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Research Article

Studies on Algal Diversity in and Around Hyderabad, India

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ABSTRACT

The present study deals with the diversity of phytoplankton of fresh water bodies from the Hyderabad city. The present work is carried out for 1 Years from March2013 to April 2014. The algal diversity survey revealed the presence of 95 species, belonging four major groups; Bacillariophyceae, Chlorophyceae, EuglenophyceaeandCyanophyceae. Out of which Bacillariophyceae was dominant. The group wise population density is as Bacillariophyceae>Chlorophyceae>Euglenophyceae>Cyanophyceae. The 28 species of Bacillariophyceae, 17 species of Chlorophyceae, 27 species of Euglenophyceae, 6 species of Cyanophyceae. The investigation shows that these classes of phytoplankton showed considerable fluctuations with water quality parameters.

Keywords: phytoplankton, Algae, Hyderabad city.

INTRODUCTION

Phytoplankton's are microscopic organisms that live in watery environments, both salty and fresh. Some phytoplankton are bacteria, some are protests, and most are single-celled plants.Among the common kinds are cyanobacteria, silica encased diatoms din flagellates, green algae, and chalk-coated coccolithophores.Like land plants, phytoplankton have chlorophyll to capture sunlight, and they use photosynthesis to turn it into chemical energy. They consume carbon dioxide, and release oxygen. All phytoplankton photosynthesize, but some get additional energy by consuming other organisms.Phytoplankton growth depends on the availability of carbon dioxide, sunlight, and nutrients. Phytoplankton, like land plants, require nutrients such as nitrate, phosphate, silicate, and calcium at various levels depending on the species. Some phytoplankton can fix nitrogen and can grow in areas where nitrate concentrations are low. They also require trace amounts of iron which limits phytoplankton growth in large areas of the ocean because iron concentrations are very low. Other factors influence phytoplankton growth rates, including water temperature and salinity, water depth, wind, and what kinds of predators are grazing on them.When conditions are right, phytoplankton populations can grow explosively, a phenomenon known as a bloom. Blooms in the ocean may cover hundreds of square kilometers and are easily visible in satellite images. A bloom may last several weeks, but the life span of any individual phytoplankton is rarely more than a few days.In general, the morphology of fresh water phytoplankton is more or less similar to that of marine phytoplankton; no species is common to

these two habitats except that some oceanic species may occur in some island saline lakes. Diatoms are common in both fresh and marine waters. The dinoflagellates are restricted mainly to the oceans. Desmids are peculiar to fresh water habitats. Since chemical composition of fresh water lakes vary much more than that of the sea water, no group of alga dominates the fresh water phytoplankton. In fresh water lakes, the members of Chlorophyceae and Cyanophyceae are more abundant and show good diversity. The Cyanobacteria which are primitive prokaryotes play a significant role in identifying the water quality of the lakes, the blue green algae tend to concentrate towards the surface. phytoplankton is mainly restricted to lentic water and is less common in the lotic water of large rivers of reduced current velocity (Wetzel, 1975). The phytoplankton stands at the base line of the food web in aquatic environment and occupy the whole water mass except when the lake is stratified and temperature dependent biological reactions develops, they form the bulk food for zoo plankton, fishes, and other aquatic organisms. (Kaushik et al., 1991), The study of ecology of fresh water phytoplankton has been made by Moss (1973), Round (1981).The physico-chemical characteristics of water play an important role in algal biodiversity and population dynamics of planktons. The diversity indices are shown to be useful in describing species diversity patterns of different algal communities.Phytoplankton constitutes the very basic of nutrient cycle of an aquatic ecosystem. They play a crucial role in maintaining proper equilibrium between biotic and abiotic components of an aquatic ecosystem.The quality of water is identified in terms of it physical, chemical and biological characteristics.The algae are purifiers of environment on one hand polluting organisms on the other. The phytoplankton diversity with seasonal fluctuation indicates the diversity of ecological niches.

Plankton is an important component of ecosystem, which responds to ecosystem alterations rather rapidly. It is due to the fact that planktonic organisms play a key role in the turnover of organic matter and energy through the ecosystem. (Telesh, 2004). The phytoplankton is microscopic algae suspended in water whose movements are less dependent on currents. They include micro and macroscopic suspended or free floating non motile or motile unicellular colonial or filamentous algae. They are ecologically significant as they form the basic link in the food chain of all aquatic animals (Misra et al., 2001). Planktonic organisms are known to react *to* different types of water pollution. This reaction is very rapid because of relatively short lifetime and high reproduction rates of the organisms. Since the phytoplankton plays a key role of primary producer in aquatic environment, it is the first component in the trophic tier affected by pollution. They provide a crucial source of food to aquatic organisms such as fish and crustacean. They are found in all types of water as their presence or absence in water indicates the quality of water. They have played an important role for environmental management as soil conditioners, bio fertilizers, bioindicators,biomointers, feed for animal, rehabilitators of degraded ecosystems through bio absorption of pollutants.

