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Original Research

Phytoplankton Community Composition in Gowrikere Tank, Anandapura, Sagara, Shivamogga, Karnataka, India

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Abstract

This study was carried out in Gowrikere tank of Anandapura village of Sagara taluk of Shivamogga city, Karnataka on phytoplankton diversity and density for a period of twelve months from January to December 2012. A total of 48 species belonging to 37 genera of phytoplankton were recorded. Relative abundance of phytoplankton in tank showed maximum of Bacillariophyceae (27.08%), followed by Chlorophyceae (22.91%), Cyanophyceae (20.83%), Desminds (18.75%) and Euglenophyceae (10.41%). The highest density of phytoplankton was recorded during summer season. Chlorococcales varied with peak density (10925 org. /l (Organism/Litre)) during May and lower in the month of December (7034 org. /l). Diatoms ranged from 1981 org. /l (September) to 4432 org. /l (January). Desmids varied with peak density (83 org./l) during February and lower in the month of July (32 org. /l). Euglenoids population showed maximum density during the month of March (3091 org./l) and minimum with 1973 org./l in the month of July. Density of blue greens recorded a maximum of 9114 organism / in April and a minimum of 7115 organism/l during the month of December. Pollution tolerant species such as *Scenedesmus quadricauda, Coelastrum microporum, Phacus longicauda, Trachelomonas robasta and Microcystis aeroginosa were recorded.*

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INTRODUCTION

Phytoplanktons are photosynthesizing microscopic organisms that inhabit the upper sunlit layer of almost all oceans and bodies of freshwater. They form bulk of food for zooplankton, fishes and other aquatic organisms. Phytoplankton constitute the primary level of the aquatic food chain by converting solar radiant energy into biomass through photosynthesis. Therefore, they act as primary produces and represent themselves as a direct food source for the aquatic animals. They also play an important role in conditioning the microclimate by regulating the level of dissolved oxygen, a vital gas for aquatic life (Sudhakara *et al.,* 2012). The community composition of phytoplankton is largely influenced by the interaction of a number of physico-chemical factors (Shinde *et al.,* 2012). Plankton of pond ecosystems was studied by several investigators (Kumar and Dutta, 1991; Bhat, *et al.,* 1991; Sayeswara *et al.,* 2011; Sayeswara *et al.,* 2012). Phytoplankton study provides a relevant and convenient point of focus for research on the mechanism of eutrophication and is adverse impact on the aquatic ecosystem. The planktonic study is a very useful tool for the assessment of water quality in any type of water body and also contributes to understanding of the basic nature and general economy of the lake (Pawar *et al.,* 2006). The maintenance of healthy aquatic ecosystem is dependent on the abiotic properties of water and the biological diversity of the ecosystem. In view of the importance of the study of phytoplankton, the present study was undertaken to assess biodiversity and density of phytoplankton in Gowrikere tank of Anandapura village, Shivamogga.

MATERIALS AND METHODS

Study Area

Gowrikere tank (Anandapura village) is a perennial freshwater body situated at about 16 km away from the Sagara town, located between 14° 4' N latitude and 75° 38' E longitude. This is medium sized tank, with total water spread of 27.79 hectare, where rain is the main source of water. The river basin of the tank is Krishna. The water has undergone moderate changes in the physico-chemical properties due to overflowing of water from adjacent paddy fields and other excessive human activities. The water is used for agricultural purpose and domestic activities.

Plankton Analysis

For analysis of plankton, one liter of composite water samples at surface level was collected at interval of 30 days from January to December 2012. One liter of sample was fixed with 20 ml of 1% Lugol's iodine solution and kept 24 hours for sedimentation. 100 ml of sample is subjected to centrifugation at 1500 rpm for 20 minutes and used for further investigation. The filtered plankton were collected in separate bottles and preserved using 10% formalin. Identification of plankton up to species level was done by referring standard manuals (Frich, 1945; Deshikachary, 1959; Needham and Needham, 1962; Philipose, 1967). Quantitative estimation of phytoplankton was done using by a Sedgewick Rafter counting cell.

