

## RESEARCH ARTICLE

## Rotifer diversity in Wainganga River at the region of Markandadeo, Tah-Chamorshi, District-Gadchiroli, Maharashtra (India)

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Manuscript Details	ABSTRACT
<p>Received : 03.06.2015 Accepted: 30.07.2015 Online Published: 30.08.2015</p> <p><b>ISSN: 2322-0015</b></p> <p><b>Editor: Dr. Arvind Chavhan</b></p> <p><b>Cite this article as:</b> Tijare RV and Gedekar SG. Rotifer diversity in Wainganga River at the region of Markandadeo, Tah-Chamorshi, District-Gadchiroli, Maharashtra (India) <i>Int. Res. J. of Science &amp; Engineering</i>, 2015; Vol. 3 (4):134-142.</p> <p><b>Acknowledgement:</b> Authors are very grateful to Director, institute of Science, Nagpur and head, Department of Zoology for availing the facilities for the laboratory work.</p> <p><b>Copyright:</b> © Author(s), This is an open access article under the terms of the Creative Commons Attribution Non-Commercial No Derivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.</p>	<p>Wainganga river being the largest lotic water body in the Gadchiroli district and plays an important role recharging the ground water aquifers. Due to north flowing in this specific area of Lord Shiva's temple it is recognized as holy place for pilgrims. Rotifers play a key role in cycling of organic material. They exhibit remarkable ability to colonize diversified freshwater biotopes and these are apparently the most sensitive indicators of water properties. Collection of plankton was carried out by using plankton net made of silk bolting cloth (200 meshes/cm) and qualitative and quantitative analysis was done by using S-R cell. In all 16 species of rotifers were identified during the investigation period i.e.2010 to 2012 and the dominant group was of family Brachionidae.</p> <p><b>Key words:</b> Rotifera, Wainganga, Markandadeo and Chamorshi.</p> <p><b>INTRODUCTION</b></p> <p>The Wainganga is one of the major tributaries of river Godavari. The River flowing from north makes a take 'U' turn to flow towards north again at only Markandadeo temple region and then it flows south on its way to meet Pranhita river and then finally mighty Godavari. It is situated at latitude 19° 59"55" North and 79° 52"21" East in Markandadeo, Thasil- Chamorshi and Dist. Gadchiroli. Due to north flowing in this specific area of Lord Shiva's temple it is recognized as holy place for pilgrims. The river being the largest lotic water body in the district and plays an important role recharging the ground water aquifers.</p>

Rotifers are the microscopic faunal component living mostly in freshwater, are characterized by the presence of an anterior wheel like rotating structure called "Corona". The habitat of rotifers may include still water environments, such as lake bottoms, as well as flowing water environments, such as rivers or streams. Rotifers are also commonly found on mosses, in rain gutters and puddles, in tanks of sewage treatment plants, and even on freshwater crustaceans and aquatic insect larvae. Rotifers play a key role in cycling of organic material. They exhibit remarkable ability to colonize diversified freshwater biotopes and these are apparently the most sensitive indicators of water properties (Somani and Pejaver, 2003).

## MATERIAL AND METHODS

Collection of plankton was carried out by using plankton net made of bolting silk cloth (200 meshes/cm). The free end of the net was attached to plastic bottle having 100 ml capacity. The plankton were collected randomly from three different sites (S1, S2 and S3) of river for quantitative and qualitative analysis. 50 liter water was filtered through the net from littoral and open water zones and carefully transferred the plankton to 100 ml bottle and then preserved in 4% formalin. Preserved samples were examined under a binocular microscope qualitatively with different magnification. Identification of plankton was done by using pertinent literature of Edmondson, (1959), Pennak (1989), Tonapi (1980) and Dhanapathi (2003).

Quantitative analysis of zooplankton was done by using Sedgwick Rafter counter cell. The sample is shaken well and 1 ml of sample is transferred quickly to the cavity with the help of graduated pipette in cell chamber and after putting a coverslip observed and counted the rotifers present in the collected water sample.

