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QUALITATIVE AND QUANTITATIVE ANALYSIS OF ZOOPLANKTON OF SOME COASTAL WATER BODIES OF BAKERGANJ, BANGLADESH

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Abstract: The experiment was carried out from July 2007 to June 2008, on eight water bodies of Bakerganj district under Barisal division in Bangladesh. The samples for zooplankton were taken by hydrobiological bottle from the surface water of the ponds and were filtered through plankton net and concentrated into 50 ml. The total amount of 100 liter of water was filtered for each sample. The qualitative zooplankton analysis showed the presence of 47 taxa from five groups: Protozoa (four taxa), Rotifera (31 taxa), Copepoda (five taxa), Cladocera (five taxa) and Ostracoda (two taxa). The groups of Rotifera and Copepoda (Both nauplii, larva and adult) were the main constituents of zooplankton community that was characterized by the dominance of the species: *Brachionus angularis, B. forficula, Keratella tropica, Polyarthra* spp., *Asplanchna* sp., *Fillinia* spp., *Cyclops* spp. *and Diaptomus* spp. Results of qualitative analysis showed that the total number of zooplankton was found to be highest in a pond (1867 ind/l; site no. 4) and the lowest in the Tulatali river (153 ind/l; site no 5). It is evident from this study that the zooplankton groups showed variations in the selected ponds. The variation depends on the different parameters that exist in the pond ecosystem.

mvi-ms‡¶ct GB M‡elYwU RjvB 2007 n‡Z Rb 2008 chš evsjv‡`‡ki ewikvj wefv‡Mi ev‡KiMÄ †Rjvi 8 wU Rjvk‡q m¤úb Kiv n‡qwQj| RIc¨vsKU‡bi bgbv msM‡ni Rb¨ RjR cwi‡e‡ki Dc‡ii ¯i n‡Z cwb msMn K‡i c¨vsKUb †bU Øviv †Q‡K ‡bqv nq| RIc¨vsKU‡bi ‰ewkó¨MZ we‡klY 5wU M"‡c 47wU cRwiZi Dcw¯wZ †`Lv †M‡Q; G‡`i g‡a¨- Protozoa-i 4 wU, Rotifera-i 31 wU, Copepoda-i 5wU, Cladocera-i 5wU I Ostracoda-i 2wU cRwiZ i‡q‡Q| RIc¨vsKU‡bi g‡a¨ AwaKvskB n‡"Q Rotifera I Copepoda; hv‡`i g‡a¨ *Brachionus angularis, B. forficula, Keratella tropica, Polyarthra* spp., *Asplanchna* sp. *Fillinia* spp., *Cyclops* spp. and *Diaptomus* spp. we‡klfv‡e D‡jL‡hvM¨| msL¨vMZ we‡klY †`Lv †M‡Q hvq M‡o me‡P‡q †ekx RIc¨vsKU‡bi cvIqv †M‡Q cK‡i (4 bs Rjvkq; 1867 wU / wjUvi) Ges me‡P‡q Kg cwYc¨vsUb cvIqv †M‡Q ZjvZwj b`x (5 bs Rjvkq; 153 wU / wjUvi)| Rjvk‡qi wewf›b wbqvgKwj GB wf›bZvi Rb¨ `vqx|

Key words: Zooplankton, dominant taxa, coastal water, variation, Cholera

INTRODUCTION

The inland river, *haors, baors, beels*, ponds, lakes, and other aquatic ecosystems have diverse biodiversity of zooplankton. The phytoplankton is eaten by zooplankton which in turn is eaten by fishes. The carrying capacity of aquatic habitat is essentially connected with the qualitative and quantitative aspect of plankton biomass. The faunal survey of the plankton of ponds and rivers is a

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basic work for a developing country like Bangladesh. The plankton, which live in all aquatic reservoirs play a significant role in the overall biological productivity of natural waters, as they serve as food to most of fishes. The importance of planktonic fauna in the economy of natural waters has led to a large number of investigators dealing with quantitative and qualitative aspects of the biota. According to Huq *et al.* (1996) zooplankton plays a major role in the multiplication, survival and potential transmission of cholera in coastal Bangladesh. Zooplankton follows a definite seasonal abundance showing the highest numbers in the winter and lowest in the summer. Works done on the plankton occurrence and abundance in ponds and other water bodies include those of Bhuiyan and Nessa (1998a, b), Bhuiyan *et al.* (2008) etc.

