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Diversity of Various Planktonic Species from Rearing Fish Ponds

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Abstract: *The present study entitled "Diversity of various planktonic species from rearing fish ponds" was done in the fish ponds of University of Agriculture Faisalabad. Water samples were taken with the help of planktonic net and observe under high and low powers of electron microscope. Brachionus plicatilis, Cyclops bicuspidatus, Paramecium, Calanoid, Closterium setaceum, Mesocyclops aspericornis, Keratella valga and Volvox found, belonging to zooplankton. Phytoplanktons were the Chlamydomonas reinhardtii and Pediastrem duplex. Cyanobacterial species was Microcystis. During the study, zooplankton was abundantly found rather than the phytoplankton. Plankton diversity increased or decreased with the physico-chemical parameters of pond, and its abundance also affected by the environmental conditions. In summer the plankton diversity decreases while during winter, it increases. It was also noticed that the pollution is also affecting the plankton abundance in these ponds.*

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I. Introduction

Biodiversity is the collection of life on globe and involve changes at all ranks of living group from genes to species and species to the ecosystems. Genetic, organismal and ecological varieties are all segments of biodiversity including several elements. (Gaston and Spicer, 2004).

Alpha diversity is the variety of species, community, or ecosystem in a specific zone, and is calculated as (the number of species in that zone). Beta diversity can be define as the variety of species within regions and includes the differentiation the amount of species that are special to every zone. Gamma diversity can be defined as amount of total diversity in a zone (Gaston and Spicer, 2004).

Pond plankton can be divided into two types; phytoplankton and zooplankton. The small plants present in the water bodies are called as phytoplankton and the animals present in the water bodies are known as zooplankton. Some unknown organisms are also present in the water bodies these are protozoa and bacteria. (Becker, 1983)

Planktonic organisms are subdivided physiologically, taxonomically or on dimensionally basis. A fundamental classification of plankton is Bacterioplankton, Phytoplankton and Zooplankton. We can also subdivide the planktons on base of their cell size. Which is the simplest strategy being that of Dussart (1965) who distribute the planktons on the logarithmic size limescale. The macroplankton's size ranges from 200-2000 µm, microplankton's size ranges from 20-200 µm, nanoplankton's size ranges from 2-20 µm, picoplankton's size ranges from 0.2-2 µm and femtoplankton's size ranges from 0.02-0.2 µm. (Tucker and Lloyd,1984).

The significance of autotrophic phytoplankton in aquatic environments is well understood. Heterotrophic plankton loose protein, vitamins and minerals deposit in biomass throughout the feed of microbial organisms, illustrating the importance of these plankton to nutrient regeneration. (Diez*et al.,* 2001)

Zooplankton is the crucial biotic element which upset the phytoplankton competitiveness. To know the link between zooplankton phytoplankton several feeding investigations has been managed. (Bernardi and Giussani, 1990)

There are two types or water bodies, natural and manmade. These may be permanent and temporary, and they are present on area of 1 m^2 and 2ha. (Biggset*et al.*, 2005) the pond can be defined as "The waterbody with the maximum length of 8m and the phytoplankton pioneer the whole area of pond" (Oertli. *et al.,* 2000)

A pond is smaller than a lake and contain freshwater. The ponds are formed by the digging a large hole into the ground and filling and keeping it with water. Commonly the water of springs and streams fall into these ponds. Ponds may be manmade. Man produced the ponds by forming a hole into the ground. Ponds are generally land locked and there is no discharge of water. Because of this they are supposed to be independent ecosystems. These ecosystems contain huge variety of plankton (Søndergaard*et al.,* 2005).

The pond water may be dark in color if its water contains higher amount of organisms and suspended particles. The lower part or the base of the pond contains dead organic matter and decaying matter and several microorganisms. The water of the pond is immobile. Nutrients have been carried by the water waves of the streams runoff during rain and also from snowmelt (Halver*et al.,*1984).

The waste of animals and decomposed plants materiel are broken down into simpler components and are used for the food for the living organisms of the pond. The organisms that live around the pond, mostly depends upon the nutrients of the pond(Halver*et al.,* 1984).

There are some main environmental factors which effect the amount of species in ponds, these are hydro period length, length, surface area, amount of oxygen disintegrates and the abundance of macrophyte species. There are two types of ponds, temporary and permanent ponds. Temporary ponds include little number of taxa, while permanent ponds include a large number of taxa. The common thing is that both types of ponds carry equal number of ordinary and alarm species. The species of orders Coleoptera, Odonata, and Hemiptera are greater in number in the macrophyte beds then in littoral and central sediments(Sondergaard*et al.,* 2005).

