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OCCURANCE OF ZOOPLANKTON (ROTIFERA AND CLADOCERA) IN SOME WATER BODIES NEAR JAMSHORO

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Abstract

Freshwater zooplankton (Rotifera and Cladocera) occurrence was studied during September-October 2009 in natural and artificial water bodies situated in Jamshoro area. Sampling area included seven water bodies with different water qualities.

A total of 46 rotifer and 15 cladoceran species were identified. Among rotifers five species namely *Asplanchnopus syrinx*, *Branchinous leydigi* f. *Tridentatus*, *B. leydigi* f. *Tridentatus* var. *rotundus*, *Dipleuchlanis propatula* and *Polyarthra dolichoptera* were first time recorded. *Brachionus* was most diverse genus having eleven species while *Lecane* contributed with seven species. *Monostyla* and *Polyarthra* were having five species each. The majority of cladoceran occurred were benthic in nature however, *Ceriodaphnia cornuta* contributed with higher populations at different stations. The occurrence of zooplankton species in relation to the water quality id discussed.

Keywords: zooplankton, Rotifera, Cladocera, Jamshoro.

1. Introduction

Pakistan is bestowed with many large and small water bodies throughout country. These are of immense importance as a source of water for different uses. The small water bodies especially the ponds and temporary pools and puddles are diverse in their water quality which in turn provides diverse environments for the micro fauna. The zooplankton fauna of Pakistan is not well documented and hence there is always a great scope of new records of zooplankton species.

Plankton play a significant role in aquatic ecosystems. They transfer energy from producers to the higher consumers, such as aquatic insects, larval fish, and some adult fish. Rotifers are considered to be the most diverse group of zooplankton. Any increase and decrease in their populations depend upon availability of food and other climatic conditions (Allan, 1976). Some rotifer species are considered as indicators of lake type. cladocerans are mostly herbivorous in feeding habit. The limnetic and benthic species are different and hence can help in classifying the lake types. The salt tolerance of different species also differs; some species are stenohaline while others are euryhaline. The main objective of the present work is to document the zooplankton fauna in the small water bodies having different salinity range and trophic status in the vicinity of Jamshoro.

2. Materials and Methods

Zooplankton samples were collected from seven different water bodies. All samples were collected using plankton net having a mesh size 55µ. These were kept in plastic bottles and were preserved in 5٪ formaldehyde. Physico-chemical parameters were determined using digital meters. Temperature, conductivity, and TDS were measured using conductivity meter (WTW Cond 330i) while pH was determined by WTW pH/Oxi340. The samples were analyzed using Sedgwick-Rafter counting cell under stereo microscope. The samples were completely examined for rare species. Identifications of zooplankton were carried out by using keys and illustrations given by Ruttner-Kolisko (1974) and Mizuno and Takahashi (1991).

3. Results

The water temperature ranged between 31.5 ˚C to 28.5 ˚C throughout the study. The pH range was found to be 9.65 to 7. 25 and salinity was 0.1 to 8.5 ppt. TDS varied from 6360 to 285 mg/l while conductivity was found to be 14970 to 558 µS/cm (**Table -1**).

A total of 46 rotifers and 15 cladoceran species were identified from seven different water bodies studied (**Table-2**). The most

Table 1. Physico-chemical parameters of the sampling stations.

Station No	Type of water body	Temperature ˚C	pH	TDS mg/l	Conductivity µS/cm	Salinity ppt
1	SU storage pond 1	29.0	7.70	305	651	0.1
2	SU storage pond 2	28.5	7.95	315	680	0.1
3	LUMHS storage pond	29.1	7.5	285	558	0.0
4	Saline pond beside Qasimabad Bypass Bridge	31.5	7.25	5030	13100	7.1
5	Apple snail aquarium at F.W. Biology Dept.	29.5	7.80	289	582	0.0
6	RBOD canal at Jamshoro	30.5	7.89	6360	14970	8.5
7	Experimental Tank of F.W. Biology Dept.	30.0	8.15	405	864	0.2

Table 2. Occurrence of zooplankton species at different sampling stations near Jamshoro

