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Study of Phytoplanktons Under Changing Environment of Lower Manair Dam and Manakondur Tank, Karimnagar, Telangana State, India

N. Ellaswamy, D. Snehalatha, T. Aseervadham and B. Digamber Rao
Department of Botany, Kakatiya University, Warangal-506 009, Telangana, India

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ABSTRACT

The Lower Manair Dam (LMD) gets water from Kakatiya canal which connects the Manair Dam and put to use for drinking purpose and irrigation purpose since from 1995. The Manakondur Tank (MT), which is located near the Karimnager city, provides water for irrigation, drinking and also used for recreational activities. Both the water bodies under study are also tourist places and covered with agriculture lands and rocky hills. There are many aquatic ecosystems which remain unexplored, in which LMD and MT were also not received attention. Hence, the present study was undertaken to elucidate certain aspects of ecology of phytoplanktons of the selected water bodies in Karimnager, Telangana State, India, with reference to their seasonal abundance and population dynamics under changing environment, during the period of September 2012 to August 2014. A total of 182 forms of euplanktonic and tycoplanktonic algae belonging to 94 genera were recorded from the sampling water bodies during the period of study. In the present investigation, four groups of algae were studied in which Bacillariophyceae, Chlorophyceae, Cyanophyceae and Euglenophyceae were identified. Community of phytoplankton was constituted by the members of 4 classes, of which 41 belonged to Bacillariophyceae, 65 to Chlorophyceae, 57 to Cyanophyceae and 19 to Euglenophyceae. The Chlorophyceae members were predominant over others in LMD, and Cyanophyceae over others in MT water body.

INTRODUCTION

Phytoplankton forms the vital source of energy as primary producers and serves as a direct source of food to the other aquatic plants and animals. It accounts substantially for the organic production of waterways. They provide information on the productivity of the environment. In India, some lakes and reservoirs have been studied for the water quality and fisheries (Shivakumar & Senthi Kumar 2008). Recently, Mahajan (2005), Jayakumar & Karpaganu (2005), Sanap et al. (2006), Shoba et al. (2006), Harsha Sadanand et al. (2006) Mruthunjaya & Rajendra Prasad (2006), Mallishwar et al. (2007), Gupta & Anuj Bhadauriya (2007), Roy Zacharias & Joy (2007), Maya Subramoni (2007), Kavitha & Rajini Balasingh (2007), Mruthyunjaya et al. (2007). Reshma & Prakasam (2007), Girijakumari & Abraham (2007), Sanap et al. (2008), Mista et al.(2008). Murugesan & Shivasubramanian (2008), Aarti Narsimhan et al.(2008), Latha & Ramachandra Mohan (2010), Leela et al. (2010), Ramadosu & Sivakumar (2010), Jindal et al. (2014), Mohammad & Krishna (2014), Patil et al. (2015), Deshmukh & Tarar (2015), Sankaran & Thiruneelagadan (2015) and Onkar Singh & Sunil Kumar (2015) have studied various freshwater bodies and described physico-chemical characteristics including algal populations. The present water bodies under study are also tourist places and covered with agriculture lands and rocky hills. There are many aquatic ecosystems that remain unexplored, in which LMD and MT were also not received attention. Hence, the present study was undertaken to elucidate certain aspects of the ecology of phytoplanktons of selected water bodies in Karimnager, Telangana State, India, with reference to their distribution and periodicity during the period of September 2012 to August 2014.

MATERIALS AND METHODS

The phytoplanktonic forms were collected by plankton net No. 20 silk bolting cloth. Sometimes samples for quantitative and qualitative analysis of phytoplankton were collected in 1-litre capacity Pyrex glass bottles, where 1 mL of Lugol's solution was kept, prior to the filling of the bottle by lake water from below the surface. For sedimentation of plankton material the bottle was kept undisturbed in the dark for 48 hrs at room temperature. After that the overlying water from the bottle was decanted and the final volume was adjusted between 10 and 15 mL. After collection the phytoplankton material was preserved permanently in Transeau's solution. The composition of the preservatives is: distilled water 60 mL or 6 parts, absolute alcohol 30 mL or 3 parts, formaldehyde 10 mL or 1 part. To each l00 mL of the above solution 5 mL of glycerine was added to prevent the materials from becoming brittle (Transeau 1951). Ten

percent glycerine solution in distilled water was used as mounting fluid for the preparation of temporary and semi permanent slides for microscopic study. Cotton blue and lactophenol were used as mounting fluid and as stain, which facilitated a clean view of the materials under the microscope. The qualitative enumeration of the phytoplankton was carried out with the help of a Sedgwick Rafter counting cell and by drop method. The counting cell was filled with water to test for any leakage and it was emptied and dried properly. The vials containing the concentrate were shaken properly and 1 mL of concentrated sample taken into the Sedgwick Rafter counting cell. Numerical counts of all members of phytoplanktons were made using the Whipple micrometer. The organisms thus counted, were expressed as units/litre (units/L) of the sample. The seasonal variation and abundance of the dominant algal genera and the groups of phytoplankton were observed. The abundance of phytoplankton groups was calculated according to the following formula (Welch 1948).

$$N = \frac{(a \times l00)C}{L}$$

Where,

N = Number of phytoplanktons per litre of original water.

a = Average number of phytoplankton in all counts in the counting cells.