Diversity index gives us information concerning with the unique and ordinary species in a community. To know about community shape, biologists use special mechanism to know about community structure which is the quantification of diversity. The Shannon's diversity index is the key to determine the variety of species in a community. It is used for two main purposes for evenness and abundance of species present in a community(Magurran, 1988)

It is very necessary to know about the procedures which help to maintain the macrophyte variety in the pond ecosystem.We can secure the whole biodiversity present in the pond ecosystem by using macrophyte diversity as a meter. Macrophyte diversity is affected by several confined factors, like physiochemical state of water, category of substratum, pond profile and the size of pon. (Oertli*et al*., 2002; James *et al*., 2005)

Among these factors the physicochemical condition of water, which significantly controls macrophyte variety, is affected by the uses of the land which is present around the pond. (Sondergaard*et al*., 2005; Declerck*et al*., 2006; Pedersen *et al*., 2006; Ecke, 2009)

The macrophyte diversity can be decrease by the eutrophication which is caused by the urbanization.It increases nutrient and sediment loading in the pond ecosystem(Carpenter*et al*. 1998).

The purpose of this work is to determine the diversity of various planktonic species from rearing fish ponds.

II. Reviewofliterature

Louette and Luc (2005) examined high dispersal capacity of cladoceran zooplankton in newly founded communities. Distribution of fauna is important but it is very tough to study but distribution of fauna in newly created ecosystems is somewhat easy to judge. This study was done in 25 newly formed ponds which are physically separated from each other. During first year of study,4.2% of Cladoceran species were found in every pond, and twenty (20) different species were examined. Overall 40% species diversity were found and the dominated species was cladoceran zooplankton. Cladoceran zooplankton also found near (3km) the newly formed waterbodies, which showed that cladoceran zooplankton had high distribution capacity. The above results were discussed in the presence of evolution and ecology which effects the distribution in aquatic ecosystems.

Kudari*et al.* (2005) studied zooplankton composition in some ponds of Haveri District, Karnataka. The study was done in 19 different water bodies during premonsoon and postmonsoon season. Overall 71 species were found, from which 38 species belongs to phylum Rotifera, 22 species belong to order Cladocera, 7 from Copepoda and 4 species belongs to class Ostracoda. 5 species were reported for the first time in the study area, 1 belong to Cladocera and 4 from Rotifera. 34 species found from two tanks, 29 species found from Akkialur tank and 5 species found from Makaravalli tank. Commonly founded Rotiferans were *Keratella tropica*, *Habrotrocha bidens*, *Brachionus calyciflorus*, *Brachionusdiversicornis*, *Keratella cochlearis*, *Lecane luna*, *Lecaneleontina*, *Fillinia longiseta*and *Fillinia opoliensis*. Commonly foundedCladocerans were *Diaphanosoma exicum*, *Ceriodaphnia cornuta*, *Moina micrura*, *Moina macracopa*. The Copepods founded species were *Neodiaptomus strigilipes*,*Heliodiaptomus viduus*, *Paracyclops fimbiatus*, *Tropocyclops prasinus* and*Mesocyclops leuckarti*. Ostracods founded species were *Hemicypris fossucula*, *Ilyocypris gibba* and *Darwinula sp.* Total 29 species found before monsoon season while 15 species found after monsoon season which showed that the species diversity was greater before monsoon season and vice versa.

Affan*et al.* (2005) studied seasonal cycle of phytoplankton in aquaculture ponds in Bangladesh. This study was done in four different ponds in Bangladesh. During the study 45 phytoplankton species were found. 30 species belong to class Euglenophyceae, 7 species belong to Chlorophyceae, 5 species belong to Bacillariophyceae and only 3 species belong to Euglenophyceae. The diversity of phytoplankton was greater in spring while lesser in winter. *Chlorella vulgaris* (Chlorophyceae) was dominant during rainy season. Bacillariophyceae was dominant throughout winter. *Euglena* (Euglenophyceae) was dominant during autumn. *Microcystis sp*, *Anabaena sp*. and *Planktolymbya sp* were dominant during spring season.

Chowdhury and Mamun (2006) examined physio-chemical conditions and plankton population of two fishponds in Khulna. This study was done in two fishponds to studied phytoplankton and zooplankton abundance, during 2003-4. Overall 25 phytoplankton and 18 zooplankton species were found. (Phytoplankton species)7 species belong to Cyanophyceae, 7 belong to Chlorophyceae, 8 from Bacillariophyceae and 3 from

Euglenophyceae. (Zooplankton species) 4 belongs to Copepoda, 7 belongs to Rotifera and 7 species belongs to Cladocera.

