

Phytoplankton Biodiversity in Valvan lake, Lonavala District - Pune (MS), India.

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ABSTRACT

The phytoplankton in a reservoir constitute the major role by virtue of their capacity to transducer the solar radiant energy into the biological energy by photosynthesis. A study of phytoplankton was carried out in Valvan lake, in different seasons during 2018-2019. All four sites of lakes mainly consisted of 52 taxa belonging to four taxonomical divisions Chlorophyta, Cyanobacteria, Bacillariophyta, and Euglenozoa. Overall fifty-two phytoplankton taxa were recorded in four sites of lake. During this investigation phytoplankton shows abundance growth in summer season and minimum in monsoon season.

Keywords: Phytoplankton, Biodiversity, Composition, Valvan lake.

INTRODUCTION

Most of the floating plankton in the major water-bodies is the unicellular microscopic algae collectively called phytoplankton [1]. Phytoplanktons are the primary producers of aquatic ecosystem. Phytoplankton form food for zooplankton, fishes and other aquatic animals. In fresh water body phytoplanktons consist of macroscopic and microscopic suspended or free floating non motile or weekly motile unicellular, colonial or filamentous algae. Algae are used to assess ecological health of aquatic habitats.

Phytoplankton are very sensitive to eutrophication so useful for detection of eutrophication of water and its adverse impact on the aquatic ecosystem and plays a very important role in regulating the dynamics of the aquatic food web and become a driving force in shaping the community structure of zooplanktons [2]. Phytoplanktons, diversity, biomass, density, seasonal variation and species distribution have been largely affected by a number of abiotic properties of water, water body morphology, sewage discharge and human activities. Phytoplanktons are the base of most of the lakes food web and fish productions is linked to phytoplanktons production. The number and species of phytoplankton helpful to determine the quality of water body. Phytoplankton are useful for detection of eutrophication of water and its adverse impact on the aquatic ecosystem and plays a very important role in regulating the dynamics of the aquatic food web and become a driving force in shaping the community structure of zooplanktons [2]. Phytoplanktons, diversity, density, species distribution have been largely affected by seasonal variation and a number of abiotic properties of water, temperature, salinity, water body morphology, sewage discharge and human activities. The quality and quantity of phytoplankton and their seasonal patterns have been successfully utilized to assess the quality of water and its capacity to sustain heterotrophic communities¹⁵. The aim of the present study was to determine composition and diversity of phytoplankton.

METHODOLOGY

The water samples were collected from the three sites of lake such as site I, site II and site III and site IV. The samples were collected in the morning hours between 8.30 to 10.30 a.m. 50 lt. of water sample was filtrated through the plankton net made of bolting silk number 25 with mesh size 64 lime. The collected samples were allowed to settle down by adding Lugol's iodine. Sedimentation requires 24 hrs after which supernatant was removed and concentrate was made up to 50 ml depending the number of plankton and preserved in 5% formalin for further studies. For the quantitative study, the concentrated sample was shaken and one drop of sample was taken on a clear micro slide with

the help of a standard dropper, the whole drop was carefully covered with the cover glass and observed. Plankton identification up to genera and whenever possible up to species level was classified according to keys given by Edmonson [3], Adoni [4]) and APHA[5].

Quantitative study of plankton was done by Sedgwick - Rafter Cell method.

The Sedgwick Rafter Cell is a special kind of slide similar to the Haemocytometer. The cell has a 50mm x 20 mm x 10 mm rectangular cavity that holds 1 ml sample. The cell is moved in horizontal directions on the stage of an inverted microscope and planktonic species encountered in the field are enumerated. A number of replicate samples are enumerated to calculate plankton / lit.

$$\text{Plankton (Units /lit.)} = n \times c / v$$

Where,

n = number of plankton in 1 ml.

c = volume of concentrate.

v = volume of sample in lit.

RESULTS AND DISCUSSION

During present study phytoplankton shows maximum growth in summer season and minimum in monsoon season in all four sites of the lake. The maximum density of phytoplankton during summer season have also been observed by Giripunje Manisha et.al., [6] in lakes of Nagpur city. Phytoplankton communities and count of Lonavala lake during monsoon, winter and summer seasons consisted of 52 taxa belonging to four taxonomical divisions. In which Chlorophyta twenty four species were recorded among which *Ankistrodesmus* sp. was dominant. In Cynophyceae thirteen species were recorded among which *Microcystis* sp. was dominant. In Bacillariophyta eleven species were recorded among which *Synedra ulna* was dominant. In Euglenozoa four species were recorded among which *Phacus* sp. which was dominant

The presence of pollution indicator species of Chlorophyceae like *Ankistrodesmus* sp., *Spirogyra* sp. as

pollution indicator species shows lake is moving towards eutrophication.

Table:1-phytoplankton diversity of valvan lake

Taxonomic divisions	Identified taxa
Cyanophyta	<i>Anacystis, Microcystis, Gomphosphaeria, Gleotrichia Chroococcus, Merismopedia, Dactylococcopsis, Aphanothece, Arthospira, Oscillatoria, Spirulina, AnabaenaNostoc</i>
Bacillariophyta	<i>Fragillaria.PinnulariaSynedra, Coscinodiscus, Cyclotella, Hydrosera, Diatoma, Tabellaria, Rhoicosphenia, Navicula, Nitzschia,</i>
Chlorophyta	<i>Coleochaete, Chlorella, Actinastrum, Coelastrum, Ankistrodesmus, Elakatothrix, Pediastrum, Tetrastrum, Zygnema, Chlorococcum, Crucigenia, Chlamydomonas, Phacotus, Scenedesmus, Tetraedron, Gonium, Tetradesmus, Desmidium, Spondylomorom ,Closterium, Staurastrum, Cosmarium, ChloromonasNitella sp.</i>
Euglenozoea	<i>Euglena, Phacus , Lepocindis, Gonyostomum</i>

Aarti Devi and Neha Antal [7] also recorded presence of water pollution indicator species as *Nitzschia* sp., *Synedra* sp., *Diatoma* sp. in Temple pond in Birpur (J and K). In the present investigation, Cyanophyceae was maximum during the winter season and minimum during the summer season. Pendse, *et.al.*, [8] recorded the maximum population of blue-green algae during winter. while minimum quantity during the monsoon is probably due to increase in water quantity. Alam and Khan [9] stated that the occurrence of *Euglena* sp. and *Phacus* sp. are a direct indication of beginning of pollution load because both these species in generally, considered to be dominant and tolerant genera of polluted pond.

The phytoplankton abundance was observed to be maximum during summer in all four sites of lake, this may be because of the increased salinity, pH, high-temperature and high-intensity of light penetration [10]. The influence of nutrient and sunlight on phytoplankton abundance and diversity has also been reported from the southern part of Orissa at Gopalpur [11] while minimum quantity during the monsoon is probably due to increase in water quantity.

Maximum growth of phytoplankton during the summer season may be due to high temperature, high temperature favors the luxuriant growth and high-intensity of light penetration [12]. Minimum growth in

monsoon season due to dilution of water by rain water.

CONCLUSION

The study shows that the abundance of phytoplankton and diversity was affected by the environmental conditions. It vary from season to season. Presence of pollution tolerant species of phytoplankton shows that the Valvan lake is highly polluted.

Conflicts of interest: The authors stated that no conflicts of interest.

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