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Biodiversity and Morphometric Analysis of Rotifers found in three different Freshwater habitats in Relation to Water Parameters in Baramati tehsil, Pune district, Maharashtra, India

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Abstract

The present study investigated the diversity of Rotifers found in three different freshwater habitats Lake present in MIDC (R-1), Songaon river (R-2) & Small Pond in Tandulwadi (R-3) which are present in Baramati tehsil, Maharashtra (India). Rotifers are microscopic forms of zooplankton found in a variety of freshwater bodies such as lakes, ponds, pools, reservoirs, and rivers. Also, found in sea water They are likely tiny organisms, which tells us a lot about water quality. They are serves as pollution indicators because they are very sensitive to changes in their environment, so if the water is polluted firstly it will lead to death of rotifers. This research demonstrated diverse array of rotifers, including 5 families; Brachionidae, Philodinidae, Lecanidae, Lepadellidae, Asplanchnidae. Among 5 families the most dominant family is Brachionidae. The observed rotifers include Brachionus forficula, Brachionus budapestinensis, Brachionus caudatus, Brachionous falcatus, Keratella tropica, Brachionus sp., Monostyla closterocerca, Philodina sp., Asplanchna sp., Rotaria scopoli, Lapdella ovalis. From selected 3 sampling sites, it was found that lake present in MIDC has high rotifers diversity. Also, in this work, checked the water parameters of selected region which including pH, temperature, alkanity, dissolved oxygen, hardness.

Keywords: *Biodiversity, Rotifers, Brachionidae, Temperature, Dissolved oxygen, Alkanity, Hardness, pH.*

Introduction

Rotifers are microscopic forms of zooplankton found in a variety of freshwater bodies such as lakes, ponds, pools, reservoirs and rivers. They are also found in sea waters. Their size varies between 40 micron to 2.5 mm. they are also known as "Wheel-Animalcule" due to the presence of anterior ciliated wheel like structure called Corona or Trochal disc. It is used for feeding and locomotion purpose. Usually they are elongated in shape. Having body is bilaterally symmetrical, unsegmented and non-coelomate. They are free swimming, fastly move by looping movements with help of tail [1]. Many rotifers are pollution indicators [2]. The digestive system of rotifers is composed by alimentary canal is entire with a muscular pharynx with chewing apparatus called mastax. Excretory system has flame cells [3] and having nervous system is simple [4].

Phylum-Rotifera (*Rotifers*) containing two groups; Monogononta and Bdelloidae [5]. In Phylum Rotifera, more than 2030 known species, they classified into three main groups; the parthenogenetic subdivision Bdelloidea (461 species), the largest subdivision Monogononta (1570 species), and the marine subdivision Sisonida (only 4 species) [6]. Rotifers are tool for environmental assessments because they are abundant and are an important part of freshwater food webs [7,8]. Also, they are known as cosmopolitan and their distribution is generally limited by environmental and geographical barriers [9,10]. And the one more reason to called them as cosmopolitan is their evolutionary adaptations, they segregate according to the habitats specificity [11,12]. Rotifers can to convert primary production into secondary consumer form, producing 50% of total plankton biomass [13]. They serves as ecological or pollution indicators of water quality because they are very sensitive kind of animals, hence also known as trophic status indicators [14].

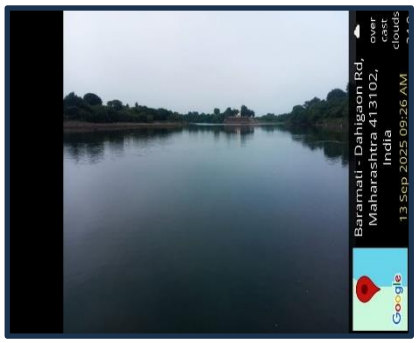
The present study aimed to assess the diversity of rotifers in 3 freshwater bodies of different habitat in Baramati city, Maharashtra, India. The study involved the random selection of 3 sampling sites within Baramati tehsil, specifically three regions: Lake present in MIDC (R-1), Songaon river (R-2) & Small pond in Tandulwadi (R-3) for the purpose of investigating rotifers diversity.

