

STUDIES ON ZOOPLANKTON DIVERSITY OF RIVER KAYADHU, NEAR HINGOLI CITY, HINGOLI DISTRICT, MAHARASHTRA



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Research Paper—Zoology

Zooplankton— The aquatic ecosystem covers a vast area and the organisms occurring in this area are under the influence of its physico-chemical parameters. The occurrence and abundance of zooplankton depends on its productivity, which in turn is influenced by abiotic factors and the level of nutrients in the water. In a fresh water system, the zooplankton forms an important faunal group, as most of them live on primary producers and make themselves available to be eaten by higher organisms in food chains including fish and contribute significantly to the biological productivity of this ecosystem (Michael, 1973). The abundance of zooplankton is most pronounced in the slower moving portions of a river system where deeper water tend to reduce velocity of current and silt deposition which make them indistinguishable from typical lentic habitats. The zooplankton of permanent swift-water stream is characteristically reduced both in number of species and biomass. The present study was undertaken to investigate the zooplanktonic diversity in river Kayadhu through different months and seasons during the period of January 2004 to December 2004 in order to assess the species composition, population density and seasonal fluctuation of this faunal group.

Materials and methods— For the study of zooplankton, samples were collected on monthly basis for a period of one year i.e. from January 2004 to December 2004. 50 L of water was filtered through plankton net of bolting silk No.25. Filtered water sample was preserved in 4% formalin and few drops of glycerin were added to it and was kept aside overnight for better sedimentation. Supernatant plankton free water was removed and settled concentrated sample were enumerated by Sedgwick-Rafter Cell method. Identification of zooplankton was done under

microscope using keys and monographs of Edmondson (1959), Pennak (1978) and Adoni (1985). The following are the specific volumes used for the identification of different groups of zooplankton viz. Rotifers (Dhanapathi, 2003), Copepods (Reddy, 1994), Cladocerans (Michel and Sharma, 1988) and Ostracods (Victor and Fernando, 1979). For their numerical estimation, the organisms were observed under light microscope using “Sedgwick Rafter Cell” as per procedure given in standard methods (APHA, 1991). Average of 5 to 10 counts for each sample was taken into account and results were expressed in number of organisms / Litre.

Results and discussion— In the present study, total 25 species of zooplankton were recorded consisting of 11 species of rotifera, 6 species of copepoda, 5 species of cladocera and 3 species of ostracoda. The monthly variations of zooplankton species is illustrated in Table 1. Species richness was high in the month of April (Summer) and October (Winter) and it was minimum during June (Monsoon). Zooplankton is the intermediate link between phytoplankton and fish, which are the secondary producers in the aquatic environment. Zooplanktons are good indicators of changes in water quality, because they are strongly affected by environmental conditions and responds quickly to changes in environmental quality. Hence, qualitative and quantitative study of zooplanktons are of great importance.

Rotifers: Rotifers are the microscopic faunal component living mostly in fresh water, are characterized by the presence of an anterior wheel like rotating structure called “Corona”. The rotifers are being considered as the most important soft bodied invertebrates (Hutchinson, 1967).

Table 1. Monthly variation of zooplankton density (Org./L) in Kayadhu river, Hingoli, Maharashtra.

