



DIVERSITY OF ROTIFERS IN PERI URBAN LAKES OF JAGTIAL DISTRICT, TELANGANA

T. MAHESH^{1*}, A. JYOTHILAXMI², D. BALAKRISHNA³
AND T. RAVINDER REDDY³

¹SRR Government Arts and Science College, Karimnagar, India.

²Government Degree College (Women), Karimnagar, India.

³Department of Zoology, Kakatiya University, Warangal, India.

AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author TM designed the study and visited the selected lakes for the sample collection. Author AJ performed all the tests for the collected samples and obtained the results. Authors DB and TRR managed the literature search and analyses of the study.

All authors read and approved the final manuscript.

Received: 11 May 2019

Accepted: 16 July 2019

Published: 29 July 2019

Original Research Article

ABSTRACT

Present study deals with the species diversity of rotifer group of zooplankton in and around the Jagtial city lakes during the period of February 2018 to January 2019. In the study period total 9 no. of rotifera zooplanktons were observed in the Chintakunta lake and 8 no. of rotifers were observed in Kandlapalli and Mupparam lake. The observed species dominance is *Brachionus falcatus*, *Keratella cochlearis*, *K. tropica*, *Cephalodella gibba*, *Brachionus diversiconis*, *Filinia longiseta*, *Brachionus caudatus* and *Lecane luna* in Kandlapalli and Mupparam lakes. In addition to the observed 8 rotiferan species Chintakunta lake has *Brachionus angularis*. The dominant order of Chintakunta lake *Brachionus falcatus*, *Keratella cochlearis*, *K. tropica*, *Cephalodella gibba*, *Brachionus diversiconis*, *Filinia longiseta*, *Brachionus caudatus*, *Lecane luna* and *B. angularis*. Throughout the study period highest rotiferan diversity was observed in summer season followed by south west monsoon and Northeast monsoon seasons in all the selected three lakes.

Keywords: Rotifera; zooplankton; lake; *Brachionus*; Kandlapalli; Mupparam and Chintakunta.

1. INTRODUCTION

Plankton, the microscopic plants and animals comprise a large portion of the living matter in natural water and play an important role in bio geo chemical cycles. Fish growth and its diversity in an aquatic ecosystem depend on zooplankton abundance of that particular water body [1]. Rotifers are commonly referred as wheel animalcules. They belong to class Rotifera of the phylum Aschelminthes. They can be distinguished by the presence of an anterior ciliated corona which helps in locomotion, feeding and sensory perception and the mastax which aids in food

processing and diet selectively. Except for a few marine and soil species rotifers are predominantly found in fresh water bodies such as ponds, lakes and rivers [2]. Although they have distinctive ecological associations in terms of habitat and many displays striking endemism, most of the taxa are cosmopolitan in distribution.

Rotifers form a very important component of the food web in fresh water habitat and at times comprise a substantial portion of biomass in zooplankton production. Planktonic rotifers often influence the density and abundance of their food the

*Corresponding author: Email: mahithota00@gmail.com;

phytoplankton and rotifers are themselves preyed upon by aquatic invertebrates and vertebrates.

Rotifers have been widely used in the assessment of aquatic pollution by advantage of the characteristic like sensitivity to small change in environment, short generation time, parthenogenetic mode of reproduction, transparent body etc. Since many rotifer species occur in fresh water lakes and ponds their community diversity has been used for studying the impact of aquatic pollution. The rotifers are also used as the indicators of water quality.

2. METHODOLOGY

Zooplankton collections were made employing a modified Haron-Trantor net with a square metallic frame of area 0.0625 m² area. The filtering cone was made up of nylon bolting silk plankton net (No. 25 mesh size 50µ) was used for collection of zooplankton. Care was taken to avoid trapping of floating debris while towing the net. The net was hauled for a distance of ten meters. Collected samples were transferred to labeled vial bottles containing 4% formalin.

The qualitative estimation of zooplankton communities was carried out in the laboratory. Samples were kept for setting for a period of 48 hours. Three equal aliquots were drawn from the settled samples. Proportionate samples were drawn from above three aliquot and transferred on to Sedgwick-Rafter cell and planktonic organisms numerically counted and identified. The identification of zooplankton species was done by the Zoological Survey of India, Kolkata and the same was confirmed by Needham and Needham [3], Michael [4], Pennak [5], Tonopi [6], Patil and Gouder [7] and Battish [8].

