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POPULATION DYNAMICS OF ROTIFER FAUNA IN TWO EUTROPHIC PONDS OF BAHRAICH DISTRICT UTTAR PRADESH

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ABSTRACT

Rotifers are small, mostly freshwater animals, and are amongst the smallest members of the Metazoa, that group of multicellular animals which includes humans, and whose bodies are organized into systems of organs. Most rotifers are about 0.5mm in length or less, and their bodies have a total of around a thousand cells. This means that their organ systems are a greatly simplified distillation of the organ systems found in the bodies of the higher animals. Rotifers are highly nutritious food for the larvae of aquatic crustaceans and fish, aquaculture technologies have been producing enormous quantities of rotifers in very large culture systems for more than 30 year. In this regard, rotifers can be seen as living nutrients that is tiny, free swimming, food for crustaceans and fishes. Considering all the data of two sampling ponds, a total 37 genera of rotifers were reported. In Guthiya pond, 17 species of rotifers were recorded belongs to 6 genera, while in Dahaura pond 20 species were recorded belongs to 10 genera during the study period. In the present study total 16 genera were recorded among them the most abundant genera were *Brachionus* and *Keratella*. The maximum diversity of rotifers was observed in the monsoon season. In conclusion, variety of rotifers that were observed in Guthiya pond and Dahaura pond including *Brachionus* and *Keratella* species are inhabitants of moderately clean waters. However, more and more knowledge regarding morphological variations and physiological conditions of rotifers should be studied and then they can be used as better indicators of environmental quality.

Keywords: Rotifers, Dahaura Pond, Guthiya Pond, Bahraich, *Brachionus sp*, *Keratella sp*

INTRODUCTION

The occurrence and abundance of zooplankton depend on productivity of water body which in turn is influenced by biotic and abiotic factors. They link the primary producer, phytoplankton with higher large trophic level organisms. Zooplankton community responds to a wide variety of disturbances including nutrient overloading (Dodson, 1992). Zooplankton also plays a key role in aquatic food chain (Sharma, 1998). Owing to this they have attracted the attention of a large number of researchers throughout the world (Havel and Shurin, 2004; Israi *et al.*, 2006). Rotifers are generally present, in great numbers and with high species richness, in tropical zooplankton colonizing a wide variety of habitats from flooded areas (Martinez *et al.*, 2000; Lansac-Toha *et al.*, 2009) to large rivers, lakes and reservoirs (Sendacz *et al.*, 2006; Almeida *et al.*, 2009; Borges and Pedrozo, 2009).

Rotifers are highly nutritious food for the larvae of aquatic crustaceans and fish, aquaculture technologies have been producing enormous quantities of rotifers in very large culture systems for more than 30 year. In this regard, rotifers may be seen as living nutrients that is tiny, free swimming food for crustaceans and fishes. Some rotifers are highly specialized but most are opportunistic feeders since they consume and assimilate different types of food (Wallace *et al.*, 2006 and Wallace and Snell, 2010) reaching high population densities and diversities, as well as high tolerances to environmental conditions, thus making them among the most diverse group in environment. Rotifers are good pollution indicators (Sladeczek, 1983 and Chergui *et al.*, 2013). Besides, rotifers are used as indicators for pollution and eutrophication because of their high reproduction rate and sensitivity to any ecological change in water bodies (Lucinda *et al.*, 2004 and Yeole *et al.*, 2008). Work on rotifers in India is very limited and scattered (Vanjare,

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2008). Studies in India are concentrated largely in the North and North-eastern states (Sharma and Sharma, 2005).

According to a conservative estimate, there are over 500 species of rotifers in Indian waters, although only 330 species belonging to 63 genera and 25 families have so far been authenticated (Sharma 1998). More recently, Segers and Babu (1999) and Sharma and Sharma (2001) have added 5 new taxa to the Indian checklist. Although taxonomic studies of Indian rotifers began more than a century ago, information on rotifer biodiversity in Indian waters is still incomplete. Most investigations carried out on this group in India have usually been restricted to planktonic species collected from the pelagic zone, whereas the importance of littoral-periphytic habitats has generally been overlooked. There is an urgent need to conduct faunal surveys on a variety of aquatic habitats in this country.

