



MICRO ALGAL DIVERSITY OF THE FRESH WATER LAKE IN THIRUVANANTHAPURAM DISTRICT, KERALA

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ABSTRACT: Vellayani Lake is the largest fresh water lake in Thiruvananthapuram district of Kerala. The lake water is extensively used for drinking and irrigational purposes. The lake is under the threat of pollution, encroachment and sand mining. The present study is aimed to record the algal diversity in 8 sites of Vellayani Lake during the pre-monsoon and monsoon period of 2013. Phytoplanktons were collected using plankton net and direct mass collection was employed for larger ones. The specimens were preserved at the site itself and brought to the laboratory and observed under Research microscope. The algal genera were identified referring various monographs. Forty two phytoplankton genera have been reported during the study period. The phytoplankton showed abundance in the pre- monsoon and had low density during the monsoon. The diversity index for the 5 families of phytoplankton during the pre-monsoon and monsoon period was also calculated. Chlorophyceae showed a diversity index of 2.71, Bacillariophyceae 2.82, Cyanophyceae, Euglenophyceae and Chrysophyceae with an index value of 1.7, 1.9, 1.07 respectively. The degree of abundance of phytoplankton in the decreasing order is Bacillariophyceae, Chlorophyceae, Cyanophyceae and Euglenophyceae, chrysophyceae and the pollution indicator phytoplankton like Closterium, Nitzschia, and Oscillatoria were found in the lake and hence these sites are in the verge of pollution. So these areas of the lake need special attention for preventing further degradation.

Key words: Vellayani, Phytoplankton, Bacillariophyceae, Chlorophyceae, Cyanophyceae, Chrysophyceae

INTRODUCTION

Phytoplankton plays an important role in the conditioning of the microclimate, regulating the atmospheric level of the vital gases for life, oxygen and carbon dioxide. The algal flora constitutes a vital link in the food chain and its productivity depends on water quality at a given time (6). The occurrence and abundance of this phytoplankton varies seasonally and their study provides a relevant focus for research on eutrophication and its adverse impact on aquatic life. This also serves as a useful tool for the assessment of water quality and in understanding the basic nature of the lake. Vellayani Lake, or *Vellayani Kayal* as known in local language, is the largest fresh water lake in Thiruvananthapuram district of Kerala. Vellayani Lake lies between 8^o 24'09"-8^o 26'30" N Latitude and 76^o 59' 08"-76^o 59'47" E Longitude. The lake is bordered by Thiruvallom and Nemom villages of Neyyatinkara Taluk. Major part of the lake is stagnant but a small portion flows to Karamana River. It is the main source of water supply to four near by panchayats. Present attempt is to identify the phytoplanktons of the lake during the pre- monsoon and monsoon period of 2013.

MATERIALS AND METHOD

Plankton Analysis

Water samples were collected from 8 sites of Vellayani Lake during the pre-monsoon and monsoon period of 2013. Plankton net (mesh size 25 µm) was swept on surface water (Secchi's disc transparency zone) and plankton collected were transferred into separate plastic bottle/containers. Surface water was sieved through plankton net to obtain planktons. The algal samples were preserved in 4% formalin. Bacillariophycean forms were studied after cleaning by the method called "Mixgen" [7]. Glycerine was used for mounting the material and observed under advanced Research microscope. The algal genera were identified referring various monographs [1,3] and literature cited.

These planktons were fixed and preserved in 4% formalin. The formalin fixed plankton samples were centrifuged at 1500-2000 rpm for 10-12 min. The phytoplankton settled at bottom were diluted to a desirable concentration in such a way that they could be easily counted individually under compound binocular microscope and phytoplankton were measured and multiplied with the dilution factors using Sedgwick Rafter cell [13,10,2]. Shannon – Weiner Diversity index of the 5 classes of phytoplanktons was also calculated for the pre- monsoon and monsoon period [9].

RESULTS

Diversity of phytoplankton: Detailed microscopic examination of phytoplanktons revealed 5 families consisting of 42 genera of phytoplankton in the order: Chlorophyceae (13genera), Bacillariophyceae (17 genera), Cyanophyceae (7genera) and Euglenophyceae (4 genera) *Chrysophyceae* (1 genera). (Table -1).

