STUDY OF DIVERSITY OF MOLLUSCA AND FISH IN SHIVAJI GARDEN LAKE RALEGAON DISTRICT YAVATMAL, MAHARASHTRA, INDIA

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ABSTRACT:-

Mollusca and fish diversity Shivaji Garden Lake Ralegaon Dist Yavatmal Maharashtra have been studies during June 2021 to May 2022 of Shivaji Garden Lake Ralegaon of Yavatmal, District Yavatmal and factor which affecting on them. Study reveals that molluscan diversity in Shivaji Garden Lake Ralegaon, of Yavatmal region, Dist. Yavatmal, Maharashtra, India, reported that total of 9 fish species were recorded and 7 species of molluscs from the lake. The dominant class Gastropoda of Mollusca was dominated by 7 species including Pila globosa, Thiara scabra, Melanoides tuberculata, Bellamya bengalensis, Lymnaea accuminata, Lymnaea lutiola,. Ichthyo fauna of Shivaji Guarden LakeDist Yavatmal Maharashtra were dominated by major carps with 5 members belonging to cyprinid forms including Labeo rohita, Catla catla, Cyprinus carpeo, Cirrhinus marigala, Labeo calbasu, followed by 3 members of family siluriformes including Clarius batrachus, Mystus bleekeri, Mystus vittatus,. The composition, distribution of benthic organisms over a period of time provide index of the ecosystem as well as sustain a rich mollusca and fish fauna.

Keywords*: *Shivaji Guarden Lake , Mollusca, Ichthyo fauna, bentic organisms.

Introduction

Molluscs constitute the second largest invertebrate and most successful group next only to insect, it has been here for over 500 million years[1,2]. The estimate of number of species of molluscs today varies from 80,000 species to 1,35,000 of these 37,000-10,000 are marine, 14,000-35,000 terrestrials and about 5000 freshwater species [1,3]. The phylum mollusca is typically divided into 9 or 10 taxonomic classes out of which the 8 classes all are reported in marine habitat with highest densities, while freshwater molluscs are divide as Gastropoda and Bivalvia (Pelecypoda). Class gastropoda occurs two groups these are further divided into two subclasses the Prosobranchia which possess a gill for respiration under water and the Pulmonata which have a long for obtaining air directly. Gastropoda species are among the most biologically used indicator to assess the quality of any water impoundment. The absence or presence of certain gastropods species can indicate the present condition of an aquatic habitat. Some of gastropods species also provide food for fishes, birds and human beings. In present study the historic Shivaji Guarden lake near to Ralegaon city was selected, which was diverse by flora and fauna due to which it attract the tourists for bird watching and fishing. But very few literature are available on status of benthic organism, so present work is carried out to study the biodiversity of mollusca phylum species.

Methodology

Study Area:- Shivaji Guarden lake is 2 km from Ralegaon city, located near at 20.41ºN, 78.52ºE , which was constructed by the Ralegaon in which is surrounded by forest. It is fresh water annual lake; water is used for irrigation as well as fishing purpose by the villagers. Collection, Preservation and Identification For the present study molluscs were collected by hand picking method during the month of January 2021 to April 2021 and preserved in 5% formalin for further study, dead samples were washed, dried and photographs were taken by Nikon D-3400 camera, species were identified from the Hand book on Indian Fresh water Mollusca by Ramakrishna and Day, 2007[4].

Results And Discussion

The Shivaji Guarden lake carries a number of aquatic weeds in the submerged as well as floating state on which thrive a large number of organisms, due to abundance of food available throughout the year in the form of aquatic

crustaceans, insects and molluscs etc. In present study, total of 9 fish species were recorded and 7 species of molluscs from the dam. The dominant class Gastropoda of Mollusca was dominated by 7 species including *Pila globosa, Thiara scabra, Melanoides tuberculata, Bellamya bengalensis, Lymnaea accuminata, Lymnaea lutiola,*. Ichthyo fauna of Shivaji Guarden Lake Dist Yavatmal Maharashtra were dominated by major carps with 5 members belonging to cypriniformes including *Labeo rohita, Catla catla, Cyprinus carpeo, Cirrhinus marigala, Labeo calbasu,* followed by 3 members of family siluriformes including *Clarius batrachus, Mystus bleekeri, Mystus vittatus,*. The quantitative analysis of molluscs was not done but it observed that the Bellamya Species and Pila globosa was the dominant than other because the shells of these species were seen scattered throughout the margin of lake compared to other species. Number of workers conducted studies on molluscan diversity in different parts of India. The freshwater ecosystem in India harbors a rich diversity of molluscs representing 212 species belonging to 21 families out of these 164 species recorded from river and streams[5]. The occurrence of Bellamya bengalensis (Lamarck), , M. scabra, Lymnaea acuminata, L. luteola, and Pila sp. from the Junona lake in present study is directly supported by the findings of Subba rao and Patil [5,6]. Kumar and Vyas , reported the eleven species of molluscs from Narmada Sagar, out of which 8 species comprises of Rachis bengalensis, R. punctatus, Bellamya bengalensis, Melanoides tuberculatus, M. scabra, Lymnaea acuminata, L. luteola and Indoplanorbis exustus [7].The species of fresh water molluscs as gathered in the present study were quite different and also as reported earlier by some authors[5,6]. A study on the molluscan diversity of Saipung Wildlife Sanctuary, Meghalaya revealed 13 species of molluscs, out of which 12 species were identified as gastropoda and 1 species of Bivalvia. The freshwater gastropod species comprises Bellamya bengalensis, F. annadalei, Pila theobaldi, Thiara (lareba) lineata, Brotia (Antimelania) costula, Paludomus (Paludomus) conica, P. (P.) regulata, P. (P.) stephanus and Indoplanorbis exustus.

Conclusion

In present study the 9 species of fish and 7 species molluscs were reported out of which 5 species reported as gastropoda and 3 species as bivalvia which indicates the rich productivity of the lake and the diversity of molluscs not only depend upon the single factor but combination of factors responsible for them such as moderate amount of water, temperature, available micro and macro vegetation and decomposers.

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SUSTAINABLEMANAGEMENT OF E-WASTE & RECYCLABLE PLASTIC WASTE INCHINTAMANI COLLEGE OF ARTS AND SCIENCE IN GONDPIPRI, DIST. CHANDRAPUR (MS)

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ABSTRACT

Present work has been taken into consideration as such initiative are much sought for and needed in the sub urban and rural areas due to negligence of concerned authorities.Plastics garbage poses a terrible picture to institutional premise & aggregates of used and tossed e-waste too seem unmanageable .To declutter and reuse these in an environment friendly approach organizations work in collab with institution. First, we show that while waste processing and disposal have remained unregulated, the municipal government has tried to restrict garbage collection, which has discouraged the entry of medium and large-scale private firms. This article has two main topics and focuses on the collection, disposal, and recycling of recyclable plastic waste in Chandrapur district. The second issue we discuss is the politicization of actual waste management practices, which has grown without significant public or private investment.This demonstrates the limitations of a rural institution when trying to handle garbage sustainably.

Keywords: *Electronic waste, Recyclable Plastic waste*.

Introduction:

On May 1, 2012, the "E-Waste Handling and Management Rules of 2011" came into effect. The regulations would apply to every manufacturer, consumer, and major consumer that produces, sells, buys, or processes electronic equipment or componentry. These regulations mandate that producers and big consumers recycle e-waste or help to ensure that it is only sent to approve recyclers.

Plastic, an incredible substance with many different properties and capabilities, has come to represent human ingenuity as well as foolishness. To stop this misuse of plastics and lessen the negative environmental effects of plastic consumption and use, recycling, up scaling, or reprocessing of PW has become urgent.Typically, PW is transformed into lower-quality products like pellets, granules, or flakes, which are then used to create a variety of finished goods like boards, pots, mats, benches, and furniture. PET (category 1) and HDPE (high-density polyethylene) (category 2) are categorised as "often not recyclable" due to their chemical properties; nevertheless, depending on local circumstances, PVC (polyvinyl chloride) (category 3) and PP (category 5) may be reprocessed. However, due to stress failure, LDPE (low-density polyethylene) (category 4) is difficult to recycle, PS (category 6) may or may not be recyclable locally, and other types of polymers (category 7) are not recyclable because of the range of ingredients used in their production.Approximately 5.5 million metric tonnes of PW are reprocessed or recycled each year in India, which accounts for 60% of the nation's total PW production. Of this waste, 70% is reprocessed in licenced (formal) facilities, 20% is handled by the unlicensed sector, and the remaining 10% is recycled at the household level. The remaining 40% of PW is ultimately not collected or littered, which leads to additional contamination of the environment (land and water) and clogging of sewers. 94% of the total PW produced is made up of recyclable thermoset plastics (HDPE, PET, PVC, etc.), while the other 6% is made up of non-recyclable multilayered, thermocol, and other types of plastics.Due to the uneconomical nature of their recycling processes, plastics like PP, PS, and LDPE are only partially recyclable in India.

When used electronics reach the end of their useful lives and are discarded, donated, or delivered to a recycler, they are referred to as

e-waste, electronic waste, e-scrap, or end-of-life electronics.

According to the UN, 7.6 kg of electronic trash would be produced annually by each person on Earth in 2021, totaling a staggering 57.4 million tones. Only 17.4% of this electronic waste, which is made up of both dangerous and valuable items, will be noted as having been correctly gathered, handled, and recycled. Numerous initiatives are being attempted to address this expanding issue, but none of them can be entirely effective without consumer participation and the right kind of education.

India lacks in rich mineral resources and untreated e-waste is dumped in landfills, thus there is a need for an effective, controlled e-waste recovery framework that would create income and jobs.

Plastic can contribute to environmental pollution and litter. These impacts may endanger both people and the environment. Additionally, if plastic is not used properly, it might be a waste of resources to create new ones. Thus, it makes sense to recycle and reuse plastic in order to reduce waste.Because of this, recycling plastic is a crucial step in the creation of plastic.

MSW scenario in India and the choice of project area:

One of India's most overlooked aspects of urban growth is municipal solid waste management. Nearly more than half of the solid trash produced in many cities goes untreated (Jha,2001). This leads to unsanitary circumstances, especially in highly populated places, which may have negative effects on one's health as well as the environment. Although there are many public sector and small-scale business activities involved in on e-waste and recyclable plastic waste.

Benefits ofrecycling and garbage management:

1. **Economic benefit**: The first and most important link in a chain of economic activity is the gathering of recyclable resources. Local infrastructure investments that support large downstream recycling economic activity are highly profitable. Importantly, a lot of these recycling producers depend on a continuous and reliable supply of recyclable materials produced through recycling initiatives.

Recycling, in a wide sense, is a component of the ethic of resource efficiency, or making the most of products. Natural resources and energy are preserved when a recycled material is used to create a new product rather than a raw material. This is so that recycled materials can be manufactured more efficiently and with less energy use than new materials as they have already been purified and processed previously. For instance, producing aluminium from recycled cans requires 95% less energy than producing the same amount of aluminium from bauxite.Investments in recycling collection foster a thriving and diverse recycling industrial sector, which benefits states and regions by creating jobs and paying high wages.

Environmental benefits: It protects natural resources, minimises greenhouse gas emissions, cleans up the air and water, and conserves energy. Everyone is aware that recycling reduces the amount of waste that ends up in landfills, but the biggest environmental advantage of recycling is the preservation of energy and natural resources, as well as the reduction of pollution caused by the production of new products from raw materials.

2. **Reduces Greenhouse Gas Emissions:** Recycling provides a substantial environmental benefit by lowering air and water pollution and saving energy. Recycling lowers emissions of greenhouse gases, such as carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons, which contribute to global climate change.
3. **Conserves Natural Resources:**Recycling-based manufacturing preserves the planet's finite natural resources by employing recycled materials in place of trees, metal ores, minerals, oil, and other raw materials extracted from the earth. This conservation lessens the need to increase mining and logging operations**.**

Recycling technologies in action

Mechanical recycling (MR)

Mechanical recycling often referred to as secondary recycling, material recycling, material recovery, or back-to-plastics recycling, entails physical operations (or treatments) that change PW into secondary plastic materials. The production of recycled material that can replace virgin polymer normally entails several steps, including collecting, sorting, heat treatment with reforming, re-compounding with additives, and extruding processes. Only single-polymer polymers like PVC, PET, PP, and PS may typically be handled by it. The zig-zag separator, air tabling, ballistic separator, dry and wet gravity separation, froth flotation, and electrostatic separation are some of the key methods used to sort and separate PW for MR. It is still one of the most popular methods of recycling post-consumer plastic packaging waste. Furthermore, various more current sensor-based separation methods for PW, such as plastic colour sorting and near-infrared technology, are available (NIR). Plastic is melted down after being shred into flakes and then turned into granules in the re-granulation process. After sorting, the collected polymers are either directly melted down and shaped into new shapes or re-granulated.

Chemical recycling is the conversion of polymers into basic chemical structures (smaller constituent molecules) for use in a range of industrial applications and/or the creation of petrochemicals and plastics. It is also known as tertiary recycling or feedstock recycling. This method of recycling involves the direct synthesis of fuel and chemicals. The food packaging business may be the most likely to benefit from the chemical recycling process. Pyrolysis, hydrogenation, and gasification are examples of chemical recycling processes.

While multilayer and complex plastics, low-quality mixed plastics, and unclean plastics are all potential candidates for chemical/feedstock recycling, during a thermal degradation process, molecules, combustible gases, and/or energy are created as multi-stream outputs. Some of the economic advantages of pyrolysis include its ease of usage in creating heat and energy, as well as the availability of easily marketable products. Plasma pyrolysis is a cutting-edge technology that combines pyrolysis with thermo-chemical properties. Chemical recycling is not yet widely used on a large scale due to high energy needs and the low cost of petrochemical feedstock compared to monomers derived from waste polymers. However, further research into the cost and catalyst reuse capabilities of pyrolysis processes is required.

Due to its density and the removal of hydrochloric acid (HCl) from products, PVC poses additional issue in the waste stream by causing incomplete segregation. In addition, problems with consistent waste supply, appropriate reactor technology, and the presence of inorganics in the waste stream make chemical recycling of plastics difficult.

Thermal Depolymerization:

Depolymerization of the plastics is the result of chemical processing where different monomer units are recovered that can be used to manufacture new plastics or converted into their raw monomeric forms through procedures like hydrolysis, glycolysis, and alcoholysis. It has been reported in studies on depolymerization of mixed waste plastics that even a small quantity, for example, 1 mg of these plastics can yield 4.5 t of energy.Depolymerization takes place in a specially modified reactor under anoxic conditions and in the presence of specific catalytic additives, with the highest reaction temperature being 350 °C, where it is converted to either liquid RDF or different gases (reutilized as fuel) and solids (reutilized as fuel in cement kilns).

Energy restoration:

PW is gasified at high temperatures (about 500-1300 °C) in a reaction with a gasifying agent (e.g., steam, oxygen, and air) to produce synthetic gas or syngas. This can then be used to make a variety of products or as a fuel to create power, with partial oxidation producing a gaseous combination of carbon monoxide (CO), hydrogen (H2), carbon dioxide (CO2), and methane (CH4). Gasification, in conjunction with pyrolysis, is a major method for chemical recycling because to its

versatility, robustness, and favourable economics. Characterization of PW is crucial for creating the best process designs, especially for HDPE, LDPE, PP, PS, PVC, and PET. According to CSIR-IIP, one kilogramme of these plastics can produce 850 millilitres of diesel, 500 millilitres of petrochemicals, 700 millilitres of gasoline, and 850 millilitres of LPG. The process guarantees a full conversion with no toxic emissions and is appropriate for both small- and large-scale.

Institutional Approach to Collect & Recycle Plastic:

Several organisations must collaborate in order to recycle plastic furniture or bottles .Various organisations must cooperate for the system to operate effectively. Institution also has alliance or linkage with a private firm for assisting in recycling of plastic waste (recyclable). Recycling done by first initially separated and placed outside for collection by the general public, businesses, and industries. Local government agencies and independent waste haulers pick up the recyclables from this point and deliver it to transfer sites. Third party agencies also provide this service of recycling upon demand by the institution or industries. The transfer station serves as a hub for the collection of recyclables before they are transported to a recycling facility.Workers at recycling facilities deposit recycling dump and load it onto conveyer belts. Before being transferred to repressors, the recycling passes through a number of sorting procedures. The plastic is cleaned, torn up, extruded, and processed into pellets by repressor.

Method of Analysis

At Institutional level, IQAC as a central unit urges various departments to collect their e-waste and give it to the collecting third party agency(Puja Infosys Ballarpur) for further treatment thus assuring necessary proper disposal to keep the pollution in control.

The Plastic Recycling Process Stages:

In order to recycle plastic, a number of steps must be taken, including gathering, sorting, and processing the plastic so that it can be used in new products:

Collection:Users place plastic waste in a recycling bin for collection.

Sorting:Facilities for sorting separate plastic from other materials and into various types of plastic.

Reprocessing*:* Plastic is cleaned, powdered into flakes, heated, and extruded into new pellets during reprocessing.

This is to advise all faculty members, including teaching and non-teaching, that beginning with the current session; each department will collect its plastic eradication and turn it over to the appropriate contact at the collecting agency (Shree Balaji Agrotech Ballarpur).

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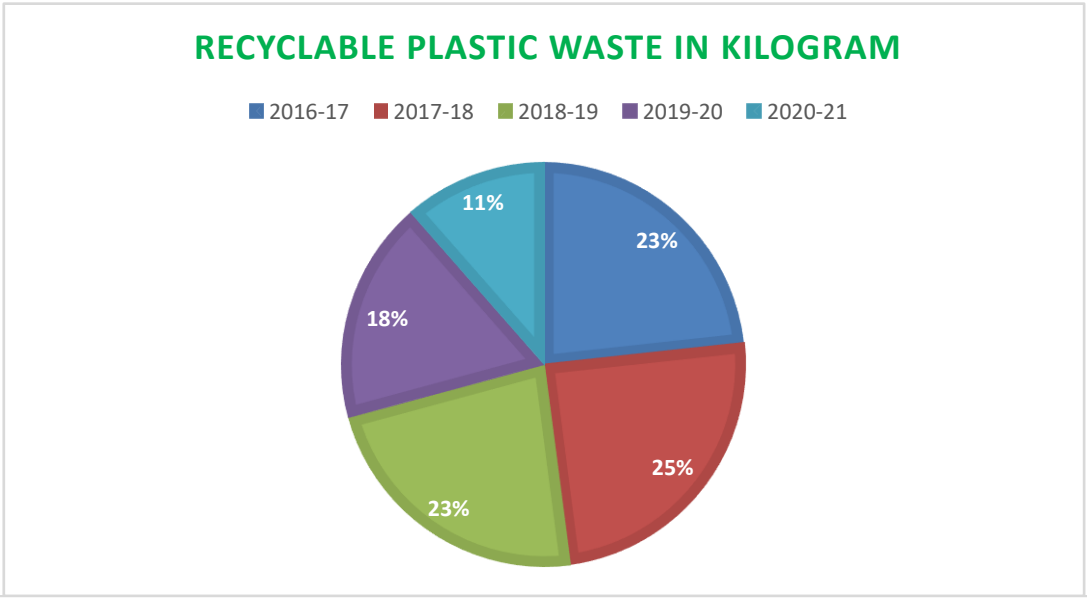
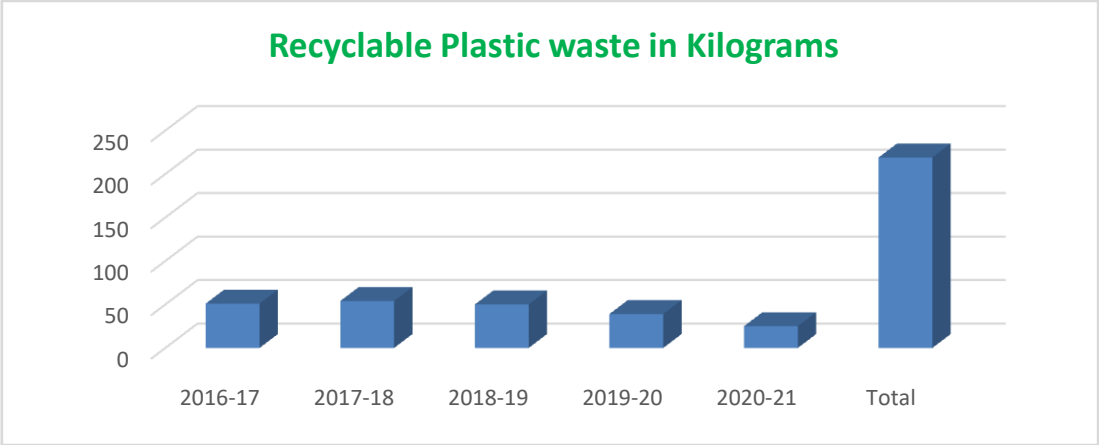
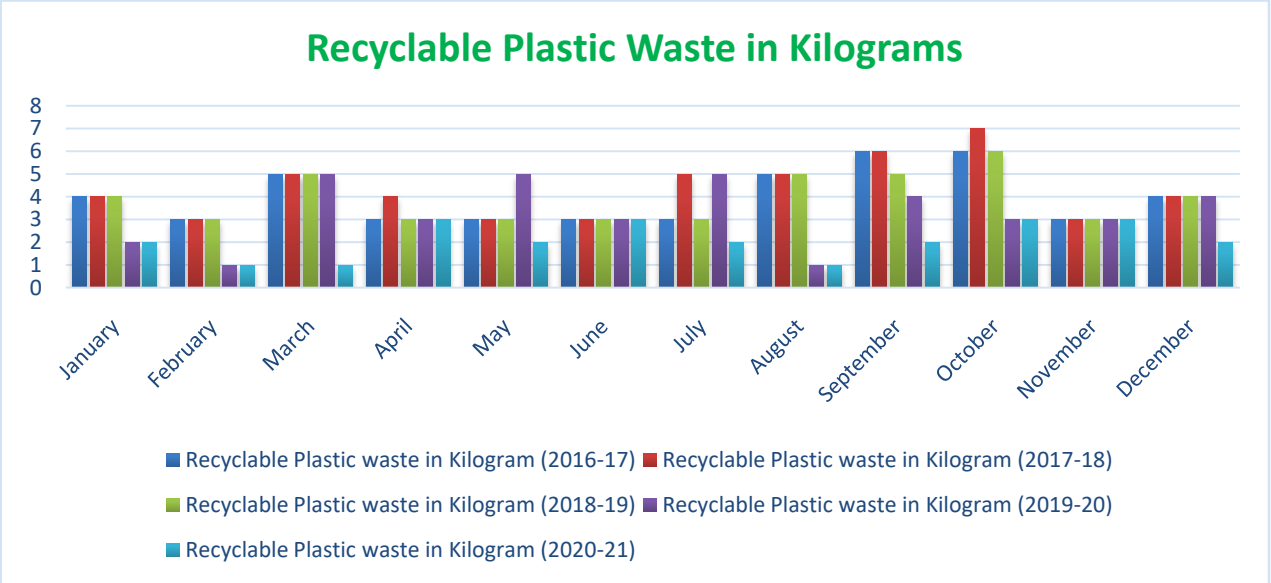
Sr. No	Session	Recyclable Plastic waste in Kilogram
1	2016-17	51
2	2017-18	54
3	2018-19	50
4	2019-20	39
5	2020-21	25
	Total	**219**



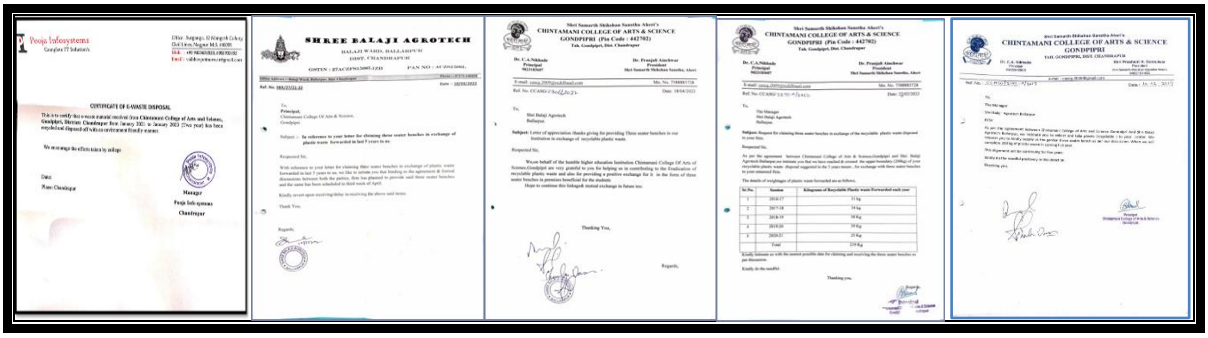


In accordance with the agreement between Shri. Balaji Agrotech Ballarpur and Chintamani College of Arts & Science,Gondpipri,we have reached and exceeded the upper limit set by the agency for first payback (200kg) of recyclable plastic waste disposal suggested in the 5 years' tenure,for exchange with Three-Seater benches to your esteemed firm. The data for related exchangemonthwise is as presented below;

Session/Month	Recyclable Plastic waste in Kilogram (2016-17)	Recyclable Plastic waste in Kilogram (2017-18)	Recyclable Plastic waste in Kilogram (2018-19)	Recyclable Plastic waste in Kilogram (2019-20)	Recyclable Plastic waste in Kilogram (2020-21)
January	**4**	**4**	**4**	**2**	**2**
February	**3**	**3**	**3**	**1**	**1**
March	**5**	**5**	**5**	**5**	**1**
April	**3**	**4**	**3**	**3**	**3**
May	**3**	**3**	**3**	**5**	**2**
June	**3**	**3**	**3**	**3**	**3**
July	**3**	**5**	**3**	**5**	**2**
August	**5**	**5**	**5**	**1**	**1**
September	**6**	**6**	**5**	**4**	**2**
October	**6**	**7**	**6**	**3**	**3**
November	**3**	**3**	**3**	**3**	**3**
December	**4**	**4**	**4**	**4**	**2**
Total	**51**	**54**	**50**	**39**	**25**



Teacher and Students and concern employee Collecting E. waste and Plastic Waste Collected plastic wastages of institute sent to Shree Balaji Agrotech Ballarpur for recycling.The supporting documentary is as shown in images below;



Results and Discussion

Overall the Institution has collected 219 Weight of waste in duration of 5 Yearsand forwarded it for treatment and further processing to the third party agency in alliance: Puja Infosys and Shri.Balaji Agrotech.Shri.Balaji Agrotech has given three seater benches in exchange of recyclable plastics.e- waste and recyclable plastics have been managed in this way in rural higher education institution.

Conclusion

In the regions like Gondpipri, exemplary effort of our Institution has set an awareness about not scattering but collecting managing wastes.In future it may be followed by other buildings of importance like Tehsil office,government schools,hospitals etc.Recycled plastics and the products made from these plastics are often expensive from the virgin plastics and therefore compete for their place in the market.But our alliance has made it possible at nominal cost.The recycling of Shri. Balaji Agrotech Ballarpur in Chandrapur is now done by an unofficial sector made up of recyclers at the lowest level and a string of merchants. The procedure develops a market for recyclables and the various recyclables in the recycling stream experience value addition. It is possible to make an effort to formally arrange the recycling activity in order to improve the lives of recyclers. Similarly Puja Infosys has supportively received the electronic waste material and both have progressed through necessary and appropriate processing of these waste ,materials and Shri.Balaji Agrotech have come up with a final product in exchange of the recyclable plastics collected,it is the recycled

plastic waste made sitting benches.These benches are a return of stipulated amount of waste given.

Fig: Provision of Three seater benches made of recyclable plastic waste by Shri.Balaji Agrotech, Ballarpur.

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EVALUATION OF SOME PESTICIDE RESIDUES IN SURFACE WATER OF RIVER AASNA PASADGAON, NANDED

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ABSTRACT

In existing study to determine the levels of selected pesticides in surface waters was carried out in two seasons and three pre-determined sites. A higher concentration of DDT was observed in all stations and matrixes, while Heptachlor was least observed. In the existing study an efforts has been made to evaluate and determine the pesticide residue of five pesticides DDT, DDE, Endosulfan, Chlorodane and Heptachore in surface water was carried out in two season by using High Performance Liquid Chromatography (HPLC). It was observed that DDT, DDE, Lindane, and Heptachlor was the predominant residues in all the sample. The level of Heptachlor and chorodane was very low.

Keywords: *DDT, DDE, Endosulfan, Chlordane and Heptachlor pesticides, HPLC, Veni.*

Introduction

Pesticides have become the part and parcel of modern day agriculture. The absence of pesticides will jeopardize the health of plants, animals and humans. Pesticides are not only an agricultural commodity but find use in non-agricultural regions. But the very nature of the pesticides to kill renders them harmful for the humans and other living beings. Rapid population growth coupled with urban and costal development in many parts of the world has generated global concern. There is the fear that anthropological population would reduce biodiversity and productivity of food resources. Studies have shown that human population that consumes large amount of aquatic food has higher levels of persistent Organic Pollutants (POPs) such as Polychlorinated Biphenyls (PCBs) and some heavy metals.

The toxicity of pesticides to target and non-target organisms generally depends on the amount present in the environment, the proportion available to the biota and ultimately in the amount actually encountered and absorbed by the organism [1].

Pesticides use has increased worldwide, particularly in its use to salvage the food supply to the ever increasing global population. Although it is undisputed that pesticides are essential in modern agriculture. There is growing concern about possible environmental contamination from agrochemicals, industries and household and rain water runoff from agricultural system, disposal of outdated stocks, containers and pockets and discharge of waste from industries [2]. These Compounds when discharge into the aquatic system plays an important role in contaminating such systems. Atmospheric transport also represents an important source of pesticides residue accumulation in water bodies [3]. It has been reorganized that the persistent and bioaccumulation tendency of these substances, their metabolites and residues in the environment make them not only remain where they are applied but instead partition between the major environmental compartments in accordance with their physic-chemical properties and may thereby become transported several kilometers from the point of their original release[4]. Such environmental distribution may lead to exposure of living organisms including man that are far removed from intended targets. Researchers have detected pesticides residues in heptachlor, endosulfane, Aldine, DDT and PCBs. Many of these pesticides have also been detected in sediment, aquatic plants and fish [5].

Material and Methods

Water samples were taken from 0.3 m below the surface with a pre-cleaned glass bottle. For sampling turbulent midstream position of water bodies were chosen to approximate mean concentration of river water. All foreign bodies were removed and the samples were stored in ice during transport and were kept at 4^0 C in the laboratory until the solid phase extraction.

Sample extraction

The procedure applied for the extraction of pesticides was similar to those reported by Laabs *et al* [6] and Steinwandter[7]. Water samples were extracted using ultrasonic extraction. Sox let extraction was done with 20 ml of hexane: dichloromethane (3:1) for 30 min. The extract was concentrated with the aid of rotator evaporator. Pre-elution was carried out with the HPLC methanol. The concentration solvent extract was then analyzed for Pesticides.

The solvent of the mobile phase of the HPLC is methanol and water (1:1). This was prepared by measuring 250ml of HPLC grade methanol into a 500ml flask and made up with 250ml of distilled water. The HPLC model CECIL 1010 was switched on. The wavelength of the system was determined by using UV visible equipment. Little quantity of stock solution was diluted with methanol and its wavelength determined nu scanning. A peak of 202nm was reached. The system wavelength was then set at 202nm and the sensitivity of the 0.05 nm of the UV detector component set. The flow rate was set at 1ml/min, afterwards, the purging of the system commenced by allowing the system to run for some time. The purging was carried out through a washing solution of 30% methanol, 70% water. Bubbling helium gas into the solution carried out degassing of the mobile phase was then set up and connected with HPLC system and allowed to run through the system of 20min.

Each sample residues was dissolved in 1ml methanol. The extracted residues was the loaded and injected into the valve of the chromatography system. The resulting chromatograph for each sample was printed out. The various retentions time noted, concentration determined and recorded.

Result and Discussion

Aasna River is surrounded by farm lands. A large amount of chemicals (Fertilizers and pesticides) are used there by farmers which can enter the reservoir through running waters and subterranean canals. Also, garbage and wastewaters are poured in the reservoir by inhabitance. All of these factors may lead to the contamination of aasna river.

Results from the study have been shown in table 1 which is related to the concentration of OC residues in water, and table 2 is related to the physicochemical properties of water. The associated figure for mean concentration for pesticide DDT was in the range of 0.01-0.09µg/L. The ratio of incidence as well as concentration of DDE, a metabolite of DDT, in these water samples were lower than those of recorded for DDT. This observed trend could be attributed to the decomposition and bioaccumulation of the DDT used in the past. DDE is more stable than DDT and decomposes more slowly by micro-organisms, heat and ultraviolet rays. The pesticides chlorodane, Lindane and heptachlor was not detected in the water samples showing that the farmers around the reservoir do not use them in their farming activities. Endosulfan, a broad spectrum contact insecticide and acaricide, is another pesticide used by many farmers. The associated figure for mean concentration of Endosulfan was in the range of 0.01-0.05 µg/L.

Table 1 : Levels of organochlorine pesticides in water samples of Aasna Resevior.