C = Volume of original concentrate in mL.

L = Volume of water passed through the net.

The result was expressed as units/litre.

Four sampling sites were identified almost equidistant on the shore of the water bodies to its north, east, west and south. Phytoplanktons were identified by using standard key books and pertinent literature (Patrick & Reimer 1966, Suxena & Venkateshwarlu 1968, Philipose 1967, Desikachary 1959, Prescott 1951, Smith 1933).

RESULTS AND DISCUSSION

In the present water bodies, four groups of algae Bacillariophyceae, Chlorophyceae, Cyanophyceae and Euglenophyceae were recorded. The Chlorophyceae members were predominant over others in the Lower Manair Dam (LMD) and Cyanophyceae were predominant over others in Manakondur Tank (MT). A total of 182 forms of euplanktonic and tycoplanktonic algae belonging to 94 genera were recorded from the sampling lakes during the period of study. Community of phytoplankton was constituted by the members of 4 classes, of which 41 belonged to Bacillariophyceae, 65 to Chlorophyceae, 57 to Cyanophyceae and 19 to Euglenophyceae (Table 1).

The phytoplankton community of the Lower Manair Dam was constituted of 4 classes of algae in which 22 belonged to Bacillariophyceae, 42 to Chlorophyceae, 26 to Cyanophyceae and 10 to Euglenophyceae. Highest number of individuals were represented by Bacillariophyceae (711905), followed by Chlorophyceae (324390), Cyanophyceae (314355) and Euglenophyceae (17623). A total of 100 forms of phytoplanktons was identified from the Lower Manair Dam during the study period, whereas, the phytoplankton community in Manakondur Tank was with 4 classes in which 30 belonged to Bacillariophyceae, 41 to Chlorophyceae, 48 to Cyanophyceae and 14 to Euglenophyceae. Highest number of individuals were represented by Cyanophyceae (501116), followed by Bacillariophyceae (487288), Chlorophyceae (291306) and Euglenophyceae (59174). A total of 133 forms of phytoplanktons was recorded from this tank.

The monthly variations of phytoplankton abundance were studied and recorded in Figs. 1, 2, 3 and 4. Interestingly, algal species do not find any predictable step for their variations in the two water bodies. Fig. 1 exhibited the seasonal abundance of various algal populations during the period of 2012-2013 of LMD reservoir. The Bacillariophyceae population ranged from 60-125 $\times 10^3$ cells/L. They were maximum in April (125×10^3) and minimum in October (60×10^3). The Chlorophyceae population ranged from 50-210 $\times 10^3$ cells/L. It was maximum in September (210×10^3) and minimum in April (50×10^3). The Cyanophyceae members ranged from 46-150 $\times 10^3$ cells/L. They were maximum in (monsoon) September (150×10^3) and minimum in March, (46×10^3). The Euglenophyceae population ranged from 12- 60 $\times 10^3$ cells/L. They were found to be maximum in November 60×10^3 and minimum in the month of March, 12×10^3. Fig. 2 indicates the seasonal abundance of various algal populations during the period of 2013-2014 of LMD. The Bacillariophyceae populations were ranged from 45-110 $\times 10^3$ cells/L. The minimum population was found in July 45×10^3 and maximum in April 110×10^3. The Chlorophyceae members ranged from 53-215 $\times 10^3$ cells/L. The maximum population was observed in November 215×10^3 and the minimum in the month of May 53×10^3. The Cyanophyceae population ranged from 40-190 $\times 10^3$ cells/L. The maximum members were found in the month of December 190×10^3 and the minimum in the month of May 40×10^3. The Euglenophyceae populations were varied from 10-55$\times 10^3$ cells/L. The maximum population was recorded in the month of November 55×10^3 and least in the month of March 10×10^3. Fig. 3 expresses the seasonal abundance of various algal groups during the year 2012-2013 from MT. The Bacillariophyceae members ranged from 55-170 $\times 10^3$ cells/L. The minimum population was found in October (55×10^3), and maximum in April (170×10^3). The Chlorophyceae population ranged

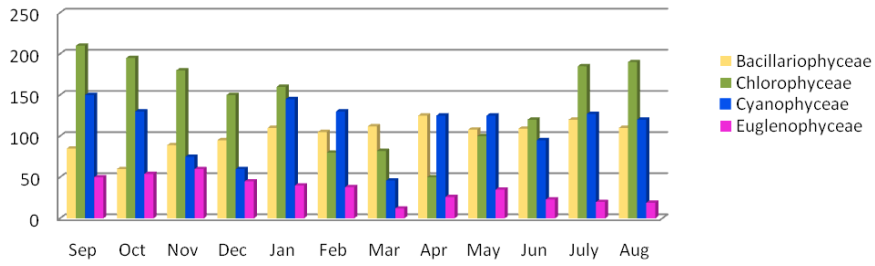

Fig. 1: Monthly variation of phytoplankton of LMD (2012-2013).