## OBSERVATION & RESULTS

In Site - I Maximum population observed of Rotifera with 77 ind /lt. in the month of November

during year 2010-11 and December during year 2011-12 and minimum population 1 ind / lt. was recorded in the month of August during year 2010-11. Seasonally, the maximum zooplankton density was recorded  $67.50 \pm 9.34$  ind / lt. during the winter season of year 2011-12 and minimum  $14.25 \pm 16.15$  ind / lt. during monsoon season of year 2010-11. During the year 2010-11, among Rotifera, *Keratella tropica*  $3.25 \pm 5.07$  ind / lt. was maximum in monsoon season while least appearance was shown by *Brachionus falcatus*  $0.25 \pm 0.43$  ind / ltr and *Filinia longiseta*  $0.25 \pm 0.43$  ind / lt. during monsoon season. In winter season, *Keratella tropica*  $9.25 \pm 6.61$  ind / lt. showed dominance followed by *Brachionus falcatus*  $8.50 \pm 2.06$  ind / lt. and minimum density was observed by *Filinia longiseta*  $0.75 \pm 0.83$  ind / ltr. In summer season, *Keratella tropica*  $7.25 \pm 4.82$  ind / lt. showed high density and low density was shown by *Trichocerca longiseta*  $0.50 \pm 0.50$  ind / lt. During the year 2011-12, in monsoon season *Brachionus falcatus* with  $3.50 \pm 4.97$  ind / lt. and *Trichocerca longiseta* with  $3.50 \pm 4.50$  ind / lt. were maximum and least appearance was shown by *Plationus patulus*  $0.25 \pm 0.43$  ind / lt. and *Brachionus plicatilis*  $0.25 \pm 0.43$  ind/lt. In winter season, *Brachionus falcatus*  $12.00 \pm 4.74$  ind / lt. showed dominance and *Brachionus rubence*  $0.75 \pm 0.83$  ind / lt. showed least appearance. In summer season, maximum density was recorded by *Brachionus falcatus*  $4.00 \pm 1.87$  ind / lt. and minimum density was recorded by *Brachionus plicatilis*  $0.75 \pm 0.83$  ind / lt.

During the present investigation, yearly the maximum average density of rotifers were recorded  $36.83 \pm 25.48$  ind / lt. during the year 2010-11 and  $39.58 \pm 24.45$  ind / lt. in year 2011-12. During the year 2010-11, yearly mean value of *Keratella tropica*  $6.58 \pm 6.09$  ind / lt. which was maximum among Rotifera and *Filinia longiseta*  $0.33 \pm 0.62$  showed minimum density. During year 2011-12, yearly mean value of *Brachionus falcatus*  $6.50 \pm 5.66$  ind / lt. was dominant and *Brachionus rubence*  $0.92 \pm 0.95$  ind/lt. showed least appearance.

In Site - II, maximum population of Rotifers was 134 ind / lt. in the month of October during

year 2011-12 and minimum population 2 ind / lt. was recorded in the month of July during year 2010-11. Seasonally, the maximum Rotifer density was recorded  $95.50 \pm 37.24$  ind / lt. during the winter season of year 2011-12 and minimum  $30.00 \pm 30.49$  ind/lt. during monsoon season of year 2010-11. In the year 2010-11, among Rotifers, *Brachionus diversicornis*  $4.00 \pm 4.90$  ind / lt. was maximum in monsoon season followed by *Keratella tropica*  $3.25 \pm 5.07$  ind / lt. while least appearance was shown by *Trichocerca cylindrica*  $0.25 \pm 0.43$  ind / lt. during monsoon season. In winter season, *Keratella tropica*  $10.00 \pm 4.95$  ind / lt. showed dominance followed by *Brachionus calyciflorus*  $8.25 \pm 1.48$  ind / lt. and minimum density was observed of *Trichocerca cylindrica*  $1.75 \pm 0.43$  ind / lt. In summer, *Keratella tropica*  $7.50 \pm 5.32$  ind / lt. showed high density and low density was shown by *Filinia longiseta*  $0.25 \pm 0.43$  ind / lt.

