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Research Paper

Rotifers Diversity in a Small Irrigation Reservoir

Zoology

KEYWORDS : Rotifera, seasonal diversity, irrigation reservoir.

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ABSTRACT

The present investigation was carried out to study the rotifers diversity in Barnoo reservoir, Jabalpur, MP. Seasonal variations in the abundance of rotifers during the study period from 2001 to 2003 were described. A total number of 18 genera consist of 43 species of Rotifers were encountered belonging to 12 families, 2 sub-orders and 2 orders. Order Monogononta had maximum species belonging to 11 families. The most diversified genera was Brachionus, represented by 14 species, Keretella represented by 5 species, Filinia represented by 5 species, Trichocerca represented by 4 species and Lecane represented by 2 species. The least dominated genera were represented by single species.

Introduction

Tropical water bodies are characterized by small sized zooplankton (Fernando, 1994) and Rotifera are a very important component of tropical freshwater plankton (Duncan, 1993). Zooplanktons are the consumers of first order and constitute an important link in the food chain of aquatic ecosystems. They comprising of Rotifers, Cladocerans and Copepods are considered to be most important in terms of population density, biomass production, grazing and nutrient regeneration in any aquatic ecosystem (Pace and Orcutt 1981). Rotifers utilize nutrients and phytoplankton more frequently to build their population as compared to Cladoceran and Copepods. This is the reason for the throughout world distribution of rotifers (Pennak 1978; Sarma and Rao. 1991). Rotifers are important for their major role in the topographic dynamics and in energy transfer in the aquatic ecosystem. They provide food for fishes in the freshwater bodies and play a major role in the fish production (Kodarkar 1999).

Biotic factors of any water body comprise phyto and zooplanktons. Reservoirs in India exhibit moderate to very rich abundance of planktons, regulated largely by the seasonal variations in abiotic factors (B.C. Jha, 2003). The productivity of a water body is characterized by the presence of living organisms in the natural environment. Intensive investigation of the geographic distribution of rotifers was published by Voronkov (1925, 1927) and Green (1972) was showed the connection of separate species with latitudes. There are several rather complete surveys of rotifer composition from Oriental regions of the tropics were done by Chengalath and Fernando (1973); Chengalath et al.(1974a, 1974b); Fernando (1980), Sharma et al. (1980); Sudzuki (1980); Fernando et al. (1981) and Dussart et al. (1984).

Material and Methods

The investigation was carried out in a small irrigation reservoir; Barnoo reservoir. It is a small irrigation reservoir in Sihora tehsil of Jabalpur district (M.P.), located at 80° 07' 10" E Longitude and 23° 20' 50" N Latitude . The reservoir is about 40 years old and was created by constructing an earthen dam of 322.50m long and was was impounded on the rainy river Barnae. Total water spread area of the reservoir is 75.6 ha. at FRL , with a catchments area of 32.8 sq. km. the maximum and minimum depth of the reservoir is 72 feet and 22 feet respectively . Barnoo reservoir was adopted for fisheries purpose in 1980. During summer the perennial region of the reservoir have uneven bottom and submerged trees (Mandloi et al, 2003 & Ojha, 2004). During the study a total number of 18 genera of Rotifers were observed and recorded.

The water sample for seasonal qualitative evaluation of planktons was collected from the reservoir for two consecutive years from 2001-2002 and 2002-2003. 50 lit. of water sample were passed out from plankton nets made of nylo-bolt silk cloth (No.25) and filtered collected in the graduated tube of 25 ml of concentrated samples and kept in 5% formalin for further analysis. The genera of plankton were identified through Ward and Whipple (1956), Needham and Needham (1962) and Fernando (2002) with the application of Inverted research microscope (Leica, make DMIL). The current systematic status of the Phylum Rotifera is followed after the works of Wallace and Snell (1991), Nogrady et al.(1993), Shiel (1995) and Melone et al. (1998). The detailed system of classification, along with the known families and genera were reported from Barnoo reservoir and mentioned in Table-1.