RESULTS AND DISCUSSION

A total of 48 species belonging to 37 genera of phytoplankton were recorded (Table 1). Monthly occurrence of different groups of phytoplankton density is given in table 2. Genus compositions of different groups are shown in Figures 1-5. Kumawat and Jawale (2003) recorded 50 species of phytoplankton from a fish pond at Anjale, Maharashtra. Nafeesa Begum *et al.* (2011) recorded 56 species of phytoplankton from a Bethur pond near Davangere, Karnataka. Diatoms represent the first dominated group among the phytoplankton. The Gowrikere tank comprises of 12 genera and 13 species of diatoms. The genus *Gomphonema* was represented by 2 species and other genera like *Cymbella, Fragillaria, Gyrosigma, Melosira, Navicula, Pinnularia, Surirella, Synandra, Tabullaria* and *Amphora* were represented by single species each. Abundance ranges from minimum of 32 org./l in July to a maximum of 81 org./l in February. Some of the pollution tolerant diatoms (Palmer, 1969) were recorded from the study area are *Navicula* sp., *Cymbella tumida* and *Pinnularia* sp.

Table 1: List of Phytoplankton in Gowrikere tank.

Chlorophyceae
Ankistrodesmus falcatus, Ankistrodesmus spiralis, Coelastrum microporum, Dimorphococcus sp., *Eudorina elegans, Pediastrum duples, Pediastrum simplx, Scendesmus quaricauda, Scendesmus dimorphos, Selanastrum gracile, Selanastrum westii.*
Bacillariophyceae
Amphora sp., *Cymbella tumida, Fragillaria capucina, Gomphonema lanceolatum Gomphonema abbreviatum, Gyrosira acuminatum, Melosira granulate, Navicula* sp., *Nitzchia amphibian, Pinnularia gibba, Surirella* sp., *Synandra tabulate, Tabularia flocculosa.*
Cynophyceae
Merismopedia glauca, Merismopedia tenuissima, Merismopedia elegans, Microcystis aeroginosa, Nostoc muscorm, Oscillatoria Formosa, Phormidium sp., *Rivuleria* sp., *Spirulina major, Synechocystis* sp.
Desmids
Closterium sp., *Cosmarium depressum, Cosmarium punetulatum, Cosmarium granulatum, Cosmarium constractum, Euastrum sublobatum, Micrasteria* sp., *Staurastrum gracile, Staurastrum* sp.
Euglenophyceae
Euglena sp., *Phacus longicauda, Phacus undulate, Trachelomonas robasta, Strombomonas gibberosa.*

Gowrikere tank recorded 7 genera and 11 species of Chlorococcales. The genera *Ankistrodesmus*, *Pediastrum, Scendesmus* and *Selanastrum* were represented by two species each and other genera like *Coeleastrum*, *Dimorphococcus* and *Eudorina* were represented by single species. The population density of Chlorococcales reached its peak in May with 10925 org./l, while in December it was least with 7034 org./l. Some of the pollution tolerant species (Palmer, 1969) identified were *Scendesmus quadricauda* and *Coelastrum* sp.

The tank recorded 5 genera and 9 species of desmids. The genus *Cosmarium* was represented by 4 species, *Staurastrum* by 2 species and other genera like *Euastrum, Micrasteria,* and *Closterium* by a single species. Density of desmids was maximum of 83 org./l in February and a minimum of 32 org./l during July.

Table 2: Monthly occurrence of different groups of phytoplankton density in Gowrikere tank.