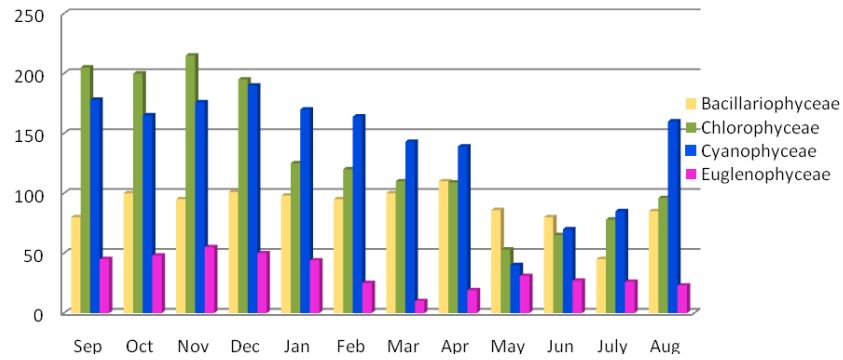

Fig. 2: Monthly variation of phytoplankton of LMD (2013-2014).

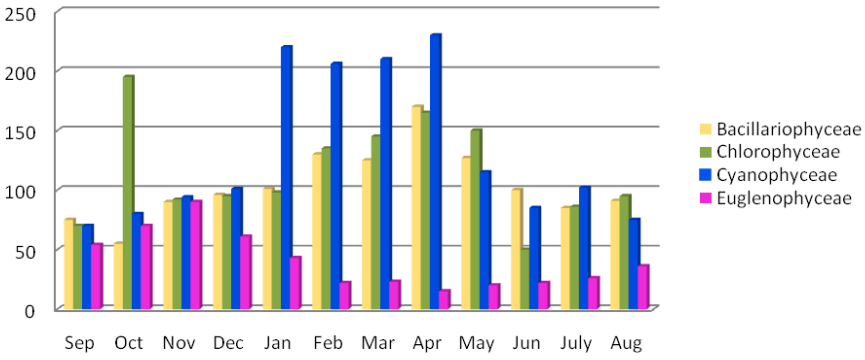

Fig. 3: Monthly variation of phytoplankton of Manakondur tank (2012-2013).

from 50-195 × 10^3 cells/L. The maximum population was observed in October (195 × 10^3) and least in June (50 × 10^3). The Cyanophyceae members ranged from 70-230 × 10^3 cells/L, with maximum in April (230 × 10^3), and the minimum in September (70 × 10^3). The Euglenophyceae members ranged from 15-90 × 10^3 cells/L. It was maximum in November (90 × 10^3), and minimum in April (15 × 10^3). However, the Euglenophyceae members were not observed in the months of May and June. Fig. 4 shows the seasonal variation of the phytoplanktons during the period of 2013-2014 of MT. In which the Bacillariophyceae members ranged from 65-170 × 10^3 cells/L. The minimum number of diatoms was found in the month of September (65 × 10^3) and maximum in May (170 × 10^3). The Chlorophyceae population ranged from 55-200 × 10^3 cells/L. It was found maximum in August (200 × 10^3), and minimum in the month of May (55 × 10^3). The Cyanophyceae population ranged from 80-255 × 10^3 cells/L under the investigation. The largest count of cells was found in the month of March (255 × 10^3), and least in July (80 × 10^3). The members of Euglenophyceae ranged from 15-60 × 10^3 cells/L. The minimum count of cells was observed in May (15 × 10^3), and maximum in January (60 × 10^3). However, in the month of June the Euglenophyceae members were not found. The total per-

Table 1: List of phytoplanktonic genera found in the water bodies.