During the year 2011-12, in monsoon season, *Brachionus diversicornis* was maximum with  $6.25 \pm 9.71$  ind /lt. and least appearance was shown by *Brachionus plicatilis*  $0.75 \pm 0.83$  ind/ltr and *Brachionus rubence*  $0.75 \pm 0.83$  ind /lt. In winter season, *Brachionus forficula*  $14.00 \pm 5.61$  ind / lt. showed dominance followed by *Brachionus falcatus*  $13.00 \pm 11.68$  ind / lt. and *Brachionus rubence*  $0.50 \pm 0.87$  ind / lt. showed least appearance. In summer season, maximum density was recorded by *Brachionus falcatus*  $8.75 \pm 1.79$  ind / lt. and minimum density was recorded by *Filinia longiseta*  $0.75 \pm 0.83$  ind / lt.

During the present investigation, yearly the maximum average density of Rotifera was recorded  $54.08 \pm 33.78$  ind / lt. during the year 2010-11 and  $60.00 \pm 40.42$  ind / lt. during the year 2011-12. The yearly mean value of *Keratella tropica* with  $6.92 \pm 5.82$  ind / lt. was maximum among Rotifera and *Trichocerca cylindrical* with  $1.17 \pm 0.99$  ind/lt. showed minimum density. In 2011-12, yearly mean value of *Brachionus falcatus*  $8.25 \pm 8.05$  ind / lt. was dominant followed by *Brachionus forficula*  $7.75 \pm 5.95$  ind / lt. and *Lecane sp.*  $1.42 \pm 1.75$  ind / lt. showed least appearance. In sampling site -III maximum population of Rotifera with 92 ind / lt. in the

month of March during year 2010-11 and minimum population 1 ind / lt. was recorded in the month of July during year 2010-11. Seasonally, the maximum Rotifera density was recorded  $56.75 \pm 18.54$  ind / lt. during the winter season of year 2010-11 and minimum  $17.00 \pm 11.18$  ind / lt. during monsoon season of year 2011-12. Among Rotifera, *Platyonus patulus*  $3.25 \pm 3.70$  ind / lt. was maximum in monsoon season while least appearance was shown by *Lecane sp.*  $0.25 \pm 0.43$  ind / lt during monsoon season. In winter season, *Brachionus forficula*  $6.50 \pm 2.29$  ind / lt. showed dominance followed by *Brachionus calyciflorus*  $5.75 \pm 4.44$  ind / lt. and minimum density was observed by *Trichocerca cylindrica*  $1.00 \pm 0.71$  ind / lt. In summer season, *Brachionus calyciflorus*  $6.00 \pm 4.64$  ind / lt. showed high density followed by *Brachionus forficula*  $5.00 \pm 5.05$  ind / lt. and low density was shown by *Trichocerca cylindrica*  $0.75 \pm 0.83$  ind / lt. followed by *Monostyla sp.*  $0.75 \pm 1.30$  ind / lt. During the year 2011-12, in monsoon season, *Platyonus patulus* was maximum with  $2.75 \pm 3.27$  ind / Lt followed by *Brachionus forficula*  $2.75 \pm 1.64$  ind / lt. and least appearance was shown by *Trichocerca longiseta*, *Keratella tinicensis*, *Keratella tropica* and *Filinia longiseta* all with  $0.25 \pm 0.43$  ind / lt. In winter season, *Brachionus calyciflorus*  $7.50 \pm 3.64$  ind/ltr showed dominance followed by *Brachionus forficula*  $7.00 \pm 2.55$  ind / Lt and showed least appearance showed by *Brachionus plicatilis*  $1.00 \pm 0.71$  ind / lt. In summer season, maximum density was recorded by *Brachionus calyciflorus*  $7.00 \pm 3.54$  ind / lt. and minimum density was recorded by *Brachionus plicatilis*  $0.75 \pm 0.83$  ind / lt.

