

Diversity of phytoplankton at Shirol freshwater tank of Kolhapur district, Maharashtra, India

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ABSTRACT

Present study deals with the qualitative and quantitative analysis of phytoplankton at Shirol freshwater tank situated in Kolhapur district, Maharashtra, India. The investigation revealed the presence of 10 species of phytoplankton. The study confirms 4 species belonging to chlorophyceae, 3 were belonging to Bascillariophyceae and 3 were belonging to Myxophyceae. The qualitative basis of analysis revealed that Chlorophyceae was dominant group among all. However, quantitative analysis of phytoplankton showed monthly variation in the total number of organisms. The highest number of phytoplankton was noted during the months of winter season while lowest during monsoon season. The percent composition of phytoplankton revealed that Myxophyceae members were dominant during study period.

Keywords: Phytoplankton, diversity, quality, quantity, Shirol, freshwater tank.

INTRODUCTION

The presence of phytoplankton in any reservoir can lead to productive and sustainability of that water body. The assemblage in the form of composition and distribution is dependent on the physical, chemical and biological properties of water. (Patil *et al.*, 2015). Population dynamics of these phytoplanktons get influenced by many physico-chemical parameters of water. Plankton is the most sensitive floating community which is being the first target of water pollution, thus any undesirable change in aquatic ecosystem affects diversity as well as biomass of this community. Phytoplankton are autotrophs and belonging to first trophic level (Mondal *et al.*, 2014). The presence of phytoplankton in water body ecosystems includes its use in estimating potential fish yield (Descy *et al.* 2005), productivity (Likens, 1975), energy flow (Simciv, 2005),

water quality (Walsh *et al.*, 2001), tropic status

(Reynolds, 1999) and management (Beyruth and Tanaka, 2000). Now-a-days, anthropogenic activities exerting a great pressure on these freshwater sources to fulfill the need of water for drinking, agricultural and industrial use. Indeed, these water reservoirs become the site of drainage and sewage release, due to which physical and chemical parameters get altered, ultimately leading to decline in the floral and faunal diversity. Present attempt was made to know the phytoplankton diversity from Shirol freshwater tank. Various workers made an attempt to study the planktonic diversity over this area are Bhosale *et al.* (2010 a) and Bhosale *et al.* (2010 b).

MATERIAL AND METHODS

Study Area:

Kalleshwar freshwater body was constructed at Shirol. It is basically used for domestic and secondarily for fishery purpose. It is perennial tank covering maximum area of about 10 ha, with an average water spread area of about 8.3 ha. This tank was characterized by presence of submerged vegetation, where significant anthropogenic activities were noticed during the period of study. This site can be considered as heronry for various wetland birds. For fishery purpose the tank is auctioned on lease for the period of

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one years to local fishermen communities. The fishing activities including release of seedling and harvesting were conducted by private parties or stake holders.

Phytoplankton Analysis:

Present attempt of study was made between January 2015 and December 2015. The plankton samples were collected from four different sites of each tank fortnightly by using plankton net having mesh size of 50 μ . The 100 liter water sample was filtered through the plankton net in 100ml sampling bottle attached to the plankton net. The collected plankton sample was preserved in 4% formalin. The qualitative and quantitative analysis of Phytoplankton was carried out in the laboratory with the help of Sedgwick- Rafter cell counting chamber. The samples were kept for setting for a period of 48 hrs. The phytoplankton and were identified as described by Needham and Needham (1962), Adoni *et al.* (1985), Michael (1984), Tonapi (1980), Trivedy and Goel (1987).

RESULTS AND DISCUSSION

The seasonal variations in phytoplankton density were observed as maximum in winter season and minimum in monsoon. Comparatively, higher density of phytoplankton was recorded in winter and summer than the monsoon season. The qualitative analysis of phytoplankton belonging to four major groups such as Chlorophyceae, Bascillariophyceae, Myxophyceae and Euglenophyceae were identified.

