



ISSN : 0973-7057

Int. Database Index: 663 [www.mjl.clarivate.com](http://www.mjl.clarivate.com)

## Population density of zooplanktons of Matashya Beez Prachhetra water body of Dighra, Muzaffarpur (Bihar, India)

Kumar Abhinesh\*

Department of Education, T.P Verma College, Narkatiaganj, West Champaran, Bihar, India

*Received : 15<sup>th</sup> June, 2020 ; Revised : 28<sup>th</sup> August, 2020*

**Abstract-** As a part of my continued investigation on the planktonic composition of water sample collected from Matashya Beez Prachhetra water body of Dighra, Muzaffarpur which is a fresh water low dimension pond used for fisheries, this article reports on the population density of different zooplanktons found in this aquatic habitat. In addition to several phytoplanktons reported from this water body in my previous research paper, eight different species of zooplanktons belonging to Rotifera, Crustacea & Brachiopoda have been found in this pond with variation in the population density in different season like winter, autumn, summer & rain. The trend of population density & variation in different season has direct correlation with that of phytoplanktons. Surprisingly the density of zooplanktonic species reflects a balance interrelationship with that of phytoplanktons thereby making the pond a steady state system.

**Key words:** zooplankton population density, Rotifera, Crustacea, Brachiopoda, seasonal fluctuation, Matashya Beez Prachhetra pond, Dighra, Muzaffarpur (Bihar)

### INTRODUCTION

All the life forms existing on earth depends upon water for their mere existence & either directly or indirectly affects human beings. Plankton community is considered as one the heterogeneous group consisting of both phytoplankton and zooplanktons population is freshwater aquatic biota that enables to reflect the nature and potential of any aquatic systems.<sup>1</sup>

Zooplanktons are sometimes detritivorous plankton drifting in oceans, seas and bodies of fresh water. The word *zooplankton* is derived from the Greek *zoon*, meaning

“animal”, and *planktos*, meaning “wanderer” or “drifter”.<sup>2</sup> Individual zooplankton are usually microscopic, but some (such as jellyfish) are larger and visible to the naked eye. Zooplankton offer several advantages as indicators of environmental quality in both lakes and rivers. As a group, they have worldwide distribution, species composition and community structure which are sensitive to changes in environmental conditions, nutrient enrichment and different levels of pollution.<sup>3,4</sup> The pond is regularly used for fishing by the local people besides dumping of domestic solid wastes and waste water. Due to regular dumping of domestic sewage, the pond has become highly eutrophic having dense algal blooms caused by Cyanobacteria. Private entrepreneurs also raise some fish species in this pond.

\*Corresponding author :

Phone : 9931691410, 9430231195

E-mail : drkumarabhinesh@gmail.com

The study of zooplanktonic composition abundance and seasonal variation is helpful in planning and successful governing the production of planktonic biomass. A number of workers have reported on different aspect of zooplankton inhabiting Indian fresh waters.<sup>5,6,7,8,9</sup> It is an important source of aquatic biomass in addition to irrigation. But this water body is under constant threat due to tourist disposal, domestic sewage and increased human activities. It is therefore, urgent need to manage scientifically this water body to tap it maximum potentiality. Here is an attempt that reflects the study of zooplanktonic composition in Matashya Beez Prachhetra Dighra, Muzaffarpur that can provide an effective knowledge about the present condition of the pond.

The study of zooplanktonic composition abundance and seasonal variation is helpful in planning and successful governing the production of planktonic biomass. A number of workers have reported on different aspect of zooplankton inhabiting Indian fresh waters.<sup>5-9</sup> It is an important source of aquatic biomass in addition to irrigation. But this water body is under constant threat due to tourist disposal, domestic sewage and increased human activities. It is therefore, urgent need to manage scientifically this water body to tap it maximum potentiality. Here is an attempt that reflects the study of zooplanktonic composition in Matashya Beez Prachhetra Dighra, Muzaffarpur that can provide an effective knowledge about the present condition of the pond.

#### **MATERIAL & METHODS**

The study on zooplanktons were seasonally planned like those of phytoplanktons during the four different seasons winter, autumn, summer & rainy season. Water

samples were collected from different locations of the water body of Matashya Beez Prachhetra from Dighra of Muzaffarpur district during the morning hours 8-11.30 am with the help of plankton net (made of bolting silk of mesh size 20-40 $\mu$ ). Each of the samples were collected in plastic bottle and taken in the laboratory for its further study. The labeled concentrated samples were preserved with 1ml of Lugol's solution, simultaneously in 100ml vials.

