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Habitat preferences and tolerance of ostracods in two freshwater Lakes in Aurangabad District, Maharashtra, India

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ABSTRACT

Ostracods used as indicator species in aquatic habitats, because each species prefers specific ecological conditions, which can be assessed based on the level of the response of the species to environmental changes. Present study monitored during October 2009 to September 2010. Samples were collected using plankton net of mesh size 64µ. Sample analysis was carried out with standard keys of zooplankton. Altogether 8 species of Ostracods from Kagzipura Lake and 4 species from Mombatta Lake were found. The habitat preference and tolerance level of Ostracods were correlated with the population density and physic-chemical variables. Result indicates that habitat preference fluctuates the diversity and population density of Ostracods. Finally it is concluded that all species of Ostracods do not prefer the same habitat and they tolerate different habitat with different water quality.

Keywords: Habitat Preference, Tolerance, Physic-Chemical Parameters, Population Density, Mombatta Lake, Kagzipura Lake.

INTRODUCTION

Ecological tolerance of freshwater ostracods is generally broad in terms of the physical, chemical and ecological variables of different aquatic habitats, each species show different response and tolerance to abiotic and biotic factors. Consequently ostracods distribution might be correlated with water quality and the types of habitats (Mezquita et al, 2007; Kulkoyluoglu, 2003). Ostracod species respond sensitively to environmental changes and if the species tolerances are known, it might be possible to use them as environmental indicators (Kulkoyluoglu, 2004). However, there is little information about the habitat requirements and tolerance level of many ostracods species (Meisch, 2000). Correlations have been found between species distribution, abundance and different environmental factors such as habitat type (Malamquist et al, 1997), oxygen content (Dole-Olivier et al, 1997), temperature, water level (Forester, 1991)) and ionic composition.

They are also intensively affected by a range of other habitat variables such as water depth, volume, retention time and the degree of aquatic macrophytes cover (Carbonel et al, 1988). During the development of indicator species, both positive indicator species (cosmopolitan species with wide range of tolerance to pollution) and negative indicator species [non-cosmopolitan or sensitive species with limited ranges of tolerance] have been used to determine the quality in variety of aquatic ecosystem (Robert et al, 1999).

During the last few years, ostracods species have been used as indicator species for different aquatic habitats, ponds, lakes and reservoirs (Kulkoyluoglu and Dugel, 2004, Schornikov et al, 2014). However, attempts to understand the habitat preferences of each species and their tolerance level to environmental variables are few (Kulkoyluoglu et al, 2017) and detailed information on their ecology, biology and distribution is required (Kulkoyluoglu et al, 2004). Thus, the present paper focused on the habitat preference and tolerance of ostracods correlate with population density and physic-chemical variables.

MATERIALS AND METHODS

Study area:

Kagzipura Lake is located (between latitude 19^0 57' N and longitude 75^0 15' E) near Kagzipura village, Tal. Khultabad 22 km away from Aurangabad city. It has depth 8 to 9 meters and used for irrigation and fishing. Mombatta lake is located (between latitude 19^0 57' 42" and longitude 75^0 13' 24") near Daulatabad village, 20 km away from Aurangabad city. The lake has maximum depth of 8.30 meter spread across approximately 7.2 sq.km. The lake is situated at foot hills in Daulatabad valley containing grassland mixed with tree vegetation and used for aquaculture.

The ostracods 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 2009 to September 2010 between 7 to 8 AM. The collected samples were kept in plastic bottles containing 4% formaldehyde solution. Both soft body parts and carapace morphology of living species were used for identification following systematic keys of Edmondson (1959), Altaff (2004) and Meisch (2000), population density is done by lackeys drop count method and physical-chemical analysis of water parameters is done by APHA (1998)

RESULTS AND DISCUSSION

In the present paper, altogether 8 species of ostracods from Kagzipura Lake and 4 species from Mombatta Lake were (Table 1). Physico-chemical parameters and population density of ostracods from Kagzipura and Mombatta Lake is given in table 2, 3 and 4.

