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RESEARCH ARTICLE

Biodiversity of Zooplankton in a floodplain lake of the Barak Valley, Assam (North-East, India).

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Abstract

Zooplankton form a food support of any aquatic ecosystem, and have been reported in percentage composition of different groups. The diversity of various types of zooplankton was studied and the result revealed that the zooplankton was represented by various genera *viz.*, cladocera, rotifera, copepoda and ostracoda. The numbers of varieties of group rotifera have been reported maximum but the percentage amount of cladocera group followed by rotifera in general. The range of total zooplankton between 253 No^{-ml} to 622 No^{-ml} and average was 430.42 $No^{-ml.}$ The annual percentage composition of various representative groups revealed 38.84% cladocera, 37.13% rotifera, 23.56% copepoda and 0.46% ostracoda. The detailed aspect of seasonal variation, percentage composition and diversity of zooplankton is discussed herein.

Introduction:-

Floodplain lakes (locally called 'Beels') encompass a vital constituent of aquatic wealth of India (Sugunan, 1997). These are naturally saturated, low-lying swampy areas which are very resource rich ecosystem, have high icthyological potentiality and allied agricultural production. It contributes a total of *c* 0.20 million ha in India and in North-Eastern region *c* 0.12 million ha to the aquatic system. It acts as regulators of hydrologic regimes, maintaining ecological eminence and assets of varied aquatic fauna and flora (Das *et al*, 2010). It supports the significant fish culture, which are amply prolific in extensive approach (Kar, 2007; 2013).The principal resources for fish production in 'Beels' or any aquatic bodies are directly proportional to the plankton abundance predominantly the zooplankton availability (Sharma and Sharma, 2008; Offem *et al*., 2009). Its assortment, allocation, profusion and discrepancy in the biotic factors give knowledge about the energy turnover in the aquatic systems (Mann, 2000; Kar, 2013) as they play a key role in cycling of organic materials, influencing all the functional aspects such as food chains, food web and cycling of matter of an aquatic system (Fouilland *et al*, 2007). Systematic studies on the Indian zooplankton began more than a century ago (Edmondson, 1959; Battish, 1992), but extensive regional surveys on faunal variability and ecosystem diversity in freshwater environment are still deficient (Sharma and Michael, 1987; Sharma, 2000; Sharma and Sharma, 2000; Khan, 2003; Kar, 2007; Sharma and Sharma, 2008; Das and Kar, 2013;) and that of flood plains of Barak valley region in particular (Kar and Barbhuiya, 2002; Kar and Barbhuiya, 2004; Bhuiyan and Gupta, 2007;).

Hence in present study efforts have been made to comprehend the biodiversity of zooplankton in a floodplain lake of the Barak valley, Assam with special reference to the general nature and composition of the taxocoenosis, biogeography and ecology as well as to their species affluence and community structure within the water body.

Materials and Methods:-

The study was conducted in a floodplain lake named Mahisa beel (24° 48′56.2" N and 92° 49′08.5" E) located in eastern part of Silchar town in the Cachar district of Assam. Qualitative and quantitative zooplankton samples were collected by filtering 100 L water from the beel with the aid of plankton net for one year from June 2012 to May 2013. Collected specimens were preserved in 5% formalin for taxonomic identification. Analysis was done on a Sedgwick – Rafter counting cell, under a light microscope. Detailed taxonomic identification was done with the help

of a stereoscopic microscope having different magnifications (X 10 initially, followed X 40) following Edmondson (1959), Sharma and Michael (1987), Battish (1992), Michael and Sharma (1998), Sharma (1998); Sharma and Sharma (2008). Analysis involved transfer of 1 ml sub sample from each samples to the Sedgewick-Rafter counter and counting of cells within 20 squares of the cells, chosen randomly. The cells counted were used for quantitative estimation of cell density following APHA (2005).

Results and Discussion:-

The present study reveals a distinct and unusual type of variation in diversity and abundance of zooplankton in the different seasons. During the investigation, 30 different genera of zooplankton were recorded from the study area. Among them 13 genera were belonging from rotifera, 12 were from cladocera, 4 were representing the group copepoda and the rest one organism was from the group ostracoda. (Table1). Such a pattern is in general conformity with the findings of Das and Kar (2013), Dalal and Gupta (2013). Interestingly, the profusion of cladocera (38.84%) was high, which was followed by the group rotifera (37.13%), copepoda (23.56%) and ostracoda (0.46%) apart from the diversity tendency of zooplankton which were represented in the present study (Fig 1). This was contrary to the observation made by Srivastava (2013).

Table-1: Seasonal variation of zooplankton groups.

