

Studies on Rotifer Diversity from Various Water Bodies in Baramati City

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Abstract

The objective of this study was to assess the diversity of rotifers in various freshwater bodies of Baramati city, Maharashtra, to better understand their ecological roles and potential as bioindicators of aquatic ecosystem health. It was hypothesized that water bodies within Baramati would host a diverse rotifer community influenced by local environmental conditions. To evaluate this, samples were collected from multiple sites, including ponds, lakes, and stagnant waters, and identified using standard taxonomic keys. The investigation resulted in the identification of 12 rotifer species belonging to 6 families and 3 orders. The presence of these species indicates a moderately diverse rotifer community and reflects the ecological variability of the region's freshwater habitats. These findings provide baseline data for future ecological monitoring, support the use of rotifers in environmental assessments, and emphasize the importance of conserving microfaunal diversity to maintain ecosystem balance.

KEYWORDS

Rotifer diversity, Freshwater ecosystems, Baramati, Bioindicators, Aquatic microfauna.

INTRODUCTION

Rotifers are microscopic, aquatic animals belonging to the phylum *Rotifera*. These organisms are renowned for their exceptional diversity, with over 12,000 species described worldwide, and are found across a wide range of habitats from freshwater lakes, rivers, and ponds to marine environments and damp terrestrial areas. Characterized by a ciliated structure called the corona, which aids in locomotion and feeding, rotifers vary greatly in form and size, with some species measuring only a few micrometers. Their ability to adapt to extreme environmental conditions, including seasonal and ephemeral water bodies, further highlights their ecological versatility.

Biodiversity, the variety of life at all organizational levels, encompasses not only the richness of species but also their genetic, ecological, and functional variations. Within aquatic ecosystems, rotifers contribute significantly to biodiversity and play an essential role in trophic dynamics and nutrient cycling. Acting as primary consumers, rotifers feed on algae and bacteria and, in turn, serve as prey for higher trophic organisms. Their abundance and distribution patterns have made them key components of freshwater zooplankton, often alongside cladocerans and copepods. Previous studies [Somani et al., 2011; Arora, 1996; Segers, 2008] have demonstrated the utility of rotifers in ecological monitoring, as their populations are sensitive to shifts in environmental conditions, including temperature, pH, dissolved oxygen, and nutrient availability.

Despite their ecological significance, there is still a lack of localized data on rotifer diversity, especially in semi-urban or rural regions such as Baramati city in Maharashtra. Most studies have focused on large freshwater bodies or specific industrial areas, leaving a knowledge gap regarding rotifer communities in small, diverse aquatic habitats. Understanding rotifer diversity in such regions is essential for assessing water quality and maintaining ecosystem health, particularly in the face of growing anthropogenic pressure and climate variability.

The present study was undertaken to investigate the diversity of rotifers in various freshwater bodies of Baramati city. It was hypothesized that the water bodies in this region support a diverse rotifer community influenced by environmental conditions. To test this hypothesis, rotifer samples were collected from multiple freshwater sites and analyzed using standard taxonomic methods. This study aims to provide baseline data on rotifer diversity in Baramati and contribute to the broader understanding of freshwater microfaunal communities, potentially supporting future ecological monitoring and conservation efforts.

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MATERIALS AND METHODS

Sampling Equipment:

Plankton nets, slides, coverslips, and containers (2-liter sterilized plastic bottles) were used for water sample collection. A compound microscope (Magnus MLX-B Plus) with 10x and 40x objectives and a light microscope were used for morphological identification of rotifer species.

Study Area and Selection of Sampling Sites:

Water samples were collected from various freshwater habitats within Baramati city, located in Pune district, Maharashtra, India. The sampling sites included the Karha River, local freshwater ponds, and lakes, selected randomly to represent different aquatic habitats within the urban and peri-urban landscape of Baramati.

Materials Used:

Standard water sampling containers (2-liter plastic bottles, sterilized) were used for collecting water samples. Microscopic analysis was performed using a compound light microscope (Magnus MLX-B Plus) with 10x and 40x objectives. A digital camera attached to the microscope was used for capturing microscopic images.

Sample Collection Procedure:

Water samples were collected during two seasonal periods: the post-monsoon season (September to October 2024) and the winter season (December 2024 to February 2025). Weekly collections were made in the early morning between 8:00 and 10:00 AM. Samples were collected from the surface water using clean containers and transported to the laboratory in insulated boxes to maintain sample integrity.

Laboratory Analysis:

In the laboratory, water samples were allowed to settle for 30 minutes before decanting the upperlayer. A drop of concentrated water sample was placed on a clean glass slide and observed under a light microscope. Rotifers were examined and photographed at 10x and 40x magnifications.

Multiple fields were observed per sample to ensure representative identification.

Identification of Rotifer Species:

Rotifer species were identified using standard taxonomic keys and published references. The identification was based on morphological features and photographic evidence. The following resources were used:

Edmondson, W.T. (1959). *Freshwater Biology*. Segers, H. (1995, 2008). *Rotifera Monographs*. Sharma, B.K. (1991, 2004). Sharma, B.K. and Sharma, S. (2018). *Indian Rotifera Fauna*.

