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Research Paper

Diversity of Cholorophyceae in Mohabala Lake of Bhadrawati, District Chandrapur (M.s.), India.

Zoology

KEYWORDS : Mohabala lake, Choloro-phyceae, Diversity.

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ABSTRACT

The Mohabala lake is principal fresh water body located within Bhadrawati tehsil in Chandrapur district of Maharashtra state. Mohabala lake is near about 25 Km North of Chandrapur and 125 Km South East from Nagpur. It is situated at about 211 m above the mean sea level. A study of rotifer was undertaken during 2013 to 2015, two year to assess the types of chlorophyceae present in this water body. This water body is utilized by local residents for cloth washing and open defecation. Siltation is also responsible for pollution of water. The Chlorophyceae are large and important group of freshwater green algae. They include some of the most common species which are important both ecologically and scientifically. During the present study 24 species of Chlorophyceae were found at all sampling sites of lake.

INTRODUCTION

Chlorophyceae (from the Greek word chloros, meaning "green") make up an extremely large and important class of green algae and these are distinguished mainly on the basis of ultra structural morphology. Members may be unicellular, colonial or filamentous. The green algae (Chlorophyceae) compose the largest and most varied phylum of algae and they are the most closely related to the higher plants because of their similar photosynthetic pigments, storage of starch and the fine structural organization of the chloroplast (Happey Wood, 1988). The green algae include a greater diversity of cellular organization and morphological structure than are found in any other algal division. There are approximately 350 genera and 2650 living species of Chlorophyceans. They come in a wide variety of shapes and forms, including free-swimming unicellular species, colonies, non-flagellate unicells, filaments and more.

MATERIAL AND METHODS

The water samples were collected from the three sites of lake such as site A, site B and site C. 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 lime. The collected samples were allowed to settle down by adding Lugol's iodine. 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.

For the quantitative study, the concentrated sample was shaken and one drop of sample was taken on a clear micro slide with the help of a standard dropper, the whole drop was carefully covered with the cover glass and observed. Plankton identification up to genera and whenever possible up to species level was classified according to keys given by Edmonson (1959), Adoni (1985) and APHA (1985) and standard analysis was undertaken as per Zar (2005).

Quantitative study of plankton was done by Sedgwick – Rafter Cell method.

Sedgwick–Rafter Cell method

The Sedgwick Rafter Cell is a special kind of slide similar to the Haemocytometer. The cell has a 50 mm x 20 mm x 10 mm rectangular cavity that holds 1 ml sample. The cell is moved in horizontal directions on the stage of an inverted microscope and planktonic species encountered in the field are enumerated. A number of replicate samples are enumerated to calculate plankton / lit.

Plankton (Units /lit.) = n x c /v

Where,
n = number of plankton in 1 ml.
c = volume of concentrate.
v = volume of sample in lit.

RESULT AND DISCUSSION

During present study Chlorophyceae was found the most dominant group among all the phyplanktons. The abadunce of Chlorophyceae was also reported by Sakhare and Joshi (2002) in Yeldari reservoir of Nanded District, Maharashtra. Pawar and Phulle (2006) recorded Chlorophyceae were found to be dominant throughout the study of Pethwadaj dam in taluka Kandhar of Dist. Nanded, Maharashtra and Jayabhaye, *et.al.,* (2007) in Parola dam of Hingoli District, Maharashtra. R. Prathap Singh and G.S. Regini Balasingh (2012) also recorded that chlorophyta was maximum number of genus in Kodaikanal lake of Dindugal District. D.S. Malik and Umesh Bharti (2012) revealed that Chlorophyceae was dominant in Sahastradhara stream at Uttarakhand. K. Harish Kumar (2015) recorded that Chlorophyceae with 27 species and Bacillariophyceae with 22 species were dominant in Jannapura tank Bhadravati taluka of Karnataka. Patil Alaka A. (2015) recorded the Chlorophyceae found to be dominant over other groups in Bhambarde Reservoir of Sangli, Maharashtra. Sachinkumar R. Patil, *et.al.,* (2015) revealed that Chlorophyceae was dominant at Yarandol Khanapur in major freshwater bodies of Ajara Tahsil of Kolhapur District (M.S.).