Month and year	Chlorophyceae	Bacillariophyceae	Desmids	Euglenoids	Cyanophyceae
January 2012	9435	4432	45	2176	8615
February 2012	9860	3921	83	2288	7623
March 2012	8114	3620	81	3091	9114
April 2012	10115	4203	69	1986	8633
May 2012	10925	3822	71	2493	8718
June 2012	8626	2924	49	2376	7922
July 2012	8121	2415	32	1973	8015
August 2012	8626	2237	36	2181	7639
September 2012	7620	1981	47	2680	1893
October 2012	7251	2114	58	2576	8115
November 2012	7630	2214	49	2171	7314
December 2012	7034	2158	59	2169	7115

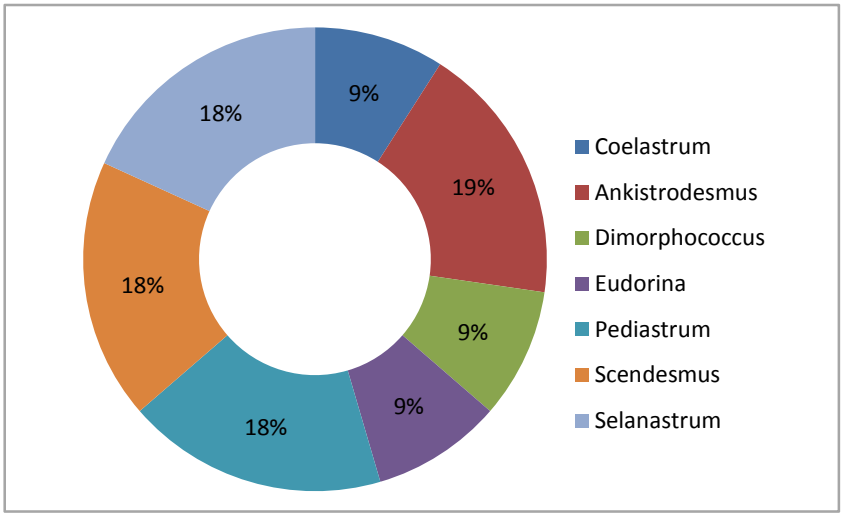

Figure 1: Genus composition of Chlorophyceae.

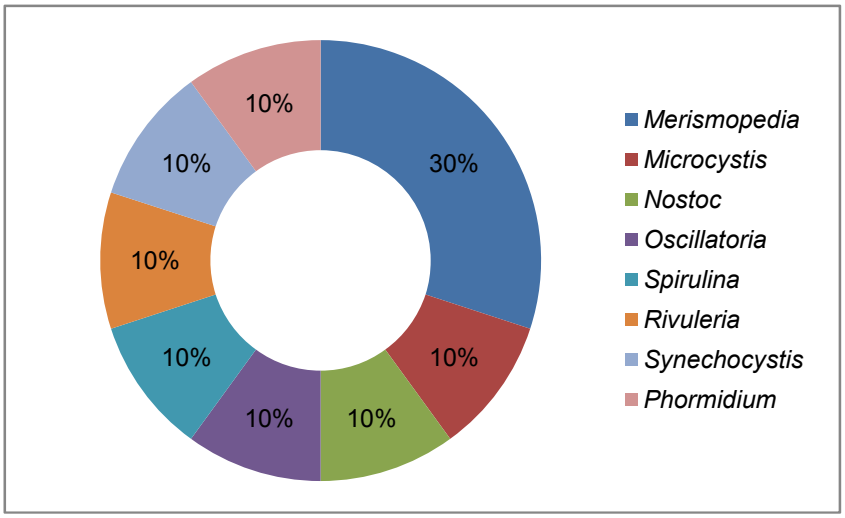

Figure 2: Genus composition of Cyanophyceae.