Total 8 species of ostracods were recorded and identified from Kagzipura lake namely, *Cyclocypris globosa, Cyclocypria kinkaidia, Cypria mediana, Physocypria furfuracea, Eucypris bisponsa, Hemicypris fossulta, Cyprinottus nuddus And Stardentia elongata.* From Mombatta Lake altogether 4 species were found; they are *Stenocypris fontinalis, Candona pierce, Cyprichoncha alba* and *Cyclocypris globosa* respectively.

All the 8 species of Kagzipura Lake are cosmopolitans while 3 species of Mombatta Lake are noncosmopolitan except *Cyclocypris globosa*. Cosmopolitans can be related to their ability to tolerate wide fluctuations in environmental conditions (Yilmaz and Kulkoyluoglu, 2006). This is because cosmopolitan species generally have wide ranges of tolerance to the changes in aquatic conditions, so that they can increase their survival rate when conditions deteriorate (Meffe and Caroole, 1994). Out of the global increase in the numbers of cosmopolitan species coincides with increasing pollution that causes a global reduction in species richness. This may require a long time period, but in small scale, sudden change can occur within a very short period of time due to anthropogenic activities, which can cause an increase in density of cosmopolitans (Roca, 2000).

Kagzipura and Mombatta lakes are different from each other by habitat and water quality. In summer and rainy seasons the higher value of chloride of Kagzipura Lake can be attributed to higher growth rate of algal population which utilized CO2 through photosynthetic activities and concentration of chloride increases with the degree of eutrophication. Kagzipura Lake having high content of Calcium than Mombatta Lake. The ostracods shell better preserved in the lakes with high calcium content. They can tolerate the low dissolved oxygen in rainy and summer season. In summer season their population density is more indicating their wide

range to tolerate hypoxic conditions (Anita Kiss, 2007). Tolerance level ostracods is high during the summer and winter season with different Physico-chemical variables. This lake is having of abundance species which was particularly influenced by the presence and coverage of the macrophytes, temperature and dissolved oxygen. The more population density is recorded in the month of summer and winter season. The dominant species by population of Kagzipura Lake are *Cyclocypris globosa*, *Cyclocypris kinkaidia* and *Eucypris bisponsa. Cyprinottus nuddus* and *Stardentia elongata* these species are very rare. *Cyclocypris globosa* is one of the species is found in both lakes. Distribution and abundance of Cyclocypris globosa is increased due to submerged and emergent macrophytes associations (Anita Kiss, 2007).

Table 1: Diversity of ostracods from Kagzipura and Mombatta Lake during October 2009 to September 2010**.**

Group	Family	Genus	Species
Kagzipura lake	Cypridoidea	*Cyclocypris* *Cyclocypria*	*Cyclocypris globosa* *Cyclocypria kinkaidia*
	Cyclocyprididae	*Cypria*	*Cypria mediana* *Physocypria furfuracea*
	Cyprididae	*Eucypris* *Hemicypris* *Cyprinottus* *Stradentia*	*Eucypris bisponsa* *Hemicypris fossulata* *Cyprinottus nuddus* *Stradentia elongate*
	Candonidae	*Candona*	*Candona sp.*
Mombatta lake	Cypridoidea	*Cyclocypris* *Cyprichoncha*	*Cyclocypris globosa* *Cyprichoncha alba*
	Candonidae	*Stenocypris* *Candona*	*Stenocypris fontinalis* *Candona peirci*

Table 2: Population Density (Ind/lit) of ostracods from Kagzipura and Mombatta Lake during October 2009 to September 2010

Lake/ Month	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Kagzipura	36	20	8	20	188	216	10	40	112	22	42	130	956
Mombatta	04	-	2	-	2	8	4	6	-	-	6	12	44

Table 3: Physico-chemical parameters (mg/lit) of Mombatta Lake during October 2009 to September 2010

