



DIVERSITY AND DISTRIBUTIONAL STATUS OF PHYTOPLANKTON POPULATION IN MANAKONDUR FRESHWATER LAKE OF KARIMNAGAR DISTRICT, TELANGANA STATE, INDIA.

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Abstract : Phytoplanktons are primitive, usually aquatic, photosynthetic and delightful organisms in their diversity and efficacy. Phytoplankton comprises a well-organized system for trapping the solar energy. These miniature amaze ball phykos alone contribute 90% of the total oxygen produced by the plant kingdom. They are prime manufacturers in water ecology and play a crucial role in converting sewage and waste water into beneficial biomass. Most of the Phytoplanktons grow in different water bodies such as ponds, pools, ditches, lakes, reservoirs, rivers and oceans. But some of them are common and widespread in habitat of the soil surface layer wherever moisture and sunlight are available. The main aim of the present study was to explore the phytoplankton from Manakondur Freshwater Lake, study the diversity pattern and assess quality of the lake. In the present study was carried out of one year from June 2020 to May 2021. A total number of 35 species were recorded. The phytoplankton diversity study provided several new data with many of the phytoplankton taxa being recorded for the first time in study site, such as 15 species among the Chloro phyceae, 9 species of the Cyanophyceae, 4 species of the Eugleno phyceae and 7 species of the Bacillario phyceae. The present observations revealed that Chloro phyceae species were dominant followed by Cyano phyceae, followed by Euglenophyceae and Bacillariophyceae were observed during the study period. There were percentage of Choro phyceae (45%), Cyanophyceae (25%), Euglenophyceae (17%) and Bacillariophyceae (13%).

Key Words - Phytoplankton Diversity, Seasonal Variation, Manakondur Freshwater Lake

I. INTRODUCTION

Water is an essential requirement for all forms of life needs, protection from pollution which otherwise cause a threat to human life. Environmental conditions such as salinity, oxygen, temperature and nutrients influence the composition distribution and growth of its biota (Swami et al., 2000). Phytoplankton are ecologically significant as they trap the radiant energy and convert into organic materials. All the herbivorous organisms depend for their food materials on these organic materials in the aquatic system. Phytoplankton forms the base of food chain in most of the aquatic ecosystems, thus playing a vital role in fisheries. Phytoplankton is the pioneer of an aquatic food chain. The productivity of an aquatic environment is directly correlated, with the density of phytoplankton. Moreover, number and species of phytoplankton serves to determine the quality of water body.

Phytoplankton study has three main advantages. Firstly, fish monitoring and surveillance programmers which are designed to determine impact data, which are badly needed for developing management strategies. Secondly, phytoplankton which are sensitive and good maintain and can be studied in a relatively short period of time since these lower trophic level Organisms have a short generation time (Schindler and Holmgren, 1971, Tondon and Singh, 1972; Munawar et al., 1978; Tripathi and Pandey, 1990, Mariazzi et al., 1991). Thirdly, phytoplanktons are among the most abundant organisms in the aquatic ecosystem and play a key role as primary producers in the aquatic food chain.

The production of any aquatic water body depends on the amounts of plankton present in the said water body. Plankton, particularly phytoplankton, has long been used as indicators of water quality. Because of their short life spans, planktons respond quickly to environmental changes. Phytoplankton is the base of most lake food chains. These are also called as producers. Indirectly fish production is linked with phytoplankton, primary small producers. Phytoplankton produces the food and oxygen with the help of carbon dioxide, water and sunlight. Oxygen and phytoplankton are then consumed by zooplanktons, which are tiny microscopic

aquatic organisms. Phytoplankton being very small in size, they are microscopic plants, they respond quickly to the environmental changes. Changes in the chemistry of water will alter the change in abundance, growth and composition of species. Phytoplankton, Periphyton and Benthic algal communities represent the major producer components of aquatic systems. The biological indicators, also called biocriteria, use measures of the biological community including lower trophic level organisms, such as algae or benthic macro invertebrates, as well as upper trophic level species, such as fish. It is difficult to understand the biological phenomenon fully because the chemistry of water reveals much about the metabolism of the ecosystem and explain the general hydro - biological relationship (Basavaraja Simpi *et al.*, 2011).

Phytoplankton is a fundamental component of many of these aquatic ecosystems, not only in terms of biological diversity but also because it contributes to primary productivity that helps to maintain fisheries and other important lake ecosystem attributes. Diversity of phytoplankton helps to enhance the productivity and strongly depicts the water quality (Moss, 1988) as well as corresponds to the biotic factors (Scheffer, 1998). Consequently, environmental change, whether it be through land use intensification, water pollution, siltation/or Salinization, is causing increasingly complex impact problems for the wetland. Despite its importance, lake phytoplankton community composition, succession and productivity are generically poorly known regionally and were not included in a recent review of Moroccan limnology (Chergui *et al.*, 1999). Phytoplankton including many species are widely distributed in the aquatic ecosystems, which maintains their structural functions. They play an important and irreplaceable role of indicators and pollution purifiers, through participating in material cycle and energy flow in lakes (Mize and Demcheck, 2009 and Lei *et al.*, 2010).