3. RESULTS AND DISCUSSION

Monthly variation and seasonal diversity of Rotifera group of zooplankton in three lakes were depicted in the Tables 1, 2 & 3, the graphetical representation of the same is stated in Figs. 1, 2 and 3 respectively.

During the study period the total of 1850 rotifers were identified in Kandlapalli lake in the summer season at both site A and site B. Among these 40 are *Filinia longiseta* at site A and 41 at site B. The No. of *Cephalodella gibba* sps recorded 100 at site A and 95 at site B. *Keratella tropica* were observed at site A is 150 no's and at site B is 143 no's. The No. of *Keratella cochlearis* were observed at site A is 152 and site B is 148 and *Brachionus falcatus* were recorded 358, 364 number respectively at site A and site B. The *Brachionus diversiconis* recorded 62, 63 in number at the site A and B, the *Brachionus caudatus*

observed at site A is 50 in number and at site B is 47 in number. *Lecane luna* recorded 18 at site A and 19 at site B. While in the same season highest number of sps recorded is *Brachionus falcatus* and the lowest no of sps is *Lecane luna* at both the stations. Similar results were observed by Balakrishna Dhatrika [9].

During the study period the total of 1250 individuals were identified in Kandlapalli lake in the South west monsoon season at both site A and site B. Among these 32 are *Filinia longiseta* at site A and 40 at site B. The No. of *Cephalodella gibba* sps recorded 96 at site A and 95 at site B. *Keratella tropica* were observed at site A is 132 no's and at site B is 128 no's. The No. of *Keratella cochlearis* were observed at site A is 100 and site B is 101 and *Brachionus falcatus* were recorded 208, 207 number respectively at site A and site B. The *Brachionus diversiconis* recorded 16, 17 in number at the site A and B, the *Brachionus caudatus* observed at site A is 32 in number and at site B is 26 in number. *Lecane luna* recorded 8 at site A and 12 at site B. While in the same season highest number of sps recorded is *Brachionus falcatus* and the lowest no of sps is *Lecane luna* at both the stations. *Brachionus* genus rotifers are the dominant among the rotifers throughout the study period.

In the study period the total of 710 individuals were identified in Kandlapalli lake in the North east monsoon season at both site A and site B. Among these 9 were *Filinia longiseta* at site A and 15 at site B. The No. of *Cephalodella gibba* sps recorded 48 at site A and 52 at site B. *Keratella tropica* were observed at site A is 61 no's and at site B is 58 no's. The No. of *Keratella cochlearis* were observed at site A is 69 and site B is 71 and *Brachionus falcatus* were recorded 138, 130 number respectively at site A and site B. The *Brachionus diversiconis* recorded 6, 11 in number at the site A and B, the *Brachionus caudatus* observed at site A is 16 in number and at site B is 18 in number. *Lecane luna* recorded 4 at site A and 4 at site B. While in the same season highest number of sps recorded is *Brachionus falcatus* and the lowest no of sps is *Lecane luna* at both the stations. Chandrashekhar and Kodarkar [10] observed six species of *Brachionus* genus from Saroornagar lake, Hyderabad, Telangana.

During the study period the total of 2591 rotifers were identified in Muppam lake in the summer season at both site A and site B. Among these 66 are *Filinia longiseta* at site A and 65 at site B. The No. of *Cephalodella gibba* sps recorded 136 at site A and 132 at site B. *Keratella tropica* were observed at site A is 172 no's and at site B is 168 no's. The No. of *Keratella cochlearis* were observed at site A is 200

and site B is 197 and *Brachionus falcatus* were recorded 488, 482 number respectively at site A and site B. The *Brachionus diversiconis* recorded 102, 98 in number at the site A and B, the *Brachionus caudatus* observed at site A is 102 in number and at site B is 100 in number. *Lecane luna* recorded 40 at site A and 43 at site B. While in the same season highest number of *sps* recorded is *Brachionus falcatus* and the lowest no of *sps* is *Lecane luna* at both the stations. Nearby results was observed by Sharma [11] in Orissa lakes.