Rotifers distribution is potentially cosmopolitan. Several workers reported their species with restricted distribution all over the world. Ahlstorm (1940) listed species with local distribution. Dhanapathi (1997) reported on the distribution of Brachionus calcyciflorus in India. Green (1972) discussed the latitudinal variations in planktonic rotifers and their assemblage. Majority of rotifers recorded from India are tropicopolitan and most of the species are seen in the reports from various countries as Koste & Paggi (1982) from South Amarica (Neotropical).

Result and Discussion

A total of 18 genera comprises 43 species of rotifers were encountered in Barnoo reservoir. There were 14 species in Brachionous, 5 species in Filinia, 5 species in Keretella, 2 species in Lecane, 4 species in *Tricocerca. Ascomorpha, Asplanchana, Cephalodella, Gastropus , Hexarthra, Horella, Mytilina , Notholka, Platyias, Ploesoma, Polyarthra, Rotaria and Testudinella* were also observed and recorded single species each(Table-1). It has been observed that in the year 2001-02 rotifers population were more in summer (29.36%) followed by monsoon (28.09%) and winter (8.3%) and in the year 2002-02 also rotifer population were also more in summer (61.11%) followed by monsoon (23.56%) and winter (6.89%) (Table-2).

The density of rotifer population can change at different seasons and different types of water bodies and also with depth and time of day (Duncan, 1984). Contrasts between the rotifer species composition and diversity in the wet and the dry season are described by Koste (1981) and Koste and Paggi (1982). Such observations were recorded in the present study.

In the present study, rotifera depicted high qualitative diversity and it showed a number of peaks (Fig. 1). The irregular periodicity in the abundance of rotifer population was reported earlier by several authors. It may be mentioned that according to Reid and Wood (1976), rotifers never follow any predictable population pattern in fresh water impoundment. According to Singh (2000) rotifers have versatile capacity to survive in

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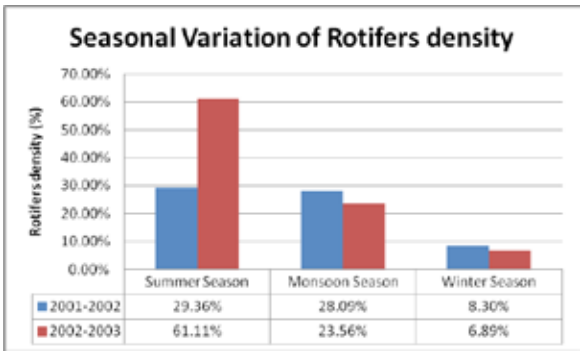
Fig.-1. Seasonal variation in Rotifers density in Barnoo reservoir



different environments. Similar observations were found in the present study also, since they were abundant in summer months indicating direct relationship with high temperature (Table 2). The peak abundance of rotifers during warm (summer) season was reported by Jain et al. (2005). Deshmukh (2001) reported 28 species of rotifera from Chhatri Lake, Amravati, Maharashtra, with maxima in summer, and this observation corroborates with the present investigation.

Conclusion

The results obtained during the present study demonstrate that Barnoo Reservoir supports the growth of quite a large number of rotifer species. The reservoir water should be properly maintained to conserve its rotifer diversity.

