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Studies On The Physico-Chemical Parameters And Planktonic Diversity Of Vaduvoor Lake At Tiruvarur District

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ABSTRACT

In the present investigation, physico-chemical parameters and planktonic diversity of Vaduvoor lake were thoroughly studied from July 2014 to December 2014. The physico-chemical parameters such as water temperature, DO, turbidity were showed significant variation however, pH, CO_2 and alkalinity showed a slight variation significant increase in water temperature observed during summer. The pH showed alkaline range throughout the study period. Dissolved oxygen showed marked variation, the turbidity, CO_2 showed slight fluctuation irrespective of the season. Diversity of plankton life were used as a measure of water quality of lake, phytoplanktons were abundance as compared to zooplankton. During the study period the phytoplanktons were observed in different divisions such as Cynophyta, Chlorophyta, Bacillariphyta, Myxophyta and Desmidiata. The genera of zooplanktons were come under Protozoans, Cladocera Rotifer and Copepods. Diveristy index of phytoplankton ranged from and zooplanktons ranged between Ballish, 1992. Freshwater zooplankton of India, Oxford and IBH Publishing Co. Ltd, New Delhi.

Keywords: Physico-chemical parameters, Plankton, diversity, abundance.

INTRODUCTION

The physico-chemical characteristics of the aquatic environment directly influence the life inhabiting it. Fluctuation in these constituents often create an adverse environment to organisms, limiting their growth and interfering in the physiological processes (Kedar and Patil, 2011). The five genera amongst zooplankton population of Janutal

at Gwulior (Agarwal, 1978). The productivity of water depends on phyoplankton population of the water. Hydrobiological studies with phytoplankton and zooplankton diversity have been made by many workers (Rao and Choubey, 1990; Deorari, 1993; Ariyadej *et al*., 2004; Mishra *et al.*, 2010 and Joseph and Yamakanumurdi, 2011). The relationship between the composition and abundance of zooplankton and the trophic state of lakes has been studied in both temperate (Ravera, 1996; Schiewer, 1998). The zooplankton, represent an important link in aquatic food chain and contribute significantly to secondary production in fresh water ecosystem (Sharma, 1998). Nutrient limitation is an important condition for phytoplankton abundance in shallow freshwater lake (Hubgle and Harper, 2002). Plankton is the most essential for many fishes as food the phytoplankton is essential component of aquatic ecosystem and act as primary producer (Verma, 2002). The zooplankton concentration and distribution are sensitive to physical chemical changes in the water (Ahmand *et al.*, 2011). The physico-chemical characteristic of lake and diversity of plankton. Therefore, the present investigation physico-chemical parameter and plankton status of Vaduvoor lake.

MATERIALS AND METHODS

For analysis of physico-chemical parameters and planktons the sample were collected from the Vaduvoor lake during July 2014 to December 2014. The sample were collected during early morning in between 6.00 to 7.00 am. The physico-chemical parameters such as temperature pH, DO, CO_2, transparency alkalinity. Temperature was measured by using mercury filled celcious thermometer. The light penetration was determined with the help of Sacchi's disc. pH of sample was determined by using Elico L. T/D-T pH meter, free CO_2, DO, alkalinity were analysed as for APHA (1995). For quantitative estimation of the plankton, 50 liters of surface water was filtered through small plankton net. Sub samples of small quantities were taken and counting of plankton was done in counting chamber under inverted microscope. The identification of phytoplankton and zooplanktons upto genetic level were done with the help of following literature (Ballish, 1992; Edmondson, 1992; Perumal *et al.*, 1998). Relative abundance and frequency of occurrence were calculated. Diversity index of planktons during each month was calculated by using the following formula

$$\text{Diversity index} = H = \frac{S\text{-}1}{\text{In}N}$$

Where
S = No. of genera of phyto and zooplanktons
N = Total No. of phyto and zooplantonic
In = National logarithm

RESULT

The physico-chemical parameters of lake are depicted in the table 1. From the table, it is clearly indicated that he water temperature showed significant fluctuation during the study period. Temperature varied from 24.69 ± 0.49 to 30.51 ± 0.61°C. It was found to be maximum (24.69 ± 0.49°C) in December 2014 and maximum (30.07 ± 0.61°C) in July. The pH value showed alkaline range 7.08 ± 0.15 to 7.22 ± 0.19. Transparency showed significant fluctuation and it varied from 31.40 ± 0.87 to 39.20 ± 1.12 cm. CO_2 did not show much seasonal variation. Dissolved oxygen showed marked variation during the study period. Alkalinity of the lake fluctuation irrespective of seasons. In the present study, most of the hydrobiological parameters were found to be optimum land. Monthly distribution and zooplankton is given in the table 2. The relative abundance are phytoplanktons and zooplankton and diversity index of plankton are given the table 3 to table 5. During the study period today 32 genera observed in which 22 genera were phytoplanktons and to were zooplanktons. Those genera present divisions were Cynophyta, Chlorophyta, Bacillariophyta, Myxophyta, Desimedphyta and zooplankton in Protozoans, Rotifers, Cladocera and Copepods monthly various observed in total numbers phytoplankton and zooplanktons. The relative of phytoplanktons allway higher. The zooplankton the relative abundance of various divisions showed significantly. Various among the phytoplanktons numbers of the Chynophyta and Chlorophyta found to be high the contribution to the Bacillariophyta and Myxophyta. Amount the zooplankton protozoans as present the higher number all month, the Rotifers and Copepods, were relative less abundance Protozoans. The diversity index of phytoplankton ranged from (2.20 to 2.98%). It was found to be minimum in August and maximum in October. The diversity index of zooplankton ranged from 1.67 to 2.14 per cent. It was found to be low (1.67%) in November and high level (2.14%) in October.

