	07	**20**
2	Stem	06	13	09	**28**
3	Root	09	16	12	**37**
4	Fruit	00	01	01	**02**
Total		**20**	**38**	**29**	**87**

B=Bacteria, F=Fungi, A=Actinomycetes.

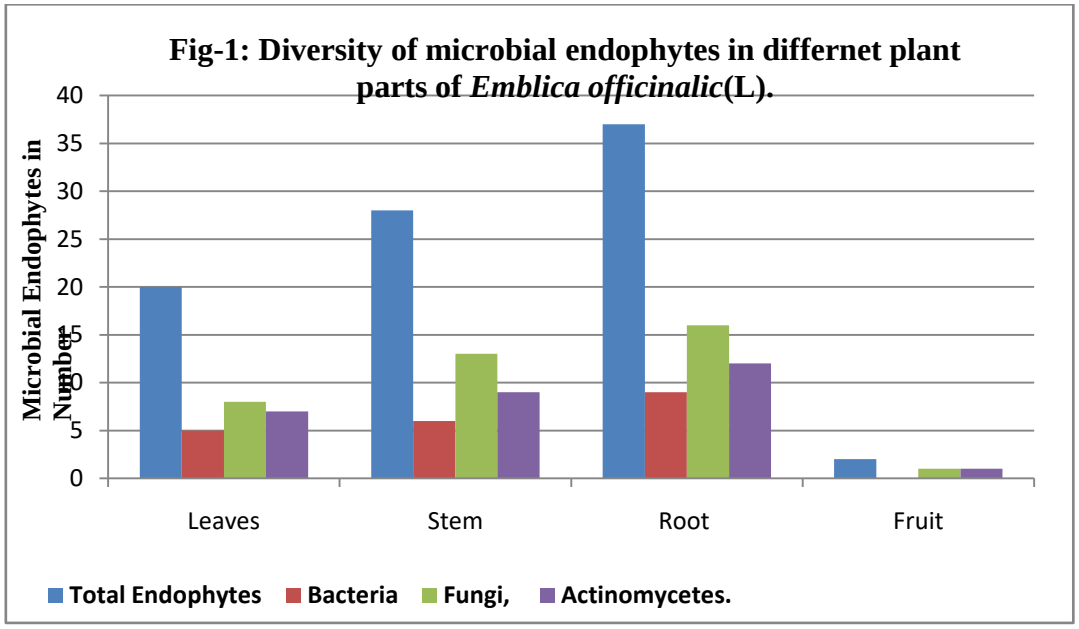


Table 2. Morphological, Cultural and Biochemical characters of Bacterial endophytes

Sr. no	Bacterial endophytes	Gram's Nature	Cell Shape	Glucose	Lactose	Maltose	I	MR	VP	C	Possible species
1	BEL1	+	Rod	+	+	+	-	-	+	+	*Bacillus spe.*
2	BEL2	+	Rod	+	-	-	-	-	-	+	*Bacillus spe.*
3	BEL3	+	Rod	+	+	-	+	-	-	-	*Bacillus spe.*
4	BEL4	+	Rod	+	+	+	-	-	+	+	*Bacillus spe.*
5	BEL5	+	Rod	+	+	+	-	-	+	+	*Bacillus spe.*
6	BES1	+	Rod	+	-	-	-	-	-	+	*Bacillus spe.*
7	BES2	+	Rod	+	+	-	+	-	-	-	*Bacillus spe.*
8	BES3	+	Rod	+	+	+	-	-	+	+	*Bacillus spe.*
9	BES4	+	Rod	+	-	-	-	-	-	+	*Bacillus spe.*
10	BES5	+	Rod	+	+	-	+	-	-	-	*Bacillus spe.*
11	BES6	+	Rod	+	+	+	-	-	+	+	*Bacillus spe.*
12	BER1	-	Rod	-	-	-	-	-	-	+	*Pseudomonas spe*
13	BER2	-	Rod	-	-	-	-	-	-	+	*Burkholderiaspe*
14	BER3	+	Rod	+	+	+	-	-	+	+	*Bacillus spe.*
15	BER4	+	Rod	+	+	-	+	-	-	-	*Bacillus spe.*
16	BER5	+	Rod	+	+	+	-	-	+	+	*Bacillus spe.*

17	BER6	-	Rod	+	-	+	-	-	-	+	*Xanthomonasspe*
18	BER7	+	Rod	+	+	-	+	-	-	-	*Bacillus spe.*
19	BER8	-	Rod	-	-	-	-	-	-	+	*Burkholderiaspe*
20	BER9	-	Rod	+	-	-	-	-	-	+	*Pseudomonas spe*

Plant parts of *Emblica officinalic* (L).

BEL- Bacterial endophytes ytes of Stem, BER- Bacterial endophytes of Root, (+) = Positive activity, (-)- Negative activity, I- Indol, MR-Methyl red, Vp- Vogesprauskaur C-Citrate.

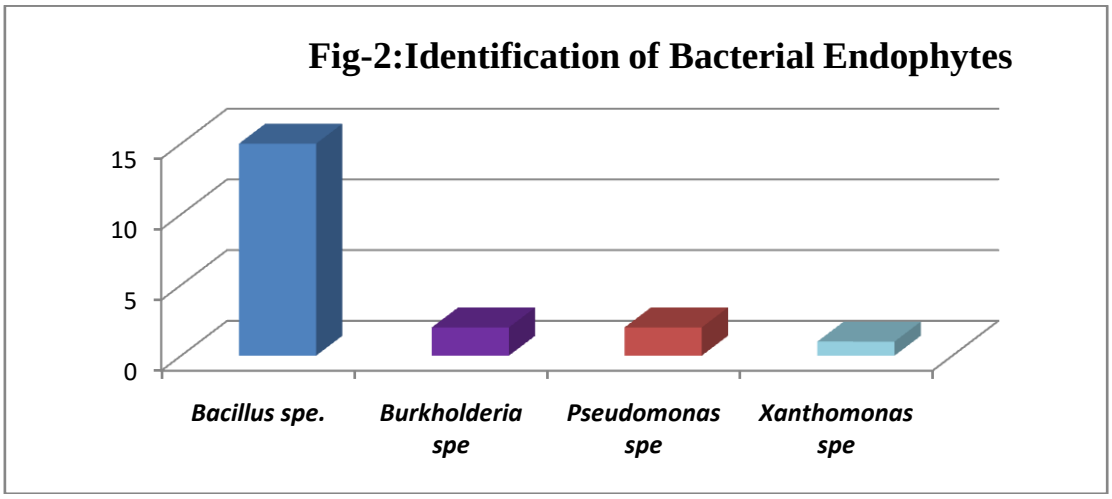


Table 3: Morphological Characters of Endophytic Fungi .

Sr. no	**Fungal endophytes**	**Surface Color**	**Shape**	**Texture**	**Possible species**
1	FEL1	Black	Cicular	Cottony	*Aspergillus spe.*
2	FEL2	Dark green	Irregular	Velvety	*Penicillium spe.*
3	FEL3	Pinkish White	Irregular	Cottony	*Fusarium spe.*
4	FEL4	Black	Circular	Dry and velvety	*Colletotricum spe*
5	FEL5	White	Irregular	Powdery	*Xyleriaspe*
6	FEL6	Pale brown	Cicular	Cottony	*Aspergillus spe.*
7	FEL7	Greenish Brown	Irregular	Velvety	*Penicillium spe*
8	FEL8	Greenish gray	Circular	Velvety	*Cladosporium spe.*
9	FES1	Blackish gray	Circular	Velvety	*Cladosporium spe.*
10	FES2	Black	Cicular	Cottony	*Aspergillus spe.*

11	FES3	Dark green	Irregular	Velvety	*Penicillium spe.*
12	FES4	Pinkish White	Irregular	Cottony	*Fusarium spe.*
13	FES5	Red	Irregular	Cottony	*Xyleriaspe*
14	FES6	Black	Circular	Dry and velvety	*Colletotricumspe*
15	FES7	Dark green	Irregular	Velvety	*Penicillium spe.*
16	FES8	White	Irregular	Cottony	*Fusarium spe.*
17	FES9	Blackish gray	Irregular	Velvety	*Alternariaspe.*
18	FES10	Light yellow	Cicular	Powdery	*Acromonium*
19	FES11	Red color	Iregular	Cottony	*Phomopsis*
10	FES12	Pale brown	Cicular	Cottony	*Aspergillus spe.*
21	FES13	Grey	Circular	Velvety	*Colletotricumspe*
22	FER1	Dark Green	Irregular	Velvety	*Penicillium sep.*
23	FER2	Blackish gray	Circular	Velvety	*Cladosporium spe.*
24	FER3	Woody brown	Irregular	Velvety	*Phomompsisspe*
25	FER4	Black	Cicular	Cottony	*Aspergillus spe.*
26	FER5	Blakish brown	Irregular	Velvety	*Xyleriaspe*
27	FER6	Redish brown	Irregular	Velvety	*Phomompsis spe*
28	FER7	Greenish gray	Circular	Velvety	*Cladosporium spe.*
29	FER8	Grey white	Irregular	cottony	*Nigrospora spe*
30	FER9	Black	Cicular	Cottony	*Aspergillus spe.*
31	FER10	Red	Irregular	Cottony	*Xyleriaspe*
32	FER11	Pinkish White	Circular	Cottony	*Fusarium spe.*
33	FER12	Pale yellow	Irregular	Velvety	*Nigrosporaspe*
34	FER13	Whitish green	Irregular	Velvety	*Penicillium spe.*
35	FER14	Light yellow	Cicular	Powdery	*Acromonium*
36	FER15	Pale brown	Cicular	Cottony	*Aspergillus spe.*
37	FER16	Blackish gray	Irregular	Velvety	*Alternariaspe.*

38	FEF1	Blackish gray	Irregular	Velvety	*Alternariaspe.*

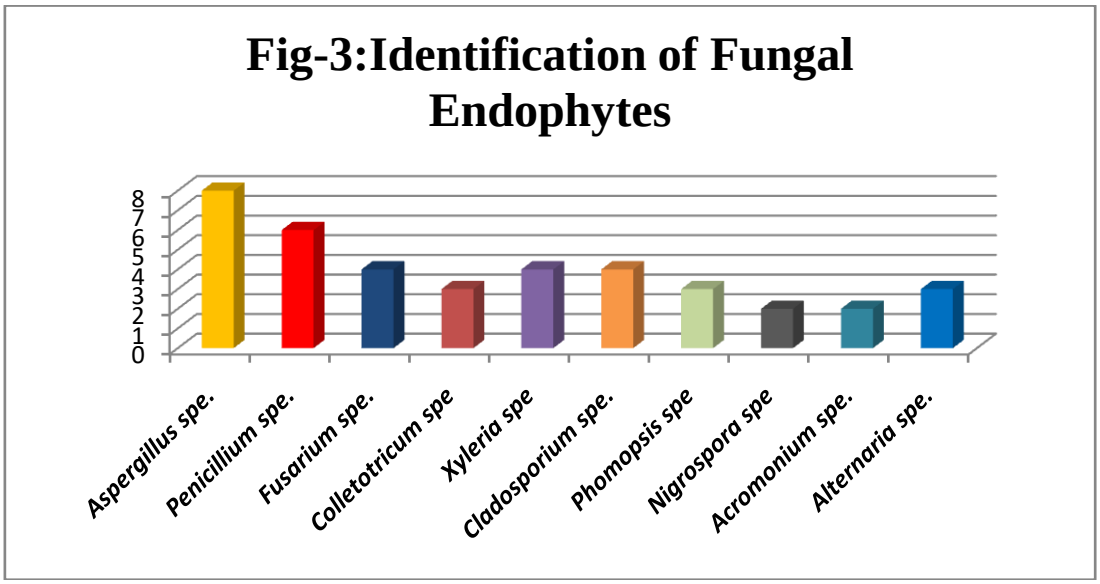


Table 4.Morphological and cultural characters of Actinomycetal isolates.

Sr. No	Actinomycetal Isolates	Front Colony color	Reverse colony color	Pigmentation	Spore morphology	Possible Species
1.	AEL1	White	Yellowish brown	Brown	Spiral	*Streptomyces spe.*
2.	AEL2	Pale Yellowish green	Whitish gray	Greenish yellow	Spiral	*Streptomyces spe.*
3.	AEL3	White	Yellow	Brown	Spiral	*Streptomyces spe.*
4.	AEL4	Gray	Yellowish brown	Brown	Chain	*Streptomyces spe.*
5.	AEL5	Yellowish orange	Light orange	-	Round	*Micromonosporaspe*
6.	AEL6	White	Yellowish brown	Brown	Spiral	*Streptomyces spe.*
7.	AEL7	Yellowish orange	Light orange	-	Round	*Micromonosporaspe*
8.	AES1	Dark grey	Violet	Light	Spiral	*Streptomyces spe*
9.	AES2	White	Yellowish brown	Brown	Spiral	*Streptomyces spe.*
10.	AES3	Yellowish orange	Light orange	-	Round	*Micromonosporaspe*
11.	AES4	Gray	Yellowish brown	Brown	Coiled	*Streptomyces spe.*
12.	AES5	White	Yellowish brown	Brown	Spiral	*Streptomyces spe.*
13.	AES6	Pink	Off white	-	Round paired	*Microbisporaspe*

14	AES7	White	Yellowish brown	Brown	Spiral	*Streptomyces spe.*
15	AES8	Pink	Off white	-	Round paired	*Microbisporaspe*
16	AES9	White	Yellowish brown	Brown	Spiral	*Streptomyces spe.*
17	AER1	Pinkish yellow	Light orange	-	Spiral	*Noccardiaspe*
18	AER2	Gray	Yellowish brown	Brown	Chain	*Streptomyces spe.*
19	AER3	White	Yellow	Brown	Spiral	*Streptomyces spe.*
20	AER4	Yellowish orange	Light orange	-	Round	*Micromonosporaspe*
21	AER5	Pink	Off white	-	Round paired	*Microbisporaspe*
22	AER6	White	Yellowish brown	Brown	Spiral	*Streptomyces spe.*
23	AER7	Orange Yellow	Yellow	Yellow	Round	*Actinoplanespe*
24	AER8	White	Yellowish brown	Brown	Spiral	*Streptomyces spe.*
25	AER9	Pink	Off white	-	Round paired	*Microbisporaspe*
26	AER10	Yellow	Yellow	Yellow	Round	*Actinoplanespe*
27	AER11	Gray	Yellowish brown	Brown	Chain	*Streptomyces spe.*
28	AER12	OrangeYellow	Yellow	Yellow	Round	*Actinoplanespe*
29	AEF1	Yellowish brown	Brown	Brown	Spiral	*Streptomyces spe.*

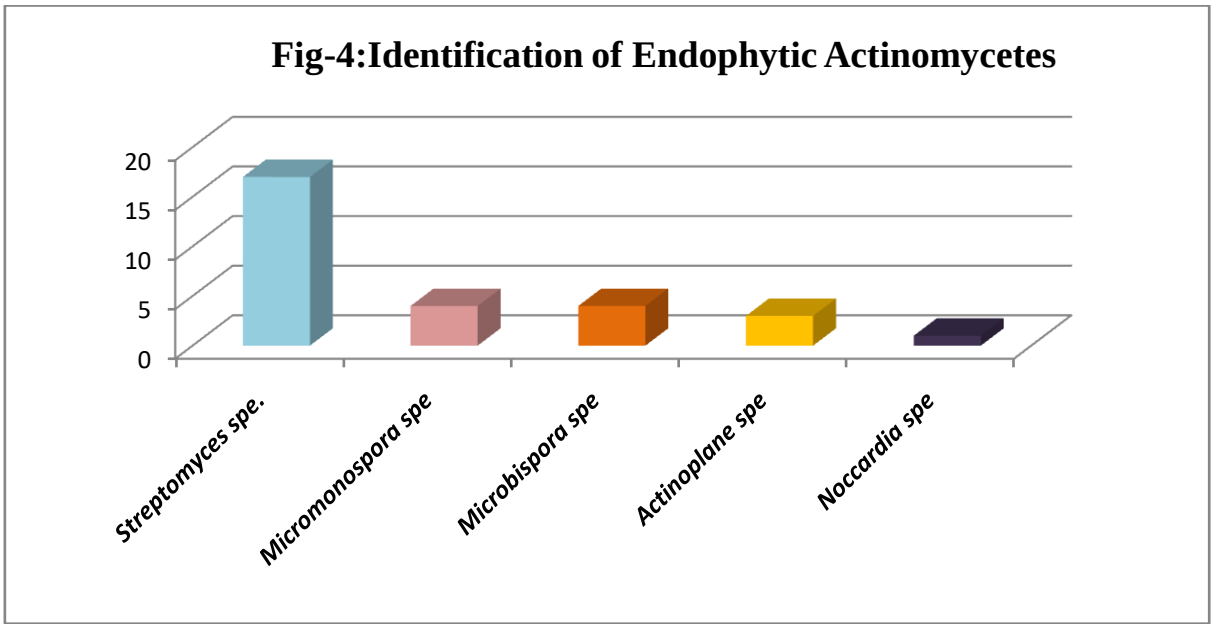


Table 5.Extracellular enzyme activity of bacterial endophytes of *Emblica officinalis*.

Sr. no	**Bacterial endophytes**	**Amylase**	**Protease**	**Lipase**
1	BEL1	+	+	+
2	BEL2	+	+	-
3	BEL3	-	+	-
4	BEL4	+	-	-
5	BEL5	-	-	-
6	BES1	+	+	+
7	BES2	+	+	-
8	BES3	+	+	+
9	BES4	+	-	-
10	BES5	-	-	-
11	BES6	+	-	-
12	BER1	-	+	-
13	BER2	-	-	+
14	BER3	-	+	+
15	BER4	+	+	+
16	BER5	+	+	+
17	BER6	-	+	+
18	BER7	+	-	-
19	BER8	+	-	-
20	BER9	+	-	-

Table 6: Enzymatic activity of fungal endophytes of *Emblica officinalis*.

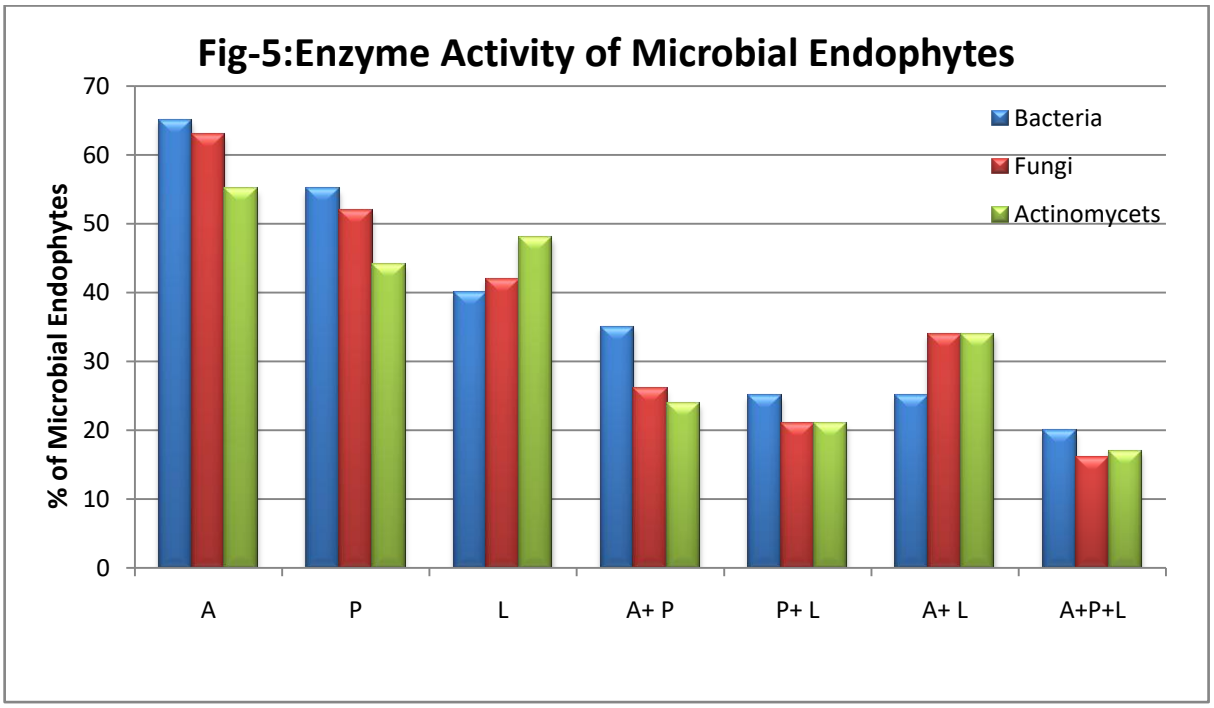
Sr. no	Fungalendophytes	Amylase	Protease	Lipase
1	FEL1	+	+	+
2	FEL2	+	-	-
3	FEL3	+	-	-
4	FEL4	-	+	+
5	FEL5	-	+	-
6	FEL6	+	-	-
7	FEL7	-	+	-
8	FEL8	+	-	+
9	FES1	+	+	+
10	FES2	+	+	+
11	FES3	+	-	+
12	FES4	-	+	-
13	FES5	+	+	-
14	FES6	+	-	+
15	FES7	-	+	-
16	FES8	+	-	-
17	FES9	+	-	+
18	FES10	-	-	-
19	FES11	-	+	-
20	FES12	+	-	-
21	FES13	-	+	+
22	FER1	+	+	-
23	FER2	+	+	+
24	FER3	-	-	
25	FER4	-	+	+

26	FER5	+	+	-
27	FER6	+	-	-
28	FER7	+	-	+
29	FER8	-	+	-
30	FER9	+	-	+
31	FER10	-	-	-
32	FER11	+	+	-
33	FER12	+	-	-
34	FER13	+	+	+
35	FER14	-	-	-
36	FER15	+	-	+
37	FER16	-	+	-
38	FEF2	+	+	+

Table 7.Enzymatic activity of Actinomycetal endophytes of *Emblica officinalis*.

Sr. No	**Actinomycetal Isolates**	**Amylase**	**Protease**	**Lipase**
1.	AEL1	+	-	+
2.	AEL2	+	-	-
3.	AEL3	+	-	-
4.	AEL4	-	+	-
5.	AEL5	+	-	+
6.	AEL6	-	-	+
7.	AEL7	-	+	-
8.	AES1	+	-	+
9.	AES2	+	-	+
10.	AES3	-	-	+
11.	AES4	+	+	+
12.	AES5	+	+	-
13.	AES6	-	+	-
14	AES7	+	-	+
15	AES8	-	-	-
16	AES9		+	+
17	AER1	+	+	-
18	AER2	-	-	
19	AER3	-	-	+

20	AER4	+	+	+
21	AER5	+	-	-
22	AER6	-	+	-
23	AER7	+	+	+
24	AER8			
25	AER9	+	+	+
26	AER10	-	-	-
27	AER11	-	+	-
28	AER12	+	-	-
29	AEF1	+	+	+



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SOIL POLLUTION: CAUSES, EFFECTS AND CONTROL

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ABSTRACT

The study soil pollution is very important because it has great impact on pollution of agricultural lands, human and Animals. Soil pollution reduces the productivity and fertility of soil due to the presence of soil pollutant. The study discuss most important sources of pollution represented by pesticides and chemical fertilizer that contain toxic contain and present its residues in to the soil remain for a long time and, contribute to eliminate soil fertility. The study also discuss the role of industrial waste in Soil pollution. The study indicate what are the bad effects of soil pollution on human, animal, agricultural land, and environment. Soil pollution reduces the production of crop and quality of products. The study refers to the methods of soil protection and agricultural lands from pollution by using organic agriculture, organic fertilizer and bio-pesticide and forest planting.

Keywords: *Pesticides, Fertilizers , Plants ,Water, Irrigation.*

Introduction

Soil is fundamental to human life on Earth. Most plants require a soil substrate to provide water and nutrients, and whether we farm the plants directly or consume animals that feed on the plants, this means that we don't exist without soil.The other reasons that soil is fundamental: it is required for trees. and the importance of trees for shade, animal habitat, building materials.

Soil is a vital part of the natural environment. It is just as important as plants, animals, rocks, landforms, lake and rivers. It influences the distribution of plant species and provides a habitat for a wide range of organisms. It controls the flow of water and chemical substances between the atmosphere and the earth, and acts as both a source and store for gases (like oxygen and carbon dioxide) in the atmosphere. Soils not only reflect natural processes but also record human activities both at present and in the past. They are therefore part of our cultural heritage. The modification of soils for agriculture and the burial of archaeological remains are good examples of this.

Soil pollution is the reduction in the productivity of soil due to the presence of soil pollutants. Soil pollutants have an adverse effect on the physical chemical and biological properties of the soil and reduce its productivity. Pesticides, fertilizers, organic manure, chemicals, radioactive wastes, discarded food, clothes, leather goods, plastics, paper, bottles, tins-cans and carcasses- all contribute towards causing soil pollution. Chemicals like iron lead mercury, copper, zinc, cadmium, aluminium, cyanides, acids and alkalies etc. are present in industrial wastes and reach the soil either directly with water or indirectly through air. (e.g. through acid rain).

The improper and continuous use of herbicides, pesticides and fungicides to protect the crops from pests, fungi etc. alter the basic composition of the soils and make the soil toxic for plant growth. Organic insecticides like DDT, aldrin, benzene hex chloride etc. are used against soil borne pests.

They accumulate in the soil as they degrade very slowly by soil and water bacteria. Consequently, they have a very deleterious effect on the plant growth stunting their growth and reducing the yield and size of fruit. Their degradation products may be absorbed by the plants from where they reach the animals and man through the food chains.

Radioactive wastes from mining and nuclear processes may reach the soil via water or as ‘fall-out’. From the soil they reach the plants and then into the grazing animals (livestock) from where ultimately reach man through milk and meat etc. resulting in retarded and abnormal growth of man. Human and animal excreta used as organic manure to promote

crop yield, pollute the soil by contaminating the soil and vegetable crops with the pathogens that may be present in the excreta.
Nitrification, which is the process of forming soluble nitrates from the elemental atmospheric nitrogen or from originally harmless organic materials actually contribute towards water pollution when the nitrates leach out of the soil and accumulate to toxic levels in the water supply.
Therefore, intensification of agricultural production by practices of irrigation (causes salination), excessive fertilizers, pesticides, insecticides etc. have created the problems of soil pollution. Soil pollution can be checked by restricting the use of above mentioned soil pollutants, resorting to organic farming, adopting better agriculture practices etc.
Soil pollution is also caused by means other than the direct addition of xenobiotic (man-made) chemicals such as agricultural runoff waters, industrial waste materials, acidic precipitates, and radioactive fallout.

Enormous quantities of waste from manmade products are being released into the soil causing soil pollution. Polluted water also causes soil pollution. Soil pollution is caused due to unhygienic habits, agricultural practices and inappropriate methods of disposal of solid and liquid wastes. Soil pollution is also caused as result of atmospheric pollution.

Types of Soil Pollution

Agricultural Pollution

• Agricultural processes contribute to soil pollution.
• Fertilizers increase crop yield and also cause pollution that impacts soil quality.
• Pesticides also harm plants and animals by contaminating the soil.
• These chemicals get deep inside the soil and poison the ground water system.
• Runoff of these chemicals by rain and irrigation also contaminate the local water system and is deposited at other locations.

Industrial Waste

• About 90% of soil pollution is caused by industrial waste products.
• Improper disposal of waste contaminates the soil with harmful chemicals.
• These pollutants affect plant and animal species and local water supplies and drinking water.
• Toxic fumes from the regulated landfills contain chemicals that can fall back to the earth in the form of acid rain and can damage the soil profile.

Urban Activities

• Human activities can lead to soil pollution directly and indirectly.
• Improper drainage and increase run-off contaminates the nearby land areas or streams.
• Improper disposal of trash breaks down into the soil and it deposits in a number of chemical and pollutants into the soil. These may again seep into groundwater or wash away in local water system.
• Excess waste deposition increases the presence of bacteria in the soil.
• Decomposition by bacteria generates methane gas contributing to global warming and poor air quality. It also creates foul odors and can impact quality of life.

Causes of Soil Pollution

Soil Pollution is a result of many activities by mankind which contaminate the soil. Soil pollution is often associated with indiscriminate use of farming chemicals, such as pesticides, fertilizers, etc. Pesticides applied to plants can also leak into the ground, leaving long-lasting effects. Read about the dangers of pesticides. In turn, some of the harmful chemicals found in the fertilizers (e.g. cadmium) may accumulate above their toxic levels, ironically leading to the poisoning of crops. Heavy metals can enter the soil through the use of polluted water in watering crops, or through the use of mineral fertilizers. Faulty landfills, bursting of underground bins and seepage from faulty sewage systems could cause the leakage of toxins into the surrounding soil. Acid rains caused by industrial fumes mixing in rain falls on the

land, and could dissolve away some of the important nutrients found in soil, as such change the structure of the soil. Industrial wastes are one of the biggest soil-pollution factors. Iron, steel, power and chemical manufacturing plants which irresponsibly use the Earth as a dumping ground often leave behind lasting effects for years to come. Fuel leakages from automobiles, which get washed by rain, can seep into the nearby soil, polluting it. Deforestation is a major cause for soil erosion, where soil particles are dislodged and carried away by water or wind. As a result, the soil loses it structure as well as important nutrients found in the soil.

Some the causes of soil pollution can be as follows:

• Industrial effluents like harmful gases and chemicals.
• Use of chemicals in agriculture like pesticides, fertilizers and insecticides.
• Improper or ineffective soil management system.
• Unfavorable irrigation practices.
• Improper management and maintenance of septic system.
• Sanitary waste leakage.
• Toxic fumes from industries get mixed with rains causing acid rains.
• Leakages of fuel from automobiles are washed off due to rains and are deposited in the nearby soil.
• Unhealthy waste management techniques release sewage into dumping grounds and nearby water bodies.
• Use of pesticides in agriculture retains chemicals in the environment for a long time. These chemicals also effect beneficial organisms like earthworm in the soil and lead to poor soil quality.
• Absence of proper garbage disposal system leads to scattered garbage in the soil. These contaminants can block passage of water into the soil and affects its water holding capacity.
• Unscientific disposal of nuclear waste contaminate soil and can cause mutations.
• Night soil contamination due to improper sanitary system in villages can cause harmful diseases.

Effects of soil pollution

1. The main reason for soil contamination is due to the presence of anthropogenic.activities. These waste products are made of chemicals that are not originally found in nature and hence lead to soil pollution.
2. The excessive use of chemical pesticides leads to absorb part of these pesticides and storethem in their tissues, roots and leaves, causing harm to humans and animals that directly eatthem. It causes indirect harm to humans by eating animal products contaminated with pesticides (eggs, milk, meat ... etc.)
3. Spraying agricultural crops with chemical pesticides leads to the elimination of microorganisms in the soil (decomposition elements such as nitrogen-fixing bacteria and streptococcus bacteria). This contributes to the analysis of organic matter in the soil, known as humus, which affects the fertility of agricultural soil
4.The excessive use of these chemicals leads to an imbalance in the existing natural balance between pests and their natural enemies. The use of insecticides helps to eliminate these natural enemies.
5. Many pesticides keep their effects for a long time in agricultural soil. In fact, this leads to the persistence of its negative impact on plants, animals and humans for a period of time that may last for several years.
6.-The excessive use of chemical fertilizers quantities that exceed the plant's need leads to their accumulation in the tissues, roots and leaves of cultivated plants. This accumulation changes the natural and chemical properties. The excessive use of nitrogenous fertilizers leads to the accumulation of large amounts of nitrates in the leaves and roots of vegetable and fruit crops. Due to the large quantities, plants become tasteless and colorless. Also, the excessive use of nitrates beyond the normal rate (15 mg per kilogram of a person's weight per day) leads to human infection with many dangerous diseases such as cancerous tumors and others.

7. Many chemical fertilizer compounds are prepared in stable compounds that cannot

bedisposed of easily. Their effects remain in the soil for a long period of up to 5-50 years as phosphorous compounds. This means that their impact on the soil will extend for a long period of time.

8.Soil pollution causes huge disturbances in the ecological balance and the health of the organisms.

9. Normally crops cannot grow and flourish in a polluted soil. However if some crops manage to grow, then these crops might have absorbed the toxic chemicals in the soil and might cause serious health problems in people consuming them.

10. Soil pollution is typically caused by industrial activity, chemicals used in agriculture and improper disposal of waste. Soil contamination leads to health risks due to direct and indirect contact with contaminated soil.

11. Logging and overgrazing: People find in the forests an outlet from city pollution. It is the main store of carbon on the earth. Destroying large areas of it, especially by burning it, adds large quantities of carbon dioxide to the atmosphere. Tropical forests are among the richest in the world for their biodiversity. Any process of destruction and removal will have a negative impact on the species of living organisms and the biological diversity itself. It also destroys the physical, chemical and biological characteristics of agricultural lands due to their exposure to erosion and sand encroachment processes

12. Industrial solid waste: A person consumes goods and cleaning materials to take care of himself, his clothes, or his tools. They contain phosphates, which increase the cleaning ability of the industrial detergent. They have a toxic effect on both humans and animals. The proximity of plants to factories, especially the cement industry, leads to the fading of green leaves, stopping their growth and delaying their fruits. Car exhaust also affects agricultural lands on the sides of asphalt roads because they are subject to the accumulation of large levels of lead. In many cases, acid rain pollutes natural waterways, and negatively affect soils andother agricultural crops. Many countries suffer from the problem of soil pollution. Many of itslands are threatened by pollution with dangerous toxic and radioactive materials that occur asa result of improper disposal or storage of these materials. Thermal pollution occurs as aresult of the power plants discharging of large amounts of hot water into the sea as part of thecooling process, which effects all elements of the environment surrounding humans, animalsand plants

Control of soil Pollution

- Reducing the use of chemical fertilizer and pesticides.
- Ban on use of plastic bags below 20 microns thickness.
- Recycling of plastic wastes.
- Ban on deforestation.
- Encouraging plantation programmes.
- Encouraging social and agro forestry programmes.
- Undertaking awareness programmes.
- Recycling paper, plastics and other materials.
- Ban on use of plastic bags, which are a major cause of pollution.
- Reusing materials.
- Avoiding deforestation and promoting forestation.
- Suitable and safe disposal of including nuclear wastes.
- Chemical fertilizers and pesticides should be replaced by organic fertilizers and pesticides.
- Encouraging social and agro forestry programs.
- Undertaking many pollution awareness programs.

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WATER MANAGEMENT ASPECT OF KAYADHU RIVER IN AKHADA BALAPUR ,DIST.HINGOLI MAHARASHTRA WITH REFERENCE TO TOTAL DISSOLVED SOLIDS AND TOTAL HARDNESS

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ABSTRACT

The study soil pollution is very important because it has great impact on pollution of agricultural lands, human and Animals. Soil pollution reduces the productivity and fertility of soil due to the presence of soil pollutant. The study discuss most important sources of pollution represented by pesticides and chemical fertilizer that contain toxic contain and present its residues in to the soil remain for a long time and, contribute to eliminate soil fertility. The study also discuss the role of industrial waste in Soil pollution. The study indicate what are the bad effects of soil pollution on human, animal, agricultural land, and environment. Soil pollution reduces the production of crop and quality of products. The study refers to the methods of soil protection and agricultural lands from pollution by using organic agriculture, organic fertilizer and bio-pesticide and forest planting.

Keywords: *Pesticides, Fertilizers , Plants ,Water, Irrigation.*

Introduction

Minerals and some organic substances are present in water referred as total dissolved solids, A large number of salts are found dissolved in natural waters, the common are carbonates, bicarbonates , chlorides, sulphates, phosphates and nitrates of calcium, magnesium , sodium , potassium, iron, manganese. If their conc. increases beyond the natural limits 500 mg/l , the water becomes polluted.

High conc. of dissolved solids in irrigation water increases the salinity of the soil and produces distress in cattle and causes sealing in boilers and corrosion in water pipes.

A high content of dissolved solids elevates the density of water, influences osmo regulation of fresh water for drinking , irrigational and industrial purposes. It is especially an important parameter in the analysis of saline lakes, coastal , estuarine and marine water. Total dissolved solids is having high values in such waters. The maximum conc. of total dissolved solids was during rainy season while the minimum value was found in winter because of stagnation (Ansari 1993)

The excess amount of dissolved solids results into high osmotic pressure which in turn causes imbalance of osmotic regulation

Material and Methods

Most of the salts and a variety of organic substances (except lipids) are soluble in water. Thus a water sample, either from surface, ground or marine source contains appreciable quantity of dissolved solids.

Procedure

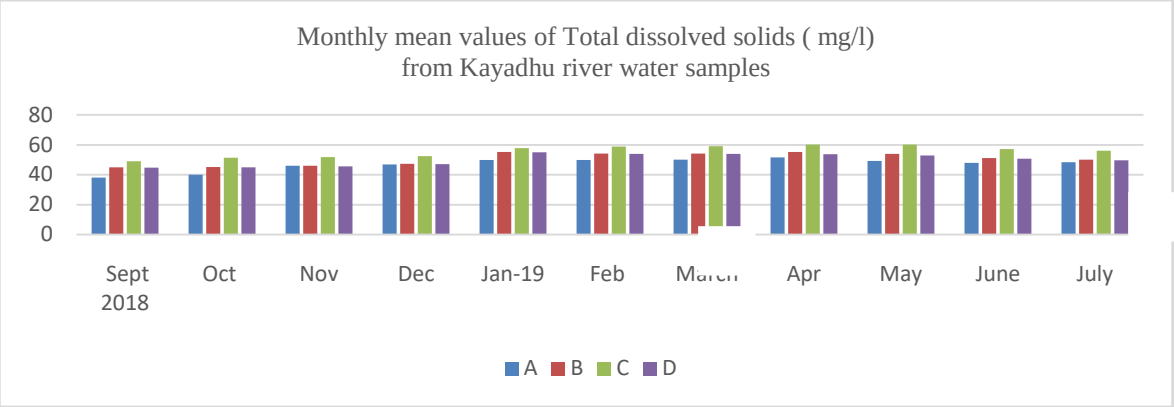
Total dissolved solid of river water samples collected from different sampling sites is determined by following Procedure. -100 ml of filtered sample was taken in a previously dried and weighed beaker and evaporated to dryness and weighed again. The amount of total dissolved solids calculated using formula.

$$\text{T.D.S. mg/l} = \frac{(A - B) \times 10^6}{V}$$

A = Final wt. of the dish in gm.
B = Initial wt. of the dish in gm.
V = Volume of sample taken in gm.