During the present investigation, yearly the maximum average density of Rotifera was recorded  $40.00 \pm 28.08$  ind / lt. during the year 2010-11 and  $36.08 \pm 21.48$  ind / lt. during the year 2011-12. While in year 2010-11, yearly mean value of *Brachionus calyciflorus* with  $4.83 \pm 4.28$  ind / lt. was maximum among Rotifera and *Trichocerca cylindrical* with  $0.58 \pm 0.76$  showed minimum density. During year 2011-12, yearly mean value of *Brachionus calyciflorus*  $5.67 \pm 3.92$  ind / lt. was dominant followed by *Brachionus forficula*  $4.50 \pm 2.75$  ind / lt. and *Filinia longiseta*  $0.33 \pm 0.62$  ind / lt. showed least appearance.

**Table 1: Monthly occurrence of Rotifera in Wainganga River at Markandadeo region during year 2010-11.**

Sr. No	Rotifer species	Jun	Jul	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar	Apr	May	Total
1	<i>Asplanchna sp.</i>	0	0	0	0	1	3	2	4	1	2	0	0	13
2	<i>Brachionus falcatus</i>	1	0	0	0	10	7	11	6	1	4	3	1	44
3	<i>B. forficula</i>	2	1	2	4	3	10	5	2	4	3	2	0	38
4	<i>B. plicatilis</i>	2	0	0	2	3	2	5	2	1	2	2	1	22
5	<i>B. quadricornis</i>	0	0	0	0	2	2	4	5	2	4	4	1	24
6	<i>B. rubence</i>	2	0	0	0	4	5	2	3	1	3	2	1	23
7	<i>B. diversicornis</i>	1	0	0	8	1	1	0	3	2	10	4	1	31
8	<i>B. calyciflorus</i>	1	0	0	8	8	11	10	4	2	5	3	1	53
9	<i>Filinia longiseta</i>	0	0	0	1	0	2	1	0	0	0	0	0	04
10	<i>Keratella tropica</i>	1	0	0	12	15	16	6	0	2	7	15	5	79
11	<i>K. ticinensi</i>	2	2	0	0	2	5	6	0	0	1	3	2	23
12	<i>Lecane sp</i>	0	0	0	3	5	6	4	3	1	5	2	0	29
13	<i>Monostyla sp</i>	0	0	0	0	0	0	0	0	0	0	0	0	00
14	<i>Plationus patulus</i>	0	0	0	2	2	4	7	5	2	3	2	2	29
15	<i>Trichocerca longiseta</i>	1	0	0	3	6	7	2	0	0	1	1	0	21
16	<i>T. cylindrica</i>	0	0	0	0	1	3	2	0	0	2	1	0	09

**Table 2: Monthly occurrence of Rotifera in Wainganga River at Markandadeo region during year 2011-12.**

Sr. No	Rotifer species	Jun	Jul	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar	Apr	May	Total
1	<i>Asplanchna sp.</i>	2	0	0	3	5	8	3	5	3	5	2	1	37
2	<i>Brachionus falcatus</i>	5	0	2	5	22	27	3	0	9	11	9	6	99
3	<i>B. forficula</i>	4	0	2	9	18	21	9	8	3	8	5	6	93
4	<i>B. plicatilis</i>	2	0	0	1	3	3	4	4	2	2	1	2	24
5	<i>B. quadricornis</i>	2	0	0	3	2	4	5	1	4	7	3	0	31
6	<i>B. rubence</i>	2	0	1	0	0	0	2	0	6	11	3	1	26
7	<i>B. diversicornis</i>	2	0	0	23	18	9	8	1	5	2	2	1	71
8	<i>B. calyciflorus</i>	4	0	2	9	21	15	9	5	4	6	4	3	82
9	<i>Filinia longiseta</i>	2	0	1	5	9	2	1	0	1	2	0	0	23
10	<i>Keratella tropica</i>	0	0	3	11	5	6	9	3	5	3	2	3	50
11	<i>K. ticinensi</i>	3	0	2	3	3	2	11	4	0	2	0	3	33
12	<i>Lecane sp</i>	0	0	0	4	3	3	1	0	1	5	0	0	17
13	<i>Monostyla sp</i>	1	0	0	4	7	4	3	3	4	6	1	0	33
14	<i>Plationus patulus</i>	2	0	0	4	6	9	11	3	4	2	2	0	43
15	<i>Trichocerca longiseta</i>	3	0	1	2	7	6	7	0	2	4	3	1	36
16	<i>T. cylindrica</i>	0	0	0	3	5	3	2	1	3	2	1	2	22