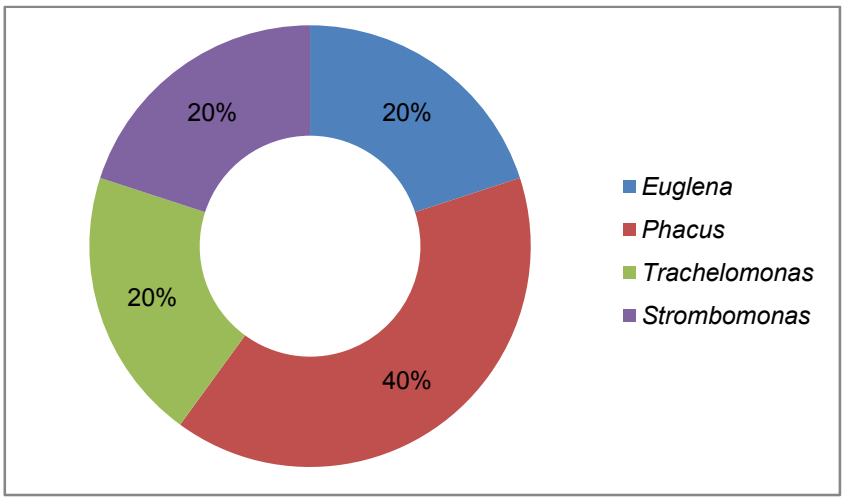

Figure 3: Genus composition of Euglenophyceae.

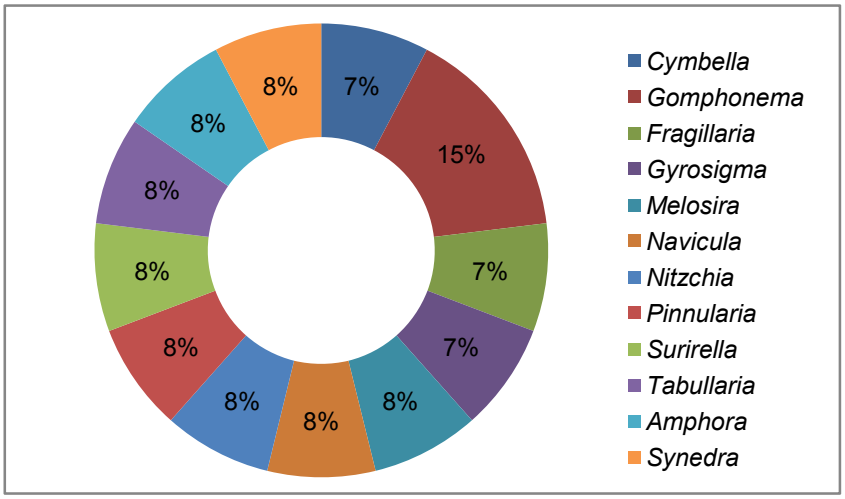

Figure 4: Genus composition of Bacillariophyceae.

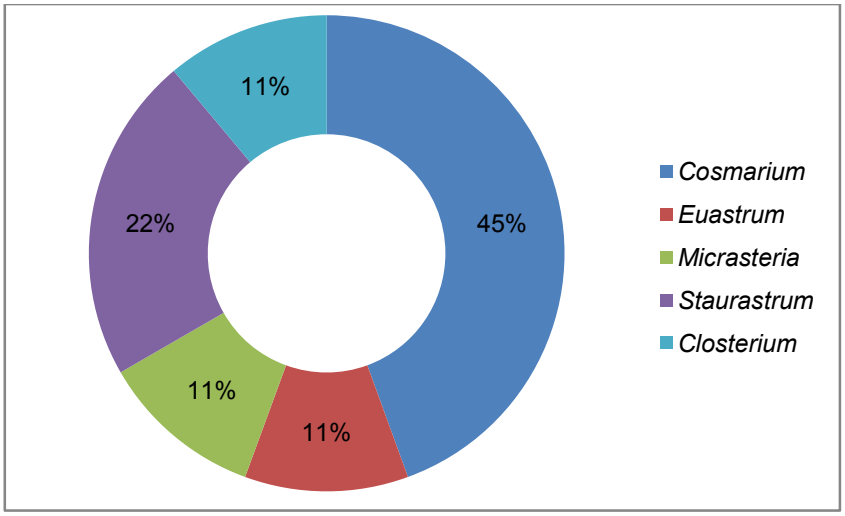

Figure 5: Genus composition of Desmids.

