

# Diversity and seasonality of rotifers in a lower Shiwalik lake, India

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## ABSTRACT

An attempt has been made to study the diversity and seasonality of rotifers inhabiting lake Mansar. A total of 27 species of rotifers belonging to 14 families were identified from an year long study. Family Brachionidae and Lecanidae were the dominant families with 7 and 6 species respectively. Most of the species were found in the littoral zone of the lake. A well marked seasonality of their abundance was observed throughout the study period. These species were observed to have variable temperature preference and thus were classified as eurythermal, cold stenothermal and warm stenothermal.

*Key words:* Rotifers, Seasonality, Littoral, Eurythermal, Stenothermal

## Introduction

Zooplankton are the basic component of aquatic biota and share an important role as an interface in aquatic food web (Adoni, 1985; Das *et al.*, 2011). Freshwaters are blessed with diversity of zooplankton and among them being rotifers. Rotifers or wheel animalcules, as term coined by Cuvier (1798), are organisms with bilateral symmetry, unsegmented non-coelomate body structure. Anterior ciliated trochal disc, used for feeding and locomotion, is a typical character of these organisms. Ever since first being described by Leeuwenhoek (1703), rotifers have been a classic choice for hydrobiologists due to their properties as-

- Rich larval live fed
- Their link in food chain
- Nutrient recycling capacity

- Water quality indicators (Ramchandra *et al.*, 2006; Sor *et al.*, 2015; Parmar *et al.*, 2016)

These microscopic organisms are also known to show polymorphism to avoid predation, apart from horizontal and vertical migrations (Jyoti and Sehgal, 1979). Thus, proper identification and enlisting of these economically important species is important and present attempt is to add a list of already existing species inhabiting a lake ecosystem.

## Materials and Methodology

**Study station:** For present study, Lake Mansar, situated at the foothills of Shiwaliks, was selected. It is a beautiful lake surrounded by pine-covered hills and is an important Ramsar site. It is considered as a holy lake and has religious significance. Its marvelous scenic beauty and recreational value is a centre

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of attraction for a lot of tourists. Apart from this, it is a habitat for numerous floral and faunal species.

**Qualitative analysis of zooplankton:** The sample was collected during morning hours. Collection of zooplankton was done by filtering 50 litres of water through a plankton net (mesh size 0.03 - 0.04 mm). The volume of filtrate was concentrated to 20 ml and for preservation, 5% formalin was added. Collected sample was then brought to laboratory for further processing. Identification of rotifers was done by observing the sample under a compound microscope. For taxonomic identification of rotifers, Pennak (1978), Adoni (1985), Battish(1992) and Edmondson (1992) were followed.

## Results and Discussion

From the present study conducted for a period of 12 months, a total of 27 species of rotifers belonging to 18 genera were enlisted (Table 1). These belonged to 14 families with maximum representation of families Brachionidae(7 species) and Lecanidae(6 species).

The dominance of families Brachionidae and Lecanidae is a very common pattern mostly observed in tropical waters by many workers (Ismail and Zaiden, 2015; Ansari and Singh, 2017; Manickim *et al.*, 2018)

Among the enlisted species, there was recorded a well marked seasonality along with the habitat preference. Organisms present in littoral zone showed seasonality and abundance as:

**Summer:** *Brachionus calyciflorus*> *Lecane quadridentata*> *Colurella obtusa*> *Cephalodella gibba*> *Mytilina ventralis*

**Winter:** *Lepadella ovalis*> *Mytilina ventralis*> *Brachionus quadridentatus*> *Scaridium sp.*> *Squatinella sp.*> *Lecane ohioensis*

The species recorded in limnetic zone also showed variability with seasons and also abundance as:

**Summer:** *Tetramastix opoliensis*> *Brachionus falcatus*> *Brachionus caudatus*> *Polyarthra vulgaris*> *Keratella tropica*> *Euchlanis dilatata*> *Lecane (Monostyla) bulla*> *Lecane (Monostyla) closterocerca*> *Lecane lunaris*