OBJECTIVE

The present study was undertaken with a view to making a systematic analysis of the planktonic fauna of seven coastal closed waterbodies and Tulatali river of Bakerganj, Bangladesh.

MATERIAL AND METHODS

Water samples were collected monthly between July 2007 and June 2008 from eight water bodies of Bakerganj district of Barisal division in Bangladesh. Except site-5 the Tulatali river all were closed aquatic system. For zooplankton sample collection, 100 liters of water were filtered successively through 64µm mesh nylon nets (Millipore corp., Bedford, MA), and 50 ml of the concentrates were collected initially as a crude measure of zooplankton. From 50 ml concentrates, 10 ml was used for analysis and the samples were immediately preserved in 5% buffered formaldehyde solution. For qualitative and quantitative study, the samples were observed under a compound microscope (Axioskop 40, Japan) in a S-R (Sedgeweak-Rafter cell) cell. The specimens were identified up to genera or species level. Quantitative analysis was followed by the total count method of Welch (1948). Identification was made following Ward and Whipple (1959), Tonapi (1960), Mellanby (1975), Bhouyain and Asmat (1992), and Ali and Chakrabarty(1992).

RESULTS AND DISCUSSION

The analysis of zooplankton both qualitative and quantitative was made and the results are as follows:

Qualitative analysis: During the study period, qualitative analysis of zooplankton contents showed the presence of 47 taxa from five groups such as Protozoa (four taxa), Rotifera (31 taxa), Copepoda (five taxa), Cladocera (five taxa) and Ostracoda (two taxa). Bhouyain and Asmat (1992) recorded 57 species of

planktons including 25 rotifers, 14 cladocerans, 10 copepods and eight ostracods from two ponds and two lakes of Dhaka city. Identification was made up to the species level. The Rotifera was the most dominant group followed by Copepoda, Cladocera, Protozoa and Ostracoda. The result of qualitative analysis of zooplankton is given in Table1.

Table 1. Qualitative analysis of zooplankton species in the eight study sites of Bakerganj district.

Species Name	Site-1	Site-2	Site-3	Site-4	Site-5	Site-6	Site-7	Site-8
Protozoa								
Arcella sp	-	-	-	-	-	-	+	-
Centropyxts sp	+	+	-	-	-	+	+	+
D*ifflugia Sp.*	+	-	+	+	+	-	+	+
Glaucoma sp	+	-	+	-	-	+	+	+
Total protozoan taxa	**3**	**1**	**2**	**1**	**1**	**2**	**4**	**3**
Rotifera								
Asplanchna sp.	+	++	+	+	+	+++	+	+
Brachionus angularis	+++	+++	+++	+	+	+	+	++
Brachionus calyciflorus	+	+	+	+	-	+	+	+
Bachiounus caudatus	+	+	+	++	+	+	+	+
Bachiounus diversicornis	+	+	+	+++	++	+	+	++
Bachiounus donneri	-	-	-	+	-	-	-	-
Bachiounus falcatus	+	+	+	+	+	+	+	+
Bachiounus forficula	+	+	+	++++	++	+	+	+
Bachiounus havanensis	+	-	-	-	-	-	-	-
Bachiounus nilsoni	-	+	+	-	-	+	-	-
Bachiounus quadridentatus	+	+	+	-	-	+	-	+
Bachiounus sp.	-	+	-	-	-	+	+	+
Bachiounus urceolaris	+	+	+	+	-	+	-	+
Conochilus sp.	-	-	-	-	-	-	+	-
Filinia longiseta	+	+	+	+	+	+	-	+
Filinia opolinesis	+	+	-	++	+	-	+	+
Filinia sp.	+	+	+	-	+	+	+	+
Filinia terminalis	+	-	+	+	+	-	+	+
Harrirgia sp.	-	-	-	-	-	+	-	+
Hexarthra sp.	+	-	+	+	-	+	+	+
Horaella sp.	+	+	+	+	+	+	+	+
Keratella cochlearis	+	+	-	+	+	-	-	-
Keratella sp.	+	-	-	-	-	-	-	+
Keratella tropica	+	++	+	++	+	+	-	+
Leacne sp.	-	+	-	+	-	-	-	-
Lepadella sp.	+	-	+	-	-	-	-	+
Monogononta sp.	-	+	+	-	-	+	-	-
Monostyla sp.	+	+	+	+	+	+	+	+
Platyias patulus	-	-	-	-	-	-	+	-
Polyarthra sp.	+++	+	+	++	+	+++	+++	+
Polyarthra vulgaris	-	-	+	-	-	-	-	-
Pompholyx sp.	+	+	+	-	-	-	-	-
Rotaria sp.	-	+	+	-	-	-	+	+

