Ostracod Density of Two Freshwater Lakes in India : A Comparative Study

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ABSTRACT Population density of ostracod of two freshwater in India lakes was monitored from October 2010 to September 2011. Samples were collected using plankton net (pore size 64µ), and analysed with standard keys. Quantitative estimation is done by drop count method of Lackey. A total of 8 species from Kagzipura and 4 species from Mombatta Lake are identified. The population density of ostracod in Kagzipura lake (372 org/lit) is rich than the Mombatta lake (45 org/lit). Species diversity indices are also computed. Results indicate that the population density of both lakes increases in summer and decreases in monsoon.

INTRODUCTION

Ostracods are bivalved micro crustaceans found almost in all types of water bodies and are one of the most diverse groups of living crustaceans. Although ostracods are abundant and widely distributed but they have received much less attention than-Cladocera and Copepoda (Pennak, 1978). Ostracods form a major link in the energy transfer at secondary level in aquatic food web between autotrophs and heterotrophs (Dievanni et. al, 2004).

Ostracods are highly sensitive to environmental variations. As a result changes in their abundance, species diversity or community composition can provide important indication of environmental changes. The species composition, distribution diversity and relative abundance of zooplankton of a reservoir could have marked impact on fisheries and health of the reservoir for public (Mustapha, 2009).

Very few workers have conducted their research on the percent composition and seasonal variation of freshwater ostracods in different parts of India (Ganapati et al, 1943; Vandysh, 2004 and Ramulu et al, 2011). The present paper focused on the comparative study of population density of ostracod in two freshwater lakes Mombatta and Kagzipura in Aurangabad district, Maharashtra, India. The result will contribute to the understanding of the present status of the ostracods fauna in Indian freshwater lakes.

MATERIAL AND METHODS
STUDY AREA

Two sites are selected for this study, namely Kagzipura and Mombatta Lakes. Kagzipura lake is located (latitude 19^0 57' N and longitude 75^0 15' E) near Kagzipura village, Tal. Khultabad, 17 km away from Aurangabad city. It has a depth of about 8 to 9 meters and is used for irrigation and fishing. Mombatta lake is located (latitude 19^0 57' 42" N and longitude 75^0 13' 24" E) near Daulatabad village of Khultabad Taluka in Aurangabad District, 15 km away from Aurangabad city. The Lake has a maximum depth of 8.30 meter. The Lake is situated at foot hills in Daulatabad valley containing grassland mixed with tree vegetation and used for aquaculture.

The Ostracod samples were collected by using plankton net of mesh size 64µ at an interval of 15 days every month for a period of one year (from October 2010 to September 2011) between the time 7 to 8 am. From each lake two duplicates of sample are taken. The collected samples were kept in plastic bottles containing 4% formaldehyde. Both the morphology of soft parts and carapace of the living species were used for identification following systematic keys of Pennak (1978), Edmondson (1992), Meisch (2000) and Altaff (2004). Population density is quantified by drop count method of Lackey (1938) and Tonapi (1980). Microphotography is taken by digital camera using compound microscope (Model No- LABOMED STC-ML).

Population density was calculated using the following formula of Lackey (1938) and Tonapi (1980):

$$N = n \times v / V$$

Where,

N = Total no. of organisms/ lit of water filtered.

n = Number of zooplankton counted in 1 ml plankton sample.

v = Volume of concentrate plankton sample (ml).

V= Volume of total water filtered through (L)

Diversity indices
• Richness index (Margalef, 1958):

$$R = S-1 / ln(n)$$

Where,

R- Richness index

S- Total number of species in a community

• Simpson index (λ) (1949):

$$\lambda = \sum_{i=1}^{S} (n_i / n)^2$$

Where,

λ = Simpson index

ni = Total population of ith species in community

n = Total population of all species in community

• Shannon index (H'):
It has been calculated as:

S

$$H' = \sum [(ni / n) \ln (ni / n)]$$

i =1

RESULT

Eight species of ostracods from Kagzipura Lake and 4 species from Mombatta Lake were found (Table 1 and Fig. A and B) and its population density is shown in Table 2. Species diversity indices are shown in Table 3.

The 8 species of ostracods recorded and identified from Kagzipura lake are, Cyclocypris globosa, Cyclocypria kinkaidia, Cypria mediana, Physocypria furfuracea, Eucypris bisponsa, Hemicypris fossuata, Cyprinottus nudus and Srandentia elongata and from Mombatta lake are Candona pierce, Cypriconcha alba, Stenocypris fontinalis and Cyclocypris globosa.