Total eleven species of phytoplankton, belonging to four orders and five families were recorded. During the study period 4 Chlorophyceae members, 3 members

were belonging to Bascillariophyceae, 3 species were Myxophyceae and one species was of Dinophyceae. The Chlorophyceae member includes *Spirogyra*, *Oedogonium*, *Pediastrum* and *Ankistrodesmus*. The Bascillariophyceae comprises *Navicula*, *Cyclotella* and *Surirella*, among these former three were noted dominant. The Myxophyceae members were represented by *Nostoc*, *Anabaena*, and *Microcystis*. Among these *Nostoc* and *Anabaena* were observed as abundant in the plankton samples of these tanks. The only Dianophyceae member represented during study period was *Ceratium*.

The quantitative results for total number of phytoplankton during the year 2015 is given in Figure 1. The total phytoplankton during 2015 was fluctuated from 1205 Unit/l to 2099 Unit/l. The numbers of planktons were lower in the month of March while higher in the month of December. The study revealed that the total numbers of phytoplankton were declined in the months of summer due to increased water temperature. There was incline in the number of phytoplankton during the months of winter season might be due to clear water transparency, intense sunlight and increased light penetration.

Monthly variation of plankton with reference to classes is given in the Figure 2. The numbers of Chlorophyceae members were fluctuated from 18 Units/l to 450 Units/l with lowest during June while highest during December.

Monthly variation of plankton with reference to classes is given in the Figure 2. The numbers of Bascillarophyceae members were fluctuated from 128 Units/l to 741 Units/l with lowest during August and highest during February.

Figure 1: Monthly variation of phytoplankton in Shirol tank

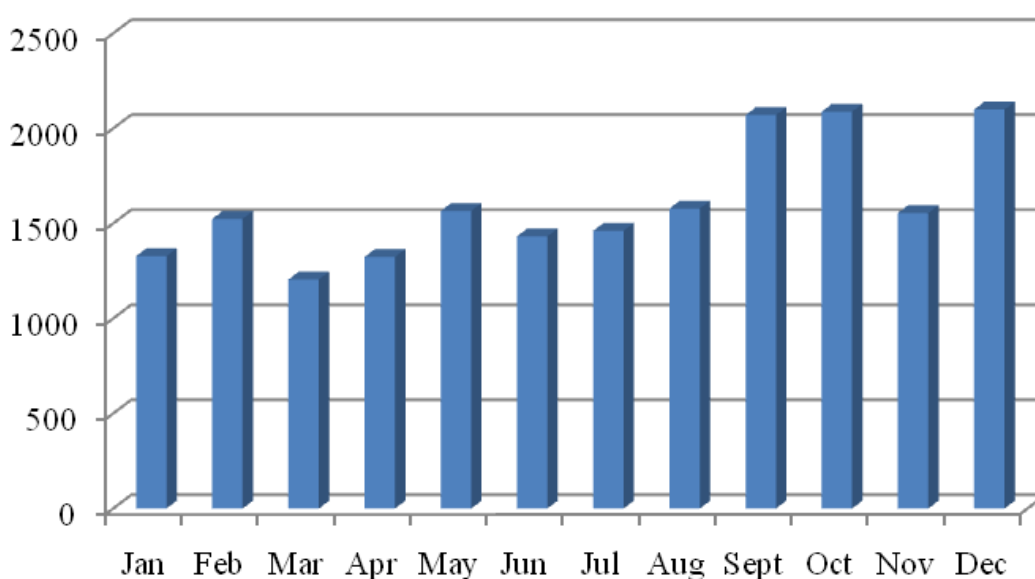


Figure 2: Population dynamics of phytoplankton with reference to groups in Shirol tank during 2015