Barbara *et al.* (2008) examined phytoplankton seasonal variation in a shallow stratified eutrophic reservoir in Garcas Pond, Brazil. This study was done just to examined the phytoplankton biodiversity in Garcas pond situated in Brazil. The samples were collected from depths of the pond. Total 236 species (belongs to 10 families) were recorded. The whole year were divided into two phases, warm-wet season and cool-dry season. The amount of *Cyanobacteria* changes whole the year. Throughout phase 1, *Raphidiopsis/Cylindrospermopsis* was dominant, while in the phase 2 its concentration decreases, and *Diatoms* concentration increases. During September Cyanobacterial bloom raised, which cause an increase in the concentration of pH and chlorophyll.

Muthukumar*et al.* (2007) examined the cyanobacterial biodiversity from different freshwater ponds of Thanjavur, Tamilnadu in India. This study was done in 5 different types of ponds. physico-chemical parameters of the ponds also investigated. Overall 39 species were found from 5 ponds. Those 39 species belong to 20 genera of Cyanobacteria. 6 species of cyanobacteria were found from pond no 1. A large bud of *Microcystisaeruginosa* found which decreases the cyanobacteria abundance. *Aphanothece microscopica, Synechocystis aquatilis, Merismopedia glauca, Oscillatoria limnetica and Oscillatoria subbrevis* were the common species found in all the ponds except pond 1.

Vanormelingen*et al.* (2008) studied relative importance of dispersal and local processes in structuring phytoplankton communities in a set of interconnected ponds. this study was done in 28 ponds which are physically connected to each other. During this study it was understood that changes in phytoplankton community depends upon the abundance of phytoplankton as well as the way of formation of community. the phytoplankton diversity was examined in turbid and clean water. The results showed great diversity in turbid water rather than clean water. The connection between ponds allow to move water between ponds, which helps to explain plankton community composition. The dispersal pattern of species effects inhabitant populations while the groups or crowds effects the adjacent populations.

Shanthala and Shankar (2009) studied the diversity of phytoplankton in a waste stabilization pond at Shimoga Town, Karnataka State, India. Overall 71 species of Algae were identified, which belongs to 5 families. The families include Bacillariophyceace, Desmidaceae, Chlorophyceae, Cyanophyceae and Euglenophyceae. In the whole study period *Scenedesmus* and *Chlorella* were dominant species of Algae. Phytoplankton play an important role in purifying or cleaning the water in waste water ponds. Diversity also gives information about rare and common species in community. The pollution also effects species diversity. The greater pollution leads to the lesser number of phytoplankton abundance.

Yang *et al.* (2010) studied plankton community structure and its dynamics in recycling and non-recycling aquaculture ponds. Overall 93 phytoplankton species found from recycling ponds, which belongs to 6 phyla and 47 genera. Total 100 zooplankton species were found from non-recycling ponds which belongs to 6 phyla and 48 genera. Chlorophyta was dominant in both recycling and non-recycling ponds. the zooplankton found from recycling pond, belongs to 42 species and 33 genera, while the zooplankton species found from non-recycling ponds belongs to 88 species and 68 genera. Zooplankton was mainly consisted of Rotifera and Protozoa. The Rotifera present in recycling and non-recyclingponds 33.34% and 48.86% respectively, while Protozoa showed their abundance in recycling and non-recycling ponds 52.38% and 42.05% respectively.

Rajagopal*et al.* (2010a) examined zooplankton diversity and physico-chemical conditions in three perennial ponds of Virudhunagar district, Tamilnadu in India. This study was done in three perennial ponds, Chinnapperkovil pond, Nallanchettipatti pond and Kadabamkulam pond. Overall 47 species were found from which 24 species belong to phylum Rotifera, 9 from Copepods, 8 from Cladoceran, 4 Ostracods and 2 from Protozoans. Chinnapperkovil pond contain 47 species, Nallanchettipatti pond contains 39 species, and Kadabamkulam pond contains 24 species. *Branchionus sp*. Was dominant from Rotifera, *Diaphanosoma sp.* was dominant from Cladocerans, *Mesocyclopes sp* was dominant from Copepods, *Cypris sp*. Was dominant from Ostracoda. The biodiversity was abundant in Chinnapperkovil pond rather than the other ponds. The species which were involve in eutrophication were *Moinodaphnia sp.,Diaptomus sp., Diaphanosoma sp., Mesocyclopes sp., Cypris sp.,Leydigia sp.,Keratella sp.,Monostyla sp., Lapadella sp.*