Species Name	Site-1	Site-2	Site-3	Site-4	Site-5	Site-6	Site-7	Site-8
Testudinella sp.	+	+	+	+	-	+	+	-
Trichocerca sp.	+	+	+	+	+	+	++	++
Unidentified	+	+	+	+	+	+++	+	+
Total rotifers taxa	**26**	**26**	**26**	**22**	**17**	**23**	**21**	**25**
Nauplii								
Nauplius	++	++	+++	+	++	++	+++	+
Metanauplius	++	+++	++	++	+++	++	++	+
Copepoda								
Cyclops nanus	+	-	+	+	+	+	+	-
Cyclops sp.	+	+	++	+	++	+	+	+
Cyclops varicans	-	-	-	+	-	-	-	-
Cyclops vernalis	-	+	-	-	+	+	-	-
Diaptomus gracilis	+	+	+	-	+	-	+	-
Diaptomus sp.	+	+	+	+	+	+	+	+
Mesocyclops sp.	-	+	+	+	+	-	-	+
Total copepods taxa	**4**	**5**	**5**	**5**	**6**	**4**	**4**	**3**
Cladocera								
Bosmina sp.	-	-	-	-	+	-	-	-
Chydorus sp.	-	-	-	-	-	-	+	-
Daphnia lumholtzi	+	-	-	+	-	-	-	-
Diaphanosoma sp.	+	++	+	+	+	+	+++	+
Moina sp.	-	+	+	-	-	-	-	-
Total cladocerans taxa	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**1**
Ostracoda								
Cypris sp.	-	-	-	-	-	+	-	-
Herpetocypris sp.	-	-	-	-	-	+	+	+
Total ostracods taxa	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**1**
Total species numbers	**34**	**34**	**35**	**30**	**26**	**34**	**32**	**33**

+ =≤ 5% of biovolume ++ = 6 – 15% of biovolume ++ += 16 – 30% of biovolume ++++ => 31 – 50% of biovolume

Quantitative analysis: In the research period the group of Rotifera dominated with regard to quality, while groups Copepoda, Cladocera, Protozoa, and Ostracoda were represented considerably by smaller number of taxons. Kaliamurthy (1974) noted rotifers as the most dominant group followed by copepods, cladocerans, and ostracods.The results of quantitative analysis of zooplankton ranged from 153 ind./l at site no. 5 to 1867 ind./l at site no. 4. The highest number of rotiferans were at site no. 4 with 1605 ind./l, while the smallest number of the representative of this group was at the site no 5 with 77 ind./l. (Table 2 and Fig. 1)

Table 2. The results of quantitative analysis of zooplankton (Average number ± SE).