Sl. No.	Algal forms	LMD	MT
	Bacillariophyceae (41 forms) 22 genera		
1.	*Achnanthes exigua*	_	+
2.	*Achnanthes subsessilis*	+	_
3.	*Actinastrum* sp.	+	+
4.	*Amphipleura pellucida*	_	+
5.	*Amphora* sp.	+	+
6.	*Bacillaria paradosa*	+	_
7.	*Cocconeis euglypta*	_	+
8.	*C.pediculus*	+	_
9.	*Cymbella sturbergii*	_	+
10.	*C. hustedii*	_	+
11.	*Diadesmis confervacea*	+	_
12.	*Diatoma elongatum*	+	+
13.	*Dioploneis* sp.	_	+
14.	*Fragilaria biceps*	_	+
15.	*F. crotononensis*	_	+
16.	*Frustulia* sp.	_	+
17.	*Gomphonema acuminatum*	+	+
18.	*G.dichotomum*	+	_
19.	*G. gracile*	+	+
20.	*G. micropus*	_	+
21.	*Gyrosigma accuminatum*	+	_
22.	*G. exima*	+	_
23.	*G. scalproides*	+	_
24.	*Mastoglosia* sp.	_	+
25.	*Navicula borealis*	+	+
26.	*N. cryptocephala*	_	+
27.	*N. exigna*	+	+
28.	*N. major*	+	_
29.	*N. pupula*	_	+
30.	*Neidium gracile*	_	+
31.	*Nitzchia* sp.	+	+
32.	*Pinnularia biceps*	_	+
33.	*P. gibba*	+	+
34.	*P. nodosa*	+	_
35.	*P. viridis*	+	+
36.	*Synedra acuta*	_	+
37.	*S. gracilis*	_	+
38.	*S. tabulata*	+	_
39.	*S. ulna*	_	+
40.	*Tabellaria fenestrata*	+	+
41.	*Surirella nervosa*	_	+
Sl. No.	**Euglenophyceae (19 forms) 5 genera**		
1)	*Euglena acus*	_	+
2)	*E.agilis*	_	+
3)	*E.geniculata*	+	+
4)	*E. oblonga*	+	_
5)	*E. stellata*	_	+
6)	*E. viridis*	+	+
7)	*E. caudata*	+	_
8)	*Phacus acuminatus*	+	+
9)	*P. longicauda*	_	+
10)	*P. communis*	_	+
11)	*P. elegans*	+	_
12)	*P. ranula*	_	+
13)	*Trachelomonus s*p.	+	+
14)	*T. dubia*	-	+
15)	*T. curta*	+	_
16)	*T. minor*	_	+
17)	*Menoidium pellucidum*	+	_
18)	*Lepocinalis acuta*	+	+
19)	*L. fusiformis*	_	+
Sl. No.	**Cyanophyceae (57 forms) 31 genera**		
1)	*Anabaena iyengarii*	+	+
2)	*A. torulosa*	_	+
3)	*A. fertilissima*	_	+
4)	*A. constricta*	+	+
5)	*A. variabilis*	+	_
6)	*A. vagincola*	_	+
7)	*Anabaenopsis javanica*	+	+
8)	*Aphanocapsa montana*	_	+
9)	*A. littorales*	+	+
10)	*A. muscicola*	+	+
11)	*Aphanothece pallida*	_	+
12)	*A. stagnina*	_	+
13)	*Aphanozomenon* sp.	_	+
14)	*Arthrospira* sp.	+	+
15)	*Calothrix parietina*	_	+
16)	*Chroococcus minutus*	+	+
17)	*C. dispersus*	_	+
18)	*C. minor*	_	+
19)	*C. turgidus*	+	_
20)	*Calothrix membranacea*	+	+
21)	*Gloeocapsa atrata*	+	_
22)	*G. granosa*	_	+
23)	*G. rupestris*	_	+
24)	*Gloeotrichia natans*	+	_
25)	*G. pisam*	_	+
26)	*Hydrococcus* sp.	+	+
27)	*Merismopedia glauca*	_	+
28)	*M. convoluta*	_	+
29)	*Microcystis aeruginosa*	+	+
30)	*M.lamelliformis*	_	+
31)	*M. flos aquae*	_	+
32)	*Nostoc linchia*	_	+
33)	*N. sphaerium*	+	_
34)	*Oscillatoria anguina*	_	+
35)	*O. formosa*	+	_
36)	*O. tenuis*	+	+
37)	*O. ornata*	_	+
38)	*O. limosa*	_	+
39)	*O. princeps*	_	+
40)	*O. rubescens*	+	+
41)	*Phormidium molle*	+	+
42)	*Pleurocasa minor*	_	+
43)	*Rivularia* sp.	_	+
44)	*Scytonema* sp.	+	+
45)	*Spirulina laxissima*	_	+
46)	*Synechococcus* sp.	+	+
47)	*Tolypothrix tenuis*	_	+
48)	*Trichodesmium* sp.	+	+
49)	*Lyngbya ceylanica*	+	_
50)	*L. latissima*	_	+
51)	*L. majuscule*	_	+
52)	*Cyanonephron styloides*	_	+
53	*Cylindrospermopsis raciborskii*	+	+
54)	*Chamaecalyx swirenkoi*	_	+

Table cont....

