



CHLOROPHYCEAN DIVERSITY OF THREE WATER BODIES OF BHADRAWATI TEHSIL OF CHANDRAPUR DISTRICT (M.S.), INDIA

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Abstract

Phytoplankton are autotrophic, prokaryotic or eukaryotic algae that live near the water surface where there is sufficient light to support photosynthesis. The phytoplankton in aquatic ecosystem is an important biological indicator of the water quality. While phytoplankton are major primary producers and the basis of the food chain in open water, some species on the other hand can be harmful to human and other organisms by releasing toxic substances into the water. The present paper describes the diversity of Chlorophyceae of Kanhala, Pindavani and Malhara ponds located near the Bhadrawati town of Chandrapur district. Qualitative and quantitative analysis of Chlorophyceae community was undertaken on monthly basis from October 2005 to September 2007. A total of 24 species were recorded in Chlorophyceae from all the sampling sites of the ponds under study. The species diversity shows variation as per sampling sites of the respective ponds.

Keywords- Kanhala pond, Pindavani pond, Malhara Pond, Chlorophycean diversity, Seasonal variation.

Introduction

Phytoplanktons are the base of most of the lakes food web and fish productions is linked to phytoplanktons production (Ryder et al., 1974). Phytoplanktons are the autotrophic component of the plankton community. Since they obtain energy through the process of photosynthesis and must therefore live in the well-lit surface layer (termed the euphotic zone) of a water body. The present investigation has been undertaken to study the qualitative and quantitative analysis of chlorophycean community at the Kanhala Pindavani and Malhara ponds located near Bhadrawati town of Chandrapur district.

Material and Methods

The Kanhala, Pindavani and Malhara ponds are principal fresh water bodies located within 9 to 10 Km of Bhadrawati town in Chandrapur district of Maharashtra state. Bhadrawati is a tahsil place nearly 25 Km North of Chandrapur and 125 Km South East from Nagpur. It is situated at about 211m above the mean sea level and is at 20° 06' 35.67" N latitude and 79° 07' 7.33" E longitude. The industrialization, urbanization and the related anthropogenic activities have resulted in waste discharge in the nearby water bodies, particularly the lakes under study.

Sample for planktonic study were collected monthly from each pond. The samples were collected in the morning hours between 8.30 to 10.30 a.m. 50 Lt. of water sample was filtrated through the plankton net made of bolting silk

number 25 with mesh size 64 limes. The collected samples were allowed to settle down by adding Lugol's iodine. Normally, sedimentation requires 24 hrs. After which supernatant was removed and concentrate was made up to 50 ml depending the number of plankton and preserved in 5% formalin for further studies.

The quantitative study of chlorophyceae was done by Sedgwick – Rafter cell method, the concentrated sample was shaken and immediately one drop of sample was taken on a clear micro slide with the help of a standard dropper, the whole drop was then carefully covered with the cover glass and observed. Identification up to genera and whenever possible up to species level was classified according to keys given by Prescott (1954), Edmondson (1959), Sehgal (1983), Adoni (1985) and APHA (1985).

Result and Discussion

The phytoplankton population in any aquatic system is biological wealth of water for fishes and constitutes a vital link in the food chain. They form a bulk of food for zooplankton. Phytoplankton is the pioneer of an aquatic food chain. The productivity of an aquatic environment is directly correlated with the density of phytoplankton.

During the present investigation in 2005-06 in Kanhala pond the 24 species of Chlorophyceae were recorded among which *Chlorella* sp. (312 no./lit.) is dominant followed by *Ankistrodesmus* sp. (296 no./lit.), *Volvox* sp. (50 no./lit.), *Spirogyra* sp. (35 no./lit.), *Micrasterias*

pinnatifida (30 no./lit.), *Coelastrum chodati* (26 no./lit.) and *Euastropsis richteri* (22 no./lit.) the other Chlorophyceae recorded are *Pediastrum tetras* (17 no./lit.), *Trochiscia pachyderma* (17 no./lit.), *Gloeocystis gigas* (16 no./lit.), *Chlorococcum humicola* (16 no./lit.), *Staurastrum* sp. (16 no./lit.), *Pleurodiscus* sp. (16 no./lit.), *Closteridium lunula* (15 no./lit.), *Vorticella* sp. (15 no./lit.), *Hydrodictyon* sp. (14 no./lit.), *Oedogonium* sp. (13 no./lit.), *Nitella* sp. (11 no./lit.), *Cylindrospermum* sp. (11 no./lit.), *Chlamydomonas* sp. (11 no./lit.) and *Chara* sp. (10 no./lit.) and in 2006-07, 20 species were recorded are *Chlorella* sp. (320 no./lit.) is dominant followed by *Volvox* sp. (224 no./lit.), *Pediastrum tetras* (103 no./lit.), *Trochiscia pachyderma* (42 no./lit.), *Micrasterias pinnatifida* (32 no./lit.), *Euastropsis richteri* (30 no./lit.) the other Chlorophyceae recorded are *Chara* sp. (17 no./lit.), *Chlorococcum humicola* (16 no./lit.), *Hydrodictyon* sp. (15 no./lit.), *Oedogonium* sp. (14 no./lit.), *Staurastrum* sp. (14 no./lit.), *Nitella* (11 no./lit.), *Cylindrospermum* sp. (10 no./lit.), *Closterium leibleimi* (9 no./lit.) and *Chlamydomonas* sp. (8 no./lit.).