Chlorophyceae- *Ankistrodesmus*, *Cosmarium*, *Closterium*, *Coelastrum* *Pediastrum*, *Scenedesmus*, *Schroederia*, *Staurastrum*, *Stauroidesmus*, *Tetraedron*, *Hydrodictyon*, *Spirogyra*, *Golenkinia*. *Tedrastrum*

Cyanophyceae - *Anabaena*, *Arthrospira*, *Cylindrospermum*, *Merismopedia*, *Oscillatoria*, *Synechococcus*, *Microcystis*

Bacillariophyceae - *Aulacoseira*, *Pinnularia*, *Pleurosigma*, *Eunotia*, *Fragillaria*, *Gyrosigma* *Synedra*, *Cyclotella*, *Gomphonema*, *Melosira*, *Nitzschia*, *Cymbella*, *Rhizosolenia*, *Navicula*, *Surirella*, *Tabellaria*

Euglenophyceae- *Euglena*, *Phacus*, *Trachelomonas*, *Lepocinclis*

Chrysophyceae - *Chrysococcus*

Table: 1 Fresh water algal taxa reported from Vellayani Lake

Phytoplankton	Pre- monsoon	Monsoon
CHLOROPHYCEAE		
<i>Ankistrodesmus fulcatus</i>	-	+
<i>Cosmarium</i> ,	++	++
<i>Closterium</i> ,	++	++
<i>Coelastrum microporum</i>	-	++
<i>Golenkinia radiata</i>	-	+
<i>Hydrodictyon</i>	+	+
<i>Pediastrum</i>	++	+
<i>Scenedesmus</i>	++	++
<i>Schroederia</i>	+	-
<i>Staurastrum</i>	++	++
<i>Stauroidesmus dejectus</i>	-	+
<i>Tetraedron octaedricum</i>	-	+
<i>Tedrastrum</i>	+	+
BACILLARIOPHYCEAE		
<i>Aulacoseira</i>	++	++
<i>Cyclotella megnethiniana</i>	++	++
<i>Cymbella</i>	++	+
<i>Eunotia</i>	++	+
<i>Fragillaria</i>	+	++
<i>Gyrosigma</i>	+	+
<i>Gomphonema</i>	+	+
<i>Melosira granulata</i>	++	+
<i>Navicula</i>	++	++
<i>Nitzschia</i>	++	++
<i>Pinnularia</i>	++	++
<i>Pleurosigma</i>	+	+
<i>Rhizosolenia</i>	-	+
<i>Surirella</i>	+	+
<i>Synedra</i>	++	++
<i>Tabellaria</i>	-	+
<i>Stauroneis</i>	+	+

Table-1 cont.....

CYANOPHYCEAE		
<i>Anabaena</i>	+	+
<i>Arthrospira</i>	-	+
<i>Cylindrospermum</i>	+	-
<i>Oscillatoria</i>	++	++
<i>Merismopedia punctata</i>	++	++
<i>Microcystis robusta</i>	++	++
<i>Synechococcus</i>	+	-
EUGLENOPHYCEAE		
<i>Euglena</i>	++	+
<i>Lepocinclis</i>	-	+
<i>Phacus</i>	++	++
<i>Trachelomonas</i>	++	++
CHRYSOPHYCEAE		
<i>Chrysococcus</i>	++	++

(+ present, ++ abundant, - absent /rare)

The Diversity index of the 5 classes of phytoplanktons was computed using Shannon – Weiner diversity Index formula:
Shannon's Index $H' = -\sum p_i \ln p_i$
Where p_i = the proportion of individuals of species i .

Chlorophyceae showed a diversity index of 2.71, Bacillariophyceae 2.82, Cyanophyceae, Euglenophyceae and Chrysophyceae with an index value of 1.7, 1.9, 1.07 respectively. Maximum diversity was shown by Bacillariophyceae and minimum by Chrysophyceae members. During summer, increasing temperature enhances the rate of decomposition due to which the water becomes nutrient rich similarly due to concentration followed by evaporation in summer season the nutrient concentration increases and abundant food present in form of photosynthesis [8,]. The high phytoplankton population density during the summer season could be related to stable hydrological factors and low water level; while low density during the monsoon season attributed to heavy flood and fresh water inflow. They were resumed again in monsoon due to dilution and high water level [5,11]. A minimum density of phytoplankton during monsoon and maximum during summer was reported in Euphrates River, Iraq.[4]

CONCLUSION

Bacillariophyceae were the dominant phytoplankton group in the study period at Vellayani Lake. The presence of a species will depend on its environmental tolerance, but the resources available to it will determine its abundance. In present study, basic information of the phytoplanktons distribution and abundance would form a useful tool for further ecological assessment and monitoring of the water quality of Vellayani Lake. According to Shannon index values $1 < 3$ during the pre- monsoon and monsoon shows the lake is not highly polluted. But the abundance of pollution indicator phytoplanktons in the lake denotes that the water is in the verge of getting polluted.

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