Monthly mean values of Total dissolved solids (mg/l)
From Kayadhu river water samples
Year 2020-2021

Months	Stations			
	A	B	C	D
Sept 2020	38.0	44.9	49.0	44.8
Oct	40.0	45.21	51.3	44.9
Nov	46.0	45.9	51.8	45.5
Dec	46.8	47.2	52.3	47.1
Jan 2021	49.8	55.1	57.7	54.9
Feb	49.9	54.2	58.8	53.8
March	50.1	54.2	59.0	54.0
Apr	51.6	55.1	60.2	53.6
May	49.3	53.8	60.1	52.9
June	47.9	51.2	57.1	50.8
July	48.3	50.1	56.1	49.6



Conclusion

In the present investigation the range of total dissolved solids was 145 to 500 mg/l at station A, 205 to 545 mg/l at station B, 235 to 550 mg/l at station C and 207 to 545 mg/l at station D from river Kayadhu at Akhada Balapur . The values of TDS from Kayadhu river water are illustrated in table...

As the permissible level of T.D.S. for drinking water is 500 mg/l . In the Kayadhu river waer it was noted that maximum conc. of T.D.S. was during summer which increased in rainy season while the minimum values were found in winter probably because of the sedimentation proces and decrease in velocity of water In monsoon TDS values were noted above the permissible level.

Total dissolved solids were recorded in the range of 81 to 195 mg/l in Saigon river at Hochiminh city, Vietnam (viet, 1989) the total dissolved solids from river Godavari at Paithan , Maharashtra were recorded in the range of 300 to 470 mg/l The maximum valyue were noted in the month of may and minimum in the month of Nov. (Zafar Javeed 1991) In physico - chemical investigations of water from river Betwa , in M.P. the T.D.S. was recorded in the range of 84-403 mg/l (Datar and vashistha, 1992). Baruah et al. (1993) recorded total dissolved solids in the range of 100 to 450 mg/l in Gelabil river , Assam..In the ground water quality assesment from chidambaram town Tamilnadu, the T.D.S. noted was in the range of 750 to 1074 mg/l (Nagrajan et. al .199

Total Hardness

Introductions:-Hardness may be due to carbonate, non carbonates depending on nature of anion to which it is linked. The ions which are present in natural waters are calcium and magnesium. The total hardness may be due to the combination of calcium and magnesium ions. Hardness of water is not pollution parameter but indicates water quality. Temporary hardness is due to carbonates and bicarbonates while permanent hardness is due to sulphates and chlorides. Carbonate hardness refers to the amount of carbonate and bicarbonate in solution that can be removed or precipitated by boiling. This type of hardness is responsible for the deposition of scale in hot water pipes and kettles. Non carbonated

hardness is caused by the association of the hardness causing cation with sulphate, chloride or nitrate and is referred to as permanent hardness because it can not be removed by boiling.

The hardness of water is inversely co-related with death rates from cardiovascular diseases but their insufficient proof that either calcium or magnesium in water is directly involved. The hardness has no known adverse effects on human health. However some evidance has been given to indicate its role in heart diseases (Peter, 1974) The water containing excess hardness is not desirable for drinking purpose it forms stone in kidney. Such water is also not desirable for potable as well as cooking purposes. The water having hardness above 200 mg/l may cause scale deposition in the water distribution system and more soap consumption.

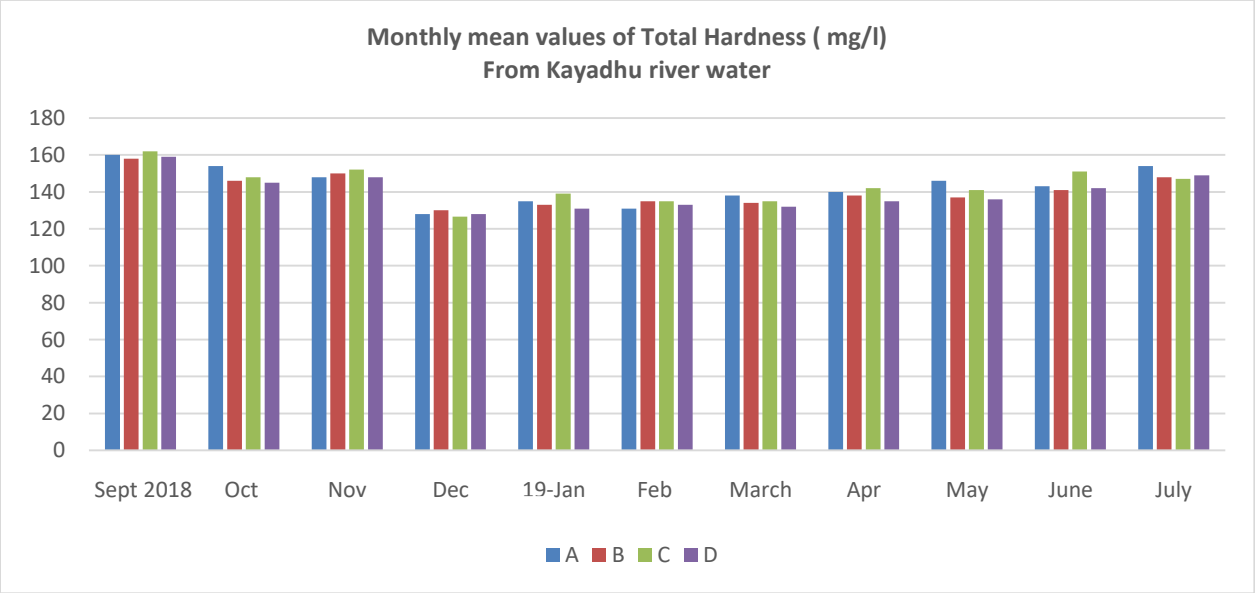
Materials and methods

Water sample for the study of total hardness was collected from the different stations and total hardness is calculated as

Monthly mean values of Total Hardness (mg/l) From Kayadhu river water samples

Year 2018-2019

Months	**Stations**			
	A	**B**	**C**	**D**
Sept 2020	160	158	162	159
Oct	154	146	148	145
Nov	148	150	152	148
Dec	128	130	126.6	128
Jan 2021	135	133	139	131
Feb	131	135	135	133
March	138	134	135	132
Apr	140	138	142	135
May	146	137	141	136
June	143	141	151	142
July	154	148	147	149



Procedure

1)In 50 ml sample 1 ml ammonia buffer (PH 10+1) and a pinch of EBT indicator is added.
2) This was titrated against 0.01 N EDTA solution.
3) The end point was the conversion of wine red to blue.

Calculation

Total hardness (mg/l) = $\frac{T \times 1000}{V}$

(Caco3)

where,

T = Titrant in ml

V = Sample in m

Conclusion

The variations in total hardness values ware found to be in the range between 128 to 160 mg/l at station A, 130 to 158 mg/l at station B, 126.6 to 162 mg/l at station C and 128 to 159 mg/l at station D. The total hardness was found to be maximum in the month of september and minimum in the month of December at all the four stations.

Saxena et.al. (1966) found the total hardness ranged between 112 to 250 mg/l in river Ganga at Kanpur. Ghose and Sharma (1988) recorded the hardness varied from 80 to 180 mg/l in river Ganga at Patna. Tripathi and Pandey (1995) recorded the maximum hardness during summer and minimum hardness during winter from (Chandari Pond), Kalyanpur fish pond at Kanpur.

Minimum values of hardness were observed in rainy while maximum values during summer. High values of hardness are probably due to the regular addition of large quantities of sewage, detergents and large scale human use.

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STEPS TOWARDS PROTECTING ENVIRONMENT

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ABSTRACT

In this paper study the counter measure to avoid the environment waste .Government action taken for controlling various environmental pollution .Also some training arrangements from local person for controlling the pollution in their area .NGOs also play very big role to control the environment for contiuesly proacting in the organization and do the various good job .Study the Gov make rule for controlling environment issue.
India is the seventh largest country in size, it have 28 state and 8 union territory .According to official statistic India forest cover is 713,789 km^{2,} which is 21.71 % of the country total land area World second fastest growing automobile industries in India also 3000 pharmaceutical companies and 10500 manufacturing unit .India operated 3000 mines in 2010 .In steel industry produce 9.1 corror tone steel per year in India .

Keywords: *Control on transport ,Control on municipal waste ,control of plastic use .*

Source of water Pollution

Country faces the biggest problem in water pollution. Water polluted by the activity of industrialization , urbanization agriculture waste ,house hold items , plastics item ,pesticides ,cloths oil spillage ,thermal power water .near coal mine water run heavy metals. Hospital waste, dairy waste ,vehicles washing waste .

Source Soil Pollution

Plastic bag ,electronics parts ,insecticide pesticide ,hospital waste through on road , garbage through road .Todays we find the mostly soil contaminated by the construction of roads ,For construction use cement and other material there is large area near to road all soil are polluted .This construction material is run through water and mix with water bodies and water also contaminated .

Air pollutants

Primary pollutants are directly emitted to the atmosphere, whereas secondary pollutants are formed in the atmosphere from precursor gases through chemical reactions and microphysical processes. Air pollutants may have a natural, anthropogenic or mixed origin, depending on their sources or the sources of their precursors. Key primary air pollutants include particulate matter (PM), black carbon (BC), sulphur oxides (SO_2), nitrogen oxides (NO_X) (including nitrogen monoxide and nitrogen dioxide, NO_2), ammonia (NH_3), carbon monoxide (CO), methane (CH_4), non-methane volatile organic compounds (NMVOCs), including benzene, and certain metals and polycyclic aromatic hydrocarbons, including benzo, pyrene (BaP).
Key secondary air pollutants are PM, ozone (O_3), NO_2 and several oxidised volatile organic compounds (VOCs). Key precursor gases for secondary PM are sulphur dioxide (SO_2), NO_X, NH_3 and VOCs. These pollutants and their precursor gases can be of both natural and anthropogenic origin including:

Sustaining of Environment

Control on Transportation

Use Electronic Vehicle because Greenhouse gases (GHGs) are emitted from the tailpipes of cars and trucks that combust fuel. Once GHGs are released, they can stay in the atmosphere for 100 years or more. GHGs act like a blanket around Earth, trapping energy in the atmosphere and causing it to warm. This can change Earth's climate, raise sea levels, and result in dangerous effects to human health and welfare, and to ecosystems
Electricity — are growing. New models of both electric vehicles and plug-in hybrid electric vehicles are entering the market in increasing numbers each year. Other alternative fuel vehicles include those that run on compressed natural gas (CNG) or E85 (a

mixture of about 85% ethanol and 15% gasoline) by water pollution is the most problem in todays

Control Municipal Waste

The Garbage are collected as municipal waste these are included house hold garbage , restaurant waste ,big shop waste these are kept ion the solid waste land fills are build it away from residential area as and it does not mix the water bodies with the land fills .Hospital waste and electronic waste separately discarded .Muncipal adapt to treat the biodegradable waste and reuse waste for agriculture pupose.Non-biodegradable waste are kept in separately, they manage on separately .No through the solid waste in neighborhood on the street ,open space and vacant space Provide large container to food market shop keepers not dispose there food on road they use the container .No through solid waste of hospital near street ,on road ,not dispose biomedical waste in regular municipal.

Control Plastic use

The plastic carry bags are the biggest contributors of littered waste and every year, millions of plastic bags end up in to the environment vis-a-vis soil, water bodies, water courses, etc and it takes an average of one thousand years to decompose completely. Therefore, to address the issue of scientific plastic waste management, the Plastic Waste.
According to the rule of Plastic waste management Rule 2016 it is mention that minimum thickness of 50 micron plastic bag use .This is take under action of manufacturer and supplier of plastic .,It is mandatory for the reuse ,recycle of plastic .Also the responsibility at rural area like Grampanchayat. Sate pollution control board grand for the production of plastics.Acording to amendment of 2021 there use of 100 micron of plastic for use of cup ,cigarate raper spoon plastic flag candy raper ,ice cream stick decoration ,themocal .We use the paper in place of plastic ,NGO and as we society member come forward for don't use the plastic bag ,only use the cloth bag as wel as paper bags .wooden spun ,banana leaf plate instead of pasic plate , woden candy stick.Plastick bottle and its cover use for the decorative purposes ,and small plastic bucket use for plantation also .

Important tips for waste management and to take part control of pollution

1. Always remember the 3 R Reduce ,Reuse ,Recycle
2. Segrigate the domestic waste into degradable and non-degradable
3. Degradable –compost
4. Non degradable –recycle
5.Reuse every bit of space on paper use both side
6.Avoide using plastic cover or bag use cloth bag for shipping .
7.Encorage manufacturer and buying of product only in pack with paper or hard board not in plastic .
8.Explain the reuse recycling of plastic to society and also encourage children to the same .
9.Educate and create the waste management through television news paper academic syllabus .
10.Citizen can take responsibility to convert compost from garbage .
11.Use electronic gadget like cell phone ,computer other electronics as long as possible

Conclusion

Though all line are all mansion is earlier preventive care is the most important .As human are increasing the responsibility to control the environment by follow all regulation are done by government and also take part in giving training to children and student .

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SPECIES COMPOSITION OF COPEPODS COLLECTION FROM SONALA DAM, DISTRICT WASHIM, (MAHARASHTRA)

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ABSTRACT

The zooplanktons play a vital role to ponder the faunal diversity of aquatic environments. Copepods are member of widely distributed crustacean subclass Copepoda. They are of great ecological importance providing food for many fish species. The present study is on the species composition of copepods collection from sonala dam, district washim, (Maharashtra). The study reveals the presence of 7 species of Copepods belonging to 5 genera, 2 families and 3 classes from the study area.

Introduction

Water is dynamic component for the survival of life forms on the planet. Fond and surface water reservoirs are the planet's most imperative fresh water resources and provide immeasurable benefits. They have imperative social and financial benefits. The surface water quality is largely affected by natural process(S. V. Deshmukh 2016). The manmade discharge represents a steady polluting source. The transport of numerous anthropogenic pollutants is determined by not as it was hydrological cycles but also physiochemical and characteristics of water which have been the subject of a few investigations. Pollution is considered because it influence plankton community and by day at the quicker rate of disintegration. Release of harmful chemicals, over pumping aquifer and contamination of water bodies with substances that advance green growth development are a few of the now a day's major cause for water quality debasement. While surface run off may be a regular wonder to a great extent influenced by climatic conditions Broad dissipation of water from the lake due to tall temperature and low rain improves the amount of salts, hand metals and other toxins or pollutants, which are honest variables for the destitute quality of the lake biological system. The diverse collections of organisms that resides in large water bodies and which are unable to win against the water current are called as planktons. They provide an important source of food to many aquatic organisms like fishes. Planktons include algae, bacteria, protozoa, zooplanktons etc

Zooplankton (Greck, zoo creature, planktons wandering) are heaps of assorted coasting and floating creatures with constrained control of motion, larger part of them are microscopic, unicellular or multicellular shapes with estimate varieties there are contrasts in morphological millimeter or more In addition to size varies there are differences in morphological highlights and taxonomic position The zooplanktons play an vital role to study the faunal biodiversity of aquatic ecosystem. They include representatives of almost every taxon of the animal kingdom and occur in the pelagic environment either as adults (holoplankton) or eggs and larvae (meroplankton) by slicer abundance at varying depths, the zooplanktons are utilized to assess energy shift at secondary trophic level. Zooplanktons are feed on phytoplankton and facilitate the conversion of plant material into animal tissue and in turn the basic food for higher animals including fishes, especially their larvae.

The word copepod come from the greek words kope and pods referring to how their antennae and legs move like oars as the copepod is swimming copepod any of very many little crustaceans, of the subclass copepod, that are extensively distributed and ecologically important, they include the water parasites. The species of copepods are about 12,000 even if not all live in a salt water even though they are considered the zooplankton copepods(S. V.

Deshmukh, 2016) Copepods are microscopic zooplankton their measure ranges from 1mm to 5mm. They inhibit both the new water and marine water environment and incorporateThree fundamental free living forms that'sCalanoida, Cyclopoida, and Harpacticoid.They serve as an amazing nourish for the fishes(Chhabha S. G. and D. S. Dabhade, 2019).

Copepods are used to describe small crustacean species that are found in the majority of aquatic environments. The Copepods can be found in both the upperWaters and bottom of water and freshwater bodies, as well as swamps, bogs, ponds,And other wet habitats. Copepodsconstitute the important group of zooplankton. Planktonic copepods (i.e. 2-4 mm in length) comprise of two major groups that are calanoids and the cyclopoids. These two major groups are separated on the basis of length of antennae, body structure and legs(S. A. Manjare, 2015).

Classification:

Kingdom – Animalia
Phylum – Arthropoda
Subphylum-Crustacea
Class - Maxillopoda
Subclass- Copepod

Review of literature:

Aziz et al., (2007), studied by qualitative and quantitative study of copepods in damietta harbor, egypt, The qualitative and quantitative elements of the copepod community in Damietta Harbor was examined through zooplankton samples collected month to month from May 2003 to April 2004. The copepods community was spoken to by 21 species, having a place to calanoids (9 species), cyclopoids (5 species) and harpacticoids (7 species). A couple of species showed up to be determined, whereas the larger parts of copepods were recorded either discontinuously or rarely. And Joshi (2011) studied on subjective and quantitative ponders of zooplanktons in Rajura Lake of Buldhana locale were carried out amid February 2010 to January 2011. Utilizing tiny taxonomical considers of zooplankton, this examination uncovered that 20 genera having a place to four major bunches.

Young et al.,(2013) studied by Genetic Diversity and population structure of two fresh water copepods (copepod Diaptomidae) Neodiaptomus, schmackeri (poppe and Richard, 1892)and mongolodiaptomusbirulai (Rylov, 1922) from Taiwan we used the mitochondria DNA co I sequence as a genetic marker to analyze the population genetic structure of two species of freshwater copepods. Deniz and Gonulio (2014) studied the temporal changes of copepod abundance and species composition in the coastal water of shamus in the southern Black sea. The copepod fauna in shamus costal region of the Black sea was investigated between January 2008 and December 2008.

Ghonmode (2015) studied the seasonal variations in the zooplankton diversity of, river Uma district Chandrapur, (M.S.), India andthis study revealed that different groups of zooplanktons have their own peak periods of density, which is affectedly local environmental conditions present at that time.Maheshet al., (2015) Studied of Zooplankton diversity and their seasonal variation in Kandlapallylake, Jagtial, Telangana, and during the study period the total number of seventeen species are identified from the selected lake during the present study. The total zooplankton Population was dominated by Rotifera, Cladocera, Copepoda and Ostracoda respectively.

Singh and Kaur (2015) Examined by zooplankton community structure Of species differences in which the populace of this wetland comprises of 17 genera of zooplankton. The recorded genera were categorized into 5 diverse bunches – Protozoa, Rotifera, Cladocerans, Copepods and Ostracods. Protozoa and Rotifera were the overwhelming bunches among zooplankton community, both having 6 genera, constituting 70.59% of the whole zooplankton populace. And Manjare (2015) Considered by subjective and quantitative consider of zooplankton from new water tanks of kolhapur area,

(maharashtra) The zooplankton community of the new water tanks was examined by month to month, tests taken from June 2009 to Dec. 2010. The water bodies such as Tamdalage, Laxmiwadi, Vadgaon tanks. These Tanks are arranged at 160 46' 35' 05" N scope, 740 27'48.71 E longitude, 160 47 23 19" N scope, 740 22'56.44" 11 E longitude and 160 49.45" N latitude,740 18 22.50" E longitude separately, close region of HatkanangleTahsil of Kolhapur locale, Maharashtra.

Bhandarkar (2015) reported The diverse species of rotifer with reference to cultural etropian in lentic ecosystem of dukheswari temple pond deori. In the present study the 46 species of rotifers form 3 order belonging to 15 families in which recorded.

S. V. Deshmukh (2016) Examined by the subjective estimation of copepod community of new water environment in Washim town Maharashtra, India, they thinks about on the copepod community in Washim town. Copepods are inexhaustible and are imperative joins in marine nourishment networks.

Dabhade and Chhaba (2019) They studied by diversity of zooplankton in which the periods of eight month at different fresh water bodies of Washim region like Ekburji dam, Keli dam, DevTalav, Padma Teertha. A total 27 zooplankton out of which 11 species of rotifers, 06 copepods, 09 cladocera and I ostracods were observed. AndHattier al., (2019)They studied by the appraisal of zooplankton differing qualities of nagaral dam, chincholli, kalaburagi, in which The work has been carried out on Zooplankton differing qualities of Nagaral dam of Chincholitaluka at Kalaburagi. Water tests were collected for the period of two a long time in month to month examining from December 2015 to November 2017. A add up to of 31 speciess has a place to four bunches such as rotifer (12 species). Cladocera (11 species), Copepoda (6 species) and Ostracoda (2 species). From the study, thephysico chemical parameters of the Nagaral dam was emphatically related with the zooplankton. Rotifera was the prevailing gather all through the ponder period among the bunches of zooplankton.

ChhabaandDabhade (2019) examined on Impact of Copepods as A Live feed on The Protein Substance of Fish CatlaCatla, the development execution and protein substance of fish Catlacatla on feed premise. Copepod feed appears noteworthy increment in development and protein content of fish Catlacatla and thus, it conclude that the Copepod feed shapes an perfect feed resource for fruitful culture of fish Catlacatla.

Material and methods

Selection site -Sonala Dam: Sonala is a small village located in Malegaon taluka of Washim district, Maharashtra.Sonala village is surrounded by Malegaon Taluka towards west region, BarshitakliTaluka towards North region, Washimtaluka towards the south region and Manorataluka towards east region. Distance of Sonala dam from Washim is 30 km via Kata road, Kinhiraja. The main purpose of Sonala dam is irrigation and constructed by Government of Maharashtra in the year 1981.

Sonala dam is the earthfill dam on Aranrivar near the Mangarulpir city in the Washim district in the state of Maharashtra in India. Height of the Sonala dam are above lowest foundation is 19.6 m (64 feet) while the length of dam is 1,114 m (3,655 feet). Volume content of dam is 698 km³ (167 cu mi)and gross storage capacity of dam is 20,270.00 km3 (4,863.03cu mi).Total capacity of dam is 16,920 km3 (4,060 cu mi).

Methods of collection

Water sample were collected for analysis from four different sites S1, S2, 53 and $4 located at four different directions of the dam. The S1 is the side of dam where water is present in more and deep level, It is near the wall of dam the second side of dam is S2 which is situated near by the Sonala village side, surrounded by agricultural area. The third site of dam is $3 which is located on the opposite side of site S1 also surrounded by field area and the last fourth site (54) of dam containing mostly shallow water

Nets: The most common method of zooplankton collection is by the net. The amount of water filtered is more and the gear is suitable both for qualitative and quantitative studies. The plankton nets used are of various types and sizes. The different nets can broadly be put into two categories, the open type used mainly for horizontal and oblique hauls and the closed nets with messengers for collecting the vertical samples from the desired depth.

Despite minor variations, the plankton net is conical in shape and consists of a ring, the filtering ring cone and the collecting bucket for collection of the organism The collecting bucket should be strong and easy to remove from the net. The netting of filtering cone is made blotting silk, nylon or other synthetic material. The material should be durable with accurate and fixed pre size. The mesh should be square and aperture uniform. The mesh size of the netting material will influmen the type of the zooplankton collected by a not. The nets with finer mesh will capture a smaller organisms, larval stages and eggs of the planktonic forms and fish eggs while those with the coarse netting material are used for collecting the bigger plankton and the fish larvae.

Fixation: The necessity of proper fixation and preservation of zooplanktons need no of emphasis. The poorly fixed and preserved samples were render their subsequent analysis difficult. The whitish precipitate and ruptured exoskeleton can be seen in the improper fixation The zooplankton deteriorates rapidly in the tropics After the sampling, the fixation of the sample should be carried out as early as possible at least within the 5min after the collection to avoid the damage to the animal tissue by the bacterial action and autolysis. An ideal fixative should be non corrosive or toxic in nature. The most common fixative and preservation reagent is 4.5% formaldehyde. It is the cheapest fixative and the zooplanktons samples can be stored for no of years The other fixative occasionally used are ethanol, picnic acid, acetic acid Analytical grade formalin is often contaminated with the iron compounds which produce brown precipitate of iron hydroxide which renders the zooplankton analysis difficult

Preservation: Allow 10 days as the minimum fixation periods. After fixation the zooplankton are added with sufficient quantity of the preservative. While transferring the care should be taken so that no part of the zooplankton sample lost. Various types of the preservations are available. The bufferd formalin is mostly used as fixative and preservative. The other preservative used are 70% ethanol or 40% iso-propanol Glycerin is often added to formalin to prevent shrinkage of the specimens, drying of the material and to facilitate the retiningcolours of zooplanktons. For better shelf life of the zooplankton samples, the preservative should be changed within the first 6 months It would be better to store the preserved zooplankton samples in well ventilated room at temperature less than 25 deg c. The sample should be placed in a wide mouth glass jars. A good quality preprinted lables, on which the collectors name fixative and preservative used and other field information are written should be putinto the jars for ready reference at the time of sample analysis.

Analysis of the sample: Cyclopoida specimen where fix in dilute formalin and placed on slide with drop of water in a drop of glycerin. Water gate evaporate and leaves only glycerin on specimen which can examine and dissected under dissecting microscope. By using needle first body was separated between the fourth and fifth thorasicsomites to exposed important fifth on the underside of the fifth thorasicsomites, as first antenna, caudal rami, on swimming legs Last two legs must be dissected out as they are too closely Permanent mount of species and dissecting part were by placing it into a drop of melted glycerin jelly on a slide.

Observation: To find out the different species of copapodsin the Sonala Dam the water sample of this water body was observed under the inverted microscope Copapods are found in fresh water ecosystem copapods structure approximately 1 mm long structure.

Photography: The photography of Copepods firstly analysis of Copepods and the water sample are taken in slide and then observed under the inverted microscope (coslab) and they form in photography Firstly analysis of Copepodsafter the water sample are taken in glass slide and then observe under inverted microscope (coslab and perform photography)

Identification: Copepods were separated and dissected under a stereomicroscope final examination of specimens was carried out under a compound microscope. Identification was done using keys korovchinsky.

Result and discussion

Sr. No	Phylum	Class	Family	Genus	Species
1	Arthropoda	Maxillopoda	Diaptomidae	Diaptomus	Pygmaeus
2	Arthropoda	Maxillopoda	Cyclopidae	Tropocyclops	Prassinus Mexicans
3	Arthropoda	Maxillopoda	Cyclopidae	Orthocyclops	O.smodestus
4	Arthropoda	Maxillopoda	Cyclopidae	Cyclopoida	Cyclopidae
5	Arthropoda	Hexanauplia	Cyclopidae	Cyclopidae	Cyclops
6	Arthropoda	Maxillopoda	Cyclopidae	Macrocyclops	M.albidus
7	Arthropoda	Maxillopoda	Cyclopidae	Tropocycops	

Table I :Taxanomic summery of copepods in sonala dam

Fig.1. Diaptomuspygmaeus

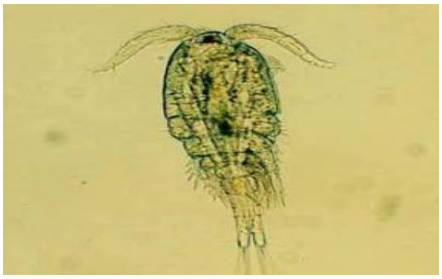


Fig.2. Tropocyclopsprasinusmexicanus

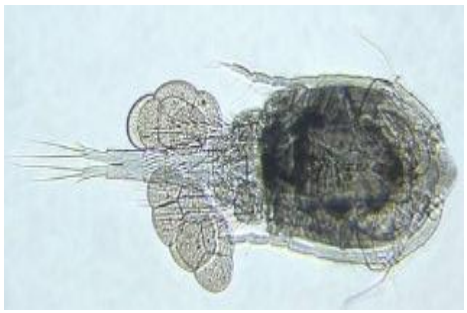


Fig.3.Orthocyclopsmodestus

Fig.4.Cyclops scutifer

Fig.5. Cyclops Larvae

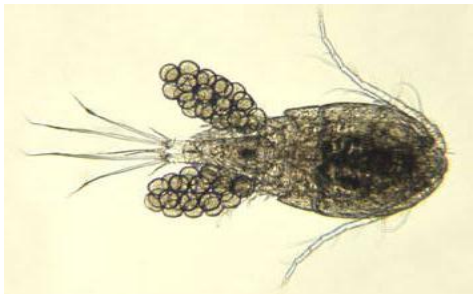
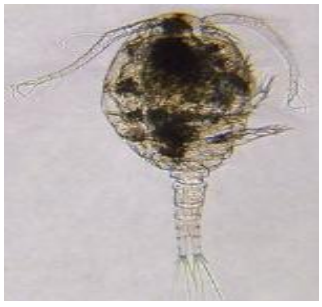


Fig.6. Macrocyclopsalbidus



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STUDY ON BIODIVERSITY OF SNAKES IN UMARKHED TALUKA OF YAVATMAL DISTRICT, MAHARASHTRA

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ABSTRACT

All over the world, near about 3783 types of snakes species are found, out of which 297 species of snakes are found only in the India. Umarkhed is municipal town near the painganga river. Umarkhed falls in Yavatmal district of Maharashtra state. In Umarkhed taluka region, 13 species of snakes reported, out of that 04 species were venomous, 02 semi venomous, 07 non venomous. The data collected from snakes friends and people from different locality. Present study is an attempt to collect information & occurrence of snakes in this region. Through this study to make aware and educate people about conservation of snake. Snake killing by human and road killing by vehicles was common.

Keywords: *Snakes, Reptilia, Umarkhed, Venomous, Non venomous, Elapidae, Viperidae, Colubridae*

Introduction

Snakes are very important creatures in the nature because as predators they feed on many harmful bugs and insects those may cause damage to us. Snakes are important to farmers because they eat mice, rats, and all other small mammals those may destroy crops. Snake venom is very important in synthesizing various drugs. Snakes control rodent populations. Snakes play very important role in the food web. Many snakes are medically important. So snakes are important in the nature. Their absence or removal may directly effect on the balance of the ecosystem.

Snakes are the members of the class Reptilia commonly they are known as reptiles. Snakes found in India show great diversity and their length varies from 6mm to 10m, while weight ranges between few grams to several kilograms. These remarkable reptiles can live in every biogeographic region of the world, at an altitude higher than 5000m and also survive in deep waters.(Dhamnankar Atul, 2006 ; S A Bansod et al., 2016)

Snakes are extremely well adapted to their habitats and plays important role in food chain and food web. The snakes are distributed in various kinds of habitats that Include grasslands, wetlands, forests, agriculture fields, around the residential areas, scrublands, deserts and sea. The Indian Cobra, Russell's viper, Saw Scaled viper, Common Krait called as big four venomous snakes found in India. (P L Jadhav et al.,2018 ; G B Kale et al.,2019)

Although many studies have been undertaken to evaluate the species diversity and distribution of snakes in India, barring the work of Walmiki et al., (2012). In Maharashtra's Nanded region studies have been undertaken (Tambre & chavan, 2016 ; P L Jadhav et al., 2018). No studies have been carried out on the species composition and distribution of snakes in Umarkhed taluka; hence, the present study is undertaken.

Review of Literature

Sonali R Raut et al., (2014) studied the biodiversity of snakes in Palghar Thane region. 25 species of snakes amongst which 15 were non venomous, 3 semi venomous and 7 venomous snakes recorded.

G. N. Tambre & S. Chavan, (2016), the diversity of snake in SRTMU campus, studied 12 species of snakes belonging to 04 different Families was recorded namely Elapidae,

Viperidae, Colubridae and Natricidae. From the recorded snake species 08 species were non-poisonous, 03 poisonous and 01 semi-poisonous.

P L Jadhav and S P chavan, (2018) observed snake species diversity and their distribution in around Nanded city (MH) India. In this studied they concluded that all 26 species of snakes were recorded which include 10 species venomous species whereas semi-venomous and non-venomous species were 16 species found in Nanded area.

Mr Gajanan sargar, Dr bhagawat et al., (2019), studied on biodiversity of snakes in jintur hilly regions Parbhani district (MH) India. 12 species of snakes originating to 04 different Families was noted namely Viperidae, Elapidae, Natricidae and Colubridae (Nicholson,1870; Whitaker,1977; Gharpurey,1954,2008; Khaire,1996,2006). From the noted snake species 03 poisonous and 08 species were non- poisonous 01 semi-poisonous.

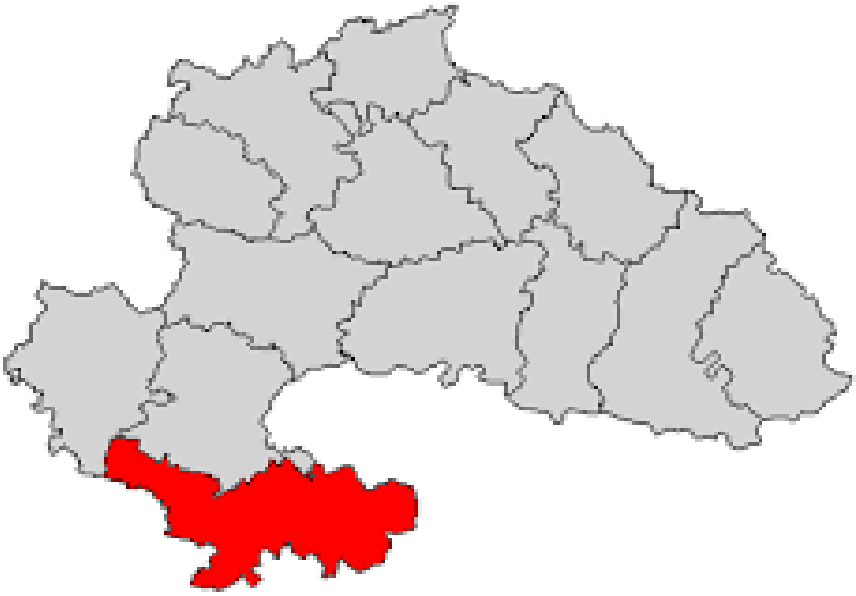
Kale G B, Vairale shiva & Ghait S N,(2019) worked on snake species diversity in rural & semi urban areas of Buldhana district (MH) India. In their study total snakes comprises 6 families Typholopidae, Pythonidae, Boidae, Colubridae, Elapidae, Viperidae. There were 22 genera recorded out of 25 snake species with 6 families during the study period of six month. Of which 17 species belonging to non-venomous, 3 semi-venomous and 5 species were venomous.

Leena N Meshram et al.,(2020), studied on diversity & distribution of snakes in adjoining areas of panvel,Navi Mumbai,(MH) India. This study observed 25 species of snakes representing 10 families and 23 genera out of which 10 species belong to family Colubridae, 3 species each to Elapidae and Viperidae, 2 species each to Erycidae and Natricidae and 1 species each to Homalopsidae, Lamprophiidae, Pythonidae, Sibynophiidae and Typhlopidae. During study, 19 species of non-venomous snakes and 6 species of venomous snakes were observed.

Materials and Methods

Study area:-Umarkhed is a municipal town near the Painganga river. It is tehsil place. It is situated 110 km from Yavatmal and 72 km from Nanded. Umarkhed falls in Yavatmal district. It is surrounded by mountains and ghats from three sides and a plane surface on one of its sides.

Method used:- To determine diversity & distribution of snakes in Umarkhed taluka, the data was collected from snake friends, local people when snakes were observed in their houses or in around their area. During this study only photographs were used. Mobile camara was used for clicking photo. The species were identified with help of snake friends also by using snake identification keys in the standard taxanomic literature and online database ‘snakes of india’,



Map of study area (Umarkhed Taluka)

Result

Umarkhed taluka region shows the presence of 13 species of snakes belonging to 05 families, namely Elapidae, Viperidae, Colubridae, Pythonidae, Boidae. From the identified snakes species 04 species were venomous, 02 semi-venomous and 07 non-venomous.

Classification

Kingdom- Animalia
Phylum- Chordata
Sub-phylum- Vertebrata
Class- Reptilia
Order- Squamata
Sub-order- Serpentes

List of snakes in Umarkhed taluka

S.N.	**Common name**	**Vernacular name**	**Family**	**Scientific name**
Venomous snakes				
1	Spectacled cobra	Naag	Elapidae	*Naja naja*
2	Common krait	Manyar	Elapidae	*Bungarus caeruleus*
3	Russell's viper	Ghonus/Parad	Viperidae	*Daboia russelii*
4	Saw-scaled viper	Furse	Viperidae	*Echis carinatus*
Semi-Venomous snakes				
5	Common vine snakes	Harantol	Colubridae	*Ahaetulla nasuta*
6	Common cat snakes	Manjrya	Colubridae	*Boiga trigonata*
Non Venomous snakes				
7	Indian rat snakes	Dhaman	Colubridae	*Ptyas mucosa*

8	Indian wolf snake	Kavdya	Colubridae	*Lycodon aulicus*
9	Common trinket snake	Taskar	Colubridae	*Coelognathus helenus*
10	Buff striped keelback	Nanety	Colubridae	*Amphiesma stolatum*
11	Green keelback	Gavtya	Colubridae	*Rhabdophis plumbicolor*
12	Indian rock python	Azagar	Pythonidae	*Python molurus*
13	Earth boa/Red sand Boa	Mandul/Matikhaya	Boidae	*Eryx johnii*

Venomous Snakes

1) Spectacled cobra(Nag)
Elapidae
***Naja naja* (Linnaeus, 1758)**
Distinctive character:-

- Hood mark design with circular ocelli connected By curved line, evoking the image of spectacles.
- Dorsal scales--smooth coloring varies from black or brown to yellowish white.
- Ventral scales--white or yellow with a wide dark neck band.
- Head is elliptical and slightly distinct from neck, nostrils are large
- eyes are medium in size and pupils are round.
- Venom is neurotoxin.
- Avg. length is 1-1.5 meter.

Distribution:- All over India.
Habitat/Habits:-
1) Found in jungles, grasslands, paddy field, anthills and even in old houses.
2) It feeds on frogs, toads, mice, small birds and occasionally small snakes.

2) Common krait(Manyaar)
Elapidae
***Bungarus caeruleus* (Schneider, 1801)**
Distinctive character:-

- Dorsal scales--smooth, glossy bluish-black with white crossbars, Underside is white.
- Head is flat very slightly distinct from neck, eyes are small with rounded pupils.
- Avg. length is 1 meter.
- Venom is neurotoxin.

Distribution:- All over India
Habitat/Habits:-

1) It lives in termites mounds, brick piles, rat holes, even inside houses, in water and water sources .
2) At night these snakes are active.
3) Feeds mainly on snakes sometimes even other kraits, occasionally eat mice, frogs or lizards.

3) Russell's viper(Ghonus/Parad)
Viperidae
***Doboia russelii* (Shaw & Nodder, 1797)**
Distinctive character:-

- Dorsal scales-- heavy, rough scaled snakes, color is yellow or brown with dark brown rounded spots edged with white & black.
- Ventral side-- whitish, yellowish often an irregular scattering of dark spots.
- Head is flat, triangular and distinct from the neck, nostrils are large.
- Eyes are large with vertical eye pupils.
- Avg. length is 120 cm.
- Venom is hematoxins.