	DDT			DDE			Endosulfan			Lindane			Heptachlor		
Pesticides Station	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Rainy Season	.09	.08	.06	.05	.04	.03	.04	.03	.05	ND	ND	ND	.01	.02	.01
Summer Season	.03	.05	.04	.03	.02	.01	.02	.03	.03	ND	ND	.02	ND	.01	ND
Average mean	.06	.07	.05	.04	.03	.02	.03	.03	.04	-	-	.01	-	.02	-
Standard deviation	.03	.01	.01	.01	.01	.01	.01	00	.01	-	-	-	-	-	-
Range	.03-.09	.01-.08	.01-.06	.01-.05	.01-.04	.01-.03	.01-.04	.00-.03	.01-.05	-	-	-	-	-	-

Based on the ANOVA and Duncan tests, the mean concentration of OC pesticides in water samples of site II & site III showed significant differences. However, this was not observed in the site I. Generally, the highest concentration of OC pesticides was seen at site II. It may be

due to the abundance of farm lands around this site which have sharp slopes toward this part of the reservoir so pesticides and other chemical material can enter there more easily. However lowest concentration of organochlorine residue was related to site III. Because there is a slow current toward this part and the contamination cannot accumulate there. Organochlorine pestcidies residues in the reservoir are likely to originate from nonpoint source via runoff, atmospheric deposition and leaching due to agriculture application and vector control practices. The lake sediments act as a sink for the persistent contaminants, whose resuspension during the reservoir's mixing may increase pesticides bioavailability and accumulation in the fishes. Pesticide pollution to the reservoir is therefore, likely to pose danger to both aquatic organism and humans.

Conclusion

The analysis of water quality parameters of Aasna reservior showed that the values are well within the permissible limits. The result of study reveals that the quality of water is though fit for domestic, irrigation purpose and also for drinking purpose after some treatment need continuous monitoring of physico-chemical parameters to improve the quality of water.

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INSECT DIVERSITY FROM PALASKHEDA RESERVOIR NEAR RISOD. DISTRICT. WASHIM MAHARASHTRA

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ABSTRACTS

The Insect diversity of 'Palaskheda Reservoir' Was studied first time for a period of three months from 10 March 2022 to 10 June 2022. The region of aquatic insect collection among Palaskheda reservoir, near the Washim region. Palaskheda is earth fill dam on kayadhu river near Risod, in the state of Maharashtra in India located along the geological coordinated are Longitude- 75.028992, Latitude – 20.115509. The dam is surrounded by hilly area. Length of reservoir is 390 meter. it is located 41 km towards west from district head quarters Washim. 5 km from Risod.

Keyword: *Insect Diversity From Palaskheda Reservoir Near Risod. District. Washim*

Introduction

The aquatic insects species derived from the fauna of North America ,Australia and Europe is about 44,000 of this about 3,000 species are estimates to inhabits inland wetland of India . aquatic insects of inland wetland comprise some well known group like mayflies (Ephemeroptera) ,and caddieflies (Trichoptera) . These are about 43000 species of insects known to inhabit diverse freshwater biotopes insects may comprise over 91% of the total individual or species of macro invertebrates. The dragonflies and damselflies (odonata) are colourful insect and prominent insects of wetland .A different functional feeding groups of aquatic insects such as shredders, filter feeders, and scrapers are the important nutrients recycling. The aquaic insects are origin is doubles still exists as to whether or not insect are primarily or adopted to aquatic environment widely accepted view is that ancestor of Myriapad insect group lived in leaf fitter area along margins of pond like environments primitive insect of the moist environment were ancestors of aquatic insects. The understanding of aquatic insects evolution and phylogeny has been hampered by poor fossil record of freshwater animal aquatic insect are capable of withstanding a hart and serve environment and can live in any climate condition .The feeding strategies aquatic insect enhance support communities of higher Organism Like Fish , Frog And Others.

Review Of Literature

Biodiversity of aquatic insect population in three permanent pond of Guwahati, Samindia studied by Hasan, haloi, chetri and begum(2016). he concluded that 25 different species belonging to 6 order and 13 family in the study order hemipetra is most diverse and abundant in pond. Aquatic insect for bio monitoring freshwater ecosystem studied by Solanki and Shukla (2015). in this study he concludes that the aquatic insects consider model organism for analyzing structure and function of fresh water ecosystem .In this the insect are biological indicator. Aquatic insects are important as a fish food bioindicator and biocontrol agent and functioning processing and cycling nutrient belongs to many specializing feeding groups studied by Dalal and Gupta. Aquatic insects and their social benefits and risks studied by Nair, Morse, Marshall (2015). He concluded the role of these insects in food weed, bio monitoring, fishing controlling weed . A aquatic insect indicate terrestrial degradation: change in taxonomical structure and functional diversity of dragonflies in tropical rainforest of east Kalimantan studied by Dolny ,Harabis, Barta, Lhota and Drozd (2012) . He concluded that Odonate not ecological indicator but also suitable and sensitive indictor of human

induced change in tropical forest. The diversity of water beetle studied by Temunovic (2007) water strider have been considered as a potential sentinel for mercury concentration freshwater ecosystem studied by Jardine, Kidd, Cunjakand Arp (2009) . He concluded that the water beetle are prefer more permanent pond with longer hydro periods for such pools constitute more constant environment. Determination of biting bug of hemipteran families present in the country of kashan studied by Dehghani ,Atharizadeh, Moghadem and Hadei (2016). In the study families Coirixidae ,Notonectidae, Girridae and Nepidae from hemipteren order were identified 45.9%, 26.9%, 25.0%, 2.2% respectively .The result leads to the conclusion that the hemipteran fauna is relatively rich in reservoir.

Materials And Methods

Washim located eastern region of Vidharbha and is of the four council of Washim district of Maharashtra. Washim was earlier known as Vastagulma. Washim is head quarter of district. The region of aquatic insect collection among palaskheda reservoir, (vegetation site , Agriculture site) near the Washim region. Palaskheda is earthfill dam on kayadhu river near risod in the state of Maharashtra in India, located along the geological co-ordinated. Longitude 75.028992 Latitude 20.115509. The dam is surrounded by hilly area . it is located 41 km toward west from district head quater Washim. 5 km from Risod, 501 km from state of capital Mumbai. Length 390 meter Location Risod Type of dam is Earthfill Impounds Kayadhu rivers -16.5 (60 ft) Dam volume 94 km3 (26 sq mi)

The period of collection of aquatic insect is the 10 March 2022 to 10 June 2022. In this period the aquatic insect are largely seen. The aquatic insect are very small and some large. The small aquatic insect are varying movable and that is why they can be collect very carefully and neatly. The insect can be collected by insect net. Theses net can be moving in water for collecting the insect .This is continuing to moving in water collecting by insects. The collecting insect is transfer into the breaker or glass jar. That is some insect can move on the upper surface of water and these are easy to collect by hand collection method. Then transfer in glass bottle fill with 75% alcohol for preservation. The collection of aquatic insect is simple and inexpensive. It includes insect net, sweeping net, the Jio tag photo app, and good quality camera are used for photography.

Google view of Palaskhed Dam

Sampling site 1

Sampling site 2

Methodology

Aquatic net :- The net used for collecting species that swim in or on the surface of water (e.g water strider, water boat man) more durable net with canvas bag or hoops with square or triangular shape are more Suitable for collecting bottom dwelling species. It is used for collection of aquatic insect in water come in variety of style. **Dip net:-** Net is heavy Canvas Bag With Mesh At Tip, For Sample Collection Of Aquatic Insect. **Insect net :-** the aquatic insect were collected in bottle . bottle is filled with 75% alcohol and after a few hours it get die there are three basic type of insect

collecting nets that are available for purchase at various companies or that can be made by individual ,aerial ,aquatic and sweeping net. Nets is made of nylon wire, which have loop about 60cm diameter. Over the nylon the muslin clot bags were hanging .loop of net was attached to the stick of one meter length by continue in water once the insects seen it is collected with helping of net and store it is collected bottles immediately. **Hand collection :-** some insect were free moving on the surface of water, they can swim on the water and that is why they can be easy to collect by hand collection. This methods is easy to collect large size insect moving on water surface. **Preservation methods :-** the collected sample of aquatic insect were preserving in the preservation liquid like 75% alcohol.

Observation And Result

The insects are the most successful group in the animal kingdom in terms of both richness and abundance and thus are the largest and most diverse group of invertebrate. The among insects, aquatic insects are the special group which exhibits rich adoptability and one mare diverse the micro habits distribution of aquatic insect population is due to their varied life style such as benthic (Associated with the bottom substrates) clinging (clinging to the substrate with grasping claus) climbing (Reside on aquatic plant stems and other shoreline substrates) Burrowing (Burrow into the soft bottom) Floating and swimming (Which are not associated with a substrate for attachment). With over 100.000 species, the aquatic insect group in 12 orders have been reported to harbor freshwater ecosystem and are prominent among other aquatic. The orders such as diptera, coleopteran and trichoptero are more diverse and constitutes 42%,19% and 12% respectively with various functional feeding group, shredder, scrapers, collector- gather, collectors filter and predators aquatic insect are link in nutrient cycling inter connected and their biological interaction of the have significant effect on community structure in the freshwater ecosystem. In addition to the ecosystem function they are very good indicators of the anthropogenic impact of aquatic environment and they are used in bio-monitoring method in aquatic system. The India is bestowed with diverse freshwater ecosystem like streams, river. Pond, wetland lakes and reservoir which serve as shelter for several aquatic insect as well as other floral and faunal communities. Most Taxonomic orders of Aquatic insects. The aquatic insect are grouped in 6 taxonomic orders. They are: 1. Aquarius Remigis : Water strider 2. Odonata : A dragonfly larvae 3. Coleoptera : carabi beetles 4. Megaloptera : A hellgrammite 5. Liocarcinusvernalis : Carb 6. Chinese mystery snail. Other orders (orthoptera, the grasshappers and crickets, blattodea, Cockroaches, and Hymenoptera, wasps) also include a few aquatic insects, A brief description of each of the main orders of aquatic insect is given below.

1. Order 1 :- Aquarius remigis:- (Water strider). The water striders are familiar insects, capable of skating across the surface of water. Water strider body is a elongated and oval shape and covered in fine hairs. Four long and narrow legs splay out from the body. Each tipped with fine hydrophobic hairs that allow the insect to quench above the surface of the water. The water strider smaller front pair of legs are used for grasping prey. Winged (Macropterous) , wingless (Apterous) and intermediate forms (Brachypterous) may occur, larger species may have a body length of 12-16 mm At least 11 species of water striders are known from Colorado and one or more reqresentative may be found where ever there is water as ponds, lakes and river, Habits of the various species vary. The water striders are feeding on insects that fall and are trapped on the surface, that come to surface for air. Prey are often located by detecting vibration of the water. Water striders lay eggs just under the water surface on emergent vegetation and flooting debris. Eggs hatch in about 12 days. The newly eggs nymph are minute but can grows rapidly over the course of a month or two passing through five nymph stage during development.

2. Order 2 :- Odonata :- The Dragonfly larvae (nymph) require water to survive, so female adults are always searching for water habitats such as ponds, streams and swamps to lay their eggs. The eggs are laid directly into or

close to water. Dragonfly larvae have unusual mouthpart under water prey and adults can scoop flying insect from the air with. Their basket like arrangement of legs a larvae adopted an aquatic lifestyle very different from there are parents. Dragonfly jeune appear squat, while the big one are long and robust the dragonfly fossils from the carboniferous period the wingspans up to it cm in other words in the distant past these insects a larger than same modern hawks. Dragonfly larvae parent, are a fully carnivorous. These are fierce predator of any aquatic animals they can catch. the water insect like water beetles and mosquito larvae, worms, tadpoles and even small fishes are part of diet . The nymphs are common in many aquatic habitats. they are especially common near dumps of aquatic vegetation tree roots .the lay eggs in water ,though their fast ,strong flight take them many places.

Order 3 :- Coleoptera : Carabi beetles Coleopteran loosely translate as 'sheath wing' reflecting the way that adults beetles have the front wings modified into hardness covers that shield the rear wings from damage while folded at rest. The flying beetles mostly are just their rear wing to fly .there are more species of beetles in the world than there are of any other group of animal or plants.

Order 4 :- Megaloptera : A hellgrammite The insect are commonly known as dorsonflies and atderfiles can be quite striking both as larvae and as adults. The immature from of the dobsonfly is called hellgrammite. The megaloptera are fierce larvae can be over 7.5cm long and are equipped with strong mandibles with which they consume their prey. They also can deliver quite a pinch if handled carelessly. The smallmouth fisherman may be families with the order which inclufes hellgrammites ferocious looking insects that can be reach 3 or more inches with giant pincher mouthparts .other Alderfiles are common to bactwater and areas with heavy organic matter in water. The larvae megalopterans are found in all types of fresh water aquatic habitats including wetland, large, rivers, lakes and ponds. There are exception the chauliodes species found in North America tend to occur in ponds rather than streams or rivers.

Fig: Aquarius remigis

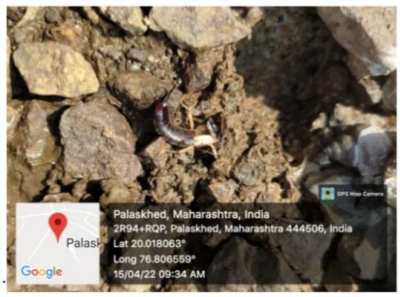

Fig : Coleoptera

Fig: Odonata

Fig: Megaloptera

Fig: Aquarius remigis

Discussion And Conclusion

This study documents of the composition of the aquatic insects communities in the different sites in studied. It shows the effect of the natural and manmade interferences on the diversity of the aquatic insects. Aquatic insects are the most probably best known for their ability to indicate the water quality in a particular environment . if a sample of the aquatic insects in a particular place is analysed in the terms of sensitive kind of versus tolerant kinds of the one can get a good measures of the environmental of health and the present study

of aquatic insect and their are diversity of the aquatic insects in the Washim region in the Maharashtra , the present study give the details ideas about the structure and the role of aquatic insects . in that the study of the size , shape and their metamorphosis are the different from different aquatic insects. I observed that seven types of the aquatic insects which are belong to the six families, dytiscidae , aeshnidae, notonectidae, nepidae, hydrophilidae, girridae and the three order which is the coleopteran , odonatan and the hemipteran. these are the aquatic insects which are the essential for the ecology . i.e., the present of the insect in the water bodies is a good indicator for health of the living environment of that water body. They are play an important role in the protecting and restoring of the aquatic ecosystems . The aquatic insects are play the major role in the ecosystem . The present study of the aquatic insects concludes that the aquatic insects are most of the important for the aquatic environment and keep the maintenance of the water balance. The aquatic insects are also keep the water temperature , humidity . they play an important role for the some of the species is used for the major role in the environmentally , friendly bio control device .also , the other species is the used for the major ecological role in the some of the way in aquatic insect's in the biodiversity is of the considerable interest to the society because of the these are so important in the diets of the different type of the fish species , including species that are the commonly consumed by human for the food . i.e., insects are the important role in the fishing.

Suggestion And Recommendation

The aquatic insects are the important components of the aquatic ecosystem arte the very abundance and the diverse group that are inhibit of the variety of the aquatic environments and they are play an important role in the ecosystem functioning and used as a bio indicator , so their are the conservation is an important aspect. These are the bio indicator have the advantage of monitoring anthragenic stress of an ecosystem over a long period of time .The aquatic insects are the most important for the water quality and the maintain. The water balanced there is the most important factor is to keep and maintain the diversity of these insects for to maintain the balance and also for the other animal, the insects which are present in the water body and many of these insects which is essential for their life cycle.

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A PRELIMINARY CHECKLIST OF MOTHS SPECIES FROM ARVINDBABU DESHMUKH MAHAVIDYALAYA CAMPUS, BHARSINGI, MAHARASHTRA, INDIA.

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ABSTRACT

Present study was an attempt to explore moth diversity from different parts of the Arvindbabu Deshmukh Mahavidyalaya, Campus. A total number of 300 moths were identified up to the family level. Families Sphingidae, Noctuidae, Geometridae, Crambidae, Arctiidae, Lymantiidae and Saturnidae were represented in the identified samples. The diversity index of Noctuidae family 2.53 was high as compared to the other families. While the lowest diversity index was found in family Geometridae and Saturnidae.

Keywords: *Moth, Diversity, Checklist, Family, Bharsingi.*

Intorduction

More than half of the world's known animal are insects and the Lepidoptera are regarded as one of the important component of biodiversity and are the second order among insects made up of approximately 1,50,000 species so far known to the literature (New TR and Collins NM.1991). Present study was designed to assess the diversity of Moths from different parts of the Arvindbabu Deshmukh Mahavidyalaya, Campus. Most of the species of moths are nocturnal, but there are also crepuscular as well as diurnal species. They play important roles throughout their life cycle like as herbivorous during their larval stage, as pollinators during their adult stage as well as food for predators and parasitoids throughout their life cycle (Scoble, 1992). Lepidoptera is one of the most quantitative comparisons between insect faunas to be valid, especially their abundance, response to the vegetation as well as climate, species richness and relative advanced taxonomy (Holloway, 1984 and 1985). Although trapping of macrolepidoptera has been carried out widely in tropical and temperate region throughout the world but result are not directly comparable between areas of different light sources, trap design, trapping periods as well as taxonomic coverage. Macrolepidopteran families in tropical and subtropical countries includes some dominating families such as Noctuidae, Erabidae and Notodontidae etc. among these family Noctuidae is dominating, both in species diversity as well as numerical strength with more than 20,000 describe species (Srivastava, 2002).

The aim of the present work was to identify and study the diversity index and evenness of moth species from different parts of the Arvindbabu Deshmukh Mahavidyalaya, Campus.

Material And Method

A field survey was done from the month of June 2022 to August 2022 during rainy season. The moths observed in the Arvindbabu Deshmukh Mahavidyalaya, Campus. during day and evening in their natural environmental condition were considered for the study. The moths observed were photographed with the help of mega plexus camera. The moths observed were identified with the help of research paper and literature available Sachin A Gurule and Ryan D Brookes (2021).

Result And Discussion:

During this study, a total number of 628 species were identified belonging to 7 families. Table 1 shows the all identified moths checklist. Fig. a. shows the number of individual belonging to each family at Amravati city. The highest number of moth species (120) were recorded from family Noctuidae, similar type of result are recorded from a study carried out in Peshawar (Muhammad, 2009).While family Geometidae with a total number of 22 moth species, represented the lowest number. Table No. 2 shows diversity index and evenness of each family of moths.

According to Mathew and Rahmatullah (1993) survival of a large quantity of widespread species in a habitat warrants common monitoring of the environmental processes as well as adoption of suitable conservation strategies in order to protect its rich genetic diversity. During this study, family noctuiodae have more species richness than the other moth's families. This species rich diversity of noctuiodae is due to the nocturnal habit that they inhabit and get protect from many enemies directly in the day light. Moreover, family sphingidae fly only for short periods either around twilight or sunrise, hence exhibit less species richness than the Noctuidae. As compared to other families like Geometridae, Crambidae, Arctiidae, Lymantiidae and Saturniidae exhibit nocturnal as well as diurnal behavior which causes less species rich in this study area. The diversity of Lepidoptera is correlated with overall habitat quality, abundance, richness and composition of the flora as well as other invertebrates that they share the biological system (Uehara-Prado and Freitas, 2009).

Table No. 1. Checklist of all identified moth species

Sr. No.	Name of the Species	Family	Subfamily	No. of Species	Identified
1	*Acherontia styx styx* Ww	Sphingidae	Sphinginae	10	7
2	*Agrius convolvuliconvolvuli* (Linnaeus)	Sphingidae	Sphinginae	11	
3	*Daphnis nerii* (Linnaeus)	Sphingidae	Macroglossinae	13	
4	*Hippotion velox* (Fabricius)	Sphingidae	Macroglossinae	02	
5	*Theretra alecto alecto* (Linnaeus)	Sphingidae	Macroglossinae	06	
6	*Hippotion Boerhaviae* (Fabricius)	Sphingidae	Macroglossinae	04	
7	*Macroglossum sp.*	Sphingidae	Macroglossinae	05	
10	*Anomis fulvida* (Guenee)	Noctuidae	Catocalinae	07	14
11	*Asota caricae* (Fabricius)	Noctuidae	Aganainae	08	
12	*Remigia undata* (Fabricius)	Noctuidae	Catocalinae	11	
13	*Chrysodeixis eriosoma* (Doubleday)	Noctuidae	Plusiinae	18	
14	*Othreis fullonica* (Linnaeus)	Noctuidae	Calpinae	10	
15	*Ophideres maternal* (Linnaeus)	Noctuidae	Calpinae	06	
16	*Spirama retorta* (Clerck)	Noctuidae	Catocalinae	08	
17	*Spodoptera litura* (Fabricius)	Noctuidae	Hadeninae	09	
18	*Trigonides hyppasia* (Cramer)	Noctuidae	Catocalinae	05	
19	*Polytela gloriosae* (Fabricius)	Noctuidae	-	06	
20	*Aedia sp.*	Noctuidae	-	05	
21	*Remigia frigalis* (Fabricius)	Noctuidae	Catocalinae	09	
22	*Ophiusa tirrhaca* (Cramer)	Noctuidae	Catocalinae	10	
23	*Grammodes geometrica* (Fabricius)	Noctuidae	-	08	
26	*Macaria fasciata* (Fabricius)	Geometridae	Ennominae	10	2
27	*Ascotis selenaria* (Denis & Schiff)	Geometridae		12	
28	*Caprinia conchylasis* (Guenee)	Crambidae	Spilomelinae	06	4
29	*Diaphania indica* (Saunders)	Crambidae	Spilomelinae	10	
30	*Pygospila tyres* (Cramer)	Crambidae	Spilomelinae	05	
31	*Spoladea recurvalis* (Fabricius)	Crambidae	Spilomelinae	09	
32	*Amata passalis* (Fabricius)	Arctiidae	Syntominae	05	5
33	*Argina astrea* (Drury)	Arctiidae	Arctiinae	07	
34	*Pericallia ricini* (Fabricius)	Arctiidae	Arctiinae	04	
35	*Creatonotus lactineus* (Cramer)	Arctiidae	Arctiinae	07	
36	*Creatonotus gangis* (Linnaeus)	Arctiidae	Arctiinae	10	
39	*Euproctis lunata* (Walker)	Lymantiidae	-	06	3
40	*Euproctis sp.*	Lymantiidae	-	09	
41	*Lymantria sp.*	Lymantiidae	-	05	
42	*Actias selene* (Hubner)	Saturniidae	Saturniinae	07	2
43	*Antheraea mylitta* (Drury)	Saturniidae	Saturniinae	09	
Total no. of species				300	37

Table No. 2. Diversity index and evenness of each family of moths

Sr. No.	Family	Shannon diversity Index (H)	Evenness
1	Sphingidae	1.92	0.99
2	Noctuidae	2.53	1
3	Geometridae	0.69	1
4	Crambidae	1.38	1
5	Arctiidae	1.61	1
6	Lymantiidae	1.09	0.99
7	Saturniidae	0.69	1

Conclusion

This work was an attempt to describe diversity of moth fauna. This study is an preliminary step to explore the moth diversity from different parts of the Arvindbabu Deshmukh Mahavidyalaya, Campus.

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FIELD EVALUATION STUDIES ON PRODUCTIVITY ON OIL CONTENT OF *ARTEMISIA PALLENS* WALL.

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ABSTRACT

Arbuscular Mycorrhizal fungi play an important role in mobilization of nutrients and enhancing plant growth. It maintain the intimate link between the plant roots and soil the present investigation deals with Field evaluation studies on productivity on oil content of Artemisia pallens with five replicates and seven treatments. Percentage of root colonization and oil quantity was increased in provided Set-F7 provided with (Mix culture of Arbuscular Mycorrhizal fungi with addition rock phosphate and Ash) as compared to Set-F1 (Control) in which plants were not supplemented either Arbuscular Mycorrhizal Fungi or rock phosphate or ash.

Keywords: *Arbuscular Mycorrhizal (AM), Artemisia pallens, Essential oil.*

Introduction:

Arbuscular Mycorrhizal fungi are known to play an important role in the nutrition and in the growth of plants in many agricultural systems in medicinal and aromatic plants. (Copetta, *et. al*., 2006). Arbuscular Mycorrhiza fungi enhance plant growth through increased plant nutrient uptake, stress tolerance, diseases protection, nutrient cycling and biological diversity. (Andhale and Mulani, 2008).

The Arbuscular Mycorrhizal diversity in herbaceous vegetation medicinal plants, in halophytes plants have been investigated by many workers Bagyaraj, D. J. (2014) Kannan, K. and Lakshminarashiman, C. (1988) Kumar, *et. al* (2013). Mulla, R. M *et.al* (1994) Mulani., R. M et.al (2004) Mulani, R. M and Waghmare, S. S. (2012). Mulani, R. M. and Prabhu, R. R. (2002). Parameswaran, P. and Augustine, B. (1988).

Fig.1 Harvesting of *Artemisia pallens*

Artemisia pallens commonly called as Davana. It is medicinal plant. In India 37 species of *Artemisia* are recorded. (Anonymous, 1985). Leaves and flower are used for the fragrant, floral decoration, religious offering. Oil is used for flavouring of bakery product and tobacco. It is used for antipyretic, antihelmentic and tonic. (Ruikar, *et. al*., 2017). It is conventially used Indian people for the treatment of immunomodelating, antipyretic, wound healing

diabetes mellitus and antihelmentic. (Devare *et. al*., 2014). *Artemisia pallens* wall is offered to lord Jotiba. (Yadav and sardesai, 2002). It is called as wormwood in English and in Kannad, Marathi and hindi languages are called as Davana and in telagu Davannamu. (Suresh *et. al.*, 2011).

Materials and methods:

Isolation of spores from rhizospheric soil by using Wet-sieving-decanting method. (Gerdman and Nicolson; 1963).

Isolation of spores was done by using three sub steps such as wet-sieving, flotation, sedimentation**.** Mix 05 gm rhizospheric soil in 250 ml luck warm water in beaker and it stirred well by using glass rod. It allows the heavier particles and debris settle down. Then solution was decanted through series of sieves and the solution decanted though 710mm sieves for the removed of debris and roots. Then solution decanted through series of sieves i.e 710mm, 210mm, 150mm, 75mm, 45mm, and 25mm respectively. Highest number of spore density was found in sieves 75mm, 45mm, 25mm and large organic debris, unwanted stones and roots were found in the sieves i.e 710mm and 210mm were discarded. Then spores were taken from each sieve on glass slide with help of brush, capillary tube and it observed at microscope for spores and sporocarps.

Assessment of Mycorrhizal infection in root-(Percentage of root colonization). (Phillips and Hayman, 1970).

The roots of the plant were collected in polythene bags and collected roots were washed with tap water 2 to3 times for removing the soil and debris. Collected roots cut into 1cm segments and root segments were taken in test tube containing 10% KOH. Then autoclaved at 15 lbs for 1hrs and 10 drops of H_2O_2 was added after cooling for destaining the roots. After 15 minute 10% KOH was removed from test tube and it washed with water 2-3 times and for decolorisation of pigmented root deep in alkaline solution of Hydrogen peroxide until bleached. After washing 10ml 1N HCL was added in test tube and it kept for 5 minute for neutralization of root tissue. Then HCL was removed from test tube and root segments were washed with water 2 to 3 times. After 30 minute cotton blue with lacto phenol was added in test tube and it kept for 24 hours. After 24 hours stained root segments were mounted on glass slide with acetic acid and glycerol 1:1 respectively. Root segments were covered with cover slip by using DPX added on four corner of glass slide. It observed under compound microscope for root colonization and percentage of root colonization was calculated by using following formula.

$$\textbf{Percent of mycorrhizal colonization} = \frac{\textbf{Number of root segments colonized}}{\textbf{Total number of root segments examined}} \times 100$$

Cultivation:

Cultivation of davana was done in winter season crop from November to March and ratoon crop increases up to April/may. Whitish, black or red soil was used for the cultivation

One year old seeds were used for cultivation but not more than one year because seed lose their viability after one year. Seven soil beds each of 30cm height and of dimension 1m × 1m was prepared. Firstly prepared the beds and it irrigated at 10 days before sowing the seeds. Then rock phosphate (500gm) and layer of ash was added in different beds then layer of soil was added on beds. Added 750 gm of AM fungi culture (mix and pure culture of AM fungi) was sprayed uniformly on separate beds before sowing the seeds of *Artemisia pallens* and it covers with soil. Seeds were sown in the soil and covered with soil.

The experiment was done on field in five fold replicate of each treatment.

Set-F1-Control(Without AMF and rock phosphate and ash)

Set-F2-Pure culture of AM fungi (*Glomus mosseae*.) with ash

Set-F3-Pure culture of AM fungi(*Glomus mosseae*.)

Set-F4-Pure culture of AM fungi(*Glomus mosseae*), rock phosphate and Ash

Set-F5-Mix culture of AM fungi and Ash

Set-F6-Mix culture of AM fungi

Set-F7-Mix culture of AM fungi, rock phosphate and Ash.

First week of sowing the beds watered regularly. . After 60 days AM inoculated seedlings of *Artemisia pallens* were transferred

into field. it is reaches height 5 to 7 cm. The plots were irrigated near about transplanting. Seedlings were instantly watering after transplanting. Regularly the plots were irrigated at first ten days and later once in two days and finally 10-15 days before harvest the water supply to the plants was totally stopped. Davana grows extending upto 50-65cm in height.

Harvesting:

. The plants were harvested at the age of 30, 60, 90, 120 and 150 days after sowing.

Oil Extraction-(Zolfaghari *et. al*., 2012)

Essential oil extraction of *Artemisia pallens* plants were dried under shade, powdered in mechanical grinder. The essential oil of *Artemisia pallens* was obtained by hydro distillation in Clevenger apparatus using 20gm of dried plant powder with 500ml distilled water over 2 hours.

Results and Disscusion:

In field cultivation experiment 95 % root colonization was observed in *Artemisia pallens*. Mycelium, Arbuscles, and Vesicles were observed in whole mount root of *Artemisia pallens.* Vesicles were elongated, rounded and prominent. At field level condition rhizospheric soil of *Artemisia pallens* was analyzed and it showed 650 spores/100g of soil. (Table no-1) Similar observations were made by Sarah and Ibrar, (2016) reported 56 to 260 spores/100gm of soil and 32 to 100% of root colonization was observed in *Helianthus annuus.* The root colonization rate was 91% and 114spores/gm soil in *Morus alba* reported by Lu *et.,al*.(2015). Root colonization was 69% and spore density 193/100g soil in *Panicum miliaceum* reported by Channabasava *et. al*., (2015).

TABLE NO- 1 Effect of various treatments of AM fungi with addition rock phosphates and ash on Arbuscular Mycorrhizal root colonization of *Artemisia pallens* in field condition.

Sr. no	Treatment	M	V	A	Percentage of root colonization	Arbuscular Mycorrhizal spore per 100gm of soil.	Inoculated Arbuscular Mycorrhizal spores.
1	F1	-	-	-	00	00	Without AMF, ash and rock phosphate
2	F2	+	+	+	82±1.22	600±1.58	*Glomus mosseae +ash*
3	F3	+	+	-	81±1	625±1.58	*Glomus mosseae*
4	F4	+	+	+	85±1	632 ±1.14	*Glomus mosseae +rock phosphate +ash*
5	F5	+	+	+	88±1.58	640±1.30	*Mix culture of AMF+ ash*
6	F6	+	+	-	90±1.41	635±1.51	*Mix culture of AMF*
7	F7	+	+	+	95±1	650±1.14	*Mix culture of AMF+ rock phosphate+ ash*

Mean ± SD,(Standard deviation with 5 replicates) Annova, p-value ≤ 0.05

(+) = Present and (-)= Absent, M-Mycelium; V-Vesicles, A-Arbuscular

Set-F1-Control(Without AMF and rock phosphate and ash)

Set-F2-Pure culture of AM fungi (*Glomus mosseae.*) with ash

Set-F3-Pure culture of AM fungi(*Glomus mosseae.*)

Set-F4-Pure culture of AM fungi(*Glomus mosseae*), rock phosphate and Ash

Set-F5-Mix culture of AM fungi and Ash

Set-F6-Mix culture of AM fungi

Set-F7-Mix culture of AM fungi, rock phosphate and Ash.

TABLE NO-2) Effect of various treatments of inoculation of AM fungi in addition of Phosphates and ash and on oil analysis of *Artemisia pallens* at 150 days intervals in field condition.

Sr. no	Treatment	Oil %
1	F1	0.71%±0.25
2	F2	2.18%±0.17
3	F3	1.8%±0.14
4	F4	2.64%±0.18
5	F5	2.22%±0.13
6	F6	2.48%±0.14
7	F7	2.86%±0.15

Mean ± SD(Standard deviation with 5 replicates) Annova, p-value ≤ 0.05

In our study oil quantity was increased in field condition as compared to pot level condition.

We have observed in field level experiment Oil quantity was increased in provided Set-F7 treatments provided with (Mix culture of Arbuscular Mycorrhizal fungi, with addition rock phosphate and Ash) as followed by Set-F4 (Pure culture of Arbuscular Mycorrhizal fungi (*Glomus mosseae*), rock phosphate and Ash), as compared to Set-F1 (Control) in which plants were not supplemented either Arbuscular Mycorrhiza or rock phosphate or ash.(Table no-2).

Similar observation were made by Silva (2008) oil content of *Zingiber Officinale* was increased with inoculation of mix culture of Arbuscular Mycorrhizal i.e *Scutellospora heterogama, Gigaspora decipiens, Acualospora koskei* and *Entrophosphora colombiana.* Oil content of sunflower was enhanced inoculated with Mycorrhiza reported by Heidari and Karami,(2014). Silva. *et.,al.*(2014) observed Content and yield of essential oil of *Mentha piperita* was increased inoculated with *Acaulospora morrowiae*. Essential oil of basil was enhanced with *Glomus mosseae* reported by Toussaint.*et,al*.,(2008).