Zooplankton	Year (2012 - 2013)		
	PRM	MON	POM
Group: Rotifera			
Brachionus sp.	+	+	+
Keratella sp.	+	+	+
Cephalodella sp.	-	+	+
Conochilus sp.	-	-	+
Filinia sp.	+	+	+
Lecane sp.	+	+	+
Trichocerca sp.	+	-	+
Anuraeopsis sp.	+	-	+
Lepadella sp.	-	-	+
Ascomorpha sp.	+	+	+
Asplanchna sp.	+	+	+
Testudinella sp.	+	+	+
Plationus sp.	-	-	+
Group: Cladocera			
Scapholeberis sp.	-	-	+
Chydorus sp.	+	+	+
Bosminopsis sp.	+	+	+
Alona sp.	-	+	+
Alonella sp.	-	-	+
Simocephalus sp.	-	-	+
Diaphanosoma sp.	+	+	+
Bosmina sp.	+	+	+
Ceriodaphnia sp.	+	-	+
Macrothrix sp.	+	-	+
Moina sp.	+	+	+
Sida sp.	+	-	+
Group: Copepoda			
Neodiaptomus sp.	+	+	+
Mesocyclops sp.	+	+	+
Heliodiaptomus sp.	-	-	+
Thermocyclops sp.	+	-	+
Ostracoda			
Cypris sp.	+	-	+

Abbreviations: PRM = Pre-monsoon, MON = Monsoon, POM = Post-monsoon,
'+' = present, '-' = absent.

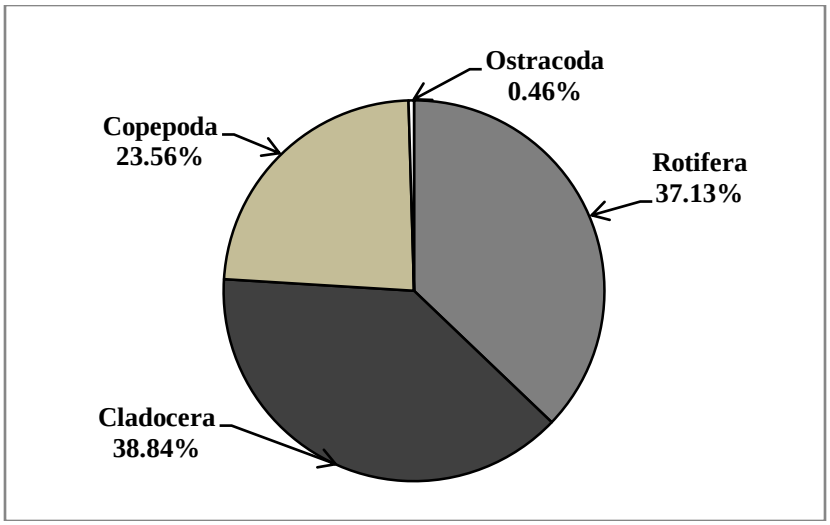
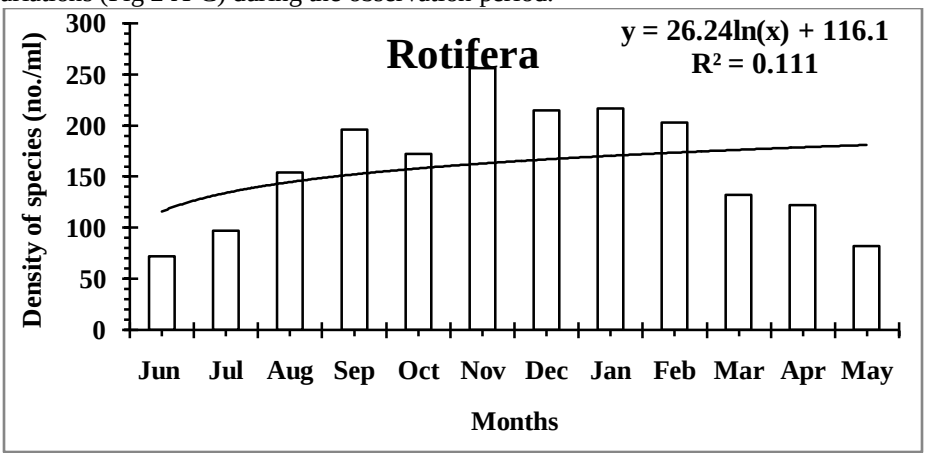
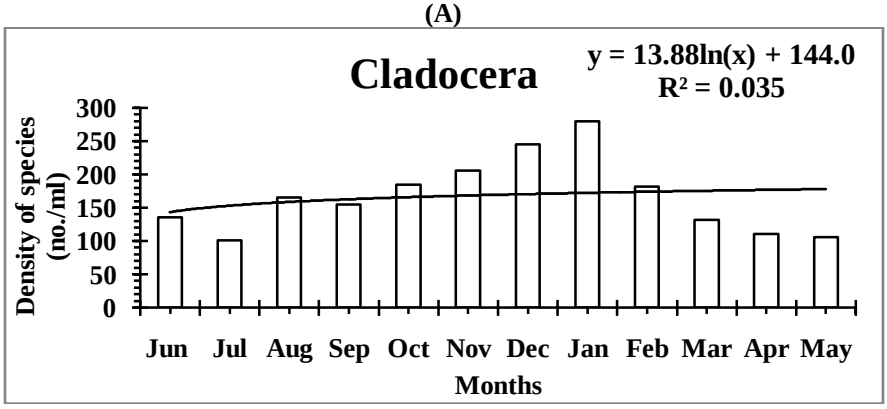