Rajagopal*et al.* (2010b) studied the comparison of physico-chemical parameters and phytoplankton species diversity of two perennial ponds in Sattur area, Tamil Nadu. During this study total 50 species were recognized which belongs to Bacillariophyceae, Cyanophyceae, Euglenophyceae and Chlorophyceae. Nallanchettipatti pond contained higher variety of phytoplankton and low phytoplankton diversity were recorded in the Chinnapperkovil pond. Chlorophyceae was dominant in both areas. The species which were dominant in Chinnapperkovil pond were, *Nitzschia bilobata, Navicula membranacea, Frustulia rhomboides, Microcystis aeruginosa, Anabaena aequalis, Scenedesmus annatus, Closterium acerosum, Oscillatoria angusta* and *Pediastrum leonensis.Zygnema caeruteum, Fragilaria oceanica* and *Spirogyra maxima* were dominant in Nallanchettipatti pond. The Chinnapperkovil and Nallanchettipatti ponds was considered to be meso-eutrophic and oligo-eutrophic respectively.

Ahmad *et al.* (2011) examined zooplankton population in relation to physico-chemical factors of a sewage nourished pond of Aligarh (UP), India. This study was done between 8am to 11 am during 2008. This study also worked on the parameters like water, oxygen, carbon dioxide, pH, alkalinity etc. During this study total 20 zooplankton species were found which belonged to 4 groups. 11 species were belonged to Rotifera,4species from Cladocera, 3from Copepoda and 2 species from Ostracods. Rotifera was the dominant group during the study. As the ponds received household debris, which increase phosphorus and nitrate concentration and increase eutrophication. Some species produced pollution in the water, which are *Brachionus,Keratella, Asplanchna, Fillinia, Diaptomus* and *Cyclops.*

Kumar *et al.* (2011) examined seasonal variations in zooplankton diversity of Railway Pond, Sasaram, Bihar. During the study 76 zooplankton species were found which belongs to Rotifera, Cladocera, Ostracoda, Copepoda and Protozoa. From that 76 species, 37 species belong to Rotifera, 15 species from Cladocera, 12 species from Copepoda, 9 species from Protozoa and only 3 species belongs to Ostracoda. The railway pond mostly contained household and domestic waste water and eutrophic in nature. There was great rise in zooplankton abundance during winter. And during monsoon season, due to high turbidity the plankton population decreases.

Sharma *et al.*(2015) studied zooplankton and microbenthic invertebrate abundance in two perennial ponds in Jammu region. During the study period, 29 zooplankton species were found from Dilli pond, 25 species found from Jakh pond. The species were belong to Rotifera, Ostracoda, Copepoda, Cladoceran and Protozoan. 23 species of invertebrates found from Dilli pond and 13 from Jakh pond. Jakh pond contained lower diversity as compared to Dilli pond. Some species also investigated which can cause eutrophication, which leads to decrease the diversity in the ponds.

III. Materialsandmethods

The present study entitled "Diversity of various planktonic species from rearing fish ponds" was carried out at the fish ponds of zoology department in University of Agriculture Faisalabad.

Fig 3.1: Sampling site

Fig 3.2: Sampling collection

Plankton collection:
Water samples are drawn from the upper and lower ends and from boundaries of fish ponds. Bottles and planktonic nets are used for assortment of plankton species, which are then studied.

Fig 3.3: Planktonic net

Identification of plankton species:
We used 10% formalin solution for preservation of plankton species, and for identification we used microscope. Pictures were shoot with the help of camera.

IV. Results And Discussion

Duringtheresearchdifferentspeciesofzooplanktonandphytoplanktonarecollectandidentified

Volvoxaureus

Kingdom	Plantae
Division	Chlorophyte
Class	Chlorophyceae
Order	Volvocales
Family	Volvocaceae
Genus	Volvox
Species	*V. aureus*