Distribution:-All over India.

Habitat/Habits:-

1) It found in anthills, rat holes, fields and grassland.
2) When threatened, form a series of S-shaped loop and produce a loud hissing sound, strikes fast when provoked.
3) It feeds on rats, other snakes, scorpions

4) Saw-scaled viper(Furse)
Viperidae
***Echis carinatus* (Schneider, 1801)**

Distinctive character:-

- Dorsal scales--rough with saw likekeeled, color is brown or sandy with darker zig-zag pattern. Ventral side is white with brown spots.
- Head is wide, pear-shaped and distinct from neck, eyes are large with vertical slit pupils.
- When threatened it formed a series of paralled C-Shaped coils, and rubbing their Scales shaped together to produce a sizzling sound 'sshhh'.
- Avg. length is 60 cm.
- Venom is hematoxins.

Distribution:- All over India.

Habitat/Habits:-

1) Though it is a nocturnal. it may be seen basking in the morning. It hide under rocks, bushes or in burrows in day.
2) It active in very humid or rainy nights.
3) It feed on scorpions, centipedes, lizards, frogs and small mice

Semi- Venomous Snakes

5) Common vine snakes(Harantol)
Colubridae
***Ahaetulla nasuta* (Lacepede, 1789)**

Distinctive character:-

- It have long and thin with very pointed heads with horizontally elliptical eye.
- The body is uniform parroty green.
- The scales are smooth but not shiny.
- They expand their bodies when disturbed to show black and white scales marking.
- Ventral side is light green or yellowish.
- Avg. length is 1 meter.

Distribution:-All over India.

Habitat/Habits:-

1) It found on small bushes and trees.
2) It move at a fair speed, when provoked they open the mouth very wide and swell body menacingly.
3) It feeds on lizards, frogs and small bird.

6) Common cat snakes(Manjrya)

Colubridiae

***Boiga trigonata* (Schneider, 1802)**

Distinctive characters:-

- Body is moderately laterally compressed.
- Dorsal scales--smooth, color is ash brown with dark brown or black marks and white-black edged zig-zag band.
- Ventral side--white and have a series of small brown spots.
- Head is large, large cat like golden eyes with vertical black pupils.
- Avg. length is 90 cm.

Distributions:- All parts of Maharashtra, south Indian states, Sri lanka

Habitat/Habits:-

1) It found mostly on trees and bushes, sometimes seen at night on the ground.
2) It feeds on lizards, small birds, mice.

Non-Venomous Snakes

7) Indian rat snakes(Dhaman)

Colubridae

***Ptyas mucosa* (Linnaeus, 1758)**

Distinctive character:-

- Dorsal scales--keeled scales with ridge running down center, color is light yellow or black or green or brown
- The underside color is yellowish.
- Body is long, thickest in the mid region and head is Pointed and broader than the neck.
- Eyes are large with rounded pupils.
- The body is uniformly color but the skin bears inter scale markings which show up when the snake puffs itself up in defense.
- Rat snakes resembled to cobra.
- Tail forms more than one third of the body
- Avg. length is 1.5-1.95 meter.

Distribution:- All over India.

Habitat/Habits:-

1) seen around agricultural field, climbs tree and swims well.
2) It feed mainly on rats, so called as rat snake. Also feeds on toads, frogs, lizards, geckos, small birds and bats.

8) Indian wolf snake(Kavdya)

Colubridae

***Lycodon aulicus* (Linnaeus, 1758)**

Distinctive character:-

- Body is small, slender, dorsal scales are smooth and slightly glossy, Color is grey, brownish or black with thin white or yellow bands. Ventral side is white.
- The head is flattish and somewhat pointed. Nostrils are small, have black eyes and the pupil is invisible. It have long sharp front teeth but not venomous.
- It resembles with common krait.
- Avg. length is 30 cm.

Distribution:- All over India.

Habitat/Habits:-

1) It is nocturnal, climbs vertical walls in search of lizards. It found commonly near human habitation, generally prefers old houses .
2) Feeds mainly on lizards, insects and on frogs

9) Common trinket snake(Taskar)
Colubridae
***Coelognathus helenus* (Daudin, 1803)**
Distinctive Character:-

- The dorsal scales--smooth and glossy. Color is tan and chocolate Brown with two prominent dark stripes on the lateral part of the body and light band checks on the fore part. Underside is white.
- Head is long, eyes have round-pupilled. Have inward pointing teeth without poison.
- Two short and dark lines on the either side of the neck may join medially to form an inverted V.
- Avg. length is 1.5 meter.

Distribution:- All over India
Habitat/Habits:-

1) It is a terrestrial snake that climbs trees in search of prey.
2) Feeds mainly on rats, lizards and small birds. It raises head when disturbed and strikes with its mouth wide open.

10) Buff striped keelback(Nanety)
Colubridae
***Amphiesma stolatum* (Linnaeus, 1758)**
Distinctive character:-

- Body is short but has long thin tail.
- Eyes have large round pupils with golden Flecks (small patch) on the iris.
- Dorsal scales--keeled scales, color is brown to grey, head and the body are of the same color. Underside is pale cream color.
- Two tan and yellow stripes along the length and to the sides of spine are distinctive feature of this snakes. It has irregular blackish crossbars on the body.
- Avg. length is 40-50 cm.

Distribution:- All over India.
Habitat/Habits:-

1) found in garden, near water bodies in marshy areas, paddy field, thicked grass, bushes. It is sleeps on branches of trees, under rocks, holes.
2) spreads its body to display blue or red colour between scales when scared.
3) It feed on frogs and toads, lizards

11) Green keelback(Gavtya)
Colubridae
***Rhabdophis plumbicolor* (Cantor, 1839)**
Distinctive character:-

- It have bright green color
- Skin is slightly glossy and strongly keeled. Underside is Greyish white.
- Head is wide, eyes are moderately large, round pupil.
- Young snakes have a black inverted 'V' mark on the head and blue black bands on the body, which disappears in adults.
- Avg. length is 60 cm.

Distribution:-All over India.
Habitat/Habits:-

1) It found in grassland, forests and also in densely populated cities, garden.
2) It feeds on mainly toads, lizards and frogs.
3) When provoked they may spread a good 'hood'. It is harmless to human but its saliva is toxic to toads and frogs.

12) Indian rock python(Azagar)
Pythonidae
***Python molurus* (Linnaeus, 1758)**
Distinctive character:-

- It is heavily bodied, smooth scaled snake with a lance shaped head and short tail.
- The bright, blotches pattern may be yellowish to Dark brown. The underside is whitish, yellowish or Light orange.
- Head is with incomplete arrow-shaped mark. labial pits on lip scale are thermo receptor and help snake locate warm-blooded prey.
- It grows upto length 3 meter.

Distribution:- All over India.
Habitat/Habits:-

1) It lives in rocky areas near water bodies. It sleeps or bask in the day time, At night they prowl in search of prey.
2) After heavy meal they become sluggish and may rest for several days.
3) It feeds mainly on warm blooded prey. e g mammals.
4) It excretes undigested Parts of the prey body like horns, hooves, teeth, hair and beak.

13) Earth boa(Mandul/Matikhaya)
Boidae
***Eryx johnii* (Russell, 1801)**
Distinctive Characters:-

- The body is cylindrical in shape with small Polished dorsal scales. The overall color is reddish or greyish or black.
- Head is wedge-shaped with narrow nostrils and very small eyes.
- Tail which is blunt, rounded not distinct from the body which make them easy to recognize hence it is also called 'two-headed snakes'.
- The thick body is well adapted for burrowing.
- Avg. length is 60 cm.

Distribution:-All parts of India.
Habitat/Habits:-

1) It lives in burrows in soft soil and emerges in the monsoon when the ground is waterlogged.
2) It feeds mainly on rats, lizards, small birds that land on the ground.

Discussion

In Umarkhed region varied diversity of snakes with 13 species representing 05 families observed. Number of species of snakes

distributed in each family reveals that 07 species belongs to family Colubridae. 2 species each to Elapidae and Viperidae. 1 each to Pythonidae, Boidae.. During present study, 07 species of non venomous snakes and 04 species of venomous snakes were identified and 02 species were semi venomous.

People without knowing the value of snakes in ecosystem and without having adequate knowledge of morphological variation between poisonous and non-poisonous snakes they directly kill them by declaring it as poisonous and hurtful creature. Through this study to create awareness among the people to understand and assist for snake conservation; because we have truthful opinion that all the creatures include snakes have equal right to live on this Earth planet. No any snake bite case was noted during this study. snake species were found in road killing by vehicles normally during the night time.

Conclusion

The present study reveals that the non-poisonous snakes were found in greatest number as compare with the poisonous and semi-poisonous snakes. Presently many snakes have made their appearance in an around areas with proximity to human population due to loss of habitats and environmental stress.

Lack of knowledge, fear of bite were the main reasons behind the snake killing. It is recommended to create awareness among people, common man, farmers, students about ecological role of snakes in ecosystem so that snake bite, snake kills may be prevented and snake diversity, food chain and food web of this ecosystem will be conserved. This will help to protect the survival of human and snakes both.

Acknowledgement

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ECOSYSTEM: A STUDY OF POLLUTANT SULFUR DIOXIDE IN INDIAN CONTEXT

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ABSTRACT

Air pollution is a major environmental health problem affecting the developing and the developed countries alike. The effects of air pollution on health are very complex as there are many different sources and their individual effects are synergistic and additive. It is not only the ambient air quality in the cities but also the indoor air quality in the rural and the urban areas that are causing concern. Sulphur dioxide (SO2) is a part of a chemical group called sulphur oxide, which is a short-lived, colorless, and foul smelling toxic gas. Natural sources of sulphur dioxide include geothermal activity. Sulphur dioxide (SO2) and particles emitted from the combustion of sulphur containing fuels are major air pollutants in urban areas, and SO2 is the principal pollutant associated with the acid deposition problem. When sulfur dioxide combines with water and air, it forms sulfuric acid, which is the main component of acid rain. For the first time in four years India's sulphur dioxide (SO2) emissions recorded a significant decline of approximately 6% in 2019 compared to 2018. Most coal plants in India are lacking in flue-gas desulfurization (FGD) technology, which is necessary to scrub emissions clean off sulphur. The vast majority of plants in India lack flue-gas desulfurization technology to reduce their air pollution.

Keywords: *Sulphur dioxide, Ecology, Pollution*

Introduction

Sulphur dioxide is a colourless, soluble gas with a characteristic pungent smell which forms sulphuric acid when combined with water. The chemical formula for sulphur dioxide is SO2. Pollution is an undesirable change in the physical, chemical or biological characteristics of air,water and land that may harmfully affect the life or create a pollution health hazard of any living organism.(ecology and environment, P.D. Sharma).According to Section 2(b) of Air(prevention and control of Pollution)Act 1981air pollution has been defined as the presence in the atmosphere of any air pollutant and the air pollutant has been defined as any solid, liquid or gaseous substance present in the atmosphere in such concentration as may be or tent to be injurious to human being or other living creatures or plants or property or environment (Sharma, 2017).

Air pollution is a major environmental health problem affecting the developing and the developed countries alike. The effects of air pollution on health are very complex as there are many different sources and their individual effects are synergistic and additive. It is not only the ambient air quality in the cities but also the indoor air quality in the rural and the urban areas that are causing concern. In fact, in the developing world the highest air pollution exposures occur in the indoor environment. Air pollutants that are inhaled have serious impact on human health affecting the lungs and the respiratory system; they are also taken up by the blood and circulated in the body. These pollutants are also deposited on soil, plants, and in the water, further contributing to human exposure. Toxicity can be defined as the relative ability of a substance to cause adverse effects in living organisms. This relative ability is dependent upon several conditions**.** The study is focused on one of the majour pollutant i.e. sulphurdioxide.

Sulphur dioxide (SO2) is a part of a chemical group called sulphur oxide, which is a short-lived, colorless, and foul smelling toxic gas. It is also classified as a "criteria pollutant" by the European Commission in 2015 and the US Environmental Protection Agency in 2016.

Sources of SO2 causing Air Pollution:

Natural sources of sulphur dioxide include geothermal activity. It is the pollutant gas most commonly found in the atmosphere and is usually present in high concentrations in urban and industrial locations. Sulphur dioxide is

produced mainly from the combustion of fossil fuels that contain sulphur, such as coal and oil (eg, coal being burnt in a home fireplace for heating and diesel-powered vehicles). It is also produced from some industrial processes (eg fertiliser manufacturing, aluminum smelting and steel making). It is emitted when fuels containing sulphur are combusted. It is released from refineries, power plants, volcanoes, smelting of metal, and fossil fuel burning (National Ambient Air Quality Status and Trends 2019).

Sulphur dioxide (SO2) and particles emitted from the combustion of sulphur containing fuels are major air pollutants in urban areas, and SO2 is the principal pollutant associated with the acid deposition proble When sulfur dioxide combines with water and air, it forms sulfuric acid, which is the main component of acid rain. Acid rain can: cause deforestation and also acidify waterways to the detriment of aquatic life. Whilst sulphur dioxide also occurs in volcanic emissions, it originates from both natural and man-made sources. Worldwide, natural sources predominate, but in urban and industrial areas the man-made sources prevail. The principal man-made source of sulphur dioxide is the combustion of fossil fuels which also releases other gases such as sulphur trioxide, nitrogen oxides and chlorine compounds. The toxic vehicular exhausts are a source of considerable air pollution, next only to the thermal power plants. In the major metropolitian cities, vehicular exhaust are also aid in the concentration of SO2 in air.

In 2019, India emitted 21% of global anthropogenic (human-made) SO2 emissions — or about 5,953 kilotons a year — nearly double that of second-ranked global emitter, Russia at 3,362 kt/year. China occupied the third position at 2,156 kt per annum. Despite drop in emissions, India still world's highest sulphur dioxide producer The findings indicate that anthropogenic SO2 emissions decreased by approximately 6% worldwide in 2019. For only the second time on record, SO2 emissions decreased in all of the top three countries with the greatest emissions: India, Russia and China. In India, emissions fell for the first time in four years because of a reduction in the use of coal.

For the first time in four years India's sulphur dioxide (SO2) emissions recorded a significant decline of approximately 6% in 2019 compared to 2018, the steepest drop in four years, according to a report from Greenpeace India and the Centre for Research on Energy and Clean Air (CREA).However, India continues to occupy the top spot among emitters for the fifth consecutive year. The image of air pollution due to refineries is given below.

Fig:1. Pollution in India

As per the report, the biggest emission hotspots in India, are thermal power stations (or clusters of power stations) at Singrauli, Neyveli, Sipat, Mundra, Korba, Bonda, Tamnar, Talcher, Jharsuguda, Kutch, Surat, Chennai, Ramagundam, Chandrapur, Visakhapatnam and Koradi. The data on sulphur emissions was sourced from the NASA Ozone Monitoring Instrument (OMI), a satellite-based device, that has been monitoring air quality from space since 2004. The device provides the geographical location and rates of emissions for hotspots for each calendar year. The catalogue is used to group the detected sources into four categories: one natural category (volcanoes) and three anthropogenic categories: power plants, oil and gas, and smelters.(The Hindu, OCTOBER 09, 2020).

Analysis

According to the data in 2019 India was the world's largest emitter of anthropogenic sulphur dioxide, which is produced from coal burning, and greatly contributes to air pollution, According to an analysis of a National Aeronautics and Space Administration (NASA) data released by environmental NGO Greenpeace on August 19, India has more than 15% of all anthropogenic sulphur dioxide (SO2) hotspots in the world detected by the OMI (Ozone Monitoring Instrument) satellite. The major SO2 emission hotspots in India are Singrauli in Madhya Pradesh, Neyveli and Chennai in Tamil Nadu, Talcher and Jharsuguda in Odisha, Korba in Chhattisgarh, Kutch in Gujarat, Ramagundam in Telangana and Chandrapur, Koradi in Maharasshtra. Following map displays the hot spots of SO2 emission in India.

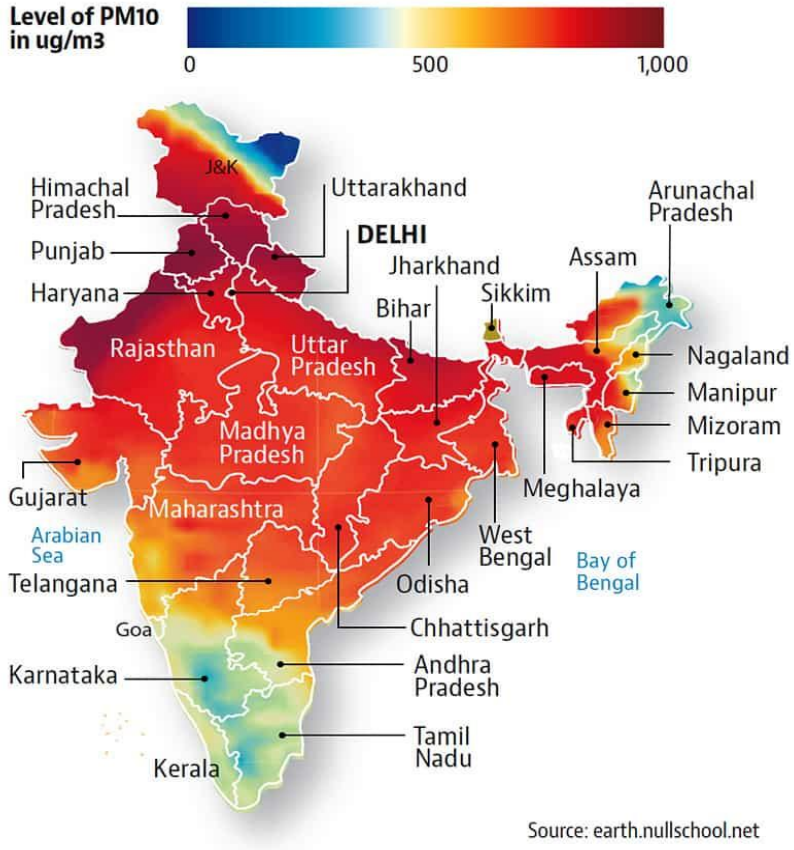

Fig:2. Air Pollution in India

Sulphur dioxide is a pollutant that contributes to acid deposition, which, in turn, can lead to potential changes in soil and water quality. High amounts of SO2 in the atmosphere can degrade air quality and cause acid rain (Tecer and Tagil 2013). Harmful chemical compounds like sulphurous acid (H2SO3), sulphuric acid (H2SO4), and sulphate aerosol (SO4) are formed by the oxidation of SO2 in the gaseous phase reactions with the hydroxyl (OH) radical and aqueousphase reactions with hydrogen peroxide (H2O2) or O3. Sulphate aerosols are also responsible for producing particulate matter (PM) of aerodynamic diameter < 2.5 µm (PM2.5).These aerosols can impact regional climate by modifying the radiative forcing (Seinfeld and Pandis, 2006), and affect cloud reflectivity and precipitation. Apart from these, sulphate aerosols reduce visibility and contribute to acid rain that damages the terrestrial and aquatic ecosystems. It is a precursor for tropospheric ozone, and nitrate and sulphate aerosols (Seinfeld and Pandis 2006).In combination with other pollutants and moisture (e.g. humidity) sulphur dioxide is responsible for the formation of high resistance, visible corrosion layers on all but

the most noble metals (e.g. silver and gold) and alloys.many bacteria and blue green algae are killed due to acidification, thus disturbing the ecological balance.

Sulphur dioxide can cause respiratory problems such as bronchitis, and can irritate your nose, throat and lungs even short-term exposure to high levels might result in death. It may cause coughing, wheezing, phlegm and asthma attacks. The effects are worse when you are exercising. Sulphur dioxide has been linked to cardiovascular disease. Sulphur dioxide can form secondary particles (sulphates) that cause haze and reduce visibility.

As per the WHO air quality guidelines (World Health Organization 2021), the recommended 24 h average SO_2 concentration should not be more than 40 µg/m^3 for protecting human health. The National Ambient Air Quality Standard (National Ambient Air Quality Status and Trends 2019) in India limits 24 h average SO_2 concentrations of 50 µg/m^3, which should not be exceeded 98% of the time in a year. Additionally, a higher level of SO_2 promotes stomatal opening, which makes excessive loss of water from plants and thus, reduces the quality and quantity of plant yield (Varshney et al. 1979). It reacts with surfaces in the gaseous phase and causes discoloration, as in the case of Taj Mahal (Bergin et al. 2015).

When sulfur dioxide combines with water and air, it forms sulfuric acid, which is the main component of acid rain. Acid rain can cause deforestation and acidify waterways to the detriment of aquatic life.

Sulphur dioxide can cause acid rain which seriously affects ecosystems. Acid rain is a major problem in the northern hemisphere where trees and whole forests have been affected. Acid rain does not occur in New Zealand. However, sulphur dioxide deposition can affect vegetation around industrial discharges and in cities. Lichens are good bio-indicators of pollution as they do not like to grow where there is sulphur dioxide in the air. (https://environment.govt). Sulfur dioxide affects the respiratory system, particularly lung function, and can irritate the eyes. Sulfur dioxide irritates the respiratory tract and increases the risk of tract infections. It causes coughing, mucus secretion and aggravates conditions such as asthma and chronic bronchitis.

Conclusion

According to the analysis, air pollution is a huge public health concern, with 91 per cent of the world's population living in areas where outdoor air pollution exceeds guideline limits by the World Health Organization (WHO) and as a result, 4.2 million people die prematurely every year. Renewable energy capacity has been increasing in India's power sector, delivering more than two-thirds of the subcontinent's new capacity additions during the FY 2019-20. But most coal plants in India are lacking in flue-gas desulfurization (FGD) technology, which is necessary to scrub emissions clean off Sulphur. The vast majority of plants in India lack flue-gas desulfurization technology to reduce their air pollution. There is urgent need for proper regular monitoring to provide timely warnings about acidification of our environment. The vast majority of plants in India lack flue-gas desulfurization technology to reduce their air pollution.

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A STUDY ON SUSTAINABLE DEVELOPMENT IN COMMERCE & MANAGEMENT

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ABSTRACT

There is close relationship between Sustainable Development and Commerce & Management. Because at every corner of globe, these subjects are playing vital role in running Socio-Economic activities. Sustainable Development concept is not new, it has been followed by many cultures over the course of history with an aim of maintaining a balance between man and nature as well as economy. For sustainable development, factors such as preserving and protecting the environment and natural resources along with maintaining social and economic equality need to be followed. As we are growing economy, facing many socio-economic problems. Would we become able to fulfill all the protocols of sustainable development? In this paper, Researcher elaborated the pillars of sustainability and how the sustainable development offers for the growth of society.

Keywords: *Commerce& Management, Socio-Economic, Environmental, Sustainability.*

Introduction

Sustainable development plays vital role in creating a balance between the economic, environmental and social needs. It is a way of organizing and managing the society by which it can exist for a long period without making any compromise on the availability of resources for future generations. We all are living in the era of science and technology, where technology is upgrading in every walk of life and who can survive here or face the competition those who will sustain according to time and situation. Now, we all are well aware about the world, what is happening in the globe, countries are fighting with each other, and it is big question for all of us, how to sustain the resources and nature because ultimately it will become cause of destruction. After all, all the areas are related to management and business and related activities of it. Here, Sustainable development is very important. What is exactly sustainable development? It's simple the development that meets the requirements of the present without negotiating the ability of future generations to meet their own wants.

Sustainability brings three elements into harmony: Economy, Society and Environment. The world is moving around these three factors whether it is commerce or management. Whatever we do, for the sack of society and it definitely affects our economy, society and environment. Business concerns need to face the fact that the boundaries of accountability and responsibility are moving fast. The trend towards sustainable management means that organizations are beginning to implement a systems wide approach that links in the various parts of the business with the greater environment at large.

Objectives of Study

- To study the concept of sustainable development.
- To understand the importance of sustainable development in commerce and Management.
- To identify the linkages between Business, environment, society and development.
- To draw inferences on it.

Research Methodology

This research paper aims to give a better understanding about the theme of Sustainable Development in Commerce and Management in current scenario. The study is descriptive in nature. The literature and data are mainly based

on secondary a source, which has been collected from various publications, magazines, journals and internet sources.

- **Meaning and Concept of Sustainable Development**

Sustainable development refers to the developing and implementing public policies and programs by considering environmental, economic and social objectives. It also involves considering the needs of the present as well as the needs of future generations.

In other words sustainable development can be defined as the application and implementation of sustainable practices by managing available resources in a way that will benefit current and future generations without harming its basic structure.

To achieve the sustainable development it is necessary to harmonize three core elements like economic growth, social inclusion and environmental protection. These three elements are well interconnected and all are most crucial for the well-being individuals and societies.

It's a way of systematic handling and managing resources without destroying the ecosystem or harming the environment. Hence this concept can be also referred to as environmentally sustainable economic growth.

Opportunities through Sustainable Development

Sustainability offers us for our business or organization in following ways-

• New Market Potential to empower the export policy and reduces import.

• Competitive Differentiation shows a way for how to survive in this technological scenario.

• It also gives a platform for Innovation so as our youth can shows and utilize their hidden qualities and skills to establish start-ups.

• It reduces Energy Bills and Operating Costs.

• It also provides to avoid various kinds of risk like law suits, new environmental regulation and taxes, and market shifts etc.

• It improves the morale of Employees.

• It increases the productivity and reduces Employee Absenteeism.

• It improves Public and Community Relations.

Commerce is basically depending on Business and Enterprises. In each and every field manufacturing is essential without its servicing is not possible. Simultaneously, our country is growing and upgrading economy on the basis of the policy of Liberalization, Privatization and Globalisation. Accordingly, we are also implementing Industry 4.0. In Industry 4.0, brings together Operational Technology and Information Technology. System Integration, Simulation and Virtualization, Internet of Things (IoT), Big Data and Analytics, Cloud, Cyber security, Augmented Reality, Autonomous Robots, Additive Manufacturing etc. are the frontiers of Industry 4.0. In this regard, Sustainable Development plays vital role.

Pillars of Sustainable Development

There are four pillars of sustainable development. They are human, social, economic and environmental.

- **Human sustainability:**

It aims to maintain the human capital in the society. Growth and development can materialize the basis of natural as well as human capital. As a responsible citizen of nation or a businessman, can invest in health and education sector which is doing and working for overall development of business enterprises.

- **Social sustainability:**

Customer is a king of market. Whether, it is field of health, business enterprises, education or any profession. Honesty and best serving is key success words of development and survival which enhances the name and fame of respective organization as a result, it protects environment and supports equality and also maintain the ecological system.

- **Economic sustainability:**

Its aims to improve the social equality by following various protocols of economic aspects ofnation. It is also possible to maintain and sustain the profitability ratios of various organization. There are many organizations who are working in this direction, we should follow them as a role model like America, Japan, Jarmany etc.

- **Environmental sustainability:**

It aims to improve human welfare via various platforms to protect environments and related issues of it. Our business and enterprises should take proper decisions to enhance the sustainability of environment. It's not only the responsibility of individual but each and every factor of society to serve for nation. As land, air, water, minerals etc. are limited source gifts by nature, so it's our moral responsibility to utilize it whenever required only.

Conclusion

As sustainable management institutions adapt, it becomes imperative that they include an image of sustainable responsibility that is projected for the public to see. This is because business concern are socially based organizations. But this can be like a double edged sword, because sometimes they end up focusing too much on their image rather than actually focusing on implementing what they are trying to project to the public; this is known as green washing.

It is very important that the execution of sustainable management practices is not put aside while the firm tries to appeal to the public with their sustainable management practices. Commerce and management are heart of every field. Sustainable development is very nearest of it. Business and Industries are growing with the aids of science and technology. As a part of social responsibility, we should follow the guidelines of Governments of various nations also. As we are consuming the advantages of recent times, but it's our moral responsibility to take care of our forthcoming generation. Hence, now it's a burning issue to work on sustainability aspects.

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NANOMATERIALS HAVE ATTRACTED A LOT OF INTEREST IN TERMS OF ENVIRONMENTAL REMEDIATION

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ABSTRACT

The primary sources of contamination of land, water, and air are extensive industrialization and intense agricultural activities. Various traditional methods are available for the treatment of different pollutants in the environment, but all have some limitations. Nanomaterials have attracted a lot of interest in terms of environmental remediation. Because of their huge surface area and related high reactivity, nanomaterials perform better in environmental clean-up than other conventional approaches. They can be modified for specific uses to provide novel features. Due to the large surface-area-to-volume ratio and the presence of a larger number of reactive sites, nanoscale materials can be extremely reactive. These characteristics allow for higher interaction with contaminants, leading to a quick reduction of contaminant concentration. In the present review, an overview of different nanomaterials that are potential in the remediation of environmental pollutants has been discussed.

1. Introduction

The world is on the edge of a major environmental calamity that will cost us our fortune. The current state of the present environment is forever deteriorating. Environmental issues are piling up across the globe, and we have to behave as in an emergency on our planet. We have to gain a new perspective and approach calamities beforehand with new concepts and strategies and with our full awareness and seriousness. Pollution in nature, such as in air, water, and soil, undergoes millions of years to eradicate. Industry and automobile exhaust emissions are the main contributing factors for most of the environmental pollution [1]. Air pollutants like NO(x), SO_2, highly reactive and toxic organic compounds, POPs like dioxins, and PAH (polycyclic aromatic hydrocarbons) are all hazardous for mankind [2]. When inhaled in high quantities, carbon monoxide (CO) can harm by immediate poisoning. When certain heavy metals such as Pb are taken into a living organism, they can vandalize by either immediate poisoning or chronic poisoning, depending on the different levels of exposure [3].

Nanotechnology possesses a prospect to significantly bestow in the development of cleaner, greener technologies that have major environmental and health advantages [4]. Nanotechnology techniques are being investigated for their potential to provide solutions for pollution management and mitigation, as well as to improve the performance of traditional environmental clean-up methods [5]. Nanotechnology can help the environment by reducing energy uptake during the manufacturing and production pathways, allowing products to get recycled after their usage, and developing and using environmentally friendly materials [6]. Nanotechnology presently holds great promise for addressing sustainability issues, but at the same time, we should also take into account the harm to the environment and human health [7]. Therefore, in this review, the importance of various nanomaterials that are capable of removing pollutants has been discussed.

2. Different Types of Pollutants

Pollutants are particles that cause damage to the environment by polluting them. When exposed to these pollutants, life can be damaged, and consequences on humans and other organisms are well recognized. Pollutants can get into the environment in a number of different ways, both naturally and through humankind [8]. The different kinds of pollutants include dyes, heavy metals, pesticides, and poly aromatic hydrocarbons.

2.1. Dyes

Dyes are a type of synthetic organic chemical that is used in a variety of industries, including textiles. As a result, during their manufacture and later during fabric dyeing, they have become frequent industrial environmental contaminants [9]. Synthetic dyes in textile wastewater decrease light penetration into rivers, altering the photosynthetic efficiency of aquatic vegetation and, as a result, the food supply of aquatic creatures. The thin coating of released dyes that might build on the receiving waters' surfaces reduces the quantity of dissolved oxygen, which has a serious impact on aquatic life. Biochemical oxygen demand (BOD) is increased by dye-containing industrial effluents. Dyes are basically persistent organic pollutants (POPs) that exist in the environment, and it has been a concern that these man-made chemicals are xenobiotic [10].

3. Environmental and Health Consequences of Pollutants

Trace pollutants have been detected and analyzed during the recent decades with the establishment of refined techniques. However, subsequently with that emerging environmental concerns are to be reasoned with. The toxicological information regarding the majority of chemicals used is incomplete; long-term usage information or low-level exposure still lacks making the environmental challenges hidden. The path for identification of various sustainable as well as long-lasting techniques to counterattack the challenges of new emerging and identified pollutants with a detailed study of their consequences will be fruitful for human generations.

4. Role of Nanotechnology and Nanomaterials for Remediation of Pollutants

Nanotechnology is a branch of science and engineering that is creating "materials" on the scale of atoms and molecules. Conventional principles of physical and chemical sciences do not apply to these sizes. The appearance, toughness, conductivity, and sensitivity of materials change drastically between the nano- and macroscales. For instance, carbon "nanotubes" are hundredfold stronger than steel, as well as sixfold lighter [11]. Various types of nanoparticles, their characterization mechanism, and how they can be applied in various sectors ranging from the health industry to the removal of environmental pollutants have been elucidated in this review.

For the elimination of environmental pollutants, the environmental remediation process employs a variety of methods (e.g., surface assimilation, absorption, synthetic reactions, catalysis using light, and filtering) [12]. Nanomaterials possess a high ratio of their surface-area-to-volume, frequently resulting in greater biogeological and chemical reactivity compared to other macroscale materials. Their improved characteristics and efficacy make them particularly appropriate for carrying out such operations [13]. Nanoscale materials are being used in a wide array of fields, including science, the environment, industry, and medicine.

Over the last few years, an increase in the number of nanoscale products with environmental remedial applications has been created and deployed. Nanomaterials, for example, have been utilized to clean up contaminated soil and groundwater at various hazardous waste sites like those damaged by chlorinated solvents or in oil spills. Manufactured nanoparticles have physicochemical, surface, and optical-electronic characteristics that answer issues that were previously difficult to tackle with traditional methods. It can design unique ways for creating new methodologies, replacing current tools, and producing new materials and chemicals with high performance and low energy usage [14].

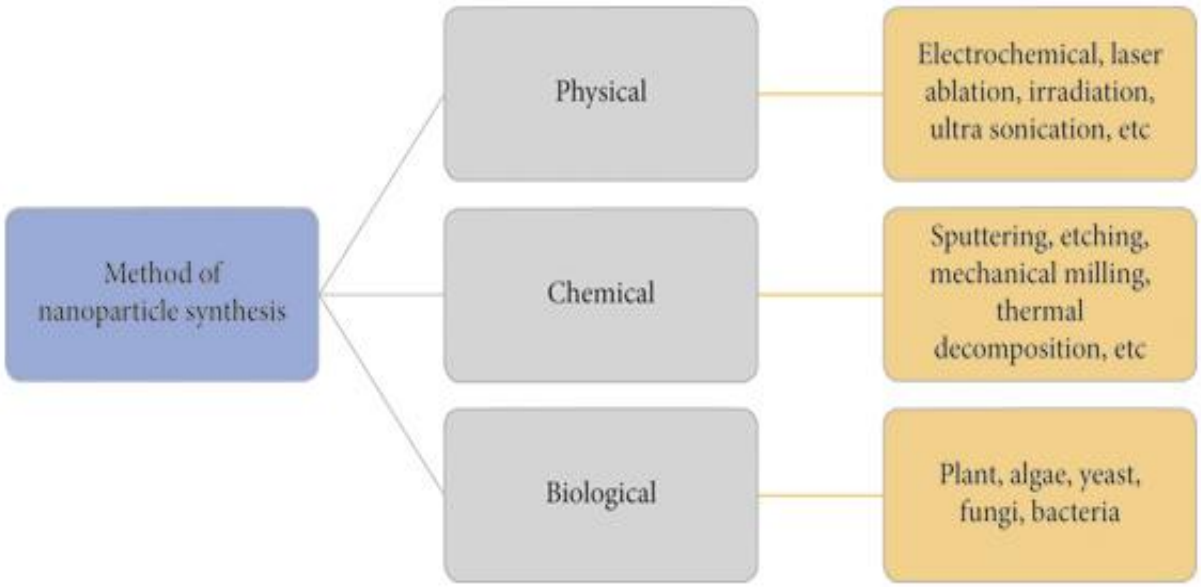
5. Different Application of Nanoparticles

The usage of nanoparticles/materials has shown tremendous growth worldwide from medical grafts to sensing tools. They have revolutionized how various techniques happen. Green synthesized particles especially silver nanoparticles have antibiotic activities; they have been used for medical implantations as silicone artificial heart valves, catheters, bone

prosthetics, dental sets, and bandages [15]. The key ability of particles at the nanoscale has promoted the formation of biosensors for the easier diagnosis of diseases, checking the progression of the problem, as well as tracking the progress of the given therapy [16]. Green synthesized biodegradable nanoscale particles can have a sustained drug release for a long period of time without reporting the risk of infections [17]. Many studies have reported the multifactorial antimicrobial property of green nanoparticles. Generally, nanoparticles either function extracellularly or intracellularly to alter the bacterial growth rates such as inhibition of cytological transport and signaling [18]. Antibiotic activities of NP antifungal properties have also been reported. These particles can degrade cell walls and have been found to be as effective as 87% in studies with concentrations as low as 6 mg/ml [19].

6. Conclusion

Nanoparticles have revolutionized the future approach for litigation of environment with biotechnology. With the increased progress of humans, industrialization and consumption of reserves are present in nature. There is an urgent requirement for the removal of these pollutants with the least possible side effects to the Earth, though not lamenting the side effects of earlier existing processes like Fenton, coagulation, adsorption, advanced oxidation etc. and their combinations as well. A more sustainable, holistic approach to the tackling of this grave issue can be nanoparticles that may be active while working on both small- and large-scale levels.



Science and innovations have made rapid advances in the production of nanomaterials to obtain unique characteristics that differ from those of bulk materials. Nanoparticles can be prepared by chemical, physical, and biological methods

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REVIEW ON UTILIZATION OF MICROBIAL CONSORTIUM FOR DEGRADATION OF NIRMALYA

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ABSTRACT

Nirmalya is referred to the offering that is offered to the god in the temple. However, most of the temples and households do not dispose the nirmalya in proper way converting it into the form of solid waste. Due to regular visits of millions of people to temples huge amount of nirmalya is generated every day, every hour leading to huge generation of waste. Most of it not been treated properly give rise to many environmental issues as well as health issues. Hence it will be convenient to convert this organic nirmalya into useful fertilizers. This may be achieved by traditional composting requiring six months. However, composting the nirmalya by using microbial consortium also gives the great results and also shortens the composting period. Also, the compost formed has rich organic value and contains the microflora required by the soil that will help in better utilization of compost by the plants.

Keywords: *Nirmalya, solid waste, environmental issues, fertilizers, composting, microbial consortium.*

Introduction

Solid waste is any material that is disposed or separated from other materials after its use. It may include solid, liquid, semi-solid materials *(idahopublichealth.com)*. The generation of solid waste has become an important global issue because of a drastic growth in world population and thus large increase in waste production*(Dr. Khalil M. et. al.2014)*. Every year tons of waste is generated in India mostly solid waste. Solid waste include garbage, containers, construction debris, commercial refuse, sludge from water supply or waste treatment plants, or air pollution control facilities, and other discarded materials, plastic waste, plant waste, rusted materials, scarps, e-waste etc. *(www.dec.ny.gov)*. Urban India produces about 42.0 million tons of municipal solid waste annually i.e., 1.15 lakh metric tons per day (TPD) *(mohua.gov.in)*. The solid waste generated in India during year 2020- 21 was reported as about 160038.9 TPD according to the Annual Report on Implementation of Solid Waste Management Rules *(MSW_AnnualReport_2020-21)*. Solid waste can be divided into two major types Municipal and Non- Municipal waste. Municipal waste includes construction waste, medical waste, sewage waste, household waste, is generated at huge amount at regular basis. One of such waste is Nirmalya, which is considered as holy waste.