During the study period the total of 1796 individuals were identified in Mupparam lake in the South west monsoon season at both site A and site B. Among these 34 are *Filinia longiseta* at site A and 35 at site B. The No. of *Cephalodella gibba* *sps* recorded 83 at site A and 79 at site B. *Keratella tropica* were observed at site A is 142 no's and at site B is 138 no's. The No. of *Keratella cochlearis* were observed at site A is 136 and site B is 136 and *Brachionus falcatus* were recorded 334, 332 number respectively at site A and site B. The *Brachionus diversiconis* recorded 74, 69 in number at the site A and B, the *Brachionus caudatus* observed at site A is 60 in number and at site B is 60 in number. *Lecane luna* recorded 43 at site A and 41 at site B. While in the same season highest number of *sps* recorded is *Brachionus falcatus* and the lowest no of *sps* is *Lecane luna* at both the stations.

In the study period the total of 1152 individuals were identified in Mupparam lake in the North east monsoon season at both site A and site B. Among these 20 were *Filinia longiseta* at site A and 27 at site B. The No. of *Cephalodella gibba* *sps* recorded 42 at site A and 43 at site B. *Keratella tropica* were observed at site A is 94 no's and at site B is 91 no's. The No. of *Keratella cochlearis* were observed at site A is 107 and site B is 105 and *Brachionus falcatus* were recorded 205 number at site A and site B. The *Brachionus diversiconis* recorded 34, 38 in number at the site A and B, the *Brachionus caudatus* observed at site A is 48 in number and at site B is 50 in number. *Lecane luna* recorded 18 at site A and 25 at site B. While in the same season highest number of *sps* recorded is *Brachionus falcatus* and the lowest no of *sps* is *Lecane luna* at both the stations. Balakrishna et al. [12] observed that *Brachionus falcatus* is the dominated species in Hasanparthy lake, Warangal.

During the study period the total of 2279 rotiferans were identified in Chintakunta lake in the summer season at both site A and site B. Among these 62 are *Filinia longiseta* at site A and 65 at site B. The No. of *Cephalodella gibba* *sps* recorded 126 at site A and 124 at site B. *Keratella tropica* were observed at site A is 158 no's and at site B is 155 no's. The No. of

Keratella cochlearis were observed at site A is 244 and site B is 247 and *Brachionus falcatus* were recorded 314, 312 number respectively at site A and site B. The *Brachionus diversiconis* recorded 86 in number at both the sites, the *Brachionus caudatus* observed at site A is 62 in number and at site B is 63 in number. *Lecane luna* recorded 59 at site A and 61 at site B. *Brachionus angularis* *sps* recorded 26 number at site A and 29 number at site B. While in the same season highest number of *sps* recorded is *Brachionus falcatus* and the lowest no of *sps* is *Brachionus angularis* at both the stations.

During the study period the total of 1541 individuals were identified in Chintakunta lake in the South west monsoon season at both site A and site B. Among these 34 are *Filinia longiseta* at site A and 40 at site B. The No. of *Cephalodella gibba* *sps* recorded 118 at site A and 119 at site B. *Keratella tropica* were observed at site A is 122 no's and at site B is 119 no's. The No. of *Keratella cochlearis* were observed at site A and site B were 122 and *Brachionus falcatus* were recorded 248, 247 number respectively at site A and site B. The *Brachionus diversiconis* recorded 26, 30 in number at the site A and B, the *Brachionus caudatus* observed at site A is 36 in number and at site B is 37 in number. *Lecane luna* recorded 36 at site A and 39 at site B. *Brachionus angularis* *sps* recorded 20 number at site A and 26 number at site B. While in the same season highest number of *sps* recorded is *Brachionus falcatus* and the lowest no of *sps* is *Brachionus angularis* at both the stations. Similar results were made by Sharma [13] and Balakrishna et al. [14].

