

Monthly variations on phytoplankton density in Samutharam Lake of Tiruvannamalai district, Tamil Nadu

R. THANGADURAI, K. SIVAKUMAR AND T. RAVIMYCIN

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See end of the article for authors' affiliations

Correspondence to :
R. THANGADURAI
Department of Botany,
Annamalai University,
ANNAMALAINAGAR
(T.N.) INDIA

SUMMARY

In the present study surface water sample of Samutharam lake were collected in the second week of every month during April, 2008 to September, 2008 and phytoplankton density was studied in relation to physico-chemical variables. Phytoplankton were counted under Cyanophyceae, Chlorophyceae, Bacillariophyceae and Euglenophyceae. The results indicated that different ecological factors have influenced the plankton abundance.

Key words :

Monthly variation,
Phytoplankton,
Density

Water in its various forms is a major element of all the components of the biosphere and one of the most needed factors for the existence of living organisms. It is regarded as the solvent of life (universal solvent) having many chemicals dissolved in it. Utilizing these in their various metabolic activities, the aquatic plants and aquatic animals bring about changes in the chemical composition of water.

Temporal variability is the structure and function of a phytoplankton community and of fundamental importance to aquatic system. Aquatic environments are subjected to high temporal variation with frequent reorganization of relative abundance and species composition of phytoplankton, as a result of interaction between physical, chemical and biological variables (Reynolds, 2000).

MATERIALS AND METHODS

Study area:

Samutharam lake is located at 76° 22'N latitude and 14° 13' E longitude. The lake receives the water by rainfall only and the total area of this water body is about 1 hectare. The temperature of this region varied from a minimum of 16.6° C in winter months to a maximum of 41° C during summer months. The average rainfall is about 424 – 590 millimeter.

Surface water samples were collected from different spots of the lake in the second week of every month during April 2008 to September 2008 and were analyzed in the laboratory for important physico – chemical

parameters like temperature, pH, DO, total alkalinity, chloride, calcium, total hardness, BOD, EC, TDS, free CO₂, nitrate, phosphate. Analysis was done according to the methods described by APHA (1998) and Trivedy and Goel (1986). A liter of water sample was collected every month separately for the qualitative and quantitative estimation of phytoplankton study. Sedimentation of water was made in Lugol's iodine and phytoplankton was counted in 1 ml sample by Sedgewick-Rafter cell method and Identified according to Fritsch (1975).

RESULTS AND DISCUSSION

The physico – chemical analysis of Samutharam lake water has been shown in (Table 1). The density of phytoplankton communities of the present water body were represented mainly by 4 groups of algae viz., Cyanophyceae, Chlorophyceae, Bacillariophyceae and Euglenophyceae (Table 2).

Phytoplankton density on monthly variations from April 2008 to September 2008:

April 2008:

In the month of April 2008, Cyanophyceae community was recorded in higher density (28500 o/l) and Euglenophyceae community in low density (4750 o/l) – (Table 2 and Fig 1a).

May 2008:

In the month of May 2008, Bacillariophyceae community was recorded in

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Table 1 : Physico – chemical parameters of Samutharam Lake from April 2008 to September 2008

Parameters	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Range
pH	8.0	8.5	8.5	8.8	8.7	8.8	8.0-8.8
Water temp °C	34	36	36	34	32	30	30-36
Calcium (mg/l)	16.00	18.05	15.06	11.80	17.63	20.15	11.80-20.15
Total hardness (mg/l)	70.00	92.00	74.00	70.00	70.00	80.00	70.00-92.00
DO (mg/l)	9.60	8.15	7.10	6.80	6.10	5.30	5.30-9.60
BOD (mg/l)	2.0	2.5	3.0	3.4	4.4	6.2	2.00-6.2
Phosphate (mg/l)	0.130	0.128	0.118	0.101	0.090	0.080	0.080-0.130
EC (mg/l)	260.00	260.00	240.00	220.00	300.00	310.00	220.00-310.00
TDS (mg/l)	0.170	0.170	0.165	0.166	0.101	0.205	0.101-0.205
Chloride (mg/l)	20.10	25.05	31.20	48.00	52.05	60.18	20.10-60.18
Alkalinity (mg/l)	62	68	73	79	85	94	62-94
Free CO ₂ (mg/l)	1.20	1.15	1.15	1.75	2.10	2.30	1.20-2.30
Nitrate (mg/l)	0.013	0.008	0.004	0.011	0.013	0.020	0.004-0.020

