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Research Article

Species Composition and Seasonal Fluctuations of Ciliates (Olygohymenophorea) from Nath Sagar Paithan District: Aurangabad (M.S.)

Vidya Pradhan[1]*, J.D. Shaikh[2], Ranjana Patel[3]
[1]*Dr. Rafiq Zakaria College for Women, Aurangabad (M.S.)*
[2]*Maulana Azad College, Aurangabad (M.S.)*
[3]*Pratishthan Mahavidyala, Paithan, Dist Aurangabad*
**Corresponding Author: drvidyasp@gmail.com*

ABSTRACT

The present study is stretched over a period of one year, so as to record the species composition of ciliates. It is an attempt to correlate the seasonal fluctuations in population density of ciliates with some selected physic-chemical parameter's. The parameters studied were temperature atmospheric and water, humidity, rainfall, pH, D.O., acidity, alkalinity, hardness, nitrogen, sulphate, chloride, phosphate and solids. The different species recorded from this major group of ciliates, olygohymenophorea were Glaucoma cintillans, Paramaecium caudatum and Vorticella campanula. The seasonal fluctuations in population density are discussed in relation to the physico-chemical parameters studied.

Keywords: Paithan dam; ciliates, seasonal fluctuation; chemical parameters.

1. INTRODUCTION

Fresh water harbor wide variety of protozoa, which plays a vital and significant role in ecosystem [1]. They are the indicators of not only pollution but play a role in breaking down organic pollutants and thus is highly useful in reducing the damage due to pollution [2-3].Ciliates are most advanced protozoan [4]. Paithan is located at latitude 1953 N and longitude 75.25 E. The Nath Sagar is reservoir created behind Paithan dam. The reservoir has submerged 35,000 hectares of land having a catchment area of 21.750 Sq.Km. with a gross storage capacity of 2909 M Cum. The existing water supply to Aurangabad is supplemented by this reservoir

2. MATERIALS AND METHODS

This reservoir is selected for the study of fluctuations in population density of ciliates in relation to some physic-chemical parameters. The water samples for the analysis were collected from the fixed points about 15cm below the surface of water during October 2009 to September 2010. The samples were collected fortnightly on 1st and 15th of every month around 9.00am. The data of humidity and rainfall was collected from meteorological department Chikalthana Aurangabad. The atmospheric and water temperature was recorded with the help of digital portable kit. The estimations of physic-chemical parameters were carried out with the help of APHA [5]. The movements of ciliates were slowed down by using methyl cellulose for observation and counting. Counting was done with the help of Sedgwich Rafter counting chamber. The population was calculated on the basis of total number of ciliates per ml. The identification of ciliates is based on Bick and Corliss [6].

3. RESULTS AND DISCUSSION

The topography of three sampling stations is as follows:

1. Godavari river (Station 1)
Lotic habitat: The sampling site is near the spill way gates of Jayakwadi project at Nath Sagar.

2. Nath Sagar (Station 2)
Lentic water: A fresh water reservoir, a source of water for drinking and irrigation purposes for Paithan and part of Marathwada region.

3. Water Well (Station 3):
The water well is in the neighbouring area about half kms away from Godavari river.

The different physico-chemical parameters were given in the tables and discussed subsequently.

Table 1: Atmospheric temperature (^{0}C) at the three sampling stations during 2009-2010

Station No.	Seasons	Months							
		1		2		3		4	
		I	II	I	II	I	II	I	II
1	Winter (October-January)	37.0	30.1	29.7	29.6	41.3	30.8	27.3	28.8
	Summer (February-May)	30.6	32.9	36.4	35.4	36.0	37.1	38.4	39.9
	Monsoon (June-September)	36.1	33.7	30.8	31.5	30.2	29.3	31.2	28.4
2	Winter (October-January)	37.0	30.1	29.7	29.6	41.3	30.8	27.3	28.8
	Summer (February-May)	30.6	32.9	36.4	35.4	36.0	37.1	38.4	39.9
	Monsoon (June-September)	36.1	33.7	30.8	31.5	30.2	29.3	31.2	28.4
3	Winter (October-January)	37.0	30.1	29.7	29.6	41.3	30.8	27.3	28.8
	Summer (February-May)	30.6	32.9	36.4	35.4	36.0	37.1	38.4	39.9
	Monsoon (June-September)	36.1	33.7	30.8	31.5	30.2	29.3	31.2	28.4
1, 2, 3, 4 (Months of the seasons in sequence) *I, II (First and Second fortnight, Average)*									

Table 2: pH at the three sampling stations during 2009-2010

Station No.	Seasons	Months							
		1		2		3		4	
		I	II	I	II	I	II	I	II
1	Winter (October-January)	6.8	7.4	6.9	7.5	6.4	7.7	6.8	6.5
	Summer (February-May)	6.5	7.2	6.2	7.1	6.3	7.2	6.5	7.2
	Monsoon (June-September)	6.9	7.7	7.8	7.7	7.0	7.2	7.4	7.9
2	Winter (October-January)	6.7	7.3	6.5	7.5	6.8	7.2	6.6	7.3
	Summer (February-May)	6.3	7.1	6.1	6.9	6.4	7.1	6.3	7.2
	Monsoon (June-September)	7.1	7.6	7.5	8.0	7.2	7.7	7.3	7.9
3	Winter (October-January)	6.8	7.4	6.2	7.2	6.9	7.7	6.5	7.1
	Summer (February-May)	6.2	7.1	6.1	7.1	6.7	7.3	6.3	7.0
	Monsoon (June-September)	7.2	7.6	7.1	7.5	7.8	7.9	7.4	7.8
1, 2, 3, 4 (Months of the seasons in sequence) *I, II (First and Second fortnight, Average)*									

