



Composition and Biodiversity of Rotifer Population in Godavari River

KEYWORDS

rotifer population, Godavari river, *Brachionus*, population density

***Bharati G. Kolhe**

Department of Zoology, M. V. P's
ACS College, Dindori - 422 009, Tal
- Dindori, Dist - Nashik (M. S.) India
*Correspondence author

Shinde S. M.

Department of Zoology, P.G.
Research Centre S. S. V. P. S's L. K.
Dr. P. R. Ghogrey Science College,
Dhule - 424 005 (M.S.) India

Rane M. S.

Department of Zoology, D. N.
College, Faizpur, Tal - Yawal, Dist -
Jalgaon- 425 503 (M.S.) India

ABSTRACT In the present investigation variation in rotifer population of Godavari river from Nashik, (M.S.) India from four different study stations were analyzed from May 2009 to April 2010. During the study period total 24 rotifer species belonging to 17 genera were found. The most quantitatively genera *Brachionus* were the main and significantly abundant genera, represented by 6 species. Monthly population density of rotifera showed its peak during December while least in August at study station IV.

INTRODUCTION

Amongst the zooplanktons rotifers ought to be well-known. Rotifera also known as the "Wheel Animal" (rota=wheel, -fera=those that bear). Rotifers are microscopic aquatic animals of the phylum Rotifera. They play an important role in the ecosystem, and considered as a bioindicators of the habitats (Segers 2008). A few rotifers are cosmopolitan, while majority of these animals are highly adapted to a wide range of freshwater conditions (Brummett 2000). As a result, the ecological investigations on rotifers also gained importance. Hence, qualitative and quantitative studies of rotifers are of great importance.

Bhat et al, (2012) studied composition and dynamics of rotifera fauna from upper basin (Bhoj Wetland) as parameter of water quality. Sitre and Zade (2012) studied biodiversity of rotifers in a freshwater lake of Nagpur city (M.S.) during different seasons of the year. Shah et al, (2013) studied rotifers of aquatic ecosystems of Kashmir Himalaya for documentation and authentication.

At present there has been lack of studies regarding the biodiversity of rotifers from Godavari river. As a consequence, the aim of the present study was to collect, identify as well as to determine monthly variation of density and diversity of rotifers from surface water of Godavari river from four study stations.

Materials and Methods

(A) Study area

Four sampling stations were selected to study the monthly composition and diversity of the rotifer population in Godavari river, Nashik, Maharashtra.

Station I: At downstream of Gangapur dam, the point before the discharge of industrial effluents. The water is used for agriculture purpose only.

Station II: Near Someshwar Temple, the point before the discharge of agro-industrial effluents. The water is used for agriculture, bathing and washing purposes and agriculture runoff is also released.

Station III: Ramkund also known as Ganga ghat is a holy place. Various rites and rituals are performed here. Water is used for bathing and washing. The domestic waste water is mostly released before and subsequent to this point.

Station IV: Ramkund Downstream just before the Tapovan area. At this point, sewage from Nashik City and some industrial waste are also released in to water.

(B) Collection of samples

Rotifers samples were collected for qualitative and quantitative analysis in between 7 a.m. to 10 a.m. by standard methods (APHA, 1985) from four sampling sites over a period of one year (May 2009 to April 2010). The collected samples were fixed in 4% formalin and brought to the laboratory for zooplankton analysis; counting and identification were done as per Battish (1992). For quantitative estimation Sedgwick - Rafter cell method was used.

RESULTS AND DISCUSSION

Table 1 represents list of rotifer species recorded in Godavari river. The pattern of rotifer analysis and monthly variation at four studied sites of Godavari river are given in table 2 and figure 1. Figure 2 represents annual mean percentage composition of rotifers at four studied stations.

During the present study, 24 species of rotifers belonging to 17 genera were recorded from four studied stations. Diversity population as studies in the present investigation indicates that rotifers dominate at all considered stations of Godavari river. The *Brachionus* was represented by 6 different species while *Filina* and *Keratella* by 2 species. The other genera of rotifer such as, *Conochilus unicornis*, *Hexarthra mira*, *Polyathra indica*, *Trichotria trichatris*, *Mytilina ventralis* contributed low densities and were restricted to certain season only. The annual rotifers population was 16%, 20%, 29%, and 35% at stations I, II, III, and IV respectively.

TABLE - 1
LIST OF ROTIFER SPECIES RECORDED FROM GODAVARI RIVER.