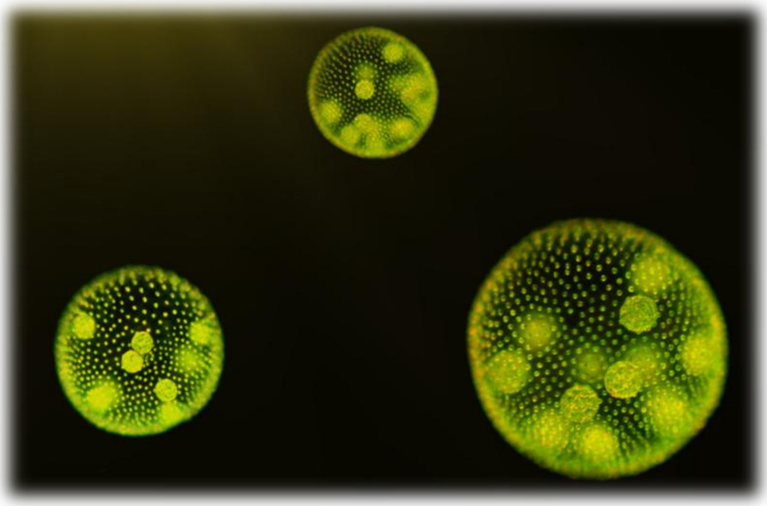

Fig4.1:*V. aureus*

Volvox is a microorganism that lives in the form of group or colonies for their common advantage. Every group or colony holds 500-50,000 cells. Volvox colonies are present in rounded space, prepared with glycoproteins. Every Volvox contains two flagella, and every colony contains a number of flagellated cells.

Every cell is linked with other cells through tinny thread like structures. These thread like structures help in movement of whole colony.

Summer is the best time to find Volvox and these can easily notice by human eye. Every organism moves in the direction of light and they contain small red eye spots, with the help of these spots, they perceive light.

Reproduction takes placed by both sexual and asexual manners. Sexual reproduction occurs in sex cells while asexual reproduction occurs in other cells. Through the process of reproduction, the new daughter cell formation or reproduction lasts until a new small colony made. The daughter group formed but not unconfined until the parent colony or group dies.

Paramecium caudatum

Kingdom	Protista
Phylum	Protozoa
Class	Ciliates
Order	Hymenostomatida
Genus	Paramecium
Species	*P. caudatum*

Fig4.2:*P. caudatum*

The shape of paramecium looks like the sole of shoe, and it is unicellular organism. The size of paramecium changes from species to species. And it lives in freshwater.

The body of paramecium covered by small hair likes extensions, called cilia. Cilia help in locomotion. The backward movement of cilia helps the organism to move backward direction. Paramecium take food partials inside their body through a process called phagocytosis. The food is pushed into crop with the help of small tiny hair like structures called cilia, which (food particle) then goes into food vacuoles.

Paramecium contains dual nuclear apparatus, one or two micronuclei, and many macronuclei. Micronucleus conserves genetic stability, and it also called germline nucleus.

Cyclopsbicuspidatus

Kingdom	Animalia
Phylum	Arthropoda
Class	Maxillopoda
Order	Cyclopoida
Family	Cyclopidae
Genus	Cyclops
Species	*C. bicuspidatus*

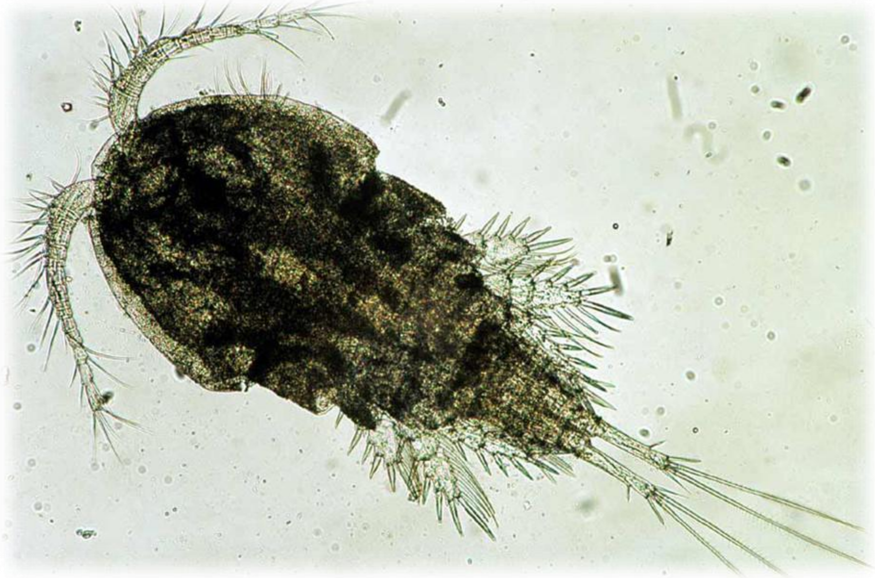

Fig4.3:*C. bicuspidatus*

Cyclops bicuspidatus present all over the world excluding Australia. It lives in deep waters and present whole year, but its richness increases during May and June. Females are larger than males.
This species found in large lakes and it is herbivore till the 25% instar and later omnivorous. It feeds upon ciliates, rotifers, small cladocera, young copepods and fish larvae. Alewife, bass, bloaters, ciscoes eat *C.bicuspidatus.* When Cladoceran;*Cercopagis pengoi* introduced into Lake Ontario, the abundance of C.*bicuspidatus* decreases.