Table-2. Rotifers observed in Barnoo reservoir

	Phylum- Rotifera
	Class- Eurotatoria
	Order- Monogononta
	Sub-order- Ploima
	Family- Asplanchnidae
1.	*Asplanchana brightwelli*
	Family- Brachionidae
2.	*Brachionus caudatus*
3.	*Brachionus angularis*
4.	*Brachionus calyciflorus*
5.	*Brachionus havanaensis*
6.	*Brachionus budapestinensis*
7.	*Brachionus donneri*
8.	*Brachionus forficula*
9.	*Brachionus falcatus*
10.	*Brachionus dichotomus*
11.	*Brachionus plicatilis*
12.	*Brachionus angularis angularis*
13.	*Brachinus bidentata*
14.	*Brachionus diversicornis*
15.	*Brachionus quadridentata*
16.	*Keretella tropica*
17.	*Keretella cochlearis*
18.	*Keretella quadrata quadrata*
19.	*Keretella salcki*
20.	*Keretella procurva*
21.	*Notholka labis*
22.	*Platyias quadricornis*
	Family- Gastropodidae
23.	*Ascomorpha*
24.	*Gastropus stylifer*
	Family- Lecanidae
25.	*Lecane leontina*
26.	*Lecane peontia*
	Family- Mytilinidae
27.	*Mytilina ventralis*
	Family- Notommatidae
28.	*Cephalodella catelina*
	Family- Synchaetidae
29.	*Polyarthra vulgaris*
30.	*Ploesoma*
	Family- Trichocercidae
31.	*Tricocerca porcellus*
32.	*Tricocerca pusilla*
33.	*Tricocerca cylindrical*
34.	*Tricocerca longiseta*
	Sub-order- Flosculariacea
	Family- Filinidae
35.	*Filinia longiseta*
36.	*Filinia opoloensis*
37.	*Filinia terminalis*
38.	*Filinia pejleri*
39.	*Filinia minuta*
	Family- Hexarthridae
40.	*Hexarthra intermedia*
	Family- Testudinellidae
41.	*Testudinella patina*
42.	*Horella brehmi*
	Order- Bdelloidea
	Family- Philodinidae
43.	*Rotaria*

Table-2. Percentage population of rotifers in different seasons at Barnoo reservoir.

Year	Summer Season	Monsoon Season	Winter Season
2001-2002	29.36%	28.09%	8.3%
2002-2003	61.11%	23.56%	6.89%