Rotifera	**ST1**	**ST2**	**ST3**	**ST4**	**ST5**	**ST6**	**ST7**
Anuraeopsis fissa GOSSE, 1851	+	-	-	-	+++	-	-
Asplanchna priodonta GOSSE, 1850	-	-	-	-	-		++
*Asplanchnopus syrinx** EHRENBERG, 1837	+	-	-	-	-	-	-
Brachionus angularis GOSSE, 1851	-	-	-	-	-	++	-
B. calyciflores f. *anuraerformis* (BREHM, 1909)	+	-	-	-	-	-	-
B. forficula WIERZEJSKI, 1891	++	-	-	-	+	-	+
B. forficula f. *minor* (VORONKOV, 1891)	+	-	-	-	-	-	-
B. forficula f.*reducta* (GRESE, 1926)	+	-	-	-	-	-	-
B. leydigi COHN, 1862	-	-	-	++	-	-	-
B. leydigi f. *tridentatus** (SERNOV, 1901)	-	-	-	+	-	-	-
B. leydigi f. *tridentatus* var. *rotundus** (ROUSSELET, 1907)	-	-	-	+++	-	-	-
B. plicatilis (O.F. MULLER, 1786)	-	-	-	+++	-	+++	+
B. quadridentus f. *brevispinus* (EHRENBERG, 1832)	+	-	-	+	-	-	-
B. rubens EHRENBERG, 1836	-	-	-	++	-	-	+
Dipleuchlanis propatula (GOSSE, 1886)	-	-	+	-	-	-	-
Euchlanis dilatata EHRENBERG, 1832	++	-	+	-	-	-	+
Filinia longiseta (EHRENBERG, 1834)	-	-	+	-	-	-	-
Hexarthra mira HUDSON, 1871	-	-	++	++	+	-	+
Keratella cochlearis (GOSSE, 1851)	-	++	++	-	-	-	+
K. quadrata (O.F. MULLER, 1786)	-	-	-	-	++	-	-
K. valga (EHRENBERG, 1834)	-	-	+	-	-	-	+
K. valga var. *tropica* (APSTEIN, 1907)	+++	-	+++	+	+	-	+++
Lecane agilis (BRYCE, 1892)	-	-	-	-	-	+	-
L. candida HARRING & MYERS, 1926	-	-	+	-	-	-	-
L. curvicornis (MURRAY, 1913)	-	-	+++	-	-	-	-
L. hastata (MURRAY, 1913)	+	-	-	-	-	-	-
L. levistyla OLOFSSON, 1917	-	-	+	-	-	-	-

L. luna (O.F. MULLER, 1776)	-	-	+	+	-	-	+++
L. papuana (MURRAY, 1913)	+	-	+	-	-	-	-
Lepadella sp.	-	-	-	-	+	-	-
Macrochaetus collinsi (GOSSE, 1867)	-	-	+	-	+	-	+
Monostyla bulla GOSSE, 1851	++	+	+	-	+	-	+
M. crenata HARRING, 1913	-	-	-	-	+	-	-
M. furcata MURRAY, 1913	-	-	-	-	++	-	-
M. lunaris EHRENBERG, 1832	-	-	-	-	-	-	+
M. unguitata FADEEW, 1925					++		++
*Polyarthra dolichoptera** IDELSON, 1925	-	++	-	-	-	-	-
P. mira VOIGT, 1904	++	-	++	-	-	-	-
P. remata (SKORIKOV, 1896)	-	++	-	-	-	-	+
P. vulgaris var. *dissimulans* (NIPKOW, 1952)	-	++	+	-	-	-	-
P. vulgaris var. *longiremis* (CARLIN, 1943)	-	++	-	-	-	-	-
Pompholyx complanata GOSSE, 1851	-	+++	-	-	-	-	+
Scaridium longicaudum (O.F. MULLER, 1789)	+	-	-	-	-	-	-
Synchaeta oblonga (EHRENBERG, 1832)	-	-	-	-	-	-	+
Tertamastix opoliensis ZACHARIAS, 1898	-	-	-	-	-	-	+
Trichocera sp.	+	-	-	-	-	-	-
Cladocera							
Alona guttata SARS, 1862	-	-	-	-	-	-	++
A. karua KING, 1853	-	-	-	-	++	-	+
A. rectangula SARS, 1862	+	+	-	-	+	-	-
Bosmina longirostris (O.F. MULLER, 1785)	-	-	+	-	-	-	-
Bosminopsis deitersi RICHARD, 1895	-	++	-	-	+	-	-
Ceriodaphnia cornuta SARS, 1855	++	-	+++	-	+++	-	-
Chydorus ovalis KURZ, 1875	-	++	-	-	+	-	-
Daphnia lumholtzi SARS, 1885	-	-	+	-	-	-	-
Diaphanosoma brachyurum LIEVEN, 1848	-	-	+	-	+	-	-
D. paucispinosum BREHM, 1944	-	+	++	-	-	-	-
D. sarsi RICHARD, 1894	++	-	+	-	++	-	-
Scapholeberis sp.	-	-	+	-	-	-	-
Macrothrix laticornis (JURINE, 1820)	+	-	-	-	-	-	-
M. spinosa KING, 1853	-	-	-	-	-	+	-
Moina micrura KURZ, 1874	-	+	-	-	+	-	-