Nirmalya is continuously generating as one of the solid wastes all over the nation. India being a diversified country has number of different religions. Also has most varied rituals followed by the peoples leading to different patterns of worships. Each pattern worship has its own important part. In India, various festivals are been celebrated throughout the year creating lots of wastes and debris in the surrounding. Most of which constitute nirmalya. Nirmalya consists of flowers, leaves, prasadam, food grains, Belpatra, garlands, coconut remains and many more things that are used as offerings for God. This nirmalya is generated at temples, mosques, churches and other worshipping places. Nirmalya constitutes approximately 25% of the total solid waste generated in the community. Some also offers those things to the rivers as they are considered equally holy as the religious places. The Nirmalya is being dumped in water reservoirs and on the free land spaces. This leads to eutrophication of water affecting the water ecosystem as well as decreasing soil fertility due to formation of toxic gases and substances. According to The Times of India in 2017 Navi Mumbai during

the Ganesh festival almost 77 tonnes of nirmalya was generated. *(Times of India)*

As nirmalya is considered as blessed remains, it is thought to be disposed at a certain holy place. Hence the regular nirmalya produced form the houses is either disposed in open land fields or under a tree that is considered as holy. According to the ancient literature, the disposal of nirmalya was carried out properly at that time. It was either disposed in the pits around the trees or in the gardens or it was disposed in the river water as per the Asian Jal Pravah method as rivers are thought to be blessed *(Pawar P. 2021).* But the nirmalya then included only the material that is degraded by the nature itself. But in today's date the components included in nirmalya has drastically changed as it not only consists of flowers, leaves, fruits etc. but also includes plastics, cements debris, idols made up of plaster of Paris which cannot be dissolved in water. Rivers are the core of any activity related to festivals, be it the Ganesh or the Druga festival or Moharram. The strain on the river is not just caused by idols, but also the copious amounts of Nirmalya thrown into the river throughout the celebrations. Past records have shown upwards of 150 tonnes of material being immersed in the river during the festivals *(Gutman M. 2019).* When such non-degrading or slowly degrading materials are disposed in water bodies it became a part of causing eutrophication. Even the degradable part of nirmalya such as flowers, leaves, sculptures of soil, cloth materials, food items, fruits etc. takes months and years to degrade and forms a layer of nirmalya over the water bodies enhancing the eutrophication process. Even if the nirmalya is disposed in the land field, it will take months to be converted in to compost as the pressure and environment required for conversion will not be formed. The nirmalya in the open field starts to decay, the process may form many types of products such as toxic substrates, toxic gases, which may lead in increased unhealthy environment, giving an invitation to numerous deadly diseases.

Although this nirmalya being a degradable product can be put to better use by converting it into manure or compost that can be beneficial for both the health environment and also to the agricultural field.

Many temples have now initiated to collect this nirmalya and put it to a better use by composting and supplying it to the volunteers that are reusing it such as Thum Creative Paryavaran Dakshata Kruti Manch has been using the floral part of nirmalya to create the essence sticks *(thumcreative.org).* Some of the trust collect this nirmalya from every religious place and convert them into a better fertilizer. Vermicomposting is one of the most applied methods used for the degradation of organic matter, and hence is mostly used for the composting of nirmalya. This method is used mainly to recycle the remains of crops and to increase the amount of P, K, N content in the compost *(Chakole P., Jasutkar D. 2014)* The chemical analysis of compost formed after vermicomposting of nirmalya showed that the compost has neutral pH (7.2), also showed that the content of carbon, nitrogen, phosphorous and potassium has increased in efficient way. Even the concentration of microelements such as zinc, manganese, iron and copper were also increased in competent manner *(Aruna K. 2016).*

Nirmalya can also be degraded with the help of micro-organisms. Micro-organism coexist with other organism, and are important part to everyday life. These micro-organisms are capable of crumbling the macro constituent of nirmalya into useful compost. As nirmalya comprise of various amounts materials it is first required to segregate these components into particular categories. After categorization the components that can be recycled such as glass components, plastic waste, paper waste, pieces of cloths should be sent to the trust that reuses such components. All the organic matter such as flowers, garlands, belpatras, offered food grains, coconuts and fruits should be separated and used for the composting. The coexistence of micro-organisms with other micro-organisms helps in conversion of this highly complex organic compound into simple products *(Jadhav A. R. 2013).* For the composting the floral wastes from the nirmalya micro-organisms were specifically isolated from the soil on floral based media *(Pindi P.,*

.Satyanarayana S., (2012)). Similarly, the other parts of the nirmalya can also be degraded with the help of microbial consortium derived from the soil sample. Also the oil offered in the temples can be remediated with the help of bio surfactant producing microbes *(Patowary K, 2016).* The micro-organisms con not only degrade the waste it also helps in reducing the period required for the degradation of waste into compost *(Mirdamadian S 2011).* Studies reported that diversity of microorganisms enriched with nitrogen, phosphorous, calcium, magnesium and potassium were found in the compost of floral waste more effectively. *The mature compost developed using the microbial consortia has the potential to support the growth of tomato plants. This method is cost effective as well as pollution free. Thus, it can be promoted as potential mechanism to maintain the environmental sustainability at wider scales (MulayY. 2020).* After the process when the compost is formed it can be used as fertilizers in the agricultural fields, gardens etc. it not only helps in cleaning the environment but also helps in increasing the fertility of the soil. Due to composting not only the waste is converted into fertilizers but the microbial content is also increased which will help the soil to regain its fertility.

Conclusion

As the nirmalya derived from the temple majorly consist of floral waste, plant waste, food waste, and other organic waste, it will be beneficial for the society to convert it into effective re-usable organic compost. It can be used to re gain the fertility of the soil. It will also reduce the amount of waste in the dumping ground. As the time period for composting is reduced due to the microbial consortium it will rapidly increase the quantity and availability of organic fertilizers in the market.

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REVIEW ON NANOMATERIALS AND ITS APPLICATION

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ABSTRACT

Nanotechnology has emerged as a top research field globally. Nanomaterials are engineered in the range of 1-100nm which imparts beneficial properties viz. improved reactivity, mechanical strength, sensing capabilities etc. Nanomaterials had wide applications in all the fields. The present review focus on these applications.

Keywords:*Nanotechnology, Nanomaterials, properties.*

1. Introduction

Nanotechnology is an innovative field which involves engineering nanomaterials with useful properties. Nanomaterials are ultra- small particles which consists of variable physicochemical characteristics viz. melting point, wettability, electrical and thermal conductivity, catalytic activity, light absorption and scattering (European Commision, 2016, Martín-Gago, J.A *et al.,* 2009). The nanomaterials are classified on the basis of the material used for their construction as carbon-based, metal-based, dendrimers, and composites.

Carbon-based NMs are constructed from carbon and depicts different morphologies viz. tubes, ellipsoids or spheres. Metal-based NMs are commonly used as quantum dots, nanogold, nanosilver, and oxides with metal bases. Dendrimers are branched polymers and are apted tools for chemical modifications (Abbasi. E *et al.*,.2014). Composites are amalgamation of nanoparticles or nanoparticles and other materials. Most widely used nanoparticles are Ag, zinc oxide (ZnO), copper oxide (CuO), cerium dioxide (CeO2), titanium dioxide (TiO2), iron oxide (FeO), fullerenes, carbon nanotubes (CNTs). Apart from these newer NMs has also manufactured. Among them Nanocomposites are NMs enclosed or encapsulated with other materials. whereas linking of 2 or more discrete NMs gives nanohybrids with different functionality (Saleh NB *et al.,* 2015). These are generally based on semiconductor substrates viz. GaAs, CdSe, CdS, SiGe (K. Arivalagan, R. Karthikeyan July 2017).

2. Applications ofNanomaterials

The nanomaterials are used in different fields as per different criteria viz. gold, silver, zinc is widely used in medical field, Platinum is use in energy storage, silver nanoparticles are use in sensors, textile and wound dressings etc. Carbon-based NMs are having wide applications in drug delivery, enzyme immobilization, biosensors, bioimaging and pollutant removal.

- **Water treatment:**

Nanomaterials hassmall sizes, large specific surface areas, strong adsorption capacities and reactivity. It is reported that due to these properties removal of inorganic and organic pollutants, baterial contaminants are successfully accomplished (Lu. *et al.,* 2016). TiO2 has been successfully applied in the contaminant degradation in water and wastewater (Guo, Q *et al.,* 2016). The mechanism beside the degradation process is that in the presence of light and catalyst, the oxidation of contaminants to low molecular weight intermediate products take place which is then transformed into CO2, H2O, and anions such as NO, PO4 3- and Cl- (A. Bratovcic 2019, SSRJ IJMSE 2019).

- **Sensors:**

Nanomaterials are widely used in electrochemical sensing devices. The sensors are designed for different purpose viz. diagnostics, food safety, environmental monitoring, food additives and contaminants etc. Biosensors possess high sensitivity and selectivity (Longyi Chen. *et al.,* 2018). Ffluorescent nanomaterials and nanostructures have been designed for glucose sensing. Glucometer which is electrochemical based sensor is widely used by diabetes patients (Ma X. *et al.,* 2016).

- **Nanomedicines:**

The nanoparticles are use as nanomedicines due to their antibacterial activities and broad-spectrum nature. Nanosilver are used for disinfecting medical devices, home appliances, water treatments, nanomedicine etc. The gold nanoparticles are widely used in photothermal therapy, drug delivery, photodynamic therapy, gene therapy, biolabeling, biosensing, etc. Nanoparticles are effectively used for targeted drug delivery (G. Cao 2014).

- **Foods:**

Nanocomposites are widely use in food industries. The nanocomposite coating imparted with antimicrobial agent was found to be effective in food packaging. New foods are among the nanotechnology created consumer products coming onto the market at the rate of 3 to 4 per week. According to company information posted on PEN's Web site, the canola oil, by Shemen Industries of Israel, contains an additive called "nanodrops" designed to carry vitamins, minerals and phytochemicals through the digestive system and urea.

- **Paints:**

Nanoparticles are reported to be use in paints to improve performance viz. making them thinner. Thinner paint coatings (‘lightweighting’), used on aircraft, would reduce their weight, which could be beneficial to the environment (S. P. Milo, A .H. W. Shaffer 1999).

- **Batteries:**

Nanocrystalline materials are use in batteries for energy holding as compare to conventional batteries. The aerogel structure is responsible to hold more energy. Nickel–metal hydride batteries made of nanocrystalline nickel and metal hydrides are reported as very efficient with less recharging and long durability.

- **Sunscreens and cosmetics:**

Titanium oxide nanoparticles possess good absorbing and reflecting property against UV light. Nanosized titanium dioxide and zinc oxide are currently used in some sunscreens. Nanosized iron oxide is present in some lipsticks as a pigment. The use of nanoparticles in cosmetics has raised a number of concerns about consumer safety.

- **Displays:**

The huge market for large area, high brightness, flat-panel displays, as used in television screens and computer monitors, is driving the development of some nanomaterials. Nanocrystalline zinc selenide, zinc sulphide, cadmium sulphide and lead telluride synthesized by sol gel techniques are candidates for the next generation of light-emitting phosphors (N. Rajkumar *et al.,* 2010).

- **Energy:**

Nanotechnology in the form of solar cells is very successfully use for energy conservation, storage as well as manufacturing. It offers renewable energy sources. The solar cells have number of layers of different semiconductors set together to absorb light at different energies Nanotechnology could help increase the efficiency of light conversion by using nanostructures.

Fig 1: Classification and wide range of application of nanomaterials (Saleh, T.A. *et al.*, 2016)

3. Conclusion

Nanomaterials had wide applicability in all the fields. The nanomaterials are not only competent but also efficient to combat number of issues in terms of environment, health, energy etc. The nanomaterials could be the best option for currently available products. More research is needed toward the applicability of nanoparticles in other unexploited areas. The awareness and knowledge towards nanomaterials and its applicability is also suggested.

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BIOFUEL: THE LUCERATIVE FUTURE FUEL

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ABSTRACT

The depletion in ozone layer from the global warming received wide spread focus on biofuels that have been recognized as energy alternatives. Fossil fuels are a finite source of energy and going to deplete in the future. Biofuel production is the safest method for controlling the organic waste which is accumulated in the environment day -by - day. The accumulated waste spread the diseases in humans, releasing the harmful gases in an environment. Biomass is a renewable feedstock used to produce biofuels for sustainable development in the future. Biodiesel derived from oil crops is a potential renewable and carbon neutral alternative to petroleum fuels. Biofuels lower emission of the carbon dioxide and methane gas, which is also brings the economic benefits. Microorganisms play important roles in the formation of biofuel they convert the substrate into the product viz. bioethanol, biogas, biodiesel, and biobutanol. This review mainly focusses on the utilization of microorganisms for the production of biofuels.

Keywords:*Biofuel, Biodiesel, global warming, microorganisms.*

4. Introduction

History:

Biofuel in the form of wood was use by the early man for cooking and heating. As the early man progress discovery of different energy sources was accomplished. The use of ethanol as a biofuel was recommended by German researcher Nicolaus August Otto. Rudolf Diesel invented the diesel engine running on vegetable oil. He used peanut oil for ignition of engine on 10 August 1893, since this date is known as international biodiesel day. During World War ll, the demand of biofuel has increased as fossil fuel become less abundant and biofuel made their way into England and Germany with alcohol made from potatoes and the mix of grain alcohol with petrol [Sideplayer.com].

In 1970s and 1980s Environmental Protection Agency, EPA situated in America, suggested that fuel should be free from sulfur dioxide, carbon monoxide and nitrogen oxides. In 1998 EPA done production of biofuel on commercial level which was alternative source of petrol. In 2010, the production of biofuel reaches up to 105 billion liters worldwide. In 2011 European countries biodiesel consumption is 53%. The International Energy Agency set a goal to reduce the use of petroleum and coal which leads to switch on the biofuel till 2050. The USA is the top country for biofuel consumption [youtu.be].

5. Classification

A. 1st Generation Biofuel :

These are conventional biofuel since produced conventionally from different biological raw materials viz. sugar, starch, vegetable oil or animal fats. First generation biofuels are produced from grains which are high in sugar, starch which are fermented into bioethanol or seeds that are pressed into vegetable oil are used in biodiesel. Common first-generation biofuel include biodiesel, biogas, vegetable oil, bio alcohol, solid biofuels, syngas [energypedia.info].

B. 2nd Generation Biofuels:

Second generation biofuels are produced from nonfood crops such as cellulosic biofuel, waste biomass, which include stalks of wheat, corn and wood. Common second-generation biofuel

includes vegetable oil, Biodiesel bio alcohol , Biogas, Solid biofuel and syngas. Continuous research is going on towards this direction. Scientists are working on generation of biomethanol, biohydrogen, DMF, Bio-DME, Fischer-Tropsch diesel, biohydrogen diesel, mixed alcohols and wood diesel using cheap resources. [energypedia.info].

C. 3rd Generation Biofuels:

Third generation biofuel is produced from the algal biomass or extract of marine algae. It is sometimes referred as "oilgae". Algae is the best feedstock due to their diversity and yield. Biodiesel, gasoline, methane, butanol, ethanol, vegetable oil, jet fuel are derived from algae [energypedia.info].

6. Types of Biofuel

1.Biobutanol:

Production of Butanol is similar to the production of ethanol by the microbial fermentation of sugar, starch, or cellulose feedstock. Biobutanol is alternative for the transportation fuel. It has a higher energy content than other fuels. The biobutanol produces a variety of the feedstock which is capable for absorbing the carbon emission and reduces the emissions of different greenhouse gases.

2.Bioethanol:

Fossil fuels are major contributors for global warming (Dürre, P., 2007). Hence need of cleanest liquid fuel which emits the least carbon emission is demanded. Bioethanol is one of the liquid fuels obtained from fermentation process using biomass for fuel generation. Microorganisms are use in the fermentation process for conversion of lignocellulose of plant material into ethanol with the help of microbial enzyme cellulase. The immobilization of microorganisms on stable surface is preferred for saccharification process. The saccharification is accomplished with the help of zymase enzyme naturally present in yeast. Some microorganism are involved in the decay of dead body and able to produce ethanol such as streptococcus pyogenes, which is also called as flesh eating bacteria or strep.

3.Biodiesel:

In this process, the microorganisms are used as the alternative production for biodiesel. The microorganisms viz. Microalgae, bacteria, Fungi and yeast carry out transesterification process and convert biomass into biodiesel (Vicente *et al.*,2010).The fast-growing microbes are effective as it converts a large feedstock. The large number of bacterial strains produces the complex lipids, which is used as indicator strained for biodiesel (Thevenieau *et al.*,2013). The production of algae to harvest oil for biofuels on a commercial scale. The maximum growth of the algae produced and the oil are formed. The solvents are used to separate the sugar from the oil by using evaporation method. Algae is the non-sulfur, non-toxic and highly biodegradable in nature. After the separation the oil is used as biofuel which is directly used in transport engine (Meng *et al.*, 2009).

4.Biogas:

Bio gas is combination of various gases viz. methane, carbon dioxide, hydrogen sulfide etc. It is generated from any organic or inorganic waste. Biogas is produced by anaerobic digestion, in this process anaerobic organisms are used, such as methanogens and Sulfate reducing bacteria inside an anaerobic digester, or biodigester. Biogas are effective source of renewable energy. The methane gas is used in the electricity production, burning of gas. The raw material, like domestic waste and agricultural waste, are converted into methane gas (biogas) with the help of the microorganism. The composition of biogas varies on the basis of raw material used and fermentation conditions.

7. Importance of Biofuels

Biofuels are designed to replace the fossil fuel and considered as renewable source because fossil fuel takes millions of years to form and human really can't wait that long. Biofuel can be produced from various biological substances viz. plant biomass, industrial waste, household waste, animal waste etc. Biomass is simply organic matter. In simple language it is dead viz. Kernels of corn, mats of algae and stalks of sugar cane are all biomass. Biofuel derive the

energy from the process of biological carbon fixation from the biomass. Biofuel exists in solid, liquid or gaseous state. The function of biofuel is similar to nonrenewable fossil fuel. Both can burn after ignition, and they release the energy which is used to power cars and electricity. There are many reasons for generating interest in biofuels. Use of biofuel reduce dependence on fossil fuels. Biofuels also helps to reduce reliance on foreign Oil. They help to lower emission of greenhouse gases viz. carbon dioxide, methane. They also help to brings business to rural economics. Uses of biofuel makes environment clean by regulating carbon dioxide rate in environment by maintaining carbon cycle, by making a way to reduce global warming. Biofuel cause less damage to the planet as compare to fossil fuel [biofuel.org.uk].

8. Conclusion

Biofuels are more sustainable option as compared to fossil fuel . Plant or algae can be replenished readily, biofuel is considered to be a source of renewable energy. Biofuel reduce the emission of greenhouse gas and decreases global warming. Biofuel are generally produced from agricultural crop by using microorganisms. Due to this it helps to decrease pollution as compared to conventional fossil fuel.

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DEGRADATION OF PLASTIC MATERIALS USING MICROORGANISMS: A REVIEW

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ABSTRACT

Plastic are high molecular weightpolymer used for various purposes viz.Packaging of food items, pharmaceuticals, and cosmetics. Excessive use of plastics causes a serious hazardous effecton the ecosystem and human life. Plastic assimilation ashore and ocean has increased concern to deteriorate these polymers. There is a need to utilize relevant deterioration techniques to lessen plastics trouble from the environment. Several plastic-degrading methods are available, but the cheapest, eco-friendly, acceptable method is degradation using microbes. Many living microorganisms have procedures to get through and deteriorate plastics. Various studies proved that the organism secretes the extracellular catalysts to deteriorate the plastic. Biodegradation of plastic helps to decreases the emission of greenhouse gases and reduces the global warming. The present review emphasis on the importance of microorganisms used for the degradation of plastic waste.

***Keywords:Biodegradation, Microorganisms, Plastics**, Global warming, Greenhouse gases.*

1. Introduction

Solid waste especially plastic is globally present in all the community waste. The manufacturing and use of plastics are continuously expanding because of high urging. They are affordable, lightweight, corrosion-resistant, and have high thermal properties. ***(****Aruna and Shanthi, 2015)*. 500 billion to one trillion/annum PE (polythene) covers have been under customary utilize around the world. Plastic is non-degradable and main factor responsible for bioaccumulation in the ecosystem. The accumulation of the plastic wastes created a serious threat to the climate and wildlife *(Sheavly and Register, 2007).* It adversely affects Earth's environment in various ways viz. decreasing soil fertility, creating suffocation and death of marine animals, causes cancer, birth defects, impaired immunity, endocrine disruption and other serious ailments in human and other animals.

In the aquatic ecosystem, plasticwaste cause hazardous effectson aquatic ecosystem. It causes abdominal obstruction in the fishes, birds and other aquatic and terrestrial animals *(Gallo et al., 2018).Ghosh and Singh* (2005) reported that terrestrial animals have PE carry bags in the intestine which is considered to be a major root cause for its death. Hence there is an urgent need to degrade plastic waste and protect our environment from its hazardous effects.

There are variousplastic waste degradation methods viz. photodegradation, thermo-oxidative deterioration and biodegradation based upon the factors involved *(Shah et al., 2008).* But the cheapest, eco-friendly, acceptable method is degradation using microorganisms. Biodegradation of plastic would be a key to a long-term answer for plastic pollution because it is non toxic and eco-friendly and globally accepted method, however, the efficiency is moderate *(Shah et al., 2008).* Microorganisms are engaged with the deterioration of both synthetic and natural polymers *(Gu et al., 2000).* Microorganisms such as bacteria and fungi are engaged in the deterioration of plastics.

Biodegradation is the ability of microorganism to degrade polymer through physical, chemical, or enzymatic action *(Albertsson et al., 1987).* The polymers are not directly utilized by microorganisms where most of the biochemical processes takes place. The decay of plastics is an extremely steady reaction. At first it is

started by ecological elements, which incorporate temperature, pH, and UV. The microorganisms that are responsible for biodegradation differ from each other and have their own optimal growth conditions. In order to use such materials as a carbon and energy source, microorganisms have developed a special strategy.Biodegradation is generally considered as consisting of both enzyme-catalyzed hydrolysis and non-enzymatic hydrolysis *(Rutkowska et al. 2002).* During deterioration, exoenzymes from microbes disintegrate complex polymers yielding more modest atoms, for instance, oligomers, dimers, and monomers, that are more adequately modest (water soluble) to pass the semi-porous external bacterial membranes and a short time later to be utilized as carbon and energy sources *(Gu, 2003).* This fundamental arrangement of polymer isolating is called as depolymerization. This elementary system of polymer degradation is called depolymerization. The break down pathways related with polymer degradation is frequently measured by the climate condition. The total deterioration of a polymer produces organic acids, CO2, CH4, and H2O. *(Fesseha H, Abebe F. 2019).*

2. Plastic Classification on the Principle of Thermal Properties

On the principle of thermal properties plastics are divided into two classes, i.e., thermoplastics and thermosetting polymers.

Thermo-plastics

This type of plastic can be molded for several times but on heating it cannot undergo any chemical change in its composition. Examples of thermo-plastics are polypropylene (PP), polyethylene(PE)

3. Thermosetting polymers

This type of plastic once melts and set down into a certain shape, after solidification it cannot be melted and modified again. Examples of thermosetting polymers areBakelite, Polyurethane,Epoxy resin.

4. Types of degradation

Photo-oxidative degradation

In photo-oxidative degradation light damage the polymer. Light is the primary source for degradation. This process isstarted by light absorption and examples of this degradation process are photodegradation and photo-oxidation.

Thermal degradation

In thermal deterioration, reactions happen overall part of the polymer while in photochemical deterioration reactions happen only on the polymer exterior part. Thermal deterioration takes place by depolymerization reaction. For its beginning, temperature and UV light are needed.

Biodegradation

Any change in the polymer structure by microorganisms are called biodegradation.In this process plastics are deteriorated by the activity of microorganisms including bacteria, actinomycetes, and fungi.

Aerobic biodeterioration

In this sort of deterioration, microbes separate huge organic compounds into more modest compounds by utilizing oxygen electron acceptor. By-products of this process are carbon dioxide and water.

Anaerobic biodegradation

Anaerobic biodegradation is the decomposition of organic contaminants by using microorganisms in the absence of oxygen. Few anaerobic bacteria utilize nitrate, sulfate, iron, manganese and carbon dioxide as their electron acceptors, to disintegrate organic chemicals into smaller compounds.

Mechanism of biodegradation

Biodegradationprocess consists of three steps; (a) microorganism attachment on the surface of polymer, (b) utilization of polymer as a source of carbon, and (c) polymer degradation. Microorganisms add to the outer layer of polymers and break down these polymers by producing enzymes to get energy for their growth. Large polymers degraded into monomers and oligomers that are low

molecular weight molecules. Few oligomers may be absorbed in the internal environment of microorganisms after diffusing inside them.

5. Characterization of Plastic Biodegradation

In the process of Biodeterioration of High molecular weight plastic into small monomeric unitssome characteristic properties of plastic have changed that are, Plastic surface properties, mechanical and physical properties of the plastic, Oxygen and Carbon dioxide consumption rate.

6. Factor Affecting Biodegradation of Plastics

There are various factors that affect biodegradation that consist of polymer characteristics, type of organism and nature of pretreatment. Sidechain bearing polymers are hard to degrade in comparison to polymers without side chains. Polymers with high molecular weight are difficult to degrade. The other factors responsible for biodegradation of polymers are their morphology, melting temperature and degree of crystallinity.

7. Conclusion and Recommendation

From the above Review it is concluded that different kinds of microorganisms play an important role in various steps indulged in the deterioration of plastics. Biodegradation of plastic decreases the emission of greenhouse gases and it will help in reducing the global warming. It will also help in clearing or reducing the plastic dumped in soil over the year also reducing the Pollution and protect from hazardous effects of petroleum plastics. The microorganisms secrete the extracellular enzymes to break down the plastic but the detailed characterization of these enzymes is still needed to be carried out. The representation of productive plastic-deteriorating microorganisms at the sub-atomic level is as yet not accessible, so exploration ought to be engaged in the field of genomics which could accelerate the deterioration.

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SIGNIFICANCE OF ECOCRITICISM AS AN INTERDISCIPLINARY STUDY

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ABSTRACT

Nature and literature have always shared a close association as is evidenced in the works of poets and other writers down the ages in almost all cultures of the world. Today the intimate connection between the natural and social world is being analyzed and emphasized in all departments of knowledge and progress. The literary critic tries to study how this close association between nature and society has been textualized by the writers in their works. In this context two terms have become very important today–ecology and ecocriticism. By analogy, ecocriticism is concerned with the relationships between literature and environment or how man's relationships with his physical environment are reflected in literature. These are obviously interdisciplinary studies, unusual as a combination of a natural science and a humanistic discipline.

Keywords:*Interdisciplinary Studies, Literary criticism, Ecocriticism etc.*

1. Introduction

As a separate movement or school of literary criticism, Ecocriticism started developing in the 1990. 'Eco' is a short form of ecology, which is concerned with the relationships between living organisms in their natural environment as well as their relationships with that environment. The two components of nature, organisms and their environment are not only much complex and dynamic but also interdependent, mutually reactive and interconnected. Ecology relatively is a new science which deals with the various doctrines which govern such relationships between organisms and environment. Today ecology is defined as the way in which plants, animals and people are related to each other and their environment. In this relationship they are so much mutually dependent on each other that any disturbance in one disturbs the other. Therefore, concern for ecology is one of the most discussed issues today. It is the concern of every country to replenish the diminishing factors of ecology which threatens human beings the most. Literature is well known for reflecting the contemporary issues could not have remained unaffected from this theme. The world of literature is full of works dealing with beauty and power of nature. However, the concern for ecology and the threat that the continuous misuse of our environment poses on humanity has recently caught the attention of the writers. It is this sense of concern and its reflection in literature that has given rise to a new branch of literary theory, namely Ecocriticism The word 'ecocriticism' first appeared in William Rueckert's essay "Literature and Ecology: An Experiment in Ecocriticism" in 1978. Yet apparently it remained inactive in critical vocabulary until the 1989 when Cheryll Glotfelty not only received the term but worked for its use in the critical field which hereafter had been used as 'the study of nature writing'. Glen Love, Professor of English at the University of Oregon, too seconded the call for 'ecocriticism' at the same WLA meeting. Since that meeting in 1989 the usage of the term 'ecocriticism' has bloomed.

2. Significance of Ecocriticism as an Interdisciplinary Study

It is appropriate here to stress that it was only in the 1990's that ecocriticism emerged as a separate discipline although it is a fact that the relationship between man and his physical environment had always been interesting to literary critics. The last decade of the twentieth century was the time when it became obvious that the greatest problem of the twenty-first century would be the survival of the Earth. Over exploitation of natural resources and man's disregard of the air, water and soil that sustain him have given rise to the question of the survival of both man and the Earth. The end of the twentieth century showed clearly

that everyone had to do something to help the Earth survive. Ecocriticism is one of the ways in which humanists fight for the world in which they live. The reflection of that difficult struggle in the area of culture and spirit speaks for the urgency of action or the urgent need to do something in this respect.

Ecocriticism means not only the application of ecology and ecological principles to the study of literature, but also the theoretical approach to the interrelation web of natural cultural and supernatural phenomena. It began to explore constructions of environment in literary texts and theoretical discourse. Since literature has always conditioned our philosophical understanding of nature and of environment. Even the aesthetic categories by which our feelings for nature are understood the beautiful, the picturesque, the scenic, the sublime, the wild etc. have been defined largely their use in literary and critical contexts. Most ecological work shares a common motivation, that is, the awareness that we have reached the age of environmental limits, a time when the consequences of human actions are damaging the planet's basic life support system. This awareness brings in us a desire to contribute to environmental restoration, not only as a hobby but as a representative of literature. Ecocritics encourage others to think seriously about the aesthetic and ethical dilemmas posed by the environmental crisis and about how language and literature transmit values with profound ecological implications. Arthur Lovejoy's contribution in this field is also very eminent. He observes that one of the strangest, most potent and most persistent factors in the western thought is the use of the term 'nature' to express the standard of human values, the identification of the good with that which is 'natural' or 'according to nature'.

This unusual interdisciplinary combination of the physical and the spiritual can be seen in some of the terms used in ecology and ecocriticism, which both have the same aim: to preserve the where, without which there cannot be 'is' or 'the survival of man'. Two different and distinct disciplines, ecology and literary criticism, are combined in order to restore the Earth's health, which was lost owing to man's wrong doing. It should be noted that ecocriticism is still not a cohesive approach. It is rather an area of diverse and over lapping projects and disciplines. This over lapping can be seen in some of the terms that they use: Ecology-Ecocriticism and language study, ecology-deep ecology, physical environment-environmental imagination, reimagination, and biodiversity-global environmental, culture environmental unconscious, endangered species- eco cultural habitat etc.

3. Conclusion

To sum up, as a distinctive approach to the literary criticism, Ecocriticism gives increased attention to literary representatives of nature and is sensitive to interdependencies that ground the author, character or work in the natural system. This approach shifts critical focus from social relations toward natural relationships and views the individual as a member of ecosystem. It values highly the 'literary sense of place' not as setting but as an essential expression of bonding with or alienation from a specific natural context.

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ECOCRITICISM: A STUDY OF ENVIRONMENTAL CONCERNS IN A. K. RAMANUJAN'S POETRY

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ABSTRACT

Human being is regarded as the product of Nature as his body comprises air, water, fire, earth and sky (space). All these five things are natural objects. Hence, Nature is everything for him, without nature, he cannot survive. But during the last few decades, he has started to harm the Nature under the name of industrialization and development. As a result, natural calamities like tsunami, earthquakes, cyclones and droughts have posed a great threat before human society. The extensive misuse of natural resources has left the whole world at the brink of ditch. The huge amount of cutting down of the rainforests, the fast-decreasing natural fuels like petrol, diesel, the disorder in the cycles of the seasons are the results of ecological imbalance. Meanwhile, a group of environmentalists began to cherish the ideas like 'return to nature', 'come forward to heal the nature', 'save trees, save lives', etc. People realized their mistake in connection with the nature and came forward to correct it. Such consciousness of the preservation of nature is known as 'Ecocriticism'. Present paper seeks to explore the ecocritical perspectives as well as ecological sensibilities in Indian writing in English with special reference to A. K. Ramanujan's poetic works.

Keywords:*Nature, Ecocriticism, Ecology, Literature.*

4. Introduction

Ecocriticism

Ecocriticism is one of the latest critical theories originated in last few decades. There are certain reasons behind its origin. Since 1950s, world has witnessed natural disasters like cyclones, draughts, pollution, earthquakes and the very recent was the havoc of tsunami. Even the latest technologies were futile before these calamities. Most of the disasters were the result of misuse of natural resources under the name of industrialization. Excessive growth in the factories, mills and companies have discharged poisonous gases in the air and acidic water in the rivers. Air pollution and water pollution are the burning issues before several countries including developed countries like America, Japan and China and developing countries like India.

Environment is the most neglected subject for many centuries. Though Poets like Wordsworth and other Romanticists have depicted the beauty of Nature. The gradual damage to the nature is never noticed by anyone. Then, a group of environmentalists and literary critics have initiated in this Nature awareness movement which is known by Ecocriticism. There was a need to contemplate over the misuse of natural resources, increasing pollution, etc.

The term, Ecocriticism is first coined by William Rueckert in his critical writing, 'Literature and Ecology: An Experiment in Ecology.' The word 'eco' comes from the Greek word 'oikos' which means household or earth and 'logy' comes from 'logos' means logical discourse. Together, Ecology means criticism of the house- the environment as represented in literature. According to Rueckert, ecocriticism applies ecology or ecological principles into the study of literature. Lawrence Buell also defines ecocriticism as a study of the relationship between literature and the environment conducted in a spirit of commitment to the environmentalist's praxis. (430) Cheryll Glotfelty and Harold Fromm also define ecocriticism as the study of the relationship between literature and the environment. (19) Lastly, Prof. Pramod Nayar's views are significant and meaningful. He writes in his book, Contemporary Literary and Cultural Theory:

Ecocriticism is a critical mode that looks at the representation of nature and landscape in cultural texts, paying particular attention to attitudes towardsand the rhetoric employed

when speaking about it. It aligns itself with ecological activism and social theory with the assumption that the rhetoric of cultural texts reflect and inform material practices towards the environment. while seeking to increase awareness about it and linking itself with other ecological science and approaches. (242)

In short, Ecocriticism is more than a mere nature study. It has distinguished itself from traditional nature writing to the serious concerns towards harms done to it by the human greed. Ecocriticism classifies ecology into two types, the shallow ecology and the deep ecology. Shallow ecology believes that the whole purpose of nature is to serve mankind and they are the masters of nature. Man being the only literary creature who thinks himself superior over the others. The later type of ecology challenges the shallow ecology and advocates the need to preserve nature and its resources to keep to keep them in their original form without interference of mankind. It also says that every creature on the mother earth have their own intrinsic values and no one is the master of anybody. This realization provides equal rights for every organism which will maintain the balance of eco-system.

5. Ecocriticism in World Literature

In American literature, Ecocriticism had its origin from the literary works of three great writers including R. W. Emerson (1803-1882), Margaret Fuller (1810-1852) and H. D. Thoreau (1817-1862). The trio was in connection with a group of New England Writers, poets, essayists, novelists and philosophers collectively known as the transcendentalists, the first major literary movement in America to achieve 'cultural independence' from European models. Emerson had enjoyed the influence of nature in his writings. He suggests that the reality can be best perceived only through the study of nature.

Robert Frost also a major American nature poet who has made use of woods, lakes, stars, horses, fields, trees, etc. His poems are with dual meanings, simple at the surface but when we probe deep in the poem, we can realize that the nature reveals the universal truth of human life. Frost's Stopping by the Woods on a Snowy Evening deals with the perennial beauty of nature and the obligations of transient human life. British eco- critics seek to warn us of environmental threats emanating from governmental, industrial, commercial and neo-colonial forces.

6. Ecocriticism in Indian Writing in English

Indian culture is rich in ecological thought from thousands of years. India is also known for its biodiversity of organisms which is depicted in the Indian literature. Ecological perspectives and sensibilities are an integral part as well as an important feature of the Indian writing in English. Ecological themes can be best perceived in the writings of the Nobel Laureate, Rabindranath Tagore, Anita Desai, Kamala Markandaya, Arundhati Roy, Ruskin Bond, Kiran Desai, Amitav Ghosh and A. K. Ramanujan.

Attipat Krishnaswami Ramanujan was born in Mysore on 16th March 1929 in a srivaishnava brahmin family. He was the well-versed master in English, Tamil and Kannad languages. His poetry collections are The Striders (1966), Relations (1971), Selected Poems (1976), Second Sight (1968) and The Black Hen in his posthumously published Collected Poems (1994). The ecological awareness is one of the key themes of his poetry. Sometimes, he deals symbolically with physical environment and pays considerable attention to the preservation of the nature.

In his poem, Ecology (Nov. 1981), Ramanujan gives a message of conservation of the trees. The poem depicts the blind and innocent faith of an illiterate Indian woman. She is the poet's mother in the poem. She suffers a severe headache due to the smell of Red Champak flowers. Though she suffers pains from the smell of the flowers, still she had a great respect and love for the champak tree in her yard. The tree is as old as her own age and gives basket full of flowers. When her children decided to cut down the tree, she protests their decision which shows her emotional attachment towards the tree. An illiterate mother became a strong spokesperson for the protection of nature by opposing the idea of cutting down of tree.

Prof. A. N. Dwivedi remarks on Ecology that the poem deals with the change of season and atmosphere and herewith the flowering of the red champak trees, giving the poets mother 'her first blinding migraine of the season' and rendering the poet furious. The poet actually wants to cut down the tree but his mother does not permit him to do so. After all, the tree is the source of sweet-smelling flowers to her gods and her daughters and her daughter's daughters, but for cousins, 'a dower of migraines in season.' (110) In this way, Ramanujan does not allow the trees to be cut down as they are the part of nature.

Ramanujan's The Strider is a famous poem about a water insect. It depicts the life of a strider who lives on the surface of water. The poem reveals poets deep ecological sensibility towards a small insect. Another poem Anxiety depicts important elements of the human body which are fire, water, earth, air and sky. The human body appears to be completely natural and after death, it returns to the nature. Poet explains in the following lines:

Flames have only lungs; water is all eyes.The earth has bone for muscle andIs a flock of invisible the air pigeons. (29)

Ramanujan's poem A River describes the destruction of a river, Vaikai. Poet advocates a suggestion that the harmful attitude of mankind towards natural objects is the main cause of human degradation and the outbreak of natural calamities. In the summer season, the river dries because its stream had several obstacles like dams, lakes, water projects, etc.