**Table 3 : Seasonal variation in average values of zooplankton at Site S - 1 of Wainganga river at Markandadeo Tah.-Chamorshi, during Year 2010-11 and 2011-12.**

S. No.	Rotifer species	2010-11				2011-12			
		Monsoon	Winter	Summer	Total	Monsoon	Winter	Summer	Total
1	<i>Asplanchna sp.</i>	0.00 ± 0.00	2.50 ± 1.12	0.75 ± 0.83	1.08 ± 0.65	1.50 ± 2.08	5.00 ± 2.74	1.50 ± 1.50	2.67 ± 2.10
2	<i>Brachionus falcatus</i>	0.25 ± 0.43	8.50 ± 2.08	2.25 ± 1.30	3.67 ± 1.26	3.50 ± 4.97	12.0 ± 4.74	4.00 ± 1.87	6.50 ± 3.88
3	<i>B. forficula</i>	1.25 ± 0.83	5.50 ± 2.69	2.75 ± 0.83	3.17 ± 1.45	1.50 ± 1.66	7.50 ± 2.29	3.25 ± 1.49	4.08 ± 1.81
4	<i>B. plicatilis</i>	1.00 ± 1.00	3.00 ± 1.22	1.50 ± 0.50	1.83 ± 0.91	0.25 ± 0.43	2.25 ± 0.43	0.75 ± 0.83	1.08 ± 0.57
5	<i>B. quadricornis</i>	0.00 ± 0.00	3.25 ± 1.30	2.75 ± 1.30	2.00 ± 0.87	0.00 ± 0.00	3.50 ± 1.50	1.25 ± 0.83	1.58 ± 0.78
6	<i>B. rubence</i>	0.50 ± 0.87	3.50 ± 1.13	1.75 ± 0.83	1.92 ± 0.94	0.50 ± 0.50	0.75 ± 0.83	1.50 ± 1.12	0.92 ± 0.82
7	<i>B. diversicornis</i>	2.25 ± 2.34	1.25 ± 1.09	4.25 ± 3.49	2.58 ± 2.64	3.00 ± 3.54	3.00 ± 0.71	2.50 ± 1.80	2.83 ± 2.02
8	<i>B. calyciflorus</i>	2.25 ± 2.34	8.25 ± 2.68	2.75 ± 1.48	4.42 ± 2.50	0.75 ± 0.83	7.75 ± 2.38	3.50 ± 1.12	4.00 ± 1.44
9	<i>Filinia longiseta</i>	0.25 ± 0.43	0.75 ± 0.83	0.00 ± 0.00	0.33 ± 0.42	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
10	<i>Keratella tropica</i>	3.25 ± 5.07	9.25 ± 6.61	7.25 ± 4.82	6.58 ± 5.50	2.00 ± 1.87	5.75 ± 4.15	1.75 ± 1.09	3.17 ± 3.37
11	<i>K. ticinensi</i>	1.00 ± 1.00	3.25 ± 2.38	1.50 ± 1.12	1.92 ± 1.50	0.75 ± 0.83	3.50 ± 2.29	1.00 ± 0.71	1.75 ± 1.28
12	<i>Lecane sp</i>	0.75 ± 1.30	4.50 ± 1.12	2.00 ± 1.87	2.42 ± 1.43	0.75 ± 0.83	3.25 ± 0.83	2.75 ± 1.79	2.25 ± 1.15
13	<i>Monostyla sp</i>	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	1.25 ± 1.64	4.75 ± 1.48	2.50 ± 2.29	2.83 ± 1.80
14	<i>Platyonus patulus</i>	0.50 ± 0.87	4.50 ± 1.80	2.25 ± 0.43	2.42 ± 1.03	0.25 ± 0.43	4.00 ± 2.45	2.25 ± 0.83	2.17 ± 1.24
15	<i>Trichocerca longiseta</i>	1.00 ± 1.22	3.75 ± 2.86	0.50 ± 0.50	1.75 ± 1.53	3.50 ± 4.50	2.50 ± 1.12	1.25 ± 1.30	2.42 ± 2.31
16	<i>T. cylindrical</i>	0.00 ± 0.00	1.50 ± 1.12	0.75 ± 0.83	0.75 ± 0.65	0.75 ± 0.83	2.00 ± 1.87	1.25 ± 0.83	1.33 ± 1.18