II. MATERIAL AND METHODS

2.1. Study Area

Pedda cheruvu is located in Manakondur village, Karimnagar district, Telangana. The lake is located in longitude 79°13'30"E and latitude 18°23'53"N. An important fresh water lake in Karimnagar District has been identified to assess its water quality. The objective of the study is to take up fish culture in this lake. Weir and Sluice are present in this lake. This lake shows good diversity of Ichthyofauna along with other fauna.



Fig-1: Satellite image of Pedda Cheruvu (Manakondur)

2.2. Phytoplankton Sampling Procedure

The samples for phytoplankton were gathered in June 2020 to May 2021, from each station in a 100ml. Sample bottle by filtering around 50 liters of water through tiny plankton net. These samples were seen under magnifying instrument and microphotography was done on camera. Pingale and Deshmukh(2005); Deshmukh and Gunale(2007); Hosmani(2008).

III. RESULT AND DISCUSSION

Among the Phytoplankton, four groups of Phytoplankton's namely Chlorophyceae, Cyanophyceae, Euglenophyceae and Bacillariophyceae were identified and each group's annual and seasonal fluctuation, in the composition and density were described and individual species abundance has been recorded (Table no-1).

3.1. Chlorophyceae

The Chlorophyceae or green algae form greenish scum on the surface of quiet or stagnant water or grow firmly attached to the submerged rocks and other objects in water. There are about 6500 species of green algae worldwide. The factors such as high temperature low nitrate and a bright sunlight are favorable for the high population of green algae (Rao, 1955). The composition of Chlorophyceae population showed different peaks in the Monsoon season, winter season and summer season and during the present investigations. Total 15 species were found among the Chlorophyceae group. The total population density of Chlorophyceae of Manakondur Lake varied between 290no. Individuals/lit during Monsoon season, 410 no.individuals/lit during winter season, 351no.individuals/lit during summer season. The annual population density of Chlorophyceae of Manakondur Lake varied between 1051 no.individuals/lit. The results of present investigation are also similar with Sakhare and Joshi (2002) recorded 14 species of Chlorophyceae from Yeldari reservoir Maharashtra; Pawar *et al.*,(2006) recorded 23 species of Chlorophyceae from Pethwadaj dam Kandhar, Nanded; Desmukh and Gunale (2007); Tiwari and Chauhan (2007a), and (2007b).

3.2. Cyanophyceae

The composition of Cyanophyceae population showed different peaks in the Monsoon season, winter season and summer season during the present investigations. Total 9 species were found among the Cyanophyceae group. The total population density of

Cyanophyceae of Manakondur Lake varied between 192 no. individuals/lit during Monsoon season, 160no.individuals/lit during winter season, 232no.individuals/lit during summer season. The annual population density of Cyanophyceae of Manakondur Lake varied between 584no.individuals/lit.

3.3. Euglenophyceae

Euglenophyceae are commonly found in small water bodies having rich organic matter. Although the euglenoid algae (Euglenophyceae) are relatively large and adverse, few species are truly planktonic. Almost all euglenoids are unicellular, lack a distinct cell wall and possess one, two or three flagella. They are comprised of more than 800 species and about 40 genera. The composition of Euglenophyceae population showed different peaks in the Monsoon season, winter season and summer season during the present investigations. Total 4 species were found among the Euglenophyceae group. The total population density of Euglenophyceae of Manakondur Lake varied between 75no. Individuals/lit during Monsoon season, 201no.individuals/lit during winter season, 125no.individuals/lit during summer season. The annual population density of Euglenophyceae of Manakondur Lake varied between 401no.individuals/lit.

3.4. Bacillariophyceae

The Bacillariophyceae constitutes an important component of the fresh water or marine plankton. They comprises of 1600 species grouped under 200 genera. They are wide spread and occur in abundance. The water quality in terms of levels of organic matter dissolved oxygen; pH and other physical factors play an important role in the ecological distribution of Bacillariophyceae (Sabata and Nayar, 1987). The composition of Bacillariophyceae population showed different peaks in the Monsoon season, winter season and summer season during the present investigations. Total 7 species were found among the Bacillariophyceae group. The total population density of Bacillariophyceae of Manakondur Lake varied between 82no. Individuals/lit during Monsoon season, 130no.individuals/lit during winter season, 100no. Individuals/lit during summer season. The annual population density of Bacillariophyceae of Manakondur Lake varied between 312no.individuals/lit. Waghmare and Mali (2007) reported maximum density during winter season at Kalamnuri dam, Hingoli district, Maharashtra. The total percentage in phytoplankton population of Manakondur Lake during June 2020 to May 2021. Chlorophyceae (45%),Cyanophyceae (25%), Euglenophyceae (17%) and Bacillariophyceae (13%) respectively(Table no-2; Fig no-2).

