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Research Article

DIVERSITY OF FRESHWATER PROTOZOANS FROM LITTORAL ZONE OF VENNA LAKE IN MAHABALESHWAR

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ABSTRACT

The species composition population and diversity of protozoa in littoral zone of Venna Lake of Mahabaleshwar, Dist. Satara, Maharashtra, during January 2016 to December 2016 is studied. On annual mean basis the total number of protozoan species estimated was to be 78. It seems that if the species variety at given time is considered the ciliates count approximate 84 %, flagellates about 7% and rhizopods are 9% of total protozoan population. By species composition Flagellates comprised 19.23 %, rhizopods were 37.17 % and ciliates were 43.58 %. Throughout the year ciliates dominated the total number and in number of varieties. The average density of total protozoa found minimal in February and peak in December. The maximum concentration of protozoa was found at a site influenced by organic waste.

Keywords: protozoa, ciliata, rhizopoda, flagellata, venna lake.

INTRODUCTION

Protozoan population plays a significant role on the microbial food webs from the soil and water ecosystems. Their predatory activities on bacteria and thus reduce their numbers in environments rich in organic matter. They also feed voraciously on phytoplankton (Finlay et al., 1988 Pratt and Cairns, 1985). These activities are also involved in shaping the bacterial and phytoplanktonic distribution and composition as it has been reported in different aquatic environments (Gude, 1979; Simek et al, 1997; Jurgens et al, 1999; and Hahn and Hofle, 2001).

Population ecology of protozoa has been widely studied in different parts of world, but the interest of Indian limnologists seems to be concentrated more towards phytoplankton and other chemical parameters of water bodies, perhaps due to some methodological difficulties. And they could mention only a few varieties of Protozoa while when only the population and types of Protozoa was studied some interesting results were obtained. Still comprehensive studies on Protozoa on various water bodies are lacking.

The present investigations were undertaken with the objectives of describing the diversity, abundance and seasonal distribution of protozoa in the littoral zone of a freshwater oligotrophic Venna lake of the Mahabaleshwar in Maharashtra state. The Venna Lake is one of the most popular lakes from western Maharashtra situated in famous hill station Mahabaleshwar. It lies between Latitude 17055 '0"to 73040'0". The lake was constructed by Shri Appasaheb Maharaj who was the ruling Satara in 1842. The area of lake is about 113311.98 sq. m. Due to hill region water comes from all high places and gathered in lake. The water of this lake is used for domestic and boating purposes; it is also supplied to hill station Mahabaleshwar and nearby villages.

SAMPLING AND IDENTIFICATION

Suitable sites for sample collection from Venna lake were identified, having fewer disturbances of the tourists and local people. Freshwater samples along with some waterweeds, algae, bottom ooze and flocculent matter arising out of washing waterweeds and aquatic plants from littoral zone was collected and brought to the laboratory; stored in wide mouthed specimen glass jars. Temperature and pH of water at the collection site was recorded. Then observed for

occurrence of protozoon under low and high power of compound microscope. It is necessary to keep the collected sample in laboratory for at least fifteen days so as to allow less populated protozoan to increase its number by division and to study progressive and retrogressive changes in varieties due course. Frequent observations were made to ensure coverage of most of the varieties under observation. Some of the ciliate and flagellate varieties are so fast moving that Photographs and videos of movements and binary fission and conjugation were recorded with Abbot digital eyepiece 5 MP as per required by magnification of 10X, 40X. Protozoan observed were identified using taxonomic criteria given by Hyman (1940), Westphal (1976), Jahn (1979) and Kudo (1977) and online references. Food preferences of various species are defined according to Kudo (1977), Pratt and Cairns (1985) and Finlay (1988)

The identified species or genera are listed in table 1. On annual mean basis the total number of protozoan species estimated was to be 78. Most of the times in the year ciliates dominated the total number and in number of varieties. It seems that if the species variety at given time is considered the ciliates count approximate 84 %, flagellates about 7% and rhizopods are 9% of total protozoan population. By species composition Flagellates comprised 19.23 %, rhizopods were 37.17 % and ciliates were 43.58 %. The average density of total protozoa found minimal in February and peak in December. Among flagellates *Euglena acus*, *E. spiroides*, and *E. oxyuris* dominated by occurrence and population. When maintained in laboratory there is decline in *E.acus* and other chloroplast containing flagellates and increase in population of *Parenima* is seen. *Palmella* is a stage of division among few flagellates shows very interesting amoeboid movement in jelly like embedding. Among rhizopods *Amoeba proteus, A. radiosa,Thecamoeba verrucosa, Actinospherium and Actinophrys, Arcella vulgaris, Difflugia oblonga, Centropyxis aculeate,* dominate throughout the year. In ciliates *Paramecium* varieties, *Euplotes*, *Coleps*, *Litonotus* and *Vorticella campanula, Vorticella microstoma, Spirostomum intermedium Stylonychia mytilus, Acineta lacustis* are seen throughout the year.