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55) *Trichonema tenue*	_	+
56) *Planktothrix compressa*	+	_
57) *Homoeothrix janthiana*	+	_
Sl. No. Chlorophyceae (65 forms) 36 genera		
1) *Ankistrodesmus gracile*	_	+
2) *A. falcatus*	+	_
3) *Arthodesmus subulatus*	+	+
4) *A.curvatus*	_	+
5) *Bulbochaete longa*	+	+
6) *Chara vulgaris*	_	+
7) *Characium ambiguum*	_	+
8) *Chlorella vulgaris*	+	+
9) *Closterium ehrenbergii*	_	+
10) *Cl. tumidum*	+	+
11) *Cl. porrectum*	+	_
12) *Cladophora glomarata*	+	_
13) *Cl. crispata*	+	+
14) *Cosmarium botrytis*	+	+
15) *C. auriculatum*	+	_
16) *C. granatum*	+	_
17) *C. forceps*	+	_
18) *C. laeve*	_	+
19) *C. moniliforme*	+	_
20) *C. phaseolus*	_	+
21) *C. javanicum*	+	_
22) *Coelastrum reticulatum*	+	+
23) *Desmidium bengalicum*	+	_
24) *Euastrum verrucosum*	+	_
25) *Hyalotheca dissiliens*	_	+
26) *H. neglecta*	_	+
27) *Hydrodictyon reticulatum*	_	+
28) *Keratococcus suecicus*	+	_
29) *Microspora* sp.	+	_
30) *Mougeotia* sp.	+	+
31) *Monoraphidium indicum*	_	_
32) *Nitella* sp.	_	+
33) *Oedogonium borisianum*	+	+
34) *O. crispum*	_	+
35) *O. grande*	+	_
36) *Oocystis gigas*	+	+
37) *O. borgei*	_	+
38) *Pandorina morum*	-	+
39) *Pediastrum duplex*	+	+
40) *P. ovatum*	_	+
41) *P. simplex*	+	_
42) *Pithophora varia*	+	_
43) *Protococcus* sp.	+	+
44) *Radiococcus nimbatus*	_	+
45) *Rhizoclonium hieroglyphicum*	+	+
46) *Scenedesmus denticulatus*	+	+
47) *S. quadricauda*	+	_
48) *S. dimorphus*	+	_
49) *S. obliquus*	+	+
50) *Sirogonium phacosporum*	_	+
51) *Spirogyra acanthospora*	+	+
52) *S. discoidea*	+	_
53) *S. formosa*	+	_
54) *S. hyalina*	_	+
55) *Stigeoclonium tenue*	+	+
56) *Staurastrum gracile*	+	+

Table cont....

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57) *S. conatus*	_	+
58) *S. pinnatum*	+	_
59) *Tetraedron gracile*	-	+
60) *T. quadratum*	+	_
61) *Triploceros gracile*	_	+
62) *Ulothrix* sp.	+	_
63) *Zygnema czurde*	+	_
64) *Z. areolatum*	+	+
65) *Zygnemopsis indica*	_	+

centage of phytoplankton (PP) community of the water bodies was also studied and it has been shown in pie diagrams (Figs. 5 & 6), in which the total percentage of phytoplanktons was found to be as 85.65% and others as 14.35% in Lower Manair Dam, whereas, in Manakondur tank the total phytoplanktons were noted as 78.15% and others as 21.85%.

Bacillariophyceae: Among the recorded 22 genera with 41 forms of diatoms only a few (*Actinastrum* sp., *Amphora* sp., *Diatoma elongatum., Gomphonema acuminatum, G.gracile, Navicula borealis, N. exigna, Neidium gracile, Nitzchia* sp., *Pinnularia gibba, P. viridis* and *Tabellaria fenestrata*) were found to be well adapted to the concerned habitats, others showed irregular appearance. Throughout the period of study, LMD showed the highest abundance of diatom (711905 cells/L) followed by MT (487288 cells/L). The members such as *Achnanthes exigua*, *Actinastrum* sp., *Amphora* sp., *Amphipleura pellucida,Cocconeis euglypta, Cymbella sturbergii, C. hustedii, Diatoma elongatum, Diopleneis* sp., *Fragilaria* sp., *Fragilaria crotononensis, Frustulia* sp., Gomphonema *acuminatum, G.gracile, G. micropus, Mastoglosia* sp., *Navicula cryptocephala, N. borealis, N. exigna, N. pupula, Neidium gracile, Nitzchia* sp., *Pinnularia biceps, P. gibba, P. viridis, Synedra acuta, S. gracile, S. ulna, Tabellaria fenestrate* and *Surirella nervosa* were reported from Manakondur tank, while *Achnanthes subsessilis*, *Actinastrum* sp., *Amphora* sp., *Bacillaria paradoxa, Cocconeis pediculus, Diadesmis confervacea, Diatoma elongatum, Gomphonema acuminatum, G. dichotomum, G. gracile, Gyrosigma accuminatum, G. exima, G. scalproides, Navicula borealis, N. exigna, N. major, Nitzchia* sp., *Pinnularia gibba, P. nodosa, P. viridis, Synedra tabulate* and *Tabellaria fenestrate* were found only in LMD reservoir. Large peaks of the diatom population were usually reported in summer months (Figs. 1 & 2) but smaller peaks were also observed in monsoon and winter months. Among the recorded genera of diatom species diversity was exhibited by the genus *Achnanthes ,Cocconeis, Cymbella* and *Fragilaria,* with 2 sp., *Gyrosigma* with 3 sp., *Gomphonema, Pinnularia* and *Synedra* with 4 sp., and *Navicula* with 5 sp., respectively.