In this way, Ramanujan deliberately focussed over the ecological aspects through his poems because it's a need of time to have a discourse and contemplation on these issues. His other poems including A Hindu to his Body, Love for a Wife, Christmas, Connect are highly ecological poems dealing with several significant subjects related with the preservation of nature and its resources. The poet has an explicit relationship with the physical environment. Though, the family relationship is one of the most occurrent themes in his poetry but his love and respect for the environmental awareness along with the conservation of natural resources can be perceived through his many poems. Thus, he is a true ecologist and gave a huge contribution to the ecocriticism.

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IMPACT OF COVID-19 ON ENVIRONMENT

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ABSTRACT

In the beginning of 2020 world hit the hardly COVID-19 pandemic. All suffered countries had enforced quarantine and lockdown as strong measure to stop the infection, spread and deaths. The lockdown of these activities has resulted in large economic losses but at the same time, it has been widely reported that these measures have resulted in improved environment al quality. Present paper is summarises and provides a distinct overview of literature on significant effect of COVID-19 on environment. Paper considering the effects imposed by COVID-19 on the air, water, and solid waste as critical elements of the pollution.

Keywords:*COVID-19, lockdown, environment quality.*

7. Introduction

A new disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been given the name COVID-19 for Coronavirus diseases in 2019. It is contagious and vascular disease (Johns Hopkins University, 2020). Since then, the COVID-19 has spread across the world and gets people infected in almost all countries worldwide. The first case of COVID-19 in India was recorded on 30 January 2020. This resulted in a severe counter measure of locking-down with transportation and travel bans to reduce and control the COVID-19 spread.

India enacted lockdowns to protect people, mitigate the spread, and ensure space in hospitals. These lockdowns disrupted daily life of nationwide, decreasing the level and frequency of human activity and industrial production. People are less commuting all over the world due to travel bans, cancelled public events and tourism. The lockdown measures are noticeably impacting the environment due to shut down of industries, factories construction, school and offices and reduced vehicular activity. This lockdown came as a relief to the environment. Leading to temporary but significant changes in air, water, and solid waste and greenhouse gas emissions. The relationship between human activity and the environment had been observed in various public health crises in the past, such as the Spanish flu and smallpox epidemics, and was observed again with the COVID-19 pandemic. (Patterson, *et, al.* 2021)

8. Review of Literature

According to the **World Health Organisation,** more than 80% of individuals living in cities are typically exposed to dangerous air pollution, which has been associated with an increased risk of COVID-19 problems and mortality. The **European Space Agency** observed a marked decline in nitrous oxide emissions between 1 January and 11 March 2020. For the first time in decades, from Jalandhar to the Himalayas became visible, as the drop in pollution triggered air quality improvement. (Picheta, 2020 and Brown 2020)

*Forster*and his team in year 2020, studied the dramatic changes to human activity had an impact on the environment for 206 countries. They observed that surplus to emerging estimates of monthly energy supply or estimated parameters that constructed the near-real-time daily CO_2 emission inventories during COVID. Reduction was observed based on activity from power generation, industry, road transportation, aviation and maritime transportation and commercial and residential sectors emissions (Forster *et, al.* 2020). Reductions in fossil fuel consumption as well as economic activity due to travel restrictions, business closures and other dramatic responses due to COVID-19 were recorded by team of MIT scholars through joint program on the

science & policy of global change. The sharp decline in air travel and vehicle transportation in COVID-19 pandemic which in effect reduced the net carbon emission across the world. Globally slow down human activity, a substantial decrease in fossil fuel use, resource consumption, and waste disposal was observed, generating less air and water pollution (Rume T and Islam 2020).

Indian cities also observed a major reduction in air pollution. The remarkable reduction of air pollutants from Maharashtra, Gujarat, Tamilnadu reported due to restrictions imposed on industrial activities and traffic between the lockdown period from 25 March to 20 April 2020. Some of the major air pollutants, like nitrogen dioxide and sulphur dioxide, decreased by one to two percent along with average reduction of 0.3 degree Celsius in temperature within the year 2019 (Adhikari *et, al.* 2021). The megacities like Mumbai, Delhi, Chennai and Kolkata average temperature dropdown by two degrees Celsius within the lockdown (Sharma*et, al.* 2020). In fourth phase of lockdown (from 22 March to 31 May 2020), the air pollutants like carbon monoxide, ammonia, sulphur dioxide and nitrogen dioxide showed a significant reduction of 22.82%, 30.61%, 32.11% and 46.95% respectively (Pal *et, al.* 2020).

The COVID lockdowns have also impacted water quality. However, the decrease in air pollution during the pandemic specific impact on water systems remains unclear. Scientists have long noted that air quality and surface water quality have a close connection. A metadata analysis of river water quality (RWQ) indicated that the rivers in Damodar, an urban-industrial area, had improved in quality. There was a reduction in pollution that led to this improvement in water quality studied by Chakraborty and his team in 2021

During the lockdown, the Water Pollution Index (WPI) for water samples ranged from 0.52 to 0.78, indicating that samples were either ‘good' or ‘moderately polluted' water revealed a significant change of the water quality during the pandemic. In the pre-lockdown period, the Water Pollution Index (WPI) of samples from the river fell between 1.59 and 2.46, indicating a high level of pollution (Balamurugan, *et, al.* 2021). Similarly the other rivers in India significant improvement in the WPI suggested that the lockdowns of heavy industries and subsequent reduction of toxic pollutants led to an increase in water quality. Specifically, DO levels increased, while BOD and nitrate concentrations decreased. Balamurugan (2021) also studied the polluted creeks and waste water flow were reduced up to 50%. The changes were a result of a decrease in sewage and wastewater being discharged into the rivers. In addition to the above studies, research on India's longest lake, Vembanad Lake, in April 2020, showed that suspended particulate matter concentration decreased by 16% during early lockdowns (Yunus, *et, al.* 2020).

9. **Conclusion**

On the other side of coin, Covid-19 required medical equipment larger than normal number, this led to increased production of medical waste. Though environmental improvements seen during the lockdown provided hope for the future, as humans returned to normal activity, these changes proved to be temporary.

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STRUCTURAL PROPERTIES OF PURE AND CALCIUM COMPOSITE GRAPHENE

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ABSTRACT

The Graphene have attracted the different researchers due to their unique semiconducting properties and 2-D structure. Due to its semiconducting properties it has wide applications in electronic and optoelectronic devices. In the present study we have focus on the structural study of the graphene and Calcium composite Graphene. In the present research paper we have synthesize the pure graphene and calcium composite graphene using electrolysis method. The synthesize material is used for XRD and FTIR characterization.

Keywords:*Graphene, Electrolysis, Structural study..*

1. Introduction

The global energy demand is increasing exponentially, and the major part of it is being provided by fossil fuels. The depletion of fossil fuels and their hazardous environmental impact are knocking the doors of scientific community to develop clean and eco-friendly energy sources [1-4]. Graphene is rapidly raising material on the ground of material science and condensed matter physics. Graphene is the name given to a flat monolayer of carbon atoms tightly packed into a two dimensional honeycomb like structure. It is a basic building block for graphite materials of all other dimensionalities [5-7]. Graphene also provides an excellent condensed matter analogue and 3-dimensional quantum electrodynamics which proposed graphene as a thriving theoretical toy model. Graphene strictly as 2- dimensional material has exceptionally high crystalline and electronic quality and also has various potential applications. Whereas one can sure about application and properties only when it is commercially use as a product, with respect to graphene no longer requires any proof of its importance in fundamental physics. Graphene represents conceptually new class of materials that are only one atom thick and on this basis, offers new roads into low dimensional physics that has never ceased to surprise and continues to provide a fertile ground for application [8-12]. The most important and common use for graphene is probably its use in composite materials, whereas it is discovered that graphene powder of (micron size) crystallites is produced for scalable mass production. As graphene is one of the most fascinating materials in the last decade since its discovery and its extraordinary quantum electric properties and great potential for various applications. Many efforts have been made to produce its derivatives by using chemical, modification (hydrogenation, oxidation and Nano structuring) [13].

2. Experimental

Generally different methods are used to synthesize Graphene out of which here we used electrolysis method. Electrolysis is a technique used to separate a compound or molecule into its component part. Take 150 ml of distilled water in the beaker and add 3-4 drops of HCL in it this is our electrolyte solution. Take two electrode's namely graphite and copper. In which graphite rod is considered as cathode and copper rod is considered as anode. Immersed these two electrodes in the electrolyte solution. Make sure that they didn't touch each other and separated with necessary distance. As graphite rod is connected to positive terminal of battery and copper rod is connected to negative terminal of battery. Which consist of two diodes d1 and d2 applying dc voltage of 20V through dimmerstat. After 2 days we get black color precipitate of Graphene settled at the bottom of beaker. Take the beaker and cover it with foil paper to avoid addition of dust and impurities in it. Place it aside for drying purpose. The obtained Graphene powder was washed two to

three times using double distilled water and kept in furnace for 12 hours for drying.

For Graphene calcium composite we take 0.1 molar (2.0438 gm) of Graphene powder in 10 ml of double distilled water. Now take 0.1 molar (0.23615 gm) of calcium nitrate tetrahydrate into the Graphene solution. Kept this solution for stirring using magnetic stirrer for 4 hours at 350 rpm. Cover it with foil paper to avoid dust particles. After completion of stirring we get blended solution of powdered Graphene and calcium nitrate tetra hydrate. Again we put this solution into furnace for heating up to 6 hours. After that we obtained the composite of Graphene + calcium nitrate tetrahydrate which is in powdered form. Now this prepared composite used for further characterization.

3. Result and Discussion

3.1. XRD

X-ray diffraction technique is primarily used for identification and characterization of compounds based on their diffraction pattern. Graphene powder was characterized to determine phase purity. Below graph (fig.1) shows XRD pattern of pure Graphene. The observed lattice parameters are given by a= 2.4560 A^0, b= 4.2540 A^0 and c= 6.6960 A^0. Also the crystallographic angles are given by α=β=γ=90. The XRD pattern of Graphene comprises broad peak around 26°, which indicates the crystallinity phase of Graphene. This broad peak is also assigned to the scattering from inter planar spacing. Fig. 2 (b) depicts XRD pattern of Graphene, which has well structural, and phase purity. The XRD of Graphene possesses two signature peaks at 26.60° (002) and 44.67° (100). The peak at 2θ = 26.3° indicates well organized structure of Graphene. From all this data we concluded that the crystal system of Graphene is orthorhombic.

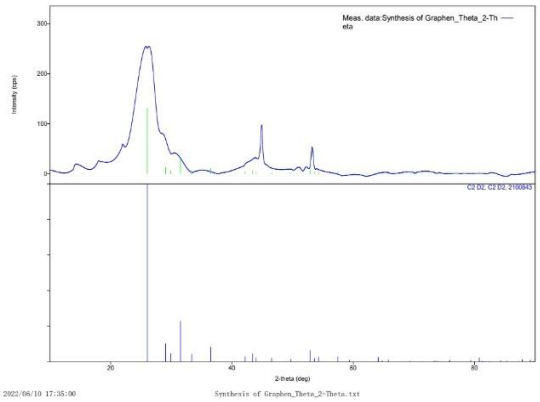

Fig.1 XRD pattern of Graphene

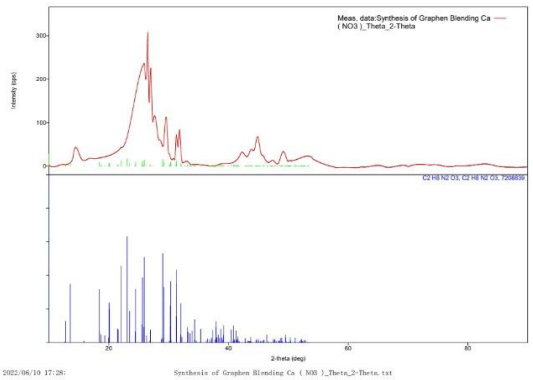

Fig. 2 XRD of Calcium composite Graphene

XRD of Calcium Composite Graphene:-Fig.2 shows the XRD pattern of calcium composite Graphene. The XRD pattern of blending of calcium nitrate tetrahydrate shows sharp peak at 20.73 (100), 26.41 (102) and 49.66 (114) which indicates that the material is crystalline in nature. The broad peak at 2θ = 44.2° is attributed to presence of some defects. The lattice parameters are observed as a= 4.9429 A^0, b= 4.9429 A^0 and c= 10.9476 A^0. Also the crystallographic angles observed are alpha =90° beta= 90° and gamma = 120° at axis of plane of crystals. So from above data we can conclude that crystal belongs to hexagonal crystal system.

3.2. FTIR

Fourier-transform infrared spectroscopy is a technique used to obtain an infrared spectrum of absorption or emission of a light. It is mainly used to measure light absorption in the range of 4000 to 400 cm^{-1} in order to identify

and quantify various materials. Below data (Fig.3) shows FTIR for pure graphene which shows sharp peak at intensity 2351.23 in the range 0.65 to 0.90. This shows presence of OH group in the material and shows absorbed water in graphene.

The below FTIR data (Fig. 4) is for graphene blended with $Ca(NO_3)_24H_2O$ shows peak at 1527.68 cm $^{-1}$. This shows presence of C-O bond. And the sharp peak observed at 2351.23 contributed by OH- stretched of H2O molecule.

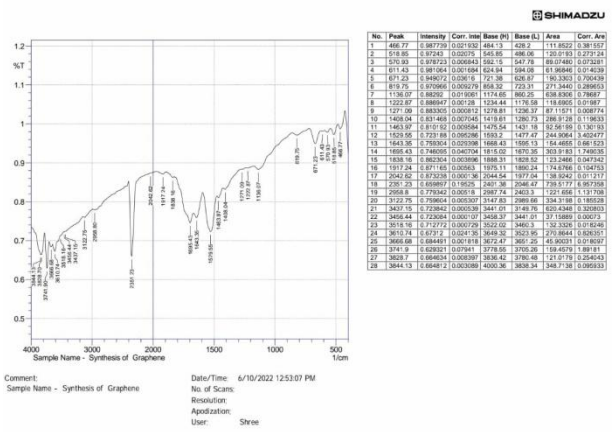

Fig.3 FTIR Graphene

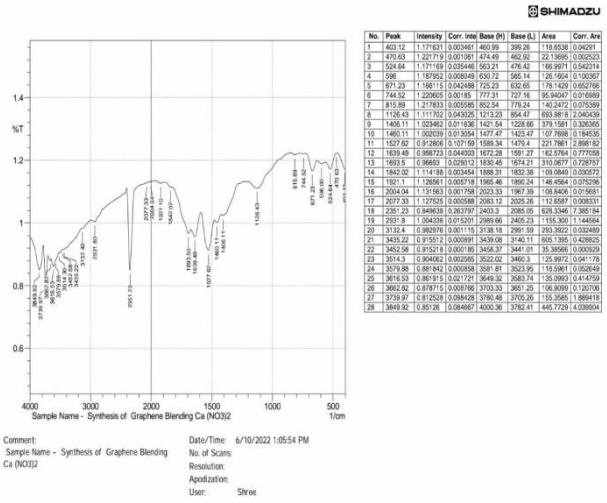

Fig. 4 FTIR Calcium composite Graphene

4. Conclusions

In the present research paper we have focus on the synthesis of graphene and calcium composite graphene. The method used for the synthesis of this pure graphene and composite graphene is the electrolysis method. The synthesize compounds used for the XRD and FTIR characterization.

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A REVIEW ON THE ALTERNATIVE ENERGY SOURCES

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ABSTRACT

Alternative Energy Sources and Renewable technologies are the clean sources of energy, it minimizes environmental impacts, produce negligible secondary wastes than conventional energy technologies, and it is a current and future economic and social needs. Sunlight and wind are the primary forms of natural energy it can transform into renewable energy flow. This provide an excellent opportunity for reduce emission of greenhouse gas and hence global warming. This paper provides a review of the importance and need of hydrogen fuel cell and different Renewable technologies.

Index Terms- *Energy Sources, Renewable technologies, global warming, greenhouse gas.*

5. Introduction

Everyday, the world produces carbon dioxide that is released to the earth's atmosphere. This increased content of Carbon Dioxide increases the warmth of our planet and is the main cause of the so called "Global Warming Effect". One answer to global warming is to replace and retrofit current technologies with alternatives.

Increasing awareness of environmental factors and limited energy resources (i.e. coal, petrol, diesel, etc.) have led to a profound evolution in one view the generation and supply of energy. Although fossil and nuclear sources will remain the most important energy provider for many more years, development of flexible technological solutions that involve alternative means of energy supply and storage is a need of time. Furthermore, the search for cleaner, cheaper, smaller and more efficient technologies has been driven by recent. World population is growing most rapidly, Renewable energy has been considered as one of the strong contenders to improve plight of Billions of people, mostly in rural areas, without access to modern forms of energy. Renewable energy sources currently supply somewhere between 15% and 20% of total world energy demand. It is estimated that in 1990, all renewable energy sources produced nearly 2900 TWh, accounting for about 24% of the world's total electricity supply. If traditional uses of biomass were also taken into account, then renewable would supply nearly 18% of global energy demand. Most of the renewable contribution to current electricity supply is provided by hydroelectric schemes [1].

Renewable energy has the potential to play an important role in providing energy with sustainability to the vast populations in developing countries who as yet have no access to clean energy. Although economically viable for several applications, renewable energy has not been able to realise its potential due to several barriers to its penetration. A framework has been developed in this paper to identify the barriers to renewable energy penetration and to suggest measures to overcome them [2]. It is widely accepted that generating energy within the city boundaries can bring many advantages, a main one being the increase in efficiency due to the reduction of energy transmission losses. Amongst all possible sources of renewable energy available in the urban context, such as wind, geothermal and solar energy, the latter is probably the most popular and has been studied to great lengths [3].

6. Need for Alternative Energy Sources

It is very important to do this for two reasons. First, and perhaps most important, we are in danger of ruining the planet's climate. Internal combustion engines run on fossil fuels like petrol, diesel emits carbon dioxide. If we continue to use fossil fuels, we may increase the temperature of the planet in ways that will harm us and our entire ecosystem. Second, we cannot keep using fossil fuels forever, there are hundreds of years or just a few decades left of this resource, the fact remains that it is a finite resource. They will eventually run out, even as the population of Earth grows. For both these reasons, we need to find other sources of

energy that do not emit carbon dioxide when used [4].

7. Climate Change Scenario

Demand for energy and associated services, to meet social and economic development and improve human welfare and health, is increasing. All societies require energy services to meet basic human needs (e.g., lighting, cooking, space comfort, mobility and communication) and to serve productive processes. Since approximately 1850, global use of fossil fuels (coal, oil and gas) has increased to dominate energy supply, leading to a rapid growth in carbon dioxide (CO2) emissions. Greenhouse gas (GHG) emissions resulting from the provision of energy services have contributed significantly to the historic increase in atmospheric GHG concentrations. The IPCC Fourth Assessment Report (AR4) concluded that "Most of the observed increase in global average temperature since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations.Recent data confirm that consumption of fossil fuels accounts for increased CO2 concentrations to over 390 ppm, or 39% above preindustrial levels, by the end of 2010 [7].

8. Alternative Energy Sources

Alternative energy encompasses all those things that do not consume fossil fuel. They are widely available and environment friendly. They cause almost no pollution [5].

4.1. Solar Energy

Sun is the first energy source in the world. It was in use much earlier before humans even learn how to light a fire. Many living things are dependent on solar energy from plants, aquatic life and the animals. Solar energy is one the alternative energy source that is used most widely across the globe. About 70% of the sunlight gets reflected back into the space and we have only 30% of sunlight to meet up our energy demands. Solar energy can be extracted either by Solar Thermal or using Photovoltaic (PV) Cells [5].

4.2. Wind Energy

Wind power is an affordable, efficient, pollution-free and cost-competitive. Wind is available virtually everywhere on earth, although there are wide variations in wind strengths. It does not cause any air pollution. Advancement in technologies has brought down the cost of setting up wind power plant. The total resource is vast; estimated to be around a million GW 'for total land coverage'. If only 1% of this area was utilized, and allowance made for the lower load factors of wind plants (15–40%, compared with 75–90% for thermal plants) that would still correspond, roughly, to the total worldwide capacity of all electricity-generating plants in operation today [6].

Wind energy can only be used in areas which experience high winds which mean that it cannot be used as a source to extract energy anywhere on earth. They sometimes create noise disturbances and cannot be used near residential areas. These disadvantages have made the use of wind energy to particular regions only [5].

4.3. Geothermal Energy

Geothermal energy is the heat from the Earth. It's clean and sustainable. Resources of geothermal energy include shallow ground, hot water, hot rock, and molten rock called magma. Found on the Earth. The shallow ground or upper 10 feet of the Earth's surface maintains a nearly constant temperature. Geothermal heat pumps can tap into this resource to heat and cool buildings. A geothermal heat pump system consists of a heat pump, an air delivery system (ductwork), and a heat exchanger-a system of pipes buried in the shallow ground near the building. In the winter, the heat pump removes heat from the heat exchanger and pumps it into the indoor air delivery system. In the summer, the process is reversed, and the heat pump moves heat from the indoor air into the heat exchanger. The heat removed from the indoor air during the summer can also be used to provide a free source of hot water [8]. Geothermal energy comes from the natural heat of the Earth primarily due to the decay of the naturally radioactive isotopes of uranium, thorium and potassium. Because of the internal

heat, the Earth's surface heat flow averages 82 mW/m2 which amounts to a total heat of about 42 million megawatts [6].

4.4. Hydroelectric Energy

Moving water is a powerful entityeasily used for the clean power generation.power is derived from the energy of water moving from higher to lower elevations. It is a proven, mature, predictable and cost-competitive technology. Thousands of years ago the Greeks used water wheels, which picked up water in buckets around a wheel. The water's weight caused the wheel to turn, converting kinetic energy into mechanical energy for grinding grain and pumping water. In the 1800s the water wheel was often used to power machines such as timber-cutting saws in European and American factories. More importantly, people realized that the force of water falling from a height would turn a turbine connected to a generator to produce electricity. Niagara Falls, a natural waterfall, powered the first hydroelectric plant in 1879 [9, 7].

4.5. Biomass Energy

Biomass materials are used since millennia for meeting myriad human needs including energy. Main sources of biomass energy are trees, crops and animal waste. Until the middle of 19th century, biomass dominated the global energy supply with a seventy percent share (Grubler and Nakicenovic, 1988). Among the biomass energy sources, wood fuels are the most prominent. With rapid increase in fossil fuel use, the share of biomass in total energy declined steadily through substitution by coal in the nineteenth century and later by refined oil and gas during the twentieth century. Despite its declining share in energy, global consumption of wood energy has continued to grow. During 1974 to 1994, global wood consumption for energy grew annually by over 2 percent rate (Figure 1). Presently, the biomass sources contribute 14% of global energy and 38% of energy in developing countries (Woods and Hall, 1994). Globally, the energy content of biomass residues in agriculture based industries annually is estimated at 56 exajoules, nearly a quarter of global primary energy use of 230 exajoules (WEC, 1994). Bio mass is the plant material derived from the reaction between CO2 in the air, water and sunlight, via photosynthesis is, to produce carbohydrates that form the building blocks of biomass. Typically photosynthesis converts less than 1% of the Available sunlight to stored, chemical energy. The solar energy driving photosynthesizes stored in the chemical bonds of the structural components of biomass. If biomass is processed efficiently, either chemically or biologically, by extracting the energy stored in the chemical bonds and the subsequent 'energy' Product combined with oxygen, the carbon is oxidized to produce CO2 and water. The process is cyclical, as the CO2 is then available to produce new [10].

Despite its declining share in energy, global consumption of wood energy has continued to grow. During 1974 to 1994, global wood consumption for energy grew annually by over 2 percent rate. Presently, the biomass sources contribute 14% of global energy and 38% of energy in developing countries [11, 12].

4.6. Ocean Energy

Ocean energy is a term used to describe all forms of renewable energy derived from the sea. There are two broad types of ocean energy: mechanical energy from the tides and waves, and thermal energy generated by converting the temperature difference between surface water and water at depth into useful energy. Ocean thermal energy conversion (OTEC) plants may have a range of applications including electricity generation [13].

4.7. Nuclear Power

The nuclear Power has a relatively short history: the first nuclear reactor was commissioned in 1954. Uranium is the main source of fuel for nuclear reactors. Worldwide output of uranium has recently been on the rise after a long period of declining production caused by oversupply following nuclear disarmament. The present survey shows that total identified uranium resources have grown by 12.5% since 2008 and they are sufficient for over 100 years of supply based on current requirements.. The nuclear share of total global electricity production reached its peak of 17%

by the late 1980s, but three major nuclear accidents have slowed down its growth in some countries, since then it has been dropped down to 13.5% in 2012. In absolute terms, the nuclear output remains broadly at the same level as before. Its relative share in power generation has decreased, mainly due to Fukushima nuclear accident. Japan used to be one of the countries with a high share of nuclear (30%) in its electricity mix and high production volumes. Today, Japan has only two of its 54 reactors in operation [6].

Table.1. Nuclear Power: top 5 countries 2011 [6]

	Installed Capacity (MW)		Actual Generation (GWh)	
Nuclear Country	**2011**	**1993**	**2011**	**1993**
United States of America	98 903	99 041	799 000	610 000
France	63 130	59 032	415 480	350 000
Japan	38 009	38 038	162 900	246 000
Russian Federation	23 643	19 843	122 130	119 000
Korea (Republic)	20 718	7 615	98 616	58 100
Rest of World	119 675	116 726	787 777	722 900
Global Total	364 078	340 295	2 385 903	2 106 000

Although nuclear power plants are efficient and moderate, some Drawbacks are also there such as nuclear waste disposal, Liabilities in case of nuclear accident and public concerns about operation

4.8. Hydrogen Energy

Hydrogen is high in energy, yet an engine that burns pure hydrogen produces almost no pollution. NASA has used liquid hydrogen since the 1970s to propel the space shuttle and other rockets into orbit. A fuel cell is a device that converts the chemical energy from a fuel into electricity through a chemical reaction with oxygen or another oxidizing agent. Hydrogen fuel cells power the shuttle's electrical systems, producing a clean byproduct - pure water, which the crew drinks.

4.8.1. A fuel cell

A fuel cell combines hydrogen and oxygen to produce electricity, heat, and water. Fuel cells are often compared to batteries. Both convert the energy produced by a chemical reaction into usable electric power. However, the fuel cell will produce electricity as long as fuel (hydrogen) is supplied, never losing its charge. Fuel cells are a promising technology for use as a source of heat and electricity for buildings, and as an electrical power source for electric motors propelling vehicles. Fuel cells operate best on pure hydrogen. But fuels like natural gas, methanol, or even gasoline can be reformed to produce the hydrogen required for fuel cells. Some fuel cells even can be fueled directly with methanol [14].

4.8.2. Advantages of fuel cells

In fuel cell, the use of hydrogen produce negligible greenhouse gases than does burning fossil fuels. fuel cell convert energy efficiently, which helps to conserve energy resources. A byproduct of this electrochemical process is pure water aclear benefit for the environment.

- Hydrogen (a testless, odorless, colourless gas) is, however , not found freely in nature. It must be extracted from other substances
- High efficiency reduced CO_2 emissions
- Clean fuels—including biogas, methanol, H_2(Hydrogen)
- Hydrogen—can be produced cleanly using sunlight or biomass directly, or through electrolysis, using renewable electricity [15].

9. Conclusion

Alternative energy refers to energy sources that have no undesired consequences such for example fossil fuels. Alternative energy sources are renewable and are thought to be "free" energy sources. They all have lower

carbon emissions, compared to conventional energy sources. These include Biomass Energy, Wind Energy, Solar Energy, Geothermal Energy, Hydroelectric Energy etc, combined use of all these will defiantly fulfill the need of energy without compromising on environmental factors.

All the alternate energy sources have better performance, but use of fuel cells with hydrogen as fuel seems to be most promising energy source. As long as a fuel cell is supplied, it will generate electricity. Since fuel cells create electricity chemically, rather than by combustion, they are not subject to the thermodynamic laws that limit a conventional power plant. Therefore, fuel cells are more efficient in extracting energy from a fuel.

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HISTOLOGICAL STUDY OF BRAIN TISSUE OF *CATLA CATLA* EXPOSED TO WATER EXTRACTS OF *BALANITES AEGYPTIACA* ROOT

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ABSTRACT

The effect of water extracts of Balanites aegyptiaca root on the histology of brain organ of the freshwater fish Catla catla was investigated. The differential acute toxicity of water extracts of B. aegyptiaca root on fish C. catla were carried out under laboratory conditions. The LC_{50} after 96 h of exposure for water extracts of Balanites aegyptiaca root were 11.00 and 13.00 mg/L, respectively. These values showed that water extracts of Balanites aegyptiaca root was more toxic. Histological changes of brain were noticed when C. catla was exposed to water extracts of Balanites aegyptiaca root for 96 h. In the brain, brain cell showed lesion, necrosis, malignancy, cellular degeneration and inflammation. The level of tissue or organ degeneration is more severe during long time exposure. This investigation revealed that root of B. aegyptiaca has piscicidal property and can be put into use in the control and management of fish ponds by farmers. There is need for more research work on the histopathology of brain tissue of fish exposed to piscicides.

Keywords:*Histology, Balanites aegyptiaca, Catla catla.*

1. Introduction

The pollutants' transport from industrial and agricultural point source into the environment and their chemical persistence, many freshwater ecosystems are faced with spatially or temporally alarming high levels of xenobiotic chemicals **(Diez *et al.*, 2002)**. The recent development of biomarkers based on the study of the response of organisms to pollutants has provided essential tools for the implementation of programmers for monitoring of contamination (**Korami *et al.*, 2000)**.

Among animal species, fishes are the inhabitants that cannot escape from the detrimental effects of the pollutants **(Olaifa *et al.*, 2004)**. Easy to capture and fairly easy to maintain and rear in captivity, fresh water fishes are remarkable indicators of aquatic ecosystem health status. In many ways, fish are not that biochemically different from mammals. Aquatic vertebrates appear to have very similar enzyme and receptor systems as humans. They are the richest source of an essentially healthy diet but they are, endangered by diet-borne pollutants transferred along the food chain. Fishes are responding to the toxicant for the period of acute as well as the chronic stress. The stress result in to the physiological changes in the body of fishes and not only that but also the behavioral, haematological and the cellular changes are present in the tissues of the exposed fish.

Fishes constitute economically vary important group of animals. The nutritional and medicinal value of fishes has already been recognized **(Jhingran, 1982)**. A number of large artificially constructed fish water impoundments have come into existence in India, especially during last four decades, adding considerably to the already existing rich water potential for the development of the country's fishery resources fish fauna of various reservoirs has been reported by **(Sharma *et al.*, 2004)**.

The Indian major carps *Catla catla* (Hamilton) was used as the test animal because it is present in almost all freshwater reservoirs in India and is suitable for toxicity monitoring **(Nair, Sherief, 1998)**and pose a potential direct threat to freshwater organism, particularly to sensitive animals, such as fishes **(Sarvanan *et al.*, 2003)**. Since prehistoric times, various cultures throughout the world have used piscicidal plants for fishing. Plants are regarded as inexhaustible sources of structurally diverse and biologically active substances **(APHA, 1976)**. Fossil record dates back the use of plants by man for various purposes including

medicinal use **(Bhatt, J.P. 1991)**. Plant extracts have been reported extensively by several authors as widely available in the tropics and have been used as natural piscicides by artisanal fisherman and as medicine in curing certain diseases. Most of the plants contain chemicals which are traditionally used to harvest fish in almost all part of the world **(Jenness, 1967)**.However, only few scientific reports regarding the piscicidal plants of India are available **(Singh and Singh, 2002; Tiwari and Singh, 2005)**. To investigate the impact of toxicants on the ecosystem, it is necessary to study the histological effects of toxicants on fish organs. Histological examinations which show pathological alterations upon exposure to toxicants have been useful to assess disease problems **(Chen and Kumlin, 1989)** as well as physiological adaptations to salinity changes **(Cataldi *et al.*, 1987)**. The fresh water fishes show dissimilar pattern of responses when exposed to toxicants **(Gardner and Laroche, 1973)**.

In the present study, an attempt has been made to observe possible toxicity and histological changes in vital organ such as brain of the fish *Catla catla* (Hamilton) exposed to lethal concentrations of plant *Balanites aegyptiaca* root extract for 96h.

2. Material and Methods

Roots of *B. aegyptiaca* are collected from local area near to the Daryapur. After shade drying the plant material was grounded into powder using pestle and mortar. One liter of distilled water was mixed with 200 g of powdered plant material. The mixtures were kept for 2 days in tightly sealed vessels at room temperature and stirred several times daily with a sterile glass rod. This mixture was filtered through muslin cloth. Further extraction of the residue was repeated 3-5 times until a clear colorless supernatant extraction liquid was obtained indicating that no more extraction from the plant material was possible. The extracted liquid was subjected to water bath evaporation to remove the solvent. The water bath temperature was adjusted to 400^0 C. The semi-solid extract produced was kept under a ceiling fan to dry. The extract was weighed and portion of it used for phytochemical screening while the rest was use for the susceptibility test.

The adult specimens of *Catla catla* were collected from the local market and brought to the laboratory. So for this experiment, fish are acclimatized in glass aquarium for 10 days.The survived fish are maintained in aerated condition and are fed regularly with fish food. The water is replaced every week and replaced with declorinated water. Faecal material and debris, if any, is also removed as and when necessary.

Lethal concentration of 11.00 mg/l and13.00 mg/l was selected for this experiment. Ten fishes were exposed to each concentration. Along with this, appropriate control was maintained for each test. The mortality did not exceed 5% during the test period in control. Survival and mortality percentage were tabulated after 24, 48, 72 and 96 hrs.For the lethal toxicity test, the fresh water fishes were divided in two groups as follows.

Group I: - Control group of *Catla catla*

Group II: - Fishes *Catla catla* were exposed to lethal concentration of root water extract.

To determine structural changes in internal tissues such as brain of both control and exposed fishes of lethal concentration were examined histologically.

3. Result and Discussion

Fig-1.1: Brain (Section) of *Catla catla* exposed to lethal concentration (control) of root water extract of *B. aegyptiaca*

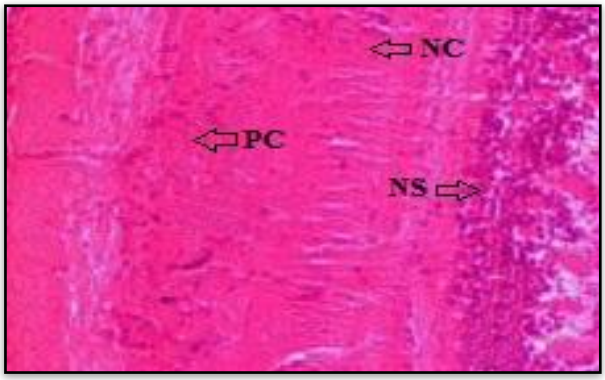

Fig.-Brain of *Catla catla* (Control).

NC: neuronal cells, **NS**: nisslsubstances and **PC**: pyramidal cells. No lesion (L), inflammation (I), pigment (P), necrosis (N), malignancy (M) and cellular degeneration(C).

Fig-1.2: Brain (Section) of *Catla catla* exposed to lethal concentration (11.00 mg/l) of root water extract of *B. aegyptiaca*showing lesion (L), inflammation (I), pigment (P) and necrosis (N).

Fig.- 24hrs

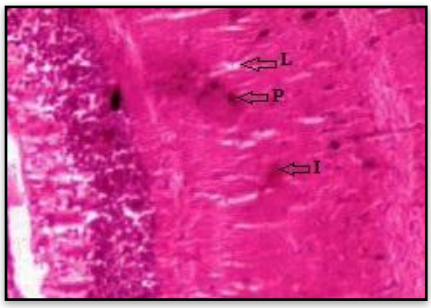

Fig.-48hrs

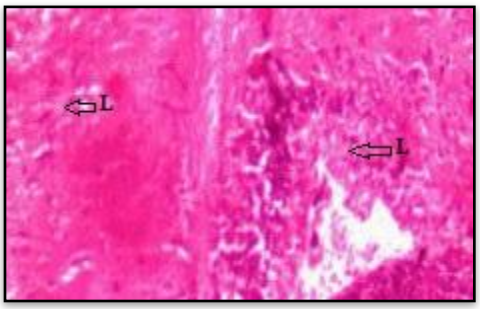

Fig.- 72hrs.

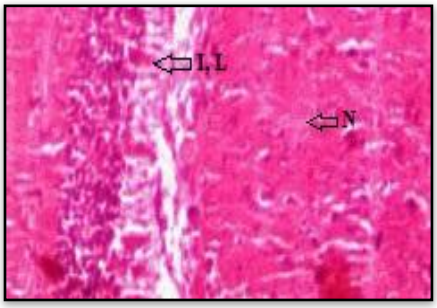

Fig.- 96hrs.

Fig-1.3: Brain (Section) of *Catla catla* exposed to lethal concentration (13.00 mg/l) of root water extract of *B. aegyptiaca*showing lesion (L), inflammation (I), pigment (P), necrosis (N) and malignancy (M).

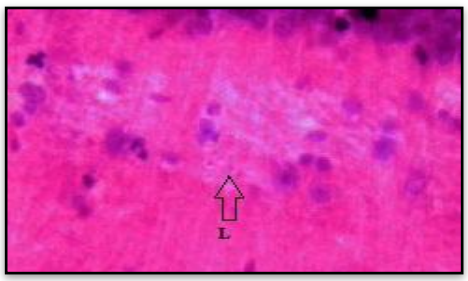

Fig.- 24hrs

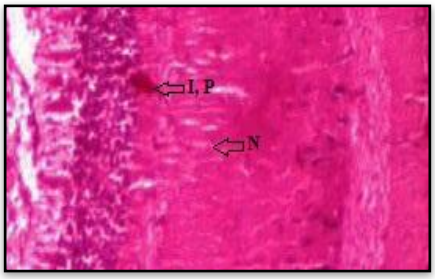

Fig.-48hrs

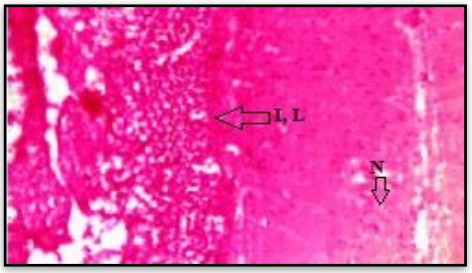

Fig.- 72hrs.