+ = present, ++ = fairly present, +++ =abundant, - = absent

diverse genus was *Brachionus* which was represented by 11 species. The next dominant genus was *Lecane* having seven species. *Monostyla* and *Polyarthara* had 5 species each while *Keratella* was represented by four species. The genera *Anuraeopsis*, *Asplanchna*, *Dipleuchlanis*, *Euchlanis*, *Filinia*, *Hexarthra*, *Lepadella*, *Macrochaetus*, *Pompholynx*, *Scaridium*, *Synchaeta*, *Tetramastrix,* and *Trichocerca* contributed only 1 species each. Among cladocerans *Alona* and *Diaphanosoma* genera contributed three species each whereas *Macrothrix* with two species each.

There are five rotifer species recorded for the first time from Pakistan. These are *Asplanchnopus syrinx*, *Brachionus leydigi* f. *tridentatus*, *B. leydigi* f. *tridentatus* var. *rotundus*, *Dipleuchlanis propatula* and *Polyarthra dolichoptera*. *Brachionus plicatilis* was most dominant at stations 4 and 6 which are saline water bodies. *Keratella valga* and *K. cochlearis* on the other hand dominated stations 1, 2 and 3 and were not found in saline water. *Lecane curvicornis* appeared and were dominant at station 3 whereas *L. luna* appeared at both saline and freshwaters but dominated at station 7. *Monostyla bulla* and *Polyarthra mira* were frequently found at the various stations having freshwater. All *Polyarthra* species were found at station 1, 2 and 3 being dominant at station 2. *Monostyla furcata* was found at station 5 only. Species like *Tertamastix opoliensis*, *Scaridium longicaudum and Synchaeta oblonga* appeared rarely but in freshwater habitats only. Most of the *Brachionus* species occurred at comparatively higher tropic status as well as higher salinity. *Hexarthra mira* was dominant both saline and

freshwater bodies. Species like *Lecane agilis* and *L. luna* occurred at higher salinities.

Among cladocerans *Alona guttata* and *A. karua* appeared at station 7 and 5, respectively. *A. rectangula* however, occurred at stations 1, 2 and 5. *Bosmina longirostris* appeared rarely at station 3 whereas *Bosminopsis deitersi* at stations 2 and 5. *Ceriodaphnia cornuta* was dominant at stations 1, 3 and 5. The *Chydorus ovalis* was dominant at station 2. All *Diaphanosoma* species were well distributed at stations 1, 2, 3, and 5 in which *D. sarsi* being dominant. Species like *Daphnia lumholtzi, Scpholeberis* sp. *Macrothrix laticornis, M. spinosa* and *Moina micrura* appeared rarely.

4. Discussion

The Rotifer *Keratella valga* and *K. cochlearis* were the most dominant zooplankton species at most of the stations. George and Fernando (1969) found this species with maximum population in sun fish Lake. Elliot (1977) in his studies on Grasmere concluded that *Keratella cochlearis* is probably the most common plankton rotifer in temperate region. Fernando (1980) on the other hand, ranked *Keratella* as dominant rotifer of warm lakes. Beach (1960) describes *Keratella cohleraris* as the typical species of the Ocqueoce River system. *Brachionus* genus is considered as eutrophic and usually appears at higher status of eutrophication. Most of the *Brachionus* species including *B. angularis* and *B. forficula* were present where water was eutrophic. *B. plicatilis* is euryhaline and is considered as saline or brackish water species. It was most dominant in saline water bodies however, it was recorded in freshwater as well. It indicates that *B. plicatilis* can also thrive in freshwater. *Hexarthra mira* is considered as a eutrophic species and it was abundant in saline water. The documentation of rotifers species *Asplanchnopus syrinx, Branchinous leydigi* f. *tridentatus, B. leydigi* f. *tridentatus* var. *rotundus, Dipleuchlanis propatula* and *Polyarthra dolichoptera* for the first time indicates that there is still need of study such diverse environments. The number of species may increases if the sampling is done for prolonged periods.

The cladoceran genera like *Alona, Chydorus, Scapholeberis, Macrothrix* and *Moina* are generally considered as shallow pond water species. Their common occurrence in shallow temporary ponds is in agreement with their general tendency. On the other hand *Bosmina, Bosminopsis, Ceriodaphnia, Daphnia* and *Diaphanosoma* are considered lacustrine zooplankton (Baloch *et al.,* 1998) which usually dominates food rich environments (Baloch and Suzuki, 2009). No cladoceran species occurred in saline water bodies indicating that they may have no tolerance for high salinity.

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