Species diversity indices of Mombatta Lake show that, species richness was maximum (3 species) in March and September and the species were absent in November, January, June and July. Simpson index is maximum (0.625) in October, April and May and absent November, January, June and July. Shannon-Weiner index was maximum (1.067) in September and absent in November, January, June and July.

Species diversity indices of Kagzipura Lake show that, species richness was maximum (7 species) in February and March and minimum (2 species) in January. Simpson index was maximum (0.52) in January and minimum (0.204) in March. Shannon-Weiner index was maximum (1.733) in March and minimum (0.673) in January.

DISSCUSSION AND CONCLUSION

The Kagzipura Lake has a high diversity (8 species) and abundance (372 org/lit/yr). This abundance of ostracods is particularly influenced by the macrophytes and vegetation around it. The highest peak of density in Kagzipura lake is found in summer particularly in March (101 org/lit) and lowest in winter in December (6 org/lit). During summer, the water level in the lake decreases and metabolic activities of biotic components increase significantly. This result is consistent with those of Jayebhaye (2010) worked on river Kayadhu, near Hingoli city, Hingoli district, Maharashtra and Ramulu (2011) study on perennial tank in Warangal district, A.P.

The dominant species in Kagzipura Lake are Cyclocypris globosa (56 org/lit), ¯Cyclocypria kinkaidia (58 org/lit) and Eucypris bisponsa (52 org/lit). Cyprinottus nudus (5 org/lit) and Strandentia elongata (5 org/lit) are very rare. Cyclocypris globosa is the only species found from both lakes and the species is dominant in the both. Diversity and population density of Cyclocypris globosa is increased due to association of submerged and emergent macrophytes (Kiss, 2007).

Mombatta Lake has less diversity (4 species) and abundance (45 org/lit) throught out the year as compared to Kagzipura Lake. In September the most abundant ostracods (12 org/lit) are recorded while in December (2 org/lit). Cyclocypris globosa is the dominant species throughout the year and highest number (6 org/lit) is observed in September. Stenocypris fontinalis, Candona pierce

and Cyprichoncha alba are found most in summer and least in winter.

Mombatta Lake has less aquatic vegetation and macrophytes as compared to Kagzipura Lake. Perhaps less availability of food and clear water has hampered population of ostracods in this lake. All 8 species of Kagzipura Lake are of cosmopolitan distribution while 3 species of Mombatta Lake are not cosmopolitan and only Cyclocypris globosa is cosmopolitan. Cosmopolitan species have wide range of tolerance to changes in aquatic conditions. They can increase their survival rate when conditions deteriorate (Mefee and Caroole, 1994).

Higher average species richness is found in Kagzipura Lake as compared to Mombatta Lake. Mukherjee (1997) reported that the higher species richness is characterized by larger food chain. In Mombatta Lake, average Simpson index was higher than the Kagzipura Lake. Higher values of Simpson index indicating poor diversity of Mombatta Lake. Similar finding was reported by Kulkarni et al (2011) in Dharamtar creek, India. The values of Shannon Weiner index in Kagzipura Lake are higher than the Mombatta Lake. The higher the value is, the higher the diversity is. If there is a case that has higher diversity, it indicates less competition between species (Colinvaux, 1973). Such findings are supported to the present result.

The present results show that the pattern of population density of ostracods observed in both lakes increase in summer (Feb-May) and decrease in monsoon (Jun-Sept). In summer growth of algal blooms and macrophytes is high due to anthropogenic activities and contamination of brick factories. Hence, the abundance of ostracods, especially those of cosmopolitans, could be the indicator of pollution (Padmnabha, 2008; Sontakke et al, 2010).