In the study period the total of 932 individuals were identified in Chintakunta lake in the North east monsoon season at both site A and site B. Among these 22 were *Filinia longiseta* at site A and 25 at site B. The No. of *Cephalodella gibba* *sps* recorded 58 at site A and 61 at site B. *Keratella tropica* were observed at site A is 74 no's and at site B is 73 no's. The No. of *Keratella cochlearis* were observed at site A is 92 and site B is 90 and *Brachionus falcatus* were recorded 162 number at site A and 159 at site B. The *Brachionus diversiconis* recorded 6, 11 in number at the site A and B, the *Brachionus caudatus* observed at site A is 18 in number and at site B is 17 in number. *Lecane luna* recorded 22 at site A and 20 at site B. *Brachionus angularis* *sps* recorded 10 number at site A and 12 number at site B. While in the same season highest number of *sps* recorded is *Brachionus falcatus* and the lowest no of *sps* is *Brachionus angularis* at both the stations. Sarwade and Kamble [15] were observed rotifera species was dominant from Krishna river, Sangli, Maharashtra. Peak population density of *Brachionus* sp. of Rotifera was observed by Mahesh et al. [16].

Table 1. Monthly variation and seasonal average of Rotifers of Kandlapally lake during the year 2018-2019

Name of the Rotiferan		Summer					South west monsoon					North east monsoon				
		18-Feb	18-Mar	18-Apr	18-May	Seasonal Average	18-Jun	18-Jul	18-Aug	18-Sep	Seasonal Average	18-Oct	18-Nov	18-Dec	19-Jan	Seasonal Average
<i>Filinia longiseta</i>	Site A	10	10	12	8	10	6	8	8	10	8	4	0	2	3	2.25
	Site B	12	9	10	10	10.3	8	10	10	12	10	6	2	2	5	3.75
<i>Cephalodella gibba</i>	Site A	30	26	20	24	25	24	26	24	22	24	8	10	14	16	12
	Site B	29	22	22	22	23.8	25	25	25	20	23.8	10	12	15	15	13
<i>Keratella tropica</i>	Site A	26	36	40	48	37.5	38	26	32	36	33	16	14	21	10	15.3
	Site B	24	35	38	46	35.8	36	25	30	37	32	15	13	20	10	14.5
<i>Keratella cochlearis</i>	Site A	46	42	26	38	38	36	22	18	24	25	18	20	20	11	17.3
	Site B	45	40	24	39	37	38	20	20	23	25.3	19	22	20	10	17.8
<i>Brachionus falcatus</i>	Site A	86	102	96	74	89.5	58	42	48	60	52	32	28	36	42	34.5
	Site B	87	104	97	76	91	54	43	46	64	51.8	30	26	34	40	32.5
<i>Brachionus diversiconis</i>	Site A	22	20	12	8	15.5	4	4	6	2	4	0	0	2	4	1.5
	Site B	20	22	11	10	15.8	6	3	8	0	4.25	2	2	2	5	2.75
<i>Brachionus caudatus</i>	Site A	18	10	12	10	12.5	6	10	10	6	8	4	2	0	10	4
	Site B	19	9	10	9	11.8	4	9	8	5	6.5	6	2	2	8	4.5
<i>Lecane luna</i>	Site A	6	4	0	8	4.5	4	4	0	0	2	0	2	0	2	1
	Site B	8	2	2	7	4.75	5	3	2	2	3	0	0	2	2	1

Table 2. Monthly variation and seasonal average of Rotifers of Muppam lake during the year 2018-2019

Name of the Rotiferan		Summer					South west monsoon					North east monsoon				
		18-Feb	18-Mar	18-Apr	18-May	Seasonal Average	18-Jun	18-Jul	18-Aug	18-Sep	Seasonal Average	18-Oct	18-Nov	18-Dec	19-Jan	Seasonal Average
<i>Filinia longiseta</i>	Site A	26	18	14	8	16.5	12	18	2	2	8.5	8	6	6	0	5
	Site B	25	16	14	10	16.3	10	18	3	4	8.75	10	8	7	2	6.75
<i>Cephalodella gibba</i>	Site A	48	32	30	26	34	18	20	26	19	20.8	12	12	10	8	10.5
	Site B	46	33	28	25	33	17	19	25	18	19.8	11	11	11	10	10.8
<i>Keratella tropica</i>	Site A	32	38	42	60	43	32	28	40	42	35.5	26	28	22	18	23.5
	Site B	30	36	40	62	42	30	27	41	40	34.5	25	27	20	19	22.8
<i>Keratella cochlearis</i>	Site A	52	58	44	46	50	32	36	38	30	34	21	28	30	28	26.8
	Site B	53	57	42	45	49.3	32	38	37	29	34	20	29	31	25	26.3