RESULTS

In the present study, a total of 12 rotifer species belonging to 6 families and 3 orders were recorded from various water bodies in Baramati city. The systematic list of species identified during the study is provided below. Among the families recorded, *Philodinidae* was the most dominant, with 6 species observed. Within this family, the genus *Philodina* was represented by 3 species, while 3 species from the genus *Rotaria* were also recorded.

A higher diversity of species was found in the freshwater ponds of Baramati, where 10 species were identified, compared to only 2 species recorded from the Karha River at Kasaba. Among the species observed, *Philodina* and *Rotaria* were the most dominant, while *Limnias* species appeared less frequently but were still notable in aquatic habitats.

In conclusion, rotifers form a significant component of the zooplankton community in the aquatic ecosystems of Baramati city. The genera *Philodina* and *Rotaria* were the dominant and most diverse groups throughout the study period. Additionally, *Limnias* species were the second most abundant, often found in a variety of aquatic environments.

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These findings suggest that rotifer diversity in Baramati is influenced by favorable environmental conditions and the availability of abundant food sources, including bacteria and micro-phytoplankton.

List of Rotifer species recorded from Baramati City at various regions

Sr.No.	CLASSIFICATION
	Phylum: Rotifera
	Class: Bdelloidea
	Order: Bdelloida
	Family: Philodinidae
1	Philodina megalotrocha
2	Philodina acuticornis
3	Philodina species
4	Rotaria tardigrada
5	Rotaria vulgaris
6	Rotaria species
	Class: Monogononta
	Order: Ploima
	Family: Notommatidae
7	Cephalodella species
	Family: Trichocercidae
8	Trichocerca pusilla
	Family: Lacanidae
9	Lecane bulla
	Family: Epiphanidae
10	Epiphanes clavulata
	Order: Flosculariaceae
	Family: Flosculariidae
11	Limnias melicerta
12	Limnias novemcornis

Photo Plate. 1 Rotifers from Baramati city in various regions





Name of the rotifers of photo plate 1:

- a. Philodina megalotrocha
- *b. Philodina acuticornis*
- *c. Philodina species*
- d. Rotaria tardigrada
- e. Rotaria vulgaris
- f. Rotaria species
- g. Cephalodella species

- h. Trichocerca pusilla
- i. Lecane bulla
- j. Epiphanes clavulata
- k. Limnias melicerta
- l. Limnias novemcornis

Discussion

The aim of the present study was to assess the diversity of rotifers in various aquatic ecosystems of Baramati city. A total of 12 species of rotifers were recorded, with *Philodina* and *Rotaria* as the dominant genera. The findings are consistent with previous studies that report *Philodina* and *Rotaria* as common and abundant genera in freshwater habitats (Segers, 2008; Sharma and Sharma, 2018).

The dominance of *Philodinidae* is particularly noteworthy. This family is widely distributed in freshwater ecosystems and is known for its ability to adapt to a wide range of environmental conditions, which might explain its prevalence in



the study area. The species *Philodina megalotrocha* and *Rotaria tardigrada* were found in high abundance, supporting the idea that

these species are well-adapted to the local environmental conditions, including stable food sources such as algae and bacteria.

The relatively lower diversity of rotifers in the Karha River, with only 2 species recorded, may be due to the specific environmental conditions of the river, such as water flow, sediment composition, and water quality, which may be less favorable for a broader range of rotifer species. On the other hand, the ponds in Baramati offer more stable and nutrient-rich conditions, which likely support a higher diversity of rotifers. Similar observations have been made in other studies, where rotifer diversity was found to be higher in more stable and nutrient-rich freshwater habitats (Somani et al., 2011).

Interestingly, *Limnias* species, though less abundant, were still present in the study area, indicating their adaptability to various freshwater environments. The relatively low abundance of *Limnias* species could be due to their specific ecological requirements or sensitivity to environmental changes, as shown in previous studies (Segers, 2008).

Overall, the study supports the hypothesis that rotifer diversity is influenced by both habitat conditions and the availability of food resources. Rotifers are critical components of freshwater ecosystems, playing an important role in nutrient cycling and serving as a food source for higher trophic levels.

Conclusion

This study provides a comprehensive account of the rotifer diversity in Baramati city, with 12 species recorded across various freshwater habitats. The results highlight the dominance of *Philodina* and *Rotaria* species in these ecosystems. The findings suggest that rotifer diversity is closely linked to favorable environmental conditions and the availability of food, such as bacteria and micro-phytoplankton.

The study also emphasizes the importance of rotifers as bioindicators of aquatic ecosystem health and their significant role in the trophic dynamics of freshwater ecosystems. Future research should explore the influence of environmental factors, such as water quality and seasonal changes, on rotifer distribution. Understanding these relationships can contribute to the effective management and conservation of freshwater habitats.

ACKNOWLEDGEMENT

I am thankful to Dr. A.S. Jagtap, Principal, T.C. College, Baramati, and Anekant Education Society, Baramati, for providing all the necessary facilities. I would also like to express my sincere gratitude to Dr. S.P. Chordiya, Head, Department of Zoology, T.C. College, Baramati, for offering the required facilities and providing constant encouragement throughout the research project.

I am especially grateful to Mr. Y.D. Awaghade for his inspiring support. I extend my deepest gratitude to my research project guide, whose inspiring guidance, constructive criticism, and constant encouragement were pivotal to the completion of this work.

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