

Pre and Post monsoon diversity of Chlorophycean algae in Mithi River, Mumbai

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Abstract- The Chlorophyceae is a large and diverse group of freshwater algae. They include members which are ecologically as well as scientifically important. They are also known to tolerate a wide range of environmental changes. The group usually occurs with a wide variety of other groups of algae in their natural habitat. A total of 18 genera have been observed during the study. The members of the group were found to be more in number in the post monsoon period as compared to the pre monsoon period.

Index Terms- Algae, Chlorophyceae, Diversity, Mithi River,

I. INTRODUCTION

The algae form an important component of aquatic flora and play a vital role in maintaining proper equilibrium of abiotic and biotic components of aquatic ecosystem. Micro-algae have vast industrial and economic potential as valuable sources in pharmaceuticals, health foods and in bioremediation of industrial effluent. Algae are also used as biological indicators of water pollution (Subramanian., 1996; Handa and Jadhav, 2015). Algae are photosynthetic organisms that occur in most habitats, ranging from marine and freshwater to desert sands and from hot boiling springs to snow and ice. They vary from small, single-celled forms to complex multicellular forms. Chlorophycean members form the base of the food chain, they are directly or indirectly a good source of food for various animal groups (Rao, 1975). They are also a good source of oxygen for the aquatic life. It is a well-established fact that more than 75% of freshwater fishes feed on plankton at one or the other stage of their life-cycle (Jafri et al., 1999). The current study is undertaken with an objective to understand the presence of the Chlorophycean group of algae during pre and post monsoon periods.

Materials and methods

Area of Study

The Mithi River in Mumbai is one of the rivers which flows through the suburban areas of the city. It has also been a major storm water drain. The area of the river is within latitude 19° 00' to 19° 15' N and longitude 72° 45' to 73° .00' E. (NEERI, 2011). Currently, it is affected heavily due to anthropogenic activities.

Collection of samples

The samples were collected from six stations along the river. The collection locations were narrowed down on basis of their accessibility and distance from the previous location. The

samples were collected in the Pre monsoon, i.e.; February to May and Post monsoon period, i.e. from October to January in 2014. The water was collected using glass wares that were thoroughly cleaned and dry sterilized at 160⁰ C for 2 hours in a hot air oven before use. The samples were fixed in 4% formalin and brought to the laboratory immediately for further analysis.

Observation and analysis of Algae

The samples were incubated till the appearance of good growth. The algal samples were observed under high magnification using binocular microscope (Labomed LP-Plan Achrom and Labomed SP-Achrom). Identification was restricted to Chlorophycean group. The algae were identified based on monographs (APHA, 2005; Prescott, 1964; Desikachary, 1959; Smith, 1950; Tiffany and Britton, 1952; Randhawa, 1959 and Prasad and Mishra, 1992). Five fields were observed for each of the three replicates. Each time the algae was observed and noted. The occurrence of particular group of organisms at different seasons was analyzed.

Results and Discussion

A total of 18 genera from the Chlorophyceae group were observed. They belonged to different orders; Volvocales, Chlorococcales (Sphaeropleales), Ulotrichales, Chaetopherales and Zygnematales (Conjugales) (Table .1). Scenedesmus, Ulothrix, and Chlorella were found abundantly in pre and post monsoon periods. Populations of genus Staurostrum, Coelastrum, Micratinium, Chlamydomonas and Pediastrum were observed only in the post monsoon periods while; genus Selanstrum and Stigeocolonium were observed particularly in the pre monsoon periods. The populations of genus Ankistrodesmus, Closteriopsis, Closterium, and Chlorococcum were found during both time of the year, but they are reduced in number during the Pre monsoon period. Genus Nannochloris, Oocystis, Planktosphaeria and Zygnema were present in the Pre monsoon periods and reduced during the Post monsoon period.

The overall variety in population of the algae is higher during post monsoon periods than the pre monsoon periods (Table 2.). Similar results have also been derived in studies conducted on algae in West Garo hills, Meghalaya (Barman. et al, 2015). Related studies in this area have been carried out by many researchers with different algal communities (Singh and Chaudhary, 2011; Prasad et al, 1992; Kanetsuna, 2002; Mishra et.al, 2002 Keshri et al, 2013). Four new records of Chlorophycean algae have been found in the Khumbu Himalaya region, Nepal (Ghimire et al, 2013)

Table .1 Phytoplankton of Class Chlorophyceae observed in the Mithi River

CLASS : Chlorophyceae	
ORDER	GENERA
Volvocales	Chlamydomonas
Chlorococcales (Sphaeropleales)	Chlorella, Pediastrum, Scenedesmus, Micratinium, Nannochloris, Chlorococcum, Closteriopsis, Coelastrum, Planktosphaeria, Ankistrodesmus, Oocystis and Selenastrum
Ulotrichales	Ulothrix
Chaetopherales	Stigeocolonium
Zygnemales(Conjugales)	Zygnema, Closterium, Staurastrum

Table. 2: Variation in the presence of Algal population of Chlorophyceae

CHLOROPHYCEAE		
Genera	Pre Monsoon	Post Monsoon
Ankistrodesmus	+	++
Chlorella	++	++
Closteriopsis	+	++
Closterium	+	++
Chlamydomonas	-	+
Chlorococcum,	+	++
Coelastrum	-	+
Micratinium	-	+
Nannochloris	++	+
Oocystis	++	+
Pediastrum	-	++
Planktosphaeria	++	+
Scenedesmus	++	++
Selenastrum	+	-
Staurastrum	-	+
Stigeocolonium	+	-
Ulothrix	++	++
Zygnema	++	+

(+) – Present, (++) – Common / Abundant, (-) – Absent

The heavy influx of water from the catchment areas during monsoons localizes the stagnant waters if any, in the course of the flow of the river created during the pre-monsoon periods. The post monsoon periods show a huge variety in the Chlorophycean group of algae, owing to the flow and abundance of water created during the monsoon periods. The peak of algal community although is different for each, most of the communities grow during the transitional periods from winters to summer. Apart from the seasonal changes, the anthropogenic activities affecting the quality of the water would show distinct changes in the algal communities according to its tolerance. The Mithi River flows from a diverse landscape beginning from a serene locale upstream to being a mixture of pollutants when it reaches the downstream areas. The pH of the river has ranged from 7.1 to 8.9 and temperature from 20.9° C to 32.7° C in different months of the year. The varieties in Chlorophycean members of algae are abundant during the postmonsoon periods

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