

ZOOPLANKTON DIVERSITY IN KHYRA MANDIR TAAL, GONDA UTTAR PRADESH**MUKUL SINHA^a AND SHARWAN KUMAR SRIVASTAVA^{b1}**^aDepartment of Zoology, Lal Bahadur Shastri P.G. College, Gonda, U.P., India^bDepartment of Botany, Lal Bahadur Shastri P.G. College, Gonda, U.P., India**ABSTRACT**

Zooplanktons occupy a central position in the food web of aquatic ecosystem. They being integral part, contribute significantly the biological productivity of the fresh water ecosystem. The present study was taken to study the seasonal changes in the density and diversity of Zooplankton in KhyraTaal located in Gonda district of Uttar Pradesh, India. The work was carried out for a period of one year from July, 2011 to June, 2012. A sum of 24 genera of zooplankton belonging to 4 groups were identified. Out of 24 genera, 10 genera belong to Rotifera, 5 to Cladocera, 6 to Copepoda and 3 to Ciliata. The plankton density showed that Rotifers dominated and constituted about 41.95 %, followed by Cladocerans (29.59 %), Copepods 14.51% and Ciliates (12.72 %). Predominance of Rotifers indicates the eutrophication of the taal hence authors suggest to initiate appropriate measures to minimize the water pollution by regulating human activities in watershed areas.

KEYWORDS: Zooplankton, Population Density, Rotifers, Cladocerans and Copepod

Diversity of plankton and population density in a water body are of great importance in imposing sustainable management policies because they act as indicator of water quality. The inadequate knowledge of plankton and their dynamics is a major drawback for the better understanding of the life process of fresh water bodies. Zooplankton is a diverse group of heterotrophic organisms that consume phytoplankton, regenerates via their metabolism, and transfer energy to higher trophic levels. They play an important role in recycling nutrients as well as cycling energy within their respective environment (Prakash *et al.*, 2002). They invariably form an integral component for fresh water communities and contribute to biological productivity (Prakash, 2001a). Further, these are also good indicator of the changes in water quality because they are strongly affected by environmental conditions and respond quickly. These are the main food for fishes; almost all the fishes at their larval stages depend on them and some of them exclusively feed on zooplankton hence their qualitative and quantitative studies are of great importance.

Though numerous works on zooplankton diversity have already been reported from different parts of India but there is scarcity of report from freshwater bodies of different parts of eastern Uttar Pradesh except some worth mentioning of Prakash and Ansari (2000); Prakash (2001a); Prakash *et al.*, (2002) So, the present study was an attempt for reporting Zooplankton diversity

and density of Khyra Mandir Taal of Gonda district of eastern U.P.

MATERIALS AND METHODS

Zooplankton samples were collected fortnightly with plankton net of bolting no. 25 with a mesh size 25 μ attached with a collection tube at the base of net during July, 2011 to June, 2012, between 9.00 and 10.00 am. Approx. 50 liter of surface water was sieved through the plankton net and sample was collected inside the collection tube. The sample was transferred to plastic bottle and preserved in 4% formalin. Zooplankton productivity was measured by using Sedge Wick Rafter Plankton counting cell and quantities are expressed as unit per liter of the taal water. The diversity of zooplankton was studied under light microscope with magnification 10X initially and followed by 40X. The specimen were identified following standard literature of Needham and Needham (1962); Battish (1992); Michael and Sharma (1998); Sharma and Sharma (2008)'

RESULTS AND DISCUSSION

In the present study, density and diversity of zooplankton are analyzed on seasonal basis and presented in table 1 & 2. In the present study total 24 genera of zooplankton was observed between the study period. Out of 24 genera, 10 genera belong to Rotifera, 5 to Cladocera, 3 to Ciliata and 6 to Copepoda (Table 1).

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Table 1: Seasonal Variation in Zooplankton Diversity of Khyra Mandir Taal

Zooplanktons	Summer	Rainy	Winter
Rotifera			
<i>Brachionus sp.</i>	-	-	+
<i>Keratella sp.</i>	+	+	+
<i>Plationus sp.</i>	+	+	+
<i>Philodinasp</i>	+	+	+
<i>Rotaria sp.</i>	+	+	+
<i>Lecane sp.</i>	-	+	-
<i>Polyarthrasp</i>	-	-	+
<i>Filinia sp.</i>	+	+	+
<i>Trichocerca sp.</i>	+	-	+
<i>Ascomorpha sp.</i>	+	-	+
Cladocera			
<i>Daphania sp.</i>	+	+	-
<i>Ceriodaphnia sp.</i>	+	+	+
<i>Monia sp.</i>	+	+	+
<i>Bosmina sp.</i>	+	+	-
<i>Chydorus sp.</i>	-	+	+
Ciliata			
<i>Paramecium sp.</i>	+	-	+
<i>Vorticella sp.</i>	+	-	+
<i>Epistylis sp.</i>	+	-	-
Copepoda			
<i>Cyclopos sp.</i>	+	+	+
<i>Nauplius sp.</i>	-	-	+
<i>Diaptomus sp.</i>	-	-	+
<i>Cyclopoid sp.</i>	-	-	+
<i>Mesocyclops sp.</i>	+	+	+
<i>Heliodiaptomus sp.</i>	-	-	+