Sr. No.	Rotifer species	Station I	Station II	Station III	Station IV
1	<i>Asplanchna brightwelli</i>	-	+	+	+
2	<i>Brachionus calyciflorus</i>	+	+	+	+
3	<i>B. caudatus</i>	+	+	+	+
4	<i>B. forficula</i>	+	+	+	+
5	<i>B. fulcatus</i>	+	+	+	+
6	<i>B. qudridentatus</i>	+	+	+	+
7	<i>B. urceolaris</i>	+	+	+	+
8	<i>Conochilus unicornis</i>	+	-	-	-
9	<i>Euchlnis dialatata</i>	+	-	+	+
10	<i>Filina logesita</i>	+	+	+	+
11	<i>Filina pegleri</i>	+	+	+	+
12	<i>Hexarthra mira</i>	-	+	+	-
13	<i>Keratella procurva</i>	+	+	+	+
14	<i>Keratella tropica</i>	+	+	+	+
15	<i>Lacane luna</i>	+	+	+	+
16	<i>Trichotria trichatris</i>	-	-	+	-
17	<i>Mytilina ventralis</i>	+	-	-	-
18	<i>P. quadricornis</i>	+	-	+	+
19	<i>Philodina flaviceps</i>	-	+	+	-
20	<i>Platylas patulus</i>	+	+	+	+
21	<i>Polyathra indica</i>	-	-	-	+
22	<i>Rotaria neptunia</i>	+	+	+	+
23	<i>Testudinella sp.</i>	+	+	+	+
24	<i>Trichocera cylindrical</i>	-	+	+	+

(+) = Present and (-) = Absent

At station I, the maximum population density recorded in June month 192 units/L and minimum 48 units/L in September. At station II, the maximum population density recorded in January month 289 units/L and minimum 44 units/L in June. Station III, showed maximum density of rotifers 508 units/L was observed in December and less number of population density was recorded 37 units/L in August. At station IV, population density of rotifer 661 units/L was highest in third week of December month and lower 34 units/L in August.

During the present study (2009-2010) the population density of Rotifers, at station I, II, III, and IV ranged between 48 to 192 units/L, 44 to 289 units/L, 37 to 508 units/L and 34 to 661 units/L respectively. At all studied stations the variation recorded, the maximum population density of Rotifers 661units/L in December 2009 while minimum 34 units/L in August 2009 was observed at station IV.

TABLE - 2
POPULATION COMPOSITION AND MONTHLY VARIATION OF ROTIFERS AT STATION I, II, III AND IV UNITS/L FROM MAY 2009 TO APRIL 2010

Month	Station I	Station II	Station III	Station IV
May	163	117	112	82
June	192	44	243	136
July	112	108	120	121
August	128	96	37	34
September	48	62	157	131
October	52	97	128	190
November	116	202	186	192
December	87	200	508	661
January	82	289	173	267
February	81	124	276	387
March	190	181	324	468
April	99	120	124	159
Average	112.5	136.7	199	235.7

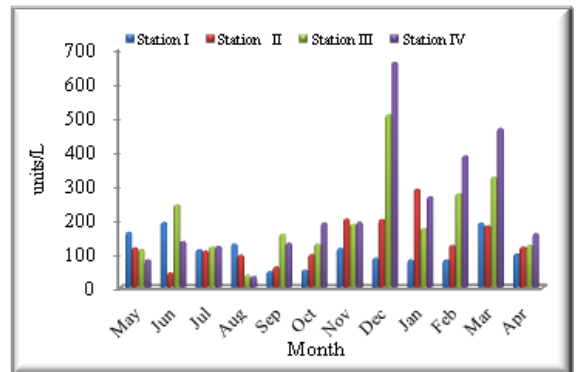


Figure 1: Population composition and monthly variation of rotifers at station I, II, III and IV (units/L) from May 2009 to April 2010.

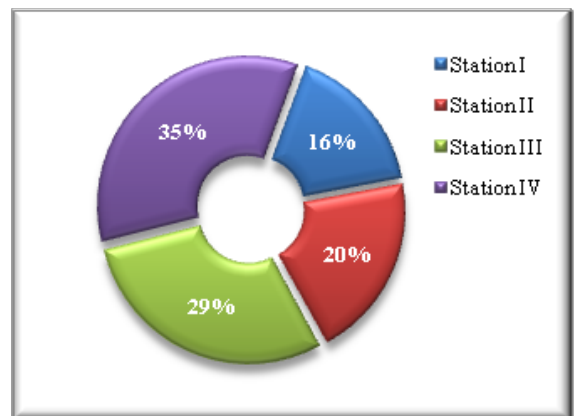


Figure 2: Annual mean percentage composition of Rotifers at Station I, II, III and IV during May 2009 to April 2010.

In the present study highest rotifer density was observed in the month of December i.e. in winter season. This was in accordance with observations of Mukhopadhyay et al, (1981), Jayadevi (1994), Shayestehfar and Abdovis (2011) and Bhat et al, (2012) have reported higher rotifer densities in winter. According to Shayestehfar and Abdovis (2011) there was always an optimum range of environmental conditions for each group of Rotifera in which they survive and multiply particularly in December. Lower values of rotifer population density and diversity were observed during monsoon which could be due to dilution of water resulting in fewer nutrients or could be due to depletion of important factors such as transparency, dissolved oxygen or pH (Kumar 2001).