RESULTS AND DISCUSSION

In food chain of aquatic, terrestrial ecosystems it is stated that producers are always greater in biomass and number. As far as protozoan related food chain is concerned as majority of them devour bacteria; almost 50% of bacterial population is finished by them in soil and water. In oligotrophic lake algae and flagellates containing chloroplast are moderate to lesser in abundance. Bacterial and related protozoan population may have significantly increased due to marginal increase in organic waste and water pollution.

pH of all water samples ranges from neutral to alkaline and it is within the permissible limit (pH 6.5-8.5) and drinking water standards temperature of water body is recorded at the time of sample collection. Minimum and maximum temperature figures have been obtained from the reliable source given in table 2.

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Table 1: Different protozoan varieties and their relative abundance at selected collection spots

Sr. No.	Variety	Relative abundance
	Flagellata	
1	*Chrysamoeba radians*	P
2	*Spondylomorum quaternarium*	P
3	*Eudorina elegans*	P
4	*Euglena acus*	P
5	*Euglena spiroides*	P
6	*Euglena oxyuris*	P
7	*Euglena rubra*	P
8	*Euglena tripteris*	P ++
9	*Euglena anabaena*	P
10	*Phacus acuminata*	P +
11	*Phacus pleuronectes*	P +
12	*Lepocinclis ovum*	P ++
13	*Peranema trichophorum*	P +++
14	*Palmella stage of flagellates*	P +
15	*Chilomonas paremecium*	P ++

	Rhizopooda	
1	*Amoeba proteus*	P ++
2	*Amoeba radiosa*	P ++
3	*Amoeba gorgonia*	P +
4	*Amoeba discoides*	P +
5	*Hartmanella hyaline*	P +
6	*Pelomyxa palustris*	P +
7	*Mayorella vespertilo*	P +
8	*Astramoeba radiosa*	P ++
9	*Pelomyxa carolinensis*	P +
10	*Vexillifera ambulacralis*	P +
11	*Thecamoeba verrucosa*	P+
12	*Sappinia diploidia*	P ++
13	*Arcella vulgaris*	P ++++
14	*Arcella bathysto*ma	P ++
15	*Arcella catinus*	P ++
16	*Arcella megastoma*	P ++
17	*Arcella mitrata*	P ++
18	*Arcella artocrea*	P ++
19	*Arcella gibbosa*	P ++
20	*Arcella arenaria*	P +
21	*Difflugia oblonga*	P ++
22	*Centropyxis aculeata*	P ++
23	*Actinophrys sol*	P ++++
24	*Actinosphaerium eichhorni*	P ++++
25	*Astrodisculus radians*	P ++
26	*Lithocola globosa*	P
27	*Rhaphidiophrys pallid*	P +
28	*Rhaphidiocystis tubifera*	P +
29	*Acanthocystis aculeata*	P +
	Ciliata	
1	*Prorodon ovum*	P +
2	*Coleps hirtus*	P ++++
3	*Lacrymaria olor*	P +++
4	*Coleps octospinus*	P ++++
5	*Didinium nasutum*	P ++++
6	*Litonotus fasciola*	P ++
7	*Trachelius ovum*	P +
8	*Loxodus rostrum*	P ++
9	*Chilodonella cucullulus*	P ++
10	*Nassula elegans*	P ++
11	*Paramecium caudatum*	P +++
12	*Paramecium multimicronucleatum*	P +++
13	*Paramecium aurelia*	P +
14	*Paramecium bursaria*	P ++
15	*Spirostomum intermedium*	P +
16	*Spirostomum minus*	P +
17	*Oxytricha fallax*	P +
18	*Uroleptus limnetis*	P +
19	*Uroleptus longicaudatus*	P +
20	*Stylonychia mytilus*	P +++
21	*Stylonychia pustulata*	P +++
22	*Stylonychia notophora*	P +++
23	*Euplotus patella*	P +++
24	*Euplotes eurystomus*	P +++
25	*Euplotes aediculatus*	P +++
26	*Vorticella campanula*	P ++++
27	*Vorticella microstoma*	P ++++
28	*Carchesium polypinum*	P +
29	*Epistylis plicatilis*	P +
30	*Zoothamnium adamsi*	P +
31	*Vaginicola* sp.	P +
32	*Podophrya fixa*	P +
33	*Tokophrya infusionum*	P +
34	*Acineta lacustis*	P +

Table 2: Temperature and pH variations in Venna Lake, Mahabaleshwar; during January 2016 to December 2016

Month	Temperature Average ^{0}C		*Temperature of water body ^{0}C	*pH
	Max.	Min.		
January	25	12	23	7.0
February	26	13	23	7.0
March	28	18	26	7.0
April	29	17	26	7.2
May	32	27	29	8.8
June	24	20	23	8.0
July	22	18	22	7.2
August	22	19	21	8.4
September	26	20	24	8.4
October	28	19	25	8.0
November	25	19	21	6.9
December	26	15	23	6.9

* Temperature of water body and pH at the time of visit

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