Table 2 : Density of phytoplankton (Organism^{per l}) under different families during different months

Families	Apr. 08	May 08	Jun. 08	Jul. 08	Aug. 08	Sep. 08
Cyanophyceae	28500	23000	28350	98900	85375	39100
Chlorophyceae	12445	13400	12075	39675	67575	64475
Bacillariophyceae	20125	77000	77700	13175	98325	91200
Euglenophyceae	4750	6000	3750	8050	11560	18900

higher density (77000 o/l) and Euglenophyceae community was in low density (6000 o/l) (Table 2 and Fig. 1 b).

June 2008:

In the month of June 2008, Bacillariophyceae community was recorded in higher density (77700 o/l) and Euglenophyceae community was in low density (3750 o/l) Table – 2 and Fig. 1 c).

July 2008:

In the month of July 2008, Cyanophyceae community was recorded in higher density (98900 o/l) and Euglenophyceae community was in low density (8050 o/l) – (Table 2 and Fig. 1 d).

August 2008:

In the month of August 2008, Bacillariophyceae community was recorded in higher density (98325 o/l) and Euglenophyceae community in low density (11560 o/l) (Table 2 and Fig. 1 e).

September 2008:

In the month of September 2008, Bacillariophyceae community was recorded in higher density (91200 o/l) and Euglenophyceae community in low density (18900 o/l) (Table 2 and Fig 1 f).

Chlorophyceae members showed a slight decrease in their growth with increase in pH, calcium, chloride, alkalinity and total dissolved solids. Bacillariophyceae showed peak growth with increasing pH, temperature, phosphate, chloride and total dissolved solids were observed earlier by Zafar (1967)

Free CO₂ in Samutharan Lake was found to be quite normal ranging from 1.20 to 2.30 mg/l, attributed to the oxidation of organic material with rise of temperature (Sreenivasan, 1966). Dissolved oxygen (DO) was found to range from 5.30 to 9.60 mg/l, corroborating the findings of Yousuf *et al.* (1986). Moreover, dissolved oxygen content was found to be considerably high in colder months due to the diffusion of CO₂ from atmosphere at lower temperature and photosynthetic activity of phytoplankton peak resulted in super saturation of oxygen in October to December. Similar DO trend was also reported by David *et al.* (1969). BOD values in Samutharam lake have been shown in (Table 1).

Temperature is considered to be an important physical factor which influences the chemical changes of water (Vass, 1989) and it was found to range between 30-36^o C in Samutharam Lake. Cyanophyceae was abundant during the low temperature period while Chlorophyceae, Bacillariophyceae and Euglenophyceae were more abundant at high temperature (Table 1).