Materials And Methods:

The water sample is collected in between 15 days gap from the three sites from August 2025 to March 2026 with sampling conducted between 06:00 AM to 07:00 AM before sunrise because rotifers are very sensitive to sunlight, in specular reflection of sunlight they sinks down into water. The sampling (sample collection & filtration) is take place by plankton net (25 micron) size, followed by transportation of the collected samples to the laboratory analysis. The Rotifers are preserved by using 4% Formalin to preserved their body structure for long time. The rotifers were examined under a Transmitted Light Microscope at an initial magnification of 10X, with further high magnification. The photograph was taken of that observed specimen. The rotifers were identified through the using standardized keys and relevant published studies,viz[15,16,17] . Size (length & width in µm) of the rotifers is done by using IMAGE-J Software. Analysis of water parameters[18] such as (pH, Temperature both is done on selected site during collection) and Alkanity, Hardness, Dissolved Oxygen testing was done in lab.

Selected locations of Baramati for water sample collections

MIDC Lake (R-1)



Songaon River (R-2)

Tandulwadi Small Pond (R-3)

Results And Discussion:

Brachionus sp.

Keratella tropica

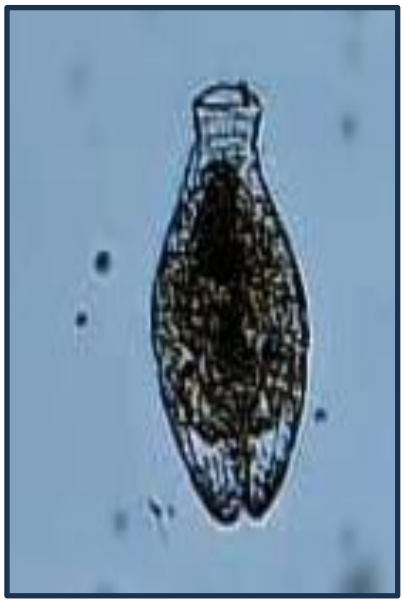
Lapadella ovalis

Brachionous falcatus

Brachionus budapestinensis

Brachionus caudatus

Brachionus forficula



Asplanchna sp.

Monostyla closterocerca

Philodina sp.

Rotaria scopoli,1777

The present study recorded total of 11 rotifers species belonging to five major families: Brachionidae, Philodinidae, Lecanidae, Lepadellidae, Asplanchnidae. Among 5 families the most dominant family is Brachionidae. The observed rotifers include *Brachionus forficula* , *Brachionus budapestinensis*, *Brachionus caudatus*, *Brachionous falcatus*, *Keratella tropica*, *Brachionus sp*., *Monostyla closterocerca*, *Philodina sp*., *Asplanchna sp*., *Rotaria scopoli*, *Lapdella ovalis*,. From selected 3 sampling sites, it was found that lake present in MIDC has high rotifers diversity (Table-1).
Also, in this work, checked the water parameters of selected region which including pH, temperature, alkanity, dissolved oxygen, hardness (Table-3).

Table 1: List of different species of Rotifers recorded in selected water bodies in Baramati tehsil

Sr. No.	Class	Order	Family	Genus	Species
1	Monogononta	Ploima	Brachionidae	*Brachionus*	*forficula*
2	Monogononta	Ploima	Brachionidae	*Brachionus*	*budapestinensis*
3	Monogononta	Ploima	Brachionidae	*Brachionus*	*caudatus*
4	Monogononta	Ploima	Brachionidae	*Brachionus*	*falcatus*
5	Monogononta	Ploima	Brachionidae	*Brachionus*	*sp.*
6	Monogononta	Ploima	Brachionidae	*Keratella*	*tropica*
7	Monogononta	Ploima	Lecanidae	*Monostyla*	*closterocerca*
8	Eurotatoria	Ploima	Lepadellidae	*Lepadella*	*ovalis*
9	Eurotatoria	Ploima	Asplanchnidae	*Asplanchna*	*sp.*
10	Eurotatoria	Philodina	Philodinidae	*Rotaria*	*scopoli*
11	Bdelloidea	Philodina	Philodinidae	*Philodina*	*sp.*

Among, Brachionus forficula, Brachionus budapestinensis, Brachionus caudatus, Brachionous falcatus, Keratella tropica, Brachionus sp., Monostyla closterocerca, found in MIDC Lake and Philodina sp., Asplanchna sp. in Songaon River and Rotaria scopoli, Lepadella ovalis from Small Pond in Tandulwadi region of Baramati tehsil.

