

Physico-chemical factors influencing the growth of diatoms in two habitats of Mysore

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Asian Journal of Environmental Science (June to November, 2009) Vol. 4 No. 1 : 12-14

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SUMMARY

The paper attempts to give an account of the periodicity of algae in two fresh water lakes of Mysore (Mandakhalli and Kukrahalli). Various physio-chemical parameters were analyzed at monthly intervals (2007-2008) and average values were calculated. Samples were screened for phytoplanktons and number of diatoms found at both the habitats. It is interesting to note that there were significant physico-chemical factors influencing the growth of diatoms in the two lakes. Seventeen species of diatoms were recorded in Mandakhalli lake and eighteen species in Kukrahalli lake during the study period. Higher pH, calcium and oxidizable organic matter coupled with low concentration of nitrates and phosphates were found to favour growth of diatoms.

Key words :

Diatoms, Physico-chemical factors, Mysore lakes

During the recent years lakes are becoming the victim of cultural eutrophication, which in turn is due to increase in anthropogenic pressure in their catchment areas, affecting the quality of water. Several workers have studied the ecology of fresh water algae, a few of interest one are of Munwar (1970), Singh (1960), Zafar (1964) and Hosmani and Bharathi (1982). The present study was aimed at monitoring the diatom population in Mandakhalli and Kukrahalli lakes of Mysore and correlating their occurrence with various physico-chemical parameters including calcium carbonate saturation index.

MATERIALS AND METHODS

Water samples were collected in 11 plastic carboys from two lakes of Mysore (Kukrahalli and Mandakhalli) at monthly intervals during June 2007 to May 2008. Samples were analyzed for various physico-chemical parameters and the phytoplankton analysis was done according to method described by Standard method of Examination Water and Waste Water APHA (1995) and, Trivedy and Goel (1986). Sedimentation of water was made in 4% formaldehyde and lugols iodine solution, and phytoplanktons were counted in 1 ml sample under a compound research microscope (40x magnitude) Fritsch (1975).

RESULTS AND DISCUSSION

The results of the analysis of the two lakes

are given in (Table 1). All physico-chemical factors showed higher values in Kukrahalli which were compared to Mandakhalli during study period. The data revealed that Mandakhalli lake through oligotrophic exhibits few characters of eutrophication due to severe environmental impact. The colour of Kukrahalli lake water appeared green during the study period because of algal bloom. There was objectionable smell of hydrogen sulphide during most part of the study period.

Singh (1960), Philipose (1960), Zafar (1964) and Munwar (1970) have studied periodicity of diatom. The important factors considered were nitrate, phosphate, calcium and pH. Diatoms increase with increase in nitrate and phosphate. In the present study, the concentration of nitrate was quite low but the diatom population was significantly high (Table 2). Tripathy and Pandey (1990), Naganandini and Hosmani (1998) observe that diatoms were maximum during winter and summer, while Parvateesam and Mishra (1993) observed that diatoms were maximum during summer season. The present study showed low concentration of calcium and dissolved oxygen influencing growth of diatoms in both the lakes. The pH ranges of 7 to 8.25 influence the growth of diatoms. Nitrates and phosphates are also considered to be important parameters in the growth of diatoms.

Rajendra Nair (1990) and Hosmani (1975) reported that diatom populations were directly correlated to phosphate content. In the present

Accepted :
January, 2009

Table 1 : Physico-chemical parameters and Langlier's index of two lakes

Parameters	Mandakkahalli	Kukkrahalli
Water temperature	28.4 ⁰ C	29.3 ⁰ C
pH	7.7	8.13
Total solids	820.7	984.4
Free carbon dioxide	10.69	4.42
Dissolved oxygen	5.32	4.7
Calcium	68	88.4
BOD	9.6	15.42
COD	14.48	23.21
Phosphate	40	48
Nitrate	30.2	46.2
Nitrite	016	0.74
Langlier's index	1.24	1.801
Diatoms organisms or/L-1	6539	8277

(All Physico-chemical parameters are mg/L except water temperature and pH)

study, diatoms growth was directly proportional to phosphate and nitrate content. Both water bodies supported the higher number of diatoms (Table 2) but have varied amounts of dissolved oxygen. In Mandakkhalli Lake dissolved oxygen was 5.32 mg/L and diatom population was 6539 org/L. Kukkrhalli lake dissolved oxygen content was low 4.47 mg/L diatom population was 8277 org/L. This indicates that oxygen has lesser influence on growth of diatoms.