In the Bahraich district, this group escapes the attention of the researchers for a long time and less work has been carried on rotifer ecology and distribution. Hence; it is proposed to make a survey of water bodies in and around Bahraich district, and to analyze the nature based on the presence or absence of indicator organisms.

MATERIALS AND METHODS

Samples were collected from different stations in these two ponds (Guthiya pond and Dahaura pond) by using horizontal sampling with plankton net (105µm mesh size). Samples were collected on a period of four months extending from December 2011 to March 2012. Rotifer samples were collected by filtering 5 lit of water from a particular site. Water samples at a site were collected from various depths instead of a particular point to avoid sampling errors. In the present study, the sampling was done in evening time between 3 to 5 pm, as rotifers have the tendency to migrate vertically for grazing on nutrient rich phytoplankton in the upper water column. Plankton was preserved in 5% neutral formalin. Fixed samples were carried to the laboratory for further analysis. From this rotifers were separated and temporary mounts were made using glycerin. Rotifer species were examined under the binocular microscope (Olympus CX 21 IFS1). The samples were thoroughly analyzed for the presence of various rotifer species. The rotifers were identified using various keys (Anitha *et al.*, 2006; Francis *et al.*, 2003; Pontin, 1978; Koste and Shiel, 1990 and Segers, 1995a) as well as image based identification provided by various websites (<http://rotifer.acnatsci.org/science>; <http://cfb.unh.edu>; www.glerl.noaa.gov/seagrant/GLWL/zooplankton/rotifers).

RESULTS AND DISCUSSION

Rotifers are pseudocoelmate animals with a size ranging 50-2000µm and commonly known as “Wheel animalcules” because of their characteristic ‘wheel organ’. They are ubiquitous, occurring in all types of fresh and brackish water habitats. About 95% species of rotifer are recorded from fresh water and remaining 5% are from marine water environment (Sharma, 1996; Karuthapandi *et al.*, 2013).

In the present study 37 species of rotifer have been reported from two different eutrophic ponds of Bahraich district belonging to 16 genera (Table) which comprises 10.88% of the known 340 species of Indian rotifer, out of 25 families and 63 genera of eurotoria so far known from India (Sharma, 1998). *Brachionus*, *Lecane* and *Keratella* are the dominant genera of this study which are represented by 7, 6 and 3 species respectively. The species richness of these three genera may be attributed to the general tropical character. Our results are in conformity with the other workers (Kumar and Senraj, 2013; Tayade and Dabhade, 2011; Sharma and Sharma, 2011).

There are number of minor reservoir, river, stream, community pond and lakes are present in the district Bahraich which has a great heterogeneity. These water bodies may pass a varied rotifer fauna, therefore littoral area along with limnetic area of these water bodies require more studies of rotifer fauna, because of that, there is an urgent need to conduct extensive surveys on the different aquatic ecosystems which will uncover many new, rare and endemic species.

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Table: Rotifer Fauna of Dhahura Pond and Guthiya Pond