Figure-1: Percentage composition of available zooplankton groups.

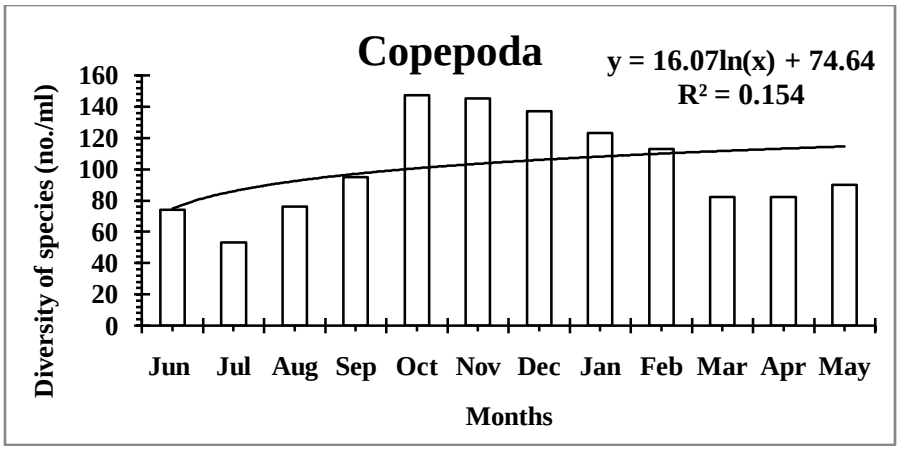
Furthermore, the present survey reveals that all types of zooplanktonic forms indicate no significant relationship with monthly variations (Fig 2 A-C) during the observation period.



(A)



(B)



(C)

Figure 2: Monthly variation of various abundant groups of zooplankton.

In addition, the range of availability of zooplankton was between 253 No^{-ml} to 622 No^{-ml} and average was 430.42 $No^{-ml.}$ However, the minimum density of zooplankton has been recorded in July and maximum were in the month of January (Table 2). Normally the monsoon is associated with lower population densities due to its dilution effect and decreased photosynthetic activity by primary producers whereas; the population rises to a higher level in the post-monsoon. This might promote availability of suitable food, favorable climatic conditions and fewer predators.

Table -2: Monthly variation of available Zooplankton density (no/ml).

Months	Rotifera	Cladocera	Copepoda	Ostracoda	Total
June	72	136	74	0	282
July	97	101	53	2	253
August	154	166	76	3	399
September	196	155	95	4	450
October	172	185	147	1	505
November	256	206	145	0	607
December	215	246	137	2	600
January	217	280	123	2	622
February	203	182	113	1	499
March	132	132	82	5	351
April	122	111	82	0	315
May	82	106	90	4	282
Total	1918	2006	1217	24	5165
Percentage	37.13 %	38.84 %	23.56 %	0.46 %	-

Conclusion:

The floodplain lake of Barak valley deserves a special mention for its ecosystem diversity because it is a prosperous habitat of various groups of zooplankton. The detailed analysis revealed that the density of cladocera was high throughout the investigation period. The range of availability of zooplankton was between 253 No^{-ml} to 622 No^{-ml} and average was 430.42 $No^{-ml.}$ The result indicates that maximum density of zooplankton occurred during the post monsoon season. This might promote the availability of abundant food, favorable temperature for the developmental stage. The objective of this investigation was therefore to develop our knowledge about the fact that the biodiversity of a flood plain lake is endowed with a great harbor of different fauna especially the zooplankton as they are playing a vital role in the stability and integrity of aquatic ecosystem, but still indicated paucity of information. So, for any scientific utilization, an indepth study should be undertaken to analyze its community and dynamics.

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