In the present investigation the dominance of Chlorophyceae was observed may be due to high level of dissolved oxygen. Dhakar (1979) stated that the green algae prefer water with high concentration of dissolved oxygen.

Total of 24 species of Chlorophyceae were recorded in all the three sites of the lake under study. The species diversity shows little variation in sampling sites of the lake. Year wise, in site A, Chlorophyceae was represented by 24 species in 2013-14 and 24 species in 2014-15, in site B, Chlorophyceae was represented by 20 species in 2013-14 and 16 species in 2014-15 and in site C of lake, Chlorophyceae was represented by 19 species in 2013-14 and 20 species in 2014-15.

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Kumawat and Jawale (2003) observed 14 genera belonging to Chlorophyceae from a freshwater pond at Dharmapuri in Beed District, Maharashtra. Pawar, *et.al.,* (2006) recorded 26 species of Chlorophyceae and observed *Ankistrodesmus falcatus* as a abundance species in Chlorophyceae in Petwadas dam of Kandhar of Nanded District, Maharashtra. Tiwari and Chouhan (2006) collected 34 species of Chlorophyceae in Kitham lake of Agra, Uttar Pradesh. Waghmare and Mali (2007) recorded 10 species of Chlorophyceae in a minor irrigation dam of Kalamnuri of District Hingoli, Maharashtra. Aijaz, *et.al.,* (2009) observed of 43 species Chlorophyceae from Wular lake. R. Prathap Singh and G.S. Regini Balasingh (2012) recorded 43 species belong chlorophyta in Kodaikanal lake of Dindugal Dist. D.S. Malik and Umesh Bharti (2012) recorded 12 species of Chlorophyceae in Sahastradhara stream at Uttarakhand. R. Prathap Singh and M.R. Abdar (2013) reported only one species of Chlorophyceae in Morna lake Shirala (M.S.), Sachinkumar R. Patil, *et.al.,* (2015) recorded 16 species belong to Chlorophyceae in major freshwater bodies of Ajara Tahsil of Kolhapur District (M.S.), Patil Alaka A. (2015) recorded 22 species of Chlorophyceae in Bhambarde reservoir of Sangli, Maharashtra.

In site A, during 2013-2014, 24 species were recorded among which *Cladophra sp.* (413 no./lit) was dominant followed by *Ankistrodesmus sp.* (327 no./lit.), *Chlorella sp.* (316 no./lit.), *Chlamydomonas sp.* (131 no./lit.), *Chara sp.* (110 no./lit.). *Closeridium lunula* (72 no./lit.), *Chlorococcum humicola* (59 no./lit.), *Nitella sp.* (59 no./lit.), *Cylindrospermum sp.* (53 no./lit.), *Euastropsis richteri* (53 no./lit), *Pleurodiscus sp.* (53 no./lit.), *Spirogyra sp.* (53 no./lit.), *Hydrodictyon sp.* (51 no./lit.), *Trochiscia pachyderma* (44 no./lit.), *Staurastrum sp.* (44 no./lit.), *Pediastrum tetras* (43 no./lit.), *Gonichloris sp.* (42 no./lit.), *Micrasterias pinnatifida* (40 no./lit.), *pleurodiscus sp.* (40 no./lit.), *Cosmarium granatum* (39 no./lit.), *Gloeocystis gigas* (37 no./lit.), *Oedogonium sp.* (36 no./lit.), *Volvox sp.* (28 no./lit.), *Cylimdrospermum sp.* (25 no./lit.) and *Closteridium linula* (22 no./lit.).

In site A, during year 2014-15, 24 species were recorded are among which *Ankistrodesmus sp.* (412 no./lit) was dominant followed by *Cladophora sp.* (406 no./lit.), *Chlorella sp.* (330 no./lit.), *Chara sp.* (154 no./lit.), *Cosmarium granatum* (153 no./lit.), *Coelastrum chodati* (143 no./lit.), *Chlamydomonas sp.* (143 no./lit.), *Spirogyra sp.* (104 no./lit.), *Euastropsis richteri* (103 no./lit.), *Hydrodictyon sp.* (94 no./lit.), *Pleurodiscus sp.* (94 no./lit.), *Netrium digitus* (91 no./lit.), *Pediastrum tetras* (85 no./lit.), *Staurastrum sp.* (82 no./lit.), *Nitella* (79 no./lit.), *Trochiscia pachyderma* (76 no./lit.), *Micrasterias pinnatifida* (74 no./lit.), *Closteridium linula* (62 no./lit.), *Goniochloris sp.* (56 no./lit.), *Nitella sp.* (49 no./lit.), *Cylindrospermum sp.* (44 no./lit.), *Gloeocystis gigas* (44 no./lit.), *Spirogyra sp.* (43no./lit.) and *Micrasterias pinnatifida* (41 no./lit.).