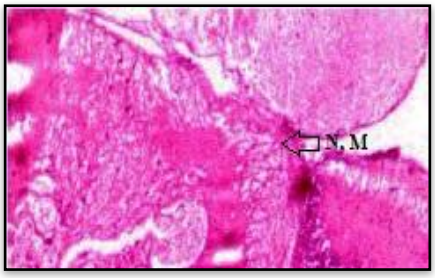

Fig.- 96hrs.

For lethal concentration at control there are no lesion, no necrosis, no pigments, no malignancy, no inflammation and cellular degeneration seen for the 24hrs, 48hrs, 72hrs, and 96hrs (Fig-1.1). At 11.00mg/l inflammation on neural cell for 24hrs, for 48hrs lesion, pigment and inflammation occurs on neural cell, while for 72hrs lesion occurs in neural cell and pyramidal cell and for 96hrs necrosis occurs on neural cell while, inflammation, lesion on nissl substances (Fig-1.2). At 13.00mg/l lesion occurs on neural cell for 24hrs, for 48hrs inflammation and pigment

on nissl substances and lesion occurs on neural cell while, for 72hrs necrosis occurs in neural cell and inflammation and lesion on nissl substances and pyramidal cell and for 96hrs necrosis, malignancy occurs on neural cell (Fig-1.3).The brain of fish exposed to lethal concentration for different time exposure (24hrs. 48hrs. 72hrs. and 96hrs.) showed inflammation and lesion of neural cell and nissl substances during low concentration while, increasing concentration for different time exposure showed inflammation, lesion, pigment, necrosis and cellular degeneration of neural cell, nissl substances and pyramidal cell were seen at later time of exposure (Fig-1.2 to 1.3).

Brainis a sensitive organ which provokes abrupt response totoxicant in the surrounding environment. In the present investigation differant changes to brainarchitecture such asinflammation, lesion, pigment, necrosis and cellular degeneration of neural cell, nissl substances and pyramidal cell, cellular necrosis. This similar observation was recorded foracute nitrate toxicity in *Rachycentron canadum* by **(Rodrigues *et al.*, 2011)**. **(Singh, 1998)** reported that exposure of sub lethal concentrations of malathion and dimethoate to *Catla catla* showed vacuolation in brain with eccentric nuclei, necrosis in molecular and granular layers. **(Sarma *et al.*,2010)** also reported mild necrosis in the apical lobe of cerebrum of brain of *Channa punctatus* intoxicated with endosulfan.

4. Conclusion

The alterations in the histology of brain tissues seen in the present study is indicative of the fact that unlike bioaccumulation in terrestrial animals which is less relevant, in aquatic environment the impact is manifold. The study also affirms the view that histological analysis is a suitable method in toxicological studies to understand the pathological conditions of tissues under stress.

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A STUDY ON HATCHING EFFICIENCY OF ARTEMIA CYST UNDER DIFFERENT SALINITIES

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ABSTRACT

The present investigation is carried out to determine the impact of salinity on hatching efficiency of Artemia cyst exposed to different salinities. For maximum hatching of Artemia cyst, salinity of medium is utmost important together with some other aquatic parameters. Present study shows gradual effect of salinity on the hatching. 25% salinity solution gives maximum hatching while the 5% salinity gives decreased amount of naupli at the end of 24 hours of incubation. The study also reports considerable variation among the treatment groups. The primary data presented in this paper will encourages to study the effect of other parameters on the hatching potential of cyst.

Keywords:*Artemia, cyst, Aquaculture, Naupli, Hatching, Salinity.*

4. Introduction

Artemia is one of the important marine water zooplankton popularly utilized to produce live feed for young ones of fishes, prawns and some other edible invertebrates. Artemia is popularly known as brine shrimp because it tolerate extremely saline environment. Taxonomically the artemia genus belongs to order anostraca. The genus artemia is widely distributed throughout the world and its presence marked by extreme saline environment where no other organism could not survive. The naupli production is cost effective, easy to use and nutritious feed for aquaculture species. The use of Artemia as live feed were described by many researchers such as **leger *et. al.* (1986), Sorgeloos*et. al.* (1998), (2001).** The newly hatched *Artemia* contains 50.6% protein, 25.7% carbohydrate, 14.2% fat, 9.4% ash and the energy value of 18.97 KJg-1, **John C. J. A., Abatzopoulos T. J., and P. M. Marian (2004).** The early stages of *Artemia* were preferably utilized as live feed for fish and shellfish larvae. For hatching of *Artemia* cyst there are some critical factors such as light, temperature, salinity, oxygen level and pH**Vanchecke and Sorgeloos (1983).** There is no optimum salinity for *Artemia* habitat that can be accurately characterized so that it is essential to investigate a range of salinity where the maximum hatching could be possible.

Artemia is physiologically adapted to extremely high salinity levels but it can be hatched on lower salinities. The complex adaptive response evolved by the brine shrimp *Artemia*to thrive in hyper saline lakes was reported by **Eads, B.D. (2004). Gajardo G.M and J.A .Beardmore (2012)** carried out a research work to study the adaptability of Brine shrimp *Artemia* to critical life conditions.**Shanmugasundaram, B., R. Rajendran and V. Thangasamy (2017)** carried out a research work on influence of physico-chemical parameters on population structure and length-weight relationship of *Artemiafranciscana.* **Islam, M.S., M. M. Kibria and M. S. Bhuyan (2019)** carried out a culture experiment to develop an easiest and cheapest technology for the production of *Artemia*biomass and cyst in the coastal area.**Obayes, Ladha, Abd Al-Rezzaq, Adi, AL-Amari, Moayed (2020)** studied the effect of some environmental factors in the hatching of *Artemia* cysts isolated from three babylon province's ponds. Hatching and harvesting techniques for Artemia cysts with different effects of salinity in the district of Situbondo, East Java was investigated by **A S Bahri ,Isroni W and N Maulida (2021).** *Artemia* have the ability to reduce the osmotic pressure of haemolymph by NaCl excretion against the concentration gradient. They can survive in water with high oxygen deficiency reported by **Dumitrascu M. (2011).**Present study aims to

determine the hatching efficiency of*Artemia* cyst exposed to different salinity levels.

5. Materials and Method

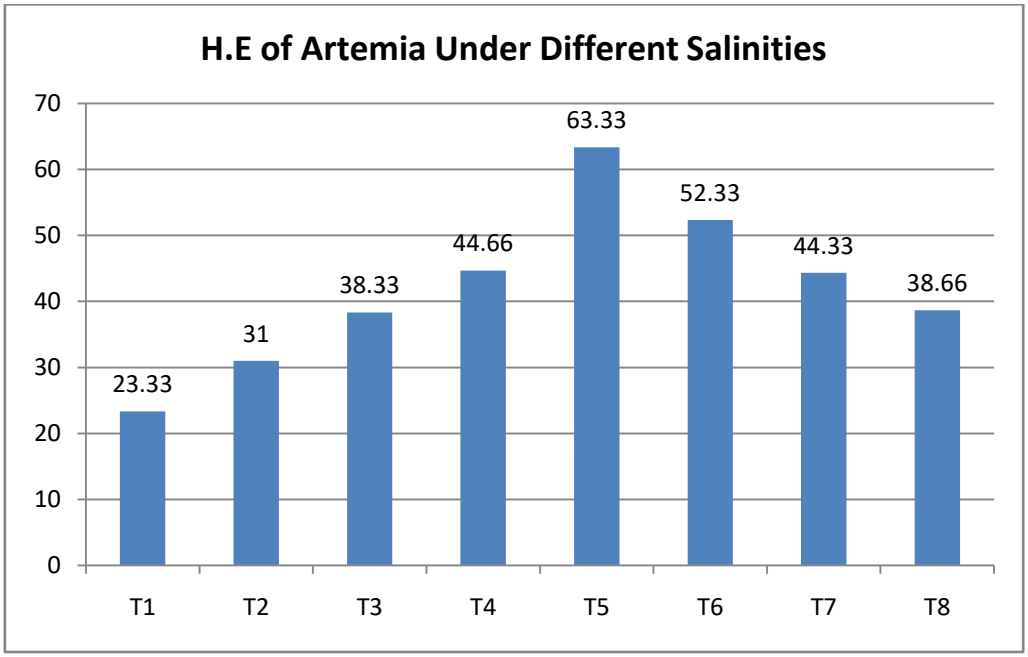
The present investigation was carried out at P. G. and Research laboratory of Zoology Department R. A. College Washim. The *Artemia* cysts are available in readymade form, for the present experiment purpose cyst ordered from online shop, (grate salt lake brine shrimp). Different concentrations of saline water were prepared for the present experiment such as, 5 % (T1), 10% (T2), 15%(T3), 20%(T4), 25%(T5), 30%(T6), 35%(T7) and (40%T8). The prepared saline solutions were added in five liter aquarium. The other parameters such as ph, temperature, aeration and light were kept constant throughout the study period. At the end of 24 hours the hatching efficiency were calculated by using the formulae prescribed by **Vanhaecke and Soorgeloos (1982**). To count the total number of naupli hatched after 24 hrs incubation sedgwick rafter cell was utilized.

6. Results and Discussion

*Artemia*is one of the important live feed organisms. The dormant cyst gives opportunity to aquaculturist to produce fresh live feed. In case of Artemia culture salinity is critical factor in successful hatching. Some other factors are also important to create optimum hatching medium but present research is only focus on the hatching efficiency of cyst under different salinity. The present experiment was carried out by making 8 different treatment solutions having different salinity levels. The cyst is exposed to these different saline solutions and incubated for 24 hours. At the end of 24 hours of incubation hatching efficiency were calculated in each treatment. The experiment is replicated three times to minimize errors. The experimental results revealed that the hatching efficiency of*Artemia* cyst varies with concentration saline solution. The maximum hatching were observed under 25 % salinity treatment whereas the minimum hatching after 24hrs of incubation were reported from first treatment as presented in table and graph below. Same kinds of results were also reported by**Jetani*et. al.* (2004).**Hatching increases initially with the increase in salinity but it slightly declines as the salinity increase. The hatching efficiency was studied by **Bahri, *et. al.* (2021)** and reported maximum hatching on 60ppt salinity. The hatching rates of Artemia cyst were also discussed by **Vanhhaeck, P. and Sorgeloos P. (1982), (1983).** Maximum hatching percentage were studied and reported by**Rajkumar and Babu (2015)**. They have reported maximum hatching on 29ppt salinity. The rate of hatching of same cyst exposed to different salinity levels in laboratory condition is important for determining the optimum salinity levels for maximum hatching. During the present it is found that hatching is gradually increases with the increase salinity but from a certain point the hatching efficiency of cyst decreases. It means that a range of 20 to 30 % salinity is optimum for maximum hatching *Artemia.*

Table 1: Hatching efficiency under different salinities.

Time	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**
24hrs	23.33± 1.15	31± 2.64	38.33± 5.13	44.66± 2.51	63.33± 3.05	52.33± 3.05	44.33± 5.03	38.66± 3.51



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ECO-CRITICISM: A STUDY OF ENVIRONMENT AND LITERATURE

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ABSTRACT

Eco-criticism is a new movement and has started developing in 1990s. It is the study of literature and environment. Its main aim is to study how individuals in society behave and react in relation to nature and ecological aspects. Eco-critics encourage others to think about the aesthetic dilemmas posed by environmental crisis.

Keywords:*Environment, literature, protect nature, eco-critics.*

8. Introduction

Human being is a component of environment and environment is the surrounding environment. It is played an important role in shaping human life. So it is our responsibility to take care of nature and respect it. It is entirely up to human to protect nature, conserve it and maintain its balance.

Everything is changed in modern age. Change is the law of nature and it is necessary but if it is good. However the change in the environment is becoming dangerous for us. There has been a great change in the environment and we feel it. Environmental change has a disaster impact on our economy, society and of course of our lives.

Our relationship with nature is changing. We are moving away from nature. In ancient times people lived in close proximity to nature as much as possible and thus they were healthy, happy and energetic. Nature is important for keeping us emotionally psychologically and physically healthy.

Due to the degradation of environment, mankind is facing far reaching consequences. Nature's vagaries, water pollution, air pollution, disturbances of natural cycle, decreasing number of animals and birds, deforestation of trees has caused an imbalance in the natural environment. Air, water, flowers, leaves, fruits, animals all these elements are dependent on each other this is called the cycle of nature. But because of the human interference the cycle of nature has been disrupted and the balance of the environment has deteriorated.

Literature is a part of the environment since there is a strong relationship between nature and human beings from ancient literature to modern literature. There are many books that reflect the theme of eco-criticism in them. Many poets and writers have depicted the romantic and beautiful nature in literature through stories, novels, poems, dramas and travel narratives. Writers have described nature's various landscapes, its changing seasons, its creative as well as destructive power and its beautiful phenomenon. They have explored environmental issues and emphasized the importance of nature. There are various writings from various writers belonging to different literature who have chosen ecological themes. Their work displays a growing awareness of environmental issues.

The theme of nature was prominent themes in the poetry of William Wordsworth. He repeatedly emphasizes the importance of nature. He held a firm faith that nature could enlighten the kind heartedness and universal brotherhood of human being and only existing in harmony with nature where man could get true happiness. Nature has always played a vital role in literature especially in poetry. Writers and poets have often use nature to explain their emotions, feelings, thoughts of life, love and death. Wordsworth believed that there is a divine spirit in nature. 'I wandered lonely as a cloud' in this poem Wordsworth says that when you feel depressed and lonely go to the nature's company, nature will give you abundant happiness. It focuses on the aspect that nature and humanity are interdependent. This is a strong bond with nature and human. Ruskin Bond is also the great lover of nature he said that live close to nature so you will never feel lonely.

Emily Dickenson presents in her poem 'Nature is what we see' that nature has many things but people do not realize. Nature is good for our mental health. It is the gift of god so we have to conserve it. Similarly Jawaharlal Nehru wrote in his 'Letters from a Father to His Daughter' that nature is a book and every little stone that is on the roadside or mountain side may be a little page in nature's book. He loved every form of nature as beautiful. All the elements of nature tell the earth's early story. More amount of knowledge one can learn from nature.

Nature has been appreciated by almost all poets in the world. SantTukaram was also giving the same message to the world through his abhang 'VrukshavalliAmhaSoyari' he says how important nature is in human life. The birds, trees, animals are the forms of God and they give their love to the entire world. Even in the 16th century SantTukaram explained the importance of environment in human life and advised its conservation. The place of environment in literature has been undisturbed since ancient times.

9. Conclusion

Modern age is science based. With the power of science, we have made many discoveries. No matter how far we go, we cannot ignore the environment. Only if there is an environment, the human race can survive. The entire human race is responsible for the degradation of the environment so now the effort to improve the balance of the environment will be the responsibility of the human being. Since ancient times, environmentalists, writers, poets, social reformers and saints have all expressed the importance of environment through their writings, keeping in mind that, we and the coming generation have to work hard to keep the environment intact.

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ASSORTMENT OF SPIDERS IN THE AGRICULTURAL FIELDS FROM BALAPUR, DISTRICT AKOLA. (MAHARASHTRA STATE)

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ABSTRACT

Spiders are insectivorous predators on earth. Spiders are eight eyes and eight legs small creature. They are Feed on insects and consume large number of preys without damaging the crops. Spiders, are the most common ubiquitous animals on land, constitute an essential portion of the predatory arthropods in several ecosystems. Recently in agricultural fields reduced pesticide use and ecological sustainability have lead to increased interest in spiders as potential biological pest control agents. Considerably insect populations increases when release from predations by spiders. Regularly use of pesticides in agricultural fields which decreases the spider populations. Spiders are among the most abundant insectivorous predators of Terrestrial ecosystem.

Spider species abundance in agro-ecosystem can be high as undisturbed natural ecosystem. Spiders act as pest control creature, which feeds on crop destructive insects. A survey of Spiders was carried out in Balapur of Akola District during September 2021 – August 2022. This article presents a study on the Diversity, distribution and current status of spider families in Balapur of Akola District. During the present study I have reported 128 species of Spiders belonging to 13 Families and 38 genera. Spiders of Families Araneidae, Clubionidae, Eresidae, Gnaphosidae, Lycosidae, Oecobiidae, Oxyopidae, Salticidae,SparassidaeTetragnathidae, Theridiidae, Thomisidae, and Uloboridae were recorded during the investigation. Such surveys are essential for conservation of these creatures in the light of climate change and building a biodiversity base line data of spider fauna of Vidarbha in near future. It is updated checklist of different agro-ecosystems from Balapur of District Akola.

Keywords:*Spiders, Diversity, Balapur, Maharashtra State.*

10. Introduction

Spiders are one of the dominant predatory groups found in ecosystems in India. Spiders belong to order Araneae, class Arachinidae and are members of phylum Arthropoda, the largest group of animal with jointed legs and hard exoskeleton. They are the largest group of arachinids comprising more than 34,000 species distributed over 60 families over worldwide. They have unique habitat and they live in almost all the environments. They are the most abundant predator of insects of terrestrial ecosystem and consume large number of insects. They have special adaptations towards a predatory way of life. Their distensible abdomens enable them to consume large amounts of food in relatively short periods of time, while their rate of predation may greatly increase during short periods when plentiful supply of food is available. Spiders are the most common ubiquitous animals on land, constitute an essential portion of the predatory arthropods in several ecosystems. Spiders are known to occupying most of the terrestrial habitats. They are generalist predator, which can act against a broader range of insect pests. Sunderland K. and Samu F. (2000). Spider species abundance in ecosystem can be high as undisturbed natural ecosystem. Spiders act as pest control creature, which feeds on crop destructive insects. Spiders are beneficial bio-control agent of insect pest in ecosystem.S. Jeyaparvathi, S. Baskaran and Ga. Bakavathiappan (2013).

Spiders are an important but generally poorly studied group of arthropods that play a significant role in the regulation of insect pests and other invertebrate populations in most ecosystems. Spiders play an important role in insect pest control without any harm to ecosystem. Recently in agricultural fields reduced pesticide use and ecological sustainability have lead to increased interest in spiders as potential biological pest control agents. Spiders act as natural biological control agent in ecosystem. Some recent workers on Indian spiders include Majumdar and Tikader (1991), Reddy and Patel (1992), Biswas and

Biswas (1992), Sadana and Goel (1995), Gajbe, U. A. (1999), Biswas and Majumdar (2000), Biswas B. and K. Biswas (2003). A survey of Spiders was carried out in Agro ecosystem of Balapur, District Akola during September 2021 – August 2022.

11. Materials and Methods

Study Area:

Balapur is the most diversity rich agro-ecosystem in Akola District. Balapur is a city located in the Akola District of Maharashtra State, India. It belongs to the Vidarbha region of the Akola Division. It is located 45km west of the District headquarters of Akola.

Balapur is located between 20.39° North and 76. 46° East with an elevation on 268 meters (879feet). Climate is hot in the city when compared to Vidarbha region. Summer is also so hot in Vidarbha regions. The annual rainfall averages 630 mm. Total area under forest is 45 sq km. It is dry deciduous type and mixed type of forest with some grassland forest. The area receives rainfall during southwest monsoon. Average temperature of the district ranges from minimum of 11^{o}C in winter to a maximum of 46^{o}C in summer with the relative humidity varying from 10-14% to 55-80%. The spider inventory studies were conducted from September 2021 to August 2022 in the five different Agroecosystems of Balapur, district Akola from Maharashtra state. I have selected five microhabitats for observations in the study area viz; agricultural land.

Sampling Methods:

Spider Inventory work was conducted at the ecosystems by different groups of workers. Five surveys were conducted per season at all study sites. Five 25 x 25 m quadrates were taken for extensive surveys. All surveys were conducted in the morning hours between 7:00 am to 9:00 am Spiders were collected by adopting standard sampling techniques as described below.

1. Beating sheets: Spiders from trees and woody shrubs were dislodged and collected on a sheet by beating trees and shrubs with a standard stick.
2. Sweep netting: Spiders from herbaceous-shrub-small tree vegetation were collected using standardized insect-collecting net.
3. Active searching and hand picking: Spiders from all three layers were collected using this method
4. Litter Sampling: Litter i.e. deciduate from the ground was collected by hand and was put in big tray. Litter sampling involved sorting in tray.

Collected spiders were photographed in live and later released. Spiders were observed using stereo zoom microscopes for studying identification keys. All specimens were initially separated from other material and identified to the family level. Spiders were identified upto species level using the standard monographs, Majumder S.C. and Tikader B. K. (1991).

12. Result

During the present study I have reported 128 species of Spiders belonging to 13 Families and 38 genera. Spiders of Families ARANEIDAE, CLUBIONIDAE, ERESIDAE, GNAPHOSIDAE, LYCOSIDAE, OECOBIDAE, OXYOPIDAE, SALTICIDAE, SPARASSIDAE, TETRAGNATHIDAE, THERIDIIDAE, THOMISIDAE and ULOBORIDAE were recorded during the investigation.

Table No. 1 Checklist of Spider Species from Agro-ecosystems of Balapur, district Akola Maharashtra State.

Sr. No.	Family	Genera	Species
1	ARANEIDAE	09	39
2	CLUBIONIDAE	01	03
3	ERESIDAE	01	02
4	GNAPHOSIDAE	04	08
5	LYCOSIDAE	04	20
6	OECOBIIDAE	01	02
7	OXYOPIDAE	02	09
8	SALTICIDAE	06	17
9	SPARASSIDAE	01	02
10	TETRAGNATHIDAE	01	02
11	THERIDIIDAE	01	02
12	THOMISIDAE	06	18
13	ULOBORIDAE	01	04
Total		**38**	**128**

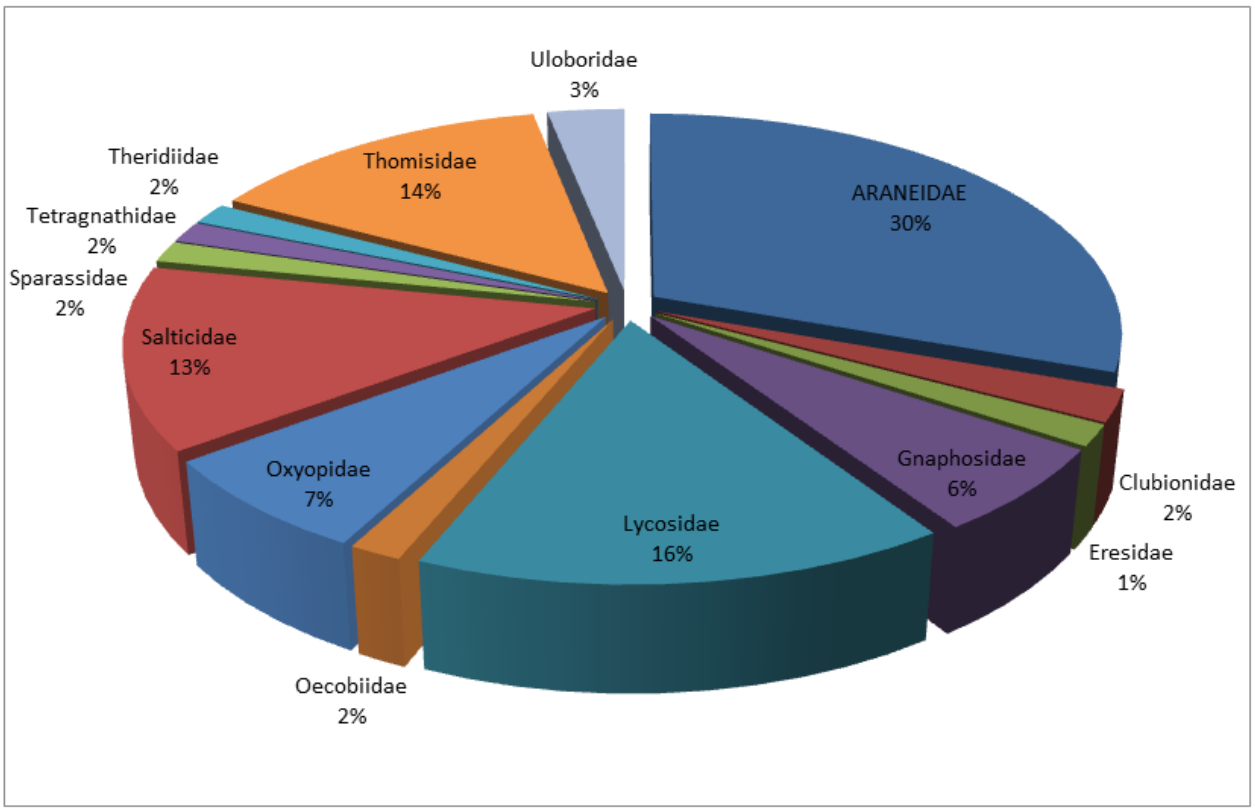

Fig. 1. Graph showing family wise Spider Species Percentage.

13. Discussion

In the present study, 128 species of spiders belonging to 38 genera of 13 families in Balapur, district Akola collected and identified. These spiders were belonging to the family Araneidae, Clubionidae, Eresidae, Gnaphosidae, Lycosidae, Oecobiidae, Oxyopidae, Salticidae, Sparassidae, Tetragnathidae, Theridiidae, Thomisidae and Uloboridae. In this study two species of spiders were observed, one is web weaver and another one is non web weaver. The web weaving spiders were belonging to the family Araneidae, Eresidae, Oecobiidae, Tetragnathidae, Theridiidae, and Uloboridae. The non web weaving spiders were belonging to the family Clubionidae, Gnaphosidae, Lycosidae, Oxyopidae, Salticidae, Sparassidae and Thomisidae. The increase in the spider density suggests that spider density in influenced by the increase in prey density. In particular, the interaction of prey and predator shows a constant numerical interaction about these relationships which is fundamental to biological control. Spiders are considered as the favorable biological control agents in the Agro ecosystem. In my investigation I have seen that the abundance of Five Family Spiders species were more. For details I have arranging the data in a Table 1 Format of systematic way. The abundance of Spider families is represented as:

ARANEIDAE 39 > LYCOSIDAE 20 > THOMISIDAE 18 > SALTICIDAE 17 >OXYOPIDAE 09.

Major Five Families i. e. Araneidae, Lycosidae, Thomisidae, Salticidae and Oxyopidae having occupying maximum percentage area in agro-ecosystems.

14. Conclusion

During investigation I have studied 128 species belonging to 38 genera of 13 Spider Families. On the above result and discussion it is clear that the Spiders are very much important creature. Species abundance of spider in agro ecosystem can be high. Spiders are beneficial bio-control agent of insect pest in the Agro ecosystem. Spider's predatory capacity can have an effect in decreasing densities of insect pests, when they are used to balance the effect of insecticides and Pesticides. Some spiders are among the most effective predators of

leafhoppers, caterpillars, and other pests. Aphids are rarely important pests of Cotton. Some Spiders and Spider lings are main control agents of aphids. Most spiders feed on an insect that's why productivity of crop gets increased. Spiders are important Pests control agents.

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PRELIMINARY INVESTIGATION OF ICTHYOFAUNAL DIVERSITY FROM WAGHADI RESERVIOR DIST.YAVATAMAL (M.S.) INDIA.

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ABSTRACT

Because of anthropogenic activity, the fresh water ecosystem is constantly at risk. Fish samples were collected for the study from February 2021 to January 2022 over the course of a year. A total of 20 species from 10 distinct families were identified in the current study.

***Keywords:**: fish diversity, wetland ecosystem ,waghadi dam, yavatmal.*

15. Introduction

The Vidarbha region is abundant in natural resources, including forests, freshwater aquatic life, and a remarkable variety of ichthyofaunal species. Fish diversity enhances the stability of the aquatic ecosystem in the region of concern, however anthropogenic activities have an impact on both the aquatic and terrestrial habitat's floral and animal diversity.

A good bioindicator of water quality is fish variety (Madhusudan et al., 2011; Patole, 2014). Due to constant anthropogenic stress, fish diversity is progressively reducing every day. This diversity not only adds to the species richness of our planet but when declined also has some deleterious repercussions on fisheries (Sakhare, 2001)

Numerous researchers have examined the taxonomy and ichthyofaunal variety of Maharashtra and other states of the nation for the past 200 years. The ichthyofaunal diversity of the HarsoolSavangi dam in the Maharashtra region of Aurangabad was examined by Shinde et al. in 2009. Ubharhande and Sonawane (2012) studied the freshwater fish flora at Paintakli Dam in Maharashtra's Buldhana district.

"Waghadi,D -01427" is the Waghadi Project and Dam's official designation. The Maharashtra government built the Waghadi Dam as part of irrigation initiatives in 1978. The closest city to the dam is Ghatanji in Maharashtra's Yavatmal District. It is built on and impounds the Waghadi River. The dam is a gravity earthfill dam. The dam measures 960 metres in length and 26 metres in height above its lowest base. The project has a spillway, which is 170 metres long. The Dam's catchment area is 23.84 thousand hectors, and the spillway is ungated. 41.11 MCM is the maximum/gross storage capacity. The amount of live storage is 35.36 MCM.

The primary icthyofaunal diversity of Yavatmal'swaghadi reservoir is the objective of the current study.

16. Material and Methods

With the assistance of local fishermen during various seasons, fish were caught from various locations of the Waghadi reservoir. Specimens were brought and preserved in a 10% formalin solution in the laboratory. Fishesh was identified with the aid of neighbourhood fishermen and established texts like Talwar PK and Jhingran A (1991), Jayaram K.C. and Sanyal A (2003).

17. Result and Discussion

In the current study, 20 fish species from 8 different orders divided into 10 different families were identified. The fish species recorded are shown in the table 1 below,

Table 1 - Ichthyofaunal diversity of Waghadi dam (During Feb 2021 to Jan 2022)

S.NO.	ORDER	FAMILY	SPECIES	Local Name
1	Mastocembeliformes	Mastocembelidae	*Macrognathuspancalus*	Bam
2	Cypriniformes	Cyprinidae	*Catlacatla* *Labiorohita* *Labioboga* *Labiobata* *Labiopangsia* *Cirrhinusmrigala* *Puntitusdorsalis* *Puntituschola*	Catla Rohu Chankora Navari Boharya mrigal podshi Tepri
3	Perciformes	Cichlidae	*Tilapia mossambica*	Talapia
		Gobidae	*Glossogobinusgiuris*	Dhangarya
4	Osteoglossiformes	Notopteridae	*Notopterusnotopterus*	Bhangad
5	Synbranchiformes	Channidae	*Channamarulis* *Channanama* *Channastriatus*	Dhokh Chandva Malar
6	Anguilliformes	Anguillidae	*Anguilla bengalensisbengalensis*	Wire
7	Atheriniformes	Belonidae	*Xenentodoncancila*	Chatarya
8	Siluriformes	Siluridae	*Ompakbimaculatus* *Mystuscavasius*	Patola Katarna
		Claridae	*Clariusbatracus*	mangur

Joshi et al.recorded 20 species belonging to 7 families from Purna River at Buldhana district. Sakhare (2001) reported 23 species belonging to 07 orders where Cyprinidae family is dominant with 11 species from Jawalgaon reservoir, Solapur District Maharashtra. This study have similar findings to the above investigations.

Ichthyodiversity from the Malangaon water reservoir containing 17 species of 15 different genera, 07 families and 05 orders were recorded. Khodake, S. P. and Petare, R. K (2020) However, In the present study fishes from total 8 orders are recorded, which shows greater diversity than the earlier investigatinssignifying better less anthropogenic activities in the dam.

18. Conclusion

Extensive investigation about icthyfaunal diversity needs to be done during various seasons to ascertain real time heath of the water reservoir and also to study the extent of anthropogenic disturbances to the water body.

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A WATER-BORNE DISEASES: A CASE STUDY OF INDIA

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ABSTRACT

The term "water-borne disease" refers to the vast volume of drinking water used to transmit infections which are mainly transmitted through consumption or contact with microbiologically contaminated water. Water-borne diseases are transmitted by polluted water and result in irreversible harm to both animals and plants, including humans. Humans and microorganisms are the groups most affected. It is responsible for epidemics and a number of different of dangerous diseases including cholera, jaundice, dysentery, typhoid, tuberculosis, paratyphoid, diarrhea, as well as others. The present study was carried out the water born disease of India. The result shows the total death due to water bon disease was 10938 from the years 2013 to 2017.Among these years the highest death was in 2017 due to highest diarrhea case was (1296683) in west Bengal, cholera in (78) in Andhra Pradesh, typhoid (429349) in Utter Pradesh .the Despite massive government efforts at all levels, as well as a large number of agencies and scholars interested in water pollution and its safety, water-borne diseases continue to be a significant public health and environmental problem. The massive quantity of quality research, while worthwhile, has not yielded the desired results, as water diseases continue to plague underdeveloped countries, with emerging economies bearing the brunt of the burden

Keywords:*Water Borne Diseases, Type, program and management,.*

19. Introduction

This paper is deals infections and diseases of human beings are transmitted by contaminated water in India. Distinctively, thispaperwillanalysis those infections and diseases that are carried by the ingestion of an aquatic organism. Untreated or contaminated water causes various types of water borne diseases which leads it to be epidemic and dangerous [savindar Singh, 2015].Water borne diseases are mostly broken out over the developing and under developed countries mostly African countries and Asian countries. Overall countries of the world are affected with the untreated drinking water cause water-borne disease, a major cause of morbidity and mortality.

Today, water infrastructure serves 85% of India's population. Each year, between 400 000 and 500 000 children under the age of five die from diarrhoea. A failure to improve personal and household hygiene is one of the causes (India Planning commission 2020) ' There are 12 incidences of viral hepatitis for every 100,000 persons (NITI Aayog 2020). However, at least two studies in metropolitan areas have indicated that the incidence may be close to 100 cases per 100,000 people. According to the research, just a small percentage of diarrheal diseases are detected.through observation. Improvements in sanitation coverage are not expected to lead to changes in hygiene behaviour, according to WHO/UNICEF (2005a). Children who may not have access to enough clean water may not wash their hands frequently enough, leading to eye infections and skin disorders like scabies. Waterborne infections are a result of poor water quality and inadequate home, animal, and human waste management. Only 30% of India's urban waste water is treated before being disposed of [National Health Policy Draft, 2015]. The remainder drains into groundwater, rivers, and lakes.Globally, about 1.8million people die in every year from diarrheal diseases, most of them directly related to diseases by consumption of untreated and contaminated water and sea-foods (WHO. 2015]. 672million people will still use a polluted water source in daily life (UNESCO, 2021)In African and Asian countries, a major number of people living along the course of water bodies still drink and use water of rivers, streams and other water bodies without any form of treatment.

According to the United Nations World Water Development Report: 2021, more than 1 lakh people in India pass away each year from diseases brought on by contaminated water. There are numerous water borne disease examples, the majority of which are brought on by chemical pollution of water bodies as a result of the effect of elevated levels of nitrates and heavy metals on the industrial areas of India, which frequently have contaminated water bodies because the waste from the factories contains toxic materials that are discharged into the environment. In contrast, some natural water contains a significant amount of microbial species, many of which have not been filtered, much less recognised.The predominant number of organisms present varies significantly between the different types of water, and it is generally acknowledged that sewage-polluted surface water contains significantly more bacteria than unpolluted water. Numerous pathogenic microorganisms, such as bacteria, viruses, and protozoa, can be found in contaminated surface waters. The pathogenic faecal source may come from non-point sources such as domestic and wild animal defection, malfunctioning sewage and septic systems, storm water drainage, and urban runoff, or from point sources such as municipal waste water treatment plants and runoff from areas where livestock are handled.Every year, drinking contaminated water causes health problems for over 37.7 million Indians, ranging from simple diarrhoea to more serious illnesses (Loksobha Reports;- health condition 2018). Living in filthy conditions and not having access to safe drinking water are the main causes of this. In India, more than 500 million people depend on the water that rivers like the Ganga, Damodar, and Hooghly supply. Therefore, even a small amount of water contamination can have a significant impact on a big population. In highly populated areas with irrigated lands, disease transmission may occur rapidly on an individual basis, and irrigation's negative impacts may be attributed to mistakes made during the original planning stages.Either during the system's design and construction, or during its operational phase, when it was poorly managed. By following the right procedures or practises and managing water effectively, diseases associated with water can be prevented or lessened. In numerous regions of the world, waterborne disease causes linked to microorganism contamination of drinking water have been observed. No longer a topic for debate, historical history and writings contain excerpts indicating that water plays a part in the transfer of all types of water-related illnesses.This will discuss only those diseases which'sarespreaded by infectious agent, especially those diseases caused by bacteria, viruses and parasites, by categorizing those diseases. This paper will not allow to understand the physiological or metabolic malfunctions or illness that are caused by untreated water containing abiotic substances, e.g., pesticides, manufactured organic compounds, trace metals or other toxicants. It also contains a composite list of water borne diseases and their infectious agents. Presently, appears to be 36 known diseases of human beings that can be or are strictly suspected of carrying by water; various have others meanings of transmission, such as human to human contact and so on. The following discussion of each water borne diseases is approached from the stand point of infectious agent that is bacteria, viruses, parasites etc.

Table.1 shows the Water-Borne diseases, Causative Agents and Their Route in Human-body, India:

Group	Disease	Causative Agents	Route	Infection organs
Disease which are often water borne	Cholera	Bacteria	Faeces	Oral
	Typhoid	Bacteria	Faeces/oral	Oral
	Amoebiasis	Protozoal	Faeces	Oral
	Giardiasis	Protozoal	Faeces	Oral
	Infectious hepatatis	Viral	Faeces	Oral

Diseases which are often associated with poor hygiene	Diarrhoea Conjunctivities	Bacteria	Faecel Cutaneous	Oral Cutaneous
Diseases with part of life cycle of paratsites in water	Schistosomiasis	Parasites	Urine/faeces	Percutaneous
Diseases which are often related to inadequate sanitaion	Hookworm (Necator/Ancylostoma)	Parasites	Faecel	Oral /percutaneous

Source: Nwabor O.F et al (2016) and NDMC (2017) Prevention and Control of Water Borne Diseases: Action Plan

Aim and Objectives ;

1. To known the occurrence and trend of water born disease in India.
2. Give remedial solution for protect from the water born disease.

20. Types of Water Borne Diseases in India

The term "water borne" or "water associated" disorders refers to ailments brought on by both direct and indirect contact with water, whether through ingestion or contact with the skin while bathing or engaging in other water-related activities. Included are illnesses brought on by infections and toxins linked to water. In general, there are four major ways that water-borne diseases can spread: directly via the body, through water that has been rinsed off the body, through water that has been contacted, and through insects that are vectors for water-borne diseases.