Name of the Rotiferan		Summer					South west monsoon					North east monsoon				
		18-Feb	18-Mar	18-Apr	18-May	Seasonal Average	18-Jun	18-Jul	18-Aug	18-Sep	Seasonal Average	18-Oct	18-Nov	18-Dec	19-Jan	Seasonal Average
<i>Brachionus falcatus</i>	Site A	102	128	146	112	122	86	92	88	68	83.5	54	36	50	65	51.3
	Site B	100	127	145	110	121	88	91	86	67	83	55	35	52	63	51.3
<i>Brachionus diversiconis</i>	Site A	32	38	22	10	25.5	16	16	22	20	18.5	6	8	10	10	8.5
	Site B	33	37	20	8	24.5	15	15	20	19	17.3	7	9	11	11	9.5
<i>Brachionus caudatus</i>	Site A	28	24	28	22	25.5	12	14	18	16	15	8	10	12	18	12
	Site B	28	22	27	23	25	11	15	19	15	15	9	11	14	16	12.5
<i>Lecane luna</i>	Site A	12	10	6	12	10	10	11	10	12	10.8	0	2	8	8	4.5
	Site B	10	10	9	14	10.8	8	13	9	11	10.3	2	4	9	10	6.25

Table 3. Monthly variation and seasonal average of Rotifers of Chinthakunta lake during the year 2018-2019

Name of the Rotiferan		Summer					South west monsoon					North east monsoon				
		18-Feb	18-Mar	18-Apr	18-May	Seasonal Average	18-Jun	18-Jul	18-Aug	18-Sep	Seasonal Average	18-Oct	18-Nov	18-Dec	19-Jan	Seasonal Average
<i>Filinia longiseta</i>	Site A	12	14	10	26	15.5	8	8	10	8	8.5	10	4	4	4	5.5
	Site B	14	15	11	25	16.3	9	10	11	10	10	9	5	6	5	6.25
<i>Cephalodella gibba</i>	Site A	28	22	26	50	31.5	30	32	36	20	29.5	10	10	18	20	14.5
	Site B	29	20	24	51	31	32	30	35	22	29.8	9	11	20	21	15.3
<i>Keratella tropica</i>	Site A	32	38	52	36	39.5	42	28	28	24	30.5	20	18	24	12	18.5
	Site B	30	40	50	35	38.8	40	27	27	25	29.8	22	17	22	12	18.3
<i>Keratella cochlearis</i>	Site A	56	50	52	86	61	42	30	24	26	30.5	22	22	30	18	23
	Site B	55	52	53	87	61.8	41	31	25	25	30.5	20	20	31	19	22.5
<i>Brachionus falcatus</i>	Site A	92	110	102	10	78.5	72	60	54	62	62	38	36	40	48	40.5
	Site B	91	109	101	11	78	70	62	55	60	61.8	36	35	42	46	39.8
<i>Brachionus diversiconis</i>	Site A	26	24	18	18	21.5	6	6	8	6	6.5	2	2	2	0	1.5
	Site B	25	25	19	17	21.5	5	8	9	8	7.5	3	3	3	2	2.75
<i>Brachionus caudatus</i>	Site A	24	12	14	12	15.5	10	10	8	8	9	4	4	2	8	4.5
	Site B	25	13	15	10	15.8	9	9	10	9	9.25	5	5	1	6	4.25
<i>Lecane luna</i>	Site A	22	11	14	12	14.8	10	8	8	10	9	6	6	2	8	5.5
	Site B	24	12	15	10	15.3	11	9	10	9	9.75	5	5	1	9	5
<i>Brachionus angularis</i>	Site A	8	6	2	10	6.5	8	10	2	0	5	4	4	2	0	2.5
	Site B	10	5	4	10	7.25	9	11	4	2	6.5	5	5	0	2	3