REFERENCE

1. AHLSTROM, Elbert H. (July 30, 1940). "A Revision of the Rotatorinan Genera Brachionus and Platyias with Descriptions of One New Species and Two New Varieties". THE BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY 77: 143–184. | | 2. S.V.A. Chandrasjekhan and M.S. Kodarkar. 1994. Biodiversity of zooplankton from saroornagar lake, Hyderbad In J.Aqua. Biol. Vol. 9 (1 & 2) 30-33. | | 3. Fernando, C.H. 1994. Zooplankton, Fish and Fisheries in tropical freshwater. In Hydrobiologia. 272; 105-123. | | 4. Desmukh, U.S. 2001. Ph.D. Thesis, Amravati University , Amravati, India. | | 5. Duncan, A. 1983. The composition, density and distribution of zooplankton in Parakrama Samudra. In F. Schiemer (ed.). Limnology of Parakrama Samudra- Sri Lanka: a case study of an ancient man-made lake in the tropics. Dr. W. Junk. The Hague: 85-94. | | 6. Duncan, A. 1984. Assessment of factors influencing the composition, body size and turnover rate of zooplankton in Parakrama Samudra, an irrigation reservoir in Sri- Lanka. Hydrobiologia. 113: 201-215. | | 7. Jain, A., J. Pal, E. Sharma, and S.C. Rai. 2005. Eco. Env. Cons. 11, 555-561. | | 8. Jha, B.C., 2003. Fish diversity in small reservoir – issues, threats and conservation needs. Proceedings of NATP Workshop-"Fisheries management in the lentic water system, : Stocking of reservoir with fish seed". CIFRI, Barackpore (W.B.). 19-20. Feb. 149-158. | | 9. Koste, W. 1981. Zur Morphology, Systematik and Okologie von neuen monogonenten Radertieren (Rotatorien) aus dem Uberschwemmungsgebiet des Magela Creek der Aligator River Region Australiens. N.T. teil 1. Osnabrucker naturewis. Mitt. 8: 97-126. | | 10. Koste, W. and S. J. D. Paggi. 1982. Rotifera of the Superorder Monogononta recorded from Neotropic. Gewasser u. Abwasser 68/69: 71-102. | | 11. Pace ML, Orcutt JD (1981). The relative importance of protozoans, rotifers, and crustaceans in fresh water zooplankton communities. Limnol Oceanogr 26:822–830. | | 12. Pennak, R.W. 1978. Fresh-water invertebrates of the United States. Wiley-Interscience Publication, New York. | | 13. Reid, G.K. and R.D. Wood. 1976. Ecology of Inland Waters and Estuaries, D. Van Nostrand Company, New York. | | 14. Sharma, S.S.S. and Rao, T.R. 1991. The combined effects of food and temperature on the life history parameters of Brachionus patulus Muller (Rotifera). Int. Rev. Ges Hydrobiologia , 76 : 229-239. | | 15. Singh, D.N. 2000. Geobios. 27,120-124. | | 16. Voronkov, N. V. 1925. On the geographic distribution of rotifers, in particular Russia. 1. Krasnojarsk: I-III, 19pp. (In Russian). | | 17. Voronkov, N. V. 1927. On the geographic distribution of rotifers, in particular Russia. 1. Krasnojarsk: 32pp. (In Russian). | | 18. Green, J. 1972. Latitudinal variations in associations of planktonic rotifers. J. Zool. London. 167: 31-39. | | 19. Chengalath R. and C.H. Fernando. 1973. Rotifera of Sri-Lanka. The genus Lecane including the description of two new species. Bull. Fish. Stn. Srilanka (Ceylon). | 24: 13-27. | | 20. Chengalath, R. , C.H. Fernando and W. Koste. 1974a. The Rotifera of Sri-Lanka 2. Lecane of the Eurotatoria including new records. Bull. Fish. Res. Stn. Sri- Lanka (Ceylon) 24: 29-61. | | 21. Chengalath, R. , C.H. Fernando and W. Koste. 1974b. The Rotifera of Sri-Lanka 3. Description of new species with new records and a list of rotifer recorded and there distribution in different habitats from Sri Lanka. Bull. Fish. Res. Stn. Sri- Lanka (Ceylon) 25: 83-96. | | 22. Fernando, C.H. 1980. The species and size composition of tropical zooplankton with special reference to Oriental Region (South- East Asia). Int. Rev. ges. Hydrobiol. 65: 411-426. | | 23. Sharma, B.K. and R.G.Michael. 1980. Synopsis of Taxonomic studies on Indian Rotatoria. Hydrobiologia. 73: 229-236. | | 24. Sudzuki, M. 1989. Rotifera from the Oriental Region and There Characteristic; Special Issue for Centennial Anniversary of Nihin Daigaku. 3: 301-343. | | 25. Fernando, C.H. and N.P. Zankai. 1981. The Rotifera of Malaysaia and Singapore with remarks on some species. Hydrobiologia. 78: 205-219. | | 26. Dussart, B.H., C,H, Fernando, T. Matsumura- Tundisi and R.J, Shiel. 1984. A review of systematic distribution and ecology of tropical freshwater zooplankton. Hydrobiologia. 113: 77-91. | | 27. Ojha, Praveen and A.K. Mandloi, (2004). Durnal variation of pH in fresh water fish culture pond. In Ecol. Envi. and Cons. 8(1):2004, pp. 85-86. | | 28. Mandloi, A.K. and Praveen Ojha (2003). Status paper on fisheries management in Barnoo reservoir. In Proc. Of the NATP workshop on 'Fisheries management in lentic water system stocking of reservoir with fish seed'. CICFRI, Barrackpore (W.B.) February 19-20, 19-32. | | 29. Wallace, R.L., and T.W. Snell. 1991. Rotifera. Pp. 187-248 in Thorp, J.H., and A.P. Covich (eds.). Ecology and classification of North American freshwater invertebrates. Academic Press, San Diego. | | 30. Nogrady, Thomas. 1993. Rotifera. SPB Academic Publishing , The Hague, The Netherlands. pp 13-46. | | 31. Shiel, R.J. 1995. A Guide to Identification of Rotifers, Cladocerana and Copepods from Australian Inland Waters. Co- operative Research Centre for Freshwater Ecology identification Guide No. 3., Albury, NSW. |