Site no.	Protozoa	Rotifera	Copepoda		Cladocera	Ostracoda	Total Zooplankton
			Adult	Nauplii			
1.	113 ± 78	941 ± 339	173 ± 97	261 ± 75	131 ± 93	0	1619 ± 383
2.	29 ± 19	234 ± 59	25 ± 7	100 ± 15	23 ± 8	0	411 ± 74
3.	8 ± 5	387 ± 185	117 ± 41	194 ± 48	59 ± 18	0	765 ± 227
4.	15 ± 12	1605 ± 960	56 ± 18	183 ± 44	8 ± 6	0	1867 ± 994
5.	3 ± 2	77 ± 21	17 ± 6	52 ± 12	4 ± 1	0	153 ± 32
6.	15 ± 10	199 ± 56	5 ± 2	35 ± 11	7 ± 4	1 ± 1	262 ± 67
7.	43 ± 39	205 ± 87	38 ± 8	202 ± 41	119 ± 104	0	607 ± 151
8.	8 ± 3	848 ± 200	193 ± 182	186 ± 122	74 ± 66	1 ± 1	1310 ± 426

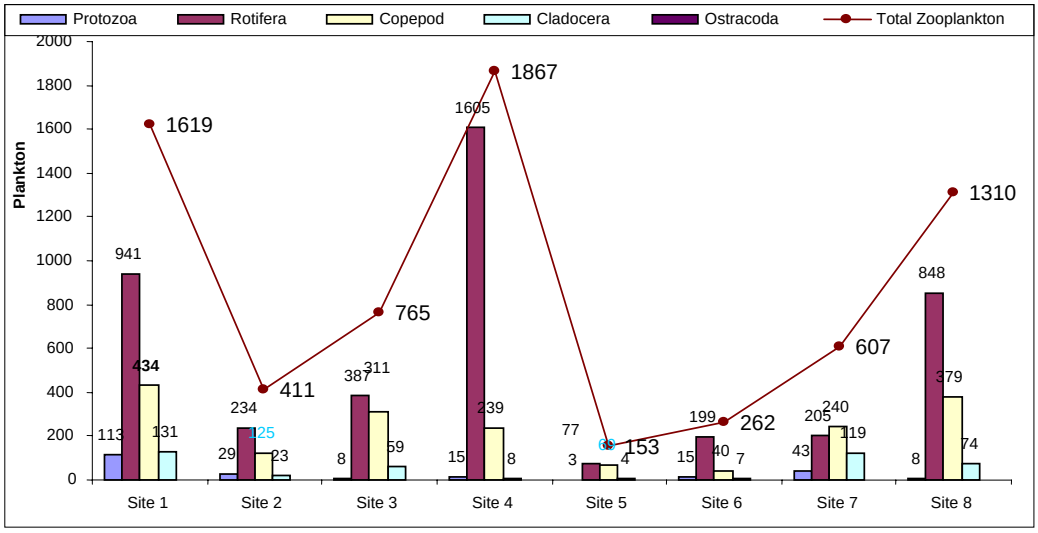

Fig.1. Average density variation of zooplankton population of the 8 sites of Bakerganj area.

Among the determined taxons from the group Rotifera, the highest number was *Bachiounus angularis, Polyartha* sp.. *Bachiounus forficula, Bachiounus diversicornis, Keratella tropica and Asplanchna sp.,* which were also dominant. On the basis of the number of taxons, Copepoda is sub-dominant group in the Bakerganj area. Zooplankton like Rotifera, Copepoda groups also had the biggest number on the profile in site no. 8 with 193 ind./l and the smallest with 5 ind./l on the profile in site no. 6. *Cyclops* spp. and *Diaptomus* spp., were dominant within this group. Zooplankton groups in relation to the population density are shown in Fig. 1.

CONCLUSION

It is evident from the study that the zooplankton groups showed variations in the selected ponds. The variation depends on the different parameters that exist in the pond ecosystem.

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