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SUSTAINABLE DEVELOPMENT GOALS: A CASE STUDY

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ABSTRACT

Obviously the Sustainable Development Goals (SDGs) not just distinguish where we must be in 2030 to make a practical world; they likewise frame new business sectors and open doors for organizations everywhere. To succeed, we should transform the worldwide objectives into neighbourhood business. The SDGs set the 2030 agenda to transform our world. The concept of sustainable development is broad and includes the idea of the well-being of all individuals. The concept of sustainable development is broad and includes the idea of the well-being of all individuals. A complete overview of sustainable development has been taken in the present research paper. In the concept of SDGs, 17 goals have been reviewed. The concept of sustainable development is clearly defined. In this research paper, the scope and nature of SDGs have been explained. Also, the framework and action plan for implementation of SDGs in India are discussed.

Keywords: *Development, Sustainable Development, Sustainable Development Goals.*

Introduction:

Sustainable Development:

The word sustainable was deduced from the Latin word 'Sustainers', which means to perpetuate or sustain. According to Robert Allen,' development that seeks to satisfy mortal requirements and amend the quality of mortal life is called Sustainable Development'. (Patil, Patil, Bhole, & Ahire, 2021)

The idea of Sustainable Development was depicted by the 1987 Bruntland Commission Report as an "improvement that addresses the issues of the present without compromising the capacity of people in the future to address their own issues." (Brundtland, 1987). Sustainable development has turned into a critical test for the cutting-edge society that we live in as ecologically mindful financial development requires a total change of the ongoing frameworks of monetary creation.

Sustainable Development is an improvement that addresses the issues of the present without compromising the capacity of people in the future to address their own issues. There are four aspects to a manageable turn of events - Society, Environment, Culture and Economy - which are entwined, not discrete. Supportability is a worldview for contemplating the future where natural, cultural and monetary contemplations are adjusted chasing worked on personal satisfaction.

Sustainable Development has turned into the popular expression of the global local area. The struggle for development and greatness has made awkwardness in the financial advancement among nations, drained a portion of the regular assets and has in this manner modified the biological equilibrium. Since this undermines the actual presence of human existence on the planet, a game-plan that would guarantee a protected climate for people in the future has turned into the need of great importance. Manageable improvement is a term begat to guarantee that advancement happens so that regular assets are supported and given to the people in the future healthy. (Bangera & Gandhi, 2021)

The Sustainable Development Goals (SDGs):

The Sustainable Development Goals (SDGs), also known as the Global Goals, were taken on by the United Nations UNs in 2015 as a widespread source of inspiration to end neediness, safeguard the planet, and guarantee that by 2030 all individuals peace and prosperity. (GLEC, 2022)

At Rio 20 Conference in June 2012, the 17-point Sustainable Development Pretensions were formulated in July 2014. Emphasis has been placed on sustainable development related to profitable development, social addition, Higher Education, and environmental protection. In addition, the focus is on meeting

these objectives. The Sustainable Development Pretensions are encyclopaedically applicable. In formulating this thing, the real situation of each nation, the capacity of that country and public policy of that nation have been taken into consideration. The primary ideal of the Sustainable Development is to reduce the absolute poverty of the world's poor through furnishing lasting and secure livelihoods that minimize resource reduction, environmental declination, artistic dislocation, and social insecurity"; at the end of the United Nations Conference on Sustainable Development held on September 25, 2015, the world leaders espoused the 2030 Sustainable Development Agenda.

Figure 1 Sustainable Development Goals

(Source: https://www.freepik.com/vectors/sustainability-infographic)

The 17 SDGs are coordinated — they perceive that activity in one region will influence results in others, and that advancement should adjust social, financial and ecological manageability. However the goals are broad and reliant, the SDGs were made more "significant" by a UN Resolution adopted by the General Assembly. The Resolution distinguishes explicit focuses for every goal, alongside markers / indicators that are being utilized to quantify progress toward each objective. The year by which the objective is intended to be accomplished is as a rule somewhere in the range of 2020 and 2030. For a portion of the objectives, no closure date is given.

Goal 1 - NO POVERTY:

This goal focuses on ending global poverty. To make equal efforts to provide basic facilities, land, property, financial services to all men, women, poor and vulnerable groups in the society. All of these aim to build capacity to deal with natural, economic, social and environmental crises.

Goal 2 - ZERO HUNGER:

This goal focuses on eliminating hunger, eliminating malnutrition, meeting the nutritional needs of adolescent girls and pregnant mothers. In addition, it includes some specific targets among farmers, rural people. Many developing nations that were suffering from the effects of hunger and hunger can now meet their food needs because of this goal in the SDGs.

Goal 3 - GOOD HEALTH AND WELL BEING:

It promotes to ensure healthy lives and promote well-being for all at all ages. This goal includes reducing the global maternal mortality rate, striving to reduce the under-5 mortality

rate. Also to control disease outbreaks. These goals include an emphasis on health care.

Goal 4 - QUALITY EDUCATION:

It targets guaranteeing comprehensive and turn over quality training and advance deep rooted learning opportunities for all. This goal also aims that all girls and boys complete free essential and auxiliary tutoring by 2030. It likewise intends to give equivalent admittance to reasonable professional preparation, to kill orientation and abundance variations and accomplish general admittance to a quality advanced education. This goal clearly recognises that the gap between children and classroom must be closed, even as the international community more explicitly addresses the challenges of quality and equity in education. (UNOOSA G. , 2022)

Goal 5 - GENDER EQUAITY:

"End all violence against and exploitation of women and girls" is the main aim of this goal for sustainable development. It means by that dispose of all types of savagery against all ladies and young ladies in the general population and confidential circles, including dealing and sexual and different sorts of abuse.

Goal 6 - CLEAN WATER AND SANITATION

The goal focuses on water availability and sanitation. Providing clean and pollution free water for all as well as sanitation facilities for women and girls, waste water planning and reuse, prevention of water pollution, sustainable planning of water use, planning of water resources, conservation of aquatic ecosystems.

Goal 7 - AFFORDABLE AND CLEAN ENERGY:

This goal ensures to access to affordable, reliable, sustainable and modern energy for all. And also increase substantially the share of renewable energy in the global energy mix (UN D. , 2022)

Goal 8 - DECENT WORK AND ECONOMIC GROWTH

This Goal aims to achieve sustained growth in per capita income and provide productive employment and decent work for all in a country that is diverse. It includes objectives to promote sustainable tourism and thereby generate employment by 2030.

Goal 9 - INDUSTRY, INNOVATION AND INFRASTRUCTURE:

This goal seeks to build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. This SDG incorporates three significant parts of practical turn of events: infrastructure, industrialisation and innovation. (UNOOSA G. , 2022) . This goal includes building appropriate infrastructure by 2030. To increase the technological capacity of the industrial sector by promoting research and development. It includes goals like sustainable industrialization etc.

Goal 10 - REDUCED INEQUALITIES:

Reduce inequality within and among countries is the main aim of this goal. There are seven goals in total. Among the important targets are raising the income of the bottom 40% of the economy above the average and taking proper care of the migrant population and making strategic efforts for it. And by 2030, it is to strive for economic, social and political benefits for all, without discrimination on the basis of age, gender, caste, religion, etc.

Goal 11 - SUSTAINABLE CITIES AND COMMUNITIES:

The mission of this goal is to make cities and human settlements inclusive, safe, resilient and more sustainable. Urban communities i.e. cities are the centres for thoughts, business, culture, and science, efficiency, social, human and monetary turn of events. Metropolitan preparation, transport frameworks, water, sterilization, whipping risk decrease, admittance to data, instruction and limit building are pertinent issues to economical metropolitan turn of events.

Goal 12 - RESPONSIBLE CONSUMPTION AND PRODUCTION:

This goal includes, in collaboration with developed countries, creating and implementing a ten-year action plan for sustainable production and consumption for developing countries, adopting the principle of recycling, envisioning and working towards zero waste by 2030.

To guarantee reasonable utilization and creation rehearses fundamentally involves to regard the biophysical limits of the planet and to decrease current worldwide utilization rates

to fit with the biophysical ability to deliver environment administrations and advantages. (UN E. P., 2022)

Goal 13 - CLIMATE ACTION:

This goal aims to take urgent action to combat climate change and its impacts. And also Environment is considered in these goals. This includes building capacity and resilience to cope with threats from climate change and other natural disasters, incorporating environmental change programs into national policies and planning. Objectives include education and awareness raising that will provide knowledge on mitigating the effects of environmental change, preventing impacts and predicting hazards. In the 2030 Agenda for Sustainable Development, member countries express their obligation to safeguard the planet from corruption and make a dire move on environmental change.

Goal 14 - LIFE BELOW WATER:

Seas, oceans and other marine assets are fundamental for human prosperity and social and monetary improvement around the world. Their protection and reasonable use are important. Seas and fisheries support the worldwide populace's financial, social and ecological necessities. Seas are the wellspring of life of the planet and the worldwide environment framework controller. Seas cover more than 66% of the world's surface and contain 97% of the planet's water. They are fundamental for making the planet reasonable.

Goal 15 - LIFE ON LAND:

This Goal aims to Protect, Restore and Promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. (Global , 2022) This includes conservation, rehabilitation, afforestation, prevention of desertification, etc., of freshwater ecosystems, forests, mountains, arid lands, wetlands as per international Regulations.

Goal 16 - PEACE, JUSTICE AND STRONG INSTITUTIONS:

This goal promotes to peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels. (United , 2022) 10 objectives have been defined in this goal. These include the goals of ending corruption, eradicating crime, preventing violence, creating effective and transparent institutions at all levels, providing justice to all, etc.

Goal 17 - PARTNERSHIPS FOR THE GOALS:

These goals include providing international aid and assistance to developing countries, providing them with financial resources, assisting them with loans, and providing financial assistance to underdeveloped countries. To assist developing countries in developing environmentally friendly technologies. They include targets such as promoting the capacity development of their national plans to achieve the Sustainable Development Goals.

Attaining SDGs:

Guaranteeing that the execution of the SDGs is established on the three standards of comprehensiveness, coordination and abandoning nobody - through a methodology that advances the incorporation of minimized gatherings and guarantees an orientation viewpoint; United Nations addresses the worldwide difficulties we face, including those connected with poorness, disparity, environment, natural debasement, flourishing, and harmony and equity. The Objectives interconnect and to abandon nobody, we really must accomplish every Objective and focus by 2030.

The 17 SDGs are coordinated — they perceive that activity in one area will influence results in others and that improvement should adjust social, economic, and environmental sustainability. Nations have focused on focusing on progress for the people who are the farthest behind. The SDGs are intended to end neediness, craving, Helps, and oppression against women and girls. The imagination, ability, innovation, and monetary assets from society are all important to accomplish the SDGs in each specific circumstance. (GLEC, 2022)

Multi-dimensional Approach: 17 Goals and 169 Targets:

The 17 SDGs and 169 targets which we are reporting today show the scale and aspiration of this new general Plan. These 17 SDGs are

interconnected and disappointment of one can influence the outcome of different objectives. The SDGs have 169 targets which have in excess of 230 remarkable pointers. The Objectives and targets are observed and audited utilizing the markers.

Responsibility of Implementing SDGs:

Plan 2030 unequivocally perceives that social factor play a basic part to play in the reception and accomplishment of the SDGs. The test of supporting SDGs can be set out somewhat by reinforcing the current scholastic foundation in the country. India is a territorial centre for Higher Education and flaunts itself for being the old neighbourhood of a few eminent establishments like IIT and IIM. These organizations have advanced framework for research. These assets can be pooled and successfully used in planning, creating and estimating pointers implied for supportable turn of events.

It is broadly recognized that the outcome of the 2030 Plan internationally will depend, to a critical way, on the headway India makes on the SDGs front. It isn't simply because of the sheer size of the populace, yet additionally in view of the strength and versatility of the Indian economy. Further, India has likewise arisen as a worldwide pioneer on the global environment activity plan.

SDGs & India:

In developing nations like India, there was some faltering in diminishing fossil fuel by products for two reasons, first their per capita outflows were lower, second, it would mean compromising with the improvement of the country. Subsequently carbon exchanging framework was developed among the nations of the existence where firms were allowed to produce carbon inside as far as possible and were relegated carbon credits for this reason to surpass the cut-off it can purchase the unused credit from another firm. In this manner the purchasing firm is punished for surpassing its carbon quantity and the selling firm is compensated for diminishing its discharges. States can consider punishing firms with higher carbon impressions by making them finance the manageable objective projects in the creating and least created nations.

For SDGs to be effectively accomplished, the public authority approaches, plans and projects must be lined up with objectives. The work can't be driven by government alone however needs help of the confidential area also. While the SDGs must be accomplished by 2030, the markers under each objective and objective are effectively checked by the Indian government. NITI Aayog is the foundation associated with managing the execution of SDGs by sharpening partners, building limit, guaranteeing and observing of SDGs and focuses through projects and plans as a team with States/UTs, the scholarly world, common society, multi-parallel organizations. Government of India has created the Sustainable Development Goals India Index 2.0 (SDGII 2.0) which is built utilizing 100 markers, covers 54 focuses across 16 objectives, excepting Objective 17, which is qualitative in nature. (Bangera & Gandhi, 2021)

The government has formulated policies to achieve Sustainable Development Goals (SDG) to mitigate the effect of Climate Change and build Sustainable cities and communities. The Government is implementing National Action Plan on Climate Change (NAPCC) which provides an overarching policy framework for all climate actions. NAPCC comprises of eight core Missions in specific areas of solar energy, enhanced energy efficiency, sustainable habitat, water, sustaining Himalayan ecosystems, Green India, sustainable agriculture and strategic knowledge for climate change. (Ministry of Environment, 2022) India faces a few difficulties in gathering the SDGs. One of the key difficulties is unfortunate framework which influences improvement. The monetary business sectors while energetic are as yet not well developed particularly concerning obligation market which makes acquiring for foundation troublesome and exclusively dependent on the financial area. The Indian financial area itself tormented by NPA emergency has brought about credit mash for private area. Unfortunate degrees of innovative work and absence of adequate development has brought about India falling behind and being not able to take on and adjust environmental change strong horticultural

practices or eco-accommodating assembling. The elevated degree of neediness in India combined with unfortunate admittance to disinfection, essential medical care and training likewise brings about the advancement in the SDGs pointers being slow.

Measures taken for executing SDGs in India:

NITI Aayog, the Government of India's foremost think tank, has been depended with the assignment of organizing the SDGs. States have likewise been instructed to embrace a comparable planning with respect to their plans, including halfway supported plans.

Likewise, the Ministry of Statistics and Programme Implementation (MoSPI) is participated during the time spent creating national indicators for the SDGs.

Conclusion

All SDGs is very important in national as well as international growth. And these are playing a vital role in the development process of the concern country. The SDGs are the guiding principle in the future development. Sustainable development is improvement process that adjoined the issues of the present without compromising the capacity of next generation's people to address their own issues. Developing countries like India needs to concentrate on these goals to cope with the international development. The Indian government and NITI Aayog are taking sufficient majors to fulfil these goals in excepted time. SDGs as a widespread source of inspiration to end destitution, safeguard the planet, and guarantee that by 2030 all human beings appreciate harmony and thriving.

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EFFECTS OF $CuSO_4$ AND $ZnSO_4$ ON SEED GERMINATION AND GROWTH OF WATER MELON

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ABSTRACT

In present studies was concluded that the copper and zinc sulphate treatment produced toxic effects on seed germination and seedling growth of water melon along with significant reduction in seedling dry weight as compared to control treatment. Similarly, the tolerance to copper treatment decreased the tolerance indices for water melon seedlings with the increase in metal concentration in the substrate as compared to control. The difference in tolerance and seedling vigour index in response to copper and zinc sulphate toxicity should be considered while water melon cultivated in copper contaminated areas. There is a need to be carried out further studies on other copper tolerant species for plantation in copper contaminated areas to overcome the shortage of agriculture crops.

***Keywords*;** $CuSO_4$, $ZnSO_4$ ON, Seeds germination, water melon and growth etc.

Introduction

Watermelon is an important fruit crop. It is a newly introduced cash crop gaining a high level of economic importance in the generation of income and provision of nutritional value. Watermelon flesh contains high quantity of vitamins, minerals and other antioxidant compounds which play important role in human metabolism. Antioxidant components help in preventing human disease by acting as oxygen radical scavenger. Watermelon rind and seed also have many health benefits due to the presence of important amino acids citrulline, fibres, minerals and phenolic compounds.

Watermelon (*Citrullus lanatus*) botanically considered as the fruit is belonging to the family Cucurbitaceae (Edwards *et al*., 2003). Cucurbitaceae family ranks among the highest of plant families for number and percentage of species used as human food. The common name of watermelon is Tarbooz (Hindi and Urdu), Tarbuj (Manipuri), Kaduvrindavana (Marathi), Eriputccha (Telegu), Kallangadiballi (Kannada), Tormuj (Bengali), Indrak (Gujarati). Watermelon is originated from Kalahari Desert of Africa but nowadays cultivated abundantly in tropical regions of the world. It has great economic importance with 29.6 million tonnes estimated production worldwide. According to the National Institute of Industrial Research, watermelon is cultivated in Uttar Pradesh, Himachal Pradesh, Rajasthan, Orissa, Gujarat, Punjab, Haryana, Assam, West Bengal, Karnataka, Orissa, Andhra Pradesh, Maharashtra and Tamil Nādu.

It is a large, sprawling annual plant with coarse, hairy pinnately-lobed leaves and yellow flowers. It is grown for its edible fruit, which is a special kind of berry botanically called a pepo. The watermelon fruit has deep green smooth thick exterior rind with grey or light green vertical stripes. Inside the fruit is red in colour with small black seeds embedded in the middle third of the flesh (Wehner *et al*., 2001).

Germination studies for different plants have been carried by Millington et al (1951), Kapp (1974). According to Iwaki and Ota (1952) germination of *Oryza* species takes place with water containing 0.6% NaCl. Kapp (1974) considers that germination of Oryza was affected at a salt content of 825 lbs/acre, whereas 3300 lbs/acre was required to affect yield when applied to 6-week-old plants.

Material and Methods

The seeds were either collected from the cultivated plants or procured from local market. They were stored in dry and stoppered glass bottles in dark. Studies on seed germination were conducted in sterilized petri dishes lined with a single layer of whatman no.1 filter paper kept moist with distilled water or test solution. They were imbibed in distilled water or test solution (10ml) in dark for 6 to 8 hours. The studies involved use of 200 seeds of water melon in different concentration along with distilled water as control for 6 h. The seeds were

then transferred to with cocopeat containing Germination tray respective solution of copper sulphate concentration and distilled water. The germination tray was incubated at green shed net (polyhouse) condition still germination and Then percent germination was calculated on the basis of seed germination and also Seedling height, root length, and the biomass of seedling were measured.

$$\text{Seed Germination \%} = \frac{\text{Total Number of seeds germinate in particular treatment}}{\text{Total Number of seeds treated in particular treatment}} \times 100$$

The dry biomass was determined by placing the seedling in an oven at 80 °C for 24 hours.

Preparation of Solution:

Different concentration of Copper Sulphate and Zinc Sulphate

Name of Salt	Concentration (ppm)
Copper Sulphate	30
	60
	90
	120
Zinc Sulphate	Control (D/W)
	30
	60
	90
	120
	Control (D/W)

Results and Discussion

Table No. 1

Effects of different concentration of Copper Sulphate on seed germination (%), seedling growth and seedling dry weight (g) of Water Melon (*Citrullus Lanatus*)

$CuSo_4$ concentration in ppm	Germination (%)	Root length (cm)	Shoot length (cm)	Seedling size (cm)	Seedling dry weight mg/g
30	91	5.4	6.8	13.1	1.1
60	78	3.9	5.2	10.2	0.98
90	69	3.1	5.1	8.9	0.45
120	47	1.2	4.8	6.4	0.21
Control (D/W)	95	8.9	12.1	22.4	2.6

Table No. 2

Effects of different concentration of Zinc Sulphate on seed germination (%), seedling growth and seedling dry weight (g) of Water Melon (*Citrullus Lanatus*)

$ZnSo_4$ concentration in ppm	Germination (%)	Root length (cm)	Shoot length (cm)	Seedling size (cm)	Seedling dry weight mg/g
30	93	8.3	7.1	16.1	1.6
60	86	4.1	6.3	11.2	1.0
90	73	3.6	4.1	8.2	0.41

120	62	2.5	2.1	5.2	0.19
Control (D/W)	96	10.9	14.1	26.3	3.8

Discussion

In present investigation on the effect of copper sulphate and zinc sulphate on germination, growth parameter of water melon seedling found that the Excessive concentration of copper sulphate and zinc sulphate generally produce common toxic effects on different growth variable of plants, such as low biomas accumulation, chlorosis, inhibition of growth and photosynthesis, altered water balance and nutrient assimilation, and senescence, which ultimately cause plant death. The plant under abiotic stress conditions is most likely to be adversely affected by heavy metals contamination.

The Results showed that seeds treated with distilled water were recorded highest seed germination percentages and also root, shoot, seedling length and dry weight of seedling, followed by seeds treated with copper and zinc sulphate decreases the overall growth parameter of seedling mentioned in **Table.1& Table.2.**

Conclusion

In present studies was concluded that the copper and zinc sulphate treatment produced toxic effects on seed germination and seedling growth of water melon along with significant reduction in seedling dry weight as compared to control treatment. Similarly, the tolerance to copper treatment decreased the tolerance indices for water melon seedlings with the increase in metal concentration in the substrate as compared to control.

The difference in tolerance and seedling vigour index in response to copper and zinc sulphate toxicity should be considered while water melon cultivated in copper contaminated areas. There is a need to be carried out further studies on other copper tolerant species for plantation in copper contaminated areas to overcome the shortage of agriculture crops.

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FISH NUTRIENTS IMPORTANCE AND THEIR IMPACT ON HUMAN LIFE

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ABSTRACT

Fishes are good source of aquatic food. They have rich sources of macronutrients and micronutrients like proteins, lipids, vitamins and minerals. Fish food wellbalanced content of essential nutrients. Fish Portions contains immunoglobins that function as a defence mechanism against viral and bacterial infections. Fatty acids large sources of PUFAs in fish these useful in prevention of cardiovascular diseases and neural disorders. Iron helps in haemoglobin formation and helps to avoid anaemia. Selenium is essential for thyroid gland function. Calcium and vitamin D found naturally in fish help to avoid rickets and osteomalacia. Vitamin A helps in the maintenance of normal eyes and an immune system. In the present review suggested fish food is rich sources of macro and micro elements they also have a lot of benefits in the health of human.

Introduction

India has a lengthy coastline around 8118 km and an economic zone of approximately 2.02 million sq. km. India's fishing industry provides a source of income for an economically backward populations of the country (Economic Review, 2016). So far, research in India on the use of excess fish has mostly focused on the manufacturing of fish meal. Fish is an important component of human diet (Tacon 2013). More than 50% of the Indian population consumes fish and in some states like Assam, West Bengal, Orissa, Goa, Kerala and other North-Eastern statesmore than 90% of the population consume fish (Das *et al.,* 2021). Fish nutrients are the substances that nourish the body, promote growth, maintain and repair body parts (Balami *et al.,* 2019). Nutrients can be divided into micro and macro nutrients, which both are energetic for good health. Macronutrients are portions, lipids, vitamins and very low amounts of carbohydrates, as well as numbers of micronutrients like zinc, selenium, iron calcium, phosphorus and copper. Selenium and zinc are trace elements. Fish is not only a good source of food, but it also has a high nutritional content, has played an important role in giving nutrients to several animals and peoples. Eating fish on a regular basis can also help avoid heart disease. It has been suggested that the longer lifespan of Japanese and Nordic populations they include lot of fish and seafood in the diet (Mohanty *et al.,* 2019). Fish oil also show beneficial effects on the skin (Wolters 2005). Nutrition experts advise eating fish at least 2-3 times every week. Fish oil helpto avoid a variety of health issues, ranging from mental disease to blindness (Parletta 2019). The health advantages of eating fish are becoming more well recognised. A study of the literature found a lot of information about the nutritional application of fish for human health. The purpose of this research is to provide information on the nutrients found in fish and their advantages to human health. Different nutrients found in fish each play a specific and vital role in human health. The information in this paper can be help people understand the advantages of eating fish and its nutritious value. It can also raise awareness of the nutritional value of fish in the prevention of various disorders.

Proteins

Fish is an rich source of quality proteins and it has greater effect than other sources terrestrial proteins, like meat and chicken. The unit cost of production of fish is much cheaper as comparison to the other sources of dietary proteins of animal origin. Animal protein not economically available to all people but fish proteins wide range of prices making it affordable to the common man. Because he has the option to choose from a fairly large number of fish species available. Fish proteins provides with 1/3 to 1/2 of one's daily protein requirement. Fish protein is mainly responsible for building and repairing muscle tissues, improving immunity and blood quality

(Mohanty 2019). Fish Proteins play the most significant role from the nutritional point of view. They provide important amino acids which are improves the overall protein quality of a mixed diet. They include essential amino acids such as tryptophan, cystine, lysine, methionine, and threonine which improves the digestibility. Aquatic protein contains essential amino acids and peptides much more than terrestrial meat protein such as lysine and methionine (Tacon & Metian, 2013; Pal *et al*., 2018). If one or more of these essential amino acids are absent or in the intake diet, may lead to improper or no utilization of protein. As a result, it will Protein deficiency can cause stunted growth and development in children or loss of muscle mass in adults, fatigue, and nutritional edema, and even might be life threatening (Roy & shaikh, 2018). some other amino acids and particularly taurine, found especially in fatty fishes including sardines, plays beneficial role in limiting the complications of type 2 diabetes and decreasing glucose, insulin and insulin resistance (Madani *et al*., 2012). Fish has health benefits with its high-protein, low-fat content. In particular, white-fleshed fish, is lower in fat than any other source of animal protein, and oily fish are high in omega-3 fatty acids. Since the human body must supply these essential nutrients, fish are an important part in the diet

Fatty acid

Fats play significant role in hormone synthesis, circulation of vitamins and providing energy. There are mainly three types of fatty acids saturated fatty acids, monounsaturated fatty acids and polyunsaturated fatty acids (PUFAs). The SFAs and MUFAs are synthesized endogenously, but PUFAs cannot be synthesized by the humans from other components by any known biochemical pathways, and therefore must be obtained from the diet. Fish lipid contains high amount of polyunsaturated fatty acids (PUFAs) in two different groups which are namely omega-3-fatty acids and omega-6-fatty acids. Omega-3 fatty acids are found in foods such as fish and flaxseed and in dietary supplements, such as fish oil. The three main Omega-3 fatty acids are alpha-linotenic acid (ALA), eicosapentanoic acid (EPA) and docosahexaenoic acid (DHA). ALA is found mainly in plant oils such as flaxseed, soya bean and canola oils while DHA and EPA are found in fish and other seafood (Morales *et al*., 2015). contribution of fish to the global consumption of protein is ~6% (Tacon *et al.,* 2013), while the contribution to global EPA+DHA consumption is > 97% (Gladyshev *et al.*, 2015). The World Health Organization, as well as many national health organizations, recommended personal daily consumption 0.5–1.0 g of EPA+DHA (Calder, et al., 2018). It is well known that the main food source of EPA and DHA for human diet is fish. LC-PUFA are known to be essential components of human diet, which provide numerous health benefits, including prevention of cardiovascular diseases and neural disorders (Harris *et al.,* 2021). Omega-3 polyunsaturated fatty acids have a positive role in preventing certain human diseases, including cardiovascular ones (Gerling *et al*., 2019). It was reported that a fish consumption of 1 to 2 servings per week could be protective against coronary heart diseases and ischemic stroke (Tilami & Sampels, 2017). Omega-3s are important components of the membranes that surround each cell. DHA levels are especially high in eye retina, brain and sperm cells. Omega-3s also provide calories and have many functions related with heart, blood vessels, lungs, immune system and endocrine organs.

Micronutrients

Micronutrients are essential vitamins and minerals for humans. They are needed in modest amounts and have a role in physiological activities throughout life. Minerals and vitamins are included in this dietary category.

Vitamins

Vitamins are low molecular weight substances play important roles in regulating the body functions. These are substance, which the body cannot synthesize and hence must be supplied through food for normal growth and development (Balachandan, 2002). Fish is a rich source of essential vitamins, such as vitamins A, D and E, as well as vitamins B1, B2 and B3 and some amount other vitamins.

The essential vitamins for human healthare available of good amount in fish, but these amounts vary according to the fish species (Srivastava *et al.,* 2008). The rich amount of vitamin A and D store in liver of fish species. Lean fishes are a good source of vitamins B group. Vitamins A sources more readily available in fish as compere to other Plant food materials . The small *Amblypharyngodon mola fish species* is a very large source of vitamin A than many other species. Vitamin A is essential the normal growth of children and also helpful to treatment in many eye diseases (Pal *et al.,* 2018). Vitamins A needed to formation of bons and teeth. Fish are good sources of Vitamin D. Its helps to immune function. Vitamin D is not found in many foods which is concentrated in the marine food chain but can also be obtained from sunlight (Mogensen, 2001). Vitamin D allows calcium absorption and is involved in both calcium and phosphorus regulation in bones. Vitamin D is also involved in muscle strength and contraction, nerve conduction, cell differentiation, thyroid function, immunity, rennin and insulin production and skin condition (McManus and Newton, 2011). Vitamin D may also lower the risk of some cancers and cure skin diseases such as psoriasis. Fish is also a good source of the B vitamins and can provide a useful contribution to the diet for this group of vitamins, as does red meat. The B group of vitamins is responsible for converting food to energy in the cells of the body and they help with the function of nerve tissue. Vitamin B is important for enzyme functioning which accelerates chemical processes in the body. Vitamin D deficiency leads to rickets, osteomalacia and a low bone mineral density and increased cases of bone related disorder. It is also connected with diabetes (Holick 2008). Vitamin D deficiency causes osteopenia, osteoporosis and fractures in adults. Fish and fish oils contains vitamin D naturally (Holick and Chen, 2008). Vitamin K present in fish is responsible for the anti-hemorrhage factor. It also helps to prevent internal bleeding and stimulates correct coagulation of blood. little Vitamin C which is important for proper healing of wounds, normal health of body tis sues and aids in the absorption of iron in the human body.

Minerals

Fish is a good source of almost all micronutrients which are not widely available from other sources in the diets of poor people (Gladyshev *et al.,* 2018). Iron, calcium, zinc, iodine, phosphorus, selenium, and fluorine are among the minerals found in fish. These minerals are highly " absorbable" or readily absorbed by the body. The availability of selenium and iodine in marine fish is very important nutritionally. Selenium is a trace element that functions as an antioxidant. Selenium is hazardous to humans at high doses. However, selenium is a crucial vitamin for humans that works as a cofactor for reducing antioxidant enzymes such as glutathione peroxidase in the form of selenoproteins. This is also in charge of thyroid gland function. Low selenium levels have been linked to an increased risk of myocardial infarctions and mortality from cardiovascular illness, as well as an increased risk of cancer and renal disease (Cladis *et al.,* 2014) Iron is required for the creation of haemoglobin in RBCs, which aids in the delivery of oxygen throughout the body. This mineral deficiency can induce anaemia, reduced brain function, and poor cognitive ability and behaviour in newborns (Iaconisi *et al.,* 2018). Iodine is necessary for the hormone thyroxin, which regulates body metabolism, and it is also essential for growth and mental development in children. Iron is required for the creation of haemoglobin in red blood cells, which transports oxygen throughout the body. Calcium is essential for strong bones (formation and mineralization) as well as appropriate muscular and nervous system function. It is also necessary for the coagulation of blood. When little fish are eaten with their bones, calcium, phosphorus, and fluorine consumption is higher than when the fish bones are discarded. Calcium deficiency may be linked to rickets in young children and osteomalacia (bone weakening) in adults and the elderly. Fluorine is also necessary for healthy bones and teeth. Zinc is necessary for most biological activities because it occurs with proteins in critical enzymes required for

metabolism. Zinc is essential for growth and development, as well as immune system function and skin health. It is also required for the perceptions of smell and taste, as well as cell division, cell development, wound healing, and carbohydrate breakdown. Zinc deficiency has been linked to week growth, skin problems, and hair loss, among other issues.

Conclusion.

In this study observed fish food is rich sources of macro and micro nutrients because fish and fish products are a significant nutritional source they have rich combination of vitamins, Polyunsaturated fatty acids,proteins balance of amino acids, minerals, and other nutrients while still being low in calories. Fish not only have significant nutritional value, but they also have a lot of benefits in the health of human, people are still unaware of those benefits.