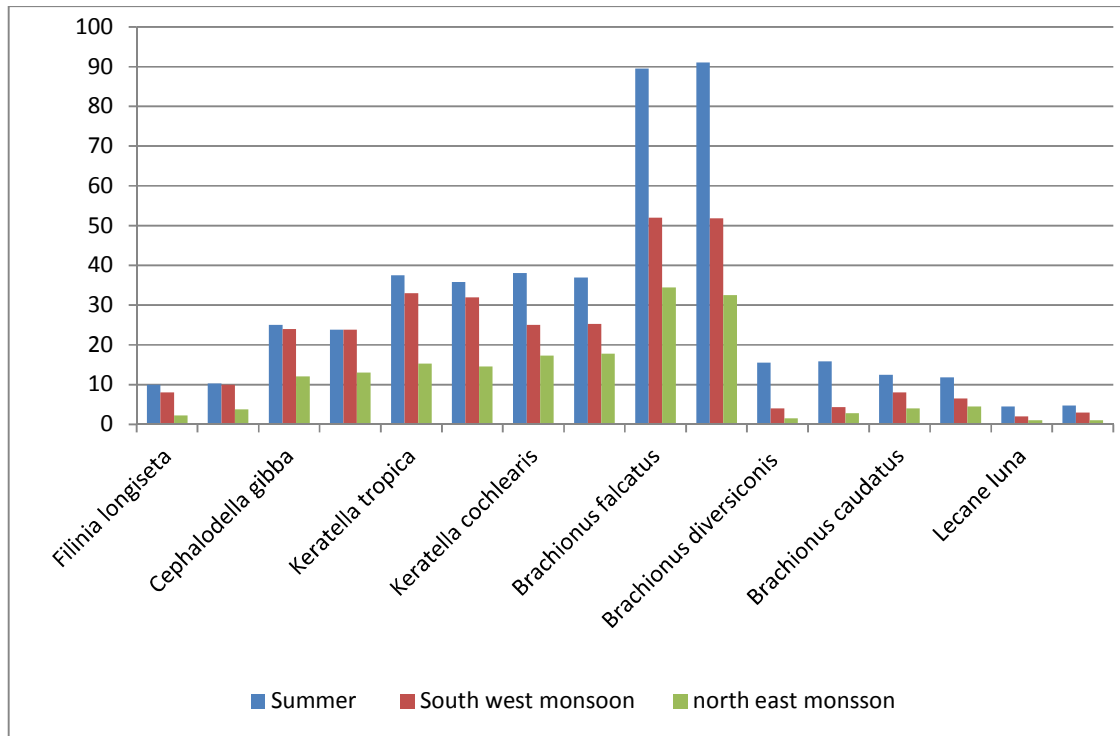


Fig. 1. Quantitative representation of Rotifers of Kandlapalli lake during the year 2018-19