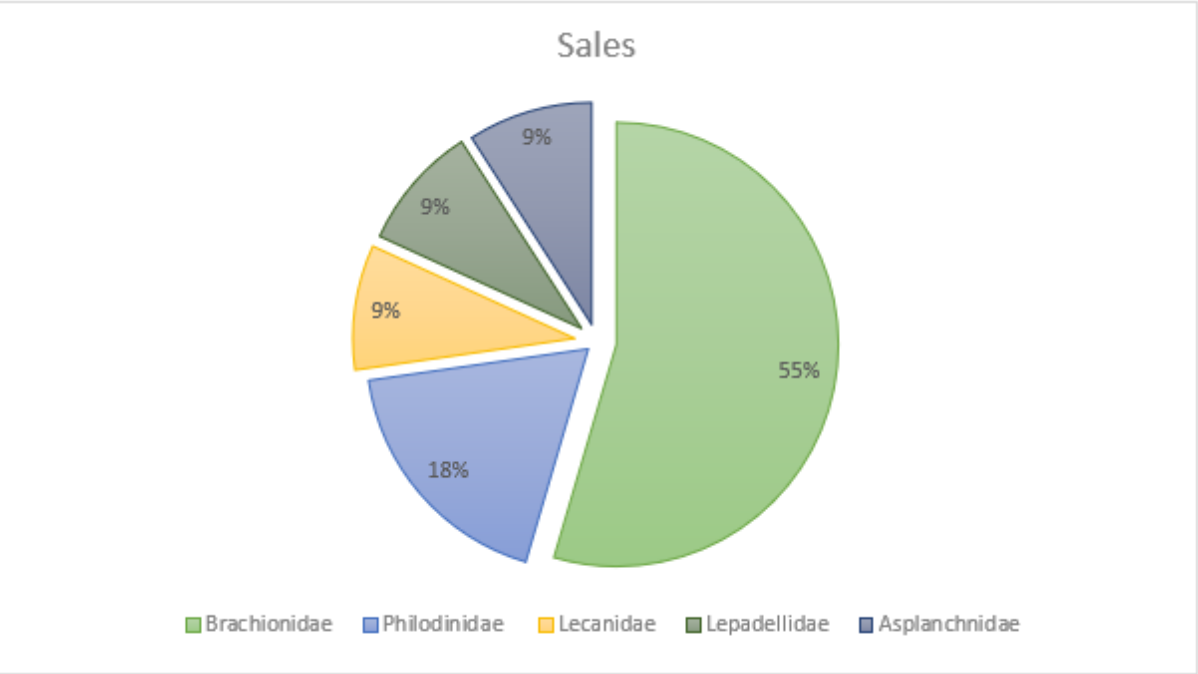


Fig 1: Showing % of the 5 families of Rotifers which explored from this Study

Scientific Name	Length	Width
Brachionus forficula	338.142µm	163.573µm
Brachionus budapestinensis	179.402µm	117.644µm
Brachionus caudatus	223.081µm	104.561µm
Brachionous falcatus	368.289µm	74.330µm
Keratella tropica	356.932µm	90.961µm
Brachionus sp.	197.752µm	55.803µm
Monostyla closterocerca	177.401µm	108.502µm
Asplanchna sp.	99.051µm	55.431µm
Philodina sp.	211.141µm	50.162µm
Rotaria scopoli	145.362µm	41.183µm
Lapdella ovalis	272.101µm	122.066µm

Table 2: Showing the Morphometry (Body Size) of the Rotifers which took by the IMAGE-J Software

PLEASE NOTE: The sizes of Rotifers was take on 10X Resolution of Microscpe.

