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"Species Composition & Ecological Parameters & Seasonal Changes of Ciliates (Polymenophorea) from Nath Sagar, Paithan"

Vidya Pradhan
Dept of Zoology,
Dr Rafiq Zakaria College for Women
Aurangabad (India)
drvidyasp@gmail.com

Abstract:

Seasonal variations in ciliate abundance and their special composition were studied at three stations of Nath Sagar Reservior: Paithan. The study was stretched over a period of one year i.e. 2013 – 2014. The study was conducted to provide background for fisheries purpose. It is an attempt to correlate the season fluctuations in population density of ciliates with some selected physico-chemical parameters. The parameters studies were Temperature, Atmospheric and Water, Humidity, Rainfall, pH, D.C. acidity, Chlorides, Phosphate and Solids. The different species recorded from this major group of ciliates, polymeno phorea were Halterii dae halteria, Euplotes affinis, Euplotes patella, Oxytricha fallax. The seasonal fluctuations in population density is discussed in relation to the physico-chemical parameters studied.

Introduction:

Fresh water is the most widely used natural medium. Since time immermorible freshwater has always been of important to man kind. Man's primary concern with water was thought to be for drinking purpose and cleaning water is not only a major component but also the best solvent. It is the medium on which all organisms depend fro their existence. Freshwater harbors wide variety of protozoa, which plays a vital and significant role in ecosystem[1].

Protozoan, the tiny creature is not only an indicator of pollution but plays an important role in breaking down the organic pollutants and thus is highly useful in reducing the damage due to pollution. Protozoa by virtue of their adaptability were present in all possible environmental conditions and is used as indicator of pollution. As such the study of various freshwater bodies in relation to different physico - chemical variables and the associated

protozoan population is highly important. Ciliates are the most advanced among the protozoan[2].

The present is an attempt to record the composition of ciliated and their seasonal fluctuations in relation to few selected physico-chemical parameters from the three sampling stations in Paithan from Marathwada region of Maharashtra State.

Paithan is located at latitude 1953N and longitude 75.25E. 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.

Materials & Methods:

This reservoir is selected for the study of fluctuations in population density of ciliates in relation to some physico-chemical parameters. The water samples for the analysis were collected from the fixed points about 15cm below the surface of water during June 2013 to May 2014. The samples were collected fortnightly on 1st and 15th of every month around 9.00 am. The data of humidity and rainfall was collected form materological department of Chikalthana, Aurangabad. The atmosphere and water temperature was recorded with the help of digital portable kit. The estimation of physico-chemical parameters were carried out with the help of APHA (1980)[3]. The moments of ciliates were slowed down by using methyl cellulose for observation and counting. Counting was done with the help of Sedgwich Rafter Counting. The population was calculated on the basis of total number of ciliates per ml. the identification of ciliates is based on Bick (1972) & Corliss (1979). This part deals with the topography of the sampling stations.[4]

Three stations were selected for the analysis during the present investigations. All the three stations are situated on the outskirts of Paithan, a place about 69km from Aurangabad city in the Marathwada region of Maharashtra State.

The three sampling stations were Godavari River – Station I, Nath Sagar Station – 2, Water Well – Station 3.

Table I A

Atmospheric Temperature ^{0}C at Three Sampling Stations during 2013 – 2014

Station no.	Seasons	Months							
		1		2		3		4	
		I	II	I	II	I	II	I	II
I	Monsoon (June – Sept.)	37.1	33.7	31.8	31.5	30.2	29.3	30.2	29.4
	Winter (Oct. – Jan.)	38.0	30.1	29.7	29.5	40.3	29.8	29.3	28.6
	Summer (Feb. – May)	30.6	32.9	36.4	35.4	37.0	29.0	29.0	28.4
II	Monsoon (June – Sept.)	37.1	33.7	30.8	31.5	30.2	29.3	31.2	28.4
	Winter (Oct. – Jan.)	38.0	30.1	29.7	29.6	41.3	30.8	27.3	28.8
	Summer (Feb. – May)	30.6	32.9	36.4	35.4	37.0	29.0	31.2	28.4
III	Monsoon (June – Sept.)	37.1	33.7	30.8	31.5	30.2	29.3	31.2	28.4
	Winter (Oct. – Jan.)	38.0	30.1	29.7	29.6	41.3	30.8	27.3	28.8
	Summer (Feb. – May)	30.6	32.9	36.4	35.4	37.0	29.0	31.2	28.4

pH Hydrogen Ion Concentration

Table 2

Hydrogen Ion Concentration at Three Sampling Stations

Station no.	Seasons	Months							
		1		2		3		4	
		I	II	I	II	I	II	I	II
I	Monsoon (June – Sept.)	6.9	7.7	7.8	7.7	7.0	7.2	7.4	7.9
	Winter (Oct. – Jan.)	6.8	7.4	6.9	7.5	6.4	7.7	6.8	6.5
	Summer (Feb. – May)	6.5	7.2	6.2	7.1	6.3	7.2	6.5	7.2
II	Monsoon (June – Sept.)	7.1	7.6	7.5	8.0	7.2	7.7	7.3	7.9
	Winter (Oct. – Jan.)	6.7	7.3	6.5	7.5	6.8	7.2	6.6	7.3
	Summer (Feb. – May)	6.3	7.1	6.1	6.9	6.4	7.1	6.3	7.2

