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Research Paper

PHYTOPLANKTON SPECIES DIVERSITY IN CHIKKAMALAPPANAKERE TANK, SHIVAMOGGA, KARNATAKA, INDIA

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Phytoplankton diversity is an important criterion for evaluating the suitability of water for irrigation and drinking purposes. Phytoplankton composition of Chikkamalappanakere tank was studied for a period of six months from July to December 2013. During the period of investigation 45 species of phytoplankton representing five taxonomic groups such Chlorophyceae, Cyanophyceae, Euglenophyceae, Bacillariophyceae and Desmids were recorded. Relative abundance of phytoplankton in Chikkamalappanakere tank showed maximum of *Cyanophyceae* (31.1%), followed by *Bacillariophyceae* (24.4%), *Chlorophyceae* (20%), *Euglenophyceae* (13.3%) and *Desmids* (11.1%). *Scenedesmus quadricauda* and *Merismopedia glauca* were the common pollution indicators.

Keywords: Phytoplankton, Chikkamalappanakere tank, Shivamogga, Karnataka

INTRODUCTION

Phytoplankton are free floating unicellular, microscopic and colonial autotrophic organisms that grow in aquatic environments whose movement is more or less dependent upon water currents (Millman *et al.*, 2005). Phytoplankton are considered as important component of aquatic flora, play a key role in maintaining equilibrium between abiotic and biotic components of aquatic ecosystem (Pandey *et al.*, 2004). Phytoplankton plays an important role in the biosynthesis of organic matter in aquatic ecosystems, which directly or indirectly serve all the living organisms of a waterbody as food. The clarity of the pond

depends on the presence or absence of suspended materials such as microscopic clay particles and phytoplankton. In the absence of suspended materials and phytoplankton, a tank will appear almost crystal clear. A number of researchers have studied the phytoplankton diversity of lentic water bodies (Pawar *et al.*, 2006; Tapashi and Mithra, 2011; Sayeswara *et al.*, 2011; Vasantha *et al.*, 2012).

The plankton study is a very useful tool for the assessment of water quality in any type of waterbody and also contributes to understanding of the basic nature of general economy of the lake (Pawar *et al.*, 2006). When the algal species

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in the phytoplankton community reproduce, the phytoplankton will reach a density that can be characterized as slight cloudiness or turbidity in the water. Unplanned urbanization, rapid industrialization and indiscriminate use of artificial chemicals in agriculture causing heavy and varied pollution in aquatic environments leading to the depletion of aquatic biota. Some species of blue green algae aggregate and make a colony floating over the surface forming the bloom. Water bloom besides imparting color to the water also gives a disagreeable smell and taste to it.

The present study has been carried out to estimate the phytoplankton diversity of Chikkamalappanakere tank. This type of a study is relevant since the Chikkamalappanakere tank forms the source of water for public distribution systems.

MATERIALS AND METHODS

Study Area

Chikkamalappanakere tank is an annual waterbody situated at about 35 km away from Shivamogga, located between 15° 63' N latitude and 14° 4' longitude. The tank received water from the adjacent paddy fields and rain is the main source of water. The river basin of the tank is Krishna river. The total area of Chikkamalappanakere tank is about 25 acres of which water spreads over an area of 15 acres with an average depth of 8-10 feet.

Plankton analysis

A water sample measuring one liter was collected for studying planktonic composition. They were collected between 9 to 10 am once a month. One liter of water sample was fixed with 20 mL of 1% Lugol's iodine solution and kept 24 h for sedimentation. 100 mL of sample is subjected to

centrifugation at 1500 rpm for 20 min and concentrate was made up to 20 mL with 5% formalin. Identification of phytoplankton was made with the help of Deshikachary (1959), Prescott (1982) and Welch (1952).

RESULTS AND DISCUSSION

Results of Phytoplankton diversity of Chikkamalappanakere tank water are given in Table 1 and depicted in Figure 6. A total of 45 phytoplankton species representing five taxonomic groups namely: Chlorophyceae, Cyanophyceae, Euglenophyceae, Bacillariophyceae and desmids were reported. Genus composition of different groups are depicted Figures 1 to 5. Phytoplankton showed a dominant position of Cyanophyceae (31.1%), followed by Bacillariophyceae (24.4%), Chlorophyceae (20%), Euglenophyceae (13.3%) and Desmids (11.1%). Kumawat and Jawale (2003) recorded 59 species of phytoplankton from a fish pond at Anjale, Maharashtra. Sayeswara *et al.* (2011a) recorded 55 species of phytoplankton from a Matthur tank of Shivamogga, Karnataka. Vasantha Naik *et al.* (2012) recorded 79 species of phytoplankton from Ganikere tank at Anandapura, Karnataka.