Month/Species	Jan 04	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec 04
Rotifers												
<i>Asplanchna sp.</i>	-	-	-	140	70	-	-	-	-	90	200	-
<i>Brachionus durgae</i>	70	-	40	60	30	-	-	-	20	50	-	90
<i>B. angularis</i>	-	-	120	300	70	-	-	-	70	400	190	-
<i>B. bidentata</i>	-	18	30	130	80	-	-	-	-	40	-	30
<i>B. falcatus</i>	-	-	20	170	40	-	-	-	60	-	60	-
<i>B. pallas</i>	-	-	-	180	20	-	-	-	-	-	-	-
<i>B. calyciflorus</i>	-	-	40	160	30	-	-	-	-	-	-	-
<i>B. caudate</i>	-	-	20	50	40	-	-	-	-	30	-	-
<i>Filinia bory</i>	-	-	10	-	20	-	-	-	-	-	-	-
<i>F. longiseta</i>	-	-	30	10	40	-	-	-	-	120	-	-
<i>Keratella vulga</i>	-	-	-	20	190	-	-	-	20	-	-	-
Copepods												
<i>Cyclops sternuus</i>	50	200	300	420	290	50	50	170	30	-	-	40
<i>C. Viridis</i>	70	170	250	360	300	40	40	280	130	30	-	60
<i>Diaptomus edax</i>	90	100	210	280	250	100	110	230	70	130	80	40
<i>D. minutes</i>	160	150	320	410	320	90	100	260	160	240	100	30
<i>Heliodyptomus viduus</i>	80	110	340	420	360	140	140	270	150	-	60	20
<i>Mesocyclops leuckarti</i>	60	80	200	280	190	180	190	250	420	-	30	-
Cladocerans												
<i>Alona intermedia</i>	70	60	130	310	80	-	-	-	200	160	130	250
<i>A. Pulchella</i>	60	100	160	260	90	-	-	250	150	300	320	260
<i>Ceriodaphnia cornuta</i>	50	40	-	100	60	-	-	600	10	-	-	70
<i>Monia micrura</i>	10	-	50	30	-	-	-	-	20	-	130	40
<i>M. brachiata</i>	-	20	40	40	50	-	-	60	-	150	50	20
Ostracods												
<i>Cyclocypris globosa</i>	100	80	120	160	200	-	60	30	70	120	50	-
<i>Cypris subglobosa</i>	-	50	60	70	80	-	-	20	120	80	-	-
<i>Stenocypris fontinalis</i>	30	10	70	60	70	-	-	40	110	80	30	-

The rotifers play a significant role in aquatic food chain and thereby constitute an important food item to fishes. Besides, rotifers are now being used as an important aquatic faunal component for biomonitoring. Taxonomic dominance of rotifers was reported in several water bodies. This pattern is common in tropical and subtropical freshwater, whether in lake, ponds, reservoir, rivers or streams. (Sampaio *et al.*, 2002 and Neves *et al.* 2003). In the present study total 11 species of rotifera were recorded belonging to 4 different genera. Among rotifers, the most abundant species were *Brachionus durgae*, *B. angularis*, *B. bidentata*, *B. falcatus* and *Asplanchna sp.* All these species had

earlier been reported from some other districts of Maharashtra, they are reported for the first time from this river. The present study also revealed that total absence of rotifers during the monsoon season. Similar observations were also made by (Sinha, 1992) who had reported total absence of rotifers during the monsoon season in the Ganga river.

Copepods: Freshwater copepods constitute one of the major zooplankton communities occurring in all types of water bodies. They serve as food to several fishes and play a major role in ecological pyramids. About 120 species of free living freshwater copepods are known from India (Uttangi, 2001). In the present

study, most abundant species of copepods were *Cyclops sternuus*, *C. Viridis*, *Diaptomus edax*, *D. minutus* and *Heliodiaptomus viduus*. During the present investigation, copepods were found to be maximum during summer and minimum during winter. Similar trend was observed by (Chauhan R, 1993) in Renuka lake, Himachal Pradesh.

Cladocerns: Cladocerans popularly called as 'water flea' prefers to live in deep water and constitute a major item of food for fish. Thus they hold key position in food chain and energy transformation (Uttangi, 2001). About 600 species of freshwater cladocerans occur through the world (Korovchinsky, 1996) of which 110 species have been recorded from India (Patil and Goudar, 1989). During the present study total 5 species of cladocera were recorded belonging to 3 different genera. Among cladocerans the most abundant species were *Alona intermedia*, *A. pulchella* and *Ceriodaphnia cornuta*. The cladoceran population showed minimum in monsoon and winter and maximum in summer. The maximum population of cladocera in summer and winter may be attributed to

favourable temperature and availability of food in the form of bacteria, nanoplankton and suspended detritus while in monsoon the factors like water temperature, dissolved oxygen, turbidity and transparency play an important role in controlling the diversity and density of cladocera. (Edmondson, 1965)

Ostracods—Ostracods are bivalve and have shape like small seeds. They inhabit all kinds of fresh water and marine environments. The freshwater ostracods occur in lakes, tanks, pools, swamps, streams and even polluted waters. The abundance of these provides a good food for aquatic organisms. Approximately 110 species are known from the inland waters bodies of the Indian Subcontinent (Patil and Gouder, 1989). In the present investigation 3 species of ostracods were recorded namely *Cyclocypris globosa*, *cypris subglobosa* and *stenocypris fontinalis*. Maximum ostracods population was recorded in summer months while minimum in rainy season. Similar observations were also made by Sunkad and Patil (2004) in Fort lake of Belgaum (Karnataka).