The reservoirs play an important role in maintaince of ecological balance hence they need to be investigated for their biological parameters. The physical and chemical parameters of water are more or less related to different aquatic life. Welch (1952) pointed out that physical and chemical parameters make possible the existence of biotic diversity and various phenomena of biological activity. In recent years reservoirs have received their attention because of environmental crises. Many workers have published their work on aquatic environment and ecology of phytoplankton in fresh water as Singh and Swarup (1990), John Wiley et al., (2000), Hiware&Jadhav (2001) Angadi et al.,(2005) and Pawar et al., (2006). Some of the species of phytoplankton are important to access the health of water body. For an instance, more of cyanophyceae members can be taken as indicators of organic pollution of reservoirs. From point of view, enlisting of the species of phytoplankton is interesting. The present study has been planned to understand a

relationship between physico-chemical parameter and planktons.

MATERIALSAND METHODS

Algal samples were collected at all the stations. And analyzed qualitatively and quantitatively. One liter of surface water samples were collected from different water bodies. After adding 2to3 ml of Formaldehyde solution, for complete settling of the organisms and finally the sample is concentrated to 100 ml. Preserved samples are mixed uniformly by geneble inversion and then pipette out one drop of the sample from a pipette on to glass slide. For analysis a cover slip is carefully placed ensuring no air bubbles remain and the cover slip is ringed with a transparent nail enamel to prevent to evaporation during the process.

For frequency measurement of different species of algae at each station, the drop method of Pearsal et al., (1946) was followed. Ten drops of the concentrated sample was carefully pipetted out and mounted on 10 slides. From each drop .2 high power microscope field (15x45) situated at even distance from each other were counted. Thus from each concentrate 120 high power microscope fields were counted to record species composition. The number of various organisms was calculated per milliliter. For this purpose, the microscope was standardized to find out the area of the field. They were identified using standard literature such as Prescott (1982,), APHA (1992), Fritsch (1965), Hutchinson (1957), Biswas (1980), and Edmondson (1963). The physico- chemical parameters were studied by using APHA (1992), Trivedy and Goel (1986).

Study Area:

Algal samples were collected from NTR Park , NECKLECE Road Lake , PEDDA CHERUVU, NLLA CHERUVU, RAMA A CHERUVU, RAMANTHAPUT CHERUV, PATIGADDA LAKE, BUGEMPET, RTC ROAD Lake.

DescriptionofTheSample Sites:

*STATION 1:*It is located NTR Park. The water in this region is transparent light and bluish green in color.*STATION 2:*It is located necklace road. The water in this region appeared. Bluish green in color.Minimum depth varied from 2to3mts.The water is used for various recreational purpose in this region.*STATION 3:*This point is located in HMT nagar,STATION 4:This point is located after uppal. *STATION 5:*This point is located near ambedkarnagar, *STATION 6:*This point is located in ramanthapur road and in southeast osmania university, *STATION 7:*This point is located north Hussainsagar lake, *STATION 8:*This point is located in northwest Hussainsagar lake, *STATION 9:*This point is located near RTC road.

RESULT AND DISCUSSION

In the present study four groups of algae were found. Chlorophyceae, Cyanophyceae, Bacillariophyceae and Euglenophyceae. Bacillariophyceae members occupied the first position at all the stations. The Chlorophyceae members occupied the second position followed by Euglenophyceae, Cyanophyceae.

Baciilariophyceae:

The distribution and periodicity of this group was done by Rao (1972), George singh, Desai and Mohanthi. The members this group occupied first position in the water bodies. These are the dominant species throughout the period of investigation at all the stations. The species of *Cyclotella, Gomphonema, Nitzschia, Navicula, Anomoenis*and*Synedra* were present. *Cyclotella* species are known to tolerate pollution. *Nitzschia* and *Gomphonema* species were shown wide variation and rich diversity at all the stations. Diatoms adopt themselves wide variety of ecological conditions. In the present investigation Diatoms represented high number and rich diversity. The species diversity is high in pennate diatoms than centric diatoms.

Chlorophyceae:

Many authors Manikyareddy and Venkateshwarlu (1992), Jyothi (1992), Vijaya (1999) worked on the distribution of this group. According to Round (1957), Amin .H.M (2013), Kn(2014),AH Motlagh(2015) their presence is due to the presence of higher concentration of nutrients. Chlorococcales constituted the major fraction of

Chlorophyceae. The species of *Schizomeris,Ankistrodesmos, sphaerocystis, Scenedesmus, Closterium* and *pediasterium* were dominating throughout the period of investigation.

Euglenophyceae:

Extensive studies of Euglenophycean members were made by Fritch (1937), Zafer (1959) and Rao (1972) found that higher concentration of chlorides,ammonical nitrogen and lower concentration of phosphates favor the growth of Euglenophyceae members. In the present investigation they are dominant group. Euglenophyceae members contributed a minor fraction of phytoplankton of the present habitats. They were represented by the species of *Phacus, Euglena and Trachelomonus* and showed high species diversity in inland water bodies.

Cyanophyceae:

In the present investigation they were present in good numbers throughout the period of investigation. According to Fritch (1937) that physical factors such as warm water influence the growth of BGA. Franklin suggested that the BGA are general indicators of eutropy of water. They flourish well in habitats rich in organic matter such as polluted lakes and rivers, shallow water bodies. They exhibit wide range of biodiversity and can tolerate wide range of temperature. The species were represented by *Oscillatoria, Spirulina*and *Chroococcus. Oscillatoria* was shown to be dominating.