The annual density showed that Rotifers dominated and constituted about 41.95 % of the total zooplankton population was followed by Cladocerans (29.59%), Copepods (14.51%) and Ciliates (12.72%) (Table2). In the present study the maximum density of

zooplankton was recorded in Summer season (1137 units/lit.) and minimum in winter season (477 units/ lit.). The population density of Rotifera, Cladocera, Copepod and Ciliata ranges from 214-492 units/ lit., 119-377 units/ lit., 83-153 units/ lit and 61-115 units / lit., respectively

Table 2: Seasonal variations in Total Zooplankton Counts (units/lit.) of Khyra Mandir Taal

Group	Summer	Rainy	Winter	Total	% age
Rotifera	492	326	214	1032	41.95
Cladocera	377	262	119	728	29.59
Ciliata	115	137	61	313	12.72
Copepoda	153	121	83	357	14.51
Total	1137	846	477	2460	-

In the present study, a total of 10 genera of rotifer recorded and they exhibited highest density in summer season. Similar finding were found in various

fresh water bodies in U.P. (Prakash and Ansari, 2000; Prakash, 2001; Prakash *et al.*, 2002.). Rotifers play a vital role in the trophic level of fresh water bodies and serve as

living capsule of nutrition. Out of 10 genera of rotifers 5 were perennial (*Keratella sp.*, *Plationus sp.*, *Philodina sp.*, *Rotaria sp.* and *Filinia sp.*) and rest of 5 genera (*Brachionus sp.*, *Lecane sp.*, *Polyarthra sp.*, *Trichocerca sp.* and *Ascomorpha sp.*) were not noticed in all the seasons.

In the present study, a total of 5 genera of cladocera were recorded. Out of 5 genera of cladocerans only 2 genera were perennial (*Ceriodaphnia sp.* and *Monia sp.*) while rest 3 genera (*Bosmina sp.*, *Daphania sp.*, and *Chydorus sp.*) were not present in all the seasons. The population density of cladocerans was highest in summer season and lowest in monsoon season. Similar finding were found in various fresh water bodies in India (Chourasia and Adoni, 1985; Prakash and Ansari, 2000; Prakash, 2001 and Prakash *et al.*, 2002).

In the present study, a total of 6 genera of copepods. Out of 6 genera only 2 genera were perennial (*Cyclopos sp.* and *Mesocyclops sp.*) and remaining 4 genera (*Nauplius sp.*, *Diaptomus sp.*, *Heliodyptomus sp.*, and *Cyclopoid sp.*) were found only in certain months of the year. On the whole, copepods exhibited higher density in summer season and minimum in winter season. Similar findings were reported in various fresh water bodies in India by Prakash *et al.*, (2002).

Three genera of ciliates (*Paramecium sp.*, *Vorticella sp.* and *Epistylis sp.*) were recorded during the present study. The density of ciliates was highest during summer season and lowest in winter season. Pace and Orcutt (1981) suggests that ciliates play an important role in nutrient regeneration because of their high rates of phosphorous excretion.

CONCLUSION

The importance of the zooplankton is well recognized as they play vital role in food chain and also play a key role in cycling of organic matter in the aquatic ecosystem. The present study on Khyra Mandir Taal shows rich density and diversity of zooplankton particularly rotifers reveals that this taal is very much suitable for aquaculture as rotifers are known to be the best food for the fish larvae. Authors found that the rotifers were found to predominant group which are the indicators of eutrophication. Therefore, measures must be taken to minimize the water pollution by regulating human activities in watershed areas.

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REFERENCES

- Ansari K.K. and Prakash S., 2000. Limnological studies on Tulsidas Tal of tarai region of Balrampur in relation to fisheries. *Poll. Res.*, **19**(4): 651-655.
- Battish S.K., 1992. Freshwater zooplankton of India. Oxford and IBH publishing Co., New Delhi.
- Chourasia S.K. and Adoni A.D., 1985. Zooplankton dynamics of a shallow eutrophic lake. *Bull. Bot. Sci. Sagar*, **32**:30-39.
- Michael R.G. and Sharma B.K., 1998. Indian Cladocera (Crustacea: Branchiopoda: Cladocera). Fauna of India and adjacent countries Series-Zool. Surv. India, Calcutta.
- Needham J.J and Needham P.R., 1962. A Guide to the study of freshwater Biology, Charles Cthomas Publisher, USA.
- Pace M.L. and Orcutt J.D., 1981. The relative importance of protozoans, rotifers and crustaceans in a freshwater zooplanktonic community. *Limnol. Oceanogr.*, **26**: 822-830.
- Prakash S., 2001. Seasonal dynamic of plankton in a fresh waterbody at Balrampur. *G.E.O.B.I.O.S.*, **28**(1):29-32.
- Prakash S. and Ansari K.K., 2000. Characteristics of zooplankton community in the Bhagwanpur Dam of Tarai Region, Tulsipur, distt. Balrampur, U.P. UGC sponsored first national conference on recent trends in life management, organized by Bipin Bihari College, Jhansi. pp. 54-56.
- Prakash S., Ansari K.K. and Sinha M., 2002. Seasonal dynamics of zooplankton in a fresh water pond developed from the wasteland of brick-kiln. *Poll. Res.*, **21**(1): 81-83.
- Sharma B.K. and Sharma S., 2008. Zooplankton diversity in floodplain lakes of Assam. *Records of Zoological Survey of India. Occasional paper no.*, **290**: 1-307.