J. Asiat. Soc. Bangladesh, Sci. 38(1): 111-117, June 2012

SPECIES COMPOSITION OF LIMNETIC ZOOPLANKTON FROM THE SOUTHERN COASTAL AREAS (MATHBARIA AND BAKERGANJ) IN BANGLADESH

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Abstract

We studied the coastal zooplankton community structure of six waterbodies of Mathbaria and Bakerganj from January 2008 to June 2009. In total 35 zooplankton species were identified under 26 genera under 20 families under 8 orders from Mathbaria. Among them 6 were protozoans, 24 were rotifers, 3 were copepods, 1 was cladocerans and 1 was ostracods. From Bakergonj a total of 42 zooplankton species were identified under 23 genera under 17 Families under 7 orders. Among them 3 were protozoans, 25 were rotifers, 7 were copepods, 6 were cladocerans and 1 was ostracods. Results showed that abundance of rotifera group from both area was higher in Mathbaria (64.86%) and Bakerganj (60.98%) than other groups while abundance of ostracoda of Bakerganj area was lowest.

Keywords: Diversity, Mathbaria, Bakerganj, zooplankton, abundance.

Introduction

Plankton are the most sensitive component of aquatic ecosystem and thereby act as an essential biological indicator for water quality. Thus the study of their taxonomic diversity, number, biomass, and physiological parameters could provide background information on the ecological status of a given body of water and its particular region. Again, the zooplankton itself being a primary consumer in the second trophic level play an important role in the aquatic food chain as well as contributor to the next trophic level. The main foods of rui, catla and catla-rui hybrid were plankton in origin (Mozumder and Naser 2009). Several investigations have been made on the community structure of zooplankton in inland aquatic ecosystems of Bangladesh (Habib *et al.* 1984, Patra and Azadi 1987, Chowdhury *et al.* 1989, Kabir *et al.* 1996, 1997, Bhuiyan and Nessa 1998, Hasan *et al.* 2001, Chowdhury and Mamun 2006, Islam 2007, Kabir and Naser 2008, Ahmed *et al.* 2011). It has recently been shown that the aquatic and free-living pseudopod, *Acanthamoeba castellanii* is not a predator to *V. cholerae* O139 rather the bacterium has shown an intracellular compatibility with this host. Thus, a possible role of *A. castellanii* as an environmental reservoir of *V. cholerae* has been proposed

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(Abd *et al.* 2007). An association has also been established between viable and 'viable but non-culturable' *V. cholerae* (Islam *et al.* 1996) and the chitinous layer of zooplankton (Nahar *et al.* 2012), particularly the copepods, which is believed to serve as a reservoir of the bacterium (Islam *et al.* 1996). *V. cholerae* is naturally present in the environment and is autochthonous in many coastal and estuarine ecosystems (Colwell and Spira 1992). This bacterium is strongly associated with both plankton forming commensal or symbiotic relationships (Colwell and Huq 1994).

Alam *et al.* (2006) has meanwhile established that the coastal ecosystem of southern Bangladesh usually form a point source were the outbreak of cholera epidemics might associate with the zooplankton population. Thus the role of zooplankton in the survival and proliferation of *V. cholerae* in the coastal aquatic ecosystem of the Bay of Bengal is now an important query. But, no study has so far been conducted on the *V. cholerae* associated zooplankton that exist in the stated coastal ecosystem of Bangladesh. The present study about the species composition of limnetic zooplankton from southern coastal area like Mathbaria and Bakerganj in Bangladesh will help the future scientists to find any association of zooplankton species with *V. cholerae* and thereby to dissolve the related public health hazard.

Materials and Methods

Mathbaria of Pirozpur district is located adjacent to the Bay of Bengal, approximately 400 Km southwest of Dhaka. The river, Baleshwar, flows along the western boundary of Mathbaria, on its other side a tropical mangrove forest of the Sundarbans is located. On the other hand, Bakerganj is adjacent to Barisal district.

Ponds or waterbodies which were socially used for sources of drinking or domestic water were selected. Sampling of water from 3 ponds of Mathbaria and 2 ponds of Tulatali river of Bakerganj were sampled monthly from January 2008 to June 2009. For zooplankton study 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. The collected zooplankton samples were fixed in buffered formaldehyde (4%) and were brought to the laboratory of Department of Zoology, University of Dhaka for further analysis.

