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Zoology

A COMPARATIVE STUDY OF ZOOPLANKTON COMMUNITY OF SIX DIFFERENT WATER BODIES IN FAKIR MOHAN UNIVERSITY, NEW CAMPUS, BALASORE, ODISHA

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ABSTRACT Zooplankton are miniature creatures. they drift passively in water column. Despite of small.size they play crucial role in aquatic ecosystem. Diversity and physicochemical parameters are essential for estimating suitability of water for drinking, culture, irrigation purposes. Marine zooplankton are far more diverse than fresh water zooplankton. Objective of the current day study is to investigate zooplankton community and evaluating relation among various physicochemical parameters of water and abundance of zooplankton across six different fresh water bodies of Fakir Mohan university, new campus, Balasore. Each of which had a unique geographic location and different water body condition. Sample were collected in summer season during 6.30 am to 8.30 am. A total number of eight different taxa of zooplankton were identified upto genus level: 1 Rotifer (Brachionus sp.), 4 Copepods (Mesocyclops sp., Microcyclops sp., Diaptomus sp. and nauplius larva) 3 Cladocera (Daphnia sp., Ceriodaphnia sp., Bosmina sp.).

KEYWORDS : Zooplankton, quantitative and qualitative analysis, Copepod, Rotifers, Cladocera, biodiversity, physicochemical parameter, Eutrophication.

INTRODUCTION

Cosmopolitan nature of zooplankton made them available in diverse aquatic habitats including ocean, lake, sea, pond, estuaries and many temporary or artificial water bodies. Zooplankton are microscopic unit. They look quite amazing under the microscope but the sample can be appeared little disappointing to unaided eye. Environmental factors influence the movement of the zooplankton. As they are passive drifters their direction of movement is determined by water flow. These animal plankton provide primary productivity to the fresh water ecosystem and play the major role in lotic community. Distributions of these tiny animals in unpolluted and contaminated water can indicate water pollution. Zooplankton are described as excellent ecological indicator. These planktonic animals play a vital role in transferring energy and nutrients to the higher trophic levels in aquatic ecosystem. Primary consumers of zooplankton community feed on phytoplankton and secondary consumers feed on other zooplanktons. Biomass of plankton determines the potentiality of an aquatic ecosystem. Effective management of aquatic ecosystem needs understandings about its composition, abundance and seasonal succession. The herbivory nature of zooplankton helps in reducing the phytoplankton abundance by feed on some tiny fast growing micro algae. Generally during the late spring several water bodies become clear due to herbivory nature of these planktonic animals. This nature helps in penetration of sun light and heat and maintain thermal stratification pattern. Nutrient contents of various zooplankton species differ from each other, which influence the recycling patterns of nutrients in water column. Water is the crucial component of the ecosystem which are depends upon the water for survival, maintaining life cycle and many other things. Though, earth is known as the blue planet whose 80% of the surface is filled with water, still 97% of the water can't be used for drinking, industrial and agricultural use(Stone et al. 2017).

A study conducted to elevate importance of zooplankton as live feed for fish culture, they reported increased growth and production of fish after introducing the plankton feed than artificial feed. These planktonic animals have vital role in aquatic ecosystem, manage other higher trophic level, so knowledge about zooplankton significance is required before fish culture

MATERIALS AND METHODS

Sample Collection

Samples were collected from six different ponds of university campus during March to April 2024 in morning in between 6.30 am to 8.30 am because of in the day time the water parameter is disturbed by environmental factors or by anthropogenic activity. Further several zooplankton migrate deeper according to light that's why horizontal sample collection must be done in early morning or after dusk for better result. The sample can be collected by sampling bottles, reagents and zooplankton nets.

Fixation

Onsite fixation of the sample is mandatory for identification of zooplankton**.** Improper fixing of sample form whitish precipitation and degraded exoskeletons. In tropical regions zooplankton degrade quickly. To avoid bacteria action the sample must be fix within 5 minutes. 4% formalin used for the fixation of sample; the pH is maintained in between 7.5 to 8.

