Environment & Ecology 35 (3D) : 2517—2520, July—September 2017
Website: environmentandecology.com ISSN 0970-0420

Studies on Seasonal Variation of Zooplankton Communities in University Pond Near Community Hall, B. R. A. Bihar University, Muzaffarpur (North Bihar)

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Received 18 November 2016 ; Accepted 20 December 2016 ; Published online 7 January 2017

Abstract Fresh water zooplankton is an important biotic component of aquatic ecosystem. The study of zooplankton diversity, both quantitatively and qualitatively is utmost necessary. Studies on zooplanktons are essential for the proper monitoring management and conservation of water resources and prediction of productivity of any aquatic ecosystem. A total species of zooplankton were recorded of which 11 species of rotifers, 6 species of Cladocera, 3 species of copepods and 3 species of protozons were recorded. In the present study, it was observed that the rotifera was the most diversified group of zooplankton as compared to other groups. The results indicated that the appearance and abundance of zooplantonic distribution varies seasonally and this variation might be due to the physico-chemical parameters.

Keywords Zooplankton, University pond, Seasonal variations, Muzaffarpur.

Introduction

Hydrosphere is one of the most important ecosystem of the biosphere. India is bestowed with many large and small water bodies. These water bodies are of immense importance and serve as source of water for various uses. The small water bodies especially ponds, manmade ponds and paddles are diverse in their water quality which in turn provide diverse environments for the micro flora. Zooplankton form a minute aquatic group but play a vital role in food chain by linking the producers and consumers [1]. Any changes in water quality leads to unbalance the whole ecosystem of the water body. The seasonal variations of physico-chemical parameters have a profound effect on the zooplanktonic distribution of water bodies. The study of the fresh water fauna especially zooplankton is complicated due to environmental variations. Fresh water zooplankton plays a key role in preservation and maintenance of ecological balance and a scientific study on its basic aspects is absolutely necessary. Information on seasonal variations of zooplankton populations of fresh water bodies especially ponds are limited in North Bihar. No any such type of research work was done on University pond situated in Bihar University campus, Muzaffarpur. Therefore the present investigation attempts to study the seasonal variations of zooplankton communities in University pond at Muzaffarpur District due to great importance as food, especially to fishes.

Study area

The University pond is situated near Community Hall in B. R. A. Bihar University campus, Muzaffarpur. The pond is very large, deep, perennial and is irregularly rectangular in shape. The pond is bounded by resi-

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Table 1. Different groups of zooplankton (indv/I) in different seasons in University pond (2013-2014).

Season	Month	Zooplanktonic groups Roti-fera	Clado-cera	Cope-poda	Proto-zoans	Total number of zoop-lank-tonic orga-nisms	Percent
Summer season	Mar 2013	110	36	51	–	197	8.42
	Apr 2013	152	50	68	–	270	11.54
	May 2013	201	63	56	–	320	13.68
	Jun 2013	172	70	66	03	311	13.29
	Seasonal average (mean)	158.75	54.75	60.25	0.75	274.5	
Monsoon season	Jul 2013	105	42	40	02	189	8.08
	Aug 2013	36	25	28	–	89	3.80
	Sep 2013	41	11	35	–	87	3.71
	Oct 2013	50	17	51	–	118	5.04
	Seasonal average	58	23.75	38.5	0.5	120.75	
Winter season	Nov 2013	85	26	53	0.3	167	7.13
	Dec 2013	105	38	65	01	209	8.93
	Jan 2014	102	42	69	–	213	9.02
	Feb 2014	77	44	47	–	168	7.78
	Seasonal average	92.25	37.5	58.5	1.0	189.25	
	Higher value	201	70	69	03	320	
	Lowest value	36	11	28	1.0	87	
	Total	1237	464	629	09	2339	
	%	52.88	19.83	26.89	0.28		

