

DISTRIBUTION AND BIODIVERSITY OF CHLOROCOCCALEAN FLORA IN THE PHYTOSESTON OF A FRESHWATER LAKE

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The occurrence, periodicity and biodiversity of Chlorococcalean flora of a freshwater lake have been described. This group of micro-algae exhibit two peaks (April-May, Sept-Oct) during the year. The population consists of 28 species belonging to 17 genera, with *Scenedesmus* as the predominant genus. In this lake their intensified occurrence is linked more with temperature than dissolved oxygen. The author concludes that their periodicity of appearance is closely associated with the availability of the preferential nutrients and their inherent physiological plasticity. It is suggested that survival strategies of Chlorococcales differ in lentic and lotic waterbodies.

Keywords: Chlorococcales; Freshwater lake.

The micro-algae constitute the bulk of algal biomass available on the earth. Currently it is believed that the number of species of micro-algae varies between 2200 to 2600. They not only contribute a major share in the photosynthetic system but also in maintaining the ecology of many fresh water ecosystems on this planet. They also form a major component of the phytoeston communities of any freshwater ecosystem. The chlorococcales are composite assemblage of fresh water micro-algae of wide occurrence. Though, they are unicellular zoosporic freshwater micro-algae, yet they possess remarkable adaptability in order to survive under varied physiological conditions¹. The ecology of chlorococcales is not clear and the available reports about their preferential habitats and nutritional requirements are conflicting²⁻⁶. In recent days, the Chlorococcaleans have acquired much importance as some of them like *Scenedesmus* or *Chlorella* etc. have been identified as rich source of proteins or vitamins; and secondly, many of the species are used as ecological or pollution indicators⁷. The present communication records the periodicity and species diversity of chlorococcalean population in Ranchi Lake.

Ranchi Lake serves as a permanent water reservoir for the town. It is spread over 45 acres. In recent days the lake is getting polluted due to many anthropogenic activities like any other city lake of India, as it receives domestic as well as other effluents from the urban agglomeration located around the lake. For the present study, water samples were collected from Ranchi Lake in order to study the species diversity and periodicity of chlorococcales each month, throughout the year. The

samples were passed through a plankton net of 55 blotting silk of 100 micron mesh size. The collected samples were preserved in plastic vial with 2% formalin for further analysis. The mixed samples of phytoplankton were sorted out and various species of chlorococcales were identified under a binocular microscope.

During the present study the author has encountered two peaks of Chlorococcales, one during April-May (early summer) and the other during September-October (early winter). The author has recorded 28 species belonging to 17 genera. The population is dominated by the genus *Scenedesmus*. The details of their distribution are given in Table. 1.

Table 1. List of various species of Chlorococcales in Ranchi Lake.

Name of the taxa	Name of the taxa
1. <i>Chlorococcum infusionum</i>	15. <i>A. convolutus</i>
2. <i>C. vitiosum</i>	16. <i>Actinastrum hantzschii</i>
3. <i>C. humicola</i>	17. <i>Selenastrum gracile</i>
4. <i>Nautococcus pyriformis</i>	18. <i>Kirchneriella obesa</i>
5. <i>Phyllobium dimorphum</i>	19. <i>Coelastrum microporum</i>
6. <i>Pediastrum borryanum</i>	20. <i>Crucigenia triangularis</i>
7. <i>P. tetras</i>	21. <i>C. tetrapedia</i>
8. <i>Hydrodictyon reticulatum</i>	22. <i>C. quadrata</i>
9. <i>Tetraedron minimum</i>	23. <i>Scenedesmus oblicus</i>
10. <i>Chlorella vulgaris</i>	24. <i>S. dimorphus</i>
11. <i>Oocystis eclipia</i>	25. <i>S. bernardi</i>
12. <i>Nephroclytium obesum</i>	26. <i>S. bijugatus</i>
13. <i>Botriococcus braunii</i>	27. <i>S. arcuatus</i>
14. <i>Ankistrodesmus falcatus</i>	28. <i>S. quadricauda</i>

The Chlorococcales are seasonal micro algae since their

periodicity of appearance or abundance is a temporary phenomenon. The earlier investigations^{8,9} have revealed that Chlorococcales flourish mainly during the summer season.

Habib¹⁰ while working on a river noticed that though maximum algae thrive during the summer season but genera belonging to Chlorococcales dwindle on the onset of rainy season. He observed only one peak of chlorococcales during June which is a summer month and concluded that the temperature of summer accelerates the growth of Chlorococcales but only up to a certain range. He also identified high concentration of dissolved oxygen as growth promoting factor for Chlorococcales in flowing water system. Earlier many workers¹¹⁻¹³ have also concluded that well oxygenated waters are a prerequisite for the growth of Chlorococcales.

During the present investigation, the author has noticed two peaks of Chlorococcales in the lake in contrast to one in river water system. Furthermore, Habib¹⁰ has recorded 16 species belonging to 9 genera in flowing water whereas, the author has recorded 28 species belonging to 17 genera in lentic habitat, Ranchi Lake. Kumawat and Jawale⁶ also recorded 18 genera of Chlorococcales from a fish pond of Maharashtra. They observed their peak dominance when pH and dissolved oxygen were at maximum and the temperature was moderate. They recorded maximum Chlorococcales flora during winter and minimum in rainy season.

During the present study it was observed that Chlorococcales appear twice, and it can safely be said that dissolved oxygen and temperature are important factors for the appearance of Chlorococcales in Ranchi Lake. Between these two factors temperature appears to be more critical as population of chlorococcales vanishes before the summer and winter. The author believes that Chlorococcales of Ranchi Lake have a narrow survival temperature spectrum. It appears that they get optimum conditions only during April-May and September-October when the temperature is not very high and water contains enough dissolved oxygen to sustain them. In rest of the months, especially during summer, the high temperature and low oxygen content of the water act as inhibitory factors for their growth. Similarly, in winter temperature becomes too low hence, not suitable for their appearance though, oxygen content is quite sustainable.

Regarding the biodiversity of Chlorococcales it

appears that lentic water seems to be more suitable for their abundance as the author has noted 18 genera. Kumawat and Jawale⁶ have also recorded 18 genera from lentic water. In contrast, Habib¹⁰ has recorded only 9 genera from the river Ramganga. The author is of the view that difference in the periodicity of their appearance and survival strategies of chlorococcales in lentic and lotic environment is entirely different. Kawecka and Eloranta⁸ have suggested that algal communities including chlorococcales in river are less differentiated and variable than lake-ecosystem. Lampert and Sommer¹⁴ have also concluded that intensified occurrence of Chlorococcalean species in lakes in comparison to river is influenced by factors like slow flow of water, high water temperature and high influx of nutrients from catchment areas. It can be concluded that the above mechanism also operates in Ranchi Lake resulting more intensified occurrence and greater biodiversity of Chlorococcalean species in the phytoseston community of Ranchi Lake.

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