For qualitative and quantitative study, zooplankton samples were observed under a compound microscope (Axioskop 40, Japan) in a Sedgeweak-Rafter cell. The specimens were identified as far as to genera or species level with the help of different literatures (Edmonson 1959, Needham and Needham 1961, Mellanby 1971, Tonapi 1980, Ali and Chakraborti 1992, Battish 1992, Bhouyain and Asmat 1992,). Plankton communities were characterized quantifying the abundance of all species on a logarithmic 'DACFOR' scale (Paramu and Ravichandran 2007). Where D = dominant, up to 500 individuals; A = abundant, up to 100 individuals; C = common, up to 50 individuals; F = frequent, up to

10 individuals; O = occasional, up to 3 individuals; R = rare, 1 individual; and NF = absent from sample.

Results and Discussion

From the present study, a total of 35 zooplankton species were identified under 26 genera, under 20 Families and under 8 orders from Mathbaria. Among them 6 were protozoans, 24 were rotifers, 3 were copepods, 1 was from cladocera and 1 from ostracoda (Table 1).

Table 1. Species composition of limnetic zooplankton from Mathbaria and Bakerganj, Bangladesh.

Group	Order	Family	Species Name	Mathbaria			Bakerganj		
				DACFOR scale					
				Site-1	Site-2	Site-3	Site-4	Site-5	Site-6
Protozoa									
	Arcellinida	Arcellidae	*Arcella sp.*	1	NF	NF	NF	NF	NF
	Arcellinida	Difflugiidae	*Difflugia sp.*	5	4	5	4	2	
	Hymenostomatida	Glaucomidae	*Glaucoma sp.*	1	1	1	NF	NF	4
	Arcellinida	Centropyxidae	*Centropyxis sp.*	1	1	2	NF	NF	1
	Euglenida	Euglenidae	*Phacus sp.*	NF	4	4	NF	NF	NF
	Euglyphida	Euglyphidae	*Pareuglypha sp.*	NF	4	NF	NF	NF	NF
			Unidentified (Nebela sp.)	NF	NF	1	NF	NF	NF
Rotifera									
	Ploima	Asplanchnidae	*Asplanchna priodonta*	NF	NF	4	4	1	5
		Brachionidae	*Brachionus angularis*	2	1	1	1	2	4
			B. caudatus	NF	NF	3	6	3	3
			B. calyciflorus	NF	NF	NF	2	NF	3
			B. diversicornis	NF	NF	1	6	3	3
			B. donneri	NF	NF	NF	1	NF	NF
			B. forficula	1	NF	3	6	4	2
			B. falcatus	NF	NF	4	4	3	4
			B. nilsoni	NF	NF	NF	NF	NF	1
			B. quadridentatus	NF	NF	1	NF	NF	2
			B. urceolaris	NF	NF	NF	1	NF	3
			Colurella sp.	1	NF	NF	NF	NF	NF
		Testudinellidae	*Filinia longiseta*	3	3	2	4	1	1
			F. opolinesis	NF	1	1	6	2	1
			F. terminalis	NF	1	1	3	2	
			Harrirgia sp.	NF	NF	NF	NF	NF	1
			Pompholyx sulcata	NF	4	1	NF	NF	NF
			Horaella sp.	1	2	2	3	1	3
			Keratella cochlearis	NF	2	NF	1	3	
			K. tropica	1	1	2	6	3	2
			Testudinella patina	NF	1	1	3	NF	3
		Hexarthridae	*Hexarthra sp.*	NF	1	3	4	NF	3
		Lecanidae	*Lecane luna*	1	NF	NF	1	NF	NF
			Lepadella sp.	NF	NF	1	NF	NF	NF
			Manfredium sp.	NF	1	1	NF	NF	NF
			Monostyla sp.	NF	1	1	1	1	1
			Monogononta sp.	NF	NF	NF	NF	NF	2
		Synchaetidae	*Polyarthra vulgaris*	4	4	4	6	3	5
		Philodinidae	*Rotaria neptunia*	NF	1	1	NF	NF	NF

Group	Order	Family	Species Name	Mathbaria			Bakerganj		
				DACFOR scale					
				Site-1	Site-2	Site-3	Site-4	Site-5	Site-6
		Trichocercidae	*Trichocerca sp.*	NF	1	1	2	1	4
			Unidentified rotifer	1	1	1	3	3	5
Nauplii			*Nauplius*	5	5	5	5	4	4
			Metanauplius	4	4	4	5	4	4
Copepoda									
	Cyclopoida	Cyclopidae	*Cyclops sp.*	3	4	4	4	3	2
			C. nanus	NF	NF	NF	3	1	1
			C. varicans	NF	NF	NF	1	NF	NF
			C. vernalis	NF	NF	NF	NF	1	1
			Mesocyclops sp.	NF	NF	NF	3	1	NF
	Calanoida		*Diaptomus gracilis*	3	4	2	NF	1	NF
			Diaptomus sp.	4	3	2	4	3	2
Cladocera									
	Diplostraca	Bosminidae	*Bosmina sp.*	NF	NF	NF	NF	1	NF
		Sididae	*Diaphanosoma sp.*	3	3	3	2	2	3
		Daphniidae	*Daphnia lumholtzi*	NF	NF	NF	3	NF	NF
Ostracoda									
	Podocopida	Cyprididae	*Heterocypris sp.*	NF	1	NF	NF	NF	1

A total of 42 zooplankton species were identified under 23 genera and under 17 Families and under 7 orders from Bakerganj. Among them 3 were protozoans, 25 were rotifers, 7 were copepoda, 6 were cladocera and 1 was ostracoda (Table 1).

