International Journal of Scientific Research and Engineering Development-– Volume 5 Issue 3, May-June 2022
Available at www.ijsred.com

RESEARCH ARTICLE OPEN ACCESS

DISTRIBUTION OF CYANOBACTERIAL DIVERSITY IN TWO FRESH WATERBODIES OF BHOPAL

Mahima Dixit

Department of Botany, Rajeev Gandhi College, Bhopal (M.P.)

ABSTRACT :
Cyanobacteria are a very diverse group of prokaryotic organisms that thrive in almost every ecosystem on earth. These blue-green algae are widespread in freshwater environment also. Present investigation confined to the two fresh waterbodies of Bhopal, which are Upper lake and Lower lake.Upper lake and lower lake of Bhopal are experiencing several environmental problems such as change in land usage patterns around lakes, pollutant land and growth of macrophytes, eutrophication due to organic enrichment such as nitro and phosphate coming from agricultural land.The aquatic environment of the lake is affected by the influx of raw domestic sewage, which enhance the growth of algal bloom.Among the various members of Cyanophyceae, *Microcystis*has been found to be the dominant during major part of the year causing permanent bloom.

Keywords:*Cyanobacteria, Microcystis,Algal bloom*.

INTRODUCTION

Cyanobacteria can found in almost every terrestrial and aquatic habitat. Cyanobacterial growth is also favoured in fresh waterbodies like ponds and lakes where are calm and have little turbulent mixing.Aquatic cyanobacteria are known for their extensive and highly visible blooms. Cyanobacteria blooms form when cyanobacteria, which are normally found in the water, start to multiply very quickly. Blooms can form in warm, slow-moving waters that are rich in nutrients from sources such as fertilizer runoff or septic tank overflows. Cyanobacteria blooms need nutrients to survive. Blooms can severely damage water ecosystem, can causing aquatinc animals and plants to suffocate and die. So these harmful algal blooms resulting from eutrophication, are toxic to plants and animals.Two major water resources of Bhopal, Upper lake, Lower lake, have been selected for present investigation. Unfortunately, these beautiful water resorts are under great environmental stress owing to human influences, discharge of sewage, growth and deposition of organic matter, siltation and eventually eutrophication.

MATERIAL AND METHODS

The analysis of Lakes was carried out for a period of two years between December 2008 to December 2010. Samples were collected on monthly intervals from 4 lakes (8 selected monitoring stations). The monitoring was usually carried out between 10 A.M. to 4 P.M. For determining the phytoplankton characteristics, samples were collected at different monitoring stations from epilimnion or surface and hypolimnion or bottom layer. For the monitoring of bottom layer, depth sampler (Ruttner's water sampler) was used the water samples from the hypolimnion layer were collected from nearly 5 feet depth. with the help of Ruttner's water sampler, The surficial and bottom water samples were usually collected from the same points.

Site selection

In Upper lake two sites were selected. One site was Boat club (S1) and the other near the Kamala park region (S2) and in Lower laketwo sites were selected. One site was KhatalapuraMandir (S3) and the other near the Naavghat region (S4).

Qualitative and Quantitative enumeration of phytoplankton-
Qualitative analysis-
Qualitative analysis of phytoplankton was done by hauling plankton net horizontally several times in lake to get a random sample, then sample were taken in to plankton bottles and 1 ml lugol was added to them.

Quantitative analysis
Quantitative enumeration of phytoplankton was carried out by passing 40 litre of lake water through a plankton net from surface and 12 litre of lake water through a plankton net from bottom (hypolimnion). The filtered sample was collected in plankton bottles of 50 ml after adding 1 ml Lugol's iodine solution.The indentification of phytoplankton was done with the help of standard works viz ., ward and Whipple (1966), Phillipose (1967), Adoni (1975), Palmer (1980) etc.

SN	NAME OF THE MEMBER OF CYANOBACTERIA FOUND IN INVESTIGATION	
	Upper lake	**Lower lake**
1	*Aphanocapsa*	*Anabaena*
2	*Aphanothece*	*Aphanizomenon*
3	*Aphanizomenon*	*Aphenocapsa*
4	*Anabaena*	*Arthrospira*
5	*Anabaenopsis*	*Chroococcus*
6	*Arthrospira*	*Cylindrospermum*
7	*Chroococcus*	*Dactylococcopsis*
8	*Cylindrospermum*	*Gleotrichia*
9	*Dactylococcopsis*	*Gomphosphaeria*
10	*Gleotrichia*	*Lyngbia*
11	*Gomphosphaeria*	*Merismopedia*
12	*Lyngbia*	*Microsystis*
13	*Merismopedia*	*Nostoc*
14	*Microsystis*	*Osillatoria*
15	*Nostoc*	*Phormidium*
16	*Osillatoria*	*Rivularia*
17	*Phormidium*	*Scytonema*
18	*Rivularia*	*Spirulina*
19	*Scytonema*	*Tolypothrix*
20	*Spirulina*	*Trachelomonas*
21	*Tolypothrix*	
22	*Trachelomonas*	

RESULT AND DISCUSSION
Upper lake
Qualitative analysis :
In upper lake during the study period 22 genera of Cyanophyceae were identified.
The following genera were found:-
Aphanocapsa, Aphanothece, Aphanizomenon, Anabaena, Anabaenopsis, Arthrospira, Chroococcus, Cylindrospermum, Dactylococcopsis, Gleotrichia, Gomphosphaeria, Lyngbia,

Merismopedia,Microsystis, Nostoc, Osillatoria, Phormidium, Rivularia, Scytonema, Spirulina, Tolypothrix, Trachelomonas.