III	Monsoon (June – Sept.)	7.2	7.6	7.1	7.5	7.8	7.9	7.4	7.8
	Winter (Oct. – Jan.)	6.8	7.4	6.2	7.2	6.9	7.7	6.5	7.2
	Summer (Feb. – May)	6.2	7.1	6.1	7.1	6.7	7.3	6.3	7.0

Dissolved Oxygen

Table 3

Dissolved Oxygen (ppm) at Three Sampling Stations

Station no.	Seasons	Months							
		1		2		3		4	
		I	II	I	II	I	II	I	II
I	Monsoon (June – Sept.)	7.7	9.1	8.3	9.4	9.0	10.2	9.4	10.9
	Winter (Oct. – Jan.)	8.4	9.0	8.1	9.5	9.0	10.2	9.6	10.3
	Summer (Feb. – May)	7.3	8.1	8.0	9.1	8.6	9.5	9.2	10.1
II	Monsoon (June – Sept.)	7.9	8.4	8.7	9.4	9.6	10.4	10.2	11.0
	Winter (Oct. – Jan.)	8.6	9.2	8.4	10.0	9.3	104	10.2	11.3
	Summer (Feb. – May)	7.3	8.3	8.3	9.2	9.0	9.8	9.2	10.1
III	Monsoon (June – Sept.)	7.4	8.3	8.3	8.9	8.8	9.9	9.4	10.1
	Winter (Oct. – Jan.)	8.0	9.0	8.4	9.3	8.4	10.0	9.3	10.4
	Summer (Feb. – May)	7.2	8.0	8.0	8.2	8.3	9.2	8.9	9.7

Alkalinity

Table 4 Total Alkalinity (ppm) at the Three Sampling Stations

Station no.	Seasons	Months							
		1		2		3		4	
		I	II	I	II	I	II	I	II
I	Monsoon (June – Sept.)	68	71	84	76	64	78	78	81
	Winter (Oct. – Jan.)	42	56	49	51	41	47	52	74
	Summer (Feb. – May)	56	62	66	68	53	51	61	80

II	Monsoon (June – Sept.)	53	64	82	76	58	65	54	77
	Winter (Oct. – Jan.)	38	41	72	47	38	42	42	62
	Summer (Feb. – May)	41	52	53	65	46	53	53	72
III	Monsoon (June – Sept.)	47	52	72	66	42	59	42	63
	Winter (Oct. – Jan.)	36	39	40	42	36	38	42	54
	Summer (Feb. – May)	40	44	38	54	38	42	40	63

Hardness

Table 5

Total Hardness at the Three Sampling Stations

Station no.	Seasons	Months							
		1		2		3		4	
		I	II	I	II	I	II	I	II
I	Monsoon (June – Sept.)	83	81	73	65	71	88	91	94
	Winter (Oct. – Jan.)	53	61	43	31	57	63	71	82
	Summer (Feb. – May)	63	75	53	42	61	76	80	88
II	Monsoon (June – Sept.)	72	68	66	52	34	70	84	88
	Winter (Oct. – Jan.)	46	53	38	23	51	57	69	72
	Summer (Feb. – May)	60	74	48	38	51	67	78	83
III	Monsoon (June – Sept.)	68	62	56	48	51	71	80	78
	Winter (Oct. – Jan.)	37	45	27	25	48	51	58	68
	Summer (Feb. – May)	52	69	35	27	42	51	74	81

The fluctuations of population densities of ciliates at the three sampling station during a period of one year are determined.

The class polymenophorea was represented by Halteriidae halteria, Euplotes affinis, Euplotes patella, Oxytricha fallax.

The salient features of the observations are the population pattern 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 – Halteria grandinella, Halteriidae halteria, Euplotes affinis, Euplotes patella, Oxytricha fallax.

The class polymenophorea was represented by one sub-class spirotrichia which was represented by two orders. Oligotrichida and hypotrichida oligotrichida was represented by a single species. Halteria grandinella and the order Hypotrichida was represented by three species, Euplotes affinis, Euplotes patella and Oxytricha fallax.[5-7]

Polymenphorea was least represented from forming 15.67% and 5.98% of total population with a density of 28/ml and 7.0/ml at the station one. At the second station, class polymenophorea was having 23.77% and 13.28% of total population with a density of 83ml and 43ml. At station 3, polymenophorea was least recorded forming 19.79% and 20.33% of total population with a density of 44/ml and 52/ml.

The class polymenophorea was dominant in monsoon at station 1, while it was dominant in winter at station 2 and 3.

The distribution and abundance of ciliates like other microbial communications is governed by a variety of ecological factors.[8-9]

In the present study, the water temperature was consistently lower than the atmosphere themperature (Table 1). The pH showed an alkaline range throughout, rarely it was acidic. The D.O. was more the winter and less in summer. Alkalinity was maximum in monsoon and minimum in winter. The hardness was more in summer moderate in winter and less in monsoon.

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

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