SR.NO / LAKE	KAGAZIPURA LAKE	MOMBATTA LAKE
1.	Cyclocypria kinkaidia (Dobbin, 1941)	
3.	Cyclocypris globosa (Bars, 1863)	
4.	Cypria mediana (Hoff, 1942).	1. Candona pierci (Turner, 1895)
5.	Cyprinottus nuddus (Brady, 1895)	2. Cyclocypris globosa (Bars, 1863)
6.	Eucypris bisponsa (Victor & Michael,1975)	3. Cyprichoncha alba (Dobbin, 1941)
7.	Hemicypris fossulata (Vavra, 1897)	4. Stenocypris fontinalis (Vavra, 1895)
8.	Physocypria furfuracea (Brady, 1896)	
9.	Strandentia elongata (Hartman, 1964)	

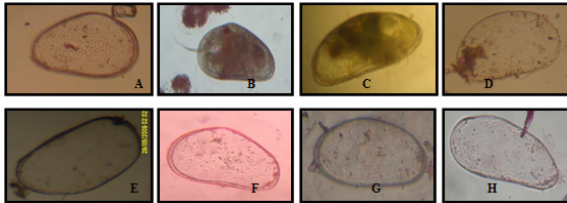Table 1: Diversity of Freshwater ostracods from Kagzipura and Mombatta Lake during Oct 2010 to Sept 2011.

TABLE 2: Monthly Population density (org/lit) of ostracods from Kagzipura and Mombatta Lake during Oct 2010 to Sept 2011.

LAKE	SPECIES/MONTHS	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	TOTAL
MOMBATTA LAKE	Cyclocypris globosa	3	-	1	-	1	4	3	3	-	-	4	6	24
	Stenocypris fontinalis	-	-	1	-	2	2	1	1	-	-	-	3	10
	Cyprichoncha alba	1	-	-	-	-	2	-	2	-	-	-	-	5
	Candona peirci	-	-	-	-	-	-	-	-	-	-	2	3	5
	TOTAL	4	-	2	-	3	8	4	6	-	-	6	12	45
KAGAZIPURA LAKE	Cyclocypris globosa	9	5	2	6	22	34	2	7	18	-	4	27	136
	Cyclocypria kinkaidia	4	2	3	-	18	10	3	-	0	4	2	12	58
	Cypria mediana	-	3	-	-	11	12	-	-	6	-	-	8	40
	Physocypria furfuracea	-	-	-	-	3	8	1	9	-	2	-	4	27
	Eucypris bisposna	5	1	1	4	5	19	1	-	12	-	3	-	52
	Hemicypris fossulata	-	-	-	-	28	16	-	-	-	-	-	-	44
	Cyprinottus nudus	-	-	-	-	-	-	-	-	-	-	-	-	5
	Strandentia elongata	-	-	-	-	-	2	-	2	1	-	-	-	5
	Candona spp.	-	-	-	-	-	-	-	-	-	2	4	-	6
	TOTAL	18	11	6	10	89	101	7	20	38	8	13	51	372

TABLE 3: Monthly species diversity indices of ostracods Mombatta and Kagzipura Lake during Oct 2010 to Sept 2011.

LAKE	INDICES / MONTHS	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	AVE.
MOMBATTA	Richness (S)	2	-	2	-	2	3	2	2	-	-	2	3	2
	Simpson (D)	0.625	-	0.5	-	0.556	0.375	0.625	0.625	-	-	0.556	0.355	0.627
	Shanon-Weiner (H)	0.562	-	0.693	-	0.637	1.04	0.562	0.562	-	-	0.637	1.067	0.72
KAGZIPURA	Richness (S)	3	4	3	2	7	7	4	4	5	3	3	4	4
	Simpson (D)	0.377	0.322	0.347	0.52	0.221	0.204	0.306	0.345	0.35	0.375	0.358	0.366	0.340
	Shanon-Weiner (H)	1.037	1.241	1.079	0.673	1.652	1.733	1.277	1.187	1.201	1.04	1.061	1.167	1.195

Fig: (A) Photographs Showing Diversity of Freshwater Ostracods from Kagzipura Lake.

A) Cyclocypris globosa B) Cyclocypria kinkaidia C) Cypria mediana D) Physocypria furfuracea E) Eucypris bisponsa F) Hemicypris fossulata G) Cyprinottus nuddus H) Strandentia elongata

Fig: (B) Photographs Showing Diversity of Freshwater Ostracods from Mombatta Lake.
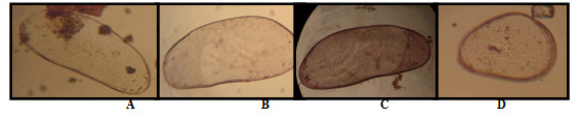
A) Candona peirci B) Cypriconcha alba C) Stenocypris fontinalis D) Cyclocypris globosa.

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