Chikkamalappanakere tank supported 7 genera and 9 species of Chlorococcales. If the diversity of Chlorococcales is considered, the genus *Pediastrum* and *Scenedesmus* was represented by 2 species each. *Crucigenia*, *Eudorina*, *Oocystis*, *Selanastrum* and *Tetraedon* were represented by a single species.

The tank comprises of 12 genera and 14 species of blue greens. Species diversity showed

Table 1: List of Phytoplankton in Chikkamalappanakere Tank

Chlorophyceae		Euglenophyceae	
01	<i>Crucigenia rectangularis</i>	24	<i>Euglena elongata</i>
02	<i>Eudorina legans</i>	25	<i>Phacus curvicauda</i>
03	<i>Oocystis gigas</i>	26	<i>Phacus truqueter</i>
04	<i>Pediastrum duplex</i>	27	<i>Phacus orbicularis</i>
05	<i>Pediastrum tetras</i>	28	<i>Strombomonas gibberosa</i>
06	<i>Scenedesmus quadricauda</i>	29	<i>Trachelomonas robusta</i>
07	<i>Scenedesmus dimorphos</i>	Bacillariophyceae	
08	<i>Selanastrum westii</i>	30	<i>Diatoma vulgare</i>
09	<i>Tetraedon longispinum</i>	31	<i>Fragillaria crotonensis</i>
Cyanophyceae		32	<i>Gyrosigma tenellum</i>
10	<i>Anacystis</i> sp.	33	<i>Melosira granulata</i>
11	<i>Anabaena</i> sp.	34	<i>Navicula pigmea</i>
12	<i>Aphanocapsa</i> sp.	35	<i>Nitzschia acicularis</i>
13	<i>Agmenellum</i> sp.	36	<i>Pinnularia biceps</i>
14	<i>Chroococcus turgidus</i>	37	<i>Pinnularia major</i>
15	<i>Merismopedia glauca</i>	38	<i>Surieal robusta</i>
16	<i>Merismopedia punctat</i>	39	<i>Synedra acus</i>
17	<i>Merismopedia tenuissima</i>	40	<i>Tabellaria</i> sp.
18	<i>Nostoc microscopium</i>	Desmids	
19	<i>Oscillatoria viridis</i>	41	<i>Cosmarium</i> sp.
20	<i>Phormidium</i> sp.	42	<i>Cosmarium tumidum</i>
21	<i>Rivuliera</i> sp.	43	<i>Closteriopsis</i> sp.
22	<i>Spirulina</i> sp.	44	<i>Euastrum sublobatum</i>
23	<i>Synechocystis</i> sp.	45	<i>Staurastrum wilde</i>

that genus *Merismopedia* was represented by 3 species. *Anacystis*, *Anabaena*, *Aphanocapsa*, *Agmenellum*, *Chroococcus*, *Nostoc*, *Oscillatoria*, *Phormidium*, *Rivuliera*, *Spirulina* and *Synechocystis* were represented by a single species.

Chikkamalappanakere tank supported 10 genera and 12 species of Bacillariophyceae. With regard to their diversity, the genus *Pinnularia* was presented by 2 species. *Ditoma*, *Fragillaria*, *Gyrosigma*, *Melosira*, *Navicula*, *Nitzschia*, *Surieal*, *Synedra* and *Tabellaria* were represented by a single species.