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"STUDY OF VARIOUS ASPECTS E-WASTE AND THEIR EFFECT ON ENVIRONMENT"

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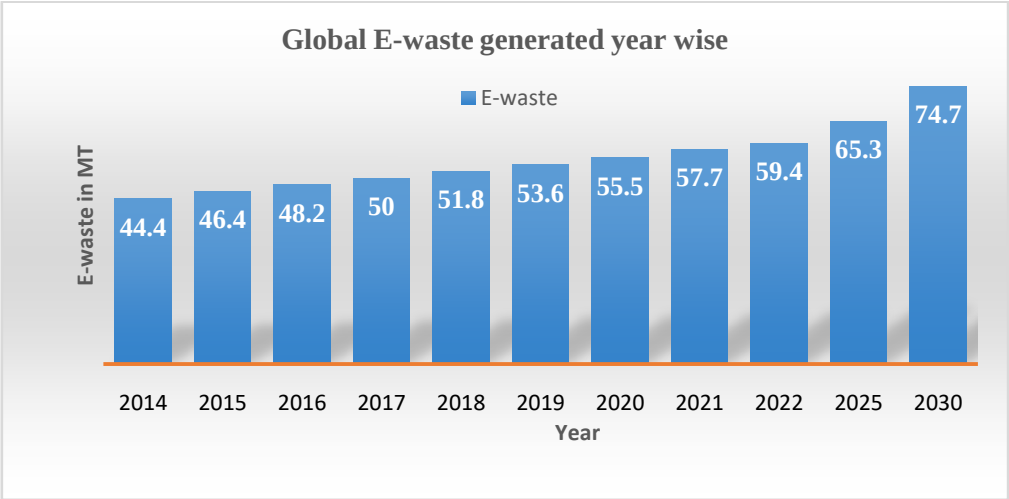
ABSTRACT

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 2022every 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%, largeequipment's24.4%, 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

Uncontrolledelectronic 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 electrical conductivity.	Exposure to beryllium causes lung cancer and designated as carcinogenic. It also responsible for skin disease.
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 byinappropriate 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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CHANGING ROLES OF ACADEMIC LIBRARIES IN DIGITAL AGE

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ABSTRACT

This paper attempted to explore changing role of academic libraries in the digital age and era of e-learning with the following objectives, to analyse changing role of academic library, to define and explain concept of e-learning and to analyse challenges of e-learning. The new technology has important role to play in academic libraries. By using this technology, academic libraries are helping users access the vast amount of library resources, evaluate and select the best information for their specific needs. E-learning is adapted readily adapted by teachers and library plays important role in providing them authentic resources. E-earning has numerous benefits and should contribute much more to education. However, there are several challenges in implementing e-learning at academic libraries which includes inadequate fund, lack of technical support, lack of training and support as well as lack of motivation and negligence by institutional management. Hence, it is necessary for academic libraries to provide adequate funds and technological support to provide better e-learning services to their clients.

Keyword: *Academic Library, Changing role, Challenges, Digital Age.*

Introduction:

The library is no longer defined simply as a building or a physical repository that houses information. With the advent of computers, the nature of libraries has changed dramatically. Technology will continue to change and libraries and librarians have to use the changing technology to provide the best access and service to their patrons. Electronic information creates challenges for the library community at its very foundation, moving it away from the traditional paper-and-print format to an ethereal world of circuits and connectivity.Computers are being used in libraries to process, store, retrieve and disseminate information. As a result, the traditional concept of library is being redefined from a place to access books to one, which houses the most advanced media including CD-ROM, Internet, and remote access to a wide range of resources. Libraries have now metamorphosed into digital institutions. Gone are the days when a library was judged by its quantitative resources. Today, libraries are surrounded by networked data that is connected to the vast ocean of Internet-based services. Moreover, electronic resources relevant to the professions are developing at an unprecedented pace.The nature of the academic library and the role they play in campus is changing. They invite student and faculty socialization, learning, research, scholarship and instruction. Academic libraries will increasingly provide information and services to their users at righttime as per their requirement. Whatever the changes, the traditional roles of a library in an academic community, especially those communities that aren't changing substantially themselves, will remain valid and important to a successful college or university. Hence, in the backdrop of above information researcher attempted to explore changing role of academic libraries in the digital age and era of e-learning with the following objectives –

Objectives:

1. To analyse changing role of academic library
2. To define and explain concept of e-learning
3. To analyse challenges of e-learning
4. To analyse Age of Digital Library

Changing roles of Academic Libraries

Libraries are forced to acquire, organize and enable access to electronic resources and provide new technology-based services. Electronic resources include online catalogues CD-ROM/ DVD databases, multimedia, online full text electronic journals, databases, e-books, digital repositories etc.Due to the impact of ICTs, libraries are incapable to fulfil the information needs of users by means of print sources alone. Libraries have to find strategies for making their resources and services readily available to the faculty and students preferably in the electronic environments; otherwise, their existence will be at stake. Academic Libraries

in the e-learning environment have already made some progress by providing access to their catalogues, databases, electronic journals, Internet resources, etc. to the user's community on the Intranet or Internet.

Concept of E-Learning

E-learning is means of becoming literate, involving new mechanisms for communication, such as computer networks, multimedia, content portals, search engines, electronic libraries, distance learning, and webenabled classrooms. Different web-based applications such as email, real-time conference; Web Cam, etc. are being used as important tools in the process of e-learning. ELearning is a catch-all term that covers a wide range of instructional material that can be delivered on CD-ROM or DVD, over a local area network (LAN), or on the Internet. It includes Computer-Based Training (CBT), Web-Based Training (WBT), and Electronic Performance Support Systems (EPSS), distance or online learning and online tutorials. The major advantage to students is its easy access. So, providing access to online e-journals and ebooks through networks will enhance the self-learning knowledge. E-learning includes wide set of applications like the use of interactive learning packages, web-based learning environments, communication applications like e-mail, discussion rooms, chat, video conferencing etc.E-learning is literally an abbreviation of the term electronic learning. In simpler terms, elearning is internet-enabled or computer enhanced Learning. It also refers to learning that is facilitated using digital tools and contents. In the case of web-based training programmes, the learner follows a pre-designed process that includes programmes for practice, assessment and feedback activities. It can also be a blended learning approach where the learner goes through a mixture of face-to-face and onlearning activities (Allan, 2002). E-learning can also be considered as a basic concept of educational delivery via technology or as an educational technique.

E-learning can provide four major benefits for the organizations and individuals involved-

(i) Access to quality education: The fact that instructors of the highest calibre can share their knowledge across borders allows students to attend courses across physical, political, and social boundaries. Recognized experts have the opportunity of distributing information internationally at minimum costs.

(ii) Affordable education: E-learning can drastically reduce the costs of higher education, making it much more affordable and accessible to the masses. An Internet connection, a computer, and a projector would allow an entire classroom in a Third World university to benefit from the knowledge of a distant instructor.

(iii) Convenience and flexibility to learners: in many contexts, e-learning is self-paced and the learning sessions are available 24x7. Learners are not bound to a specific day/time to physically attend classes. They can also pause learning sessions at their convenience. (iv)

(iv) Reducing environmental impact: e-learning allows people to avoid travel, thus reducing the overall carbon output. The fact that it takes place in a virtual environment also allows some reduction of paper usage. With virtual notes instead of paper notes and online assessments instead of paper assessments, eLearning is a more environmentally friendly solution.

Challenges and Issues for Libraries in E-Learning:

Today e-learning is considered as alternative tools of empowering knowledge and skills. It is also treated as alternative means for classroom teaching. Now with the help of Internet, it is possible to deliver the information with highest degree of precision which is not possible with traditional skills. It has overcome several constraints of traditional learning system, but the development of e-learning has thrown up new problems focused on the copyright and intellectual property rights implications of electronic text. Students, researchers, staff, employees and other end users affiliated with virtual university or digital libraries are to be allowed to print-on-paper excerpts of digitally available works on the same conditions according to which they may make photocopies of print material. The library authorities have to discuss seriously with publishers on this aspect in order to evolve some mechanism profitable

to users, publishers as well as to the authors. Users may be charged for each access, downloading from servers and/or each kind of digital library collection. This would provide a reverse for publishers, authors and libraries. Security aspect is another most pressing challenge of digital affairs. Piracies of database, viral invasions, and parallel satellite networking stress are some other issues for digital libraries, which are confronted as a way of routine. According to Jayaprakash and Venkatramana (2006), major challenges can be enumerated as under:

1. There is no mechanism available to establish standards for internet materials, instruction, design and quality of interaction.
2. Information providers are more interested in profit than quality services.
3. Lack of organization of information on Internet, as not all sites are updated regularly.
4. Lack of expertise as not many vendors/experts are available in the country and abroad as well. Overseas vendors charge too much and also reluctant to import techniques/technology, and
5. Lack of motivation, because in a classroom instruction the teacher and students interact in discussing and understanding the subject spontaneously, which creates motivation among the students towards learning.

Whereas, in e-learning, due to lack of motivation sometimes it may appear dull. Vatnal, Mathapati and Prakash (2004), have pointed out additional issues, which hinder the development and pose challenges among libraries in e-environment. These are-

Instruction and Training:

One of the main problems in e-learning system is the sufficient knowledge and skills of usage of information technology. Web-based education require much training as the e-learning involves different types of multimedia files and learners should have the knowledge of the same. There is also seen lack of awareness in using electronic equipment.

Interaction:

The lack of interaction between learner and subject specialist is another problem. It may possible for subject expert availability, but for teacher may be possible to access via e-mail. Sometimes, face-to-face interaction can be made possible through online conferencing. E-learning designers also need to increase the interactivity.

Speed of Network:

Internet connectivity is essential to access the information or learning materials. As e-learning involves multimedia file, higher speed of network with sufficient bandwidth is required. Sometimes, low speed and connectivity cause frustration among the learners or the users of Internet. Further, Internet has not reached in remote areas and has limited reach to users, only in urban areas.

Budgetary Support: Considerable infrastructure such as hardware, software and labor require heavy investment. Organizations, which want to start e-learning system, should have enough funding. The lacuna on this part hinders the creation of better and interactive environment.

Quality of the Services:

Regular user surveys are needed to test the materials to ensure the higher quality of the services to its users; hence, they should be repackaged on periodical basis.

Copyright:

Libraries need to distribute copies of the same information to the distance learners. Therefore, librarians must be familiar with the sufficient rights to acquire intellectual property, especially in digital environment.

Thus, above major problems need the attention of the policy makers and of the librarians to be solved out for creating better e-earning environment.

Conclusion:

The new technology has important role to play in academic libraries. The introduction of ICT made substantial upgradation and changes in every area of science and technology. This has also brought reflective changes in academic world. There is emergence of new model of education and learning due to change in technologies. Under these prospective, libraries also adopt new information systems and

services, which proved mostly beneficial for improvement in its services. By using this technology, academic libraries are helping users access the vast amount of library resources, evaluate and select the best information for their specific needs. E-learning is adapted readily adapted by teachers and library palys important role in providing them authentic resources. Elearning has numerous benefits and should contribute much more to education. However, there are several challenges in implementing elearning at academic libraries which includes inadequate fund, lack of technical support, lack of training and support as well as lack of motivation and negligence by institutional management.

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WOUND HEALING PLANTS OF MAHUR TALUKA, NANDED DISTRICT, MAHARASHTRA

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ABSTRACT

Medicinal herbs are being used for treating different ailments in different parts of world by different communities. The present study explorations conducted in forest areas of Mahur talukas resulted in the information on the plants used in treating many diseases. This paper deals with wound healing plants. At the time of sports computation minor injuries are occur in trible areas the indigenous people are use herbal remedies. For which about 10 plants species belonging to 10 Angiospermic families are used.

Keywords:*Wound healing plants, Indigenous people, Mahur.*

Introduction

Mahur taluka is located in northern part of Nanded district. It is bounded North by Yavatamal district, South by Kinwat taluka of Nanded district East part by Adilabad district of Telangana and West by Pusad taluka of Yavatmal district of Vidarbh region.Geographically the Mahur taluka is situated between $19^0$49`to$19^0$83` North latitude and 77^0 91` to $77^0$55` East longitude. The total geographical area of taluka is 52,160 hectares of which 14397.39 hectares area covered with forest and 37762.61 hectares are non-forested area and its population is 86782 (Census-2001), out of this 15.5 percent is inhibited by tribal population of aborigines like Andh, Kolam, Gond, Naikede and Pradhan. Mahur taluka is a thick forested area of Nanded District. The main river is Penganga which flows from the South to North direction.

Materials and methods

For documentation of medicinal properties information and collection of plant material, several tours were undertaken during the period from 2021 to 2022. Data presented here is based on personal observations and interviews with traditional healers and the methodology used is based on the methods available in the literature. information about medicinal plants was documented in data sheets. For collection of plant material, local informer accompanied to authors. Plant identification was done by using regional floras and flora of adjoining districts. Plants used were compared with major published literature.

Enumeration

The present botanical explorations conducted in forest areas of Mahur taluka of Nanded District. resulted in the traditional plant uses of 10 plants species belonging to 10 families. Following data includes botanical name of species, vernacular name, family, plant part used, method of preparation of medicine.

Sr. No.	Plant Name, Family & Local name	Part Used	Mode of Preparation
1.	*Azadirachta indica* A. Juss. (MELIACEAE) 'Kadu- Neem'	Root	Crush and apply externally till cure.
2.	*Butea monosperma* (Lamk.) Taub. (FABACEAE) 'Palas'	Gum	Apply externally on wounds.
3.	*Datura metal* L. (SOLANACEAE) 'Kala Dhotra'	Leaves	Crush and apply externally
4.	*Dioscorea bulbifera* L. (DIOSCOREACEAE) 'Jatashankar'	Root tuber	Crush and apply externally.

5.	*Heliotropiumm indicum* L. (BORAGINACEAE) 'Burandi'	Leaves	Past apply externally till cure.
6.	*Holoptelea integrifolia* (Roxb.) Planch. (ULMACEAE) 'Basmia'	Root	Past apply externally twice only.
7.	*Jatropha curcas* L.(EUPHORBIACEAE) 'Jungli erand'	Latex	Apply externally till cure.
8.	*Parkinsonia aculata* L. (CAESALPINIACEAE) 'Bangali babul'	Leaves	Past apply externally till cure.
9.	*Tridax procumbens*L. (ASTARACEAE) 'Taklani'	Leaves	Crush with 'Jagreen' and past apply externally till cure.
10.	*Verbascum chínense* (L.)Santapu (SCROPHULARIACEAE) 'Pivla kutke'	Leaves	Past apply externally till cure.

Results and discussions

Information gathered from Mahur Taluka, Nanded district indicates that the village people of this region possess good knowledge of herbal drugs.

Majority of preparation are from leaves (05), underground parts (03) etc.

To test the scientific validity of the herbal preparations or drugs, clinical studies are required, which can establish therapeutic properties of these preparations for safe use.

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A STUDY ON BUSINESS STRATEGIES FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

India is agrarian country. The growth and development of Indian Economy is depending on Business strategy. Business is game changer part of development. Sustainable development is good business in itself. It creates opportunities for suppliers of 'green consumers', developers of environmentally safer materials and processes, firms that invest in eco-efficiency, and those that engage themselves in social well-being. These enterprises will generally have a competitive advantage. They will earn their local community's goodwill and see their efforts reflected in the bottom line. In this paper, Researcher described the concept of sustainable development and how management system and leadership support to sustainable development.

Keywords: *Business, Strategy, Sustainable Development.*

Objectives of Study:

- To study management system for sustainable development.
- To understand the management leadership for sustainable development.

Introduction:

The concept of sustainable development has received growing recognition, but it is a new idea for many business executives. For most, the concept remains abstract and theoretical. Protecting an organization's capital base is a well-accepted business principle. Yet organizations do not generally recognize the possibility of extending this notion to the world's natural and human resources. If sustainable development is to achieve its potential, it must be integrated into the planning and measurement systems of business enterprises. And for that to happen, the concept must be articulated in terms that are familiar to business leaders. The following definition is suggested: For the business enterprise, sustainable development means adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future. This definition captures the spirit of the concept as originally proposed by the World Commission on Environment and Development, and recognizes that economic development must meet the needs of a business enterprise and its stakeholders. The latter include shareholders, lenders, customers, employees, suppliers and communities who are affected by the organization's activities. It also highlights business's dependence on human and natural resources, in addition to physical and financial capital. It emphasizes that economic activity must not irreparably degrade or destroy these natural and human resources. This definition is intended to help business directors apply the concept of sustainable development to their own organizations. However, it is important to emphasize that sustainable development cannot be achieved by a single enterprise (or, for that matter, by the entire business community) in isolation. Sustainable development is a pervasive philosophy to which every participant in the global economy (including consumers and government) must subscribe, if we are to meet today's needs without compromising the ability of future generations to meet their own.

Enhancing Management Systems

- **Perform a stakeholder analysis**

A stakeholder analysis is required in order to identify all the parties that are directly or indirectly affected by the enterprise's operations. It sets out the issues, concerns and information need of the stakeholders with respect to the organization's sustainable development activities.

- **Set sustainable development policies and objectives**

The next objective is to articulate the basic values that the enterprise expects its employees

to follow with respect to sustainable development, and to set targets for operating performance.

- **Design and execute an implementation plan**

It is important to draw up a plan for the management system changes that are needed in order to achieve sustainable development objectives. Translating sustainable development policies into operational terms is a major undertaking that will affect the entire organization. It involves changing the corporate culture and employee attitudes, defining responsibilities and accountability, and establishing organizational structures, information reporting systems and operational practices. These changes are normally so substantial that a three-to-five-year plan with one-year milestones will be needed. Managing this type of organizational change requires leadership from senior management. The board of directors, the chief executive officer and other senior executives must be actively involved in the process. They need to lead by example, and to set the tone for the rest of the organization.

- **Develop a supportive corporate culture**

In order to ensure that the organization and its people give their backing to the sustainable development policies, an appropriate corporate culture is essential. In the process of implementing sustainable development or environmental management policies, many companies have experienced a kind of organizational renewal. The increased participation of employees not only generates practical ideas, but also increases enthusiasm for the programme itself. Most customers and employees enjoy being part of an organization that is committed to operating in a socially responsible manner.

- **Develop measures and standards of performance**

The implementation of sustainable development objectives, and the preparation of meaningful reports on performance, require appropriate means of measuring performance. Management control, as well as external reporting, depends in part on the availability of timely information about company operations. This is needed in order to allow management to assess performance against external and internal performance standards, using appropriate performance measures. Information systems will therefore need to be reviewed, to enable the necessary reports to be provided to management.

- **Prepare reports**

The next step in the process is to develop meaningful reports for internal management and stakeholders, outlining the enterprise's sustainable development objectives and comparing performance against them. Directors and senior executives use internal reports to measure performance, make decisions and monitor the implementation of their policies and strategies. Shareholders, creditors, employees and customers, as well as the public at large, use external corporate reports to evaluate the performance of a corporation, and to hold the directors and senior executives accountable for achieving financial, social and environmental objectives.

- **Enhance internal monitoring processes**

On an ongoing basis it will be important to develop mechanisms to help directors and senior managers ensure that the sustainable development policies are being implemented. Performance monitoring is well established as an important element of the management process. In many areas, it is directly linked to reporting. The key to any system's effectiveness is whether the management monitors operations and outputs on an ongoing basis.

Management leadership

Establishing sustainable development objectives, systems and monitoring mechanisms requires leadership on the part of senior management, and a commitment to continuous improvement.

- **The role of the board**

It is important that corporate sustainable development policies be implemented consistently throughout an organization. Too many business enterprises observe variable levels of corporate ethics and integrity, depending on the country in which they are operating. This double standard is inconsistent

with the concept of sustainable development, and ensuring that it does not prevail is an important role of the directors.

- **Self-assessment**

The first step for businesses in adopting sustainable development principles is to assess their current position. Management should know the degree to which the company's activities line up with sustainable development principles. This requires evaluating the company's overall strategy, the performance of specific operations, and the effect of particular activities. Various self-assessment devices are available to help this process, such as the GEMI and CERES questionnaires, as well as material tailored to specific industries – for example, the North American chemical industry's 'Responsible Care' programme.

- **Deciding on a strategy**

Once managers have gained an understanding of how its own operations shape up, they should gauge the performance of other, comparable organizations. Comparisons against the standards set by other industries and environmental groups can be instructive. This task should be relatively easy if there is reasonable public disclosure, organized industry associations and co-operative sustainable development programmes. However, if these structures do not exist, management could approach other businesses to discuss sharing information and possibly establishing an industry group.

- **Small business and private company considerations**

The road to implementing a sustainable development philosophy will be different for smaller businesses, but with ingenuity, perseverance and cooperation, they can achieve the desired result.

Conclusion:

Sound environmental performance is probably a reasonable objective for most businesses, with sustainable development as a longer-term goal. However, this can lead to confusion. In the developed world, the focus is on environmental management, while in developing countries, rapid and sustainable development is paramount. The global economy is coming under growing pressure to pay for the restoration of damaged environments. But this economic engine is being asked to help solve other pressing problems at the same time. The challenge is to solve all of these problems in a sustainable manner, so as to generate continuing development. Despite ambiguities about definitions, there is now widespread support for sustainable development principles within the business community. However, for that support to grow, it will be important to recognize and reward initiatives that are being taken to turn the concept into reality.

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ATHLETES' HEALTH AND ENVIRONMENT

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ABSTRACT

The main purpose of this article was to discuss the health and environment of athletes. Living and non-living elements are called environment. The life of a living thing depends on its environment. The environment plays a major role in the health of the players and sports performance. Therefore, the sports performance of the players can be effective. In this article, it has been discussed that water and air can have an adverse effect on the health of the players at the time of playing the game and at the places where the game is played.

Keywords: *Athletes, Health and Environment.*

Introduction:

Sports are words that everyone has played, experienced. In the present situation, if we talk about India, the attitude of Indian people towards sports is slowly changing, their feeling towards sports, their thinking is becoming positive. Talking about some time ago, peoples belief that, if you study well, you will become a Nawab, if you will play then you will become Kharab (bad). The one who was interested in studies considered smart, but on the other hand, the one who was interested in sports was considered as low level person. Not only this if had someone who wanted to make a career in sports, people used to laugh at him. But today situation is becoming opposite from before. Today, the situation of sports, their prevalence and their fame has increased a lot. Today money is also involve in sports, a players can earn more money through sports, people have come to know this and this is the main reason that people's thinking and their attitude towards sports has changed. Right now we can also look at sports as our career. The utility of sports is that it also helps us in keeping our self healthy and fit. People got to know that, sports are the key of our fitness and hence people start loving to play or join sports. In early age, when we start playing any game, we play for our entertainment, our recreation, for time pass purpose, don't have any rule compulsion, we make a rule for our convenience (its often changed), no discipline at all. But when we turn up, we got to know that if we want to play any game, then we must follow all discipline and rules seriously. Due to sports we can achieve the maximum level of fitness components such as strength, endurance, flexibility, agility and coordination, through regular exercise. In other hand through sports we can discipline our life too and socialize our self. If we play a team game, it's teach us how to coordinate with others, think about others also, in team we get new teammates, belong from different community, different region, how to merge with them and it would helpful for improve our personality in social community. If we study 2-3 hours continually, we felt tired then spend some time for playing or physical exercise, it helpful for regain our energy, feel relax and actively prepare for next activity.

Health and Environment

If someone asks you what is the most valuable thing in the world? So your answer can be gold, silver, diamonds or anything like that. But, the truth is that our health is our real treasure. If you are sick you cannot enjoy anything in the world. Healthy is not one who does not have any disease or one who is physically healthy. Health means total health. That is, the real meaning of health is physical, social, mental and emotional well-being. Good health is also about managing stress and leading a more active life. It is said that a healthy mind resides in a healthy body. A person who has good physical health, has more physical possibilities of doing work. That is, physical health is the main part of your overall health. Nowadays most of us are working from home, yet it is important that we set a routine for ourselves and stick to it. Having a regular

routine reduces stress and improves mental health. It would be better if your daily routine includes helping children in studies, completing office work from home, cooking, doing other household chores and health measures like asanas, exercises, pranayama etc. Environment is the living and non-living elements present in the environment of every individual. The life of every person or living thing depends on the environment. Also the health and sports performance of the players depends on the environment. Generally, environment is considered as the main elements such as water, air and land but these are the impersonal elements that are included in the environment i.e. social and economic elements. Many studies have shown that social and economic factors are closely related to athletes' health and sports performance. Human growth and health are closely related to the environment. Water and air are two elements that can adversely affect the health of the players, often directly at the time of playing the game and at the places where the game is played. That designation is discussed as follows. Just as every person needs water, water is more important for an athlete. It is very important for an athlete to maintain the level of water in his body at all times while performing sports. Athletes who do not balance their body water levels while playing sports or exercising are more prone to dehydration. Maintaining good water levels improves blood flow and circulation, thereby improving oxygen supply to each tissue. Due to the disruption of oxygen supply to the muscles, their movement becomes faster, so that the sports that the athletes have to perform can be performed in a better manner. Hydration helps in flushing out the body's accumulated dirt, it regulates the body temperature, keeps the agility and mental capacity of the athletes in order and helps in proper sports performance. In this context, Kenney, (2016) explained that due to lack of water in the body, sweat does not evaporate as it should and blood supply to the muscles does not take place and this leads to dizziness, nausea, vomiting, chills and headaches. A player may face many things. Players need to pay special attention to the water level and cleanliness of the water, the reason behind this is that the water content may be different in different places when the players have to go to different places to play. Drinking contaminated water can lead to many diseases. Another most important element for living things is air or we can say oxygen. Every person needs oxygen called Pranavayu. Air is an important element in the environment. Air is life-sustaining, apart from providing the oxygen necessary for life, air performs many functions. Athletes need more oxygen when playing sports or exercising. If the athlete is exposed to air pollutants during this time, adverse effects may include reduced lung function and difficulty in oxygen intake. During the daily practice, it is necessary to practice in a hygienic environment and on the ground without pollution, so it can be avoided from lung disorders and heart disorders. At the time of organizing the competition of marathon athletes, the pollution level at the place should be measured so that the impact on athletic performance and health can be prevented. At the time of training, the level of air pollution should be observed. Factories, automobile emissions, and other harmful environmental pollutants such as ozone gas, carbon monoxide and sulfur dioxide are the major polluters of air pollution. When athletes exercise more, they draw more air into their lungs, which can affect their health by inhaling toxins and dust particles. Without an adequate supply of oxygen, athletes cannot reach peak performance. Training and competing outdoors increases exposure to pollution, which can cause respiratory problems and cardiovascular disorders.

Conclusion

Environmental pollution has become a worldwide concern due to its effects on athlete health, the environment, and climate change. Hydration and fresh air intake are important whenever an athlete performs sports. Physical health and mental health depend on the environment itself. Various health related diseases can occur. Therefore, it is important to target environmental factors during exercise and play.

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HYDROTHERMAL SYNTHESIS OF NICKEL FERRITE-REVIEW

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ABSTRACT-

Nickel ferrite having formula $NiFe_2O_4$. Hydrothermal route is one of the most commonly used technique owing to its economics and high degree of compositional control. This does not require extremely high-processing temperature or sophisticated processing. This method has very simple reaction setup. Nickel ferrite are commonly obtained is characterized and its property studied by X-ray diffraction analysis, Scanning Electron Microscopy, Transmission Electron Microscopy, Fourier transform infrared spectroscopy, Vibrating sample spectroscopy, UV-VISIBLE Spectroscopy, Cyclic Voltametry, Electrochemical Impedance Spectroscopy. With help of this method, nickel ferrite upto 10nm size can be obtained. Hence hydrothermal synthesis is good choice for preparation of the ferrites.

Keyword- *nickel ferrite, hydrothermal, synergistic effect, substituted nickel ferrite, characterization technique.*

Introduction-

Nanospinel ferrite is soft magnetic material having formula MFe_2O_4 (M is divalent metal ion like Ni, Zn, Co, Cu etc.). It is most attracting class of materials due to their intresting and important properties as low melting point, high specific heating, large expansion coefficient, low saturation magnetic moment and low magnetic transition temperature etc[1-2]. Because of these properties, they have many applications as photoelectric device, catalysis, sensors, nano devices, microwave devices and magnetic pigment [3-8]. Properties of ferrites depend upon nature of ions, charges and their distribution among tetrahedral and octahedral sites [10].Nickel ferrites are one of the versatile and technological important soft ferrite materials due to their typical ferromagnetic properties, low conductivity and low eddy current losses, high electrochemical stability, catalytic behavior, abundance in nature etc [8]. This is inverse spinel in which eight units of $NiFe_2O_4$ go into a unit cell of the spinel structure. Half of ferric ions preferentially fill the tetrahedral sites (A-sites) and others occupy octahedral sites (B-sites) [11]. They can be represented by formula $(Fe^{3+})_A [Ni^{2+}Fe^{3+}]_B O_4^{2-}$ [12].They are prepared by various chemical methods such as hydrothermal, sonochemical, sol-gel methods, microwave plasma, co-precipitation, microemulsion methods, citrate precursor techniques and mechanical alloying for fabrication of stoichiometric and chemically pure spinel ferrite nanoparticles [10, 13-19]. Hydrothermal route is one of the most commonly used technique owing to its economics and high degree of compositional control. This does not require extremely high-processing temperature or sophisticated processing. By hydrothermal route at a temperature of ~150^{o}C ferrites can be prepared [10]. In this, one attempt has been made to review on hydrothermal synthesis of nickel ferrite and its characterization.

Method –

Hydrothermal synthesis is the heterogeneous reactions for synthesizing inorganic materials in aqueous media above ambient temperature and pressure. In this method, an aqueous mixture of precursors is heated in a sealed stainless steel/Teflon lined autoclave above the boiling point of water, and consequently, the pressure within the reaction autoclave is dramatically increased above atmospheric pressure. The synergistic effect of high temperature and pressure provides a one-step process to produce highly crystalline materials without the need of post annealing treatments. Hydrothermal strategies have also been developed to synthesize a broad range of nanomaterials, including magnetic nanomaterials. The reaction parameters, such as the type and concentration of the precursors, the solvent, the stabilizing agents, and the reaction temperature and time, present important effects on the products.

In typical hydrothermal synthesis, 1 mmol of nickel salt and 2 mmol of ferric salt dissolve in 80 ml deionized water follow by stirring to

form uniform dark brown transparent solution. pH is maintain basic more than 9, mostly 12 or 13. In most cases surfactant like cetyltrimethylammonium bromide (CTAB), hexamethylenetetramine (HMT) etc. is added. Then solution is injected teflon lined/steel autoclave and put in an furnace at temperature more than 100^{o}C to 220^{o}C for required hours. After that it allows to cool naturally. Product collected and rinsed with copious amount of ethanol and deionized water for several times followed by vaccum drying in oven. Then it allows sintering at temperature 400-800^{o}C for desired time in the electrical furnace. Ilmars Zalite et al. prepered nickel ferrite at different temperature 200-250^{o}C for 1-3hr p=17-17.5 MPa and after formation dried at 40^{o}C, particle size is found to be 22nm [20].

M. Hua et al. prepared hexamethylenetetramine (HMT) assisted nickel ferrite by maintaining pH 13 at different temperature 140,160,180 and 200^{o}C for 12 hr, particle size is found to be 81,69,63 and 46nm respectively [21]. K. Nejati and R. Zabihi prepared nickel ferrite at different temperature 45, 80, 100, 130 and 150^{o}C for 18 hour. They maintained pH 10 with help of 5M triethylamine in ethylacetate solution. A product was dried at vaccum oven at 70^{o}C for 3 hour. They used glycerol and sodium dodecyl sulfate as surfactant for preparation of ferrite, particle size is found to be 50-60nm [22]. M.S. Al-Hoshan et al. prepared nickel ferrite at 150^{o}C for 24 hr. precipitate obtained dried at 80^{o}C in vaccum oven overnight and sintered at 400^{o}C for 8 hr in furnace [23]. Miroslaw M. et al. prepare nickel ferrite at pH 12 and with 240^{o}C temperature for 8 hr then product were dried 60^{o}C for 24 hr. Then it sintered at 1200^{o}C for 1 hr, particle size is found to be 44.1nm [24]. A. Dias et al. prepared nickel ferrite at 175^{o}C for 4 hr at pH 7.5. Then product dried at 60^{o}C [25].

Now a day's researcher had tried to focus on substituted nickel ferrite beside to prepared pure nickel ferrite so as to study its effect of substitution and tried to explore new applications. The properties and new application of nickel ferrite can be developed by substitution of different divalent cation. R.S. Melo et al. synthesized nickel doped cobalt ferrite mamoparticles [26]. T. Krishnaveni et al. prepared NiCuZn ferrite at pH 9.45 with sintering temperature 900^{o}C for 4 hr, particle size is found to be ~20-60nm [27]. Anh T et al. prepared zinc-nickel ferrite with the help of 25% ammonia solution pH 8.5 at different temperature 120, 140, and 180^{o}C for 6 hr. finally it dried at 100^{o}C for 4 hr.

Techniques-

Ferrites are characterization and their property will be studied by using following

1) X-ray diffraction analysis (XRD)-
2) Scanning Electron Microscopy (SEM)-
3) Transmission Electron Microscopy(TEM)-
4) Fourier transform infrared spectroscopy (FT-IR)-
5) Vibrating sample spectroscopy (VSM)-
6) UV-VISIBLE Spectroscopy-
7) Cyclic Voltametry(CV)-
8) Electrochemical Impedance Spectroscopy(EIS)-

Conclusion-

Hydrothermal synthesis occurs with dissolution, precipitation, particle growth and structural reording. Hydrothermal synthesis gives magnetic nanomaterials with very high crystallinity because of its high-temperature and high-pressure reaction conditions. But in this method, it gives low yield of products. This method gives uniform crystallization ferrite. At some extent, we can see variation particle size by temperature and time of the reaction. Also this is very simple reaction setup to perform it. Hence hydrothermal synthesis is good choice for preparation of the ferrites.

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COASTAL-UNDERWATER DIVERSITY OF BIVALVE USING THE SOME ASPECTS OF STATISTICS, FROM COAST OF INDIA

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ABSTRACT

Coastal-Underwater diversity and taxonomy of edible bivalvemolluscsfrom, open sea, rocky substrata, sandy beach, and muddy habitat was studied and The Shannon diversity index and Evenness is calculated for the durationOctober 2017 to September 2018,also these study SCUBA equipment usedas per study conditions, due to scuba diving able to observe and study of natural condition of their habitat of species, The productive molluscan fauna in prevalence of different habitats so a wide chance of research to further explore on the possibility of ecological value and there conservation.