Chlorophyceae: The generic diversity of Chlorophycean

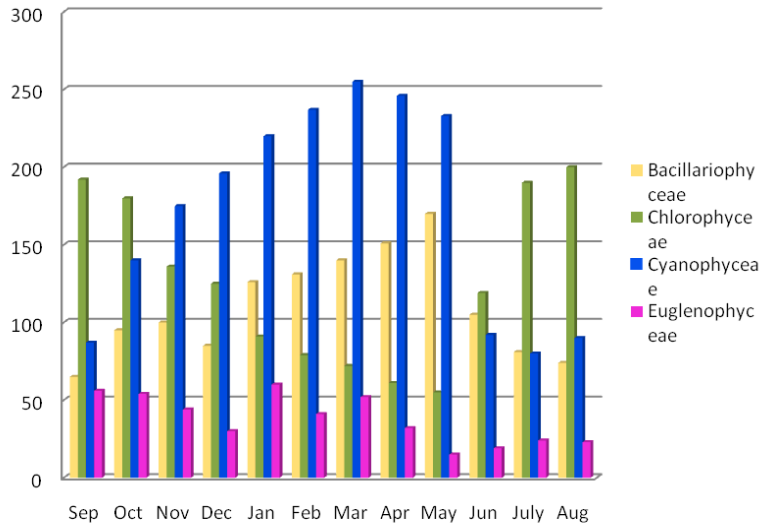

Fig. 4: Monthly variation of phytoplankton of Manakondur tank (2013-2014).

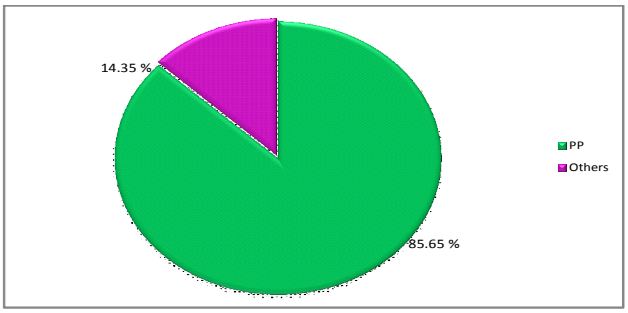

Fig. 5: Percentage of phytoplanktons and others in Lower Manair Dam.

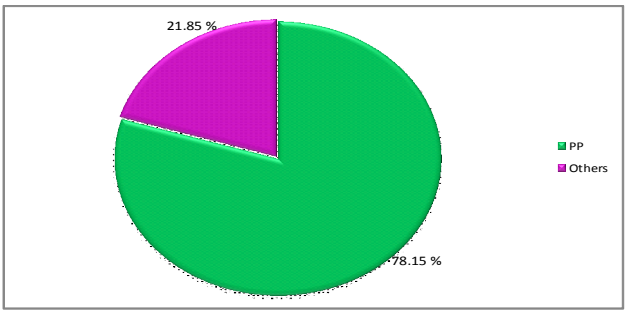

Fig. 6: Percentage of phytoplanktons and others in Manakondur Tank.

members were maximum with 36 genera with 65 forms during the period of study in both the water bodies. The members, such as *Arthodesmus subulatus, Bulbochaete longa, Chara vulgaris, Chlorella vulgaris, Closterium ehrenbergii, Cladophora crispata, Cosmarium botrytis, Coelastrum reticulatum, Mougeotia* sp., *Oedogonium borisianum, Oocystis gigas, Pediastrum duplex, Protococcus* sp., *Rhizoclonium hieroglyphicum, Scenedesmus denticulatus, S. obliquus, Spirogyra acanthospora, Stigeoclonium tenue, Staurastrum gracile* and *Zygnema areolatum* were recorded as the major dominant genera in the waters. Among them *Ankistrodesmus gracile*, *Arthodesmus subulatus*, *A. curvatus*, *Bulbochaete longa*, *Chara vulgaris, Characium ambiguum, Chlorella vulgaris, Closterium ehrenbergii, Cl. tumidum, Cladophora crispate, Cosmarium botrytis, Cosmarium laeve, C. phaseolus, Coelastrum reticulatum, Hydrodictyon reticulatum, Hyalotheca dissiliens, H. neglecta, Mougeotia* sp., *Nitella* sp., *Oedogonium borisianum, O. crispum, Oocystis gigas, O. borgei, Pandorina morum, Pediastrum duplx, P. ovatum, Protococcus* sp., *Radiococcus nimbatus, Rhizoclonium heiroglyphicm, Scenedesmus denticulatus, S. obliquus, Sirogonium phacosporum, Spirogyra acanthospora, S. hyalina, Stigeoclonium tenue, Tetraedron gracile, Staurodesmus conatus*, *Staurastrum gracile*, *Triploceros gracile, Zygnema areolatum* and *Zygnemopsis indica* were the important dominant genera of Manakondur tank, while the members like *Ankistrodesmus falcatus*, *Arthodesmus subulatus*, *Bulbochaete longa, Chlorella vulgaris, Closterium tumidum, Cl. porrectum, Cladophora glomarata, Cl. crispata, Cosmarium botrytis, C. auriculatum, C. granatum, C. forceps, C. moniliforme, C. javanicum, Coelastrum reticulatum, Desmidium bengalicum, Euastrum verrucosum, Keratococcus suecicus*, *Microspora* sp., *Mougeotia* sp. *Oedogonium borisianum, O. grande, Oocystis gigas, Pediastrum duplex, P. simplex, Pithophora varia,*