**Table 4 : Seasonal variation in average values of zooplankton at Site S - 2 of Wainganga river at Markandadeo Tah. - Chamorshi, during Year 2010-11 and 2011-12.**

S. No.	Rotifer species	2010-11				2011-12			
		Monsoon	Winter	Summer	Total	Monsoon	Winter	Summer	Total
1	<i>Asplanchna sp.</i>	1.25 ± 1.30	5.25 ± 1.64	4.00 ± 1.87	3.50 ± 1.60	1.25 ± 1.30	5.25 ± 1.79	2.75 ± 1.48	3.08 ± 1.52
2	<i>Brachionus falcatus</i>	2.25 ± 1.48	7.75 ± 0.83	3.25 ± 2.05	4.42 ± 1.45	3.00 ± 2.12	13.0 ± 11.68	8.75 ± 1.79	8.25 ± 5.20
3	<i>B. forficula</i>	2.75 ± 2.17	6.00 ± 1.58	4.25 ± 1.48	4.33 ± 1.74	3.75 ± 3.34	14.00 ± 5.61	5.50 ± 1.80	7.75 ± 3.59
4	<i>B. plicatilis</i>	1.25 ± 1.30	4.75 ± 1.48	1.75 ± 1.79	2.58 ± 1.52	0.75 ± 0.83	3.50 ± 0.50	1.75 ± 0.43	2.00 ± 0.59
5	<i>B. quadricornis</i>	2.00 ± 2.00	4.50 ± 1.80	2.50 ± 1.80	3.00 ± 1.87	1.25 ± 1.30	3.00 ± 1.58	3.50 ± 2.50	2.58 ± 1.79
6	<i>B. rubence</i>	1.25 ± 1.30	3.75 ± 1.48	3.25 ± 2.17	2.75 ± 1.65	0.75 ± 0.83	0.50 ± 0.87	5.25 ± 3.77	2.17 ± 1.82
7	<i>B. diversicornis</i>	4.00 ± 4.90	5.25 ± 3.27	2.50 ± 1.50	3.92 ± 3.22	6.25 ± 9.71	9.00 ± 6.04	2.50 ± 1.50	5.95 ± 5.75
8	<i>B. calyciflorus</i>	3.00 ± 3.08	8.25 ± 1.48	4.25 ± 1.48	5.17 ± 2.01	3.75 ± 3.34	12.50 ± 6.08	4.25 ± 1.09	6.83 ± 3.50
9	<i>Filinia longiseta</i>	1.50 ± 2.06	3.00 ± 2.45	0.25 ± 0.43	1.58 ± 1.65	2.00 ± 1.87	3.00 ± 3.54	0.75 ± 0.83	1.92 ± 2.08
10	<i>Keratella tropica</i>	3.25 ± 5.07	10.0 ± 4.95	7.50 ± 5.32	6.92 ± 5.11	3.50 ± 4.50	5.75 ± 2.17	3.25 ± 1.09	4.17 ± 2.58
11	<i>K. ticinensi</i>	1.75 ± 1.79	4.50 ± 2.96	3.25 ± 2.17	3.17 ± 2.30	2.00 ± 1.22	5.00 ± 3.54	1.25 ± 1.30	2.75 ± 2.02
12	<i>Lecane sp</i>	1.25 ± 1.64	7.50 ± 2.06	2.00 ± 0.71	3.58 ± 1.47	1.00 ± 1.73	1.75 ± 1.30	1.50 ± 2.08	1.42 ± 1.70
13	<i>Monostyla sp</i>	1.25 ± 1.64	4.75 ± 2.86	1.00 ± 0.71	2.33 ± 1.74	1.25 ± 1.64	4.25 ± 1.64	2.75 ± 2.38	2.75 ± 1.89
14	<i>Platyonus patulus</i>	2.25 ± 2.86	7.50 ± 2.69	2.00 ± 1.41	3.92 ± 2.35	1.50 ± 1.66	7.25 ± 3.03	2.00 ± 1.41	3.58 ± 2.03
15	<i>Trichocerca longiseta</i>	0.75 ± 0.83	2.75 ± 1.92	1.75 ± 1.30	1.75 ± 1.35	1.50 ± 1.12	5.00 ± 2.92	2.50 ± 1.12	3.00 ± 1.72
16	<i>T. cylindrica</i>	0.25 ± 0.43	1.75 ± 0.43	1.50 ± 1.12	1.17 ± 0.66	0.75 ± 1.30	2.75 ± 1.48	2.00 ± 0.71	1.83 ± 1.16