Bacillariophyceae and Chlorophyceae members show rich diversity. Among the Diatoms the species of *Gomphonema, Navicula,* and *Nitzschia* showed rich diversity and they can be used as good indicators of water quality.

Chlorophyceae - the species of*Schizomeris,Ankistrodesmos,sphaerocystis, Scenedesmus, Closterium*and*pediasterium* showed high diversity. Cyanophyceae showed low diversity due to eutrophication of water bodies. They constitute the bloom and imparting bluish green colour to water.

CHLOROPHYCEAE	station- I	station- II	station- III	station- IV
Chlorela vulgaris	+	+	+	+
Ankistridesmos	+	+		+
Coelastrumcambriciun	+		+	+
Co. microporum		+	+	
Closteridium	+	+		+
Pandorinamorum	+	+	+	+
Closteriumacerosum	+		+	+
Sphaerocystisschroeteri		+	+	
CrucigeniaTetrapedia	+	+	+	+
C. crucifer	+			+
C. rectangularis	+	+	+	+
C. epiculata	+		+	+
Scenedesmusdimorphus		+	+	+
S. bernardii	+	+	+	+
S.falcatus	+		+	
S. arcuatus	+	+	+	+
S. obliquus		+	+	+
S.muzzanensis	+	+		+
S. quadricauda	+	+	+	+
S. quadricauda	+		+	
S. armatus	+	+	+	
S. acutus		+	+	
S. serratus	+		+	+
S.incrassatulus	+		+	+
S. Quadricauda		+		+
S.bicaudatus	+	+	+	+

T.trigonum	+	+	+	
T. regulare	+	+	+	
T. trigonum		+	+	+
Oocystis	+		+	+
ActinastrumHantzschii	+	+		+
Chlorococcum		+	+	+
Eudorinaelegans	+		+	
Eudrina degauss	+		+	+
Micractiniumpusillum			+	+
Golenkinia				+
SelenastrumBibraianum	+	+	+	+
S. gracilis	+		+	
Stigeoclonium	+	+		+
Pediasterium duplex	+		+	+
P. tetras	+	+		+
Peridiniumcinctum		+	+	+
Dictyosphaeriumpulchellum wood	+		+	+
Di. ehrenbergianum	+	+	+	+
CYANOPHYCEAE				
Oscillatoria. Subbrevis	+	+	+	
Microcystisaeruginosa	+		+	+
Gomphosphaeria		+	+	
Chroococcusturgidus	+	+		+
Arthospira		+	+	+
Anabaena	+			+
Spirulina major		+	+	
BACILLARIOPHYCEAE				
Gomphonemaparvulum	+	+		+
G. parvulum	+	+		+
G.sphaerium		+	+	
Pinnularia biceps	+		+	+
P.interrupta	+	+	+	+
Melosiragranulata		+	+	
Cyclotellameneghiniana	+	+		+
Cyclotellabipunctata	+	+	+	+
C. pumilagrun			+	+
Coscinodiscus		+	+	+
Nitzschiaacicularis	+		+	+
Ni. palea	+	+	+	
Ni. acicularis	+		+	+
Ni.palea	+	+		+
Ni. hungarica		+	+	
Ni. Thermalis	+	+		+
Ni. Sublinearis	+		+	+
Ni. Frustulum		+		+
Ni. Amphibia	+		+	
Ni.amphibia	+	+	+	+
Naviculapunctulata			+	+
N. rhynchocephala	+	+		+
N.cryptocephala	+		+	
N.radiosavar		+	+	+
N. bacillum	+		+	+
Achnanthesexigua		+	+	

Synedra ulna	+		+	+
S. acus		+		+
EUGLENOPHYCEAE				
Lepocinclis			+	+
Phacus.longicauda		+	+	+
P. ranula	+	+		
P. orbicularis	+		+	+
p. tortus		+		+
P. helikoidis	+		+	+
P. circumflexus	+	+		+
p.brachykentron		+	+	+
P.pleuronectes	+		+	
p.acuminatus	+		+	+
p.curvicauda		+	+	+
P. ephippion	+	+		+
P.arbiculavis		+	+	
P anomalous	+		+	+
P.denisii	+	+		+
Euglena proxima		+		+
E. paramylum	+	+	+	
E. repulsans	+		+	+
E. Polymorpha	+	+		+
E. caudatavar		+	+	
Euglena oxyuris	+			+
E. acus		+	+	
E. tripteris	+	+		+
Trachelomonaswoycickii			+	
T. pulcherrima	+	+		+
T. varians		+	+	+
T. robusta	+	+		+
T. hispida		+	+	+
Lepocincilsfusiformis		+		+

Class	Genus	Species	Percent
BACILLARIOPHYCEAE	6	30	
CHLOROPHYCEAE	19	44	
EUGLENOPHYCEAE	4	29	
CYANOPHYCEAE	7	7	
TOTAL	36	109	

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