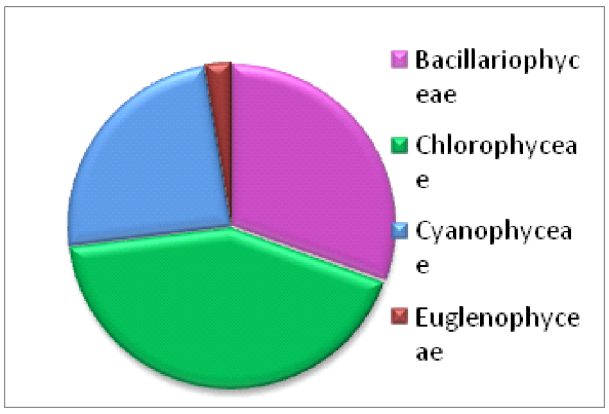

Fig. 7: Proportion of various groups ofalgae in Lower Manair Dam.

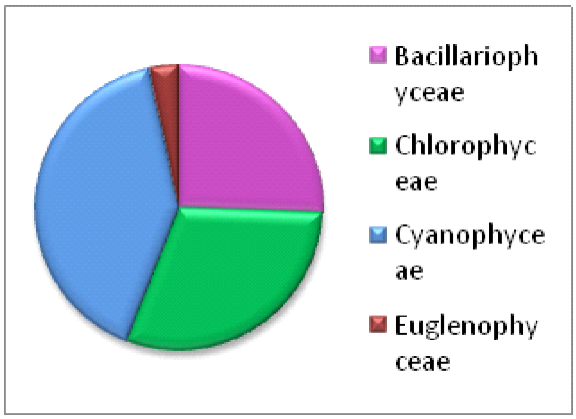

Fig. 8: Proportion of various groups ofalgae in Manakondur Tank.

Protococcus sp., *Rhizoclonium hieroglyphicum, Scenedesmus denticulatus, S. quadricauda, S. dimorphus, S. obliquus*, *Spirogyra acanthospora*, *S. discoidea*, *S. formosa*, *Stigeoclonium tenue*, *Staurastrum gracile*, *S. pinnatum*, *Tetradon quadratum*, *Ulothrix* sp., *Zygnema czurde* and *Z. areolatum* were found in LMD reservoir, respectively. Throughout the period of study LMD showed the highest recorded abundance (324390 cells/L) of green algae, and in Manakondur tank they were found to be less (291306 cells/L). The *Cosmarium* was the genus which exhibited the maximum (8 species) diversity followed by *Oedogonium* with 5 species, *Scenedesmus* and *Spirogyra* with 4 species, *Closterium, Pediastrum* and *Staurastrum* with 3 species and *Ankistrodesmus*, *Arthodesmus*, *Cladophora*, *Hyalotheca, Tetraedron* and *Zygnema* with 2 species each. Throughout the sampling period the peaks of green-algae were recorded in the monsoon months and lower abundance in summer months (Figs. 1, 2, 3 & 4).

Cyanophyceae: Throughout the period of study, sharp peaks of Cyanophycean members were exhibited in summer months (Figs. 3 & 4). Out of 31 genera with 57 forms only a few of them were found to be the dominant in both the waters, these are *Anabaena iyengarii, A. constricta, Anabaenopsis javanica, Aphanocapsa littorales, A. muscicola, Arthrospira* sp., *Chroococcus minutes, Calothrix membranaceae, Hydrococcus* sp., *Microcystis aeruginosa*, *Oscillatoria tenuis*, *O. rubescens*, *Phormidium molle*, *Scytonema* sp., *Synechococcus* sp., *Trichodesmium* sp. and *Cylindrospermopsis raciborskii.* Blooms of cyanophycean algae were recorded during the period of summer. The blooms of *Microcystis aeruginosa* and *Merismopedia glauca* were found in the Manakondur tank, while the blooms of *Anabaena variabilis* were reported in Lower Manair Dam reservoir. During the period of study, Manakondur tank showed highest abundance (501116 cells/L) of blue-greens followed by Lower Manair Dam (314355 cells/L). The members of Cyanophyceae, *Anabaena iyergarii, A. torulosa, A. fertilissima, A. constricta, A. vagincola, Anabaenopsis javanica, Aphanocapsa montana, A. littorales, Aphanothece pallid, A. stagnina, Aphanozomenon* sp., *Arthrospora* sp., *Calothrix parietina, C. membranacea, Chroococcus minutes, C. dispursus, C. minor, Gloeocapsa granosa, G. rupestris, Gloeotrichia pisum, Hydrococcus* sp., *Merismopedia glauca, M. convoluta, Microcystis aeriginosa, M. lamelliformis, M. flosaquae, Nostoc linchia, Oscillatoria anguina, O. tenuis, O. ornata, O. limosa, O. princeps, O. rubescens, Phormidium molle, Pleurocapsa minor, Rivularia* sp., *Spirulina* sp., *S. laxissima, Synechococcus* sp., *Tolypothrix tenuis, Trichodesmium* sp., *Lyngbya latissima, L. majuscule, Cyanonephron styloides, Cylindrospermopsis raciborskii, Chamaecalyx swirenkoi* and *Trichonema tenue* were reported from the Manakondur tank. While in Lower Manair Dam reservoir, the members such as *Anabaena iyengarii, A. constricta, A. variabilis, Anabaenopsis javanica, Aphanocapsa littorals, A.muscicola, Arthrospira* sp., *Chroococcus minutes, C. turgidus, Calothrix membranacea, Gloeocapsa atrata, Gloeotrichia natans, Hydrococcus* sp., *Microcystis aeruginosa, Nostoc sphaerium, Oscillatoria formosa, O. tenuis, O. rubscens, Phormidium molle*, *Scytonema* sp., *Synechococcus* sp., *Trichodesmium* sp., *Lyngbya ceylanica, Cylindrospermopsis raciborskii, Planktothrix compressa* and *Homoeothrix janthiana* were found. Among the observed members of Cyanophyceae the maximum species diversity was exhibited by the *Oscillatoria* (7 species) followed by *Anabaena* (6 species), *Chroococcus* (4 species) and *Aphanocapsa*, *Gloeocapsa*, *Microcystis* and *Lyngbya* have shown with three (3 species), *Aphanothece, Gloeotrichia, Merismopedia* and *Nostoc* with two (2 species) each (Table 1).