dential Gannipur Mohalla on the East side, Health center and Social Science Block on the South side, University Community Hall on the West side and PG Chemistry department and Physics department on the North side. A cemented road also passes towards West-East sides. This pond has the following characteristics features : (a) Total area : 3.00 ha (b) length : 160 M. (c) depth : 5–6 meter various according to seasons. (d) It is rain fed and surrounding catchment areas, non-drainable (e) well infested with floating, marginal and submerged aquatic weeds (f). It receives domestic sewages from the residential houses constructed on the eastern side of the pond which makes the possibilities of pollution or alternation in aquatic environment (g). The pond is also utilized for various purposes such as washing, bathing, fishing, drinking by the cattle, religious purposes during chhath festival. Besides, it is also utilized on the occasion of immersion of Goddess of Minerva.

Materials and Methods

Zooplankton was sampled seasonally (summer, monsoon and winter) during the period from March 2013-Feb 2014. The zooplankton samples were collected by filtering 50 litters water through standard plankton net (77 mesh bolting silk) and the concentration samples were fixed in 50% of formation. The quantitative analysis of zooplanktonic organisms was carried out using Sedgwick Rafter plankton counting cell in accordance to Welch [2]. Zooplankton species identification was done with the help standards references Alfred et al. [3] and Adoni et al [4].

Results and Discussion

Zooplankton are the important part of food Chain and food web of an aquatic ecosystem. The seasonal variations of different groups and qualative analysis of zooplanktons are presented in Tables 1 and 2. Zooplankton population of the University pond composed of generally rotifers, cladocerans, copepods and protozoans. The maximum collection of zooplanktonic

Table 2. List of diversity of zooplanktonic grapswise population in University pond (2013–2014).

Rotifera	Copepoda
Branchionus calyciflorus	Mesocylopus hyalinus Cyclopus viridis
B. angularis	Ectocyclopus sp.
B. caudatus	
B. falcatus	
B. forticula	
B. mirapalis	
Keratella tropica	
Keratella vulga	
Filinia longiseta	
Filinia terminalis	
Roteria vulgaris	
Cladocera	Protozoa
Daphnia carinata	Amoeba sp.
Moina dubia	Paramecilm sp.
Maina sp.	Euglena sp.
Alonella nana	
Alonella globosa	
Alonella dentifera	

organisms were made in summer season and minimum in monsoon season. A total 23 species of zooplankton were recorded of which 11 species of Rotifers, 6 species of Cladocera, 3 species of Copepods and 3 species of Protozoans were recorded.

The percentage (%) population of zooplankton was in order of Rotifera > Copepoda > Cladocera > Protozoans. Rotifers were 1237 (52.88%), Copepoda, 629 (26.89%) followed by Cladocera 464 (19.83%) and Protozoa (0.28%).

The zooplanktonic distribution shared distinct seasonal variations. Each group of zooplankton showed their own maximal and minimal peeks. Kumar and Singh [5] reported that zooplanktonic distribution was found that higher during summer months, intermediate during winter months and lower during monsoon seasons due to different physico-chemical parameters, climate conditions and vegetation covers.

In the present investigation zooplanktonic population was poor during monsoon season probably due to heavy rain causing severe disturbance in zooplanktonic distribution of this pond. Roy et al. [6] reported that the rotifers population prolonged in summer season and decrease in the monsoon season, probably due to water movement and increased in the post monsoon and abundance of rotifers was comparatively lower in winter. Ghosh et al. [7] found that the zooplankton abundance varies seasonally and showed direct or indirect relationship, with the physico-chemical parameters. Rajagopal et al. [8] observed that increase in zooplankton population were correlated with rise of water temperature. Prasad and Singh [9] observed that the fluctuation of zooplanktonic communities greatly influenced by the variation in the temperature with many other factors.

Bhuiyan and Gupta [10] and Park and Shin [11] observed increase in zooplankton population with the rise in temperature while working on different water bodies. Zooplankton abundance in natural water body is mainly governed by various environmental factors. The variations in population density are generally intrinsic and extrinsic as reported by Odum [12]. Thus the present investigations, the zooplankton showed

variation in their abundance which are probably due to the differences in some related physico-chemical parameters.

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