Table 3: D O (ppm) at the three sampling stations during 2009-2010

Station No.	Seasons	Months							
		1		2		3		4	
		I	II	I	II	I	II	I	II
1	Winter (October-January)	8.3	9.1	8.4	9.9	9.0	10.3	9.9	10.9
	Summer (February-May)	7.3	8.2	8.1	9.2	8.9	9.8	9.3	10.1
	Monsoon (June-September)	7.7	8.4	8.3	9.4	9.2	10.2	9.7	10.7
2	Winter (October-January)	8.9	9.4	8.8	10.1	9.4	10.5	10.4	11.5
	Summer (February-May)	7.2	8.4	8.4	9.4	9.1	9.9	9.1	10.0
	Monsoon (June-September)	7.9	8.8	8.6	9.7	9.8	10.4	10.2	11.1
3	Winter (October-January)	8.0	9.1	8.3	9.2	8.5	10.1	9.5	10.4
	Summer (February-May)	7.2	8.0	8.0	8.1	8.3	9.2	8.9	9.7
	Monsoon (June-September)	7.4	8.2	8.2	8.9	8.9	9.9	9.2	10.1
1, 2, 3, 4 (Months of the seasons in sequence) *I, II (First and Second fortnight, Average)*									

Table 4: Total alkalinity (ppm) at the three sampling stations during 2009-2010

Station No.	Seasons	Months							
		1		2		3		4	
		I	II	I	II	I	II	I	II
1	Winter (October-January)	42	56	49	51	41	47	51	75
	Summer (February-May)	57	61	64	67	57	54	63	80
	Monsoon (June-September)	67	72	84	78	63	79	76	84
2	Winter (October-January)	39	42	71	48	39	41	43	62
	Summer (February-May)	42	51	54	66	45	51	51	71
	Monsoon (June-September)	53	65	81	75	59	67	5.3	76
3	Winter (October-January)	36	39	40	43	37	38	41	56
	Summer (February-May)	40	43	37	54	39	42	40	61
	Monsoon (June-September)	47	51	73	66	43	5.9	41	65
1, 2, 3, 4 (Months of the seasons in sequence) *I, II (First and Second fortnight, Average)*									

Table 5 Total Hardness (ppm) at the three sampling stations during 2009-2010

Station No.	Seasons	Months							
		1		2		3		4	
		I	II	I	II	I	II	I	II
1	Winter (October-January)	53	61	45	32	56	63	71	83
	Summer (February-May)	63	77	53	43	61	76	81	89
	Monsoon (June-September)	84	81	74	66	72	89	91	95
2	Winter (October-January)	47	53	39	23	51	57	69	72
	Summer (February-May)	61	75	47	39	52	67	79	85
	Monsoon (June-September)	73	69	67	53	35	70	85	89
3	Winter (October-January)	38	45	27	25	48	51	58	67
	Summer (February-May)	53	69	35	27	43	51	75	81
	Monsoon (June-September)	66	61	57	49	51	71	80	79
1, 2, 3, 4 (Months of the seasons in sequence) *I, II (First and Second fortnight, Average)*									

The fluctuations of population densities of ciliates at the three sampling stations during a period of two years are determined.

The class Oligohymenophorea was represented by Colpidum colpoda, Glancoma scintillans, Paramaecium caudatum and Vorticella campanula.

The salient features of the observations are:

The population patter was –

1. Station 2 > station 3 > station 1
2. Winter > monsoon > summer
3. Station 2 had the maximum variety of species and station 3 the minimum.

The total population, composition of ciliates, relative proportions and the relative densities of orders and seasonal variations of species are discussed in relation to physico-chemical parameters. The species consistently present at all the stations were – Colpidium colpoda, Paramecium caudatum, Vorticella campanula and Glaucoma scintillans.

Glaucoma scintillans were recorded only from station 2. An attempt is made to correlate the findings with the physic-chemical parameters studied.

The distribution and abundance of ciliates like other microbial communications is governed by a variety of ecological factors. The physic-chemical parameters vary from place to place and interact with each other therefore it is difficult to draw specific conclusion concentrating upon the specific effect of any single factor on the population density. However some generalized interrelationship. The physic-chemical parameters and the population can be established.

During the present study the water temperature was consistently lower than the atmospheric temperature (table 1). The pH showed an alkaline range throughout; rarely it was acidic (table 2). The D.O. was more the winter and less in summer (table 3). Alkalinity was maximum in monsoon and

minimum in winter(table 4). The CO_2 was inversely related to D.O. The hardness was more in summer moderate in winter and less in monsoon (table 5). The phosphate was more in monsoon less in summer and least in winter.

The relative densities of ciliates differed during all the seasons. In general the population density was more in winter less in monsoon and least in summer.

4. REFERENCES

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