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Rotifers as an indicator of water quality

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ABSTRACT

Rotifers are the connecting link between primary producers and consumers in aquatic food web. Ramala Lake is a historical impoundment situated in the heart of Chandrapur city. In present investigation zooplankton composition of water indicate more rotarian diversity in comparison to other groups. Rotifers stood first not only quantitatively but qualitatively also. The group was represented by 21 species of 12 genera.

Key words – Ramala Lake, zooplankton, rotifer, biodiversity, bioindicator

INTRODUCTION

Zooplankton is ecologically and economically important heterogenous group of tiny aquatic microorganisms. These are either herbivorous feeding on phytoplankton or carnivorous feeding on other zooplankton. They themselves fed upon by fish. The rotifiers constitute a dominant component of freshwater zooplankton and serve as a food for young ones and an adult of commercially important culturable fishes (Sharma 1991). These are considered as important bioindicator in depicting trophic status of water quality in ecosystem (Sladeck, 1983; Berzins and Pejler, 1987.) Rotifera is one of the fascinating groups of zooplankton in an aquatic ecosystem. Rotifera, also called as wheel animalcules, is one of the major phyla consisting about 1500 species. These are microscopic animals having flattened and ciliated ventral surface. Rotifer occurs almost universally in freshwater habitat. Rotifer diversity refers to varieties of species within their community. Rotifers are also known as the Rotatoria, originating in fresh water. They are harmless microorganisms with transparent bodies displaying a variety of forms with an amazing alacrity in movement and behavior; play a major role in trophic structure of an ecosystem by their numerical abundance. Eutrophic water bodies have rich rotifer diversity. Rotifers are the smallest animals and occur worldwide in primarily freshwater habitats. They are important in fresh water ecosystem as they occur in all biotypes. About 95% of the rotifers

are encountered in fresh water, while 5% are from brackish or marine water and most are free living. Like the other zooplankton, rotifers also form a link in the aquatic food chain. They have a rapid turnover and high metabolic rates and feed on detritus. Rotifers are extensively cultured as fish food.

The present study deals with rotifer species diversity and richness of Rotifers in Ramala lake of Chandrapur city, Maharashtra. Ramala lake is perennial rainfed water body constructed in Chandrapur city by Gond Raja in fifteenth century along the north east side of city wall. Lake is situated at 79˚18′ E longitude and 19˚18′ N latitude and about 232 meters above MSL.

METHODOLOGY

The zooplankton samples were collected early in the morning from the three sampling sites on monthly basis for two years i.e. from November 2005 to October 2007. The water was filtered through plankton net, made of bolting silk cloth and concentrate was collected in glass bottle, fixed in 4% formalin and specimens were identified according to the key from Edmondson (1959), Battish (1992).

RESULTS AND DISCUSSION

Zooplankton is an important index of secondary production and natural source of food for higher organisms including fishes. Zooplankton plays a key role in transferring energy from one trophic level to other in aquatic habitats. They are also used as biological indicators of water body.

The abundance of zooplankton has been governed by cumulative effects of physico-chemical variables, (Ahemed and Alizera,1992). Generally the species included in the zooplankton belongs to Protoza, Rotifera, Cladocera, Copepoda and Ostracoda. Zooplankton from Ramala Lake comprised of above said major five groups. Maximum density of zooplankton was found in summer. During present study, 43 species of zooplankton were identified.

The rotifers invariably constitute a dominant component of freshwater zooplankton and contribute significantly to their dynamics and production. (Sharma,1991). These organisms are regarded as valuable bioindicator to depict the trophic status of water quality. (Pejler, 1987) Rotifer species have been identified as indicators of water pollution (Arora, 1962). Several species of Brachionus are recorded from highly polluted fresh water lake. Hussainsagar, Hyderabad by Malathi et al. (1998). Varma and Datta (1987) reported eutrophication of water bodies on basis of Brachionus species. Rotifers play an important role as grazers, suspension feeders and predators within the zooplankton community. The difference in the periodicity and population density of different rotifers species can be analyzed by considering the nutritional ecology and biotic interactions. Rotifer species exhibit marked differences in their tolerance and adaptability to changes in physiochemical and biological parameters. Such changes are dramatic and sudden in case of urban ecosystem.

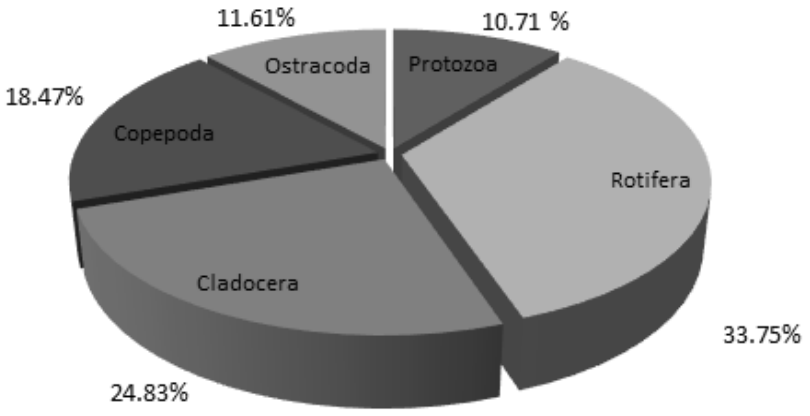

Fig. 1: Percentage composition of Zooplankton

Table 1: Rotifer species recorded from Ramala lake during study period November 2005 to October 2007.