Euglenophyceae: The recorded 5 genera with 19 forms in Euglenophyceae (*Euglena geniculata, E. viridis, Lepocinalis acuta, Phacus acuminatus, Lepocinclis fusiformis, Menoidium* sp. and *Trachelomonas* sp.) were found to be well adapted to the concerned habitats under study. The Manakondur tank expressed the maximum abundance (59174 cells/L) of Euglenophyceae members followed by LMD reservoir (17623 cells/L). The members like *Euglena agilis, E. geniculata, E. stallata, Phacus acuminatus, P. longicauda, P. communis, P. ranula, Trachelomonas* sp., *T. dubia, T. minor, Lepocinclis acuta* and *L. fasiformis* were reported from Manakondur tank, while the *Euglena geniculata*, *E. oblonga, E. viridis, E. caudata, Phacus acuminatus, P. elegans, Lepocinclis acuta, Menoidium pellucidum, Trachelomonas* sp. and *T. curta* were found in LMD reservoir. Large peaks of Euglenoid population were reported in winter months, while small peaks were found in summer months. The genus, *Euglena* exhibited species diversity (7 species) followed by *Phacus* with 5 species, *Trachelomonas* with 4 species and *Lepocinalis* with 2 species, respectively.

In the reservoir of LMD, the phytoplankton community represents the presence of 30.49% of Bacillariophyceae, 42.59% of Chlorophyceae, 24.27% of Cyanophyceae and 2.65% of Euglenophyceae. The Chlorophyceae members were dominant over other groups (Fig. 7). Phytoplankton community of Manakondur tank represents the 40.65% of Cyanophyceae, 25.61% of Bacillariophyceae, 30.36% of Chlorophyceae and 3.38% of Euglenophyceae. In this tank Cyanophyceae members were found to be dominant over others (Fig. 8).

In the present investigation, the monthly fluctuations of phytoplankton have been studied and observed that they do not follow any predictable rule, however, some generalized trends with respect to some aspects have been observed.

It has been stated that temperature is the most important factor affecting diatom growth (Yoshitake & Imahori 1980). The qualitative and quantitative study of phytoplankton and their successional patterns have been utilized to assess the quality of water. Attempts have been made on phytoplankton to use as indicators of trophic state and pollution (James & Evison 1979).

It could be concluded that the Chlorophyceae were identified as seasonally dominated over the other members in LMD, and in MT the Cyanophyceae members were dominant over others.

The prominent members of Cyanophyceae (*Anabaena variabilis, Merispmopedia glauca* and *Microcystis aeruginosa*), Bacillariophyceae members (*Amphora* sp., Cymbella *sturbergii, Gyrosigma accuminatum* and *Gomphonema dichotomum)* and Chlorophyceae members such as *Chara vulgaris*, *Pediastrum duplex* and *Rhizoclonium hieroglyphicum* were noticed throughout the year in respective water bodies. The presence of wide variety of free living algae, protozoans, rotifers, crustaceans, nematode worms and cysts of parasites were also observed in samples. Such water is not safe for drinking purpose. Thus, it requires a continuous monitoring and study of algae existing in waters of various quality in order to determine what controls, what changes, or what uses can be instituted for the benefit of man and for the conservation of water and desirable aquatic life. Furthermore, algae have a great potential as bioindicators, however, these aspects are fully elucidated and need further exploration. Therefore, for a better management of the water ecosystem, people should be educated regarding the importance of water bodies and their uses.

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