IV. CONCLUSION

The present study on Manakondur fresh water Lake exhibits rich and diversified Phytoplankton which is dominated by Chlorophyceae throughout the study period which reveals that the Lake is very much suitable for aquaculture. The present observations revealed that Chlorophyceae species were dominant followed by Cyanophyceae, followed by Euglenophyceae and Bacillariophyceae were observed during the study period. There were percentage of Chlorophyceae (45%),Cyanophyceae(25%),Euglenophyceae(17%) and Bacillariophyceae(13%).

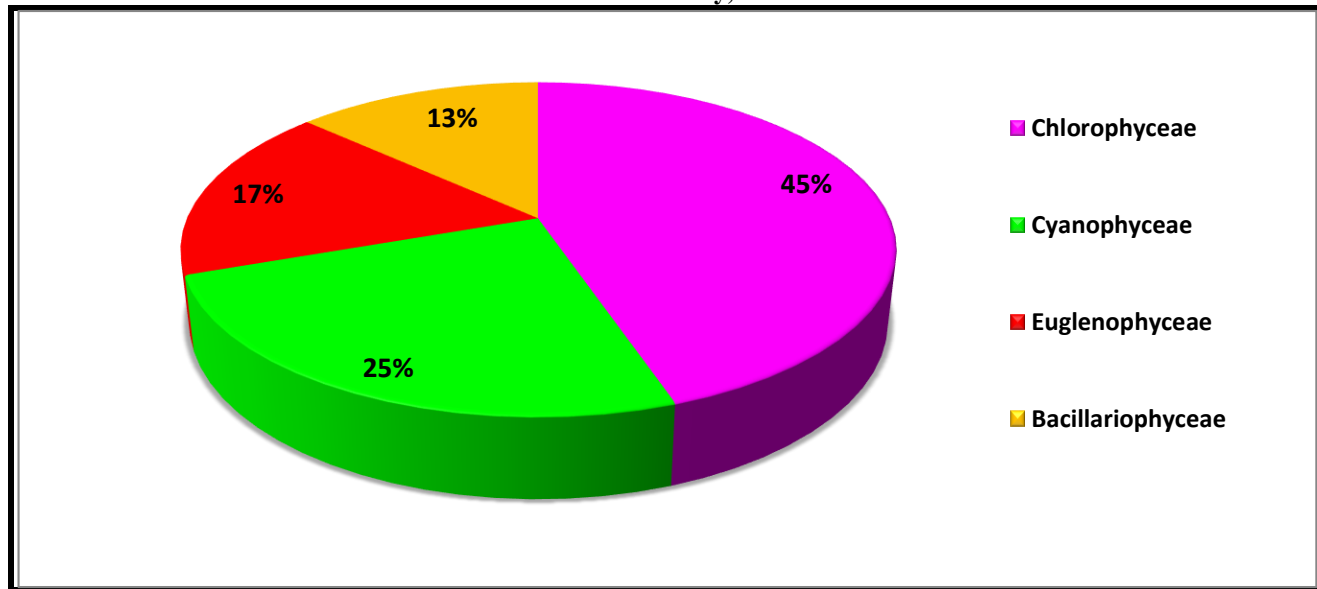
Table-1: Phytoplankton Recorded from Manakondur Fresh water Lake during June-2020 to May-2021

Chlorophyceae	Cyanophyceae	Euglenophyceae	Bacillariophyceae
1).Ankistrodesmus falcatus	1).Anabena tyengarii	1).Lepocinclis fusiformis	1).Amphora spp
2).Chara spp	2).Anabenopsis spp	2).Menoidium spp	2).Cymbella affinis
3).Chlorella vulgaris	3).Gloeotrichia spp	3).Phacus spp	3).Fragillaria brevistriata Grum
4).Cladophora glomarata	4).Hydrococcus spp	4).Euglena caudata	4).Navicula cuspidate
5).Cladophora ariculata	5).Microcystis aeruginosa		5).Pinnularia clasterium
6).Cosmarium borytis	6).Nostoc splaerium		6).Pinnularia gibba
7).Mageotia spp	7).Oscillatoria formosa		7).Synedra ulna
8).Microspora spp	8).Oscillatoria rubescens		
9).Nitella spp	9).Trichodesmium spp		
10).Oedeogonium borisianum			
11).Spyrogyra acanthophora			
12).Spyrogyra discoidea			
13).Ulothrix spp			
14).Volvox			
15).Zygnema spp			

Table-2: Seasonal Variation of Phytoplankton population of Manakondur Lake during the year from June, 2020 to May, 2021

S.No	Group	Seasons			Total	Percentage
		Monsoon	Winter	Summer		
1.	Chlorophyceae	290	410	351	1051	45%
2.	Cyanophyceae	192	160	232	584	25%
3.	Euglenophyceae	75	201	125	401	17%
4.	Bacillariophyceae	82	130	100	312	13%
	Total	639	901	808	2348	100%

Fig No-2: Showing Group wise Distribution of Phytoplankton population in Manakondur Freshwater Lake during year June, 2020 to May, 2021



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