Blue greens represented by 8 genera and 10 species. If the diversity of blue greens is considered, the genus *Merismopedia* was represented by 3 species and other genera like *Nostoc*, *Oscillaria*, *Spirulina*, *Rivuleria*, *Synechocystis* and *Phormidium* each by a single species. Density of blue greens recorded a maximum of 9114 org./l in March and a minimum of 7115 org./l in December. Some of the pollution tolerant species recorded from the study area are *Microcystis aeroginosa* and *Oscillatoria formosa. Microcystis aeroginosa* is used as the best indicator of pollution and is associated with highest degree of civic pollution. In the present study *Micricystis aeroginosa* was recorded.

Comparatively euglenoid population was less which represents 4 genera and 5 species. *Phacus* were represented by 2 species, *Euglena, Trachelomonas* and *Strombomonas* by a single species each. The population density of euglenoids reached its peak in March with 3091 org./l, while in July it was least with 1973 org./l. Some of the pollution tolerant euglenoid (Palmer, 1969) recorded were *Euglena* sp., *Phacus* sp. and *Trachelomonas* sp. whose density was in Gowrikere tank which indicated the presence of organic matter in the water body.

CONCLUTION

The water samples from Gowrikere tank was collected and analyzed for plankton composition. The ecological status of the tank was found to be impoverished in terms of species composition. A rich phytoplankton flora with 13 species of diatoms, 11 species of chlorococcales, 10 species of blue greens, 9 species of desmids and 5 species of euglenoids were reported. The presence of euglenophycean members indicate that the water is organically polluted as euglenoids are the bioindicators of pollution.

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REFERENCES

Bhat, L.R., Lacoul, P., Lekhak, H.D., Jha, P.K. (1991). Physico-chemical characteristics & phytoplanktontons of Taudaha Lake, Katmandu. *Pollution Re*search 18(4): 353-358.

Deshikachary, T.V. (1959). *Cyanophyta.* ICMR, New Delhi.

Frich, F.E. (1945). The structure and reproduction of Algae. Volume 2. Cambridge University Press, London, UK.

Kumar, S., Datta, S.P.S. (1991). Studies on Phytoplanktonic population dynamics in Kunjwani pond, Jammu. *Hydobiologia* 7: 55-59.

Kumawat, D.A., Jawale, A.K. (2003). Phytoplankton of a fish pond at Anjale, Maharashtra. *Ecology Environment and Conservation* 9(1): 411-415.

Nafeesa Begum, Sayeswara, H.A., Naik, K.L. (2011). Seasonal variations of Phytoplankton diversity in Bethur pond near Davangere, Karnataka, *Environment and Ecology*. 29(3A): 1355-1359.

Needham, J.G., Needham, P.R. (1962). A Guide to study of freshwater biology. *Holden Bay*. San Francisco, U.S.A.

Palmer, C.M. (1969). A composite rating of algae tolerating organic pollution. *Journal of Phycology* 5: 76-82.

Pawar, S.K., Pulle, J.S., Shende, K.M. (2006). The study of phytoplankton of pethwadaj Dam, Taluka kandhar, Nanded, Maharashtra. *Journal Aquatic Biology* 21:1-6.

Philipose, M.T. (1967). *Chlorocaccales: Monographs on algae*. ICAR Publ. New Delhi.

Sayeswara, H.A., Mahesh Anand Goudar, Manjunatha, R. (2011). Water quality evaluation and phytoplankton diversity of Hosahalli pond, Shivamogga, Karnataka (India). *International Journal of Chemical Sciences* 9(2): 805-812.

Sayeswara, H.A., Mahesh Anand Goudar, Nafeesa Begum. (2012). Physico-chemical profile and phytoplankton diversity of Murughamatta tank, Shivamogga, Karnataka, India. *Pollution Research* 31(3): 351-356.

Shinde, S.E., Patthan, T.S., Sonawane, D.L. (2012). Seasonal variations and biodiversity of phytoolankton in Harsool-savangi dam, Aurangabad, India. *Journal of Environment Biology* 33: 643-647.

Sudhakar, O., Neela Rani, P., Venugopal, G., George, J.P. (2012). Seasonal variations of phytoplankton population in Powai lake, Mumbai, India. *Ecology, Environment & Conservation* 18(4): 993-996.