**Table 5 : Seasonal variation in average values of zooplankton at Site S - 3 of Wainganga river at Markandadeo Tah. – Chamorshi, during Year 2010-11 and 2011-12.**

S. No.	Rotifer species	2010-11				2011-12			
		Monsoon	Winter	Summer	Total	Monsoon	Winter	Summer	Total
1	<i>Asplanchna sp.</i>	1.25 ± 1.30	4.25 ± 1.64	2.75 ± 2.17	2.75 ± 1.70	1.50 ± 1.50	3.25 ± 1.64	3.25 ± 1.48	2.67 ± 1.54
2	<i>Brachionus falcatus</i>	2.50 ± 2.50	5.75 ± 2.59	4.00 ± 1.87	4.08 ± 2.32	1.75 ± 1.79	6.00 ± 4.74	4.00 ± 1.87	3.92 ± 2.80
3	<i>B. forficula</i>	2.00 ± 1.59	6.50 ± 2.29	5.00 ± 5.05	4.50 ± 2.97	2.75 ± 1.64	7.00 ± 2.55	3.75 ± 1.92	4.50 ± 2.04
4	<i>B. plicatilis</i>	1.25 ± 1.30	3.75 ± 1.48	2.25 ± 2.49	2.42 ± 1.76	0.00 ± 0.00	1.00 ± 1.71	0.75 ± 0.83	0.58 ± 0.51
5	<i>B. quadricornis</i>	1.50 ± 1.66	3.50 ± 1.66	3.25 ± 2.17	2.75 ± 1.83	0.50 ± 0.50	1.75 ± 1.09	3.00 ± 2.55	1.75 ± 1.38
6	<i>B. rubence</i>	1.50 ± 1.66	3.50 ± 1.50	2.25 ± 2.49	2.42 ± 1.88	0.75 ± 0.83	0.00 ± 0.00	3.25 ± 2.28	1.33 ± 1.04
7	<i>B. diversicornis</i>	1.50 ± 1.12	5.25 ± 2.38	4.00 ± 2.12	3.58 ± 1.87	0.75 ± 0.83	4.50 ± 3.35	5.00 ± 2.5	3.42 ± 2.24
8	<i>B. calyciflorus</i>	2.75 ± 2.68	5.75 ± 4.44	6.00 ± 4.54	4.83 ± 3.92	2.50 ± 2.29	7.50 ± 3.64	7.00 ± 3.54	5.67 ± 3.16
9	<i>Filinia longiseta</i>	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.25 ± 0.43	0.75 ± 0.83	0.00 ± 0.00	0.33 ± 0.42
10	<i>Keratella tropica</i>	0.00 ± 0.00	2.50 ± 1.80	3.00 ± 4.12	1.83 ± 1.98	0.25 ± 0.43	4.00 ± 3.39	1.75 ± 1.30	2.00 ± 1.71
11	<i>K. ticinensi</i>	0.50 ± 0.87	3.75 ± 1.92	2.25 ± 0.43	2.17 ± 1.07	0.25 ± 0.43	3.50 ± 1.80	2.00 ± 0.71	1.92 ± 0.98
12	<i>Lecane sp</i>	0.25 ± 0.43	1.75 ± 1.09	1.50 ± 1.66	1.17 ± 1.06	1.25 ± 1.30	3.25 ± 3.70	2.25 ± 1.79	2.25 ± 2.26
13	<i>Monostyla sp</i>	0.00 ± 0.00	2.00 ± 1.58	0.75 ± 1.30	0.92 ± 0.96	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
14	<i>Platyonus patulus</i>	3.25 ± 3.70	3.00 ± 2.15	2.25 ± 2.28	2.83 ± 2.70	2.75 ± 3.27	3.25 ± 2.95	2.00 ± 2.12	2.67 ± 2.78
15	<i>Trichocerca longiseta</i>	1.00 ± 1.22	4.50 ± 2.69	4.00 ± 3.39	3.17 ± 2.44	1.50 ± 1.66	0.00 ± 0.00	3.00 ± 3.08	1.50 ± 1.58
16	<i>T. cylindrica</i>	0.00 ± 0.00	1.00 ± 0.71	0.75 ± 0.83	0.58 ± 0.51	0.25 ± 0.43	3.00 ± 3.08	1.50 ± 1.66	1.58 ± 1.72

