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Study of zooplankton diversity and density in Doura chour of Phulaut village under Madhepura district

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Abstract- Zooplanktons play very important role in aquatic ecosystem. Their diversity and density are the indicators of water quality and physicochemical parameters of water. In the present study, diversity and density of zooplanktons were examined in Doura chour of Madhepura district during July-23 to December-23. Altogether, 13 genera of zooplanktons were identified out of which 6 belongs to Rotifera, 5 belong to Cladocera and 2 belong to Copepoda. Rotifera was dominant followed by Cladocera. Maximum density of zooplanktons was observed during the month of Aug and minimum in the month of July. Population density during six month was recorded as 178 ind/l for Rotifera, 131 ind/l for Cladocera and 61 ind/l for Copepoda. Percentage density of Rotifera, Cladocera and Copepoda was observed as 48.108%, 35.405% and 16.486% respectively.

Keywords: Zooplanktons, Rotifera, Cladocera, Copepoda, Diversity, Density.

INTRODUCTION

Zooplanktons are a diverse group of heterotrophic organisms that feed on phytoplanktons, regenerate nutrients by their metabolic and transfer energy to higher trophic level.¹ Zooplanktons are main source of food for fishes. These organisms are base of food chain and food web in all aquatic ecosystem.² They provide direct link between primary producers (phytoplanktons) and higher trophic level such as fishes.³ Zooplanktons are microscopic organisms of aquatic ecosystem which contribute in understanding the basic nature and economy of aquatic habitat. Zooplanktons face a wide variety of disturbance in aquatic ecosystem such as nutrient food, acidification, pollution etc.. Therefore they can be used as tool for monitoring aquatic ecosystem. Hence, they are considered as ecological important organisms.⁴

Freshwater zooplanktons comprises of Rotifera, Cladocera, Copepoda and Ostracoda.⁵ The distribution and diversity of zooplanktons depends mainly on physicochemical parameters of water.⁶ It is well studied tool for understanding water pollution status.⁷

Present study was conducted to assess diversity of zooplanktons in Daura chour of Phulaut village under Madhepura district. Chours are natural water bodies in low land area where water deposit from the flooding of river and rain water from surrounding area. This chour is situated about 55 km away from district headquarter. Water remain logged throughout the year in this chour.

MATERIAL & METHODS

Zooplanktons were collected weekly from July-2023 to December-23. Collection was carried out by filtering 100 lit. surface water through plankton net of bolting silk no. 25. Samples were preserved in 4% formaldehyde and

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2 to 3 drop glycerine and a pinch of detergent was added to it. Detergent avoids the aggregation of zooplanktons. Samples were collected in separate glass jars labelled with the name of site, date of collection and time of sampling. The samples were observed under microscope by using Sedgewich-Rafter cell count method. Identification was carried out on the basis of standard monographs.

Density of zooplanktons was calculated by the formula:

$$\text{Density of zooplankton individual/liter} = \frac{\text{No. of zooplanktons in one drop (o. 1ml)} \times 10 \times 1000}{1}$$

RESULT

In the present study, zooplanktons were collected during July-23 to December-23 from Doura chour of Phulaut (Madhepura). Zooplanktons were identified up to genus. Abundance of zooplanktons was calculated in each month. Collected zooplanktons belonged to Rotifera, Cladocera and Copepoda. From Rotifera 6 genera, Cladocera 4 genera and Copepoda 2 genera were identified. Rotifera dominated in the studied chour. Among Rotifera *Trichotria* dominated while in Cladocera, *Alonella* was dominant genus. Monthly variation in zooplanktons was calculated.

Table 1- Abundance of zooplankton sps. in Doura chour

Zooplanktons		Abundance in (ind./l)					
Class	Genera	July	Aug	Sept	Oct	Nov	Dec
Rotifera	<i>Brachionus</i> sps.	5	7	6	8	7	9
	<i>Trichotria</i> sps.	7	8	6	7	9	8
	<i>Ascomorpha</i> sps.	6	5	7	6	8	7
	<i>Lecane</i> sps.	4	6	5	7	5	6
	<i>Rotaria</i> sps.	5	4	3	-	-	-
	<i>Conochilus</i> sps.	4	3	-	-	-	-
Cladocera	<i>Sida</i> sps.	5	4	3	5	4	2
	<i>Alonella</i> sps.	7	6	8	8	7	6
	<i>Daphnia</i> sps.	5	6	-	-	-	3
	<i>Bosmina</i> sps.	4	5	6	4	5	3
	<i>Moina</i> sps.	3	4	5	4	4	6
Copepoda	<i>Heliodiaptomus</i> sps.	5	6	4	6	3	-
	<i>Mesocyclops</i> sps.	6	7	8	5	6	5

Maximum density of zooplanktons was calculated in the month of Aug-23 (71 ind/l) and minimum in the month of July-23 (40 ind/l). Population density during six month was recorded as 17.8 ind/l for Rotifera, 131 ind/l for Cladocera and 61 ind/l for Copepoda. Percentage density was recorded as 48.108% Rotifera, 35.405% Cladocera and 16.486% Copepoda during study period.