Months/ Parameters	Air temp. (^{0}C)	Water Temp. (^{0}C)	pH	Dissolved Oxygen (mg/lit)	Chloride (mg/lit)	Calcium (mg/lit)	Total hardness (mg/lit)
October	30	28	8.7	3.96	20.70	24.84	62.08
November	25	26	8.4	4.23	18.60	19.23	150
December	23	24	7.9	4.56	16.70	17.63	140
January	22	23	7.2	3.38	17.40	14.42	102.8
February	24	22	6.4	2.94	37.10	28.08	164
March	29	22	6.5	3.52	42.00	46.49	178
April	32	27	6.8	4.83	47.00	51.30	184
May	29	28	6.8	4.3	84.00	49.69	196
June	30	25	6.9	2.04	63.00	46.49	170
July	29	28	6.5	2.34	36.00	44.08	140
August	27	28	8.3	2.96	16.50	42.48	136.6
September	28	26	8.2	2.31	18.00	24.08	129.6

Table 4: Physico-chemical parameters (mg/lit) of Kagzipura Lake during October 2009 to September 2010

Months/ Parameters	Air temp. (^{0}C)	Water Temp. (^{0}C)	pH	Dissolved Oxygen (mg/lit)	Chloride (mg/lit)	Calcium (mg/lit)	Total hardness (mg/lit)
October	30	29	8.5	3.05	21.5	29.81	184.0
November	25	27	8.9	3.43	18.0	31.90	182.0
December	23	25	8.4	3.83	15.0	20.04	153.0
January	22	24	8.2	2.39	59.0	24.08	150.6
February	24	23	7.2	2.75	57.3	36.08	188.6
March	29	26	7.5	2.80	82.0	55.31	198.2
April	32	27	6.8	2.96	89.2	54.50	224.0
May	29	26	6.7	2.52	78.0	57.71	218.0
June	30	25	6.8	2.00	72.0	55.31	220.0
July	29	28	5.2	1.90	64.0	51.30	154.0
August	27	24	7.4	2.66	89.5	54.50	169.7
September	28	26	7.8	4.27	80.0	62.50	193.0

Mombatta Lake includes the only 4 species of ostracods with very less in number. *Cyclocypris globosa* is one of the species is dominant by population as compared to other species like *Stenocypris fontinalis, Candona pierce* and *Cyprichoncha alba*. The water parameters like temperature, dissolved oxygen, pH, chloride, chloride and total hardness of Mombatta Lake fluctuates seasonally. Shape and size of all 4 of 3 species (*Stenocypris fontinalis, Candona pierce* and *Cyprichoncha alba*) of ostracods in Mombatta Lake are large as compared to species of Kagzipura Lake. This is the major characteristics of ostracods related to the habitat and water quality. Changes of shape and increase in size of Ostracod species due to the temperature and productivity of the lake and it is influenced by environmental factors. (Baltas et al, 2000).

All recorded species from both lakes showed distinct habitat preferences and ecological tolerance. In particular temperature, dissolved oxygen content and the presence & coverage of the vegetation influenced the diversity and population density of the Ostracod species. Most species have different species-specific tolerance level to a variety of environmental conditions. Wide tolerance associated with cosmopolitan characteristics of species. Such knowledge may be useful, especially during monitoring programs when water the main focus.

From the above findings suggest that Ostracods prefers the habitat of Kagzipura Lake because it covers abundant macrophytes is the source of food and shelter to avoid the predators. Due to increasing abundant macrophytes it leads to the formation of algal blooms results water body becomes eutrophicated (Sontakke et al, 2014). They are widely tolerated to such eutrophic and oligotrohic water bodies with different physic-chemical variables. Result indicates that wide tolerance ranges and occurrence in environmental conditions from mesotrophic to eutrohic (Mezquita et al, 2007, Kulkoyluoglu, 2004; Kulkoyluoglu et al 2017).

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