Brachionusrubens

Kingdom	Animalia
Phylum	Rotifera
Class	Monogononta
Order	Pliomida
Family	Brachionidae
Genus	Brachionus
Species	*B. plicatilis*

Fig4.4:*B. plicatilis*

B.plicatilis can live in extensive range of salinity. This is the one and only commercially vital rotifer in the family Brachionidae. This species is very important for food. This species found in salt waters.
B.plicatilis is a mysterious species. It can reproduce both sexually and asexually. When population density rises, *B.plicatilis* reproduce sexually.

Closteriumsetaceum

Kingdom	Plantae
Division	Charophyta
Class	Zygnematophyceae
Order	Desmidiales
Family	Closteriaceae
Genus	Closterium
Species	*C. setaceum*

Fig4.5:*C. setaceum*

This *C. setaceum* is present in the whole world and this is the unicellular species of chlorophyte green algae belongs to family Closteriaceae.

Order Calanoid

Kingdom	Animalia
Phylum	Arthropoda
Subphylm	Crustacea
Class	Maxillopoda
Subclass	Copepoda
Superorder	Gymnoplea
Order	Calanoida

Fig4.6: Calanoid

Copepodes contain an order of zooplanktons called Calanoida. They contain eighteen hundred species lives in both freshwater and marine water. Calanoid copepodes makes a major part of oceans of world.They make 55-95% of zooplankton species. They play a vital role in food webs and food chains

The Calanoid size ranges from 0.5mm to 2.0mm but the maximum size of a Calanoid is 18mm. Calanoid are different from other copepodes. Calanoid have two antennae the first antennae is ½ of the body of Calanoid while the second one is polygamous.

Microcystis

Domain	Bacteria
Kingdom	Eubacteria
Phylum	Cyanobacteria
Class	Cyanophyceae
Order	Chroococcales
Family	Microcystacea
Genus	Microcystis

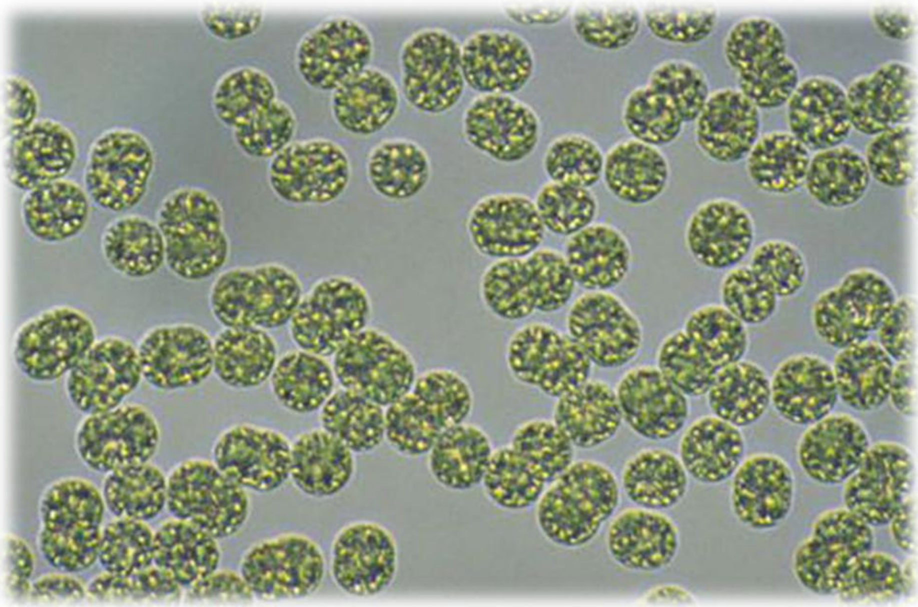

Fig4.7:*Microcystis*

Microcystis are insignificant cells contains gas filled vesicles.The small cells join to each other to form colonies that are of spherical shaped. Sometimes the colonies dropped their unity and de-shaped.
Boundaries of Microcystis colonies are made up polysaccharide compounds. The color of protoplast is light blue-green which seems like brown, due to gas filled vesicles. Gas filled vesicles give buoyancy to them.
Microcystis had powerful impact of phosphorus to nitrogen ratios. They are expert to take nitrogen and phosphorus from medium where they live.