The periodicity of diatoms in Mandakkahalli Lake was regular except for a few species like *Cymbella*

Table 2 : Distribution of Diatoms (monthly occurrence)

Months	Mandakkahalli	Kukkrahalli
	June 2007 -May 2008	June 2007 -May 2008
June, 2007	12260	10924
July, 2007	13860	15540
August, 2007	15540	20580
September, 2007	13120	16800
October, 2007	13600	13440
November, 2007	13020	15120
December, 2007	12600	17540
January, 2008	12180	10920
February, 2008	12180	17640
March, 2008	18060	18060
April, 2008	13860	21000
May, 2008	14280	21000
Total organisms	55236	192660
Average	6539	8435
Total organisms	6539	8277

Numbers represent organism / L (org/L)

cymbiformis, *Stauroneis phoenicentron*, *Gyrosigma granula* and *Gomphonema gracile*. Whereas, *Gomphonema tenelum*, *Synedra ulna*, and *Navicula rhomboids*, were found in significantly high numbers. In Kukkrhalli *Gomphonema tenelum*, *Navicula rhomboids* and *Synedra ulna* dominated and occurred as blooms (Table 3). The Langelier's index which is a measure of calcium carbonate saturation had no correlation with the growth of diatoms in the present study.

Table 3 : Occurance of species of Diatoms (org/L)

Species of Diatom	Mandakkahalli	Kukkrahalli
	June 2007- May 2008	June 1999- May 2000
<i>Coccooneis placentula lineata</i>	17000	100080
<i>Cymbella cymbiformis</i>	8820	NIL
<i>Cymbella asimulata</i>	6720	NIL
<i>Cymbella aspera</i>	NIL	4620
<i>Cymbella turgidula</i>	NIL	420
<i>Cyclotella striata</i>	NIL	6300
<i>Cyclotella catenata</i>	5460	NIL
<i>Eunotia monodon</i>	7140	NIL
<i>Gyrosigma granula</i>	6300	6720
<i>Gyrosigma elongatum</i>	NIL	7980
<i>Gyrosigma accuminatum</i>	NIL	4200
<i>Gomphonema tenelum</i>	7560	29610
<i>Gomphonema sumatrense</i>	4200	5460
<i>Gomphonema gracile</i>	8720	NIL
<i>Gomphonema subapicatum</i>	NIL	5040
<i>Navicula rhomboids</i>	18460	13070
<i>Navicula shpaerophora</i>	13020	18640
<i>Nitzschia palea</i>	4620	13640
<i>Pinnularia gibba</i>	7980	2100
<i>Pinnularia simplex</i>	5040	NIL
<i>Stauroneis phoenicentron</i>	8720	5140
<i>Stauroneis angulare</i>	6360	NIL
<i>Synedra ulna</i>	20260	32340
<i>Synedra acus</i>	NIL	16380
<i>Rhopalodia gibba</i>	NIL	7160
Total organisms per year in two lakes	157060	157780

Members represent Organisms/L (org/L)

Conclusion:

Through all these observations, it can be concluded that many physico-chemical parameters are necessary for existence of diatoms. pH, calcium and oxidizable organic matters coupled with low concentration of nitrite and dissolved oxygen and high concentration of nitrate and phosphate favour the growth of diatoms.

Acknowledgment:

Authors are thankful to Prof. Hosmani, Prof. Belagali and Dr. Vivekanandhan for their guidance to research work and also UGC for financial assistance.

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