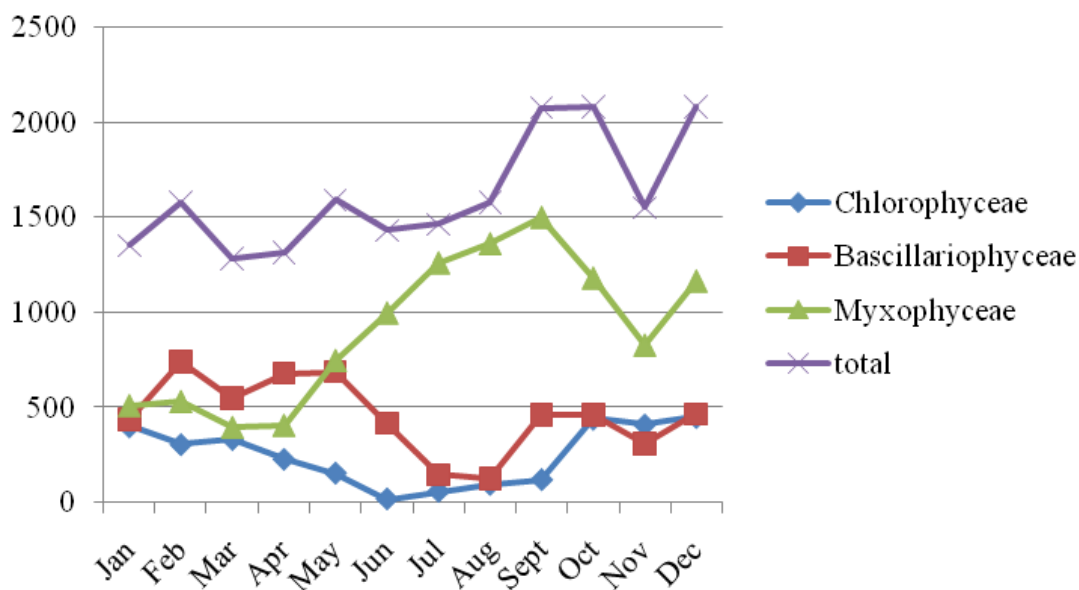
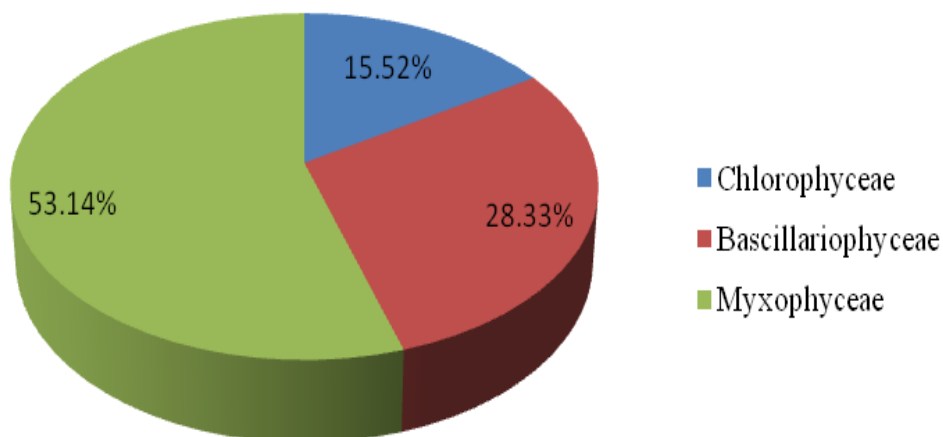


Figure 3: Percent composition of phytoplankton at Shirol freshwater body



Monthly variation of plankton with reference to classes is given in the Figure 2. The numbers of Myxophyceae members were fluctuated from 400 Units/l to 1497 Units/l with lowest during March while highest during September.

The total composition of planktons includes the members of Chlorophyceae, Bascillariophyceae and Myxophyceae. The total composition of the planktons (Figure 3) revealed that Myxophyceae was a noted dominant during the study period with holding the percentage of 56.14%. The Myxophyceae was followed by Bascillariophyceae and the total composition of this group indicated by 28.33% and the percent composition of Chlorophyceae is lower among other groups which it holds 15.52% during the study period.

Anitha and Singara (2007) and K.N. Nikam and S. V. More (2016) found phytoplanktons belonging from classes Chlorophyceae, Bacillariophyceae, Cyanophyceae and Euglenophyceae during July 1999

to June 2001 from Lower Manar Dam and Kakatiya canal, Karimnagar, Andhra Pradesh, India.

The population condition was stable during the months of summer months and noted declining during monsoon season. In the present study, the phytoplankton production was coinciding with the optimum water depth of 1 m. This is an agreement with the earlier works of Sukumaran and Das (2001) in some freshwater reservoir of Karnataka.

Conclusion

The present study can be concluded that the qualitative status of phytoplankton was medium rich while the quantitatively it is rich. Seasonal variations in total number of planktons were noted and found that the winter season was favourable season for the growth and development of phytoplankton.

Conflict of Interests

Authors declare that there is no conflict of interests regarding the publication of this paper.

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