During the present investigation in 2005-06 in Pindavani pond 22 Chlorophyceae species were recorded among which *Ankistrodesmus* sp. (328 no./lit.) is dominant followed by *Chlorella* sp. (281 no./lit.), *Volvox* sp. (225 no./lit.), *Coelastrum chodati* (46 no./lit.), *Cosmarium granatum* (39 no./lit.) *Microsterias pinnatifida* (33 no./lit.), *Vorticella* sp. (31 no./lit.), *Glaeocystis gigas* (30 no./lit.) the other Chlorophyceae recorded are *Chlorococcum humicola* (15 no./lit.), *Netrium digitus* (15 no./lit.) and *Staurastrum* sp. (15 no./lit.), *Closterium leibleimi* (14 no./lit.), *Trochiscia pachyderma* (13 no./lit.), *Nitella* sp. (12 no./lit.), *Cylindrospermum* sp. (11 no./lit.), *Oedogonium* sp. (10 no./lit.), *Pleurodiscus* sp. (7 no./lit.) and *Spirogyra* sp. (3 no./lit.) and during the 2006-07, 23 Chlorophyceae species were recorded among which *Ankistrodesmus* sp. (293 no./lit.) is dominant followed by *Chlorella* sp. (207 no./lit.), *Volvox* sp. (128 no./lit.), *Vorticella* sp. (39 no./lit.), *Glaeocystis gigas* (35 no./lit.), *Euastropsis richteri* (30 no./lit.), *Coelastrum chodati* (30 no./lit.), *Trochiscia pachyderma* (28 no./lit.), *Micrasterias pinnatifida* (27 no./lit.), *Oedogonium* sp. (27 no./lit.). Other Chlorophyceae recorded are *Nitella* sp. (23 no./lit.), *Goniochloris* sp. (21 no./lit.), *Pediastrum tetras* (18 no./lit.), *Staurastrum* sp. (18 no./lit.), *Pleurodiscus* sp. (18 no./lit.), *Hydrodictyon* sp. (18 no./lit.), *Cosmarium*

granatum (17 no./lit.), *Closterium leibleimi* (13 no./lit.) and *Chlamydomonas* sp. (13 no./lit.).

During the present investigation in 2005-06 in Malhara pond the 24 species of Chlorophyceae were recorded among which *Vorticella* sp. (244 no./lit.) is dominant followed by *Volvox* sp. (193 no./lit.), *Coelastrum chodati* (32 no./lit.), *Netrium digitus* (26 no./lit.), *Euastropsis richteri* (24 no./lit.), *Pediastrum tetras* (21 no./lit.), *Micrasterias pinnatifida* (19 no./lit.), *Closterium leibleimi* (17 no./lit.), *Chlamydomonas* sp. (16 no./lit.), *Goniochloris* sp. (15 no./lit.), *Ankistrodesmus* sp. (15 no./lit.), *Staurastrum* sp. (11 no./lit.) and *Pleurodiscus* sp. (11 no./lit.), *Chara* sp. (9 no./lit.), *Chlorococcum humicola* (8 no./lit.) and *Hydrodictyon* (8 no./lit.), *Cylindrospermum* sp. (7 no./lit.) and *Oedogonium* sp. (7 no./lit.) and *Chlorella* sp. (6 no./lit.) and *Nitella* sp. (6 no./lit.) and during the 2006-07, 19 species were recorded among which *Volvox* sp. (159 no./lit.) is dominant followed by *Ankistrodesmus* sp. (163 no./lit.), *Vorticella* sp. (30 no./lit.), *Cosmarium granatum* (23 no./lit.), *Gloeocystis gigas* (20 no./lit.), *Microsterias pinnatifida* (14 no./lit.), *Staurastrum* sp. (14 no./lit.), *Pleurodiscus* sp. (14 no./lit.), *Netrium digitus* (13 no./lit.), *Spirogyra* sp. (12 no./lit.), *Oedogonium* sp. (11 no./lit.) and *Chara* sp. (11 no./lit.) *Chlorococcum humicola* (10 no./lit.), *Pediastrum tetras* (10 no./lit.), *Chlorella* sp. (10 no./lit.), *Trochiscia pachyderma* (8 no./lit.), *Hydrodictyon* sp. (8 no./lit.), *Chlamydomonas* sp. (7 no./lit.) and *Cylindrospermum* sp. (6 no./lit.).