#### **Identification of sampled phytoplanktons:**

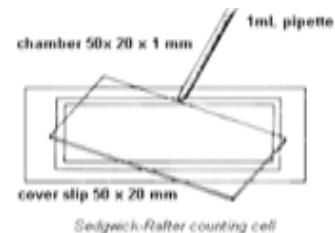
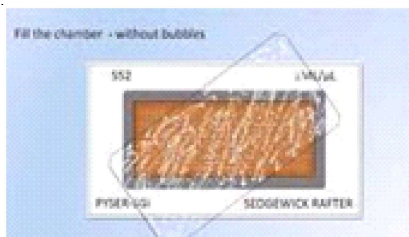
The water sample containing the zooplanktons were examined under high resolution stereoscopic microscope (MSZ 20) & the numbers per sample were counted in the plankton counter Sedgewick Rafter slide & identification was done according to the work of various researchers.<sup>10-14</sup> The numbers of each group of phytoplanktons were recorded in the observation Table no. 1 also showing the seasonal variation.

#### **Statistical Analysis**

Analysis of relative abundance of zooplanktons with respect to various numbers of sampling being the observation number of collected data had also been done by using the relative abundance statistical formula,  $p_i = n/N \times 100$ , where  $p_i$  is  $i^{\text{th}}$  number of zooplanktonic species found,  $n$  = number of individuals of a species,  $N$  = total number of individual of all the species. The statistical result has also been reflected in bar diagram or histogram as shown in graph 1. For the statistical analysis of these phytoplanktons the standard methods given by different scientists were used.<sup>15</sup>



**Fig 1 :-Phytoplankton net(mesh size:20-40  $\mu$ m)**

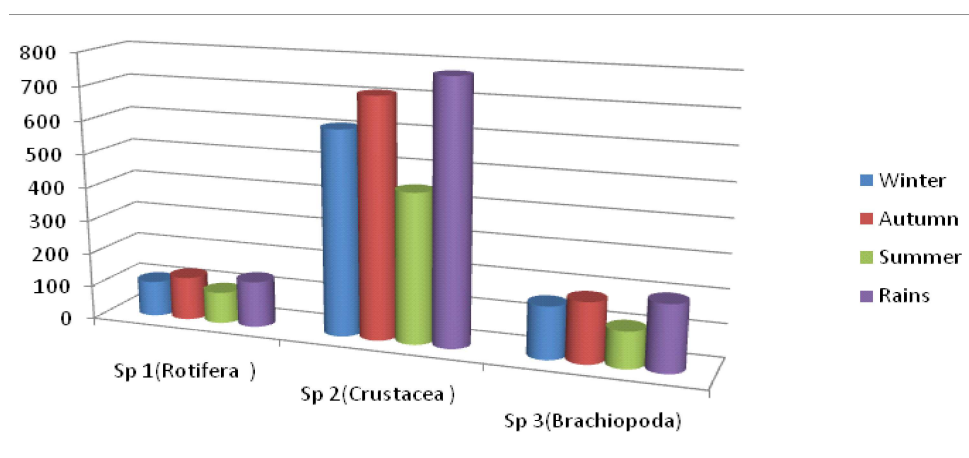


**Fig 2: Sedgewick Rafter plankton counter**

**Table 1: Seasonal mean population & relative abundance of zooplanktons sampled from Matashya Beez Prachhetra water body of Dighra**

Seasons	Winter		Autumn		Summer		Rains	
Group & genus	Individual sample population per SNS	Relative abundance % (N/n*100)	Individual sample population per SNS	Relative abundance % (N/n*100)	Individual sample population per SNS	Relative abundance % (N/n*100)	Individual sample population per SNS	Relative abundance % (N/n*100)
<b>(A) Rotifera</b>								
(i) <i>Keratella sp.</i>	81	77.14	98	76.56	75	80.64	105	74.80
(ii) <i>Brachionus sp.</i>	24	22.85	30	23.43	18	19.35	32	325.19
Total	105		128		93		137	
<b>(B) Crustacea/Copepoda</b>								
(i) <i>Cyclops</i>	100	16.42	120	16.92	70	15.73	130	17.56
(ii) <i>Mesocyclops</i>	68	11.16	79	11.14	45	10.11	88	10.13
(iii) <i>Eucyclops agilis</i>	123	20.19	130	18.33	100	22.47	156	18.24
(iv) <i>Diaptomus sp.</i>	318	52.21	380	53.59	230	51.68	400	54.05
Total	609		709		445		774	
<b>(C) Brachiopoda/Chladocera</b>								
(i) <i>Daphnia sp.</i>	92	58.97	105	58.33	64	59.25	120	60.60
(ii) <i>Ceriodaphnia sp.</i>	64	41.02	75	41.66	44	40.74	78	39.39
Total	156		180		108		198	
Grand total	870		1017		646		1088	