R E F E R E N C E

- * **Adoni A.D.** (1985) Workbook on Limnology (Ed), Department of Environment, Government of India, Bandona Printing Service, New Delhi. * **APHA** (1991) Standard methods for the examination of water and waste water. American Public Health Association, Inc. New York. 18th Ed. * **Chauhan R.** (1993) Seasonal fluctuation of zooplanktons in Renuka lake Himachal Pradesh. *Uttar Pradesh J. Zool.*, 111(1): 17-20. * **Dhanapathi M.V.S.S.S.** (2003) Rotifers from Andhra Pradesh, India-III. *Hydrobiologia*, 48(1): 9-16. * **Edmondson W.T.** (1959) Freshwater biology. 2nd Ed. John Wiley & Sons, New York, U.S.A. * **Edmondson N.T.** (1965) Reproductive rates of planktonic rotifers related to food temperature in nature. *Ecol.* Vol 5: 61-68. * **Hutchinson G.E.** (1967) A treatise on limnology, Volume II. Introduction to lake biology and the limnoplankton. Wiley, New York. 1115pp. * **Korovchinsky N. M.** (1996) How many species of cladocera are there? *Hydrobiologia*.321:191-204. * **Michael R.G.** (1973) Seasonal trends in physico-chemical factors and plankton of a fresh water fish and their role in fish culture. *Hydrobiologia*, 30: 144-160. * **Michael R.G.** and Sharma B.K. (1988) Fauna of India and adjacent countries. Indian cladocera (crustacea: Branchipoda: Cladocera). *Zool. Sur. India*: 261pp. * **Neves I.F.,** Rocha O., Roche K.F. and Pinto A.A. (2003) Zooplankton community structure of two marginal lakes of the River Cuiaba (Mato Grass, Brazil) with analysis of rotifer and cladocera diversity. *Braz. J. Biol.*, 63(3): 329-343. * **Patil C.S.** and Gouder B.Y.M. (1989) Fresh water invertebrates of Dharwad, Prasaraanga, Karnatak University, Dharwad. * **Pennak R.W.** (1978) Freshwater invertebrates of United States 2nd Edn. John Willey Sons Inc., New York. * **Reddy, Y.R.** (1994) Copepoda: Calanoda: Diaptomidae: Guide to the identification of the microinvertebrates of the continental waters of the world. Vol.5 SPB Publishers, The Hague, Netherland. * **Sampio E.V.,** Rocha O., Matsumura-Tundisi, T. And Tundisi J.G. (2002) Composition and abundance of zooplankton in the limnetic zone of seven reservoirs of the Parana Panema River, Brazil. *Braz.J.Biol.* 62(3): 525-545. * **Sinha R.K.** (1992) Rotifer population of Ganga near Paba, Bihar (India) *Proc. Nat. Acad. India-B*, II: 313-332. * **Sunkad B.N.** and Patil H.S. (2004) Water quality assessment of fort lake of Belgaum (Karnataka) with special reference to zooplankton. *J. Environ Biol.* Vol. 25(1), 99-102. * **Uttangi J.C.** (2001) Conservation and management strategy for the water fowls of minor irrigation tank habits and their importance as stopover site in Dharwad Dist. In: Hosetti and M. Venkateshwaralu (eds.), Trends in wild life and management. Daya publ. House, New Delhi, India, PP: 179-221. * **Victor R.** and Fernando C.H. (1979) The fresh water ostracopoda (Crustacea: ostracoda) of India. *Records of the zoological survey of India*, 74(2) 147-242.