Table 1 Monthly average of physico-chemical parameters

Months	Temperature (°C)	pH	Transparency (cm)	CO_2 (ppm)	DO (CC/l)	Alkalinity
July	30.51 ± 0.61	7.16 ± 0.16	39.20 ± 1.12	0.0123	4.4672 ± 0.24	138.6 ± 2.49
8Aug.	29.67 ± 0.58	7.10 ± 0.18	36.90 ± 1.06	0.1276	5.0256 ± 0.31	164.8 ± 2.54
Sep.	27.33 ± 0.47	7.21 ± 0.13	35.90 ± 0.98	0.1364	3.9088 ± 0.81	171.9 ± 3.11
Oct.	27.25 ± 0.49	7.16 ± 0.13	34.70 ± 0.92	0.01496	3.3504 ± 0.26	174.7 ± 3.78
Nov.	25.57 ± 0.42	7.22 ± 0.19	33.60 ± 1.02	0.1716	4.7146 ± 0.25	182.6 ± 4.08
Dec.	24.69 ± 0.49	7.08 ± 0.15	31.40 ± 0.87	0.01804	4.6742 ± 0.21	169.4 ± 3.25

Table 2 Number of phytoplankton and zooplankton recorded

Number of Plankton	July	August	Sep.	Oct.	Nov.	Dec.
Number of phytoplankton	156	147	145	154	144	142
Number of zooplankton	44	39	35	42	36	44
Total number of plankton	198	186	180	196	180	186
R.A. of phytoplankton	78.78	79.03	80.55	78.57	80.00	76.34
R.A. of zooplankton	22.22	20.97	19.75	22.43	20.00	23.67

Table 3 Relative abundance of plankton

Phytoplankton and Zooplanktons	July	August	Sep.	Oct.	Nov.	Dec.
Chynophyta	28.28	31.72	33.89	32.14	30.00	33.79
Chlorophyta	19.19	12.90	16.11	16.33	18.33	17.20
Desmichiata	9.18	10.75	7.78	12.76	7.78	4.83
Myxophyta	15.31	9.14	8.33	4.59	8.89	9.16
Bacillariophyta	7.14	14.52	14.44	12.76	15.00	12.36
Protozoans	7.65	9.67	10.55	10.20	9.44	11.83
Rotifiers	6.63	3.22	5.00	4.56	3.89	3.76
Cladoceras	5.10	4.30	2.78	3.57	3.33	3.23
Cipepods	3.06	3.76	1.11	3.06	2.22	4.84

Table 4 Diversity index of phytoplankton

Month	No. of genera (S)	Total of individuals (N)	InN	Diversity index
July	14	156	5.05	2.57
Aug.	12	147	4.99	2.20
Sep.	13	145	4.77	2.52
Oct.	16	154	5.04	2.98
Nov.	14	144	4.97	2.62
Oct.	15	142	4.95	2.82

Table 5 Diversity index of zooplankton

Month	No. of genera	Total of individuals	InN	Diversity index
July	9	44	3.78	2.12
Aug.	8	39	3.66	1.91
Sep.	8	35	3.55	1.97
Oct.	9	42	3.74	2.14
Nov.	7	36	3.58	1.67
Oct.	8	44	3.78	1.85

DISCUSSION

In the present study is relevant to physico-chemical study, biodiversity of plankton in Vaduvoor lake. The relationship between the composition and abundance of zooplankton and the trophic state of lakes has been studied in both temperate (Ravera, 1996; Schiewer, 1998). Nutrient limitation is an important condition for phytoplankton abundance in shallow freshwater lake (Hubgle and Harper, 2002). It is reported that five genera amongst zooplankton population of Janutal at Gwulior (Agarwal, 1978). Sharma (1998) studied that the zooplankton represent an important link in aquatic food chain and contribute significantly to secondary production in freshwater ecosystem. Verma (2002) studied that plankton is the most essential for

many fishes as food. The phytoplankton is essential component of aquatic ecosystem and as primary producer. Ahmad *et al.* (2011) reported that the zooplankton concentration and distribution are sensitive to physical and chemical changes in the water. The present study is relevant to physico-chemical parameter study, biodiversity of plankton in Vaduvoor lake. This study explains that Vaduvoor lake are in rich biodiversity of plankton, and need to conservation in future.

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