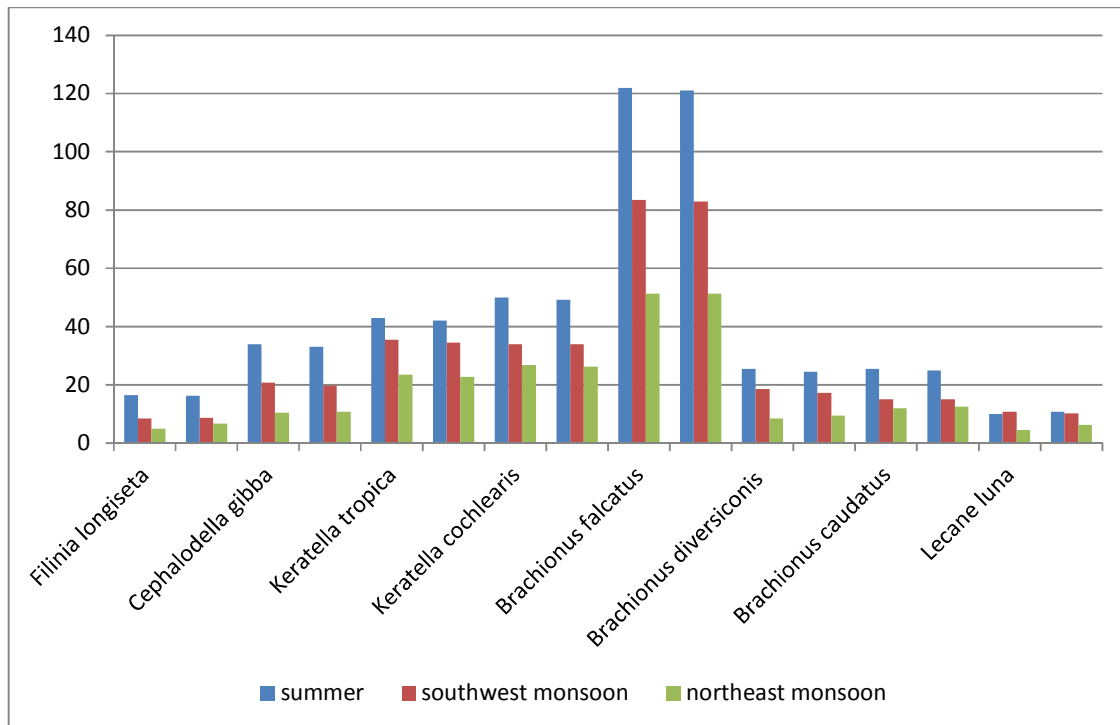


Fig. 2. Quantitative representation of Rotifers of Muppam lake during the year 2018-19

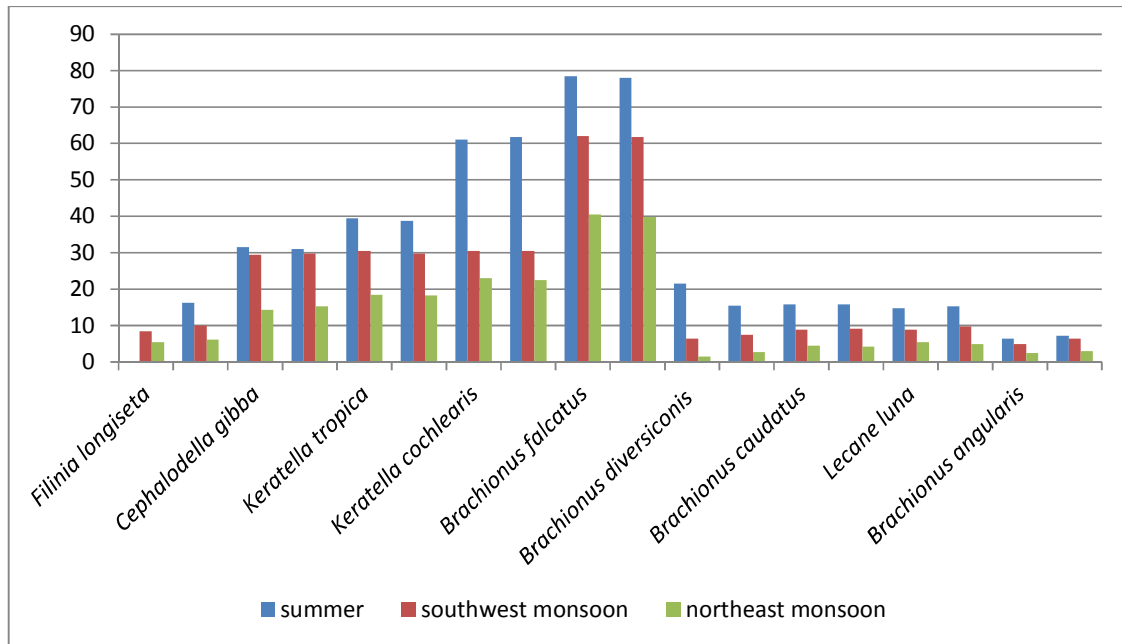


Fig. 3. Quantitative representation of Rotifers of Chinthakunta lake during the year 2018-19

