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Studies on zooplanktons of Dhanora (Hattipaul) Lake of Buldhana district, Maharashtra.

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Abstract

The plankton constitutes the basic food sources of any aquatic ecosystem, which supports fish and other aquatic animals. Zooplankton diversity is one of the most important ecological parameters in water quality assessment. Zooplanktons are good indicators of the changes in water quality because they are strongly affected by environmental conditions & respond quickly to changes in water quality. Zooplankton is the intermediate link between phytoplankton and fish. Hence qualitative and quantitative studies of zooplankton are of great importance. In the present paper qualitative and quantitative studies of zooplanktons in Dhanora (Hattipaul) Lake of Buldhana district were carried out during February 2010 to January 2011.

Introduction

Plankton is part of aquatic life, which is composed of tiny organisms living and drifting in the direction of water current. It acts as the main source of food for most fauna, both in lotic and lentic water ecosystems. Zooplanktons are microscopic animals that eat other plankton. Zooplanktons occupy a central position between the autotrophs and other heterotrophs and form an important link in food web of the freshwater ecosystem. Zooplanktons constitute the food source of organisms at higher trophic levels. The Zooplankton and fish production depend to large degree on the phytoplankton (Boney, 1975). Zooplankton is a good indicator of changes in water quality because it is strongly affected by environmental conditions and responds quickly to changes in environmental quality. The major zooplankton groups vary in their relative abundance and they belong to these groups Rotifera, Cladocera, Copepoda, Ostracoda.

In ecologically, zooplankton are one of the most important biotic components influencing all the functional aspects of an aquatic ecosystem, such as food chains, food webs, energy flow and cycling of matter (Dadhick and Sexena, 1999; Sinha and Islam, 2002). The distribution of zooplankton community depends on a complex of factors such as, change of climatic conditions, physical and chemical parameters and vegetation cover. Most of the species of planktonic organisms are cosmopolitan in distribution (Mukherjee, 1997).

In this investigation, the data of zooplankton in Dhanora (Hattipaul) Lake was collected for one year, February 2010 to January 2011 inclusive, from selected stations.

Material and Method

1. Description of site:-

Dhanora (Hattipaul) Lake located at distance of 10 km. from Jalgaon (Jamod) Tahsil and 55 km. from Khamgaon, District Buldhana (MS.) India. The lake lies between 21º 07' 00" N latitude and 76º 27' 45" E longitude. Lake covers 31.20 hectors surface area with 268 m. length.

2. Collection of sample:-

Water sample from three selected stations were collected monthly during February 2010 to January 2011 on early morning hours between 7.00 to 10.00 am. The zooplankton sample will be collected by filtering 50 liters water through standard plankton net of bolting silk No.25. Concentrated sample was fixed in 4 % formalin.

3. Biological analysis:-

The supernant plankton's free water was removed and the settled zooplanktons were enumerated by 'Sedgwick-Rafter Cell' method. Identification of zooplanktons species was performed under microscope by using keys and monographs of standard References; Pennak (1978) and Adoni et. al.(1985).

Observation and Discussion

The abundance and distribution of zooplankton is guided by a variety of ecological factors. The physiochemical parameters such as temperature, light, pH, organic and inorganic constituents and the interrelationship with their organisms play an important role in determining the nature and pattern of fluctuation of population densities of zooplankton in an environmental unit. The importance of these factors has been stressed by several workers including Arora (1966), John et al.(1980), Kumar and Datta (1994), Kodarkar (1992) and Desilva (1996). However these parameters are extremely variable from place to place and from time to time. These parameters also interact with each other in a variety of ways. In such conditions it is rather difficult to draw specific conclusions about the individual effects of these parameters on population densities of zooplanktons. But it can be expressed in general that the fluctuating patterns of physico-chemical conditions of water affects the distribution of zooplankton. This microscopic taxonomical study of zooplankton revealed that 22 genera belonging to four major groups of Zooplankton (Rotifera, Cladocera, Copepoda and Ostracoda) inhabited the body of water. These groups with their respective genera composition are:

1) Rotifera (6 genera) i) *Brachionus sp.* ii).*Cephalodella sp.* iii) *Trichocerca sp..* iv) *Keratella sp.* v) *Lucane sp.* *vi) Dicranophorous sp.*	**2) Cladocera (7 genera)** i) *Allonella sp.* ii) *Bosmania sp.* iii) *cerodaphnia sp.* iv) *Dadaya sp.* v) *Daphnia sp.* vi) *Chydorous sp* *vii) Macrothrix sp.*
3) Copepoda (5 genera) i) *Cyclops sp.* ii) *Diaptomous sp.* iii) *Mesocyclops sp.* iv) *Microcyclops sp* *v) Macrocyclops sp.*	**4) Ostracoda (4 genera)** *i)Candona sp.* *ii) Cypris sp.* *iii) Cyclocyprus Sp* *iv) Stenocypris sp.*

These groups of zooplanktons show the following alternations in their sequence with change in season.

Summer: Copepoda > Rotifera > Cladocera > Ostracoda.
Monsoon: Copepoda > Cladocera > Rotifera > Ostracoda.
Winter: Rotifera > Copepoda > Cladocera > Ostracoda.