**Table 1**

S. No.	Family	Rotifer species
1	Flosculariidae	<i>Ptygura sp.</i>
2	Hexarthridae	<i>Hexarthra mira</i> (Hudson,1871)
3	Filiniidae	<i>Tetramastix opoliensis</i> (Zachariad,1898)
4	Notommatidae	<i>Cephalodella gibba</i> (Ehrenberg,1832)
5	Scaridiidae	<i>Scaridium sp.</i>
6	Synchaetidae	<i>Polyarthra vulgaris</i> (Carlin,1943)
7	Gastropodidae	<i>Ascomorpha sp.</i>
8	Trichocercidae	<i>Trichocerca similis</i> (Wierzejski,1893)
9	Brachionidae	<i>Brachionus caudatus</i> (Barrois and Daday,1894)
10		<i>B. patulus</i> (O.F.Muller,1786)
11		<i>B. falcatus</i> (Zachariad,1898)
12		<i>B. quadridentatus</i> (Zachariad,1898)
13		<i>B. calyciflorus</i> (Pallas,1766)
14		<i>Keratella tropica</i> (Apstein,1907)
15		<i>Platygaster quadricornis</i> (Wiszniewski,1954)
16	Euchlanidae	<i>Euchlanis dilatata</i> (Ehrenberg, 1832)
17	Mytilinidae	<i>Mytilina ventralis</i> (Ehrenberg,1832)
18	Lepadellidae	<i>Colurella obtusa</i> (Goose,1850)
19		<i>Lepadella ovalis</i> (O.F. Muller,1786)
20		<i>Squatinella sp.</i>
21	Lecanidae	<i>Lecane luna</i> (O. F. Muller,1776)
22		<i>L. ohioensis</i> (Herrick,1885)
23		<i>L. bulla (Monostyla bulla)</i> (Gosse,1851)
24		<i>L. quadridentata</i> (Ehrenberg, 1830)
25		<i>L. closterocerca</i> (Schmarda, 1859)
26		<i>L. lunaris</i> (Ehrenberg, 1832)
27	Trichotridae	<i>Trichotria sp.</i>

**Winter:** *Keratella tropica* > *Tetramastix opoliensis* > *Polyarthra vulgaris* > *Ptygura* sp. > *Brachionus caudatus* > *Trichocerca similis* > *Euchlanis dilatata* > *Lecane luna* > *Lecane (Monostyla) bulla* > *Hexarthra mira* > *Lecane (Monostyla) closterocerca* > *Trichotria* sp. > *Cephalodella gibba* > *Brachionus patulus* > *Ascomorpha* sp. > *Platyias quadricornis*

The collected data reveal that highest number of species were found in littoral zone due to presence of vegetation for refuge from light and predators, less stressful environment, more availability of food and temperature change. Among the species enlisted, *Mytilina ventralis*, *Lepadella ovalis*, *Lecane quadridentata*, *Lecane ohioensis*, *Lecane lunaris*, *Colurella obtusa*, *Scaridium* sp., *Squatinella* sp., *Brachionus quadridentatus* and *Brachionus calyciflorus* were exclusively littoral. Such horizontal distribution can be linked with hunt for requisite food or avoidance of predation by finding refuge in vegetation (Pratiwi *et al.*, 2016; Sharma *et al.*, 2017; Sharma and Sharma, 2018)

While studying seasonality, temperature was observed to play a pivotal role. Depending upon the range of temperature preferred by enlisted species, they were classified into following groups:

**Eurythermal :** *Keratella tropica*, *Polyarthra vulgaris*, *Trichocerca similis*, *Ptygura* sp., *Hexarthra mira*, *Tetramastix opoliensis*, *Mytilina ventralis*, *Euchlanis dilatata* and *Lecane (Monostyla) closterocerca*

**Cold stenothermal:** *Lecane luna*, *Ascomorpha* sp., *Scaridium* sp., *Lepadella ovalis*, *Colurella obtusa*, *Trichotria* sp., *Cephalodella gibba*, *Brachionus quadridentatus* and *Platyias quadricornis*

**Warm stenothermal:** *Lecane ohioensis*, *Lecane (Monostyla) bulla*, *Lecane quadridentata*, *Lecane lunaris*, *Brachionus caudatus*, *Brachionus patulus*, *Brachionus falcatus*, *Brachionus calyciflorus* and *Squatinella* sp.

Such variability of species with changing temperature highlights the differential requirement of optimal temperature range by different species. Such variability may also be favourable for reducing competition among rotifers and thus assuring their presence in a water body.

**Conflict of Interest:** the authors declare no conflict of interest.

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