Keywords: *diversity,bivalve, coast of India.*

1. Introduction

In India the marine molluscs are recorded from the diverse habitats on the coastal region and in sea. They occur in different habitats such as mangroves, coral reef, rocky coasts, sandy beaches, sea grass beds and also at greater depth in the sea, they are more diverse and abundant in the rocky intertidal zone along the coast. Sandy stones, inter tidal flats, mangrove areas [1]. Mangroves are one of the biologically diverse ecosystems in the world, rich in organic matter and nutrients and support very large biomass of flora and fauna [2]. The gastropods are collected extensively for local consumption. Mangrove roots & lower parts of trunks provide substrate for oysters and mussels. Because these animals are filter feeders, they are confined to microhabitats below mean high water and are usually only abundant in areas adjacent to open water. The blood clam, *Anadaragranosa* and other cockles can be found in large numbers in mudflats on mangrove strands, where it lies partially buried in the sediment [3]. An oysters, mussels and clams serve the nutritional needs of the coastal population they are good source of minerals, protein, and glycogen and easily digestible compared to other animal food [4]. In India, till today, 5,070 species of molluscs have been recorded of which, 3,370 are from marine habitats [5]. The gastropods such as sacred chank, *Trochus*, *Turbo* are exploited from the Indian marine region [6]. The present study investigate the diversity of bivalvemolluscs of mangrove, rocky coasts, sandy beach from selected study sites of Raigad district coast of India.

2. Materials and Methods:A. Turbadi"A": (Lat. 18°14.469"North and Long. 073°01.156"East). The backwater soft muddy regions, there is exposed inter-tidal mudflatabout 40-50m during low tide, in dense large mangroves trees were present like*Rhizophoramucronata*(Lamarck),*Ceriopsta gal*(Perr.) (Robinson), *Avicennia alba*Blume with associated bivalve species *Crassostreacutuckensis* (Newton & Smith), *Saccostreacucullatea* (Born) were present during low water mark at high water mark to till low water mark, locality is about 100-150 m away from the village on the western side, there was one small natural protected jetty on the rock basement for the landing fish catch, during second survey whole muddy platform fulfill by stones granules and brick of Pisces, domestic water discharged occurred.

B. Waral "B": (Lat. 18°12.111"North and Long. 073°03.176" East). The back water soft muddy region,there is exposed inter-tidal mudflatabout 5-10m during low tide, the locality is on eastern side away from the village about 150-200m, so there is domestic discharge occurrence, in dense large mangroves trees were present like *Avicennia alba*Blume,and *Sonneatia alba*J.Smith.

C. Mendadi"C": (Lat. 18°11.036" North and Long. 073°02.999" East). The back water swamp muddy region, there is exposed inter-tidal mudflatabout 40-50m during low tide, the locality about 10-15m away from the village on the southern side, dense large mangroves trees

Sonneratia alba J. C. Smith were dominant, oysters were present on the black rocks, the village is attached to the locality due to there is domestic discharged, no fishing activates.

D. Pabhara"D": (Lat. 18°09.617" North and Long. 073°05.804" East). The back water soft muddy region,there is exposed inter-tidal mudflatabout 5-10m during low tide, on western side far away from the village the locality is about 100-150m, in dense small mangroves trees*Sonneatia alba*J.Smith., were present with pebbles in the soft mud, due to the nearest village ther is domestic discharge occurred, fishing activities were occurred by boat.

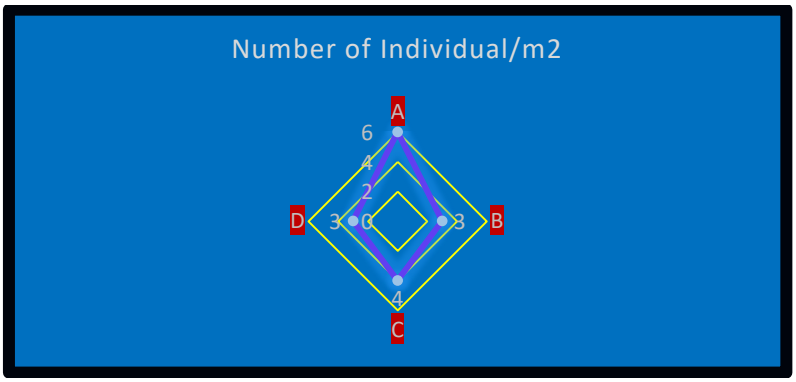
2.2 Live animals collected by handpicking including mangrove associated bivalve species during low tide. Five quadrates of nylon rope each 1-m² was prepared, randomly at each locality just over the bed. Twice in each season post-monsoon, winter and summer October 2017 to September 2018. Soon after fishing, they were brought to the laboratory and the shells were brushed to clean the fouling biomass and mud. They were then stocked in filtered seawater pumped in the laboratory from the localities for observation then animal preserved in 70% alcohol for taxonomical identification of morphological characters of typical animal, especially, lunal, umbo, and operculum. Internal parts teeth. The shells were identified from Zoological Survey of India, Kolkata. Also using the following references: Annotated checklist of Indian Marine Molluscs (Cephalopoda, Bivalve and Scaphopoda) Part-1 Ramakrishna and A. Dey. Occasional Paper no. 320, ZSI -2010.

3. Results: 3.1: According to "fig. 1". The four Orders, four superfamilies, four families, four subfamilies and sixspecies recorded from these four localities, Order Arcoida belongs to one superfamily and one family- Arcidae belongs to one species.Order Veneroida belongs to two families, and two subfamilies (Mrertricinae and Tapetinae) family Veneridae belongs to two species and family Corbiculidae belongs one species.While Order Ostreoida, suborder Ostrina, superfamily Ostreoidea, family Ostridae, Subfamily Crassostreinae and two species.It is an indicates much more diversity in muddy habitats. Shannon diversity index (H) = 1.3419, while Evenness is 0.9680.During study period. The edible bivalves are playing a vital role in the food those people living on the coastal line of India.

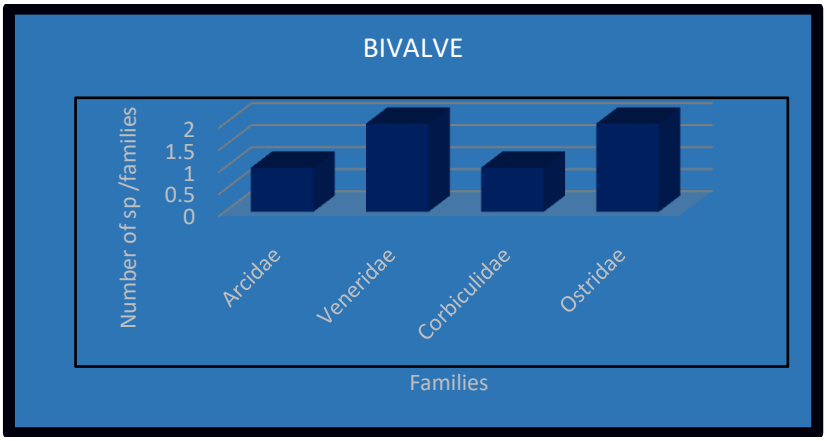
According to Shannon Wiener Diversity Index

No. of sample	pi=sample/sum	ln (pi)	pi*ln (pi)
06	**0.375**	**-0.9808**	**-0.3678**
03	**0.1875**	**-1.6739**	**-0.3138**
04	**0.25**	**-1.3862**	**-0.3465**
03	**0.1875**	**-1.6739**	**-0.3138**
sum=16			**Sum = -1.3419**

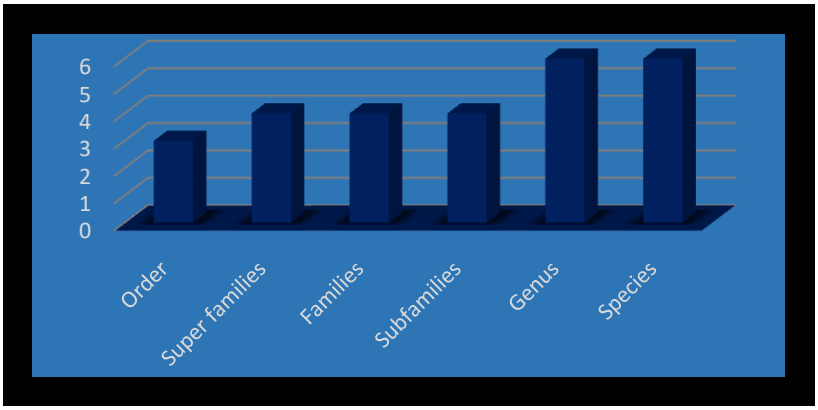
H= 1.3419
H_{max}= ln(N) = ln(4)=1.3862
Evenness = H/H_{max} = 1.3419/1.3862=0.9680
Result: Shannon diversity index (H) = 1.3419
Evenness = 0.9680



GRAPH NO.I.Bivalves recorded in number of individual/m².



GRAPH NO.II. Bivalves recorded in number of species/family from study site.



GRAPH NO.III. Taxonomical Identification of class bivalve fromstudy sites.

3.2: At the study site "A" and "C" has great diversity as compare to"B" and "D" due to the pollution. According to graph number I. Bivalve species recorded in number of individual/m², graph number II. Bivalves recorded in number of species/family from study site, and graph number III. Showing the taxonomical Identification and systematic position of class bivalve from selected study sites from coast of India.

4.Discussion:

4.1: The diversity of bivalvemolluscs at four localities of Raigad district coast varies significantly. The pulmonate snail *Cassidula nucleus* has been studied from Pichavaram mangroves [8]. The *Nerita (Dostia) crepidularia* in vellar estuary mangroves, its having a variety of habitats mangroves plant on the stems, intertidal mudflat during the high tide time animals moving to plant stem after that during low tide time animals moving to mud flats [10].The importance of ecology the relatively high temperature, high oxygen content, low wave energy and the semi-enclosed nature of the habitat. Decomposed minerals of the plant litter from August onwards is an important component of nutrient

cycling in wetlands & it harbours a large number of diverse species [7]. The lowest density was in the month of July because of monsoon season. In monsoon, due to self-dilution of the body fluid, the sensitive molluscs were unable to adjust the fluctuating osmotic balance quickly hence their mortality was high. After the month July because of adjustment, the mortality rate of molluscs decreased gradually. As a result, density of molluscs increased. It also understood that in the month of July, the salinity and temperature dropped down which made the condition adverse for the molluscs [10]. The population density was at its peak in the month of November during post monsoon period. It is clearly noticed by many research workers that the post monsoon period is the most favorable time for the new inflow of molluscan species. The mangroves support high density of every type of molluscan species especially, *Telescopium, Potamides, Natica, Nerita,* and *Littorina*and *oysters*. The *Littorina sp*. was densely found on the trunks, pneumatophores as well as on stilt roots of mangrove plants. It is good harvesting place for variety of molluscan species [7]. **4.2:** The bivalves and gastropods are generally benthos organism and they are regularly used as bio-indicators of aquatic healthy. These species can produce a billion of larvae in the form of planktons that sustains the biotic population & they have an essential role in food chain, & energy flow. The observation of these species populations in mangrove ecosystem is important to evaluate their condition [11]. In the region of *Nerita (Dostia) crepidularia*, *Littorinasp*, *Cerithideasp*, were observed to the mud banks, mudflats, mangrove forest, sandy muddy area swamps, prop-roots and pneumatophores. *Telescopiumtelescopium* were found in the mud flats of mangroves plants.

4.3: Mangroves are providing rich faunal resources from macro faunal communities to microbial diversity. Molluscs can reach high biomass in mangroves ecosystem because of high primary production within the food web, as predators, herbivores, detritivores& filter feeders. The numerical abundance & biomass of molluscs can be equally impressive. The numerous investigation of mangroves associated molluscs in the world wide, 39 species recorded of gastropods in as Australian mangroves, [12]. 23 molluscs species from the mangrove forest in Hong Kong [13]. 44 sp., of Sematan mangrove forest of Malaysia recorded [14]. A total account of Sundarban 56 sp.ofmolluscs 31 gastropods & 25 bivalves [15]. 12 bivalve & 13 gastropods mangrove associated molluscs at Ratnagiri recorded [16] 39 gastropods belongs 15 families from Raigad district coast recorded [17]. Gastropods are typically one of the dominant and most conspicuous macrofauna in mangrove systems, and occupy wide range of ecological niches.

5. Conclusion:

5.1: At the site "A"&"C"has greater diversity & commercial value and food importance for the common people. The total number & type of molluscs probably is influenced by their habitat & geographical condition. At "B"&"D" probably have suitable habitat to support rich diversity, also commercial, ecological food importance.At the all four study sites C*rassostreacuttackensis* and *Saccostreacucullata*are found, while *Marcia opima* recorded at the site "A", *Marcia opima* is used highly by common people because of their taste in marine food.

.**5.2:** The bivalves have a significant ecological role to play in the mangrove ecosystems, also rocky habitats is suitable especially for oysters. However very little information is available on the bivalve molluscan diversity of mangroves. Hence, the decreasing diversity probably because the chemical is mixing in the sea by the different kinds of industries. it is necessary to document the diversity of the group of threatened ecosystems. There is an urgent need conservation & sustainable utilization of bivalve molluscan species.

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AIR MYCOFLORA OF POMEGRANATE *(Punicagranatum* L) YARDS IN MARATHWADA REGION YEAR 2021-22

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ABSTRACT

Pomegranate (Punicagranatum L) is an important fruit cash crop of India. It is regarded as a commercial vital cash crop of India of the Punicaceae family, cultivated in tropical, subtropical areas. India is a leading country in the world in Pomegranate production in the world. Maharashtra is the main producer of these fruits. Twentyfungi and nonsporulating forms were observed in infected and healthy Pomegranateplants. A large number of fungi was recorded on PDA, GNA, and LMA from infected and healthy Pomegranate yards. Very few mycoflorawere recorded on RA and MRBSA media. It was noted that more air mycoflora was isolated from infected Pomegranate plants than from the phyllo-sphere of healthyPomegranateplants. It was very interesting to note that moreTrichoderma species were observed in the air of healthy Pomegranateplants than in infected Pomegranate plant yards.

Keywords– *Pomegranate, PDA & GNA, Trichoderma sps*

Introduction

Pomegranate*(Punicagranatum* L) is an important fruit cash crop of India. It is regarded as commercial vital cash crop of India of the Punicaceae family, cultivated in tropical, subtropical areas. India is a leading country in the world in Pomegranate production in the world. Maharashtra is a main producer of this fruits. It is a draught-prone fruit crop and hence cultivated on large scale in some districts of Marathwadaregion like Aurangabad, Osmanabad, and Latur.Some popular and high yielding varieties of Pomegranate, cultivated in Marathwada region are ***Ganesh***and ***Bhagwa*** .These varieties are subjected to various diseases of bacteria, fungi. However, these varieties get infected by the diseases like bacterial blight by bacteria and fungal disease like di back and soorgurooga caused by *Ceratocystisfimbriata, Fusariumoxysporum*.These are the major constraint.The *Fusarium wilt* diseases are hard to control including biological, chemical and cultural control methods and the use of disease-resistant varieties. Most of the Pomegranatediseases in the Marathwada region of Maharashtra are caused by fungi. However, bacterial and viral diseases have also been reported. Not all Pomegranatediseases are equally serious in all Pomegranateyards and varieties. Anthracnoseand rust are managed by application of fungicides with Bordeaux mixture as the leading one. Nowadays, a wide range of organo-phosphates, carbamates, thiocarbamates etc. are applied for the control of these diseases. These diseases can be kept under check by the observance of strict sanitation and regular spraying during the rainy season. But present investigation observed that the number of fungi seen on the leaf is harmful but some *Trichoderma* species are also seen on healthy yards.

Material and Methods

For the present investigation seven different media namely potato dextrose agar (PDA), Glucose nitrate agar (GNA) Czapek's agar (CZKA), Richards agar (RA), and Malt extract agar (MEA) were prepared and sterilized in an autoclave at 15lbs for 15 minutes and were used for isolation of air myco flora by Petri plates of different agar media were exposed over infected mango yards bought to laboratory and kept in an incubator for eight days at 27+-2 ^{0}c and the fungi growing on Petri plates containing different media were examined The fungi grown were examined microscopically and identification was confirmed.

Identification of Fungi :

The various fungi were identified to their generic and specific taxon on the basis of gross colonial and microscopic morphology. The fungi were identified on the basis of the shape, measurement, and size of the conidiophores, sporangiophores, vesicles, sterigmata, conidia, hyphae, and conidial head morphology by

using a binocular microscope (LABO Bio plan XL). Morphological studies were usually made from the material mounted on slides in Lacto phenol and cotton blue. Certain fungi, however particularly those imperfect species form chains of spores that were easily displaced. Such imperfect fungi were studied without disrupting their growth pattern.

Experimental Result

It is evident from Table shows that total twenty one fungi were observed from phyllosphere of Pomegranate. The most common and dominant fungi were *Alternaria alternate. Alernariatenius, Aspergillus niger, Aspergillus flavus, Cercospora sp.,* Curvalarialunata, *Fusarium oxysorum, Botrytis cineraBotryosphaeria ribs, Erysiphe cichoracearumErythriciumsaimonicolorPseud ocercosporamali, Phytophthora palmivora Pythium spiendens, Rhizoctonia solaniCurvalariatuberculata Penicillium citrinum, Penicillium expansum, Rhizopus oryzae, Mucor circinelloides Trichoderma viride,* and Non sporulating forms. The maximum fungi were observed during rainy season and lowest number of fungi were recorded on phyllosphere during summer seasion

Result & Discussion

1. Pomegranate is one of the most important fruit crops in the Marathwada region of Maharashtra. It makes the financial backbone of the farmers.
2. Twenty-one fungi were observed from infected and healthy Pomegranateyards.
3. The large number of fungi recorded on PDA & GNA media.
4. More *Trichoderma*sps observed fromhealthy Pomegranateyards than infected Pomegranate yards.

Table: Isolation of air mycoflora of infected and healthy Pomegranate yards on differentmedia

Sr. No	Mycoflora	Infected yards					Healthy yards				
		PDA	GNA	RA	MEA	CZKA	PDA	GNA	RA	MEA	CZKA
1	*Alternaria alternata*	-	-	-	+	+	+	+			
2	*Alternaria tenius*	+	+	+	+	+					
3	*Apergillusniger*	+	-	-	-	-	+				
4	*Aspergillus flavus*	-	+	+	-	-					
5	*Botryosphaeria ribs*	+	+	+	+	-					
6	*Cercosporasp*	+	+	-	-	-	+				
7	*Curvalarialunata*	+	+	+	-	+			+		
8	*Curvalariatuberculata*	+	-	-	-	+					
9	*Erysiphe cichoracearum*	+	+	-	+	+	+		+		
10	*Erythriciumsaimonicolor*	+	-	-	+	+					
11	*Fusarium oxysporum*	+	+	+	+	-					
12	*Phytophthora palmivora*	+	+	+	-	+					
13	*Pseudocercosporamali*	-	-	-	-	-					
14	*.Phytophthorapalmivora*	+	+	-	+	+					
15	*Penicillium expansum*	+	-	-	-	-					
16	*Pythium spiendens*	-	+	+	-	-					
17	*Rhizoctonia solani*	+	+	-	-	+					
18	*Rhizopus oryzae*	+	+	+	+	-					
19	*Trichoderma viride*	+	+	-	-	+	+	-		+	+
20	*Mucor circinelloides*	-	+	+	+	-					
21	*Non-sporulatring forms*	+	+	+	+	-					

Note + Percent, (-) Absent

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THE GENERATION, COMPOSITION &MANAGEMENT OF MUNICIPAL SOLID WASTE - A CASE STUDY OFWARD NO. 105, KOLKATA MUNICIPAL CORPORATION

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ABSTRACT

This paper presents a general over view of the current Solid Waste (MSW) management in Ward no.105 of Kolkata Municipal Corporation (KMC), West Bengal. Municipal Solid waste management plays an important role in improving the environment. But this is one of the most challenging issues in urban cities at present scenario, which are facing a serious pollution problem due to the generation of huge quantities of solid waste; we need to have a better understanding of the importance of SWM. A case study has been undertaken to understand the environmental as well as socio-economic impact of SWM. The study area selected for this purpose was Ward no.105 in Kolkata. The aim of this study was to discover and interpret the various factors that have led to problems of SWM in the ward. The observation and analysis showed that the particular ward generates more than 14 tonnes of solid waste per day. As a group, households are the single largest generators of Municipal waste in Kolkata. On an average maximum solid waste generated from household and market area and minimum from institution. The study was carried out to draw a relation between SWM, the effects of producing high rate of Solid Waste, development and impact of Solid waste management. The study was purely observational and based on interactions and interviews of the KMC officer on duty of this Ward and local people. A thorough study was also carried out based on reports and papers published so far on SWM of Kolkata Metropolitan Area. The results highlight that SWM directly and indirectly has caused changes in the ward. The various factors of poor SWM which may cause health issues have been highlighted in this case study. The increasing rate of solid wastes generation is primarily because of population growth. KMC management practices and awareness could be a step forward to a better Solid Waste Management. The study is concluded with a few fruitful suggestions, which may be beneficial to encourage the competent authorities/ researchers to work towards further improvement of the present system.

***Keywords**: Solid Waste, Solid Waste Management, Disposal, Public health, Waste Management Practice.*

1. Introduction

Solid waste management is defined as the discipline associated with control of generation, storage, collection, transport or transfer, processing and disposal of solid waste materials in a way that best addresses the range of issues like public health, nature conservation, economic, aesthetic, engineering, and other environmental considerations.

In its scope, solid waste management includes planning, administrative, financial, engineering, and legal functions. Solutions might include complex inter-disciplinary relations among fields such as public health, city and regional planning, political science, geography, sociology, economics, communication and conservation, demography, engineering, and material sciences.

Solid waste management practices can differ for residential and industrial producers, for urban and rural areas, and for developed and developing nations. The administration of non-hazardous waste in metropolitan areas is the job of local government authorities. On the other hand, the management of hazardous waste materials is typically the responsibility of those who generate it, as subject to local, national, and even international authorities.

Classifications of Solid Waste:

A. Source-based Classification:

- Residential
- Commercial
- Institutional
- Municipal
- Agricultural
- Open Areas

B. Type-based Classification:

- Garbage
- Ashes and Residues
- Combustible and non-combustible wastes
- Bulky wastes
- Street wastes
- Biodegradable and non-biodegradable wastes
- Dead animals
- Abandoned vehicles
- Construction and demolition wastes
- Farm wastes
- Sewage wastes
- Hazardous wastes
- Bio-Medical Waste
- E-Waste

SWM has socio-economic and environmental dimensions which include various phases such as waste storage, collection, transport and disposal, and the management. Environmental dimension includes avoiding disposing of wastes in the streets, storm water drains, rivers and lakes to preserve the environment, control vector - borne diseases and ensure water quality/resource. The problem of municipal solid waste management has acquired alarming dimensions in to changing lifestyles of people coupled with unplanned developmental activities, urbanization and industrialization, the waste quantity and characteristics. The physical and chemical characteristics of city refuse to show that about of it is compostable and ideal for biogas generation due to adequate nutrients, moisture content of 50-55% and a carbon-to-nitrogen ratio of 25-40. Therefore, the development of appropriate technologies for utilization of wastes is essential to minimize adverse health and environmental consequences nitrogen (N), phosphorus (P) and potassium (K).

Studies reveal that the percentage of the organic matter has remained almost static at 41% in the past 3 decades, but the recyclables have increased from 9.56% to 17.18%.

Solid waste management is an essential service in any society. Before introducing the process, however, let's start with a discussion of the material being managed solid waste.

Solid waste refers to the range of garbage materials arising from animal and human activities that are discarded as unwanted and useless. Solid waste is generated from industrial, residential, and commercial activities in a given area, and may be handled in a variety of ways. As such, landfills are typically classified as sanitary, municipal, construction and demolition, or industrial waste sites.

Definition of Solid Waste Solid waste is the unwanted or useless solid materials generated from human activities in residential, industrial or commercial areas. Solid wastes are the organic and inorganic waste materials such as product packaging, grass clippings, furniture, clothing, bottles, kitchen refuse, paper, appliances, paint cans, batteries, etc., produced in a society, which do not generally carry any value to the first use. Solid waste can create significant health problems and a very unpleasant living environment if not disposed of safely and appropriately.

Waste can be categorized based on material, such as plastic, paper, glass, metal, and organic waste. Categorization may also be based on hazard potential, including radioactive, flammable, infectious, toxic, or non-toxic wastes. Categories may also pertain to the origin of the waste, whether industrial, domestic, commercial, institutional, or construction and demolition.

Regardless of the origin, content, or hazard potential, solid waste must be managed systematically to ensure environmental best practices. As solid waste management is a critical aspect of environmental hygiene, it must be incorporated into environmental planning.

2. Literature Review

Solid waste management has become one of a major concern in environmental issues. This is particularly true to urban areas where population is rapidly growing and amount of waste generated is increasing like never before. Almost half of this population lives in urban areas. Waste generation increase proportionally to this population number and income, creating the needs of effective management Urbanization and industrialization leads to new lifestyles and behavior which also affects waste composition from mainly organic to synthetic material that last longer such as plastics and

other packaging material. E-waste that barely existed before was generated as much as now.
The management of waste become complex and the facilities provided cannot cope with the increasing demand and needs. Therefore, best approach need to be implemented immediately while considering environmental, social and economic aspects which are the drivers of sustainable waste management.
As a result of globalization, the quantity and generation rate of solid waste in Africa have increased tremendously and this calls for the need to salvage the situation before it gets out of hand. This article presents the review of solid waste trends in Africa from the pre-colonial era till the present day. It also discusses the composition of solid wastes, collection, transportation and disposal in different African countries.
(Solid Waste Management in Africa: A Review, Ibrahim Bello, Muhamad Norshafiq bin Ismail & Nassereldeen Ahmed Kabbashi. January 2016.)
In the twenty-first century, major emphasis should be levied on environmental safety and concern regarding human health. In this relevance, solid waste management need major attention. Awareness in society is profusely obligatory for minimization of solid waste generation. Careful study reveals that municipal solid waste (MSW) provides a major contribution to the total amount of solid waste. But e-wastes are the most frequently growing waste which is also an efficient source of various toxic elements.
(Solid Waste Management in India: A Brief Review: Proceedings of 6th Icon SWM 2016, Priyabrata Banerjee, Abhijit Hazra, Pritam Ghosh, Amit Ganguly, Naresh Chandra Murmu & Kumar Chatterjee. January 2019.)
Municipal solid waste management is a major problem faced by city planner all over the world. The main objective of this study to examine the current and environmental compliance status of the solid waste management system of Rohtak city. Total waste generation of the city is 189 MT/day and per capita, waste generation is 0.4 Kg/person. For proper management whole city is divided into six zones. Among which zone five and six covers surrounding nine villages. The present service area covered by the bins are less than 50 percent.
(A Case Study on Municipal Solid Waste Management System of Rohtak City, Haryana, India, Meena Deswal & J S Laura. June 2018.)
Most urban areas in the country are plagued by acute problems related to solid waste. It is estimated that the total solid waste generated by 300 million people living in urban areas is around 40 million tonnes/year. Municipal Solid Waste (MSW) is a heterogeneous mixture of different constituents out of which around 50% is organic. Municipal Solid Waste management (MSWM) is perhaps the most essential service required by urban population to combat the severe implications that MSW may have on their health and to the overall environment.
(Municipal Solid Waste Management in West Bengal, M Sanyal, Anirban Das, Arunabha Majumdar, Pankaj Kumar Roy, Asis Mazumdar. February 2010.)

3. Objectives Of The Present Study:

The purpose of this study is to assess the current practices and state of solid waste management systems (SWMS) in one mediumsized municipal ward, identifying main issues and problems along with its ineffectiveness, inefficiency and also to gain some suggestions and recommendations to improve the SWM infrastructure and practices in such wards of Kolkata. Municipal solid material generation and their disposal is a major and critical issue in almost all municipal wards of Kolkata. It can harm local environment, as well as pollute underground potable water.
It may also become responsible for dissemination of various diseases in urban areas and its peripheries. Present investigation has been planned to include the target of municipal solid waste management by reducing the quantity of routine production of waste and proper disposal of waste along with recovery of materials and energy from solid waste. All such practices do not have much requirement

of any kind of specific raw material and energy inputs for technological processing.

The proposed investigations have the following

- The primary goal of solid waste management is reducing and eliminating adverse impacts of waste materials on human health and the environment to support economic development and superior quality of life. This is to be done in the most efficient manner possible, to keep costs low and prevent waste build-up in the study area.
- To identify the composition of household waste in the study area.
- To study the waste collection system in the study area.
- To study the temporary waste storage system in the study area.
- To access the environmental impact of the waste collection transportation and storage in the study area.
- To identify the ultimate disposal system of solid waste odour pollution in the study area.

4. Research Work

4.1 Methodology

- This case study has been done to understand the impact of solid waste management of ward no.105, Kolkata.
- The study was observational.
- In the first phase of the study, a questionnaire survey was carried out to KMC officer & local people.
- Data was collected based on interaction with the:
  - KMC officer (On duty of this particular ward)
  - Local people
- A thorough survey of the study area was done with photoshoot, information gathered from individual area of this ward.
- The standard methodology adapted for the Municipal Solid Waste and management according to the rule is shown in figure. This method is configured as a reference practice for SWM in this study.

Figures Showing Solid Waste Management Procedures of Ward No. 105 Kolkata

4.2 Brief description of the study area

Ward No. 105, Kolkata Municipal Corporation is an administrative division of Kolkata Municipal Corporation in Borough No. 12, covering parts of Haltu (Baidyapara – Jadavgarh - Ashutosh Colony - Sarat Bose Colony-Nazir Bagan-Sucheta Nagar - Neli Nagar) and Garfa (Manasatala) neighborhoods in South Kolkata, in the Indian state of West Bengal. Ward No. 105 is bordered on the north by Sarat Ghosh Garden Road and Haltu Main Road; on the east by K. P. Roy Lane; on the south by Baidyapara Road and the canal and on the west by Garfa Main Road.

The ward is served by Garfa police station of Kolkata Police. Patuli Women police station has jurisdiction over all police districts under the jurisdiction of South Suburban Division, i.e., Netaji Nagar, Jadavpur, Kasba, Regent Park, Bansdroni, Garfa and Patuli. As per the 2011 Census of India, Ward No. 105, Kolkata Municipal Corporation, had a total population of 21,267, of which 10,609 (50%) were male and 10,658 (50%) were female. Population below 6 years was 1,226. The total number of literates in Ward No. 105 was 18,811 (93.86% of the population over 6 years).

5. Results And Discussions

5.1 Current waste generation status of ward no. 105

5.1.1 Waste Generation

Waste, which arises from virtually human's activities, can be classified conveniently with their source. Major categories include household and consumer wastes, industrial wastes, agricultural wastes, extraction wastes, energy production wastes and sewage sludge. Waste can also be classified by hazard and by composition. Information on waste arising, particularly on industrial and hazardous waste, is often difficult to assemble. Inefficient data collection methods, infrequency of surveys, reluctance of industry to supply information, and confusion over definitions of hazardous waste --- are all contributory factors.

5.1.2 Municipal Waste

The term "municipal wastes" applies to those wastes generated by households and to wastes of similar character derived from shops, offices and other commercial units. Packaging materials are becoming an increasingly important component of municipal wastes in developed countries. Many small business, commercial units and hospital, especially those in developing countries, rely on municipal waste Services. Consequently, the municipal stream may often contain some hazardous wastes, such as hospital wastes, paints, solvents and batteries. Careless handling and disposal of municipal wastes may thus pose a threat to human health.

5.2 Present Waste Management Practice AT KMC

All activities and in terms of solid waste management in this area are performed under four heads. Such as –

- Waste collection
- Transportation of waste
- Disposal of waste

The expenditure of Kolkata Municipal Corporation for more than 70% are expended for waste collection and only 5% are used for final.

5.3 The Present Scenario Of Solid Waste Management In Ward No.105, Kolkata

The present procedures observed during the study are as follows –

5.3.1 Waste Collection Procedure of Ward no.105, Kolkata

Kolkata Municipal Corporation is responsible for collecting the garbage from different areas of this ward. Municipal Authority is collecting this garbage in regular manner. In this area there are houses, shops, markets, offices, hospitals, little factories – major sources of garbage producers are located at specific areas. There are numbers of big dust bins in several area. Garbage is accumulated in this bin from adjacent areas. In each area four sweepers are working and each of them wear blue dress. Besides that two persons are involved for collecting garbage from door to door. In market area, extra two sweepers are provided. There is no open drainage system. So sweepers are involving in sweeping the roads and collecting the garbage and transferring the waste into the bins. The collection of waste from these dust bins is frequently done where numbers of sweepers involved are more. The collected garbage is carried by small cart, tractors or trucks which are dedicated for collection purpose.

5.3.2 Transportation of Waste

Collected garbage is transported to the disposal areas in specific manner. It starts from small dumper and ends into big dust bins. Among the

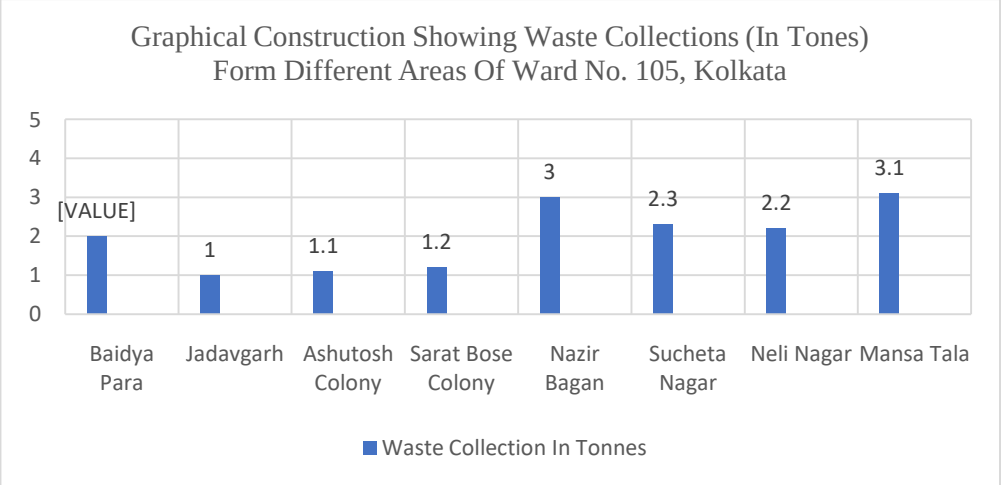
collected garbage, both degradable and non-degradable wastes are present. It is alarming that several plastic products are dumped into the dust bins. Several types of vehicles are used for transporting garbage to disposal sites which are as follows: **i)** Tri cycle cart **ii)** Tractor **iii)** Tipper Truck Six tri cycle carts are provided in each area for collection of garbage from door to door. But in market area extra two tri cycle carts are provided. One tipper truck and one tractor are provided in the area. Tipper truck and tractor both are giving from a area. One truck can carry approximately fifty bins and one tri cycle cart can carry garbage. Eight people are provided in the truck and five people are provided in the tractor. The tractors and dumpers carrying waste are not covered or partially covered during the journey and waste tends to spill on the roads. The loading and unloading of waste is done through manual as well as mechanical system.