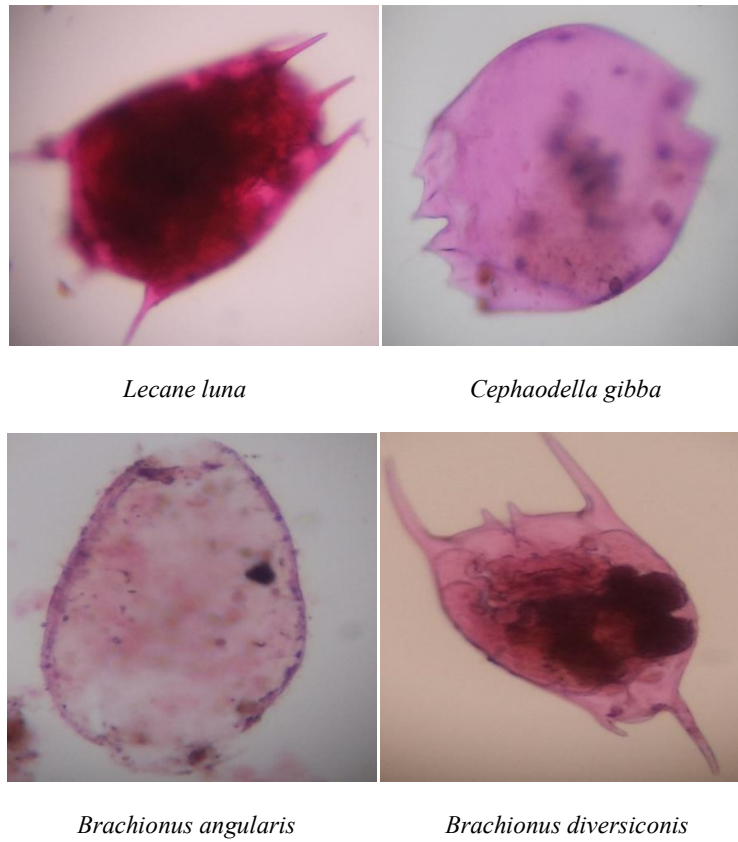


Plate 1. Figures of identified rotifers

4. CONCLUSION

In the present investigation mupparam lake shows highest diversity of Rotifer fauna followed by chithakunta lake and Kandlapally lake. Among all the species of zooplankton *Brachionus* genus zooplankton is dominant in all the three lakes.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Venkataramana GV, Sandhya Rani PN, Smitha. Taxonomical study and Diversity of Rotifers in Chikkadevarayana canal of Cauvery river, Karnataka, India. *Int. Res. J. Environment Sci.* 2015;4(8):13-21.
2. Sharma BK. Rotifera, (Animal Resources of India-State of Art ZSI); 1991.
3. Needham JG, Needham PR. A guide to the study of fresh water biology Holden day Ins. San-Francisco, U.S.A. 1962;108.
4. Michael RG. Cladocera: In a guide to the freshwater organisms. J. Madhurai Univ. Suppl. 1973;1-2.
5. Pennak PW. Freshwater invertebrates of United States 2nd Ed. John Wiley and Sons, New York. 1978; 303.
6. Tonapi GT. Freshwater animals of India (An Ecological Approach) Oxford and IBH Publishing Co. New Delhi, India; 1980.
7. Patil CS, Gouder BYM. Freshwater fauna of Dharwad (Karnataka State, India): Cladocera. *J. Karnataka Univ. Sci.* 1982;27:115-126.
8. Battish SK. Freshwater zooplankton of India. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. 1992;130.
9. Balakrishna Dhathrika. Diversity of rotifers in three lentic water bodies of Warangal urban area Telangana. *The J. of Zool. Stu.* 2017;4(5):14-18.
10. Chandrasekhar SVA, Kodarkar MS. Studies on *Brachionus* from Saroornagar lake, Hyderabad. *J. Aqua. Biol.* 1995;10 (1-2):48-52.
11. Sharma BK. Contributions to the rotifer fauna of Orissa. *Hydrobiologia.* 1980;70:225-233.
12. Balakrishna D, Suresh P, Mahesh T, Surender Reddy K, Ravinder Reddy T. Limnological studies of Hasanparthy lake Warangal District, Telangana, India. *Int. J. of Zool. And Appl. Biosci.* 2017;2(6):266-269.
13. Sharma BK. Indian *Brachionidae* (Eutrotaria: Monogononta) and their distribution. *Hydrobiologia.* 1987; 144:269-273.
14. Balakrishna D, Reddy TR, Reddy KV, Samatha D. Physico-chemical parameters and plankton diversity of Ghanpur Lake, Warangal, A.P., India. *Int. J. of Zool. Res.* 2013;3(1):44-48.
15. Sarwade AB, Kamble NA. Plankton diversity in Krishna river, Sangali, Maharashtra. *J. of Eco. and the Nat. Env.* 2014;6(4):174-181.
16. Mahesh D, Balakrishna K, Surender Reddy, Ravinder Reddy T. A study of Zooplankton diversity and their seasonal variation in Kandlapally lake, Jagtial, Telangana. *Int. J. of Sci. and Engin.* 2015;1(2).