1. Water-Borne Diseases:

In India, the most common water-borne diseases are cholera, amoebic typhoid, giardiasis, and hepatitis. Children under the age of five who live in impoverished nations frequently suffer from diarrheal illnesses. Estimates place the number of diarrhea-related fatalities among children 0 to 6 years old in India at 158,209, with a 9.1% proportional mortality rate. Between 0 and 6 years old, the estimated incidence of diarrhoea was 1.71 and 1.09 episodes/person/year in rural and urban settings, respectively. According to the National Family Health Survey-4 Report (2015–16), 9% of all children under the age of five were said to have experienced diarrhoea in the previous two weeks. According to studies, the prevalence of acute diarrheal illnesses in some metropolitan settings was as low as one episode per child per year.The National Institute of Cholera and Enteric Diseases (NICED), Kolkata, West Bengal, India, is a WHO Collaborating Center for Diarrheal Diseases Research and Training. Each year, it receives between 1000 and 1500 strains of Vibrio cholera for biotyping, serotyping, and phage typing from between 30 and 40 institutions in India and a few from abroad. A total of 16,624 Vibrio cholera strains were acquired from 24 States between 1990 and 2007, of which 7,225 strains were used for a phage typing research. By using accepted methods, all of these V. cholera strains were recognised and verified. Utilizing polyvalent O1 and monospecificInaba and Ogawa antisera, as well as monoclonal antibody O139 (Difco& BBL Manual), strains were serotyped (2009).The normal procedure used in our laboratory for phage typing was utilised. To evaluate whether a specific area was cholera endemic in the current investigation, we examined the location from which strains of V. cholera O1 were obtained from different parts of the nation throughout different years.Numerous cases of sporadic viral hepatitis have been linked to HAV in India. In a recent study from Kerala (Rakesh et al. 2015), HAV was found to be the cause of an outbreak of AVH in the Mylopore hamlet of the Kollam district (Indian Scenario, August, 2016) The authors found that participants aged 15–24 years had a higher attack rate (4.6%) than those aged 5–14 years (3.1%). In this

village, pipe water contamination from a borewell was found to be a cause of infection (Rakesh P.S. et al. 2015).In a beautiful study by Acharya et al., 1424 schoolchildren between the ages of 4 and 18 were examined for seroprevalence of anti-HAV antibodies, and it was discovered that 93.2% of the children had anti-HAV antibodies in their plasma. 256 individuals with underlying chronic liver disease had their seroprevalence of anti-HAV tested, and 97.6% of them had positive results, demonstrating a high seroprevalence of HAV in India (AcharyaS.k, 2003). In a different study from Kottayam, HAV was identified as the cause of an AVH outbreak in the vicinity of the medical college, and the authors stressed the importance of having a clear strategy for controlling viral hepatitis (Arankalle V.A., 2006).In a research from Lucknow, 267 AVH patients were assessed, and HAV was shown to be the most prevalent cause in 26.96% of patients, followed by HEV in 17.97% of patients. [Jain P.,2013)

2. Water washed Diseases:

Diseases that thrive in environments with limited access to clean water and poor sanitation are known as "water scarce" or "washed" diseases. More so than water quality, water quantity is what determines how well illnesses are controlled in water.

a. Through soil Helminthes are intestinal worms that are mainly spread by coming into contact with polluted soil. Ascris and whipworm are the most common helminthes. Over 130 million children worldwide have severe geo-helminth infections, which result in 12,000 annual fatalities from helminthes (WHO 2002).

b. Acute Respiratory Infections (ARI): Pneumonia and ARI together account for about 19% of all child fatalities annually (Nwabor et al. 2016)**c**.Skin and Eye Diseases: United Nations Children's Fund 2008 posits that trachoma is the world's leading reason of preventable blindness. About 6 million people are blind due to trachoma and more than 10% of the world's population is at risk.

2.1 Water-Based Diseases

Water-based illnesses are infections brought on by parasites and pathogens that live in aquatic hosts. Fish, snails, and other aquatic creatures are examples of these hosts (Nwabor et al. 2016). Humans can become infected by eating the infectious forms or by having them penetrate their skin.

2.2 Vetor-Based Water Related Diseases

There is no direct link between these illnesses and the quality of the water consumed. They are those diseases that are spread by certain vectors that live near or in water bodies where they breed. These insect vectors bite humans, which then transmit the disease. The most prevalent vector insects are flies and mosquitoes.

Mosquito-fly-Borne Diseases

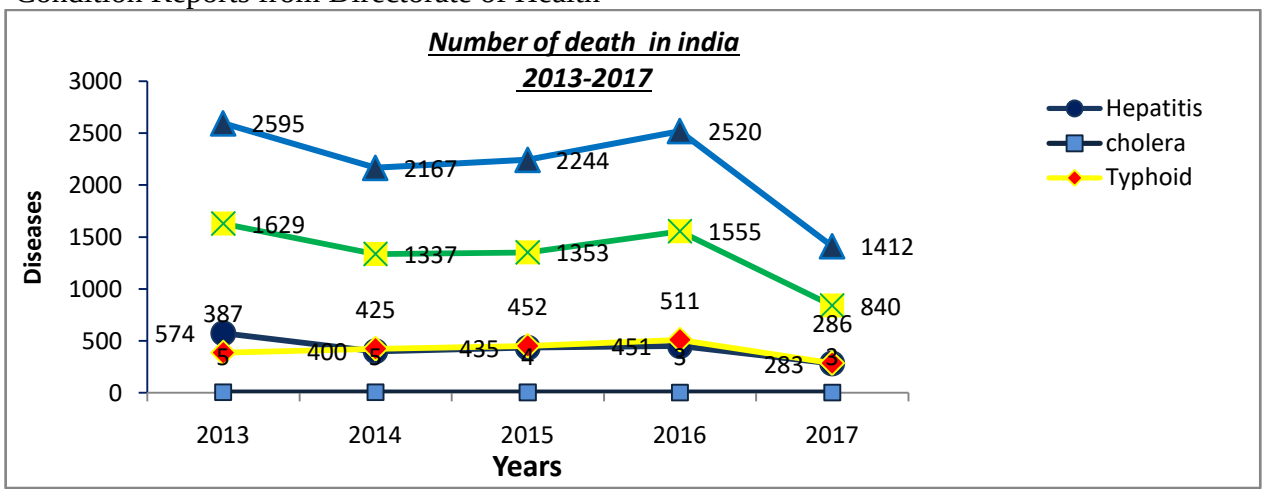
- Malaria
- Yellow fever
- Dengue fever
- Filariasis

Over 150 countries throughout the world have a high prevalence of diseases transmitted by mosquitoes. Over 500 million people worldwide are infected with mosquito-borne diseases, which cause roughly 1 million fatalities each year (WHO/UNICEF, World Malaria Report, 2005). Every year, almost 40 million Indians contract diseases transmitted by mosquitoes. Mosquitoes are the main source of a number of diseases, including dengue, malaria, brain fever, yellow fever, chikungunya, and others (Med India Report; 2015). If the symptoms are not recognized, these illnesses can be fatal.

Table ;- 2. Reported Death Cases By Water-Borne Diseases 2013-2017, India

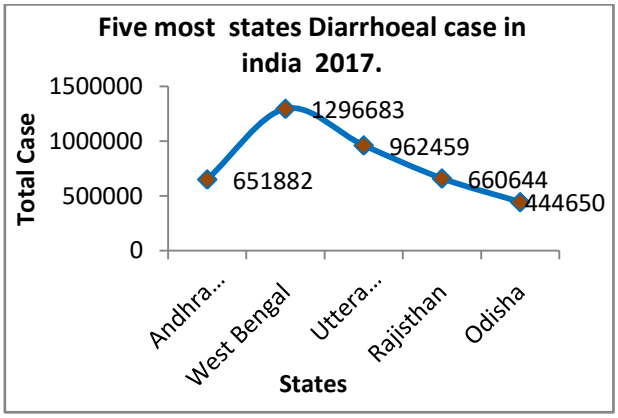
DISEASES	**NO.OFDEATH PERYEAR**				
	2013	**2014**	**2015**	**2016**	**2017**
DIARRHOE	1629	1337	1353	1555	840
HEPATITIS	574	400	435	451	283
TYPHOID	387	425	452	511	286
CHOLERA	5	5	4	3	3
TOTAL	**2595**	**2167**	**2244**	**2520**	**1412**

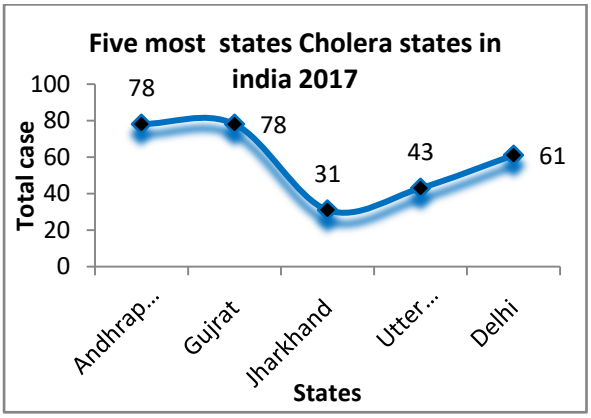
Source: Loksabha, 2018 Monthly Health Condition Reports from Directorate of Health services of States/UTs,

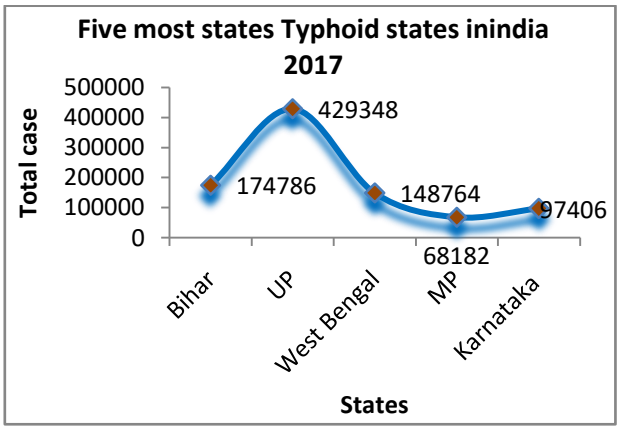


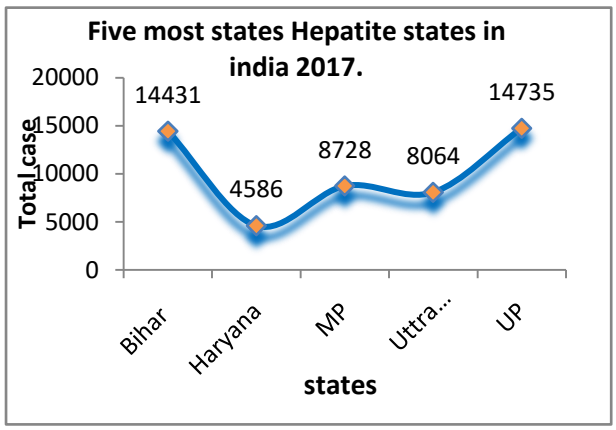
The total highest death case due to water diseases was 2595 in the year of 2013, and in 2014 was(2167),2015(2244), 2016 (2520),2017 (1412).

The highest number of death case due to diarrhea wasfounded in 2013(1629) and in 2014 (1337),2015, (1353) 2017 was 1337, therefore the lowest diarrhea case founded in the year of 2017 (840). The highest number of death case due to Typhoid was 452 in 2015 and lowest was founded in 2013 (387). The number of death case due to hepatitis was founded in 2013 (574), 2014 (400),2015(435),2016 (451), 2017(283).









Figure; - 2 four major water born disease in most fivestates of India 2017.

Source: - *Loksobha, 2018. Monthly Health Condition Reports from Directorate ofHealth services of States/UTs,*

Figure 2, shows the dominance of Diarrhea, Cholera, Typhoid, and Hematite among the five major states in India. Respectively the above diagram shows thatthe India recorded totaldiarrheal case is 9630572 in 2017,(*Loksobha report 2018)* in whichWest Bengal state(14 %) is recorded highest Diarrheal case among the 5 top most states of India, followed by Utter Pradesh (10.42 %), Rajasthan (7.15%), and Odisha (4.8%). The total case of cholera 383 casesin India.(*Loksobha report (2018)*. WhereAndhra Pradesh carried78 cases (20.25 %) recorded highest cholera in India, followed by Gujarat 78 cases (20.25%) Jharkhand 31 cases (8.05%), Utter Pradesh 43 (11.10%), and Delhi 61 case (15 %). the total case of typhoid is 1493050 in India (loksobha 2018).Respectively among the 5 highest states of typhoid, Utter Pradesh carried 429348 (28.79%) number of case in 2017, it is recorded highest number of case in India as followed by Bihar (11.70%), west Bengal (9.96%), Karnataka (6.5%) Madhya Pradesh (4.5%), India has a total case of hepatitis is 98086 (loksobha 2018) in which Utter Pradesh states is carried highest recorded in 14735 (15.02%), mong the top most states ,followed by Bihar 14431(14.71%), Madhya Pradesh 8728 (8.89%), Utterakhand 8064 (8.22%).

3. Remedies

A number of waterborne diseases can be prevented by:

- ensuring that water is coming from a clean source and carrying water treatment steps when in hesitation; and regularly treating open water sources and testing water from open sources.
- Learn about water testing facilities in various Indian states.
- Avoid drinking water from untreated sources.
- Always heat all food before eating it.
- Washing hands thoroughly with soap and water before eating and after defecating
- Always keeping food and water covered.
- Keeping the environment clean
- Increasing toilet use by designing toilets that are appropriate, user-friendly, and sanitary.

4. Health policies and Programs, directed at waterborne diseases in India

The National Health Policy 2017 reaffirms the government's commitment to reforming the health sector and achieving universal health coverage. It focuses on disease elimination, reduction in mortality and improvement of health services.

The main strategy to control diseases caused by drinking of contaminated water is providing of safe drinking water. The Government of India supplements the efforts of the states by providing technical and financial assistance under the centrally-sponsored National Rural Drinking Water Programme (NRDWP) for providing safe and adequate drinking water supply facilities in rural areas of the country.

The National Centre for Disease Control (NCDC) provides assistance to state and Union Territory governments to prevent and control waterborne diseases and in investigating outbreaks of such diseases under the Integrated Disease Surveillance Programme (IDSP). While waterborne diseases continue to dominate the scene, the condition could worsen with climate change. Adequate preparedness both at the policy level and among citizens is the need of the hour.

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STUDY OF FEMALE GAMETOPHYTE OF VOLVULOPSIS NUMMULARIA (L.) ROBERTY (CONVOLVULACEAE)

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ABSTRACT

In the present embryological investigations, female Gametophyte of Volvulopsisnummularia has been studied to understand the taxonomic consideration and affinities of the family Convolvulaceae. Family resembles superficially with some members of the Scrophulariaceae. Hutchinson (1973), Stebbins (1974) and Takhtajan (1980, 1997) are of opinion that it is derived from Scrophulariaceae and is very close to it. The findings in the present investigation will help to justify the position of the families of the order Tubiflorae.
The material for the present investigation was collected from localities in and around Nagpur District. The taxon Volvulopsisnummularia shows some interesting features with protandrous condition, anatropous ovules with unitegmic, sessile or showing short funiculus, chlorophyll pigments in the integument, nucellus degenerates at an early stage of ovule development, polygonum type of embryo sac, the embryo development is found to be of Caryophyllad type (Johanson, 1950).

Keywords:*Embryology, Tubiflorae, Convolvulaceae, Volvulopsisnummularia, polygonum, Caryophyllad, funiculus.*

21. Introduction

Angiosperms exhibit the dominant vegetation in the world. Diversity in angiospermous taxa is at high level because of unique pollination and genetic mechanisms. The group is also showing its distinctness due to adaptive features both in external and internal characters.
Literature on plant taxonomy shows that the history of plant classification is a fascinating subject as the classification of plants based on the biological facts. The three types of classification are recognizable viz. artificial, natural and phylogenetic. Artificial system based on one or few characters; the natural system reflects the situation as it is believed to exist in nature and utilizes all information available during the period. The phylogenetic systems indicate the arrangement according to their evolutionary sequence and reflect genetic relationship. Linnaeus's sexual system (1737) is exemplified as an artificial system. Bentham and Hooker's (1862-1883) system designed on that of de Candolle but descriptions differs from it as each and every taxon was studied fresh from the material in British and continental herbaria. Classification of plants based on evolutionary principals began from Engler and Prantl (1887-1915) who believed in simplicity to complexity.
The taxonomic consideration and affinities of family Convolvulaceae has been studied embryologically.

22. Family – Convolvulaceae

The family Convolvulaceae is allied to Polemoniaceae on one hand and to Solanaceae on the other and therefore placed under Solanales by Hutchinson (1973) along with Solanaceae, Nolanaceae and Scrophulariaceae.

23. Materials and Methods

The young and developing flowers, buds, mature fruits at different stages of development were fixed in 70% Formalin – Acetic – alcohol between 9.00 am. to 11.00 am. At times the fixation was done in between 4.00 pm to 6.00 pm. The material, after fixation, transferred to 70% alcohol.
The selected material was processed for dehydration. The clearing was done in alcohol - xylol series as per the method given by Johansen (1940). The infiltration was done in the wax having the melting point of 56ºC to 62º C and embeding was done as per the routine methods.

The sections were cut on rocking/rotary microtome at the thickness varying between 8 to 16 µ. They were stained either in 0.5 % Delafield Hematoxylin and also iron-alum or HeidenhainsHematoxylin. Some plants showed satisfactory results in one stain and some in the others. The destaining was done in a picric acid .The light green/gentian violet was used as counter stain. The sections were mounted in canada balsam. After observations camera lucida figures were drawn and plates were prepared after inking.

24. Observation

The taxon under investigation shows protandrous condition (Fig.1) ovary is bicarpellary, syncarpous with axile placentation, 2 ovules in each locule. The ovules are anatropous, unitegmic, sessile or showing short funiculus, tenuinucellate (Fig.2) and the cells of integument are compactly arranged. The ovule arises as a small mound of homogenous tissue on the central placental axis (Figs.1 and 2). Initially the ovule looks orthotropous. The integument arises close to the base of these ovular tissues with the differentiation of integument; the ovule begins to curve (Fig.3). By the megaspore tetrad stage, the ovule becomes anatropous and the homogeneous tissue converted to the nucellus.

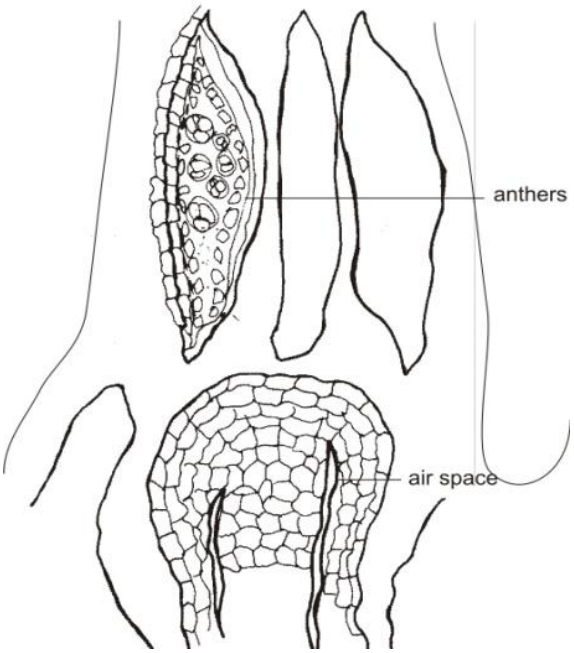

Fig. 1

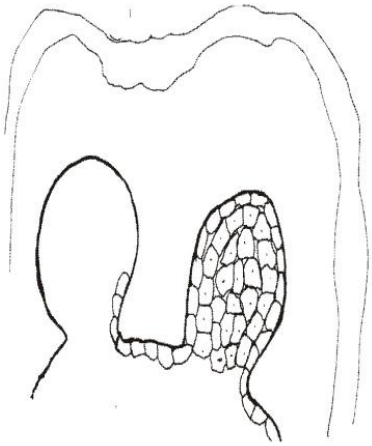

Fig. 2

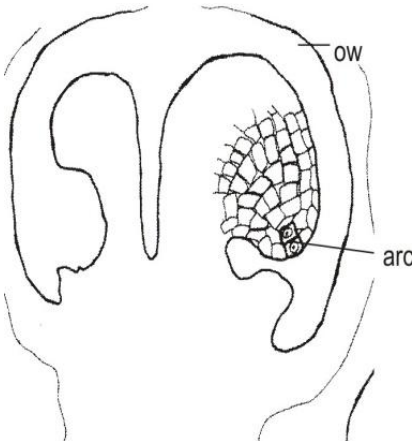

Fig. 3

The integument then grows faster than the nucellus and surrounds it completely with a very narrow slit, a micropyle (Mi, Fig. 4). The taxon *Volvulopsisnummularia* showed the presence of chlorophyll pigments in the integument. This gives yellow green appearance to the ovule. The massive nucellus degenerates at an early stage of ovule development. The innermost glandular layer of the integument becomes specialized to perform the nutritive function for the embryo sac, is the endothelium (Fig. 6).

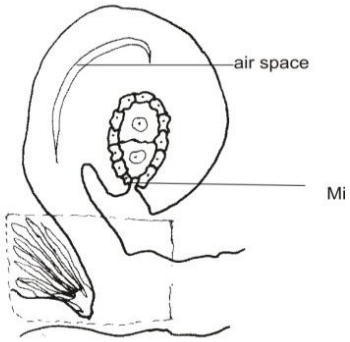

Fig. 4

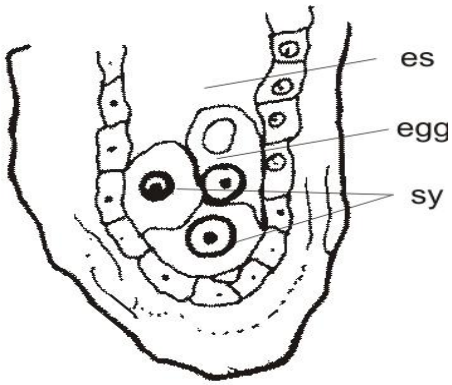

Fig. 5

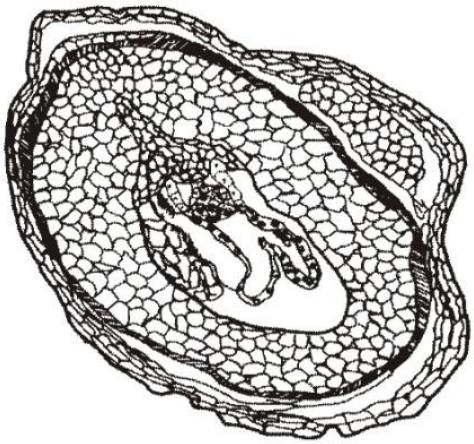

Fig. 6

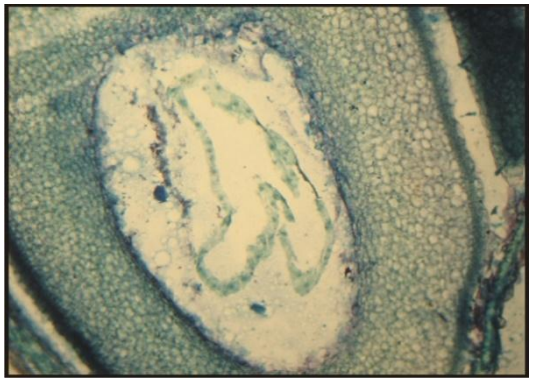

Fig. 7

Fig. 8

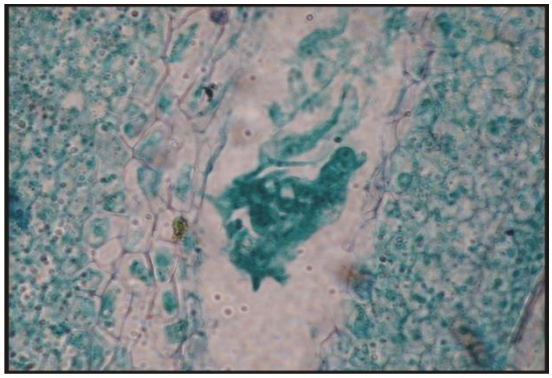

Fig. 9

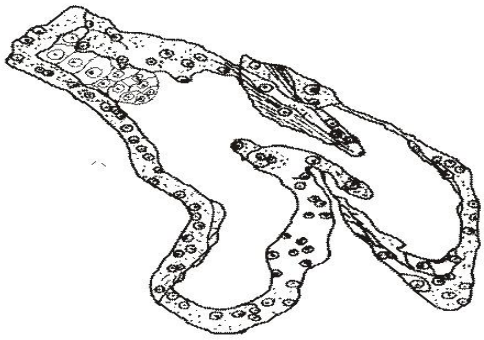

Fig. 10

The archesporial cell functions directly as the megaspore mother cell (Fig.3). Cytokinesis in the megaspore mother cell accompanies meiosis forming dyad and linear megaspore tetrad. The three micropylar megaspores degenerate where as the chalazal one remains functional. The enlargement of chalazal megaspore takes place. It is accompanied by increased vacuolation on either side of the nucleus.After the first nuclear division, the two daughter nuclei move apart to opposite poles. Each nucleus is surrounded by dense cytoplasm. Thin peripheral layer of cytoplasm occur while the center being occupied by a large vacuole.

The next division gives rise to the four-nucleate embryo sac. The four nuclei are not exactly in the same plane but are arranged in the rhomboidal form (Fig. 6,7). This stage is followed by the 8-nucleate embryo sac comprising a micropylar and a chalazal quartet. The 3 nuclei at the micropylar end gives rise to egg and two synergids (Fig. 5), 3 at the chalazal end forms the antipodal cells and the remaining two, one from each pole fused in the center forming secondary nucleus thus

forming the 8-nucleate Polygonum type of embryo sac (Fig. 7, 8).

The synergids are slender and elongated forming notch towards lower side with prominent hook. The upper part of synergid shows 'filiform apparatus', the egg nucleus lies just below the region of the hook. The lower part of synergid contains vacuole. Both the synergids persist even after fertilization and remain active. They degenerate when the primary endosperm nucleus divides.

In the egg, the nucleus and most of the cytoplasm lie in the lower part of the cell and the upper part is mostly vacuolar.

The antipodal cells are short-lived., degenerate after fertilization. The polar nuclei are close to egg apparatus rather than in the center. The fusion of polar nuclei occurs after the entry of pollen tube inside the embryo sac. This shows that, the polar nuclei fuses only in association with a male gamete. The secondary nucleus thus lies just below the egg separated with the antipodals by a large vacuole (Figs.8).

25. Fertilization

More than one pollen tube enters the stylar region but only one can make the passage through placental obturator (Fig.8) to the ovule and porogamy takes place. The placental obturator facilitates the easy entry of pollen tube. Penetrating the wall of embryo sac, the pollen tube passes between the wall of embryo and synergid. The synergids assume an egg like appearance. Both the synergids degenerate after fertilization.

Both the male gametes are discharged in close proximity to their mates i.e. one male gamete fuses with the egg while other with the two polar nuclei. Thus the general phenomenon of syngamy and triple fusion takes place. The exact gametic fusion has not been observed.

26. Endosperm

The fusion of one of the male gamete with the two polars gives rise to primary endosperm nucleus. The endosperm formation is free nuclear initially (Fig. 6, 7). Later the nuclei are separated by walls. The number of divisions in the primary endosperm nucleus forms multiple nuclei. As the division proceeds, the nuclei become pushed more and more towards the periphery of the sac. As a result the center is occupied by a large vacuole (Fig.10). The nuclei are aggregated at the micropylar and the chalazal end of the sac forming the thin layer at the sides (Fig.9). Towards the chalaza, the layer of nuclei slightly is curved inside into the center of the embryo sac. The nuclear endosperm enveloped the developing embryo. Towards the maturity of the embryo the nuclear endosperm becomes cellular accompanied by wall formation and the sac is divided into several chambers (Figs.10).

27. Embryogeny

After Syngamy, the zygote divides shortly afterwards. The first division divides the zygote into the basal cell *cb* and the apical cell *ca* (Fig. A). The basal cell *cb* remains undivided and forms a large vesicular canal like structure.The*cb* does not involve in the further development of embryo (Fig.B). The terminal cell *ca* undergoes transverse divisions to form a row of cells as *ci*, *m*&*cc* (Fig.C). The lower cell *cc* again divides transversely to form the tier *ci, m, l, l'* (Fig.D). Each of the lower three cells divides by a vertical wall whereas the upper cell *ci* divides by a transverse wall (Fig. E). The embryo now comprises of 5 tiers including *cb* namely *cb* and derivatives of *ca*, viz *n, m, l'* and *l* (Fig. F).

The next division is again the vertical at the right angles to the first in *l, l'* and *m* forming three quadrants (Fig. G). The m also divides by a vertical wall &*n* divides by a transverse wall to give rise to *o* and *p* (Fig. H). The destination of all the six tiers is decided. The tier *l* is destined to give rise to the stem tip, *l'* to the cotyledons, *m* to the hypocotyl, *n* to the root cap and *o* and *p* formed a short suspensor abuts on the large cell *cb* (Fig. I). Thus, the embryo development is found to be of Caryophyllad type (Johanson, 1950).

The suspensor later undergo elongation but attached to a large vesicular structure. The transverse section of fruit showed the embryo with very long suspensor haustoria performing a special function of pushing the embryo into the endosperm. The cells of tier *o*& *p* divide longitudinally to form two suspensor cells. This enlarges to such an extent to occupy the entire micropylar part of the embryo sac (Fig.

J). The long suspensor remains distinguishable upto the time of differentiation of the cotyledons (Fig.12). The apical meristem can be seen in the transverse section of fruit. The embryo at this stage is very much elongated with the distinct apical meristem and the radicle (Fig.11). By this time the suspensor reduced and the much elongated cotyledons can be seen (Fig.12).

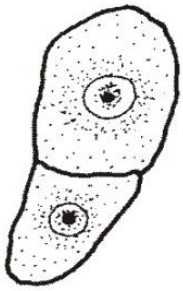

Fig. A

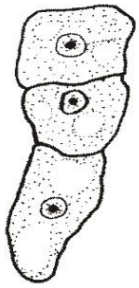

Fig. B

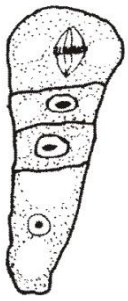

Fig. C

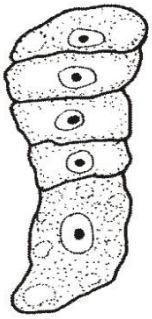

Fig. D

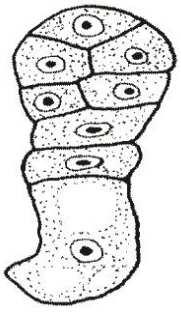

Fig. E

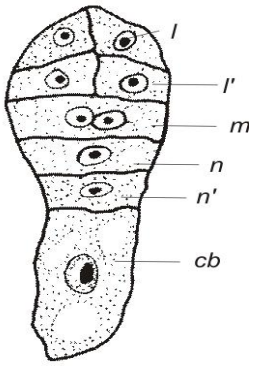

Fig. F

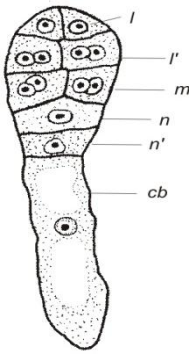

Fig. G

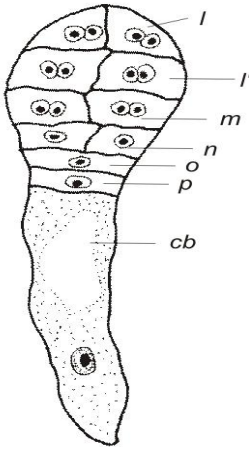

Fig. H

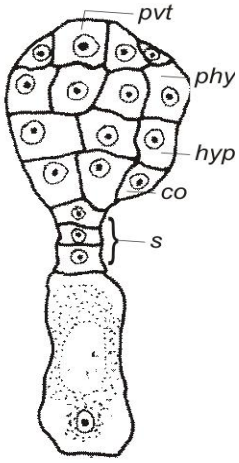

Fig. I

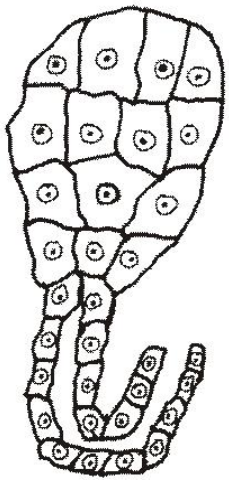

Fig. J

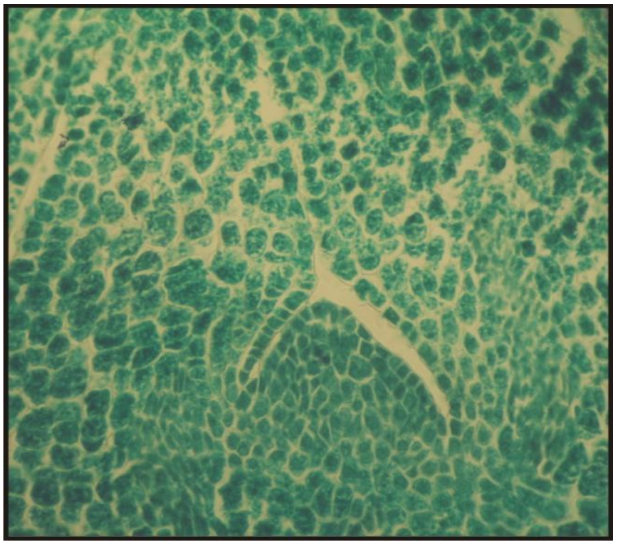

Fig. 11

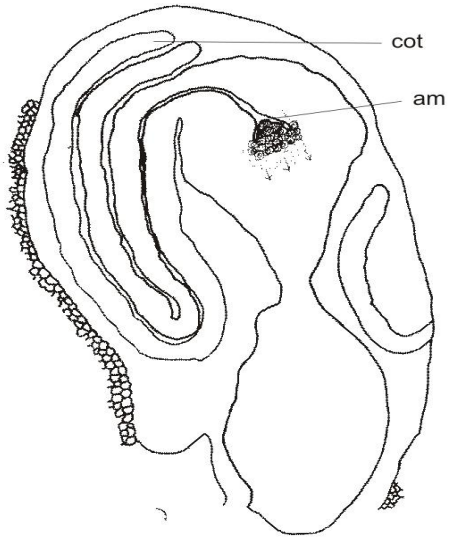

Fig. 12

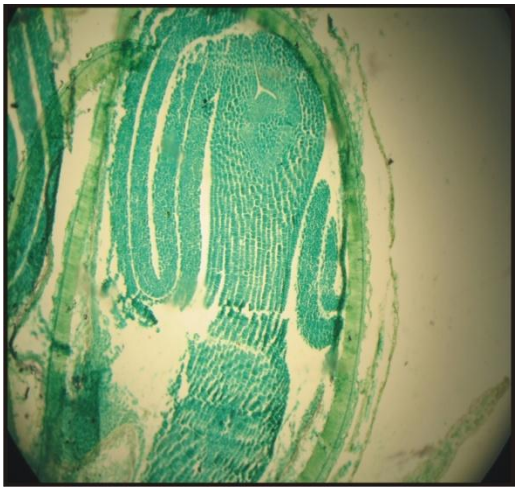

Fig. 13

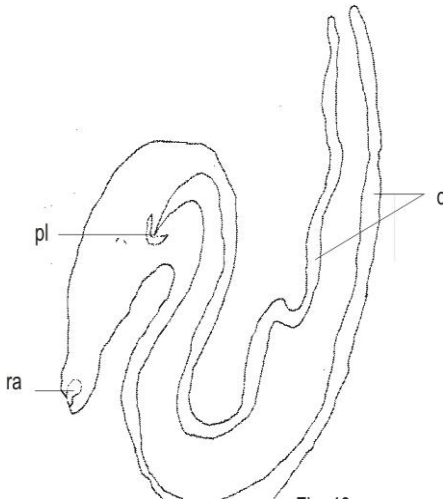

Fig. 14

The seed under favorable conditions germinate. Prior to this, the tissues undergo differentiation demarcating well the apical region of plumule which will form the shoot apex (Fig. 13). The elongated filamentous cotyledons easily break the seed coat exerting pressure on the wall. The cells of the micropylar region of the embryo differentiate into the radicle which will form the root apex (Fig. 14)

28. Development of Seed Coat and Pericarp

The four ovules which are arranged in apposite decussate fashion are developed into seeds. The seeds are dark brown in color and smooth walled. The young ovule consists of compactly arranged, chlorophyllous cells. The outer epidermis of the integument (seed coat) is thickly cuticularised comprises of 7-8 layers structure at the time of ovule development (Fig. 15).

In the fully mature fruit, the seed coat is formed by the outer epidermis and few hypodermal layers. This is because 2-3 hypodermal layers of integument are consumed by the developing embryo sac (Fig. 16). The hypodermal layers are densely filled with chlorophyllous pigments. The mature fruit wall shows the inner wall, parenchymatous middle layers and the outer wall (Fig. 17). The hypodermal layers of the pericarp reduced later contributing its content to the developing embryo.

Its layer develops the thickenings on their radial inner tangential walls. The inner epidermis becomes lignified forming the protective layer. The lignin deposition can easily be seen in the longitudinal section of the pericarp. The outer epidermis is thin walled and mucilaginous (Fig. 18).

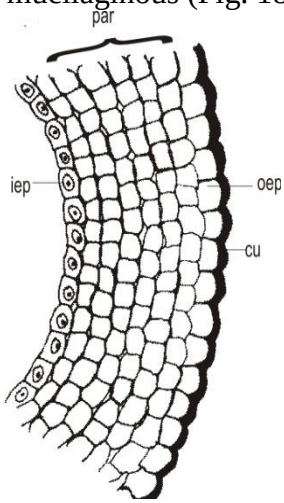

Fig. 15

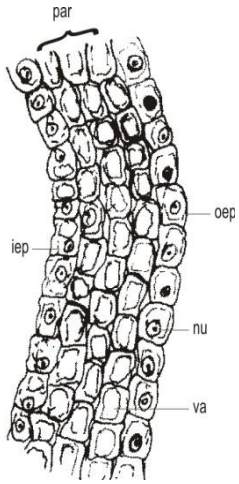

Fig. 16

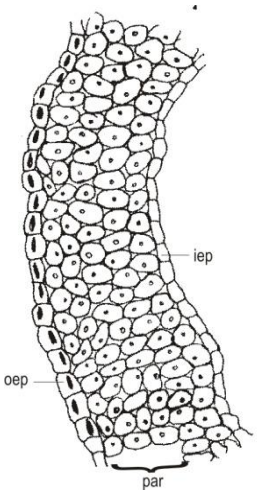

Fig. 17

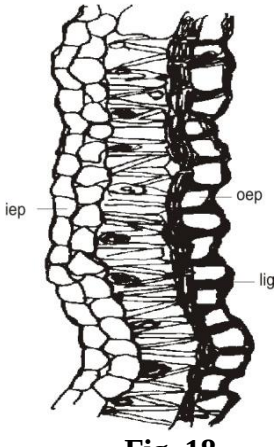

Fig. 18

29. Discussion and Conclusions

Volvulopsisnumularius of the Convolvulaceae shows tetrasporangiate anther and its wall development corresponds to Dicotyledonous type (Davis, 1966). The epidermis is tuberculated. The cells of endothecium shows fibrous thickening of 'V' of 'W' shaped. Binucleate, glandular or secretary type of tapetum has been recorded in *Volvulopsisnumularia* (present study).