In site B, during 2013-14, 20 species were recorded among which *Cladophora sp.* (309 no./lit.) was dominant followed by *Ankistrodesmus sp.* (223 no./lit.), *Chlorella sp.* (183 no./lit.), *Chlamydomonas sp.* (116 no./lit.), *Spirogyra sp.* (84 no./lit.), *Coelasroum chodati* (67 no./lit.), *Chara sp.* (62 no./lit.), *Netrium digitus* (48 no./lit.), *Staurastrum sp.* (47 no./lit.), *Oedogonium sp.* (45 no./lit.), *Euastropsis richtri* (42 no./lit.), *Closteridium linula* (39 no./lit.), *Microsterias pinnatifida* (39 no./lit.), *Cosmarium granatum* (39 no./lit.), *Pediastrum tetras* (33 no./lit.), *Hydrodictyon sp.* (32 no./lit.), *Pleurodiscus sp.* (27 no./lit.), *Volvox sp.* (24 no./lit.), *Cylindrospermum sp.* (23 no./lit) and *Gloeocystis gigas* (20 no./lit.).

In site B, during 2014-15, 16 species were recorded among which *Ankistrodesmus sp.* (254 no./lit.) was dominant followed by *Chlorella sp.* (188 no./lit.), *Cosmarium granatum* (128 no./lit.), *Chara sp.* (96 no./lit.), *Chlamydomonas sp.* (94 no./lit.), *Coelastrum chodati* (20 no./lit.), *Netrium digitus* (82 no./lit.), *Euastropsis richteri* (78 no./lit.), *Pleurodiscus sp.* (65 no./lit.), *Pediastrum tetras* (62 no./lit.), *Nitella sp.* (60 no./lit.), *Goniochloris sp.* (41 no./lit.), *Goniochloris sp.* (38 no./lit.), *Micrasterias pinnatifida* (37 no./lit.), *Glaeocystic gigas* (29 no./lit.) and *Closteridium linula* (20 no./lit.).

In site C, during 2013-14, 19 species were recorded among which *Ankistrodesmus sp.* (233 no./lit.) was dominant followed by *Chlorella sp.* (186no./lit.), *Chlamydomonas sp.* (153 no./lit.), *Pediastrum tetras* (64 no./lit.), *Chara sp.* (59 no./lit.), *Micrasterias pinnatifida* (57 no./lit.), *Netrium digitus* (57 no./lit.), *Hydrodictyon* (55 no./lit.), *Coelastrum chodati* (51 no./lit.), *Euastropsis richteri* (46 no./lit.), *Cosmarium granatum* (42 no./lit.), *Chlorococcum humicola* (39 no./lit.), *Spirogyra sp.* (38 no./lit.), *Pleurodiscus sp.* (36 no./lit.), *Oedogonium sp.* (36 no./lit.), *Gloeocystis gigas* (21 no./lit), *Closteridium linula* (16 no./lit.), *Cylindrospermum sp.* (15 no./lit.) and *Trochiscia pachyderma* (14 no./lit.).

In site C, during 2014-15, 20 species were recorded among which *Cladophora* (276 no./lit.) was dominant followed by *Ankistrodesmus sp.* (262 no./lit.), *Chorella sp.* (206 no./lit.), *Coelastrum chodati* (119 no./lit.), *Chlamydomonas sp.* (100 no./lit.), *Closteridium linula* (95 no./lit.), *Chlorococcum humicola* (94 no./lit.), *Chara sp.* (91 no./lit), *Spirogyra sp.* (82 no./lit.), *Nitella sp.* (78 no./lit.), *Troschiscia pachyderma* (69 no./lit.), *Pleurodiscus sp.* (62 no./lit.), *Hydrodictyon sp.* (60 no./lit.), *Pediastrum tetras* (56 no./lit.), *Goniochloris sp.* (36 no./lit.), *Gloeocystis gigas* (33 no./lit.), *Cylindrospermum sp.* (30 no./lit.), *Staurastrum sp.* (30 no./lit.), *Oedogonium sp.* (27 no./lit.) and *Microsterias pinnatifida* (21 no./lit.).