Parameters	MIDC Lake	Songaon river	Small Pond in Tandulwadi
Temperature	28 °C	28 °C	28°C
pH	6.5	7	7
Alkanity	78.2mg/L	67.84mg/L	76.51mg/L
Dissolved oxygen	7.8mg/L	6.73mg/L	6.27mg/L
Hardness	55.32mg/L	61.54mg/L	51.32mg/L

Table 3: Results of water parameters of 3 different water samples

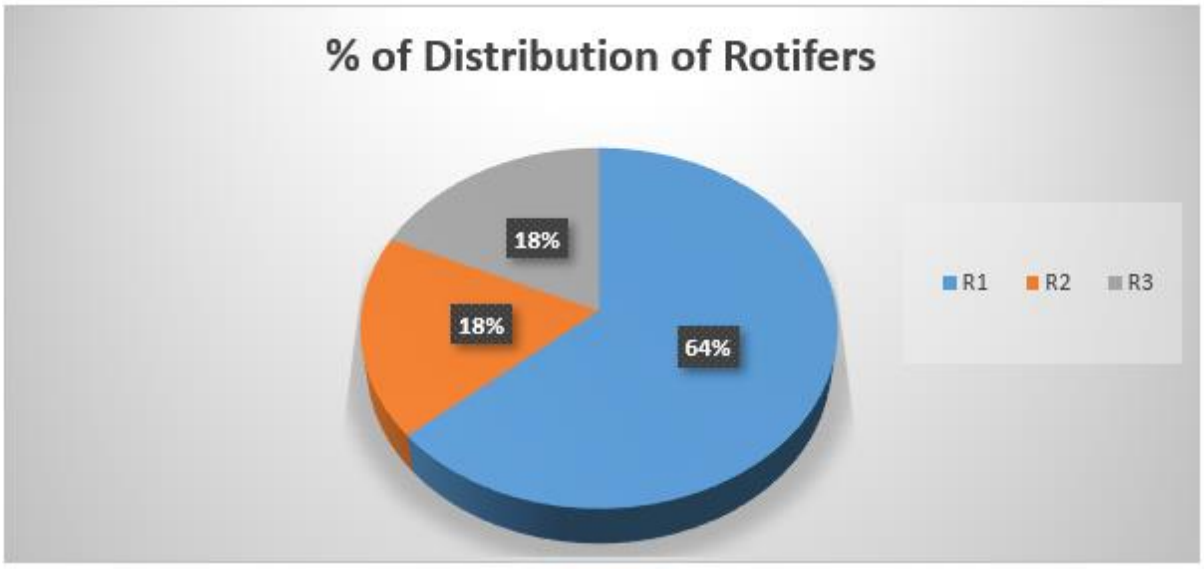


Fig 2: Showing % Distribution of Rotifers from different three sampling sites i.e., R1, R2, and R3 from Baramati tehsil

Conclusion:

The study on the biodiversity of rotifers in the Baramati region revealed a diverse assemblage of species in August 2025 to March month of 2026 five families of different rotifers, in freshwater bodies from different habitat. This research demonstrated diverse array of rotifers, including 5 families; Brachionidae, Philodinidae, Lecanidae, Lepadellidae, Asplanchnidae. Among 5 families the most dominant family is Brachionidae (Fig-1). The observed rotifers include Brachionus forficula, Brachionus budapestinensis, Brachionus caudatus, Brachionous falcatus, Keratella tropica, Brachionus sp., Monostyla closterocerca, Philodina sp., Asplanchna sp., Rotaria scopoli, Lapdella ovalis. Morphometric Analysis of each rotifer species performed by using IMAGE-J Software (Table-2). From selected 3 sampling sites, it was found that lake present in MIDC has high rotifers diversity (Fig-2). Also, in this study, checked the water parameters of selected region which including pH, temperature, alkanity, dissolved oxygen, hardness (Table-3).

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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