Chlorophyceae was the most dominant group among all the planktons. The dominance of Chlorophyceae was also recorded by Sakhare and Joshi (2002) in Yeldari reservoir, Nanded district, Maharashtra and Jayabhaye *et al.*, (2007) in Parola dam, Hingoli district, Maharashtra.

In the present investigation also the dominance of Chlorophyceae was recorded in Pindavani ponds and Malhara pond probably be due to high level of dissolved oxygen.

A total of 24 species were recorded in Chlorophyceae from all the sampling sites of the ponds under study. The species diversity shows variation as per sampling sites of the respective ponds. Year wise, In Kanhala pond, Chlorophyceae was represented by 24 species (2005-06) and 20 species (2006-07), in Pindavani pond Chlorophyceae was represented by 22 species (2005-06) and 23 species (2006-07) and in Malhara pond Chlorophyceae was represented by 24 species (2005-06) and 19 species (2006-07).

Somani and Pejawar (2003) reported 14 genera of Chlorophyceae in Masunda, Thane, Maharashtra. Kumawat and Jawale (2003) recorded 14 genera belonging to Chlorophyceae from a freshwater pond at Dharmapuri in Beed district, Maharashtra. Pawar *et al.*, (2006) reported 26 species of Chlorophyceae and observed *Ankistrodesmus falcatus* as a dominant species in Chlorophyceae in Petwadas dam of Kandhar of Nanded district, Maharashtra. Tiwari and Chouhan (2006) reported 34 species of Chlorophyceae in Kitham lake, Agra, Uttar Pradesh. Waghmare and Mali (2007) reported 10 species of Chlorophyceae in a minor irrigation dam of Kalamnuri, District Hingoli, Maharashtra.

Among the different species in Kanhala pond *Chlorella* sp. was dominant followed by *Ankistrodesmus* sp., *Volvox* sp., *Spirogyra* sp., *Microsterias pinnatifida* and *Coelastrum chodati*. In Pindavani pond *Ankistrodesmus* was dominant followed by *Chlorella* sp., *Volvox* sp., *Coelastrum chodati*, *Cosmarium granatum* and *Microsterias pinnatifida*. In Malhara pond *Vorticella* sp. was dominant followed by *Volvox* sp., *Closterium chodati*, *Netrium digitus*, *Euastrphis richteri* and *Pendiatrum tetras*.

The presence of pollution indicator species like *Ankistrodesmus* sp., *Spirogyra* sp. as per Palmar 60 pollution indicator species shows that the Kanhala pond is completely

eutrophic and Pindavani pond is moving towards eutrophication.

In the present investigation, Chlorophyceae was maximum during the summer season and minimum during the monsoon season in all the three ponds. Kumawat and Jawale (2003) observed dominance of Chlorophyceae in the month of April. Khapekar and Deshpande (2007) reported similar observation during the assessment of Naik lake, Nagpur, Maharashtra. Factors such as high temperature, low nitrate and bright sunlight are favorable for the population of green algae (Rao, 1955).

Jayabhaye *et al.*, (2007) reported maximum Chlorophyceae population during the summer and minimum during the rainy season in Parola dam, Hingoli, Maharashtra. Factors such as high temperature, low nitrate and a bright sunlight are favorable conditions for high population of green algae (Rodhe, 1948). In the present investigation, maximum Chlorophyceae during the summer is due to high temperature.

Conclusion

Maximum species of Chlorophyceae were recorded during the summer months probably due to high temperature and longer photoperiod. The dominance of Chlorophyceae in Pindavani pond and Malhara pond is due to high dissolved contaminant as indicated by the physico-chemical analysis of its water.

Table No. 1 : Yearly Statistical analysis data of Chlorophyceae

Sr. No.	Component	Kanhala pond	Pindavani pond	Malhara pond	Kanhala pond	Pindavani pond	Malhara pond
		Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD
1	Chlorophyceae	86.17 + 19.67	101.50 + 23.36	63.58 + 10.62	82.75 + 56.22	92.25 + 21.14	45.25 + 17.34

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