All these solid wastes collected either by "Door-to-Door" collection process or dumped by residence in a common community pits/vat/mechanized container. Ragpickers often collected recycled wastes from household or from community storage site.

- Segregation materials should be done by municipal authority by promote recycling and reused waste by create or organized an awareness programs and campaign. The municipal authority shall take in charge phased programs to ensure community participates in waste segregation programmed. For this purpose, the municipal authorities shall arrange regular meetings at quarterly intervals with representatives of local resident welfare associations and non-governmental organizations.

Sl. No.	Area	Waste Collection (Tones/Day)
1	Baidya Para	2
2	Jadavgarh	1
3	Ashutosh Colony	1.1
4	Sarat Bose Colony	1.2
5	Nazir Bagan	3
6	Sucheta Nagar	2.3
7	Neli Nagar	2.2
8	Mansa Tala	3.1

Table 1 (Waste Collection in Tonnes From Different Areas Of Ward No. 105, Kolkata)



Graphical Construction 1

5.3.3 Disposal of Waste

Usually, garbage is disposed in well-defined disposal site as landfill. All transport fleets dump their waste, which often transport with cover from interim storage sites. All categories of wastes earlier dumped together in disposal sites.

Normally the collected waste of this Ward No. 105 under KMC dumped at the disposal site is

DHAPA which is located to eastern metropolitan bypass. Bulldozers are used at DHAPA disposal site to areal extended and label the waste.

➢ **Importance of Waste Disposal**

There are a few reasons. First, to keep our world from being one big trash can. Two, to prevent toxins from seeping into our soil and groundwater supplies. Three, since there is so very much trash, to separate out anything reusable or recyclable. or even compostable. Finally, to avoid methane emissions that landfills produce. There are more.

➢ **Waste Disposal and Processing Techniques**

Waste disposal is the final stage of the waste management cycle. About 90% of the municipal waste collected by the civic authorities on duty of this ward and dumped, which have no provision of leachate collection and treatment.

Method Of Disposal	Merits	Demerits
Land filling	• Easy operation • Land gets labeled	• Required large area • Chances of land and water contamination in adjoining areas
Open land dumping	• Easy for segregation by ragpicker • Low-cost dumping	• Environment pollution risk is high • Large area required
Burning/Incineration	• Operation is easy • Reduced waste volume	• Air pollution problem in site • Formation of smog
Processing and Bio-conversion into compost	• High useful ecofriendly process	• More cost is involved

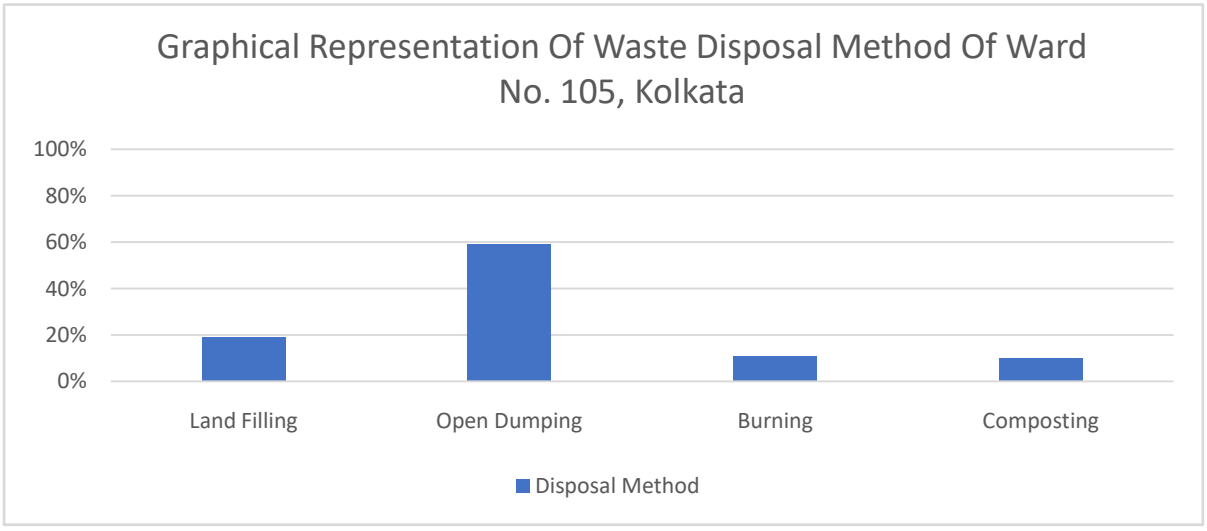
Table 2 (Methods of disposal with merits and demerits)

➢ **Methods of disposal of solid waste in ward no. 105, Kolkata**

The collected waste of this Ward No. 105 under KMC dumped at the disposal site. Percentage wise methods are given in the table below –

Methods of disposal	Msw (in percentage%)
Land filling	19%
Open land dumping	59%
Burning/incineration	11%
Processing and Bio-conversion into compost/Bio gas/Bio ethanol	10%

Table 3 Methods of disposal (in percentage%)

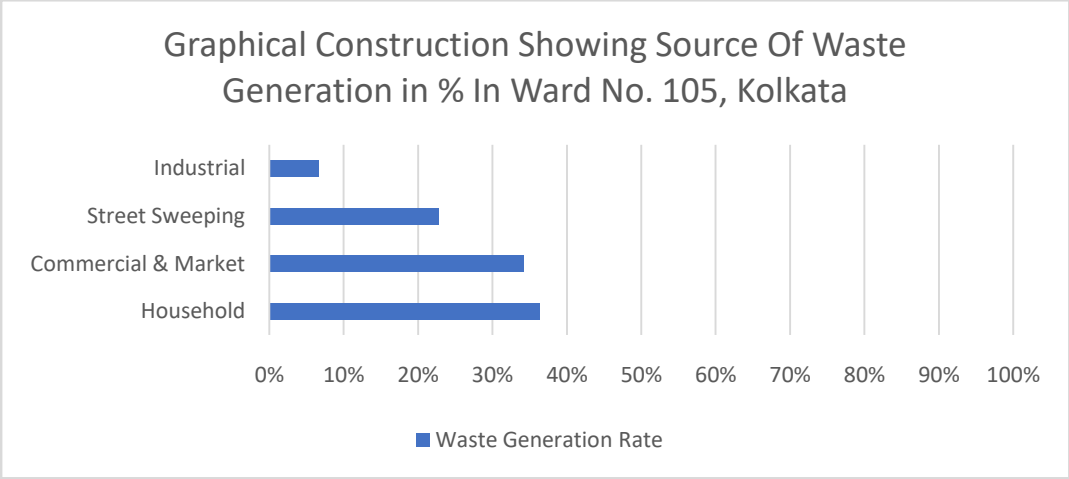


Graphical Construction 2

5.3.4 Major sources of solid waste of ward no. 105, Kolkata

Major sources of sw	Waste generation rate (in %)
Household Waste	36.37%
Commercial & Market Waste	34.20%
Street Sweeping Waste	22.81%
Industrial Waste	6.62%

Table 4 (Sources of Waste Generation in %)



Graphical Construction 3

5.4 The Quantitative Analysis Of MSW Of Ward No. 105, Kolkata

The percentage of recyclable materials (glass, paper, plastic, metals) has been found to be very low. (This may be due to rag pickers, who collect and segregate recyclable materials from disposal points). The major waste types are shown in the below table (in %).

Waste Type	Waste Quantity (in %)
Organic Part	48.98%
E-Dash	21.21%
Several Components	21.031%

Table 5 (Quantitative Analysis of MSW of Ward No. 105, Kolkata)

7. Conclusions

1. The KMC should make certain modifications and improvements to solid waste management services which have been practicing. This is not sufficient to mitigate the present and future problems related to solid waste management in ward no.105, Kolkata. To achieve a target of 100% collection, transportation, treatment, and disposal, Municipal Corporation would first need to prepare a macro plan which would identify the quantity of waste generated in the whole municipality area and the broad strategy to be adopted to manage the system. This should be followed by a micro or locality-based plan, which would provide details as to routes, timing, equipment, and manpower deployment.
2. Considering the nature and components of waste generated by households and business places, the waste reduction, reuse, recycling and composting processes would be more suitable in managing the challenge. These management options should be integrated in a sustainable framework.
3. Human ways of life have placed pressure on the environment and have caused imbalance in the eco systems by the producing, consuming and wasting of natural resources. Most countries evidently

have major effects on the environment due to SW generation with economic development since the natural resources are used, and waste and pollution are produced. Therefore, the concern towards the management of solid waste as an integral part for sustainable development has increased.

4. This study explored the importance of SWM for sustainable development with the concern of new development process.
5. There were four research objectives to be achieved with the study. The first objective was to study the characteristics of solid waste management practices in the area. The researcher investigated the environmental impacts of solid waste management practices and assessed how waste management practices can contribute to sustain the development processes in ward no.105, Kolkata. Establishing an understanding of the perception amongst local communities regarding solid waste management for sound environmental development was also a concern. It is clear that improper waste management practices have a significant impact on the natural environment and sustainable development in the study area. Thus, awareness about SWM impact on sound environmental development or/and sustainable development in seemingly low. Therefore, it is important that the SWM should be developed from the primary level. Waste storage and primary disposal are the dominant means of managing waste. Thus, it has caused significant challenges in the study area. Therefore, waste separation from the household level, proper storage, more efficient waste collection systems, and sustainable recovery and disposal practices are identified as needed process in the study area.
6. Assessment of waste generation is essential for for-emulating the solid waste management system. While per capita waste generation is a statistic, which is necessary for indicating trends in consumption and production, the total weight and volume of waste generated by the community served by the management system are of greater importance in planning and design. On the basis of the information furnished by the KMC officer and local people in the given questionnaire and the survey conducted in various area from time to time the per capita waste generation rates have been calculated based on the various population ranges.
7. The ultimate fate of all solid waste whether they are residential wastes collected and transported directly to a landfill site, residual materials from Materials Recovery Facilities, residue from the combustion of solid waste, rejects of composting, or other substances from various solid waste processing facilities. As a result, good amount of solid wastes are remaining accumulated various places in the area creating problems to public health and the environment, Municipal solid waste generation may be dependent on the population density. In order to assess dependency of municipal solid waste generation on population density data analysis were undertaken for that particular area, ward no.105, Kolkata. Characters of the waste were studied at the field as per standard method and quantifications were assessed for garbage, ash, paper, plastic ceramic, glass, rags etc.The existing SWMS studied for the Kolkata metropolitan areas indicate the estimated waste generation rates in ton/day for various population ranges in this area ward no.105, Kolkata.
8. In ward no.105 having population less than 50,000 the waste generation ranges in approx. 14-16 tonnes/day. Average generation of solid waste is therefore 16 tonnes/day. The residents in densely populated areas will have no other alternative but to keep all solid wastes in the household or community containers. So, chances of waste thrown in vacant plots will get reduced considerably in densely

populated areas. Further in densely populated area the socio-economic conditions are comparatively higher.

9. The present study has reflected the above phenomenon. We know the population density cannot be maintained but waste generation can be maintained through source minimization of the ward no. 105, Kolkata. Uncontrolled dumping of MSW is practiced in majority some of the area. This practice causes aesthetic pollution and also degrades the environmental quality option. The quantitative analysis of MSW revealed that 48.98% waste was comprised of garbage i.e., organic part. Around 21.91 % of MSW consists of ash/earth/silt (inert matter). The rest 29.031% wastes were found to be the mixture of several components i.e., paper, plastic, rags, cotton, leather, rubber, glass etc. The study also indicated the organic part of SWM ranged between 37.02% and 68.93%. The ash contents of MSW have been found to be in higher proportion (40.72% to 21.50%) where the ash content was found to be 3.5 %. The percentage of recyclable materials (glass, paper, plastic, metals) has been found to be very low. This may be due to ragpickers, who collect and segregate recyclable materials from disposal points.

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APPLICATIONS AND BENEFITS OF GREEN CHEMISTRY: A STUDY

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ABSTRACT

Green chemistry is the branch of Chemistry which is focused on the design, manufacture of chemical products to deliberately eliminate or reduce the use and generation of hazardous substances.. It gives emphasis on the reduction, recycling or elimination of the use of hazardous and toxic chemicals in processes by finding alternative or creative routes for making the desired products which minimizes the impact on the environment. Paul Anastas and John Warner postulated 12 principles of Green Chemistry based on the minimization or no use of toxic solvents in chemical reactions. It analyzes the no formation of residue or waste products. Green Chemistry has influenced the various sectors like industrial, pharmaceutical, educational, environmental, research areas etc. to achieve the goal of sustainable environment. Green Chemistry is building a safer, progressive, more sustainable, healthy and prosperous mother earth planet for the humans and living environment.

Keywords: *Green Chemistry, eco-friendly, sustainability*

Introduction

Chemistry has become a very fundamental part of daily life since the last few centuries. Chemistry has brought major revolutions which raised the quality of life by advanced medicines, clothing, fertilizers to increase crop production etc. Along with the same advances in Chemistry it is also having negative and harmful effects of some chemicals on the environment as well as human health which are in a long use. Environmental pollution is one of the biggest problems the world is facing today. The main cause of this is mixed organic solvents, thrown toxic chemicals, drainage into water resources, toxic gases drained from industrial chimneys. To reduce this negative impact of toxic chemicals, the chemists and researchers are searching for alternative solutions. In the world of growing population and limited resources, the answer to sustainable innovation, eco-friendly and efficient production is Green Chemistry. The term Green Chemistry was first used by Paul T. Anastas[1] in 1991to implement sustainable development in Chemistry at industrial, research and academic level. [2,3]

Green Chemistry is the branch of Chemistry to design and apply chemical compounds and reactions to reduce the use and synthesis of chemical hazards for the environment. Green Chemistry works under two main concepts:

1. The problem of efficient utilization of raw materials and elimination of its waste materials
2. The environmental issues related with the production, application and reuse or disposal of chemicals.

To synthesize the desired products by minimizing the harmful effects of toxic chemicals on the living environment, is the main aim of Green Chemistry.[3-5]

It gives a new approach for synthesis and designing of drugs and other chemical compounds having eco friendly, efficient and economical advantages as compared to the conventional processes.[6]

Anastas and Warner proposed a set of twelve principles of Green Chemistry to create safer and most efficient ways to synthesize products, reduction of waste and elimination of hazards.

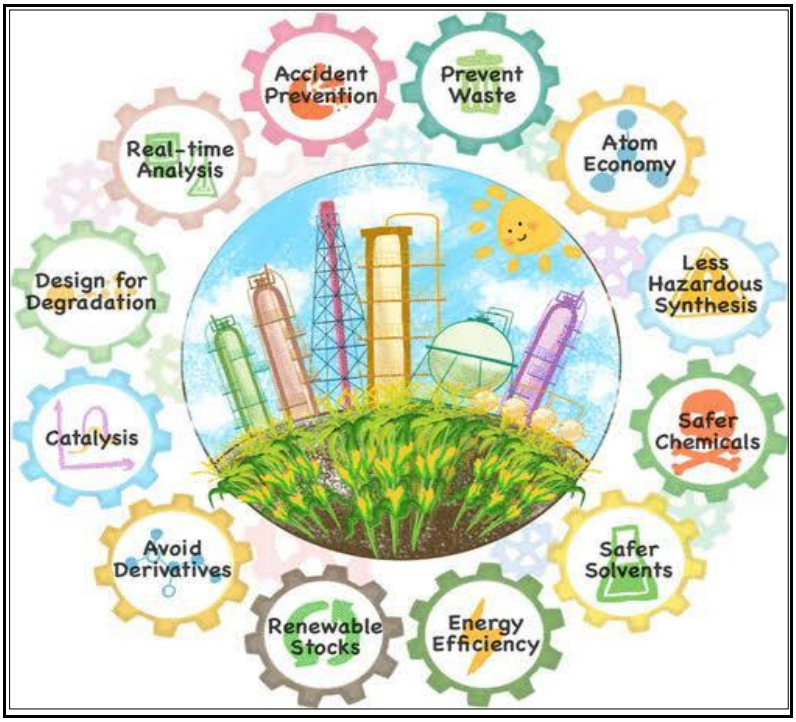


Figure 1: Principles of Green Chemistry [7]

The Twelve Basic principles of Green Chemistry are as follows:

1. **Prevention**: It is better to prevent waste than to treat or clean up waste after it has been created.
2. **Atom Economy:** Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.
3. **Less hazardous chemical synthesis:** Synthetic methods should be designed to use and generate substances that possess no toxicity to the human health environment.
4. **Designing Safer Chemicals:** Chemical products should be designed to affect their desired function while minimizing toxicity.
5. **Safer Solvents and auxiliaries:** The use of auxiliary substance (e.g. solvents, separation agents, etc.) should be made unnecessary wherever possible
6. **Design for Energy Efficiency:** Energy requirements of chemical processes should be recognized for their environmental and economic impacts and should be minimized. If possible synthetic methods should be conducted at low temperature and pressure.
7. **Use of Renewable feedstocks:** A raw material or feedstock should be renewable rather than depleting whenever technically and practicable.
8. **Reduce Derivatization:** Unnecessary derivatization (use of blocking groups, protection/deprotection, and temporary modification of physical/chemical processes) should be avoided whenever possible. As such steps require additional reagents and can generate waste.
9. **Catalysis**: Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.
10. **Design for Degradation:** Chemical products should be designed so that at the end of their function they do not persist in the environment and breakdown into innocuous degradation products
11. **Real time analysis for pollution prevention:** Analytical methodologies need to be further developed to allow for real-time in process monitoring and control prior to the formation of hazardous substances.
12. **Inherently safer Chemistry for accident prevention:** Substances and the form of substance used in a chemical process should be chosen so as to minimize the potential for chemical accidents, including releases, explosions and fires.

- **Applications of Green Chemistry in various fields:**

1. In everyday life:

A. Solar water heater: The installation of a solar water heater reduces the energy costs at lower initial expenses.

B. Building with Green technology: The Green building reduces environmental problems. The reusable materials, green roof, solar power, water conservation, energy efficient windows make green buildings more sustainable by producing economically attractive buildings. And improving the quality of life.

C. Green Dry Cleaning of clothes: Perchloroethylene (PERC) is used as a solvent for dry cleaning commonly. Joseph et.al. developed the technology called micelle technology in which CO_2 is used as a solvent and a surfactant for dry cleaning. It helps to remove the use of halogenated solvents.[8,9]

D. Rainwater Harvesting system: The rainwater is stored in a barrel or cistern by the rain collector system. This is used for non potable use like irrigation, watering of plants, toilet use etc. These systems are very affordable.

E. Biodiesel Production: Biodiesel is produced from used cooking oils, vegetable oils, yellow grease or animal fats. It is superior to a petrodiesel. As it is obtained from renewable resources, it benefits the environment.[10]

2. In Pharmaceutical Industry: Pharmaceutical companies are improving to a very high extent to save the environment by using green chemistry to produce drug molecules. Some of the effective and less toxic methods are as follows:

A. Anasts have explained the synthesis ofNaproxen with chiral metal catalyst containing BINAP (2,2'-bis[diphe-nylphosphino]-1,1'- binaphthyl) ligand having good yield and mild reaction conditions.Fig.2 [11]

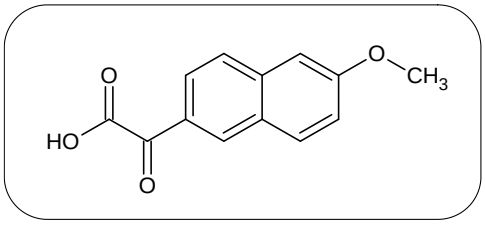


Figure 2: Neproxen

B. Aspirin can be synthesized by microwave irradiation followed by the use of catalysts like H_2SO_4, $MgBr_3$, OEt_2, $AlCl_3$, $CaCO_3$, NaOAc, Et_3N. Ingrid et.al. have designed a solvent free approach for the synthesis of Aspirin providing greener alternatives to the conventional synthesis.Fig. 3 [12]

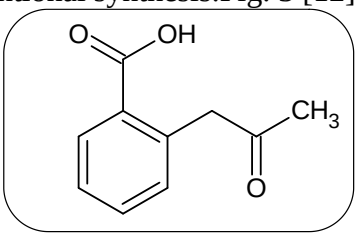
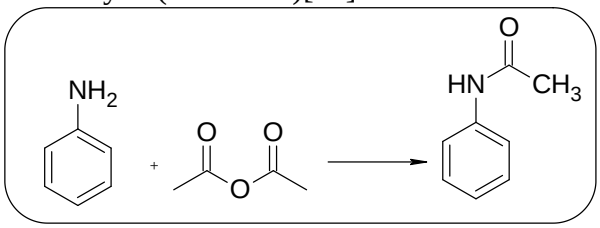


Figure 3: Aspirin

C. The one-pot synthesis of amine using acetic anhydride under room temperature and pods of*Acacia concinna* fruit as a green catalyst. (Scheme 1)[13]



Scheme 1

D. Ibuprofen (non steroidal and anti-inflammatory drug) synthesis is based on the principles of Green Chemistry, which reduces the production of unwanted by-products.Fig.4[14]

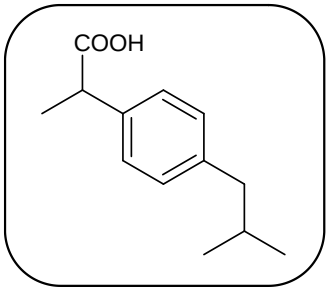


Figure 4: Ibuprofen

E. The synthesis of jasminldehyde by the condensation of 1-heptanal and benzaldehyde in 1:5 ratio in the presence of chitosan as a catalyst in the nitrogen atmosphere, so as to prevent the formation

of acids from aldehyde. This method requires less reaction time and no toxic waste is formed.Fig.5[14]

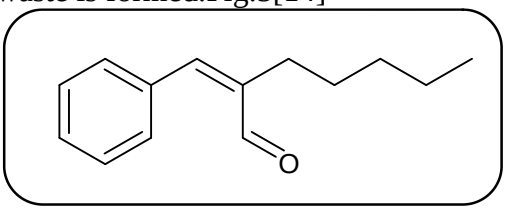
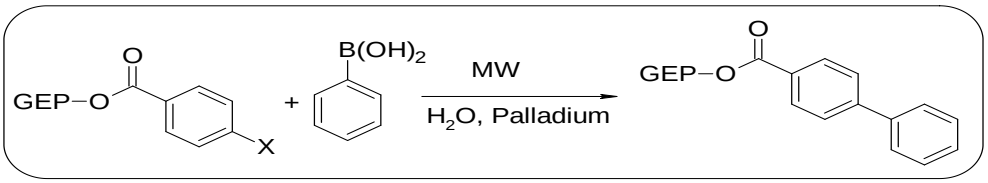


Figure 5: Jasminaldehyde

3. In Research Laboratories:

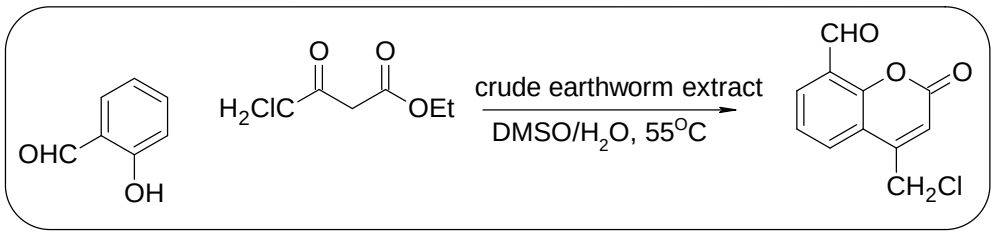
A large number of biocatalysts and green catalysts are used in the synthesis of chemical compounds by the researchers and chemists. It provides a greener and safer pathway for the reaction.

1. Highly fluorinated compounds on solid phase PEG with microwave irradiation, synthesized by Lew et.al. PEG is a soluble polymeric support for small molecule synthesis and eases the purification after reaction.(Scheme 2)[15]



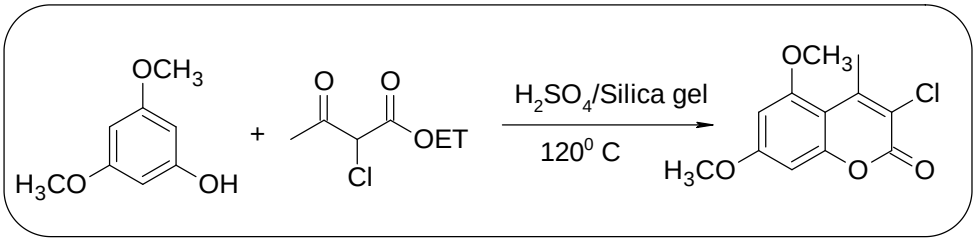
Scheme 2

2. Coumarin derivatives are synthesized by Guan et.al.by the reaction of various salicaldehyde derivatives in the presence of crude earthworm extracts with different β ketoesters.The yield for the same was 32-87% in water/DMSO. The catalyst used earthworm extract is eco friendly, affordable, easily available, stable and environmentally benign.(Scheme 3)[16]



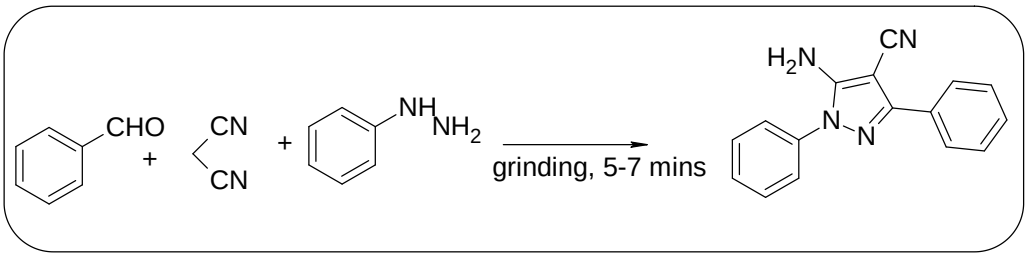
Scheme 3

3. One pot synthesis of coumarincatalyzed by silica gel along with H_2SO_4 without solvent, is a green pathwayby avoiding toxic and hazardous catalysts and solvents. The (Scheme 4) is mentioned as follows:[17]



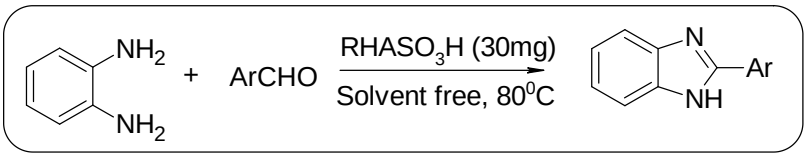
Scheme 4

4. The synthesis of polysubstituted amino pyrazoles by grinding, one pot three component system without catalyst, showed that most of the synthesis of pyrazoles are multi-step requiring expensive catalyst, anhydrous condition, inert atmosphere and long reaction time.(Scheme 5)[18]



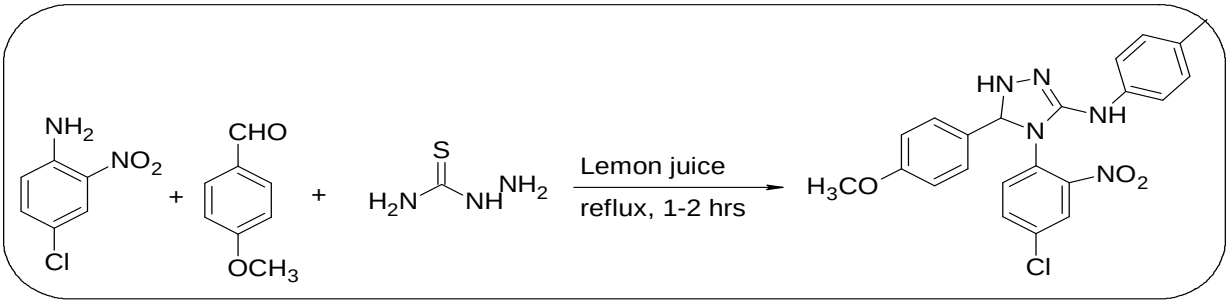
Scheme 5

5. Benzimidazoles and quinoxalines can be prepared by the condensation of ortho-phenylenediamine with substituted aldehydes in the presence of sulphonated rice husk (RHA-SO3H). This reaction involves catalyst reusability and short reaction time.(Scheme 6)[19]



Scheme 6

6. Lemon juice can act as biocatalyst which is non-toxic and can work in mild conditions. The multi-component synthesis of substituted-2H-1,2,3-triazoles derivatives by using lemon juice in ethanol by the reaction of 4-chloro-2-nitro aniline and 4-methoxy aldehyde with thiosemicarbazide in higher yield.(Scheme 7)[20]



Scheme 7

➢ **Objectives and Benefits of Green Chemistry:**

Green Chemistry is the key to a sustainable environment, preserving the environment by avoiding the use of toxic catalysts and solvents. Instead it searches for an alternative option for them. It acts as the bridge between science and society to improve the quality of life. The interdisciplinary and multidisciplinary researchers and chemists are needed to think and create green and safer methodologies.

The **Objectives** of Green chemistry are as follows:

- It enables creativity and advanced research.
- The exotic reagents application reduces the energy consumption and opts for water as a solvent by replacing organic solvents and significant savings.[22]

The **Benefits** of Green Chemistry are as follows:

- Less waste formation is provided by Green Chemistry.
- Green processes can be implemented with the innovations to ensure the preservation of human health and environment.
- Less energy consumptive processes are preferred in Green Chemistry.

- Solvent free microwave assisted reactions are practiced in research on a large scale. It provides an opportunity to work with open vessels and hence the risk of high pressure is avoided, increasing the scale up potential of such reactions.
- Preservation of resources

Figure 6: Green Chemistry Goals [21]

Conclusion

Green Chemistry has the ability to take on the future challenges in environmental, economical, and societalresources sustainability by designing more efficient scientific technologies and synthetic schemes for chemists to minimize the by-products and maximize the yield of desired product. The education of Green Chemistry and its sense of urgency are the important thing to be implemented is the need of an hour to sustain our mother planet and its resources. To make our environment pollution free and greener, Green Chemistry focuses on use of less toxic chemicals and solvent free reactions. Such innovations in chemical synthesis will guide us to a more sustainable and greener environment.

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23.

BIOLOGICAL ACTIVITIES OF MEDICINAL PLANTS

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ABSTRACT

Medicinal plants have been utilized for a long time for treatment and anticipation of different human sicknesses since they have generally shown a wide range of organic exercises (e.g., antimicrobial, cell reinforcement, mitigating, hostile to disease). Dynamic mixtures delivered during optional vegetal digestion are normally answerable for the organic exercises of some plant species utilized all through the globe for different purposes, including treatment of irresistible sicknesses. Presently a day, interest in medicinal plants and in their dynamic accumulates is as of now expanding. Because of their present less cumulation issues and can thusly be used for quite a while. The focal point of this Special Issue is on current re-established interest concerning medicinal plants, and it is pointed toward accumulating a comprehensive outline of the possible organic exercises of a few medicinal plants and their particular detached builds.

***Keywords**: Antimicrobial, Reinforcement, Medicinal plants.*

Introduction

Medicinal plants are significant regular wellspring of potentially secure medications. They have been assuming a critical part in relieving human torments by contributing home grown drugs in the essential medical services frameworks of far off regions. From ancient times individuals have been involving medicinal plants for the treatment of a wide assortment of afflictions. This conventional utilization of plants depends on an experimental, immortal experimentation, relating specific plants to the administration and fix of specific sicknesses. These plants were utilized as natural details in unrefined structures like colors, teas, powders, and poultices. The conventional way by which these plants were utilized can in any case be found in networks, went down through regular history, nevertheless win to be a fruitful type of drug, regardless of the coming of present day medication. Fragrant medicinal plants will be plants with smell attributes as well as having medicinal properties and are "substance goldmines" in view of the different scope of auxiliary metabolites that they have and the wide scope of pharmacological exercises that they show [1]. The utilization of sweet-smelling medicinal plants has been expanding consistently with prominent use in the drug, medicinal, and food enterprises [2].