Quantitative analysis

On the epilimnion the maximum density of Cyanophyceae was recorded as 43045 units/lit during summer (June'2010) at S2 station, while minimum was recorded during winter (January'2009) at S1 station. At hypolimnion the maximum density was recorded as 49305 units/lit during summer (June'2010) at S2 station, while the minimum was recorded during winter (January' 2009) at S2 station. The *Microcystis* was the dominant species of this group. Second dominant species was *Aphenocapsa*.

Lower lake

Qualitative analysis

During the period under study a total of 20 genera of Cyanophyceae were identified.

The following genera of Cyanophyceaewere found:-

Anabaena, Aphanizomenon, Aphenocapsa,Arthrospira, Chroococcus, Cylindrospermum, Dactylococcopsis, Gleotrichia, Gomphosphaeria, Lyngbia, Merismopedia,Microsystis, Nostoc, Osillatoria, Phormidium, Rivularia, Scytonema, Spirulina, Tolypothrix, Trachelomonas.

Quantitative analysis

Cyanophceae was most dominant over all other groups of phytoplankton throughout the study course. On the epilimnion layer the maximum density of Cyanophyceae was recorded as 119880 units/lit during summer (June'2010) at S4 station, while minimum was recorded during winter (January'2009) at S3. In the hypolimnion layer the maximum density was recorded as 134810 units/lit during summer (June'2010) at S4 station, while minimum was recorded duringwinter (January'2009) at S3 station. The most abundant form of this group was *Microcystis*, the occurrence of which was of estimated maximum. Second dominant species was *Aphenocapsa*.

During the present investigation, Cyanophyceae was the most dominant group and showed their presence with 22genera in Upper lake, 20 genera in Lower lake.The dominance of this group was recorded during summer season. According to Hutchinson (1967) and Shapiro (1973) dense population of many planktonic blue-green algae are often associated with fairly high water temperature.Chang et al., (1988), Saxena (1990) and Tamot(1996) have reported that blue-green algae started increasing in number during earlysummer and attained their maxima in the middle of summer season. In previous observations of Lower lake, Saxena (1990) and Tamot (1996) observed maximum growth of Cyanophyceae during summer and minimum during winter season. Similar findings were observed in the present study. Cyanophyceae group was mainly represented by the presence of *Microcystis*species; other members of this group such as *Aphenocapsa, Anabaena, Spirulina, Rivularia, and Oscillatoria* were also found. Among the various members of Cyanophyceae, *Microcystis*has been found to be the dominant during major part of the year causing permanent bloom. The presence of *Microcystis* indicates that water is organically polluted and eutrophic (Saxena, 1990; Trivedi et al., 1990 and Khare,1993). *Microcystis* formed algal blooms, when algal blooms decompose they utilize oxygen in water thus depriving fish and other aquatic fauna of this essential element.

CONCLUSION

Two major water resources of Bhopal, Upper lake and Lower lakehave been selected for present investigation. Unfortunately, these beautiful water resorts are under great environmental stress owing to human influences, discharge of sewage, growth and deposition of organic matter, siltation and eventually eutrophication.The presence of the blooms of pollution indicator Cyanobacteria such as *Microcystis, Anabaena,Aphenocapsa*shows that these lakes are eutrophic water bodies and under is a great pollution stress.

REFERENCES

Adoni, A.D. (1975): Studies on the microbiology of Sagar lake. Ph.D. Thesis, Univ. Of Sagar, Sagar.

Chang, William, Y.B. and Ronald, Rossman (1988): Changes in the abundance of blue-green algae related to nutrient loading in the near shore of lake Michigan, Hydrobiologia, 157(3): 271-278.

Hutchinson, G.E. (1967): A treatise on limnology, II. Introduction to lake biology and the limnoplankton. Jhan Wiley and Sons, N.Y., 1115 pp.

Khare, P. (1993): Secondary production in a tropical lentic system with reference to zooplankton and fish feeding of Motia tank, Bhopal.

Palmer, C.M. (1980): Algae and water pollution. Castle House Pub. Ltd. Pp. 1-96.

Phillipose, M.T. (1967): Chlorococcales. ICAR, New Delhi.

Saxena, R. (1990): Limnological and water quality status of the Lower lake of Bhopal with special reference to certain phytoplankton, microinvertebrates and microbiological components. Ph.D. Thesis, Bakatullah Univ., Bhopal.

Shapiro, J.V. (1973): Blue-green algae: Why they become dominant. Science, 179 : 382-384.

Tamot, P. (1996): Water quality monitoring of Lower lake, Bhopal. Research Project Sp. By EPCO, Bhopal.

Trivedi, R.K. (1990): Studies on freshwater lakes on western Ghats with special reference to human activity and pollution. Final Technical Report, MoEF Project under Western Ghat Eco-development programme.

Ward, H.B. and Whipple, G.C. (1966): Freshwater biology (ed.). W.T. Edmondson. John Willey and Sons Inc. New York (1948).