Method Of Quantitative Analysis Of Zooplankton

Quantitative analysis was done by using Sedgwick Rafter cell method. The collected preserved sample was diluted to 100cc of distilled water. The chamber was cleaned properly by removing contaminants. 1ml from the diluted sample was taken carefully spread over the chamber with the help of dropper by placing the cover slip diagonally. The cell contains 1000 small squares, by using microscope zooplankton was counted in all 1000 squares. No. of organisms per ml. was counted by using the formula given below.

$$\text{No./ml} = \frac{N \times 1000}{L \times D \times W \times S}$$

Where, N = no. of zooplankton counted
L = length of transect strip (in mm)
D = depth of the chamber (mm)
W = transect strip width (in mm)
S = no. of squares counted

RESULT

Qualitative Status Of Zooplankton

Sample were collected from six different ponds of Fakir Mohan University New campus. After analysis 8 different taxa were identified to genus level **(Table no. 2).** Group Rotifera, copepoda and Cladocera were identified, out of which 4 taxa from copepoda, 3 from Cladocera and 1 from rotifer in total. During investigation in Pond no. 1, all 8 taxa were recorded. Copepod were dominated in pond, 3 taxa (*Mesocyclops sp., Microcyclops sp., Diaptomus sp*., Nauplius larva) were found to be present in large number. *Bosmina sp.* dominated in pond no. 1 and *Ceriodaphnia sp.& Daphnia sp.* were present in moderate number. *Brachionus sp.* of Rotifer group, also present in large no. Abundance of Mesocyclops sp. of copepoda group and Brachionus sp. of group Rotifera were recorded in pond no. 2. Diaptomus sp., Microcyclops sp., Bosmina sp. were present in moderate number. Pond no. 3 was dominated by Cladocera group (Ceriodaphnia sp., Daphnia sp., Bosmina sp.) and copepod group (Mesocyclops, Microcyclops, Diaptomus sp.) and Brachionus species were recorded in moderate number. Pond no. 4 present inside the Vice chancellor's residency. Copepods were present high in number followed by Cladocera and Rotifers. Likewise, in pond no. 5 copepod (Mesocyclops, Microcyclops) and Rotifer (Brachionus sp.) found, present in very less in number. Mesocyclops sp. were recorded high in number in pond no. 6 but Diaptomus sp., microcyclops sp. and Bosmina sp. were present

less in number. **(Table no. 3)**

Quantitative Status Of Zooplankton

Quantitative estimation of plankton was done with Sedgwick rafter cell. Total no. of zooplankton is tabulated in Table no.4 and density of individual taxa recorded in table no. 5. Pond no. 1 has highest density of zooplankton and least in pond no. 5 i.e. 3.8×10^3 and 0.6×10^3 respectively per litre. 1.6×10^3, 2.9×10^3, 2.2×10^3,1.2×10^3 no. of zooplankton found in pond no. 2,3,4,6 respectively per litre. Highest density of copepod recorded in pond no.1 near centre of excellence 1.8×10^3, least no. found in pond no.5 i.e. 0.4×10^3. Likewise, Cladocera present abundantly in pond no.1 i.e 1.5×10^3 and Rotifer present large in no. in pond no. 1,2,4 that's 0.5×10^3.

Table No.1. List Of Zooplankton Identified In Ponds Of FMU During Experiment.

Taxonomic Group	GENERA
Rotifera	*Brachionus*
Copepoda	*Mesocyclops, Microcyclops, Diaptomus, Nauplius larva*
Cladocera	*Daphnia, Ceriodaphnia, Bosmina*

Table No.2. Shows Distribution Of Zooplankton In Different Ponds, Of University Campus

Zooplankton	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	Pond 6
Mesocyclops Sp.	++	++	++	++	+	++
Diaptomus Sp.	++	+	++	++	-	+
Microcyclops Sp.	++	+	++	++	+	+
Bosmina Sp.	++	+	++	++	-	+
Ceriodaphnia Sp.	+	-	++	-	-	-
Brachionus Sp.	+	++	+	++	+	-
Nauplius Larva	+	-	-	-	-	-
Daphnia	+	-	+	+	-	-