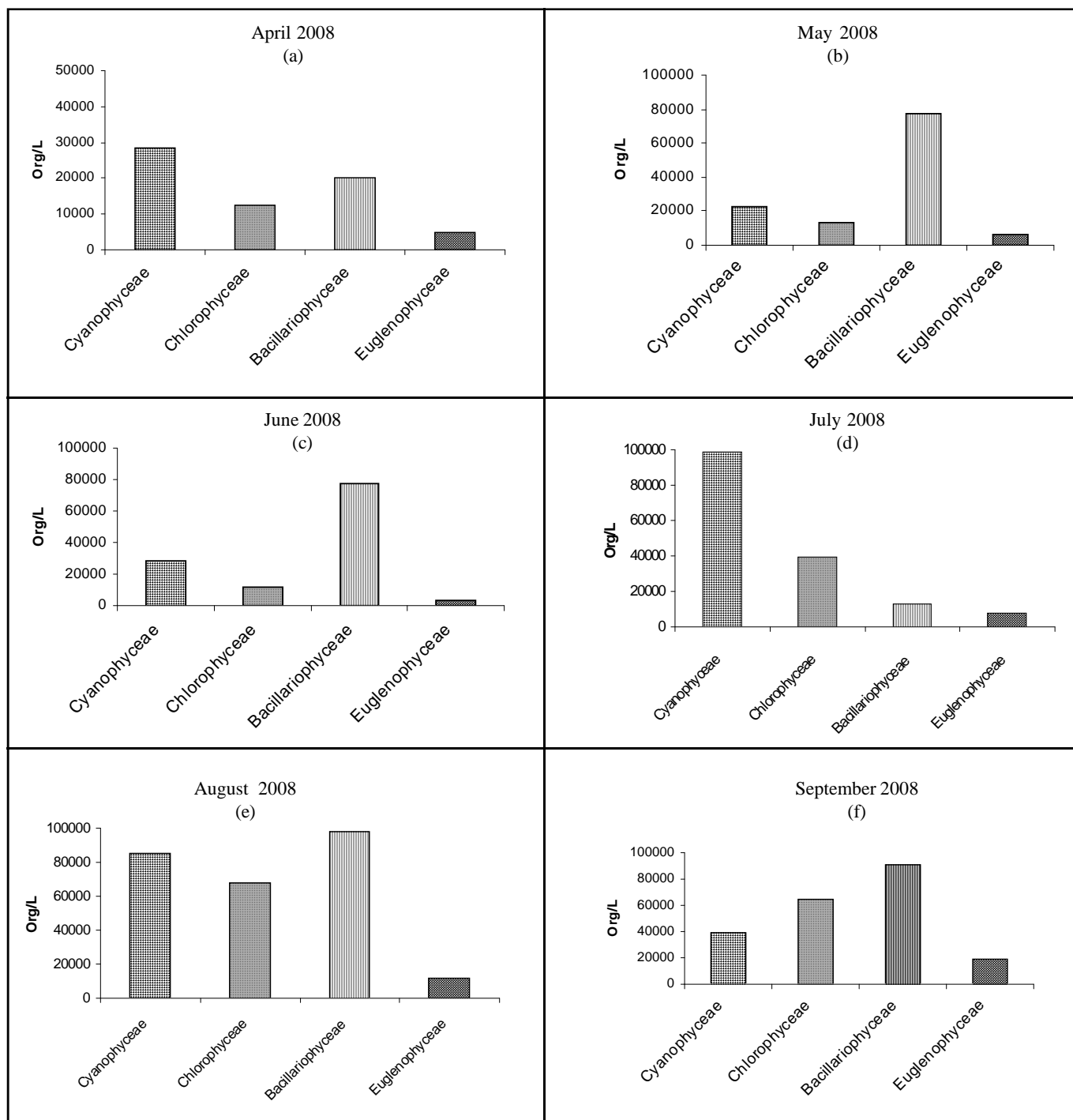


Fig. 1 : Phytoplankton density on monthly variations from April 2008 to September 2008

The phosphate showed lower values but there was definite increase in phosphate concentration in winter months. This increase could be attributed to inflow of salt bearing water as reported.

Thus, the results indicate that different ecological factors have influenced the plankton abundance. The present study ensures that variation in the abundance of plankton can be best explained when environmental factors

jointly influence. It may be concluded that the density of phytoplankton is dependent on different months variables.

Authors' affiliations

K. SIVAKUMAR AND T. RAVIMYCIN,
Department of Botany, Annamalai University,
ANNAMALAINAGAR (T.N.) INDIA

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