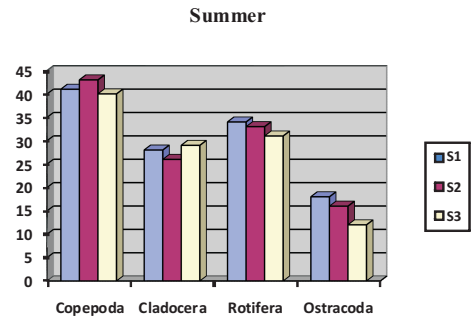
Rotifera, Cladocera, Copepoda and Ostracoda did not show any bloom but a peak was noticed in summer, followed by winter and the lowest numbers were present in the monsoon season. Within the groups no remarkable seasonal variations were noticed. The differences in the population of different components were not of significance. Zooplanktons of all major groups were observed in the summer season. The summer population maxima of zooplankton were co-related with higher temperatures, lower transparency, and a high standing crop of primary producers leading to greater availability of food. These same findings were expressed by Salve and Hiware (2010) who studied the zooplankton diversity of Wan reservoir, Nagapur (MS.), India.

According to Bais and Agrawal (1995), a progressive increase in the alkalinity of water also increased the zooplankton population. The simultaneous presence of dissolved oxygen and hard water also favored the production of zooplankton during the summer in both lakes. Similar results have also been suggested by a number of workers (Ramakrishnan and Sarkar, 1982; Bhati and Rana, 1987 and Kumar and Datta, 1994).

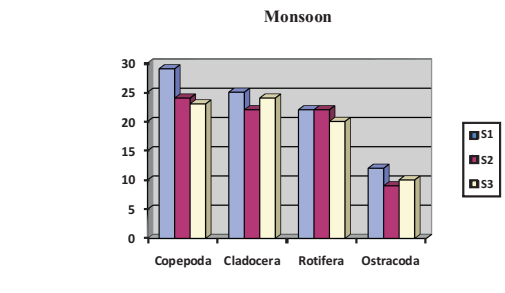
Normally the monsoon is associated with lower population densities due to its dilution effect and decreased photosynthetic activity by primary producers. Similar results have been shown by Bais and Agrawal (1993). The summer population of total zooplankton falls during the monsoon due to a dilution effect. The population rises to a higher level in the winter as a result of favorable environmental conditions, including temperature, dissolved oxygen and the availability of abundant food in the form of bacteria, nanoplankton and suspended detritus. Edmondson (1965) and Baker (1979) have also confirmed these findings. The findings have been tabulated in Table 1-2, Picture 1-4.

Table 1: Seasonal abundance of different groups of zooplankton and their concentration at different sites during January 2000 to December 2000. (No./l.)

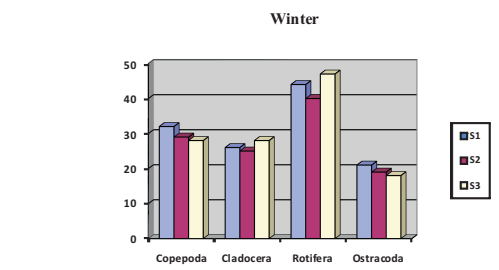
Season	Group	Station 1	Station 2	Station 3
Summer	Copepoda	41	43	40
	Cladocera	28	26	29
	Rotifera	34	33	31
	Ostracoda	18	16	12
Monsoon	Copepoda	29	24	23
	Cladocera	25	22	24
	Rotifera	22	22	20
	Ostracoda	12	09	10
Winter	Copepoda	32	29	28
	Cladocera	26	25	28
	Rotifera	44	40	47
	Ostracoda	21	19	18



Picture 1



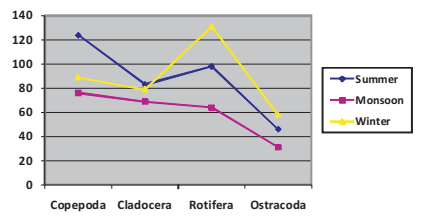
Picture 2



Picture 3

Table 2: Seasonal abundance of different groups of zooplanktons and their concentration during February 2010 to January 2011.(No./L)

Sr.No.	Group	Summer	Monsoon	Winter
01	**Copepoda**	124	76	89
02	**Cladocera**	83	69	79
03	**Rotifera**	98	64	131
04	**Ostracoda**	46	31	58



Picture 4

In conclusion, the diversity and density of zooplanktons from Dhanora (Hattipaul) lake of Buldhana district exhibited by four major groups (Rotifera, Cladocera, Copepod and Ostracoda) with 22 genera showed seasonal variability in density due to seasonal alternation in different physicochemical parameters. Zooplankton density was least in the monsoon seasons. This was due to dilution effect, high turbidity and less photosynthetic activity by the primary producers. Maximum population of Rotifera observed in winter season and Ostracoda did not show any seasonal remarkable fluctuations. Thus study has determined that abundance of zooplankton has been governed by the cumulative effect of physico-chemical and biological parameters.

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