Sr. No.	Species	Station I	Station II	Station III
1.	Brachionus calyciflorus	+	+	+
2.	Brachionus bidenta	+	+	+
3.	Brachionus falcatus*	-	+	+
4.	Brachionus forficula	-	+	+
5.	Brachionus durgae	+	+	+
6.	Brachionus quadridentatus	+	+	+
7.	Brachionus calyciflorus var.Melhin	+	+	+
8.	Keratella tropica	+	-	+
9.	Rotaria rotatoria*	+	-	-
10.	Lecane papuana	+	-	+
11.	Lucane bulla*	+	+	-
12.	Lecane styrax	-	-	+
13.	Testudinella sp.	-	-	+
14.	Filinia longiseta	+	-	-
15.	Asplanchna intermedia	+	-	-
16.	Trichocera Porcelhs	+	-	-
17.	Trichocera kostei	+	-	-
18.	Plantionus patulus	-	-	+
19.	Platuas quadricornis	+	+	-
20.	Philodina sp.	+	+	+
21.	Polyarthra indica	+	+	+

(+) = Present; (-) = Absent, (*) = Pollution indicator species

Water samples from three different stations were collected qualitative and quantitative analysis of zooplankton for the period of two years. During the present study, Rotifers stand first in order abundance, contributing 33.76% of total zooplankton. The rotifer population of the lake ranged between 01 units/L at station II in the month of February 2007 and 48 units/L at station II in the month of March 2006.The observation of zooplankton composition of water body indicates more Rotarian diversity followed by Cladocera, Copepoda and Ostracoda. Rotifers dominated the zooplankton population. Rotifers were not only numerically abundant but also showed maximum diversity.

Rotifers are microscopic soft bodied fresh water invertebrates. Their distribution and ecology have interesting evolutionary implication (Reid and Wood, 1976). Rotifers have been used to indicate trophic status of water body. Since long time the rotifers have been used as bioindicators of water quality, because of their diversity and cosmopolitan distribution. The group Rotifera was presented by 21 species of 12 genera. The lake represented highest number of species of genus Brachionus. 6 species pf this genus were recorded during the period of investigation. *Brachionus calyciflorus* and *Brachionus bidenta* dominated the lake at all the stations. *Brachionus falcatus* found only at station II.

The genus *Lecane* was represented by three species whereas genus *Trichocera* was represented by two species. Remaining 10 genera were represented by one species each. Rotifers were found to be maximum at the three stations. The group was found to be most dominant group at all the station. Maximum density of rotifers was found in summer followed by winter and monsson Welch (1952). Tandon and Sigh (1972) have shown a direct relationship between rotifer population and water temperature.

Brachionus sp. were found to be dominant throughout the study period. Six different species of Brachionus were found among which *Brachionus calyciferous* and *Brachionus bidentata* were found to be very common. Pollution indicator species like *Rotaria, Lepadella, Brachionus falcatus* were found abundant at station I and station II. Edmondson (1965) and Baker (1979)

observed the high rotifer population in winter and attributed to favorable temperature and availability of abundant food. In the present investigation, the species of rotifers found other that *Brachionus* and *Keratella* are *Lecane sp., Trichocera, Filina, Testudinella, Asplanchna Rotaria, Plantionus, Platyas, Cephalodella* etc. Tijare and Thosar (2007) have recorded nine species of *Brachionus* and 20 species of Rotifers from three lakes of Gadchiroli district. Similar observations with 7 species of *Brachionus* also made by Somani and Pejawar (2003) from Masuunda lake, Thane (M.S.).

According to Reid and wood (1976) rotifers never follow any predictable population pattern in fresh water impoundment. Deshmukh (2001) reported 28 species of Rotifera from Chhatri Lake of Amaravati with maxima in summer, which corroborate with the present investigation.

CONCLUSION

Rotifers are chiefly fresh water forms and presence of these microorganisms in abundance is related to the suitable conditions for their survival. Since long time, the rotifers have been used as bioindicator of water quality because of their diversity and cosmopolitan distribution. Rotifers such as B. forficula and Filinia logiseta are considered as indicator of eutrophy. But according to quantitative analysis of rotifers in present investigation which is not exceeding 200/1, the water body is oligotrohpic. Eutrophic water bodies have rich rotifer diversity

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