**Graph 1: Zooplanktonic composition of Matashya Beez Prachhetra water body of Dighra**



## RESULTS & DISCUSSION

The population density of zooplankton species found in the Matashya Beez Prachhetra water body taxonomically belong to three groups of lower invertebrates like Rotifera, Crustacea and Brachiopoda. Rotiferans are represented by the two taxa- *Keratella sp.*, *Brachionus sp.*, Crustaceans by four - *Cyclops*, *Mesocyclops*, *Eucyclops agilis*, *Diaptomus sp.* and Brachiopoda by two species - *Daphnia sp.* & *Ceriodaphnia sp.* with the significant variation in their relative abundance indicating population density. Group wise comparison as shown in above table reflects

that crustaceans were among the most populated species with respect to rotifers & brachiopoda. As a matter of fact, relative abundance of species is a statistical dimension of numerical value of mean population density of any species. plankton since the 1930s with numerous research projects continuing today

The finding presented in the tables & graphs in this article reflect the individual mean population per quadrat of standard aquatic net sweep observed during collection of the random sample of agitated water from different parts of the above pond. The data also indicate significant variation in the population density of zooplanktons in

different seasons of the experimental year 2016-2018. It is clear from the graphics prepared from the tabular data of sampled zooplanktons that the overall seasonal mean population density of zooplanktons was found to be higher during the rainy season followed by autumn & winter season but minimum during the summer season. This gradient of seasonal fluctuations in zooplanktonic population density is directly related with the varying water temperature during the seasons & also the changing profile of pond's physicochemical property. The other reason of seasonal fluctuation may be correlated with the variation in the phytoplanktonic as well as other faunal population existing at different trophic levels in the pond.

The synergistic consideration of fluctuating zooplankton population density along with that of phytoplankton derives important information regarding the biological health of this pond that it is eutrophic in nature observing recycling of different mineral, abiotic & biotic resources to sustain the diversity & density of various life forms like zooplanktons, phytoplanktons, fishes and insect larvae.

#### ACKNOWLEDGMENT

The author is highly thankful to his, guide Dr. R.K Singh, retired Professor & Head, Department of Zoology, A.N College Patna (Magadh University) & Prof. Siddha Nath Prasad Yadav 'Dean', Head University department of Zoology Magadh University Bodh Gaya for their guidance and encouragement for completing this research work.

#### REFERENCES

1. Kumar, P., Sonallah, F. and Wangane, A. 2010. A preliminary limnological study on Shershah Suri Pond, Sasaram, Bihar. *Asian J. Exp. Sci.*, **24(2)**: 219-226.
2. Thurman, H. V. 1997. *Introductory Oceanography*. New Jersey, USA: Prentice Hall College.
3. Jha, P. and Barat, S. 2003. Hydrobiological study of Lake Mirik in Darjeeling, Himalaya. *J Environ Biol.* **24(3)**:339-44.
4. Holz, J.C., Hoagland, K. D. 1996. Experimental microcosm study of the effects of phosphorus reduction on plankton community structure. *Can. J. Fish Aquat. Sci.* **53**:1754-64.
5. Das S.M and V.K Srivastava. 1956. Some new observation on plankton from fresh water ponds and lakes of Lucknow. *Sci. & cull.* 21:466-467
6. Dhanapathi, M.V.S.S.S. 2003. Rotifers from Andhra Pradesh, India-III. *Hydrobiologia.* **48(1)**:9-16
7. Gopal B.R.K Trivedi and P.K Goel. 1984. Influence of water hyacinth cover on the physico chemical characteristics of water and phytoplankton in a reservoir 'near jaipur India int Review Hydrobiol .
8. Sugunan V.V *et al.* 2000. *Ecology and fisheries of west Bengal* CIFRI report (ICAR New Delhi) .
9. Zafer A.R. 1964. On the ecology of algae in certain fish ponds of Hyderabad India. *Hydrobiologia.* **23**:179 – 195.
10. Adoni A.D. 1985. Work book on limnology. Pratibha Publishers, Sagar. 1-126
11. Needham, J. G. and Needham, R. P. 1972. A guide to the study of freshwater biology. Holden-day, INC Cali 94 (III), U.S.A.
12. Pennak, R. W. 1978. Freshwater invertebrates of United States 2<sup>nd</sup> Edn. John Willey Sons Inc., New York.
13. 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.
14. Victor, R. and Fernando, C. H. 1979. The fresh water Ostracoda (Crustacea: Ostracoda) of India. *Records of the zoological survey of India.* **74(2)**:147-242.
15. APHA. 1998. Standard Methods for Examination of Water and Wastewater, 20<sup>th</sup> Ed., American Public Health Association, Washington, DC, New York.