Figure 1: Genus Composition of Chlorophyceae

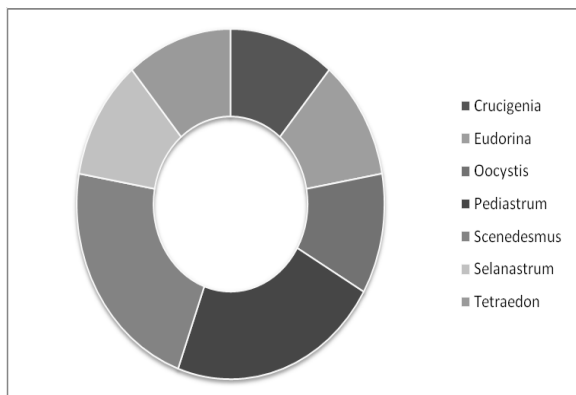


Figure 4: Genus Ccomposition of Bacillariophyceae

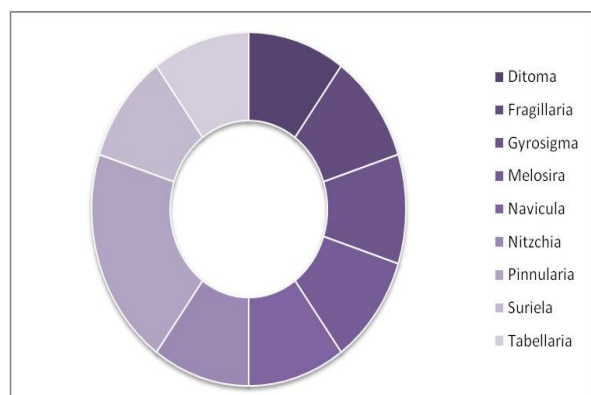


Figure 2: Genus Composition of Cyanophyceae

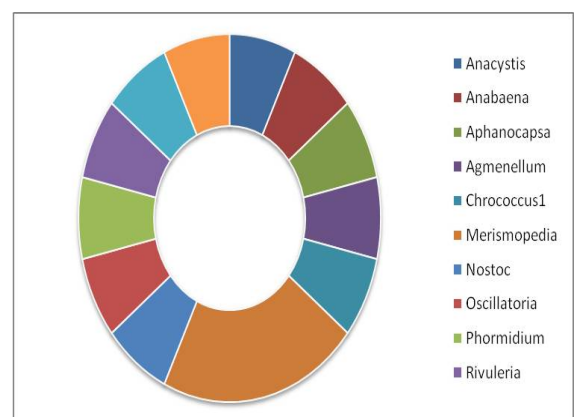


Figure 5: Genus Composition of Desmids

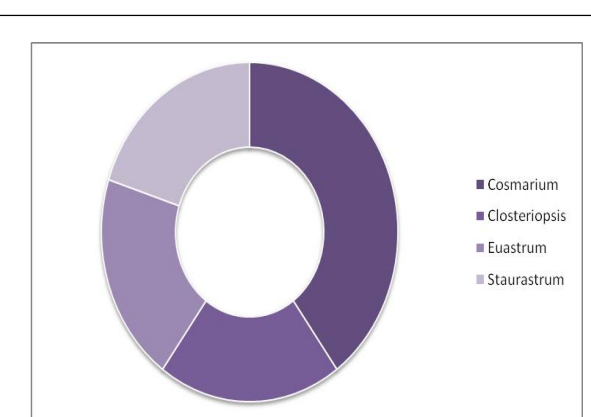


Figure 3: Genus Composition of Euglenophyceae

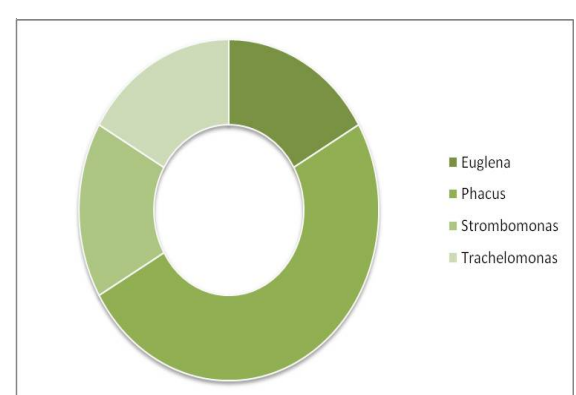
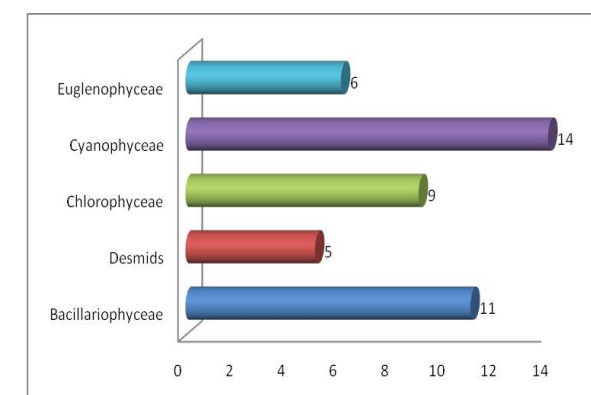


Figure 6: Speceis Composition of Different Taxonomic Groups



Desmids were represented by 4 genera and 5 species. *Cosmarium* was represented by 2 species. *Closteriopsis*, *Euastrum* and *Staurastrum* were represented by a single species.

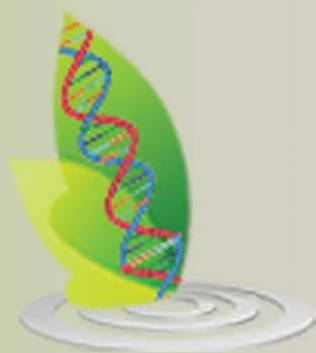
Euglenoids are represented by 4 genera and 6 species. Species diversity showed that genus *Phacus* was represented by 3 species. *Euglena*, *Strombomonas* and *Trachelomonas* were represented by a single species.

CONCLUSION

The water samples from Chikkamalappanakere tank was collected and analyzed for planktonic composition. The ecological status of the tank was found to be impoverished in terms of species composition. A rich algal flora with 14 species of blue greens, 11 species of diatoms, 9 species of Chlorococcales, 6 species of Euglenoids and 5 species of desmids were reported.

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