## DISCUSSION

Rotifera were represented by 16 species in the present study, the common genera was *Brachionus*, *Keratella* and *Trichocera*. These are usually reported as dominant zooplankton taxa of lotic areas (Dorak, 2013). *Keratella* was next to *Brachionus* as far as the numerical abundance of rotifers was concerned. Jayabhaye (2010) recorded 11 species of rotifera from river Kayadhu in Hingoli. Dorak (2013) observed 24 species in lower Sakarya River Basin, Turkey. Umadevi (2013) reported 14 species of Rotifera in Karanja river, Karnataka. *B. calyciflorus* and *B. falcatus* showed dominance throughout the year, followed by *B. forficula*, *K. tropica*, *B. diversicornis*. Peak of rotifers were noticed in the month of March and less numbers were in the month of July and August. Sharma *et al.*, (2010) observed minor peak in the month of August and the major peak in the month of March. An analysis of seasonal fluctuation in the population density of rotifers revealed that being the dominated group, the population was more in winter, moderate in summer and least in monsoon. Similar seasonal pattern was also observed by Tijare (2007) in three freshwater bodies in Gadchiroli and Watkar and Barbate (2013) in Kolar river, Saoner. The high population density of the rotifers could be attributed to their parthenogenetic reproductive patterns and short developmental rate under favorable conditions, their morphological variations called cyclomorphosis and adaptations and their ability to feed on different food types (Jafari *et al.*, 2005). High Rotifer population in winter may be due to favorable temperature and availability of food material, also supported by the studies of Sharma (1992) and Kamble *et al.*, (2013). During Monsoon, the flooded water may wash out the population of rotifer. Rotifers and cladocerans are less able to maintain their positions in flowing water than copepods (Dorak, 2013). Jose and Sanalkumar (2012) advocated that in summer, the absence of inflow of water brings stability to the water body and the availability of food is more due to production of organic matter and decomposition, these factors contribute for high species density. Shayestehfar *et al.* (2008) observed that the high temperature,

length of the day, the intensity of sun light during the summer and the acceleration of phytoplankton and algae are some of the factors for the growth and abundance of rotifera.

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