Vermin of developed crops stay the chief restriction to expanded horticultural creation of food and fiber. In this way, security of plants from rural nuisances and microorganisms stays an essential distraction of farming researchers. Essentially, bug vectors of illnesses, for example, intestinal sickness, filariasis, yellow fever, resting ailment and Chagas' illness keep on smothering advancement endeavors in numerous nations and record for a huge number of passings every year. In spite of genuine natural worries over their utilization and manhandle bug sprays stay the primary line of safeguard against herbivorous bugs, nematodes, plant microbes and bug vectors of sickness. The US Environmental Protection Agency reports utilization of pesticides in the US alone came to 2.73 billion pounds in 1993, representing 33% of world utilization. The component of this substance affront to the climate has long reach biological repercussions and adds incredible driving force to the quest for non-poisonous, earth pacific strategies for farming and public wellbeing vermin the executives. On-going investigations uncover that plants have numerous unobtrusive guards that disrupt bug development, improvement and conduct and come up short on harmfulness to higher animals(4). By and large, plants have provided the science for more than 25 % of remedy drugs utilized in human medicine(3) and such pharmacologically dynamic plants have likewise given prompts regular insecticides(4).

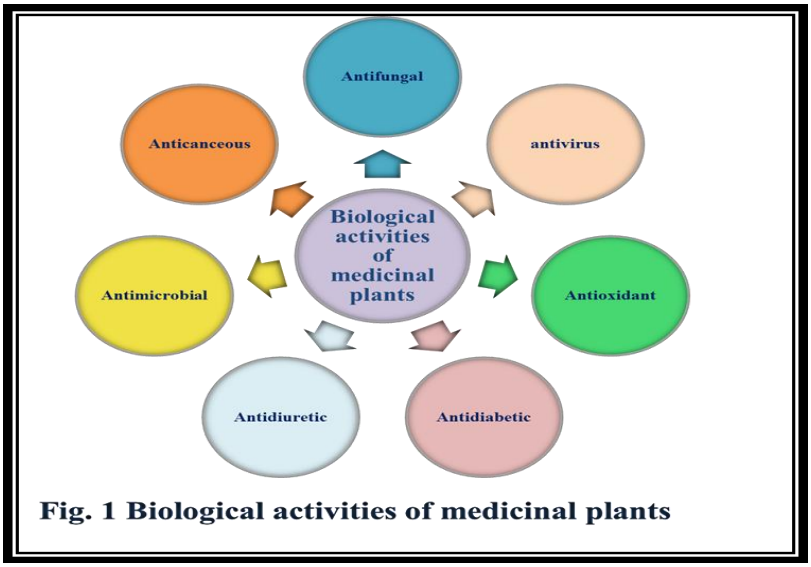

Fig. 1 Biological activities of medicinal plants

2. Biological Activities of Medicinal Plants

2.1. Catharanthusroseus L.

Catharanthusroseus is a significant medicinal plant of family Apocynaceae. It is developed chiefly for its alkaloids, which are having anticancer exercises (7). Catharanthusroseus has known antibacterial, antifungal, antidiabetic, anticancer and antiviral exercises. The concentrates have shown huge anticancer activity against various cell types (6). Because of the presence of bioactive atoms plants are utilized as phytomedicine to fix numerous grumblings. Catharanthusroseus has 'vinblastine' and 'vincristine' and utilized in malignant growth.

2.2. Rauwolfia serpentine L.

Rauwolfiaserpentina is hypotensive because of presence of 'serpentine', 'reserpine' and 'ajmalicine'.

2.3. Papaversomniferum L.

Papaversomniferum contains 'morphine' and 'codeine' and is pain relieving and narcotic.

2.4. Withaniasomnifera L.

the bioactive parts of plants 'Withanaloides' announced from *Withaniasomnifera*valuable in treatment of joint inflammation.

2.5. Tephorsea candida L.

'Tephdidoside' is a flavanol glycoside gotten from *Tephorsea candida* viewed as dynamic against human disease [16].

2.6. *Diospyrosperegrina* (Gaertn.) Gürke

Diospyrin' announced from *Diospyros* species goes about as antileishmanial specialist.

2.7. Berberis vulgaris L.

'Berberine' got from *Berberis vulgaris* announced for antidiabetic, hepatoprotective, antimicrobial activity.

2.8. Digitalis lanata Ehrh.

'Digoxin'obtained from *Digitalis lanata*utilized in heart illnesses.

*2.8. Allium sativum*L.

Another compound 'Allicin' separated from *Allium sativum* revealed for its cardioprotective, calming action [17].

2.9. Andrographispaniculata (Burm.f.) Nees

'Andrographolide', dynamic diterpine got from A. paniculata goes about as a respectable anticancer specialist against tumors of bosom, ovary, stomach, colon, prostate, kidney, nasopharynx threatening melanoma and leukemia.

2.10 Nigella sativa L.

'Thymoquinone' and 'dithymoquinone' of *Nigella sativa* shows anticancer activity against various kinds of diseases like colon, prostate, pancreas, uterus, harmful ascites, dangerous lymphoma, threatening melanoma, sarcomas and leukemia.

2.11 Plumbagozeylanica L.

'Plumbagin' detached from Plumbagozeylanica frustrates development and spread of bosom

disease, liver malignant growth, fibro-sarcoma, threatening ascites and leukemia by cell multiplication [19].

2.12 Azadirachtaindica L.

Neem is maybe the most valuable customary medicinal plant in India. Each piece of the neem tree has some medicinal property and is in this manner monetarily exploitable. During the most recent fifty years, aside from the science of the neem compounds, extensive advancement has been accomplished in regards to the organic action and medicinal uses of neem. It is currently viewed as a significant wellspring of remarkable normal items for advancement of meds against different illnesses and furthermore for the improvement of modern items. This audit gives a higher perspective basically on the natural exercises of a portion of the neem intensifies separated, pharmacological activities of the neem removes, clinical examinations and conceivable medicinal uses of neem alongside their wellbeing assessment.

*2.13 Aervajavanica Burm.*f.

The plant*Aervajavanica* has a place with family Amaranthaceae. (Judd et al., 2008). This plant has got parcel of use for instance, this spice is utilized as diabetic demulcent, diuretic, the resultant fluid of plant is utilized to dispose of swellings. Powder of the plant is utilized to fix ulcers of homegrown creatures.

2.14 Artemisia brevifolia Wall. ex DC.

Auxiliary digestion in a plant not just assumes a part in its endurance by delivering attractants for pollinators, yet it additionally goes about as a substance guard against hunters and illness. As per the method of extraction utilized, generally refining from the fragrant plants, medicinal oils contains an assortment of unstable particles, for example, terpenes, phenolic-determined sweet-smelling and aliphatic parts. Used for the therapy of illnesses like jungle fever, hepatitis, disease, aggravation and contaminations by growths, microscopic organisms and infections. [17]

2.15 Conyzabonariensis L.

The medicinal purposes ascribed to *Conyza* species incorporate the treatment of jungle fever [18] and wounds [19], as well as antibacterial, cancer prevention agent, cytotoxic [20], calming [21], pain relieving [22], antiviral [23], antiproliferative [24], antischistosomal [25], antiprotozoal [26] and antidiarrheic exercises [27]. Especially, C. bonariensis has been utilized for the treatment of cerebral pain [28], cutaneous leishmaniasis [29] and for its antibacterial activity [30]. Past examinations of C. bonarienses have uncovered glycosides, polyphenolic mixtures, flavonoids and sesquiterpenic lactones [30].

2.16 Stellaria media L.

The examination of bioactive metabolites from various pieces of *S. media* uncovered north of 80 auxiliary metaboltes. A portion of these mixtures are saponins, alkaloids, heart glycosides, unsaturated fats, tannins and terpenoids [31, 32, 33]. The unrefined concentrates and segregated mixtures of S. media showed critical pharmacological exercises, for example, hostile to hepatoma [34], against heftiness [35, 36], anticancer [37], antipyretic, mitigating [38], against oxidant [39], antimicrobial [40, 41] and anxiolytic possibilities [42]. The plant has played exceptional medication disclosure jobs in regular and present day medication.

2.17 Sileneconoidea L.

Substance separates contain flavones, glycosides, saponins, sterols and glycosides. An exploration concentrate on shows that S. conoidea can be utilized as a pointer species for gold. Conventional remedial upsides of the species for treating respiratory, cancer prevention agent, hostile to diabetic and anticancer.[9]

2.18 Fumariaindica Hausskn

Fumariaindica(Hausskn.)Pugsley (Fumariaceae), known as "Fumitory", is a yearly spice found as a typical weed all around the fields of India. The entire plant is broadly utilized in customary and folkloric frameworks of medication. In customary frameworks of medication, the plant is rumored for its anthelmintic, diuretic, diaphoretic, purgative, cholagogue, stomachic and narcotic exercises and is utilized to sanitize blood and in liver obstruction.[10].

2.19 Malvaneglecta L.

The *Malvaneglecta* is utilized to treat skin inflammation, broken bones, help in stomach

torment and to treat enlarging, dermatitis, consumes and throat infection.[11]

2.20 Cynoglossumlanceolatum Forssk.

The blooming and fruiting plants of *Cynoglossumofficinale* and*Cynoglossumamabile* were utilized for assurance of alkaloids. The flying parts and foundations of Cynoglossumfurcatum were examined for pyrrolizidine alkaloids and a few constituents are distinguished as Neo coramandaline, echinatine, virifloryl ester of laburnine [12]. Puerile the runs, Heals injuries, wounds, joins broke and cracked bones and lets enlarged appendages and treats gathering free from serous liquids in the joints. Brings down fever, hacks, trouble in passing pee because of water maintenance and controls appropriate progression of period cycle. Additionally as a love potion, calming, mental problems.[13.14].

2.21 Boerhaaviaprocumbens Banks ex Roxb.

*Boerhaviaprocumbens*is a medicinal spice utilized in the treatment of different illnesses including asthma, hack and jaundice. stem and foundation of *B. procumbens*contain fundamental supplements and the antimicrobial actitivity.[15]

2.22 Launaeaprocumbens (Roxb.)

The plant *Launaeaprocumbens* has a place with the family Asteraceae and generally utilized in the treatment ailment, kidney, liver dysfunctions and eye diseases.[16]

S	Botanical name	Family	Part of plant	Biological Activities of the Plant Used
1.	*Aervajavanica*	Amaranthaceae	Whole plant	The decoction of *Aervajavanica*is used as a gargle for toothache. It is also used in skin Infection, inflammation and abdominal worms.
2.	*Artemisia brevifolia*	Asteraceae	Flower heads and leaves	The leaves and inflorescence are ground to form powder (phaki) which is used for gastric problems
3.	*Conyzabonariensis*	Asteraceae	Whole plant	The herb is used as homeostatic, stimulant, astringent and diuretic. It is also used in dysentery and haemorrhage.
4.	*Stellaria media*	Caryophyllaceae	Whole plant	It is known as cooling, astringent, and vulnerary, used in plasters to be employed on broken bones.
5.	*Sileneconoidea*	Caryophylaceae	Whole plant	The plant is known as emollient and is used in Bath or as fumigant.
6.	*Fumariaindica*	Fumariaceae	Whole plant	The whole plant is boiled in water and is used in itching, pimples and boils of skin.
7.	*Malvaneglecta*	Malvaceae	Leaves and stem	The plant is known as cooling, emollient, and demulcent. The leaves are recommended in piles, and scurvy. The seeds are used in bronchitis, cough inflammation, ulcera-tion of bladder, and in haemorrhoids; externally applied in skin diseases.In digestive problem, for food poisoning, as fodder, but excess amount cause loose motion.
8.	*Cynoglossum lanceolatum*	Boraginaceae	Leaves, roots	It is used in the treatment of acute nephritis, periodontitis, acute snake bite etc. It also eliminates toxic heat and inducing diuresis to reduceedema.
9.	*Boerhaavia procumbens*	Nyctaginaceae	Leaves, roots	The leaves are cooked as potherb and are given in edema and dropsy. 50 ml juice of the plant is given thrice a day in dysmenorrhea. The powder of the dried roots is snuffed in flue. The powder of the roots along with honey is given in cough & asthma.
10.	*Launaeaprocumbens*	Asteraceae	Whole plant	Used as coolent, diuretic, demulcent, allergic infections. The plant is grinded in water along with candy (Misri) and is given orally for painfulmicturation.

11.	*Catharanthusroseus*	Apocynaceae	Whole plant	'vinblastine' and 'vincristine' used in cancer
12.	*Papaversomniferum*	Papaveraceae	Whole plant	'morphine' and 'codeine' and is analgesic and sedative
13.	*Withaniasomnifera*	Solanaceae	Whole plant	useful in treatment of arthritis
14.	*Tephorsea candida*	Fabaceae	Whole plant	'Tephdidoside' is a flavanol glycoside active against human cancer
15.	*Digitalis lanata*	Scrophulariaceae	Whole plant	'Digoxin'obtained from it used in heart diseases
16.	*Nigella sativa*	Ranunculaceae	Whole plant	anticancer activity against different types of cancers such as colon, prostate, pancreas, uterus, malignant ascites, malignant lymphoma, malignant melanoma, sarcomas and leukemia.
17.	*Rauwolfia serpentine* L.	Apocynaceae	Whole plant	treatment for hypertension

Table1. Biological activities of some selected medicinal plants. (5)

Conclusion

Biological activities of Medicinal plants such as antimicrobial, antifungal, anticancerous, antioxidant, imunomodulatory, antidiuretic activities are helpful for curing the various diseases. These biological activities are present in different parts of these medicinal plants such as root, stem, leaf, whole plant etc. Medicinal plants have been utilized in conventional medication as a family solution for different sicknesses, including biliary problems, anorexia, hack, diabetic injuries, hepatic issues, stiffness and sinusitis. Throughout the previous few decades, broad work has been done to lay out the natural exercises and pharmacological activities of various medicinal plants.

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PARASITES LOCATION IN SHEEP'S ORGANS

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ABSTRACT

With an exploration of evolution the animals shows their specificity with habitat and their own eco-environment. Because each living form has developed its own tuning & adoptability in terms of survival to fittest as Pisces for aquatic form, cattels for terrestrial form and rest of we knows similarly the parasitic form also manifest specificity while living with the host and host's organs. Here have tried to linked parasites and host's organs selection for surviving as they often found only in the same organ with fewer exception.

Keywords: *parasites, location, organs, sheep etc.*

Introduction

A sheep livestock playing important role in the food and agriculture sector, the nation has more than 66.00 milllion sheep livestock census in world. As the benefit of sheep via export value of meat is about 8 percent of the total agriculture and food which is being processed.sheep is one of the best option for backword population to strengthening their economical situation. So its very an essential to assure for sheep safety, healthy environment, prophylaxis and hygiene. Much more care , support being taken , drugs, research explored however parasites assassination is also parallels increased. They have chosen specific organs of host where they habituating and extending their life cycles. If we observed the sheep at glance externally the ectoparasite remained adhered to its body suface such as Chlorioptes (mites), Melophagus(ked), Lucilia(strike), Linognathus, Damalinia(lice) and certain flies like as Callophora, Chrysomyas etc. all these external parasites would have seen around the sheep and goats also which are sucking the blood and taking nutrition continuously from host consequently becoming weaken and dying. At the same time the endoparasites residing in the body at various organs likely in the nasal sinus-Oestrusovis, brain-taeniamulticeps, in the muscles-Toxoplasma(pseudocyst), taeniaovis(cysticercus), in the mesenteries-Taeniahydatigena (cysticercus), cecum & colon-Oesophagostomum, chabertia, trichuris, rumen-paramphistomum and the last small intestine which is habituated by moniezia, Bunostomum, Trichostrongylus, Nematodirus & Cooperiaetc. all these are found in the above mentioned resepective organs in the host of sheep (supporting data).

Material & Methods

Observations, Survey, reviewed of literature, dissections and expertise suggestions.

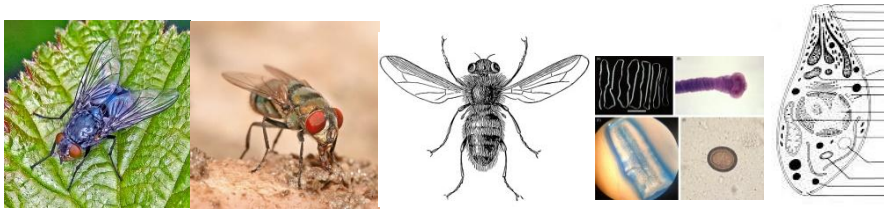
Discussion :Table No. 1/host –sheep-

Sr.no	Organs name	Parasites found
1	Body surface	*Chlorioptes (mites)*
2	Body surface	*Melophagus (ked)*
3	Body surface	*Lucilia(strike)*
4	Body surface	*Linognathus, Damalinia(lice)*
5	Body surface	*Callophora, Chrysomyas (flies)*
6	Sinus	*Oestrusovis*
7	Brain	*Taeniamulticeps*
8	Muscles	*Toxoplasma(pseudocyst), taeniaovis(cysticercus),*
9	Mesenteries	*Taeniahydatigena (cysticercus)*
10	Cecum & colon	*Oesophagostomum, chabertia, trichuris*
11	Rumen	*Paramphistomum*
12	Small intestine	*Moniezia, Bunostomum, Trichostrongylus, Nematodirus&Cooperia*

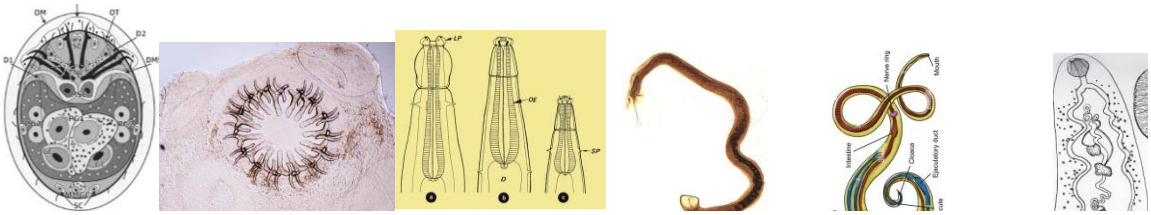
Above tabulated data itself indicate that 7 ectoparasites are found on the body surface of host while as 14 endoparasites are being habituating the 8 sheep organs for shelter. Now one can imagine that if such parasites population if attacked/ get infected , how could be survive the host ? Even after drugs administration day by days parasites exceeding their resistance and attaining more power to exists & survival for fittest. Due to the battle between parasitic form &drugs , poor host is struggling for existence, loosing the life expectancy if once infected. Above all parasites are obligatory because they can't complete their life cycle without the host and their organs, it means at any condition host becoming a victim of parasites and consequently in such situation being mandatory to suffering. Apart from this above parasites such as *Chlorioptes (mites), Melophagus (ked), Lucilia(strike), Linognathus, Damalinia(lice), Callophora, Chrysomyas (flies), Oestrusovis, Taeniamulticeps, Toxoplasma(pseudocyst), taeniaovis(cysticercus), Taeniahydatigena (cysticercus), Oesophagostomum, chabertia, trichuris, Paramphistomum, Moniezia, Bunostomum, Trichostrongylus, Nematodirus & Cooperia* may be found in another site of host but rarely.

Parasites shown below taken from internet source to realized their structure:

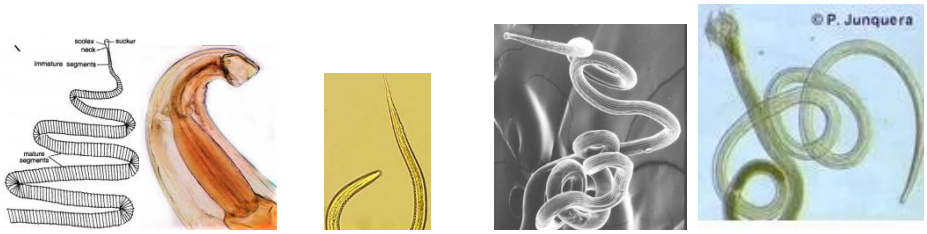
Chlorioptes (mites)Melophagus (ked)Lucilia(strike)Damalinia(lice) Linognathus(lice)



Callophora(flies) Chrysomyas (flies) Oestrusovis Taeniamulticeps Toxoplasma



Taeniaovis Taeniahydatigena Oesophagostomum Chabertia Trichuris Paramphistomum



Moniezia Bunostomum Trichostrongylus Nematodirus Cooperia

An encouragement to focus parasitology & awareness

1.Need to develop various model of parasites and their infection sources in public to makes aware among.

2. To provoke world wide movement to develop & improve new drugs to overcome parasites infection.

3. To focus on how can be destroy intermediate host ….

4. More funding need to be release to enabling awareness, focus, attention and persuading such issues.
5. Need to be reform new policy and regulaion in drug administation.
6. Need to be frame new syllabus in curriculum from schooling to higher education.
7. An essential to detail study on druges benzimidezol compound which form 5 various group and various mode of action as antihelmintics in controle measure. Which are play role in act by inhibiting fumarate-reductase enzyme system& also binding with tubulin thus preventing polymerisation of tubulin to form microtubulesin the intestinal cells of nematodes or in the cuticles of cestodes causing reduced uptake of the glucose there by depriving the energy to the parasites. Both tubulin binding and inhibtion of fumurate – reductase result in the parasite being deprieved of energy.
8. Can be focus maximaly five compound to more effective result such as Mebendazole, Thiabendezole, Parbendezole, Fenbendezole, Oxfendazole & Febantel.
9. Further study and analysis can be done onImidothiazole Group which acts as nerve ganglion stimulant and also depolarising the neuromuscular system causing rapid muscles reversible paralysis . and ganglion binding anthelmintics include Tetramisole, Levamisole&Morentel.

Result and conclusions

The above study shows that the parasite are invading more on body surface and small intestine of host while as rest of organs are found minimum intensity of infection. So in term of minimize the body surface infection, need to be use antihelminths liquid drugs solution to prevent adherence of parasite to host. In case of internal parasite the oral drugs administration need to be implanted with the time by the concerned expertise. So that intense infection as well as demises of host from parasites can be overcome.

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FTIR SPECTROSCOPY OF DRAGLINE SILK OF*NEOSCONA THEISI* (WALCKENAER, 1841) FROM FAMILY ARANEIDAE

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ABSTRACT:

Spider silks are known for higher tensile strength, therefore there is need to study factors playing the role in their structure. The present paper aims to make use of a non-destructive methodology to identify the functional groups in both stretch and without stretch dragline silk fiber. FTIR technique were used to investigate structures of the dragline silk samples weaved by spider Neoscona theisi (Walckenaer 1841) from the family Araneidae. The dragline silk samples were periodically collected from the leaves and branches of herbs, shrubs and plants of 'living fences' near the agro ecosystem in and around Akola district, Maharashtra, India. FTIR spectroscopy was recorded with stretch and without stretch silk fiber.

***Keywords**: Spider silk, Araneidae, FTIR spectroscopy, ecosystem*

Introduction

The spider from family Araneidae construct orb web comprises of silk polymeric protein. The dragline silk of araneoids (ecribellate orb-weaving spiders and their relatives) displays both high tensile strength and extensibility, making it tougher than nearly all other natural or synthetic materials (Goslin*et al.* 1886; Goslin*et al.* 1999). Spider silks are primarily composed of proteins that are synthesized in specialized abdominal glands. An individual orb-weaving spider spins up to five different types of silk fibers, each serving critical ecological functions, including prey capture, shelter, predator avoidance, egg protection, and dispersal (Foelix 1996; Blackledg*et al.*2006). Because of its extremely high tensile strength and toughness, dragline (major ampullate) silk has received the most attention of the spider silks. This silk is composed of two types of fibroins, MaSp1 (Xu*et al.*1990) and MaSp2 (Hinman*et al.*1992).The genes encoding these proteins are co-expressed in the major ampullate silk glands, and both proteins are found throughout the fiber (Sponner*et al.* 2005; Sponner*et al.*2005). Short glycine-rich regions (GGX, where X represents a subset of aa) followed by a stretch of multiple alanines (poly-A) characterize both proteins. The ubiquitous poly-A stretches are hypothesized to form hydrophobic crystalline domains that are responsible for the high tensile strength of the fiber (Simmons *et al.* 1994; Parkh*et al.* 1997. In contrast, the glycine-rich regions are hydrophilic with runs of the peptide motif GGX conforming to a 3_1-helix (Kümmerlen*et al.* 1996; Dong *et al.* 1991). While poly-A and GGX motifs describe almost all of MaSp1, MaSp2 also has a large proportion of GPG motifs (Ayoub *et al.* (2007). These proline-containing repeats likely form type II beta-turns, and such kinks in part explain the reversible extensibility of dragline fiber(Hayashi *et al.*1999;Sponner *et al.* 2005;Hayashi *et al.*1998; Van *et al.*2002).

In FTIR (Fourier transform infrared) spectroscopy the molecules once interact with the infrared radiations, the incident radiations are absorbed by a molecule in the draglinesilk fiber in particular wavelength. The molecules give vibrations that intern produces absorption spectrum. The absorption spectrum provides information of different functional group present in the spider silk fiber. Humidity is the important factor responsible to alter the mechanical properties of spider silk. Dew and rain will lead spider dragline fibers to shrink significantly (up to 50 % of its initial length) and restrained silk generates stresses in excess of 50 MPa (Work 1981; Bell *et al.* 2002; Pérez-Rigueiro*et al.* 2003; Boutry and Blackledge 2010). This process is known as super contraction (Work 1977, 1981).

Materials and Methods

The dragline silk samples were periodically gathered from the leaves and branches of herbs, shrubs and plants of 'living fences' near the agro ecosystem in and around Akola district,

Maharashtra, India. The spider specimens from the web were also collected and identified under a Carl- Zeiss Stemi 2000-c Stereo-Zoom microscope, referring to the morphological descriptions and illustrations given by Levi (1997) and Gajbe (2007). The genitalia were dissected, immersed in 10% KOH solution until get cleared and observed under microscope. All the identified spider species with their silk type were grouped and later on Fourier transmission infrared spectroscopy (FTIR) of the clean and strong dragline fibers were done, at National Chemical Laboratory (NCL) Pune, India.We have rimmed all the silk samples on ATR mode i.e Attenuate Transmittance Resonance mode. The resolution was set at 4 and the total number of scan recorded were 10 in numbers. FTIR instrument were spectrum- GX from Perking Elmer.

Peak range cm^{-1}	**Assignment**	**Spider silk**		**Remark**
		With stretch	without stretch	
530-584	N-H	526(w), 595(s)	596(b)	N-H plane wagging
643-967	-	868(w) 924(w)	868(w) 922(w)	Absorption due to bending
1015-1032	-	1016(s)	1020(b)	Frequency peak due to bending vibration
1230	C-O	1228(w)	1231(w)	C-O single bond amide III
1140-1492	N-H amide II	1147(w) 1412(b)	1145(w) 1418(b)	Frequency peak due to bending vibration
1600-1700	Protein amide-I	1628(b)	1630(i)	Frequency peak due to C=O stretching vibration
2941-2946	O-H, C-H	2921(i)	2921(i)	Frequency peak due to C-H stretching
3297-3300	O-H, N-H	3284(b)	3280(b)	Frequency peak due to N-H stretching vibration

(s): strong, (I): intense, (b): broad, (w): weak

Table.1 FTIR absorption peak values for *Neoscona theisi* (Walckenaer, 1841) with stretch and without stretch spider dragline silk samples.

Results and Discussion

FTIR spectroscopy of spider *Neoscona theisi* (Walckenaer 1841), was recorded for stretch and without stretch silk fiber. As detailed in Table 1, a number of well-defined peaks were obtained in the range of 600-4000 cm^{-1}. The silk show protein peaks in the Amide I (1600-1700 cm^{-1}) and Amide II (1500-1600 cm^{-1}) regions. The amide group in protein and polypeptides give specific vibration band in UV spectra. The spider silk in without stretch sample show a distinct amide-I band and the peak at around 1630 cm^{-1}. The band around 1630 cm−1 was proposed to represent short-segment chains (β-strands) connecting helical segments, and not involved in typical β-sheet structures (Semra ˙Ide *et al.* 2011). The frequency peak in stretch sample is at around 1628. The spider silk fiber exhibit frequency peak at 1016 cm^{-1} (with stretch), 1020 cm-1 (without stretch), 1147 cm^{-1} (with stretch) and 1145 cm^{-1} (without stretch) due to bending vibrations. The spider silk fiber exhibit frequency peak at 2921.38 cm^{-1} (with stretch) and 2921.47 cm^{-1} (without stretch) for salt formation and C-H stretching.The spider silk fiber exhibit frequency peak at 3284 cm^{-1} (with stretch) and 3280 cm^{-1} (without stretch) for N-H stretching.

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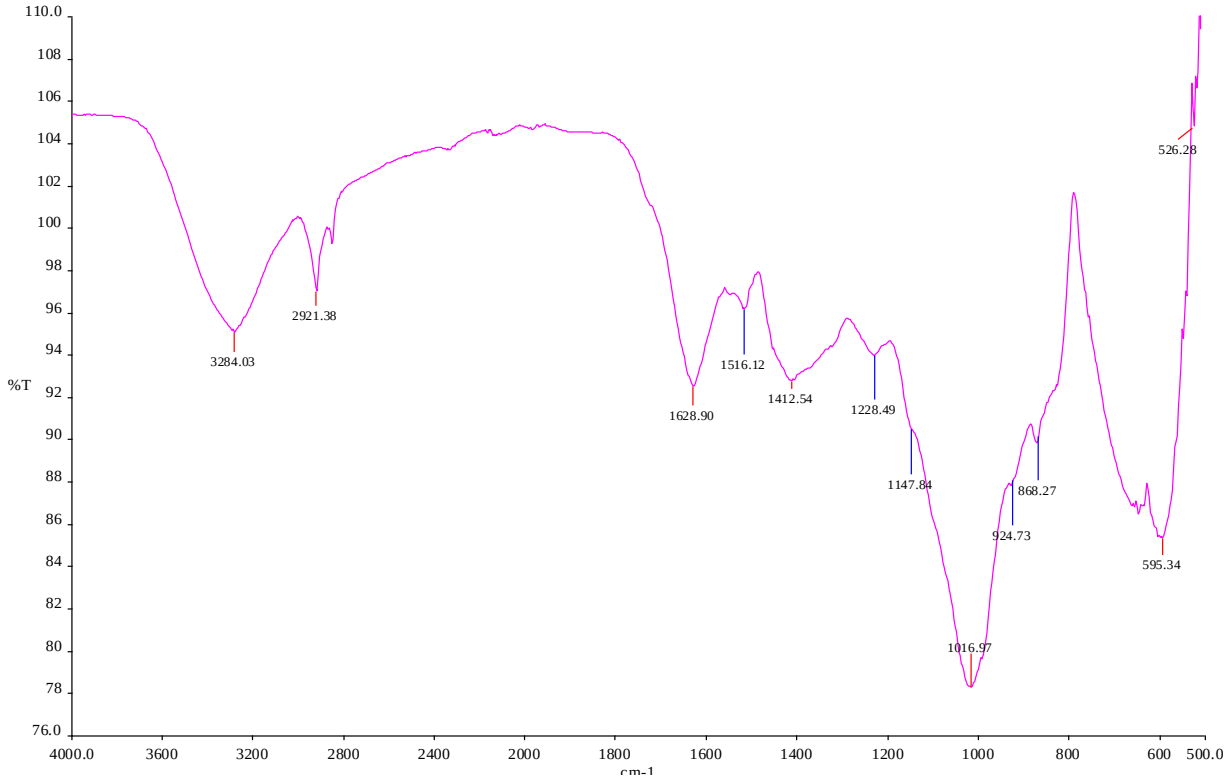

Graph-1a. FTIR spectra of *Neoscona theisi* (Walckenaer, 1841) forstretch fiber

Graph-1b FTIR spectra of*Neoscona theisi* (Walckenaer, 1841) for without stretch silk fiber

Graph-1c. Overlay with stretch (green)and without stretch (Pink)silk fibre

Conclusion

The spider species are valuable for their structural related information with silk contents. FTIR spectroscopy of stretch and without stretch silk fiber of spider *Neoscona theisi* (Walckenaer, 1841) was recorded. The functional group instretched dragline silk fiber is studied to silk fiber without stretch. FTIR analysis confirms the presence of the amide group in protein dragline silk. Higher frequency peaks in stretched sample shows the presence β sheets configuration in the polypeptide back bone of dragline silk. The lower wave number peak might indicate the random coil structure. Our future studies will be on the study of orb weaved spider silks by FTIR spectroscopy.

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SYNCHRONIZATION SCHEME OF MIMO-OFDM FOR BER USING MATLAB SIMULINK

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ABSTRACT

In recent years, the need for high-speed data transmission has expanded due to the expansion of digital communication. Due to its resilience to ISI, a major difficulty in high speed data transfer, OFDM is a possible method for obtaining high data rates in a mobile setting. A multiple-input multiple-output (MIMO) communication system coupled with the orthogonal frequency division multiplexing (OFDM) modulation technology can reliably transmit large data rates over broadband wireless channels. The MIMOOFDM system is now considered as one of the most competitive 4G mobile wireless system technologies. In this study, analyze the BER performance of the MIMO-OFDM system with two distinct equalizers (ZF and MMSE) for various modulation schemes including BPSK, QPSK, 16-QAM, and 64-QAM across multipath fading channels including AWGN (Additive White Gaussian Noise), Rayleigh, and Rician. The simulation findings reveal that the BER performance of MMSE equalizers is superior to that of ZF equalizers. In addition, investigated both equalizer's fading channels using various modulation approaches.

