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Seasonal Variation of the Zooplanktonic Community of Turkaulia Lake at District East Champaran, Bihar

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Abstract

In the present investigation zooplankton density was studied of Turkaulia lake, East Champaran, Bihar during July 2007 to Jute 2008. Eighteen species of zooplankton were recorded (rotifers 4 copepods 5 cladocerans 6, ostracods 1 and protozoans 2 species). The maximum density of zooplankton was recorded in December (386 units/liter) and minimum in July (165 units/liter). The variation in the number of zooplankton species is directly related with seasonal effects.

Key words : Zooplankton, Limnology, Diversity, Seasonal variation.

The proposed investigation site, the Turkaulia lake, is a natural and perennial water body. It is situated at about 6 km from Motihari town on Motihari-Areraj main road in North Bihar, at latitude 24°30′N′ and longitude 85°30′ E′. It is an ox-bow lake, about 6 km long. The maximum depth is 8 to 9 m in the middle while minimum (1.5—2.0 m) in the marginal area.The width of the lake varies between 152—183 m at different places. The main source of water is rain in the catchment area. In aquatic ecosystem the zooplanktons play an important role as they fulfil the nutritive requirements of not only the fishes but also of other macroinvertebrates. At the same time the zooplanktons are used as indicator of biological productivity. Khanna and Singh (1) and Nandan and Kumavat (2) reported the limnological relation between pollution and biodiversity on various water bodies. Pulle and Khan (3) studied the relation between different physico-chemical characteristics diversity, density and also the seasonal variation of zooplankton. Hence, knowledge of the species composition and distribution of zooplankton is of great value especially in fish culture programs. Unfortunately such investigation in Turkaulia lake has not so far been done systematically.

Methods

For the collection of zooplankton three sites were selected in the range of one km. The sampling was done at all selected sites monthly from July 2007 to June 2008. In each month about 10 liter of water was collected at each selected site and all were mixed thoroughly. The mean depth of water at each site was 2 to 3 m. By the use of plankton net, made up of 25 no. bolting silk, the planktons were sieved and then preserved in 5% formalin in the tubes of 10 ml. The qualitative estimation of plankton was carried out by direct census method with the help of Sedjwick rafter counting cell under a binocular microscope. Zooplanktons were counted in 100 squares, average was calculated and expressed in percentage. Identification was also made during counting.

Results and Discussion

In the present study 18 species of zooplanktons were recorded. Of these, four belonged to Rotifera, five to Copepoda, six to cladocera, one to Ostracoda and two to Protozoa (Table 1). The zooplankton population was dominated by rotifers (30.74%), followed by copepods (25.78%), cladocerans (18.57%), ostracods (17.44%) and protozoans (7.45%). The maximum density of zooplankton was recorded in December (386 units/liter) and minimum in July (165 units/liter). The population density of rotifers ranged between 53—128 units/liter. The maximum density of rotifers was noticed in January and minimum in June. Among rotifers, *Brachionus* sp. had the highest average population density and *Monostyle* a sp. had the lowest

Table 1. Monthly variation in the density of different zooplanktons (units/liter) during July 2007 to June 2008.

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Rotifera												
Platiyas	13	14	17	13	17	22	25	14	13	10	12	09
Brachionus	29	30	32	38	42	46	51	40	38	36	27	24
Asplanchna	17	18	20	15	20	24	27	22	22	19	16	13
Monostyla	9	10	12	12	16	20	25	16	15	13	10	07
Total rotifers	68	72	81	78	95	112	128	92	88	78	65	53
Copepoda												
Cyclope	5	4	7	11	18	20	25	23	21	19	11	8
Mesocyclops	5	4	6	12	17	22	24	20	19	17	9	8
Nauplius	8	6	9	20	25	24	22	23	22	21	14	10
Neo-Diaptomus	9	8	10	13	18	23	25	25	21	20	13	12
Diaptomus	3	2	5	6	11	16	18	14	13	12	5	6
Total copepods	30	24	37	62	89	105	114	105	96	89	52	44
Cladocera												
Daphnia	4	6	12	18	21	21	19	16	15	13	10	5
Moina	2	5	8	10	12	13	12	13	12	9	5	3
Simocephalus	6	8	11	16	18	19	17	16	15	10	10	8
Bosmina	1	2	2	1	3	4	4	3	4	3	1	1
Ceriodaphnia	4	6	8	12	14	14	13	14	13	8	8	5
Alona	0	2	1	4	6	8	5	6	6	5	1	0
Total cladocerans	17	29	42	61	74	79	70	68	65	48	35	22
Ostracoda												
Stenocypris	35	38	26	75	65	63	43	33	42	57	45	51
Protozoa												
Paramecium	12	7	10	8	10	18	18	19	17	20	18	15
Euglypha	3	4	5	4	4	9	10	9	9	7	4	5
Total Protozoa	15	11	15	12	14	27	28	28	26	27	22	20
Total zooplankton	165	174	201	288	337	386	383	326	317	299	219	190

average density. The density of copepods varied between 24—114 units/ liter. The maximum was reported in January and minimum in August. Among copepods, *Nauplius* sp. had the highest average density and *Diaptomus* sp. had the lowest. The density of cladocerans was found between 17—79 units/liter. The maximum and minimum value was noticed in December and July respectively. In this case, the density of *Daphnia* sp. was at the peak and *Bosmina* sp. was at the bottom level. The population density of Ostracods varied from 26 to 75 units/liter. The maximum and minimum were noticed in October and September respectively. Only one species of this group was reported. The density of protozoans ranged between 11—28 units/liter. The maximum and minimum were recorded in January and August respectively. Among protozoans, *Paramecium* and *Euglypha* sp. were reported. The number of *Euglypha* sp. was about half than those of *Paramecium* sp. In this way, the variation in the population of zooplanktons from maximum to minimum in different months was noticed in following order. Dec>Jan Nov> Feb> Mar>Apr> Oct>May Sept>Jun>Aug>Jul.

The highest population of zooplankton was observed during winter, lowest during rainy while moderate population was observed during summer season. Rotifers dominated in most of the months. They had their highest population during winter season and lowest during summer, of which *Brachionus* sp. was reported to be dominant one, followed by *Asplanchna* sp. *Platiyas* and *Monostyle* sp. Second to the rotifers were copepods which exhibited its peak in winter season. The third were cladocerans showing its peak in winter and lowest in rainy season. The fourth were ostracods which showed its presence in the similar fashion. Protozoans were recognized as the fifth group.

Kulshreshha and Johri (4) recorded the highest

population of zooplankton during winter and lowest during monsoon. According to Sinha (5) rotifers were found to be dominant group.Bais and Agrawal (6) worked on comparative study of zooplanktonic spectrum and observed that rotifers were the most abundant group.

It may be considered that the fall in the population of zooplankton in monsoon period, is due to dilution of water caused by rains and also due to fall in submerged macrophytic diversity. On the other hand, the increase in population in winter season is due to low temperature, high percentage of dissolved oxygen, low velocity and other suitable conditions (7).

The Turkaulia lake is rich in organic matters and provide a better water quality for zooplankton. Highest biodiversity, low temperature, high dissolved oxygen, rise in pH and low bicarbonates are also the supporting factors for the growth of zooplankton. Thus, it may be concluded that the density of zooplankton depends upon the different abiotic factors directly or indirectly. It is also evident that some biotic factors also play a decisive role in the growth zooplankton.

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