Mesocyclopsaspericornis

Kingdom	Animalia
Phylum	Arthropoda
Class	Maxillopoda
Order	Cyclopoida
Family	Cyclopidae
Genus	Mesocyclops
Species	*M. aspericornis*

Fig4.8:*M. aspericornis*

M. aspericornis lives in freshwater, belongs to family Cyclopidae. This species mostly found in Singapore, Sumatra and Hawaii.
M. aspericornis form a well matched predator couple for decrease of larval populations of *Aedes notoscriptu*s and *Culex quinquefasciatus* in drain habitats in Queensland.
M. aspericornis combine with *Bacillus thuringiensis var.israelensis*have been used to controls the*Aedes aegypti* larvae in Thailand.

Pediastrumduplex

Kingdom	Viridiplantae
Division	Chlorophyta
Class	Chlorophyceae
Order	Sphaeropleales
Family	Hydrodictyaceae
Genus	Pediastrum
Species	*P. duplex*

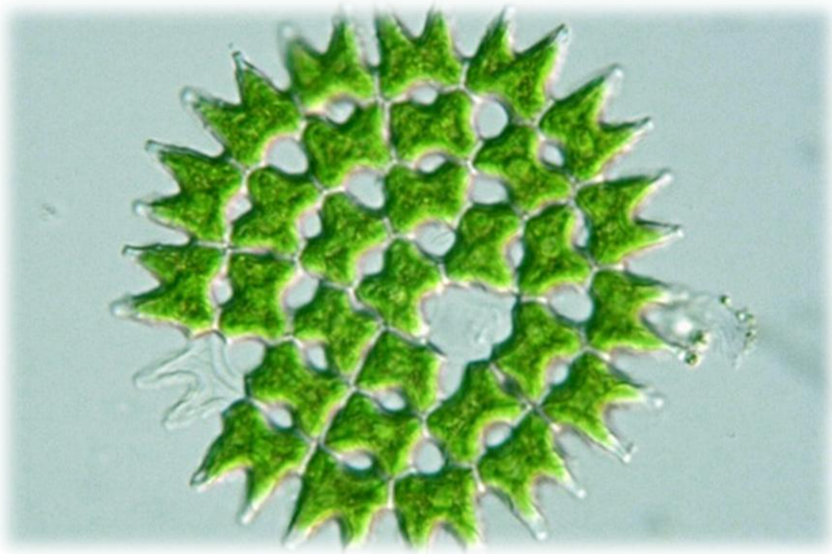

Fig4.9:*P. duplex*

P. duplex belongs to family Hydrodictyaceae and genus Pediastrum. It ispresent in those water bodies which contain huge amount of nutrients. *P. duplex*are autotrophs and can produce their own food by using sunlight. It lives in freshwater bodies.

P.duplex can reproduced asexually by forming biflagellate zoospore, rising from each of the colony. Zoospores released from parent colony in a cavity and then arraigned themselves in a cellular fashion. The cells expand and attain a maximum size.

P.duplex can reproduce sexually by forming small motile gametes that are released from parents. The zygote then grows in the zoospores and attain a maximum size.

Chlamydomonas reinhardi

Kingdom	Monera
Phylum	Chlorophyta
Class	Chlorophyceae
Order	Chlamydomonadaceae
Family	Chlamydomonadaceae
Genus	Chlamydomonas
Species	*C. reinhardi*

Fig 4.10:*C. reinhardi*

Chlamydomonas reinhardtii is a single-cell green alga, size of this species varies from a few micrometers to 10 micrometers in diameter.it has two flagella which help in movement. It has cell wall, an eye spot and a big pyrenoid. Eye spot helps in the detection of light.

These species are generally spread in the terrestrial and aquatic habitats. These are greatly examined due to comfort in the culturing of the species. *C. reinhardtii* is very helpful in the production of hydrogen as well as this species used in the formation of biopharmaceuticals and biofuel.

In ideal growing environments, before releasing of daughter cells in the external environment the cells undergo two or three mitotic divisions. Hence a single step of growth, one mother can produce 4 or 8 daughter cells.

The cell cycle of *C. reinhardtii* is light dependent and independent. As the growing period is light dependent while after the transition point all the developments are light independent.