(+) = present
(++) = abundant
(-) = Absent

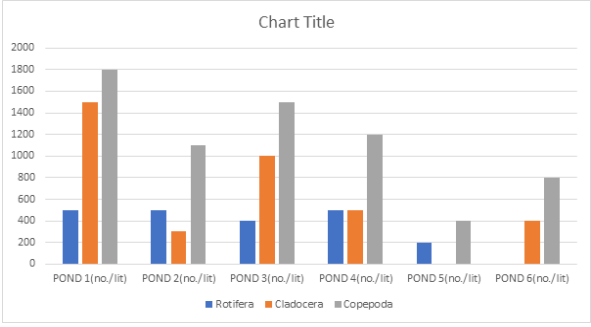

Fig -1. Different group of zooplankton density per litre in different ponds of university campus.

DISCUSSION

Present day study found Rotifera present abundantly during summer, similar data reported by Malik et a. in lake of Uttarakhand. In current study diversity, density/abundance of zooplankton and correlation of these with abiotic factor of their aquatic environment was studied in summer time. For better understanding and deeper knowledge further studies with seasonal variation should be taken into consideration. Interactive effects of other factors, such as pollution, climate change, sewage on dynamics of zooplankton can be investigated. Advanced study of these small planktonic animals help us understand ecosystem health and functioning leads to conservation, management of aquatic ecosystem.

CONCLUSION

Study conducted to analyse zooplankton community, qualitatively and quantitatively and their relation with abiotic environment. By qualitative investigation of zooplankton in six different ponds total no. of eight different taxa were identified out of which, one species belongs to rotifer, 3 taxa of Cladocera and 4 taxa of copepoda. Quantitative analysis help in estimation of density, in all six ponds copepod present in abundant number. Highest number of zooplankton per litre was found in pond 1, it may be due to stable environmental factors, nutrient availability etc. These are marvellous bioindicators, presence of species like Brachionus, ceriodaphnia, Daphnia, mesocyclops give a sign of future eutrophication. Proper management of ponds and limited anthropogenic activity recommended to maintain good water quality. Further research must be done by considering different seasonal variation of zooplankton with respect to variation of water parameter, long term investigation can provide deeper insight about how abiotic factor influence zooplankton density and distribution.

REFERENCES:

1. Wetzel, R. G., & Likens, G. (2000). *Limnological analyses*. Springer Science & Business Media.
2. Gajbhiye, S. N., Govindan, K., & Desai, B. N. (1982). Distribution of planktonic fish eggs and larvae around Bombay waters.
3. Ahmed, K. K. U., Ahamed, S. U., Hossain, M. R. A., Ahmed, T., & Barman, S. (2003). Quantitative and qualitative assessment of plankton: some ecological aspect and water quality parameters of the river Meghna, Bangladesh.
4. Sterner, R. W. (2009). Role of zooplankton in aquatic ecosystems. In *Encyclopedia of inland waters* (pp. 678-688).
5. Hassan, A. A. E. R. (2011). Zooplankton as natural live food for three different fish species under concrete ponds with mono-and polyculture conditions. *Egyptian Journal for Aquaculture*, *1*(1), 27-41.
6. Woelkerling, W. J., Kowal, R. R., & Gough, S. B. (1976). Sedgwick-rafter cell counts: a procedural analysis. *Hydrobiologia*, *48*, 95-107.
7. Panwar, S., & Malik, D. S. (2016). Zooplankton diversity, species richness and their distribution pattern in Bhimtal Lake of Kumaun region,(Uttarakhand). *Hydrology Current Research*, *7*(1), 219.
8. Balakrishna, D., Reddy, T. R., Reddy, K. V., & Samatha, D. (2013). Physico-chemical parameters and plankton diversity of Ghanpur Lake, Warangal, AP, India. *International Journal of Zoology Research*, *3*(1), 44.