Among the different species in site A, *Cladophora sp.* was dominant followed by *Ankistrodesmus sp., Chlorella sp., Chara sp., Cosmarium granatum and Chlamydomas sp.* In site B, *Cladophora sp.* was dominant followed by *Ankistrodesmus sp., Chlorella sp., Cosmarium granatum, Chlamydomas sp. and Chara sp.* In site C, *Cladophora sp.* was dominant followed by *Ankistrodesmus sp., Chlorella sp., Chlamydomas sp., Closteridium linula, Chlorococcum humicola, Chara sp., Spirogyra sp and Nitella sp.*

The presence of pollution indicator species like *Ankistrodesmus sp., Spirogyra sp.* as pollution indicator species shows that the site A is eutrophic and site B is moving towards eutrophication. A.B. Sarwade and N.A. Kamble (2013) observed major species as *Chlorella sp., Ankistrodesmus,sp., Spirogyra sp.,* in Bharatnagar lake of Miraj Tahsil of District Sangli Maharashtra. M.R. Abdar (2013) reported presence of organic pollution indicator algal species like *Ankistrodesmus falcatus, Chlorella vulgaris* in Morna lake Shirala (M.S.).

In the present investigation, Chlorophyceae was found maximum during the winter season at site A and minimum during the monsoon season at site C. Jayabhaye, *et.al.,* (2007) observed maximum Chlorophyceae population during the summer and minimum during the rainy season in Parola dam of Hingoli, Maharashtra. D.S. Malik and Umesh Bharti (2012) revealed that Chlorophyceae was maximum during the winter season and minimum during the monsoon season in Sahastradhara stream at Uttarakhand.

In the present investigation, Chlorophyceae was found maximum during the winter season may be due to high amount of dissolved oxygen and minimum during the monsoon season may be due to low temperature and dilution due to rain water. Dissolved oxygen shows positive correlation with Chlorophyceae species.

Table No. 1 : Seasonal variation of Chlorophyceae in Mohabala lake at site-A during year 2013-14

S.N.	Parameters	Summer			Monsoon			Winter			Total		
1	Chlorophyceae	161.25	±	44.16	152.25	±	21.66	217.00	±	16.48	176.83	±	12.02

Table No. 2 : Seasonal variation of Chlorophyceae in Mohabala lake at site-A during year 2014-15

S.N.	Parameters	Summer			Monsoon			Winter			Total		
1	Chlorophyceae	150.00	±	12.37	344.75	±	26.33	245.75	±	57.38	246.83	±	18.81

Table No. 3 : Seasonal variation of Chlorophyceae in Mohabala lake at site-B during year 2013-14

S.N.	Parameters	Summer			Monsoon			Winter			Total		
1	Chlorophyceae	72.00	±	26.47	175.75	±	36.52	127.75	±	36.50	125.17	±	4.73

Table No. 4 : Seasonal variation of Chlorophyceae in Mohabala lake at site-B during year 2014-15

S.N.	Parameters	Summer			Monsoon			Winter			Total		
1	Chlorophyceae	36.25	±	18.16	192.50	±	31.09	110.75	±	39.64	113.17	±	8.83

Table No. 5 : Seasonal variation of Chlorophyceae in Mohabala lake at site-C during year 2013-14

S.N.	Parameters	Summer			Monsoon			Winter			Total		
1	Chlorophyceae	65.75	±	22.57	153.50	±	20.95	85.25	±	24.43	101.50	±	1.42

Table No. 6 : Seasonal variation of Chlorophyceae in Mohabala lake at site-C during year 2014-15

S.N.	Parameters	Summer			Monsoon			Winter			Total		
1	Chlorophyceae	58.75	±	37.57	255.25	±	47.60	142.75	±	65.96	152.25	±	11.75

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