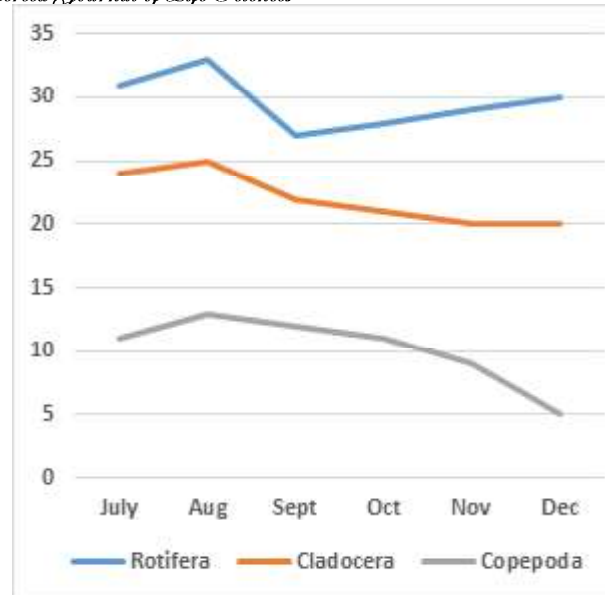


Fig. 1- Monthly variation in diversity of zooplanktons

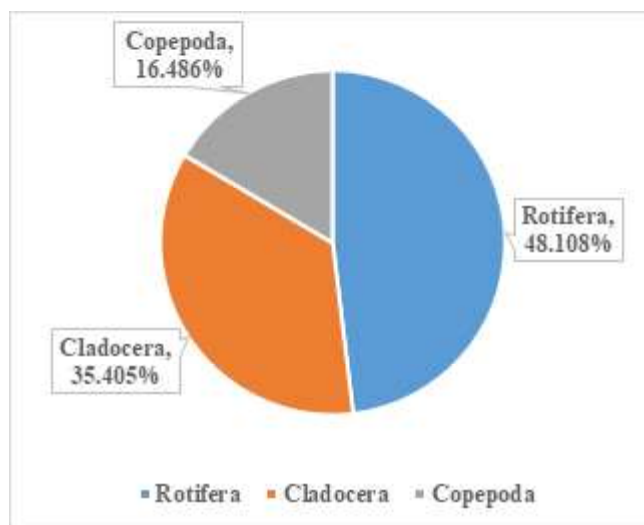


Fig. 2- Graph showing % of class Rotifera, Cladocera and Copepoda from July-23 to Dec-23.

DISCUSSION

Zooplanktons are diverse group of heterotrophic organisms that feed on phytoplanktons. They regenerate nutrients and transfer to higher trophic levels. Zooplanktons are main natural source of food for fishes. They play very important role in aquatic ecosystem. These organisms dispose off sewage and thus are natural purifier.

Zooplankton diversity is one of the most important parameter in water quality assessment. Hutchinson (1967)⁸ reported that *Brachionus* sps. of Rotifera is an indicator of organic pollution. Wilhm and Dorris (1968)⁹ reported that rise in diversity of zooplanktons were signal of healthy

environment in an aquatic ecosystem. Marneffe *et al.* (1996)¹⁰ reported that the population of Rotifera is higher in summer. In our study, also it was observed that population of Rotifera was higher in July and Aug-23 in comparison to Nov and Dec. Saba and Sadhu (2015)⁶ reported monthly variation in zooplankton population from Garga reservoir of Bokaro district (Jharkhand). They reported that *Brachionus* sps. was abundant among Rotifera. In our study also population of *Brachionus* sps. among Rotifera was observed higher. Highest population was observed in Rotifera followed by Cladocera during the month of July. Kar and Kar (2016)⁵ studied the diversity of zooplanktons and reported that Rotifera was dominant followed by Cladocera. Similar result was observed in the present study. Kaur *et al.* (2018)¹² studied zooplankton diversity in polluted water of Buddha Nullah, Ludhiana. They reported presence of only two groups- Rotifera and Cladocera. Among Rotifera, *Brachionus* population was highest. Kar and Kar (2016)⁵ studied diversity and density of zooplanktons in Sat beel of Cachar, Assam and reported that Rotifera was 53%, Cladocera 25% and Copepoda 27%. In our study, Rotifera represented 48.108%, Cladocera 35.405% and Copepoda 16.486%.

CONCLUSION

Present study was conducted during July-23 and Dec-23 in Daura chour of Madhepura district to examine diversity and density of zooplanktons. Zooplanktons were collected and identified up to genus. Altogether 13 genera were identified, 6 belonging to Rotifera, 5 belonging to Cladocera and 2 belonging to Copepoda. Rotifera was dominant among zooplanktons. Among Rotifera, *Trichotria* was dominant followed by *Brachionus*. Zooplanktons were maximum in the month of Aug and minimum in the month of July. Population density during six month was recorded as 178 ind/l for Rotifera, 131 ind/l for Cladocera and 61 ind/l for Copepoda. Percentage density of Rotifera, Cladocera and Copepoda was observed as 48.108%, 35.405% and 16.486% respectively.

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