Keywords: *"MIMO, OFDM, ZF and MMSE Equalizer, Multipath fading channels, M-QAM"*

I. Introduction

Investigation of the numerous information distinctive yield (MIMO), Orthogonal Frequency Division Multiplexing (OFDM) has been seen as one of the most promising answers for fundamentally expanding switch pace talent and transmission restrict in the expansive band far off correspondence[1]. Inspite of everything, the structure of low multifaceted nature flag handling and discovery plans prepared for assisting knowledge rates near the MIMO limit remains a noteworthy scan. The Bell Labs Layered house Time (BLAST) plan of Foschini was the most important effective low-multifaceted nature cognizance plot proposed for countless reception apparatus faraway channels. The most severe chance (ML) and the greatest a posterior (MAP) detection are excellent cognizance plots whose intricacy improve exponential so far as the range of transmit receiving wires. The decoder, whose intricacy is cubic involving the range of transmit reception apparatuses, establishes the primary problematical ML area conspire that can be sent in MIMO channels. List SD, tender versions of the circle decoder, can also be utilized to accomplish close restrict on a quite a lot of radio wire channel be multifaceted nature is nearly improved contrasted and the first circle interpreting calculation. The straight identification procedure, for instance, zero-forcing (ZF) and MMSE, has low unpredictability, with execution just about mediocre compared to that of perfect awareness. The stochastic consecutive Monte Carlo (SSMC) process is in light of the consecutive Monte Carlo (SMC) technique for Bayesian derivation and may more commonly fill in because the delicate MIMO demodulator in an iterative collector. The SSMC system, whose multifaceted nature is likewise direct with the variety of transmit reception apparatuses, beats with MMSE. In this paper, the MIMO framework, with the SSMC discovery, is joined with the OFDM and rapid channel coding to embrace execution examination in recurrence certain blurring channel.

The carrier spacing must be set to the reciprocal of the symbol period to achieve this. However, the OFDM suffers from a high peak-to-average power ratio due to the independent phases of the sub-carriers. With this high PAPR, the transmitter must use a costly and power inefficient digital to analogue converter (DAC) to minimise out-of-band radiation and signal distortion, and this necessitates a linear power amplifier (PA).

However, as the number of antennas increases, practicality begins to suffer. Reduced PAPR in huge MIMO-OFDM systems is therefore critical to enabling low-cost and power-efficient hardware solutions. PAPR PAPR reduction in single-input single-output (SISO) OFDM wireless systems has been the subject of several developments. To name a few of the most common: clipping, tonal reserve, active constellation extension, and partial transmission sequence (PTS). Even while these PAPR-reduction approaches are easy to extend to point-to-point MIMO systems, the downlink extension to multi-user (MU) MIMO systems is not straightforward, partly because collaborative receiver-side signal processing is virtually impossible in reality since the users are spread. Massive MIMO-OFDM systems have just received a novel PAPR reduction approach. By using the redundant degrees-of-freedom (DoFs) created by the BS's vast number of antennas, the suggested system is able to reduce PAPR while simultaneously cancelling MUI. An technique for rapid iterative truncation (FITRA) was devised to solve the linear restricted optimization issue. This algorithm's convergence rate is rather poor, though. A regularisation parameter is also used to ensure that the PAPR reduction and the MUI cancellation are in balance (i.e. data fitting error). In reality, it may be difficult to decide on a regularisation parameter. It's possible to regard this as an additional degree of freedom that allows the algorithm to be fine-tuned. For example, peak signal clipping was used to minimise PAPR and some antennas at the BS were allocated to compensate for peak-clipping signals. The computational complexity of this approach is reduced.

Even yet, it only reduces PAPR by a little amount, and the antennas set aside for compensation may be subject to even higher PAPRs. In this research, we present a unique Bayesian method to the combined reduction of PAPR and cancellation of MUI in downlink massive MIMO-OFDM systems with many simultaneous users[2]. It is possible to define MUI cancellation as an underdetermined linear inverse problem with multiple solutions. The unknown signal is assigned a hierarchical truncated Gaussian mixture prior model to search for a low PAPR solution (i.e. solution). Potentially encouraging an almost constant-magnitude solution with as many entries as feasible sitting on the reduced borders, this hierarchical prior can result in low PAPR. Hyper parameters linked with a previous model can be estimated using a variational expectation-maximization (EM) approach. As an additional aid to algorithm construction, the generalised approximation message passing (GAMP) method is utilised. The GAMP approach also considerably reduces the algorithm's computational complexity.

II. Literature Survey

Yu Liuet al 2017 says that The problem of modulation classification for a multiple-antenna (multiple-input multiple-output (MIMO)) system employing orthogonal frequency-division multiplexing (OFDM) is investigated under the assumption of unknown frequency-selective fading channels and signal-to-noise ratio (SNR). The classification problem is formulated as a Bayesian inference task, and solutions are proposed based on Gibbs sampling and mean field variational inference. The proposed methods rely on a selection of the prior distributions that adopts a latent Dirichlet model for the modulation type and on the Bayesian network (BN) formalism. The Gibbs sampling method converges to the optimal Bayesian solution, and using numerical results, its accuracy is seen to improve for small sample sizes when switching to the mean field variation inference technique after a number of iterations. The speed of convergence is shown to improve via annealing and random restarts. While most of the literature on modulation classification assumes that the channels are flat fading, that the number of receive antennas is no less than that of transmit antennas, and that a large number of observed data symbols are available, the proposed methods perform well under more general conditions. Finally, the proposed Bayesian methods are demonstrated to improve over existing non-Bayesian approaches based on independent component analysis (ICA) and on prior Bayesian methods based on the “super constellation” method[3].

Amit Kumar Pathy et al 2021 In this article, we design and implement a tree-based blind modulation classification algorithm for asynchronous multiple-input–multiple-output and orthogonal frequency-division multiplexing (MIMO-OFDM) systems. It can classify many of the linearly modulated signals, such as binary phase shift keying (BPSK), quadrature phase shift keying (QPSK), offset QPSK, minimum shift keying, and 16-quadrature amplitude modulation. The proposed classifier works in the presence of unknown frequency, timing, and phase offsets and with no prior knowledge of channel state information. Classification is performed in three steps. In the first step, preprocessing is done on the received signal to nullify the effect of timing offset. In the second step, key features are extracted by calculating higher order cumulants of the frequency-domain signal. In the third step, thresholds are determined by using the likelihood ratio test. A closed-form theoretical derivation for the probability of correct classification is obtained. The Monte Carlo simulations are conducted to compare the performance of the proposed algorithm with the existing algorithms. Finally, the proposed algorithm is validated through radio frequency testbed measurements over an indoor propagation environment[4].

JéssicaSanson et al 2018 This paper presents results for the determination of the direction of arrival (DoA) problem for a MIMO OFDM radar system using some of the most popular techniques: Multiple Signal Classification (MUSIC), Estimation of Signal Parameters via Rotational Invariance Techniques (ESPRIT), Minimum Norm (Min-Norm), Minimum Variance Distortionless Response (MVDR). The performance of the algorithms is evaluated using two different metrics, namely the performance achievable in terms of resolution and the probability of target distinction, since, for example, in automotive systems, not only the resolution but also the correct distinction of the number of targets can be crucial. The results presented in the paper show that the Min-Norm algorithm is a better option when used for applications that require reliable distinction of targets[5].

III. Related Work

OFDM relies on multicarrier communication methods. Multicarrier communications are based on the concept of signal division bandwidth is divided into the number of subcarriers and information is sent on each individual subcarrier not like the typical multicarrier transmission system with Each sub carrier's spectrum and band are non-overlapping and distinct pass filtering is used to extract the desired frequency in a signal. The frequency separation between sub carriers in OFDM is chosen in such a way that the subcarriers are mathematically orthogonal to one another. The spectral characteristics of subcarriers
overlapping, although individual sub carrier can overlap derived by base band processing. This overlap occurs OFDM has a feature that makes it more spectrally efficient than the typical multicarrier communication method. As demand for high-data-rate multimedia increased, Several strategies such as increasing modulation sequence or using several antennas on the transmitter and receivers have been investigated to improve spectral efficiency.

IV. Proposed Model

The purpose of this study is to offer a complete evaluation of several MC approaches for OFDM signals. The statistical technique and the AI approach are two primary groups of MC algorithms that will be described in depth. The framework concentrates on the most prevalent statistical and ML models, stressing their merits and shortcomings. The contributions of numerous research publications are summarized into concise formats. This will make it easy for the reader to distinguish the main aspects of each strategy. Furthermore, research work also report findings obtained by using several statistical and ML algorithms with a testbed based on the National Instrument (NI) radio frequency (RF) hardware across an indoor transmission environment. Finally, difficulties and future research avenues are briefly examined. : Blind modulation classification (MC) is a crucial aspect of creating an adaptive or intelligent transceiver for future wireless communications. Blind MC has various uses in the adaptive and automated

systems of sixth generation (6G) communications to enhance spectrum efficiency and power efficiency, and minimize latency. It will become an essential element of intelligent software-defined radios (SDR) for future communication. In this study, propose a numerous MC approaches for orthogonal frequency division multiplexing (OFDM) signals in a systematic fashion, also focus on the most extensively used statistical and machine learning (ML) models and underline their advantages and limitations. The statistical-based blind MC encompasses likelihood-based (LB), maximum a posteriori (MAP) and feature-based approaches (FB). The ML-based automated MC encompasses k-nearest neighbors (KNN), support vector machine (SVM), decision trees (DTs), convolution neural networks (CNNs), recurrent neural networks (RNNs), and long short-term memory (LSTM) based MC approaches. This survey will assist the reader to grasp the basic aspects of each approach, their merits and downsides. Some of the key methodologies, such as statistical and machine learning-based algorithms, have also been simulated under various restrictions so that a fair comparison may be made between different methods.

V. Block Diagram

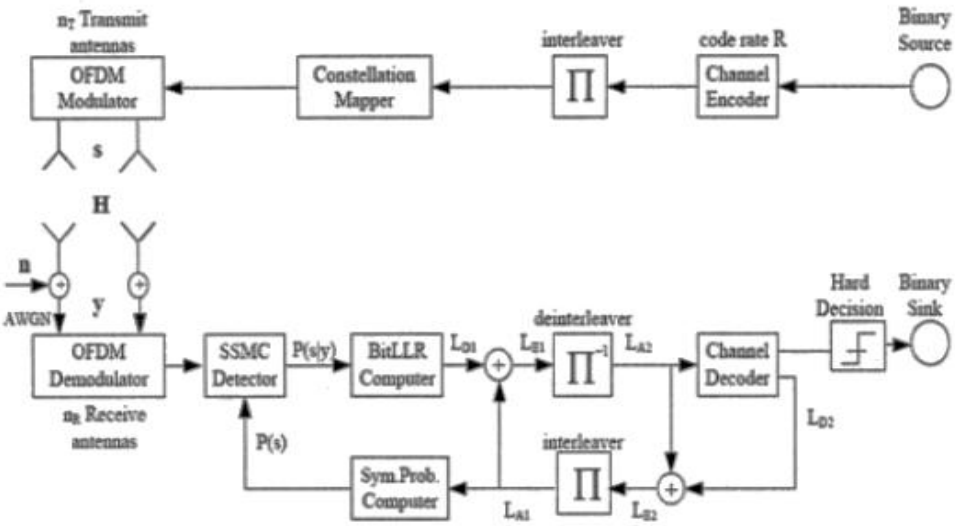

Fig 1: Block Diagram of Workflow for the proposed method

MIMO-OFDM (multiple input multiple output orthogonal frequency division multiplexing) is a novel wireless broadband technology that has garnered significant traction in recent years[6]. Recognition for its capacity for high-speed transmission and its other resilience against inter-symbol interference channel impairments. Motivated by two essential objectives: high data rate and performance. This amalgamation MIMO OFDM is a very promising feature, since OFDM is able to support additional antennas, since it simplifies equalization MIMO systems[7,8]. In OFDM, fading is typically seen as an error difficulty in wireless networks, while MIMO channels provide the solution fading to boost the overall communication capacity network. Additionally, this signal model is converted to acceptable linear version for Zero-Forcing Equalization (linear) detection approach and Minimum Mean Square Error estimate methods. MMSE has been proved to be effective. Superior to ZF but more complicated than ZF. This research work could use optimum low rank MMSE estimator for minimizing complexity. And thus, we may say that MMSE is the best channel estimator with respect to attaining the minimum BER.

VI Conclusion

The following conclusions based on the simulation's parameters: BPSK's BER is demonstrably low, making it the optimal modulation approach for data transmission over all channels and both equalizers.

Compared to BPSK modulation, QPSK modulation is more susceptible to fading for the MMSE equalization, followed by 64-QAM, 16-QAM, and finally 16-QAM. Compared to BPSK modulation, however, the ZF equalization is more sensitive to fading with 16-QAM, 64-QAM, and finally QPSK modulation. Furthermore, the MMSE equalization surpasses the ZF equalizer. Work can be expanded to include more channels, such as m-channels, and other modulation schemes of a higher order. Additionally, various new equalizers can be used to assess performance.

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TRICHODERMA SP. AS A BIOCONTROL MEASUREFOR PLANT DISEASES MANAGEMENT

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ABSTRACT

Harmful chemical fungicides as well as fertilizers which are being applied today for increasing crop production, creates very serious hazardous health problems to human beings and ecosystem as a whole.To overcome all these disadvantages caused by excessive use of chemical fungicides for controlling disease, a new approach evolved that uses micro-organisms for the control of phytopathogens i.e., biocontrol of disease.The antagonistic potential of Trichoderma species which has been long known to control various soil-borne fungal pathogens in biological way have been utilized. The faster growth rates with which it competes with fungal pathogen mainly brings upon their antagonistic characteristics. According to literature, it is revealed that Trichoderma spp are good for future practice as a biocontrol agent for controlling various plant pathogens.

Keywords: Plant disease, Chemical fungicides, Biocontrol agents and *Trichoderma spp*.

Introduction

Disease in plants, in a simple way defined as the series of invisible and visible responses of plant cells and tissues to a pathogenic organism or environmental factor that result in adverse changes in the form, function, or integrity of the plant and may lead to partial impairment or death of plant parts or of the entire plant (Agrios, 2005). Similarly, Plant diseases, by their presence prevent the cultivation of growth of food plants in some areas; or food plants may be cultivated and grown but plant diseases may attack them, destroy parts or all of the plants, and reduce much of their produce i.e., food, before they can be harvested or consumed(Agrios, 2005).

The losses produced due to plant diseases are usually lower in the developed countries and higher in the developing countries i.e., countries that need food the most. It is been estimated that of the 36.5% average of total losses, 14.1% are caused by diseases. Considering that 14.1% of the crops are lost to plant diseases the total annual worldwide crop loss from plant diseases is about $220 billion(Agrios, 2005).

The agents that cause disease in plants are the same or very similar to those causing disease in humans and animals. They include pathogenic microorganisms, such as viruses, bacteria, fungi, protozoa, and nematodes, and unfavourable environmental conditions, such as lack or excess of nutrients, moisture, and light, and the presence of toxic chemicals in air or soil(Agrios, 2005).Because it is not known whether plants feel pain or discomfort and because, in any case, plants do not speak or otherwise communicate with us, it is difficult to pinpoint exactly when a plant is diseased.

Traditional Plant Disease Management

Methods of plant disease management vary considerably from one disease to another, depending on the kind of pathogen, the host, the interaction of the two, and many other variables. In controlling diseases, plants are generally treated as populations rather than as individuals, although certain hosts (especially trees, ornamentals, and, sometimes, other virus-infected plants) may be treated individually. Control measures are generally aimed at saving the populations rather than a few individual plants (Agrios, 2005).

Traditionally the plant disease management can be classified as regulatory, cultural, biological, physical, and chemical, depending on the nature of the agents employed. Regulatory control procedures aim at excluding a pathogen from a host or from a certain geographic area. Most cultural control methods aim at helping plants to avoid contact with a pathogen, creating environmental conditions unfavourable to the pathogen or avoiding favourable ones, and eradicating or reducing the amount of a pathogen in a plant, a field, or an area. Finally, physical, and chemical methods aim at protecting the plants from the pathogen inoculum that has arrived, or is likely to arrive, or curing an infection that is already in progress (Agrios, 2005).

In general, excluding or reducing the initial inoculum is most effective for the management of monocyclic pathogens. Controls such as crop rotation, removal of alternate hosts, and soil fumigation reduce the initial inoculum. With polycyclic pathogens, the initial inoculum can be multiplied many times during the growing season. Therefore, a reduction in the initial inoculum must usually be accompanied by another type of control measure (such as chemical protection or horizontal resistance) that also reduces the infection rate. Many controls, e.g., excluding a pathogen from an area, are useful for both monocyclic and polycyclic pathogens (Agrios, 2005).

The physical agents used most in controlling plant diseases are temperature (high or low), dry air, unfavourable light wavelengths, and various types of radiation. Chemical agents are generally used to protect plant surfaces from infection or to eradicate a pathogen that has already infected a plant. A few chemical treatments, however, are aimed at eradicating or greatly reducing the inoculum before it encounters the plant. They include soil treatments (such as fumigation), disinfestation of warehouses, sanitation of handling equipment, and control of insect vectors of pathogens (Agrios, 2005, Mahmood *et al.*, 2016).

The traditional agricultural practice employed to control the plant disease have severe disadvantage that it is not effective to check the pathogen and is not eco-friendly. However, excessive use of chemical fungicides in agriculture has led to deteriorating human health, environmental pollution, and development of resistance in pathogen to fungicide (Dalvi and Rakh 2017, Bolognesi and Merlo, 2019).

Trichoderma spp. as Emerging Biocontrol Practice

Trichoderma species can antagonize and control a wide range of economicallyimportant plant-pathogenic fungi and have been known as biocontrol agentsagainst soil-borne, foliar and postharvest phytopathogenic fungal pathogens andcanalso control viruses and bacteria (Sivan and Chet 1992; Herrera-Estrella andChet 1998; Yedidia et al. 2003; Harman 2006).

Table1: *Trichoderma spp* showingbiocontrol action against some plant pathogenic diseases

Trichoderma spp	**Host**	**Disease**	**Reference**
T. harzianum& T hamatum	Cucumber plant		Abd-El-Moity *et.al.* (2003)
T virideae	Groundnut	Stem rot	Karthikeyan *et al* (2006)
T virideae	Ground nut	Stem rot	Manjula *et al* (2004)
T longibrachiatum			Deng *et al* (2007)
T harzianum	Ground nut	Stem rot	Ganesan *et al* (2007)
T spp	Sunflower	Root rot	Yaqub & Shahzad(2008)
T harzianum	Sugarbeet	Root rot	Rawat & Tiwari(2010)
T hamanatum	Groundnut	Collar rot	Bagwan(2011)
T virideae	Ground nut	Macrophomina phaseolina (collar rot)	Doley & Jite(2012)

Mechanism of *Trichoderma* Bio Control Action: -

*Trichoderma spp.*possess different mechanisms to tackle the plant pathogens in lab as well as in the farm which are listed as follows:

Competition

One of the mechanismsthat is shown by *Trichoderma spp.* as biocontrol agent is competition through rhizosphere competence. Rhizosphere competence is important because a biocontrol agent cannot compete for space and nutrients if it is unable to grow in the rhizosphere. *Trichoderma* species, either added to the soil or applied as seed treatments, grow readily along with the developing root system of the treated plant. This can be shown by simply plating surface sterilized root segments from treated plants on an agar medium. After incubation period, the fungus grows from all parts of the root. The difficulty in viewing competition through rhizosphere competence as a major mechanism in biological control is that strains of *T. koningii* that are excellent root colonizers exhibit little or no biocontrol activity against *R. solani* on cotton seedlings (Howell, 2003).

Mycoparasitism or Hyperparasitism

Oneof the salient featuresofmembers of the genus *Trichoderma* is their ability to parasitize other fungi. It is therefore not surprising that Weindling (1932) described biocontrol by *T. lignorum* of citrus seedling disease, incited by *Rhizoctonia solani*, to mycoparasitism. Weindling described the mycoparasitism of *R. solani* hyphae by the hyphae of the biocontrol agent, including coiling around pathogen hyphae, penetration, and subsequent dissolution of the host cytoplasm. This phenomenon occurred regardless of the supply of external nutrients to the host or mycoparasite. Although he considered the possibility that under certain circumstances *T. lignorum* might act as a competitor for nutrients with *R. solani*, he much favoured mycoparasitism as the principal mechanism for biocontrol (Howell,2003).

Enzymes

More recent research into the possible mechanisms involved in biological control by *Trichoderma species* has led to several alternative explanations for successful biocontrol. One idea that has been advanced is that enzymes such as chitinases and/or glucanases produced by the biocontrol agent are responsible for suppression of the plant pathogen. These enzymes function by breaking down the polysaccharides, chitin, and β-glucans that are responsible for the rigidity of fungal cell walls, thereby destroying cell wall integrity(Howell, 2003).

Similarly, Metcalf and Wilson (2001) described the colonization of onion roots, infected with *Sclerotium cepivorum*, by *T. koningii*. Hyphae of the biocontrol agent penetrated into infected epidermal and cortical tissue of the root to destroy the hyphae of the pathogen, with little or no damage to uninfected plant tissue. The authors ascribed this biocontrol phenomenon to production of endo- and exo-chitinases by *T. koningii*(Howell, 2003).

Antibiotic mediated suppression

Many instances of successful biocontrol by *Trichoderma* species have been credited to the mechanisms of mycoparasitism and/or antibiosis. In 1983, Howell and Stipanovic isolated and described a new antibiotic, gliovirin, from *Gliocladium (Trichoderma) virens* (GV-P) that was strongly inhibitory to *Pythium ultimum* and a *Phytophthora* species, but not to *R. solani*, *Thielaviopsis basicola*, *Phymatotrichum omnivorum*, *Rhizopus arrhizus*, or *Verticillium dahlia*. Gliovirin also was not inhibitory to the bacteria *Bacillus thuringensis* and *Pseudomonas fluorescens*. They demonstrated that mutants unable to synthesize the antibiotic lost the capacity to control Pythium damping-off of cotton. a mutant (GV-1) with enhanced gliovirin production was no more effective than the wild type in controlling the disease (Howell, 2003).

Induction of systemic resistance

Another mechanism proposed to explain biocontrol activity by *Trichoderma* species is that of induction of resistance in the host plant

by treatment with the biocontrol agent. This concept is supported by the work of Yedidia *et al.*, (1999) who demonstrated that inoculating roots of 7-day-old cucumber seedlings in an aseptic hydroponic system with *T. harzianum* spores to a final concentration of 10^5 per ml-initiated plant defence responses in both the roots and leaves of treated plants. They also demonstrated that hyphae of the biocontrol fungus penetrated the epidermis and upper cortex of the cucumber root. The plant response was marked by an increase in peroxidase activity (often associated with the production of fungitoxic compounds), an increase in chitinase activity, and the deposition of callose-enriched wall appositions on the inner surface of cell walls. Increased enzyme activities were observed in both roots and leaves. Interestingly, the plant defence became muted with time and began to resemble a symbiotic mycorrhizal association (Howell, 2003).

Conclusion

These literatures support that *Trichoderma spp* are good for future practice as the bio control agent for the management of various plant pathogens which cause loss in crop production.

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IMPACT OF A MIX TREE PLANTATIONS AND WATER HARVESTING MEASURES UNDERTAKEN ON CAMPUS ENVIRONMENT IN SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED, MAHARASHTRA, INDIA

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ABSTRACT

The present investigation was conducted to study impact of mix tree plantations and water harvesting measures undertaken on Campus Environment in Swami Ramanand Teerth Marathwada University, Nanded, and Maharashtra, India. SRTM University Campus has undertaken several tree plantations drives at campus of which first mega drive. The plantation was carried out on 15 August 2014 the Independence day by officers, staff and students of the campus schools. During this mega drive plantation plants like Syzygium cumini, Emblica officinalis, Bauhinia purpurea, Madhuca indica, Pongamia pinnata, Ficus religiosa, Azadirachta indica, Melia azadirachta, Morinda citrifolia, Tamarindus indica, Tectona grandis, Thespesia populnea, Pithocolobium saman, Acacia feruginea, Dalbergia sisso, Annona squamosa, Cassia glauca etc. were planted. Afterwards every year plantation was carried out in the campus mainly in botanical garden, biodiversity park, mango plantation, around the schools and library during monsoon. The plantations was carried out under movement of Green University Clean University in this campus to increase the biodiversity in the campus area as well as make area clean and healthy climatically for students, staff and for the people visiting the campus. Various drives were undertaken for mix plantations with objectives like enhance greenery with plantation of medicinally important as well as the fruit bearing plants like Annona squamosa, Annona reticulata, Tamarindus indica, Syzygium cumini etc. which has increased bird diversity in the campus. Present paper gives the details of positive impact of mixed plantation on campus environment.

***Keywords**: Campus environment, Mix tree plantations, Water harvesting measures.*

Introduction

Tree Plantation is one of most important initiatives of the Government of Maharashtra to increase the green cover across the state. As a part of the initiative, the Maharashtra Government decided to plant around 2 crore trees across the state. Also, the state government announced its plan to plant 50 crore saplings in upcoming years. Tree planting improves our environment. Planting a tree can add to our income, decrease energy costs and also can enhance our quality of life and improve our health. Trees reduce sound, produce oxygen, store carbon, clean the air, gives shade and cools, reduces wind and erosion and increases property values.

The principal objective of industrial plantation is production of any product i.e wood fibre fuel production, timber, pulpwood for paper, cardboard, and panel products. Industrial plantations of trees are grown for non timber forest products like gums and resins. Tree planting is one of the important ways of equalizing for the loss of natural flora and fauna as a means of providing domestics products such as building poles , fencing materials fire wood and even leaves for livestocks fodder. Tree planting for social and community needs are now considered as part of rural development forestry and subject and subject to participatory process to place them in local people . Selection of trees for plantation is very important. The tree species are useful as fodder as well as fuel purpose and they also provides livelihood fir the villagers. The regular needs to be fulfilled from the trees which are planted in wastelands, gairans, and on panchyat land.

The practice of planting trees goes back to ancient times, and many economically important species have been widely planted outside their natural range of distribution for thousands of years. Prior to 1900, low population density and the widespread availability of natural forests meant that there was no need to plant trees extensively as an industrial resource. However, some nations became progressively more concerned about their lack of natural forests, and in the first half of 20th century tree planting began in earnest in western Europe, the united states, Australia, New Zealand, South Africa and a small number of developing countries such as India, Chile, Indonesia and Brazil. Later, in the 1950s, Japan, Korea and China embarked on massive reforestation programs.

During 1960s the launching of large-scale plantation programs in many tropical countries were undertaken between 1965 and 1980 the area devoted to tropical plantations tripled. During this period the United Nations of Food and Agriculture Organization (FAO) played an important role by disseminating technical information and promoted plantations in every country. Plantations often benefited from direct subsidies and they were mostly managed by state organizations.

According to the Global Forest Resource Assessment 2002, conducted by FAO, the global plantation estate increased from 17.8 million hectares in 1980 to 43.6 million hectares in 1990 and 187 million hectares in 2000 (Cossalter and Pye-Smith, 2003). Thus the tree plantation rate increased worldwide.

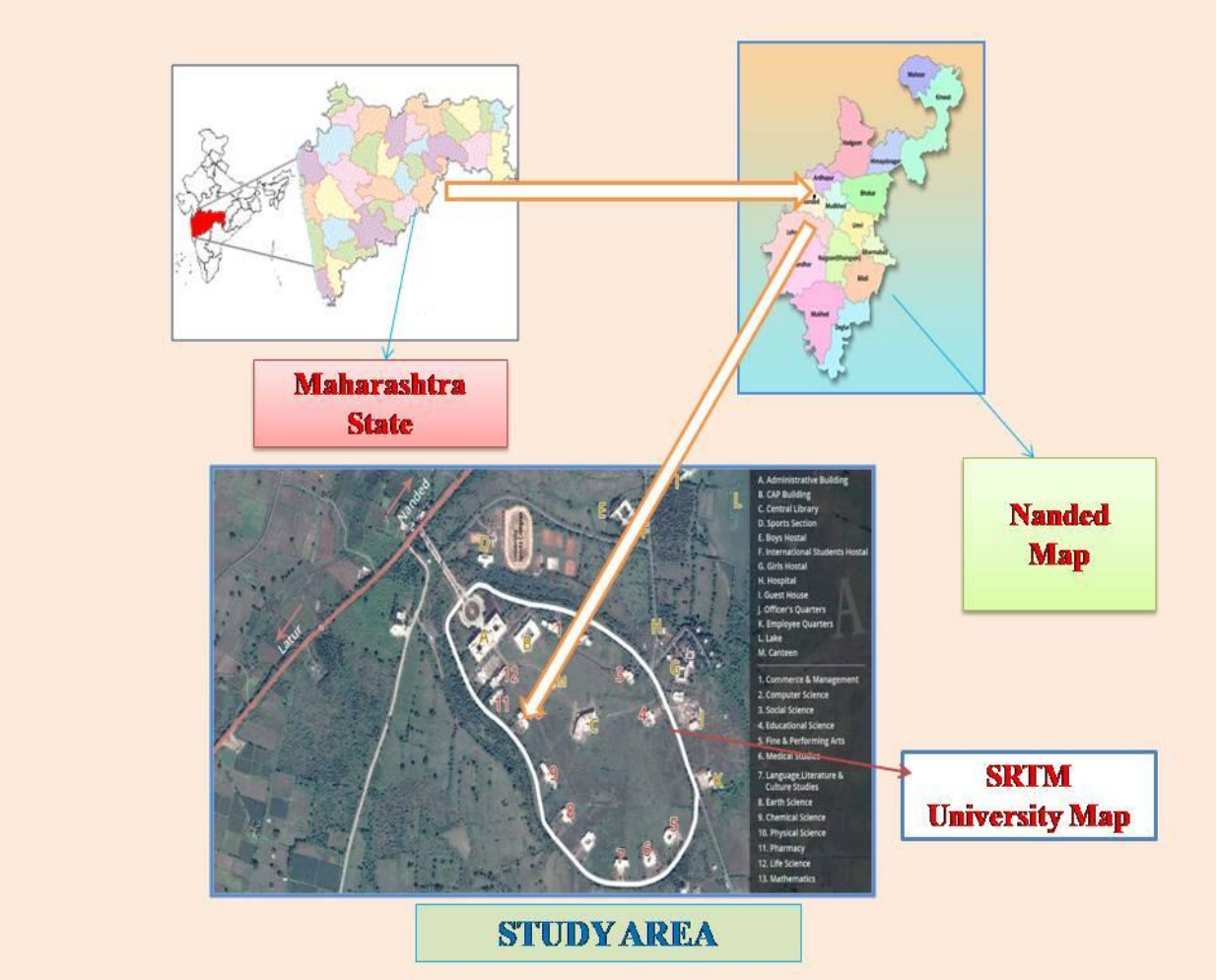
Materials And Methods

Campus area of Swami Ramanand Teerth Marathwada University measures about 550 acres on south side of Nanded on Nanded-Latur highway at latitude 19.1022° N and longitude 77.2843° E. The University was established on September 17, 1994 by the Government of Maharashtra and the University caters to the southern part of the Marathwada region of Maharashtra covering four districts namely, Nanded, Latur, Parbhani and Hingoli. Regular visits were undertaken to study the biodiversity of the campus from last few years and we have identified Algae, Bryophytes, fungi (both micro and macro) Pteridophytes, Gymnosperms and Angiosperms. Mulani R. M., *et. al.* (2015), Mulani R. M., Wakode V. A. (2015); Mulani, R. M. and Pawar G. S. (2015)

There is varied kind of habitat conditions. The University area mainly has low height area and low land with few plain platue and undulating plains. There are two minor water bodies (1.0 – 5.0 ha. area) that remain dry during summer (April - May) each year. The soil colour in the region is yellowish red and the soil surface is covered by small to medium sized stone logs. There are 27 residential buildings in the University campus that includes Students Hostels, University Staff quarters, Officers quarters, Guest house, student's canteen, Canteen at Guest House. The land under the University Jurisdiction is also used for the plantation of Mango, Jatropha and social forestry plantations. During monsoon and winter season whereas the grass get dried and converts from green to straw coloured. The land in the region remains covered with dried grass.

After development of SRTM University Campus regular tree plantations have undertaken by introducing new tree species mainly Mango, Teak, Shisam and other species. The good water conservation strategies has been undertaken in campus which resulted more sustainability of tree species and now presently the water bodies formed at the campus under new water resources management strategies undertaken by the SRTM University are almost full of water throughout year. The water level in the wells have increased and even the borewell water

reamains continous even during summer reason.



Observations

Mix plantation which was undertaken mainly in Biodiversity Park with the active support of forest department of Nanded division by sponsoring project to SRTM University Nanded and the plantation was undertaken. In addition massive mix plantation was done Botanical garden, in front of Main administrative building, along the sides of VC Bungalow, officer's quarters, Near Knowledge resource centre, and Central Canteen area, Sports ground, Around boys and girls hotels and remaining open areas are resulted into decrease in temperature and increase litter biomass on the floor which increases higher fungal diversity.

The earlier two lakes from which mud was removed which increased the ate quantity and recently few water tanks were developed by active involvement of the administration special mention to Hon. Vice Chancellor supported this activity and the water shade management was undertaken in the form of trenching, deep ploughing which resulted into more percolation of water in the campus and ultimately increase of water table. Large number of flora and fauna increased in the campus which is a positive step in changing environment and in upcoming years it will be a good avenue type of campus which will attract more students to this campus. The administrative department, Estate department, Garden section, School of Earth Sciences, School of Earth Sciences, School of Media Sciences have taken good steps in changing the greenery of environment of the campus. Biodiversity Park and botanical garden will add treasure of plants in the campus.

Figure 1 SRTMU University Campus

Figure 2 Water tanks at SRTM University Campus

Conclusion

The number of plantation drives of mix plantations was with the main objectives to increase greenery and cultivation of plants having medicinal importance as well as the fruit bearing plants has resulted in increase in biodiversity of the campus and also in temperature and increase litter biomass on the floor which increases higher fungal diversity.

The various water harvesting measures undertaken in the form of trenching, deep ploughing which resulted into more percolation of water in the campus and ultimately increase of water table. Large number of flora and fauna increased in the campus Thus the environment of the campus is changing to more ecofriednly nature of development in the campus.

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