Keratella valga

Kingdom	Animalia
Phylum	Rotifera
Class	Eurotatoria
Order	Ploima
Family	Brachionidae
Genus	Keratella
Species	*K. valga*

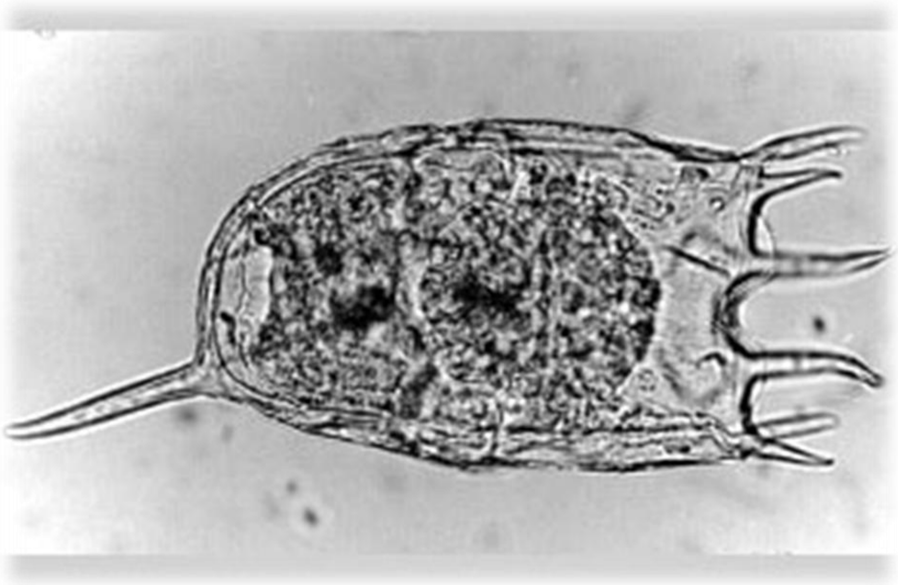

Fig 4.11:*K. valga*

This genus contains sixteen identified species. *K.valga* swims very fastly. Their eggs are attached to their foot. Size of this species is 0.45mm in length. They can reproduce both, sexually and asexually. In the absence of males unfertilized egg develop and asexual reproduction occurs.

V. Discussion

The present study reveals that the current area of Pakistan is 881,913 km², from which 60,500-hectare area consist of ponds, 10,500-hector area present in Punjab is covered by ponds, 560-hector in Khyber Pakhtunkhwa, 240-hector in Baluchistan and Northern areas. 8.6 million consist of villages, ponds, waterlogged areas, rivers, canals, reservoirs, and lakes. A great variety of fish farms are under construction in Pakistan.

Phytoplankton are beneficial to human life, petroleum and natural gas are the major products of phytoplankton that we used. A long time we used the skeletons and remains of planktons, as a building material. Excretions of Diatoms are used as for paints, polishing etc. major source of oxygen that we use for breathing are produced by phytoplankton. (Falkowski et al 2003). Sometimes zooplankton are used for food, but not greater than that of phytoplankton. phytoplankton also used in medicines. Chlorella and some microscopic algae are used for nutrient supplement. Algae is used in the formation of some medicines which cure some diseases of nervous disorders. (Deans et al 1955)

Zooplankton is vital which affects competition of phytoplankton. Several experiments are performed to determine the connection between zooplankton and phytoplankton. (Burns,1987; Haney, 1987; de Bernardi and Giussani.1990, Gliwicz, 1990). Experiments showed that the increased amount of phytoplankton, decreases the amount of zooplankton. Shortly both are inversely proportional. Increased the rotifers diversity, decreases the amount of Cladocerans. (Allan et al 1982).

Pollution in water caused by direct and indirect manner. Human is the major source of pollution in water. Water pollution occurs by domestic waste, oil spills, shipping, waste of factories. As fish amphibians affected with water pollution but major affected species are of phytoplankton, as phytoplankton starts the food chain and disturbance in its growth can leads to the decreased phytoplankton another aquatic organisms. (Priya Mallika D'Costa et al 2017).

Many studies showed that Algae are affected with pollutants. The production of Algae is directionally proportional to the photosynthesis. The polluted water of factories which mixes with the water of aquatic ecosystem contains color and pollutants decreased the production of plankton in aquatic habitat. The chemical pollutants inhibit the penetration of light in the water so the growth of phytoplankton ceased. Chlamydomonas is very fastly affected by the lead, cadmium and methylmercury. When these metals present in water, the rate or growth of Chlamydomonas declines abruptly. (Overnell 1975).

During this study, total 11 species found, zooplankton were dominant. Brachionus plicatilis, Cyclops bicuspidatus, Paramecium, Calanoid, Closterium setaceum, Mesocyclops aspericornis, Keratella valga and Volvox found, belonging to zooplankton. Chlamydomonas reinhardtii and Pediastrem duplexnd belongs to phytoplankton. Cyanobacterial species was Microcystis.

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