The taxon under investigation shows the orthotropous ovule initially but with the differentiation of the integument the ovule begins to curve which finally becomes anatropous. But this is not true with other members of the family Convolvulaceae as the bitegmic condition is frequent (Johri&Nand, 1934; Juliano, 1935).

In the present investigation, the Polygonum type of embryo sac with slender and elongated synergids has been examined, which correlates with the study of Yana and Rao (1993). Thus it is concluded that the embryogeny in Convolvulaceae appears to be heterogenous.

The author aggred with the seperation of family from Tubiflorae by Hallier (1912) and Wettstein (1935) and raised it to the ranked of an order Convolvulales on the basis of large embryo with folded cotyledons. Thus according the present embryological findings plays a key role in delimiting the taxa and proved to be helpful to enumerate that the placement of family Convolvulaceae in Tubiflorae is not justified.

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VEGETATION MONITORING METHOD FOR ENVIRONMENT CONSERVATION

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ABSTRACT

The main objective was mapping and monitoring tree-cover cover. of the country is to know the dynamic changes of forest resources in terms of quantity and quality over a period of time so that appropriate planning and management interventions could be developed for their conservation and sustainable utilization. Spatial distribution of resources on maps along with other features will provide information for planning and implementation and utilization of these resources in a sustainable manner. In this present research works on the satellite images and digital aerial photography that can be processed for visualization of terrain conditions in Digital mode, which were generated from a variety of resources. A digital elevation model can be used to closely examine various terrain attributes, their influence on the movement of soil and nutrients, as well as the resulting effect on forest, plant, and wildlife productivity and distribution.

Keywords:*GPS, GIS, MIS, DSS, Digital aerial photography, Vegetation Monitoring, Geospatial Data.*

30. Introduction

The application of IT tools technology to biodiversity information. It thus deals with the information capture, storage, provision, retrieval, and analysis, populations, and taxa and their interaction. It covers the information generated by the fields of systematics including population biology, behavioral sciences. Biodiversity Informatics is considered a part of environmental informatics Biodiversity Informatics will provide the skeleton for a generalized scientific information infrastructure in biology. Biodiversity Informatics is to provide a sound information management infrastructure for biodiversity and Global Change research.

31. Review Of Liturature

Kagan (2006) has shed light on challenges and opportunities for applying biodiversity information to management and conservation. Information on vascular plant taxonomy, as addressed by global biodiversity information facility and key partners, serves as an example of current efforts to integrate information. In addition, intensive or public policy need to promote the use of standards, the long-term maintenance of data sets, the maintenance of institutions for maintaining and distributing information, and more careful use of limited resources. In order to describe GBIF methodology he used vascular plants as an example, with a particular focus on the way the information is developed applied in North America. The above example appears as representative of biological informatics systems globally.

Lertlum and Murai **(**1995) carried out computer assisted monitoring of vegetation using multi-resolution satellite and geospatial data. The authors approach was object oriented, a relatively new method in computing, was an attempt to improve modeling of the real world. In their view previous modeling approaches were more record oriented, essentially to close to computers, this new Pedigram was a frame work for generating models closer to the real world features. The ideal would seem to be providing an isomorphy that was direct correspondence, between real world entities and their computer representation.

Lobo (2008) analyzed the results of the best comparative study of the performance of different modeling techniques, which used pseudo-absence data selected at random. He provided an example of variation in model accuracy depending on the type of absence information used, showing that good model predictions depend most critically on better biological data. This research work was study of the relative performance of different modeling techniques. Comparing the reliability of 16 techniques, and 226 species from six world regions, the author validated the

predicted distributions with "independent" and reliable species presence / absence data that was withheld from model building.

Joshi *et al.,* (2004) explored the potential of multi-temporal IRS-ID WiFs (Wide Field Sensor) data for characterization of tropical forest in Central India. As the WiFS has red (R) and near infrared (NIR) band that was sensitive to vegetation. In the present study the forest cover of the central highland was accounted as 34.68% whereas the FSI reports 34.84 % forest cover. However, the WiFS product provided additional information on forest types, Viz., tropical moist deciduous, dry deciduous and mixed deciduous. The WiFS derived forest maps could be very useful as input to biogeochemical models that require timely estimates of forest area and type.

Rawat*et al.,* (2008) have shed light on monitoring and mapping India's forest and tree cover through Remote Sensing. Forests are ecological as well as socio-economic resource. These have to be managed judiciously not only for environmental protection and other services but also for various products and industrial raw materials. This requires periodic monitoring of the forest cover of the country for effective planning and sustainable development. The main objective of forest survey of India in mapping and monitoring forest and tree cover of the country is to know the dynamic changes of forest resources in terms of quantity and quality over a period of time so that appropriate planning and management interventions could be developed for their conservation and sustainable utilization.

Schneider *et al.,* (1998) described a tool developed for panoramically surveying the contents of the collection: the Herbarium Specimen Browser. They created WWW tools for botanists and botanically interested nonspecialist to explore aspect of botanical datasets, mainly relating to geographic distribution of various plant groups.

Roderic and Page (2008) focused on challenges of linking data and the role of shared identifiers. A major challenge facing biodiversity informatics is integrating data stored in widely distributed databases. Initial efforts have relied on taxonomic names but have limitations as identifier, being neither stable nor globally unique, and the pace of molecular taxonomic and phylogenetic research means that a lot of information in public sequence databases is not linked to formal taxonomic names.

32. Materials & Methods

Trees were coded, tagged, and labeled with unique tree code. The tree height was measured. The height and girth data was collected which is important criteria for evaluation of research site in relation to number of tree species, genera, and families. The collected data was the classified according to scientific parameters. Then data was entered into an MS-Excel spreadsheet and then it was transformed into graphic form. The dataset and databases are useful as management information system (MIS) in decision making. This modern day technical facility was fully utilized for the study of biodiversity in trees species of compartment 1016.

Using Internet Technologies

Internet explorer software was used. Actual topographic locations of vegetation-spot potential from the satellite photographic images were studied. A total of 12 different sites, aerial photographs were taken. Here, MS-Access software was used to store the data of tree species. Database tools like query, forms, and reports were applied for analysis, handling, processing and managing the data. Database software was the best alternative to the conventional methods for handling huge/large amount of data or information in user friendly manner with sufficient security system. Photographic data and information was provided in the form of CDROM's. Image specimen's sets of the tree species showed digital images with their external characteristics. CDROM was the secured information which could be widely spread through Internet and portable electronics devices.

Trees were coded, tagged, and labeled with unique tree code. The tree height was measured with the help of bamboo by doing feet wise marking on it, and in case of very tall and tallest trees the height was measured by climbing on tree if necessary. The data was

entered into an MS-Excel spreadsheet and then it was transformed into graphic form.

33. Observations & Results

The study was carried out with the help of computer and Internet. The satellite maps were downloaded to understand the area broadly. Present study explored the current trees status of the study site. During monitoring study the area was highlighted properly and visually labeled. Many satellite photographs of different views of the research area were prepared and studied. This data was useful for identify the forest category as tropical dry deciduous type. The satellite map indicated small visual patches of forest vegetation cover comprising dense forest, open forest and non forest areas which were well labeled showing thereby the topographic situation of the area.

These are the usage of new technology in monitoring forest cover which describes relationship in between real world and its computer representation. Aerial digital satellite maps provided accurate and real picture of geographical distribution of the compartment 1016. This was achieved by using software MS-Internet Explorer (Web browser), Adobe ImageReady CS, Adobe Photoshop CS, and Corel Graphics suite 11. The satellite maps were prepared with the support of Google Earth Maps searching tool. This software's were used to visualize captured data and to zoom it many more times.

The main objective was mapping and monitoring tree-cover cover. of the country is to know the dynamic changes of forest resources in terms of quantity and quality over a period of time so that appropriate planning and management interventions could be developed for their conservation and sustainable utilization. Spatial distribution of resources on maps along with other features will provide information for planning and implementation and utilization of these resources in a sustainable manner.

34. Discussion

The Specimen Browser System was developed for easy access; all the specimen images were stored in the directory and subdirectory in listing format which were further linked with the data table using hyperlink option; just by single click on it, the system could be operated and implemented in a very simple way. The herbarium, bark specimens along with field maps were linked to the table. The specimen browser provided specified image and table data in its desirable form rapidly. Schneider *et al.,* (1998) pursued the more specific project of transferring the field information into electronic form. Specimens collected within Texas were used by the Specimen Browser. For each of those, the following items have been recorded: accession number and source herbarium, collector's name, a collector-specific number for the specimen, data of collection, country of collection, and scientific name. Future revisions to the Specimens to be used as they were entered; future data-gathering passes were anticipated to input data from annotations and images of the plants themselves. Cotter and Bauldock (2000) assumes that information technology provides us tools to digitize information a 76 e it in accessible systems; discover and e data pertinent to the issue at hand; analyze data from diverse distributed databases input and promote interactions among colleagues through collaboratoria, internet-based communication facilities which enable discussions, document development and revision, and decision making in real time. In view of Kagan (2006) Biodiversity informatics has to provide consensus reference system in structural features (e.g. in database design) and and content definitions (controlled vocabularies, i.e., list of applicable terms). Taxon based information system (or system using taxon names) must find ways to map individual taxon concept reliably. Information on vascular plant taxonomy, as addressed by global biodiversity information facility and key partners, serves as an example of current efforts to integrate information of the plant biodiversity. Aerial satellite monitoring method helps to understand better the complexity of the forest. The main intension of using this digital image processing system was to provide current status of forest with its potentially important data for monitoring, planning, conservation and management of the forest. Lertlum and Murai**(**1995) illustrated the use of objected-

oriented data model to handle the integration problem of multi-resolution, multi-temporal data sets by defining an object oriented data model that could handle multi-resolution, multi temporal remote sensing GIS data sets. A semi-automated classification procedure was adopted by Meyera *et al.,* (1996) for identification of forest species from digitized large-scale, colour-infrared aerial photographs to simulate imagery from future sensors with high spatial resolution capability.

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AN EXPLORATION OF ECO-FEMINISM AND RESISTANCE IN SARAH JOSEPH'S GIFT IN GREEN

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ABSTRACT

Over the ages, Literature has been playing a vital and constructing role in promoting the environmental ethics. Literature concerns for maintain and restoring the instinct connection between human and Nature. In discourses of purity of concerning environment, ecofeminism has played a very significant role. Several eco-feminist writers like Mahasweta Devi, Arundhati Roy, Anita Desai, Vandana Shiva and Sarah Joseph depicts a natural bonding between women and nature. Eco feminist's aim is to adopt a new attitude towards nature as well as women. Women has considered equally in balancing the development while sustaining natural resources as women and Nature. Women are the conscious caretakers of whole planet. Sometimes they take very strong stand for the preservation of ecology. The present novel is an exploration of ecofeminism and resistance of women for creating a perfect harmony with the nature as well as sustainable development.

Keywords:*Eco -feminism, women, Nature, resistance and sustain.*

35. Introduction

Ecofeminism is an interdisciplinary movement. It calls a new way of thinking about nature, women, politics and spirituality. Actually ecofeminism depicts movements and philosophies that link feminism with ecology. Eco feminist theory reiterates that women and nature are devastated by the patriarchal society. It also deals with the spiritual connection between woman and nature. Ecofeminist appeals for both environmentally and ethically good society that respects nature and woman. Indian women novelist like Mahasweta Devi, Aurndhati Roy, Kiran Desai, Usha K.R. depicts intimacy and a natural bonding between woman and nature. Their writing addresses issues like pollution of Nature and oppression of women. There eco-feminist traces ecological consciousness as well as male domination sufferings of women.

The ecofeminism was first invented by the French Feminist Francoise'dEaubonne in her book. *Le Feminismeou La Mort* (Feminism or Death) published in 1974. It gives importance to ecological revolution organized by women. Ecofeminism is an amalgamation of ecology and feminism. It is a concept which questions the patriarchal oppression and the exploitation of Nature. The connection among literature, Woman and Nature has gained more attention in literary works concerning environment.

Sarah Joseph is one of the renowned contemporary Indian women writers in Kerala. Being a feminist and environmentalist, she focuses on the women and nature themes, globalization and materialism that lead to the ecological destruction. She was won SahityaAkademi Award and Crossword for Translation award. *Othappu*(*The scent of other side*), Aathi (*Gift in Green*) and Oorukaval (*The Virgil)* are some of her novels that gives experiences of women in male dominated society. She has raised her voice of resistance mainly On the marginalized, deprived, misinterpreted and misused women as well as environment.

Aathi is written in Malayalam and translated by ValsonThampu in English entitled as *Gift in Green.*It is focused on the globalization has created tremendous impact on the lives of women. Women suffered in male dominated society.As well as these women struggles against environmental issues. In the opening of this novel, Aathi is such lagoon. It is cool and serene in the womb of an inviolate purity and but a greedy man entered in to the village, for the sake of development strategies. He started to destruct the environment for the sake of modernity and development but couldn't find peace in it. At last flood rises to purify the land. Here the nature creates culture and when people move against it, the nature itself

destroys what it has created. This novel is throws light on the preservation of the ecological conservation.

Gift in Green has an exploration of ecofeminism and resistance to the growing invasion of fertile land. This novel depicts woman and nature are on and the same as they are sharing same activities ex. Procreation – creation. But both woman and nature are destroyed continuously by men and globalization. The radical feminist strongly opposes the ill-treatment towards nature and women. The plight and predicament of women is equivalent to the devastation of the land and the nature.

Gift in Green is a story of Aathi, an island with its natural beauty and purity. Aathi'speople lives in peaceful, sacred and cool environment which is not inflected by the rays of modernization. They are surrounded and protected by the nurtured water. The cool, shadow and clean water of Aathi.Aathi's people lived a simple and secured life in the lap of nature from the outside world. The village is surrounded by mangrove forests and water. Aathi people 'Felt themselves to by one with trees, the birds, the water, and the land'.(44) They have a natural bonding with their land and water. Even they can't sell their land for other communities. Even Kunjumathu's father gives priority to a farmer for marriage of his daughter. They consider that working with earth will furnish all sorts of pleasure.

Aathi is an ideal world of ecology. But pure water gets polluted after the arrival of kumaran and his companions. They pollute the environment of Aathi. They tried to replace the cool, quiet, green and shadow village in to concrete jungle, shopping malls, with so called development strategies. Kumaran is a greedy businessman whose intension is getting more profit from the natural landscape. He claims that through the modernization people gets comfortable life, but actually throws innocent people into pathetic life. Kumaran has planned to transform Aathi into paradise of modernity. The modes of living such as water- life and forming are replaced with the construction of building resulting in toxic-waste and destruction of natural habitant. He has not any concern for the culture and belief's of the people of Aathi. He replaced the age old Thampuran Statue with another god's idol in gold.

This activity of so call development disturbed the agrarian life of Aathi and cause violence to the gentle female characters like Kunjumathu. Actually Kumaran betrothed Kunjumathu and gone to the city for his bright future. He starts investing money for developing the place and replaces the natural life of Aafthi with buildings. Kunjumathu even after betrayed by Kumaran. She decides to take care of the land his parents. Kunjumathu is eco conscious and lover of the nature. She feels very bad when kumaran spoils the nature.

"Ever since the thing began basket full of empty liquor bottle, plastic bags and rotting food had been accumulating in the mangrove forest". (Joseph 86) Modernization completely changed clean village into dirty village. When Kunjumathu prays to God, she envision and empty future without water, all the wealth of the village getting smashed one by one.

'Paddy fields, parched, Trees, dry and withered. The earth cracked, wells, dried up, cattle tormented by thirst. Birds, perishing.Children howling in hunger.Desert storms raging with vengeance. The burning sand it brought along. Covering the land. Red-hot rocks. Thorny bushes.Scorching heat. Freezing cold' (196) are scenes mentioned by Joseph in this novel. This is real picture of degradation of environment. Today we are facing all these ecology problems. The entire scene shows the degradation means the end of peaceful and comfortable life human beings. This is aghast picture of exploitation of ecosystem.

Kumaran decides to renovate the Thampuran Temple. This temple is the belief of village people. The village women take a strong stand against it. They start to assemble in Thampuran Temple to stop kumaran to demolish it. Women are the symbol of creation like nature. Kumaran's cunningness reestablished the temple. He misuses the nature and village for his business and profit. Age old silence of Aathi is spoiled by the globalization.

Sarah Joseph explores the modernization issues in Kerela in this novel. Aathi and its nature are part of social and sprit of women.

Women realize the deteriorian and the upcoming harmful consequences of nature destruction before men and try to warn them. But their warning is rejected by patriarchal society. Due to this women lives under the threat of death.

Sarah Joseph explored another kind of issue i.e. Bio-medical waste. The biomedical waste is the major issue of degradation of ecology. The biomedical waste is that which dumped into the immediate environment from hospitals. But placentas are purifying in the water. They were not buried into the earth. Shailaja, works as sweeper in a hospital. She is lover of nature. She collects waste biomedical things and dumps daily into large toilet bowl inside the hospital. She wants to protect the village by protesting against modernization. Here Joseph depicts present environmental issues water contamination, lack of proper waste disposal system, dumping of biomedical waste in waters in rivers, the use of endosulfin to ensure profit in farming. The problem of land filling, destruction of marshes disposal of plastic and biomedical waste are created due to the materialistic development.

Shailaja is married to Chandramohan. He is one the native of Chakkamkandam. But that village have no septic tank available due to it produces bad smell and people living nearly places fell sick. The waste breeds disease causing bacteria and all people facing health issue problems. Shailaja after monitoring all these issues and she left the Chankkamkandam and came to Aathi. She wants to protect the village from globalization Kunjumathu and Shailaja protesting against the destruction of Aathi. The bond of nature and woman is clearly visible here. They are ordering nature to give pure water for their survival .It shows their caring responsibility towards nature.

'You will give us water and live hood. We shall work with you and take care of you' (201) Kunjumathu and Shailaja are nature saviors; they come to rescue the village. They start cultivate paddy in the fields across the village. This gives a good result and it helps Aathi to regain its greenery.

Another women character Gitanjali who comes to Aathi with her daughter Kayal seeking to cure for her daughter's mental turbulence. 'Let her see water, hear the sound of water. Play with water she is sure to improve'. (57) Here author throws light on the healing power of nature. Aathi touched Kayal and healed her mind body.

Sarah Joseph pointed the contemporary reality of Kerala to the use of endosulfin in the border district of Kasargod and Palakkad state pollution control board has banned endosulfian. "Endosulfian is not safe to eat the fish. Those who eat it will die of some in curable disease" (169)

Aathi's people aware of his fact they have no idea about sly plan of Kumaran. Kunjumathu retorts kumaran with her sharp words and protest against use of Endosulfian.

Aathi's meditative peace, tranquility everything collapses by the arrival of Kumarn. He destroys the Green bangle. Kunjumathu, Shailajla and many other women were willing to sacrifice their life for their earth. To save Aathi from this destruction is the prime motto of their life. Green bangle, the margrave forest in Aathi, plays a powerful symbol that depicts the exploitation of eco system. Greenery is present throughout the novel. The plot gives the degradation of ecology and it ends in regeneration of Aathi.

Male characters such as DinakaranKumaran, Markose and Amhu are the ardent supporters of development or globalization. Whereas the female characters such Ponanni, Gitanjali, Kunjumathu, Shailaja are attached to land faming, fishing and culturing. They have passionate attachment with mother earth. They have a sense of perfect harmony with the land. They are motherly attached towards glorious land. They opposed to idea of the constructing bridge and lease their productive land for money and job. Women are the agents to preserve and protect. It is clear that women hold greater responsibility then men to protect the environment. Women are protective and proactive for sake of mother land.

The novel depicts the environmental concerns of the women as well as sustainable development is the need of the hour. It is essential to have holistic outlook towards nature to fill up the gap between human and non human entities. This novel narrates the unique practices and eco-friendly culture of

Aathi. Novel opens up possibilities for life practices based on mutual love and care respecting mother –earth. Women alone can not stop violence against nature all together takes to save planet. This novel gives a green vision to the reader to drift towards the earth centric view.

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APPLICATION OF LAPLACE TRANSFORMATION IN SCIENCE AND ENGINEERING FIELD

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ABSTRACT

In this article, we'll discuss about the Laplace transform's characteristics and many domains in which it may be used. Laplace transform is another topic we cover since it is one of the most effective methods used by mathematicians, scientists, and researchers to solve issues. This essay will explore utilizing the Laplace transform to overcome research problems. An analysis of the properties and uses of the Laplace transform is the goal of this paper's scholarly review. Additionally, the Laplace transform of significant functions, such as the periodic function and unit impulse function, is presented in this study.

Keywords:*Differential equation, Laplace transform, Properties.*

36. Introduction

Overview of the Laplace transform's characteristics, together with a definition and examples of how it is used in engineering and applied sciences, are provided in this work. The integral transform known as the Laplace transform is represented by the symbol $L[f(t)]$. By first deriving the generic form for the term f, the third order equation $af''''(t) + bf'''(t) + cf''(t) + df(t) = g(t)$ may be solved $f(t)$. This generic form will have integration constants whose values may be determined by suitable boundary conditions. Using the Laplace transform, which converts the differential equation into an algebraic equation and has the additional benefit of include the boundary conditions from the outset, is another methodical approach to solving this equation. Furthermore, the Laplace transform approach fails if $f(t)$ represents a function that has been ceased. Laplace transform techniques are also useful in a variety of technological disciplines, including control theory, population growth and decay issues, where understanding the system transfer function is crucial and where Laplace transform succeeds.

37. Definition of Laplace Transform

Laplace transform of the function $f(t)$ for all $t \geq 0$ is defined as [1-5]

$$L[f(t)] = \int_0^\infty f(t)e^{-st}dt = F(s) \quad (1)$$

in which the Laplace transform operator L is used. If a function is piecewise continuous and of exponential order, it has a Laplace transform $\forall\, t > 0$.These are only necessary requirements for the Laplace transform of the function $f(t)$ to exist.

38. Properties of Laplace Transform [2]

3.1 **Linearity Property:** If $L[f(t)] = \dot{f}(s)$& $L[g(t)] = \bar{g}(s)$ then

$L[af(t) + bg(t)] = aL[f(t) + bL[g(t)]$where$a$ and b are arbitrary constant.

3.2 **First Shifting Property:** If $L[f(t)] = \dot{f}(s)$then $L[e^{at}f(t)] = \dot{f}(s-a)$

3.3 **Convolution Theorem:** If $L^{-1}[\dot{f}(s)] = f(t)$&$L^{-1}[\bar{g}(s)] = g(t)$ then

$L^{-1}[\dot{f}(s)\ X\ \bar{g}(s)] = \int_0^t f(u)g(t-u)du$

3.4 **Laplace transform of derivative:**

1. $L[f'(t)] = sL[f(t)] - f(0)$

2. $L[f''(t)] = s^2L[f(t)] - sf(0) - f'(0)$
3. $L[f'''(t)] = s^3L[f(t)] - s^2f(0) - sf'(0) - f''(0)$and so on.

3.5 **Laplace transform of Integrals:** IF $L[f(t)] = \dot{f}(s)$,then

$$L\left\{\int_0^t f(u)du\right\} = \frac{1}{s}\dot{f}(s) \& \int_0^t f(u)du = L^{-1}\left(\frac{\dot{f}(s)}{s}\right)$$

3.6 **Multiplication by t^n:** If $L[f(t)] = \dot{f}(s)$,then $L[t^n f(t)] = (-1)^n \frac{d^n}{ds^n}(\dot{f}(s)), n\epsilon Z^+$

3.7 **Division by t:** If $L[f(t)] = \dot{f}(s)$,then$L\left\{\frac{f(t)}{t}\right\} = \int_0^\infty \dot{f}(s)ds$

3.8 **Laplace Transform of Unit step function:** If $L[u(t-a)] = \frac{e^{-as}}{s}$ where $u(t-a) = \begin{cases} 0, & t < a \\ 1, & t \geq a, a \geq 0 \end{cases}$

3.9 **Second Shifting theorem:** If $L[f(t)] = \dot{f}(s)$,then$L[f(t-a)u(t-a)] = e^{-as}\dot{f}(s)$

3.10 **Laplace Transform of Unit impulse function:** If $L[\delta(t-a)] = e^{-as}$where $\delta(t-a) = f(x) = \begin{cases} \infty, & t = a \\ 0, & t \neq a \end{cases}$

3.11 **Laplace Transform of Periodic Function:** $L[f(t)] = \frac{1}{1-e^{sT}}\int_0^t e^{-st}f(t)dt$

39. Application

Example – 1.

Consider,$ty'' + y' + 4ty = 0$ If $y(0) = 3, y'(0) = 0$ (2)

Taking Laplace transform of the given equation,

$-\frac{d}{dp}L[y''] + L[y'] - 4\frac{d}{dp}L[y] = 0$

$-\frac{d}{dp}\{p^2Y - py(0) - y'(0)\} + pY - y(0) - 4 - \frac{dY}{dp} = 0$

$$(p^2 + 4)\frac{dY}{dp} + pY = 0$$

$-\frac{dY}{dp} + \frac{p}{p^2+4}dp = 0$

Integrating

$$\log Y + \frac{1}{2}\log(p^2 + 4) = \frac{1}{2}\log a$$

$Y^2(p^2 + 4) = a.$

Taking Laplace inverse

$L^{-1}Y = bL^{-1}\left\{\frac{1}{(p^2+4)^{\frac{1}{2}}}\right\}.$

Putting $t = 0, y = 3$ we get $3 = b\,J_0(0) = b$

$y = 3\,J_0(2t).$

Example -II

Consider, $y'' + ty' - y = 0,\ if\ y(0) = 0, y'(0) = 1$ (3)

Taking Laplace transform we get,

$$p^2Y - 1 - \frac{d}{dp}(pY) - Y = 0$$

$$(p^2-1)Y-\left(Y+p\frac{dY}{dp}\right)=1$$

$$(p^2-2)Y-p\frac{dY}{dp}=1$$

$$\frac{dY}{dp}+\left(\frac{2}{p}-p\right)Y=-\frac{1}{p}$$

$$I.F=e^{\int\left(\frac{2}{p}-p\right)dp}=e^{2\log p-\frac{p^2}{2}}$$

$=e^{\log p^2}.e^{-p^2}.$

The solution of (3) is

$$Y\,p^2e^{-\frac{p^2}{2}}=c+\int\left(p^2e^{-\frac{p^2}{2}}\right)\left(-\frac{1}{p}\,dp\right)=c-\int p\;e^{-\frac{p^2}{2}}\,dp$$

Put $\frac{p^2}{2}=z$ then $p\,dp=dz$

$$Y\,p^2e^{-\frac{p^2}{2}}=c-\int e^{-z}\,dz=c+e^{-z}=\;e^{-\frac{p^2}{2}}$$

$Y=\frac{c}{p^2}e^{\frac{p^2}{2}}+\frac{1}{p^2}.$

Taking inverse transform

$y=t+cL^{-}\left\{\frac{1}{p^2}e^{\frac{p^2}{2}}\right\}.$

Subjecting this to the condition $y(0)=0$, we get $c=0$

$y=t.$

40. Conclusion

Laplace transform is a very useful tool to solve highly difficult issues in most engineering and change scientific field. Through this article, we demonstrate the applications of Laplace transform in numerous fields such engineering (mechanical, electrical, etc.), physics problems, and more. Laplace transform is now widely used to identify solutions to a variety of situations.

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HAZARDS EFFECT OF E-WASTE ON THE ENVIRONMENT AND HUMAN HEALTH IN INDIA AND E-WASTE MANAGEMENT

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ABSTRACT

E-waste consist of scrap of electronic appliances such as computers, mobiles and telephones, radio, speakers etc. Major producers of e-wastes are China, USA and India. According to Global E-waste statistics 57.4 million Metric tones E-waste is generated in 2021. According to the UN, in 2021 each person on the planet will produce an average 7.6 kg of e-waste. Toxic components in electronic waste, such as mercury, lead, cadmium, polybrominated flame retardants, barium, and lithium, are hazardous to human health. E-waste is toxic, non-biodegradable, and accumulates in the environment, including soil, air, water, and living organisms. Around 78% of India's e-waste is not being collected or disposed by the government.In India, E-waste is managed through land filling, incineration, and recycling.

Keywords:*E-waste, Toxic components, hazardous to human health, E-waste management, land filling, incineration, and recycling.*

41. Introduction

In the 21th Century, the information and communication revolution has brought enormous changes in the way we organize our lives, our economies, industries and institution. At the same time, these have led to manifold problems including the problem of massive amount of hazardous waste and other wastes generated from electric products [1]. It constitutes a serious challenge to the modern societies and require coordinated effects to address it for achieving sustainable development. Rapid growth of technology, upgradation of technical innovations, and a high rate of obsolescence in the electronics industry have led to one of the fastest growing waste streams in the world which consist of end of life electrical and electronic equipment product such as Refrigerator, Washing machines, Computers and Printers, Televisions, Mobiles, iPod etc. Many of which contain toxic materials [2].

According to Comptroller and Auditor-General's (CAG) Report, over 7.2 MT of Industrial Hazardous Waste, 4 lakh Tonnes of electronic waste, 1.5 MT of Plastic waste, 1.7 MT of medical waste and 48 MT of municipal waste are generated in the country annually. There are 10 states that contribute to 70% of the total E-Waste generated in the country. - 65 cities generate more than 60% of the total E-Waste in India [3].

Electronic waste contains toxic components that are dangerous to human health, such as mercury, lead, cadmium, polybrominated flame retardants, barium and lithium. The negative health effects of these toxins on humans include brain, heart, liver, kidney and skeletal system damage. The improper disposal of electronic products leads to the possibility of damaging the environment. As more e-waste is placed in landfills, exposure to environmental toxins is likely to increase, resulting in elevated risks of cancer and developmental and neurological disorders [5].

For the management of E-waste initiatives should be taken such as Extended Producer Responsibility; Design for Environment, Reuse, recycle technology platform for linking the market facilitating the circular economy aim to encourage consumers to correctly dispose of the e-waste, with an increased reuse and recycling rates, and also adopt sustainable [4,5].

42. Methodology

The methodology adopted for the review was carried out using Three steps

i. A literature study was conducted to get an overview of the effect of E-waste on Environment and Human Health in India.

ii. a literature study on Generation of E-waste State wise in India.
iii. a literature study on the land filling, incineration, and recycling methods used for the E-waste management.

E-waste generation in India: -

Very few sources give relevant data with respect to e-waste generation in India. The ministry said according to Central Pollution Control Board (CPCB), the growth rate of this e-waste is even higher. This waste was 7.71 lakh tones in 2018-19 and 10.14 lakh tonnes in 2019-20. Electronic waste is emerging as a serious public health and environmental issue in India. India is the "Third largest electronic waste producer in the world"; approximately 2 million tons of e-waste are generated annually and an undisclosed amount of e-waste is imported from other countries around the world. So, in 2020-2021 more than 12 lakh tonnes of E-waste is generated [3].

State wise E-waste Generation in India: -

Maharashtra is the topmost e-waste producing state followed by Tamil Nadu, Andhra Pradesh, Uttar Pradesh and West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab for total 70% of e-wastes production [3].

43. Environmental and Health Issues

The e-waste contains a number of toxic components that can cause serious damage to environment and human and animal health if not properly discarded in an environmentally sound manner. Effects of some of the chemicals found in e-waste on human health are given below:

1) Brominated flame retardants: Brominated flame retardants (BFRs) have routinely been added to consumer products for several decades in a successful effort to reduce fire-related injury and property damage. Recently, concern for this emerging class of chemicals has risen because of the occurrence of several classes of BFRs in the environment and in human biota. The widespread production and use of BFRs; strong evidence of increasing contamination of the environment, wildlife, and people; and limited knowledge of potential effects heighten the importance of identifying emerging issues associated with the use of BFRs. These do not decompose easily in the environment, and long-term exposure can cause impaired memory function and learning. Pregnant women exposed to brominated flame retardants have been shown to give birth to babies with behavioral problems as it interferes with estrogen and thyroid functioning [4].

2) Lead: Lead is a naturally-occurring element that can be harmful to humans when ingested or inhaled, particularly to children under the age of six. Found in most computer monitors and televisions, lead exposure leads to intellectual impairment in children and serious damages to human reproductive systems, the nervous system and blood. Lead poisoning can cause a number of adverse human health effects, but is particularly detrimental to the neurological development of children [4].

3) Cadmium: The kidney is the critical target organ for the general population as well as for occupationally exposed populations. Cadmium is known to accumulate in the human kidney for a relatively long time, from 20 to 30 years, and, at high doses, is also known to produce health effects on the respiratory system and has been associated with bone disease. Found in rechargeable batteries for laptop computer and other electronic devices, can cause damage to kidneys and bones. Cadmium can be bio-accumulated in the environment and is extremely toxic to human, in particular adversely affecting kidneys and bones [4].

4) Mercury: Elemental and methyl mercury are toxic to the central and peripheral nervous systems. The inhalation of mercury vapor can produce harmful effects on the nervous, digestive and immune systems, lungs and kidneys, and may be fatal. The inorganic salts of mercury are corrosive to the skin, eyes and gastrointestinal tract, and may induce kidney toxicity if ingested. Neurological and behavioral disorders may be observed after inhalation, ingestion or dermal exposure of different mercury compounds. Symptoms include tremors, insomnia, memory loss, neuromuscular effects, headaches and cognitive and motor dysfunction. Kidney effects have been reported, ranging from increased protein in the urine to kidney failure.

Mercury (Hg), which is used in lightening devices in flat screen monitors and televisions can cause damage to the breast milk [4].

5) Hexavalent Chromium Compounds: Hexavalent chromium is a toxic form of the element chromium. Hexavalent chromium compounds are man-made and widely used in many different industries. A known carcinogen, these are used in the creation of metal housing which are typical of many electronic products. It can cause lung cancer, irritation or damage to the nose, throat, and lung (respiratory tract), irritation or damage to the eyes and skin etc. Plastic compounds: Poly vinyl chloride (PVC) cabling is used for printed circuit boards, connectors, plastic covers and cables. When burnt or land-filled, these PVCs release dioxins that have harmful effects on human reproductive and immune systems [4].

Treatment and Disposal: - Because of the complex composition of valuable and hazardous substances, specialized, often "high-tech" methods are required to process e-waste in ways that maximize resource recovery and minimize potential harm to humans or the environment. Unfortunately, the use of these specialized methods is rare, with much of the world's e-waste traveling great distances, mostly to developing countries, where crude techniques are often used to extract precious materials or recycle parts for further use. This also leads to localized pollution of environment and is health hazards for advanced life forms [5].

44. The Methods Following in General for the Management of E-Waste

1. Land filling: It is widely used methods for disposal of e-waste. In this method, trenches are made on the flat surfaces by removing soil from the trenches and waste material is buried in it, which is covered by a thick layer of soil. Secure landfill is made using modern technique. Here they are provided with some facilities like, impervious liner made up of plastic or clay, leachate collection basin that collects and transfer the leachate to wastewater treatment plant. The degradation processes in landfills are very complicated and run over a wide time span and can be many years [6].

2. Incineration: In this controlled and complete combustion process, the waste material is burned in specially designed incinerators at a high temperature (900-1000oC). Advantage of incineration of e-waste is the reduction of waste volume and the Utilization of the energy content of combustible materials. In this method some environmentally hazardous organic substances are converted into less hazardous compounds [6].

3. Recycling of e-waste: Fridge, washing machines, TVs, Monitors & CRT, keyboards, laptops, modems, telephones, hard drives, floppy drives, Compact disks, mobiles, fax machines, printers, CPUs, memory chips, connecting wires & cables can be recycled. Recycling involves dismantling i.e. removal of different parts of e-waste containing dangerous substances like PCB, Hg, separation of plastic, removal of CRT, segregation of ferrous and nonferrous metals and printed circuit boards. Strong acids are used to remove precious metals such as copper, gold, palladium. The value of recycling from the element could be much higher if appropriate technologies are used [6].

4. Re-use: It constitutes direct second hand use or use after slight modifications to the original functioning equipment. It is commonly used for electronic equipment like computers, cell phones etc. Inkjet cartridge is also used after refilling. Old working computers can be donated to schools or organization working in the field of education. Computers beyond repairs can be returned back to the manufacturers. This method also reduces the volume of e-waste generation. The better option is to avoid its generation. To achieve this, buy back of old electronic equipment shall be made mandatory. This can considerably reduce the volume of e- waste generation [6].

45. Method Suggested for E-Waste Disposal

For e-waste disposal, a "Reduce, Reuse, recycle" strategy should be used. Reduce e-waste generation through smart procurement and proper maintenance. Reuse working electronics by donating or selling them to someone who can still use them. Those

components that cannot be repaired should be recycled. Only use authorized recyclers to dispose of e-waste products. The Process E-Waste recycling process should be a balance between disassembly, mechanical separation of complex materials and metallurgical treatment [7].

1)First Stage - Manual component segregation, in which different parts of E-waste are separated.

2)Second Stage - The mechanical separation method is used. Initially, ferrous, aluminium, plastic, and nonferrous materials are separated in this process.

3)Third Stage - Plastics are then recycled through the plastics recycling process, which further processes the plastic.

4) Fourth Stage - The nonferrous metals are transported to a metallurgical treatment plant, where they are separated into constituent metals.

46. Conclusion and Recommendation

Better way of managing e-waste: I believe it is Health Hazards for all life forms on the planet, supporting proper environmental health, which is the ultimate goal on the planet. I believe the following methods can be used to address e-waste and its management:

1. Waste Management of Technology at the very onset of development and manufacturing a piece of new electrical and electronic item.
2. Determining the 'User Codal Life' of all electrical and electronic items.
3. Allowing a new model of a product with only a minor or moderate improvement over the previous model.
4. as part of the regulation, a time limit should be established between the introduction of new and old models into the market.
5. Encouragement of product repair rather than 'Use and Through' methodology.
6. To avoid health risks to human health and the environment, e-waste should be disposed of in multiple locations rather than in a single location. I called this 'e-Product for All and e- Waste for All.
7. If disposal is the last resort, all disposal methods should be discouraged except 'Deep Land Filling,' which means burying e-waste at the deepest level available on that land. Given the way our land has formed over millions of years, such a method of disposal has environmental support.
8. Encourage entrepreneurs to use e-waste components to create new products, and the government should provide special subsidies to such manufacturing units.

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