	Name of Rotifer
1	<i>Brachionus angularis</i>
2	<i>Brachionus quadrates</i>
3	<i>Brachionus caudatus</i>
4	<i>Brachionus falcatus</i>
5	<i>Brachionus forficula</i>
6	<i>Brachionus bidendus</i>
7	<i>Brachionus quadridentatus</i>
8	<i>Keratella quadrata</i>
9	<i>Keratella tropica</i>
10	<i>Keratella vulga</i>
11	<i>Lecane (Monostyla) bulla</i>
12	<i>Lecane (Monostyla) Lunaris lunaris</i>
13	<i>Lecane hastate</i>
14	<i>Lecane quadridentata</i>
15	<i>Lecane obtusa</i>
16	<i>Lecane bidentata</i>
17	<i>Hydatina senta</i>
18	<i>Notops sp.</i>
19	<i>Chetonotus sp.</i>
20	<i>Colurus caudatus</i>
21	<i>Colurus rotandus</i>
22	<i>Colurus dicentrus</i>
23	<i>Rattulus sp</i>
24	<i>Rattulus longiseta</i>
25	<i>Collotheca ambigua</i>
26	<i>Collotheca pelagic</i>
27	<i>Filinia longiseta</i>
28	<i>Filinia termanilis</i>
29	<i>Mytilina ventralis</i>
30	<i>Philodina flaviceps</i>
31	<i>Philodina rosealla</i>
32	<i>Roteria neptunia</i>
33	<i>Roteria rotaria</i>
34	<i>Trichocerca cylindrical</i>
35	<i>Trichocerca tetractis</i>
36	<i>Gastropus minor</i>
37	<i>Gastropus stylifer</i>

Rotifers play vital role in interlinking the aquatic food chain, nutrient recycling and considered as a bioindicators of the habitats, Sharma (1996) and Segers (2008). They also serve as valuable indicators of water quality (Sladeczek, 1983; Yeole *et al.*, 2008).

Karuthapandi *et al*, (2013) reported 114 species of fresh water rotifers of Andhra Pradesh with valid nomenclature. According to him family *Lecanidae* and family *Brachionidae* have occupied high species richness. They reported 24 species of *Brachionus* and 26 species of *Lecane*. Our results are in agreement with the findings of these workers.

The notable feature of higher species diversity with relatively lower numbers of a large number of species noticed in the present study may be ascribed to fine niche portioning amongst rotifer species in combination with high micro and macro-scale habitat heterogeneity especially in littoral environments as

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suggested by Segers (2008). Specific observations are however desired to support this hypothesis. The generalizations on higher evenness and lower dominance concur with the results of Sharma and Sharma (2005) and Sharma and Sharma (2011) and appear to be salient features of the rotifer communities of the lentic ecosystem of North India.

Sitre and Zade (2012) identified 17 rotifer species belonging to 12 genera during the year span. The *Brachionus* was represented by 4 different species. Our results are well in agreement with above findings. Similar trend was also recorded in Rishi lake of Maharashtra (Kedar and Patil 2002) and Dal lake of Kashmir (Jeelani et al. 2005).

Vanjare and Pai (2010) recorded 13 species of rotifer including 5 new records to the Maharashtra state. Among the recorded species of rotifer, *Ptygura pedunculata* (Edmondson, 1939) is reported first time in India and the Oriental region.

Many authors have noted that *Lecane*, *Brachionus* are often present in large no of tropical aquatic body, community ponds and lakes also (Segers, 2001; Medina-Junior, 2000 and Hamaidi-Chegui et al. 2013). These same types were also collected in the present study. Occurrence of *Keratella* with *Brachionus* is indicative of nutrient rich status of the water body (Berzins, 1979). *Brachionus* formed the dominant and diversified genus among the rotifers throughout the study period from the Dahaura and Guthiya ponds of Bagraich district. Sunkad (2004) and Pawar and Pulley (2005) also observed the dominance of *Brachionus* in the Rakaskappa reservoir of Belgaum, North Karnataka and Pethwadaj Dam of Nanded District in Maharashtra state.

From the present study it is suggested that diversified rotifer fauna of Dahaura pond and Guthiya pond of Bagraich district can be linked with favourable conditions and availability of abundant food in the form of bacteria, nanoplankton, macrophytoplankton, animal waste and suspended detritus in the lake water.

Dahaura and Guthiya ponds are nutrient rich and contain diversified rotifer fauna. The above results are an effort of arbitrary and limited sampling for a short period. Detailed work in the future will ensure to yield new insight into the actual status of rotifer fauna in India.

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