Brachionus species are very common in temperate and tropical waters (Hutchinson 1967), indicates alkaline nature of water. According to Dirican et al, (2009) permanent dominance of rotifer species such as *Brachionus* and *Keratella* are indicative of eutrophic condition and their abundance was due to the presence of high levels of organic matter in the river. Station III and IV are downstream sites showing abundance in rotifer species which is due to the discharge of different wastes into the river such as agriculture, domestic sewage, industrial effluents, etc. (Kolhe et al, 2013).

CONCLUSIONS

From the present study it is concluded that, the diversity and density of the rotifers increased in the winter and decreased during the monsoon period. The rotifer population in Godavari river is highly influenced at station III and IV as compared to station I and II. Abundance of rotifer species such as, *Brachionus* at Station III and IV indicates nutrient rich water body which may undergo the state of eutrophication, if not managed appropriately. Hence there is an urgent need to control the discharge of industrial and domestic sewage.

ACKNOWLEDGEMENTS

Authors are sincerely thanks to, Prof S. P. Zambare, Head Department of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra State for providing laboratory facilities to conduct the present work.

REFERENCE

- [1]APHA (1985). Standard method for the examination of water and waste water. 14th Ed. APHAWWAWPCF. Washington, D.C. pp. 1193. [2] Battish, S. K. (1992). Fresh water zooplankton of India, Oxford & IBH Publishing House. pp. 233. [3]Bhat, N. A., Wanganeo, A., and Wanganeo, R. (2012). Composition and dynamics of rotifera fauna from upper basin (bhoj wetland) as parameter of water quality. 3(3), 109-113. [4]Brummett, R. E. (2000). Food organism availability and resource partitioning in organically and inorganically fertilized Tilapia *rendalli* ponds. *Aquaculture*, 183, 51-71. [5]Dirican, S., Haldun, M., and Suleyman, C. (2009). Some physico-chemical characteristics and Rotifers of Camligoze Dam lake, Susehri, Sivas, Turkey. *Journal of Animal and Veterinary Advances*, 8(4), 715-719. [6]Hutchinson, G. E. (1967). A treatise on Limnology, Vol. II, Limnoplankton. Wiley. New York. 1015. [7]Jaya, D. M. (1994). Seasonal variation and population density of rotifers in three lakes of Hyderabad. *Journal of Aquatic Biology*, 9(1&2), 41-44. [8]Kolhe, B. G., Zambare, S. P., Andhale, S. B., and Rane, M. S. (2013). An estimation of plankton population of Godavari river with reference to pollution. *Bioscience Discovery*, 4(1), 117-120. [9]Kumar, K. S. (2001). Studies on freshwater copepods and cladocera of Dharmapuri Dist. Tamil Nadu. *J Aqua Biol*, 16(1 &2), 5-10. [10]Malathi, D., Chandrashekhar, S. V. A., and Kodarkar M. S. (1998). Studies on *Brachionus* from lake Hussainsagar Hyderabad, India. *J Aquatic Biol*, 13(1&2), 7-12. [11]Mukhopadhyay, S. K., Babu, R. M., Muley, S. V., and Yadav, B. E. (1981). A study of the rotiferan population from Waghhol, Poona. *Proc. Symp. Ecol. Anim. Popul. Zool. Surv. India*. 2pp: 47-62. [12]Nath, D. (1997). Methods of evaluating primary productivity in small water bodies in fisheries enhancement in small reservoirs and flood plain lake CIFRI. pp. 65-73. [13]Segers, H. (2008). Global diversity of rotifers (Rotifera) in freshwater. *Hydrobiologia*. 595, 49-59. [14]Shah, J. A., Pandit, A. K., and Shah, G. M. (2013). A research on rotifers of aquatic ecosystems of Kashmir Himalaya for documentation and authentication. *Proc Natl Acad Sci, India, Sect B Biol Sci*, DOI 10.1007/s40011-014-0334-7. [15]Shayestehfar, A., and Abdovis, S. (2011). Diurnal fluctuations in population density of rotifera in relation to some physical and chemical parameters from Karun river, Khuzestan Province, Iran. *Agricultural Science Research Journal*, 1(10), 272-276. [16]Sheeba, S., Ramanujan, N., and Santosh, S. (2004). Qualitative and Quantitative study of zooplankton in Ithikkara river, Kerala. *Eco Env and Cons*, 10(3), 249-292. [17]Sitte, S. R., and Zade, S. B. (2012). Studies on biodiversity of rotifers in a freshwater lake of Nagpur city (M.S.) during different seasons of the year. *International Journal Of Innovations in Biosciences*, 2(3), 109-111. [