Results show that zooplankton species abundance of rotifera from both area (64.86% in Mathbaria and 60.98% in Bakerganj) was highest compared to other groups and diversity of ostracoda of Bakerganj area was lowest (Fig.1). Rahman *et al.* (2006) made similar observations from Hamil beel, Bangladesh where rotifer was dominant and protozoans were 3rd or 4th in abundance.

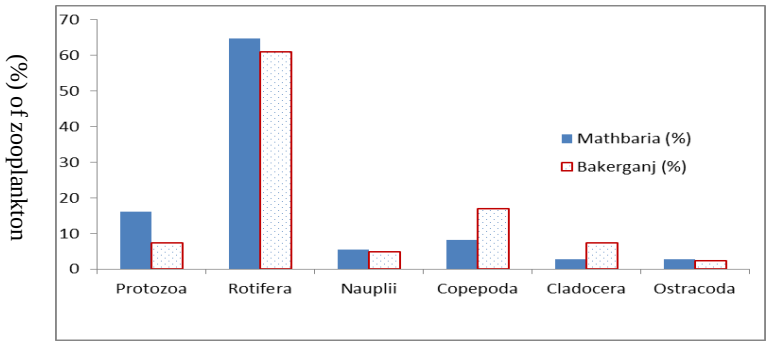

Fig. 1. Composition (%) of zooplankton species in Mathbaria and Bakerganj during January 2008 to June 2009.

Composition of zooplankton at 6 sites (3 sites of Mathbaria and 3 sites of Bakerganj) presented in Table 1 shows that the most abundant and common zooplankton species in

all sites were *Brachionus angularis*, followed by *Filinia longiseta, Horaella sp., Keratella tropica, Polyarthra vulgaris, Cyclops* sp., *Diaptomus* sp. and *Diaphanosoma* sp.

On the basis of abundance range (DACFOR Scale), rare species (R = 1 indiv.) were *Heterocypris* sp. *Bosmina* sp., *Cyclops varicans*, *C. vernalis*, *Rotaria neptunia*, *Monostyla bula*, *Manfredium* sp., *Lecane luna*, *Brachionus nilsoni* and *Arcella* sp. Ehsan *et al*. (1997) stated that Cladocerans were less in abundance in winter months in Chanda beel, Bangladesh. Distribution of zooplankton was not uniform in all sites (Rahman *et al*. 2006). The number of zooplankton species varied from 19 to 33 in Mathbaria and 27 to 32 at Bakerganj. Highest number of zooplankton was recorded at site 3 (33 species) of Mathbaria and the lowest at site 1 (19 species) of Mathbaria (Fig. 2). The variation of species number and differences of total zooplankton in two geographical locations were `acceptable as they may be influence by environmental factors of the waterbodies.

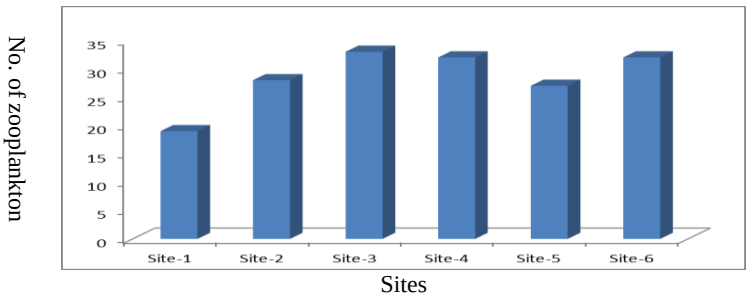

Fig 2. Total number of zooplankton species and their distribution at Mathbaria during January 2008 to June 2009

Acknowledgements

This research, an integral part of the major multidisciplinary project entitled 'Epidemiology and Ecology of *Vibrio cholerae* in Bangladesh' was financed by the National Institute of Health (NIH) research grant #1RO1A13912901 under the collaborative agreement between the International Center for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) and Johns Hopkins Bloomberg School of Public Health. The authors gratefully acknowledge the NIH Ecological Surveillance Team at ICDDR,B for kindly supporting this research.

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(Received revised manuscript on 28 June 2012)