

Cladocera Diversity in the Aquatic Habitats of Jammu District, (J&K)

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Abstract- Cladocera occupy the primary consumer level in aquatic food chains and have a very vital role in stability and integrity of aquatic habitats. Therefore, knowledge of biodiversity of these organisms can be utilized in the management of aquatic habitats and for commercial aquaculture practices. The present study involved analysis of diversity and dynamics of these planktonic crustacea in Jammu district of the Union Territory of Jammu and Kashmir. This investigation recorded 15 species of cladocera belonging to 8 genera and 4 families from the study area. The percental contribution of different families demonstrated a typical trend where Daphniidae>Chydoridae>Moinidae>Macrothricidae. Habitat preference was also recorded in some cladocera.

Keywords: Cladocera, Microcrustacea, Plankton

I. INTRODUCTION

Cladocera, commonly called water fleas, refer to the microcrustacean organisms ranging in size from 0.2-6.00mm (with exception *Leptodora kindtii* which may grow up to 18mm). Body is not clearly segmented and enclosed in a carapace which appears bivalve. These plankton (drifting at the mercy of currents) belong to order Diplostraca, Class Branchiopoda and Subphylum Crustacea [1]. These microcrustacea facilitate the transfer of energy from producers to consumers in the aquatic food chains. They are important diet component of fishes and thus have a vital role in the stability and integrity aquatic ecosystems [2]. Globally 4000 species of cladocera have been reported [3] and these include 620 species of cladocera residing in freshwaters [4]. In this context 187 species of cladocera have been documented from freshwaters of India [5].

Perusal of literature reveals contributions of various workers to the investigation on the branchiopod fauna in aquatic habitats of India ([6], [7], [8], [9], [10], [11] and [12]). In the context of Jammu and Kashmir, extensive data about of the cladocera residing in the aquatic habitats of Kashmir is available [13], [14], [15], [16], [17] and [18]. However diversity of Cladocera in the water bodies of Jammu has almost remained unexplored but for some isolated works [19], [20], [21], [22], [23] and [24].

Considering dearth in information regarding diversity of cladocera in this part of the country, present investigation was carried out to unfurl the diversity and related aspects of cladocera in the aquatic habitats of Jammu district of the of Jammu and Kashmir.

The paper is organised into 4 sections. Section I contains the introduction and significance of the present study while sections II gives an overview of the study area and methodology adopted to carry out present investigation. The section III contains the results and discussions duly supported by tables and figures. The section IV contains the conclusion drawn on the basis of present investigation.

II. MATERIAL & METHODS:

Jammu district, Jammu and Kashmir has subtropical climate. It is geographically located between 74° 24' E to 75 ° 18' East longitudes and 32° 50' N to 33° 30' North latitudes. It is spread over an area of 3097 sq. kilometres and divided into five tehsils viz., Jammu, Samba, R.S. Pura, Akhnoor and Bishnah. In order to analyse the cladocera faunal elements an extensive survey of 28 aquatic habitats (22 lentic and 6 lotic) was done from November, 2010-October, 2011. For collection of plankton, approximately 100 litres of water was filtered through plankton net of standard bolting cloth No. 25 (0.03 – 0.04µ mesh size). The filtrate was taken in plastic vials and preserved in 5% formaldehyde solution. These samples were brought to laboratory for qualitative and quantitative studies as per the standardised protocols [25], [26], [27] and [28].

$$\text{Number/l} = \frac{C \times 1000m^3}{A \times D \times F}$$

Where C = Number of organisms counted
A = Area of field
D = Depth of the field (mm)
F = Number of fields counted.

III. RESULTS AND DISCUSSIONS

The extensive survey conducted during present study established presence of 15 species of Cladocera belonging to 8 Genera (*Daphnia*, *Simocephalus*, *Ceriodaphnia*, *Moina*, *Macrothrix*, *Scapholeberis*, *Alona* and *Chydorus*) and 4 Families (*Daphnidae*, *Moinidae*, *Chydoridae* and *Macrothricidae*) in the aquatic habitats spread across the length and breadth of Jammu district of the Union Territory. The Cladocera recorded during present survey include *Daphnia magna*, *Daphnia rosea*, *Daphnia similis*, *Simocephalus vetulus*, *Simocephalus serrulatus*, *Ceriodaphnia reticulata*, *Ceriodaphnia cornuta*, *Scapholeberis kingi*, *Moina brachiata*, *Moina micrura*, *Macrothrix rosea*, *Macrothrix laticornis*, *Alona rectangula*, *Alona guttata* and *Chydorus sphaericus*. (Table 1)

The cladocera genus *Daphnia* was recorded as the most dominant genus with 3 species (*D. magna*, *D. rosea* and *D. similis*). It was followed by *Simocephalus*, *Ceriodaphnia*, *Moina*, *Macrothrix* and *Alona* with 2 species each while *Scapholeberis* and *Chydorus* recorded one species each. The dominance of *Daphnids* in the freshwater surveyed during the present study may be attributed to their high reproductive potential along with wider tolerance for physico-chemical parameters and a wide habitat range. Similar observations have been made by [29] and [30]. (Table 1)

Table 1: List of Cladocera reported from the freshwater habitats of Jammu district (J&K)

S.No.	Name of Cladocera	S.No.	Name of Cladocera
1.	<i>Daphnia magna</i>	9.	<i>Macrothrix rosea</i>
2.	<i>Daphnia rosea</i>	10.	<i>Macrothrix laticornis</i>
3.	<i>Daphnia similis</i>	11.	<i>Moina brachiata</i>
4.	<i>Simocephalus serrulatus</i>	12.	<i>Moina micrura</i>
5.	<i>Simocephalus vetulus</i>	13.	<i>Alona rectangula</i>
6.	<i>Ceriodaphnia reticulata</i>	14.	<i>Alona guttata</i>
7.	<i>Ceriodaphnia cornuta</i>	15.	<i>Chydorus sphaericus</i>
8.	<i>Scapholeberis kingi</i>		

The distribution pattern of cladocera revealed that the lentic habitats recorded 14 species (*Daphnia rosea*, *D. similis*, *Simocephalus serrulatus*, *S. vetulus*, *Ceriodaphnia reticulata*, *C. cornuta*, *Scapholeberis kingi*, *Macrothrix rosea*, *M. laticornis*, *Moina brachiata*, *M. micrura*, *Alona rectangula*, *A. guttata* and *Chydorus sphaericus*.) while the lotic habitats recorded only 5 species of cladocera ((*Daphnia magna*, *D. rosea*, *Moina brachiata*, *M. micrura*, *Ceriodaphnia reticulata*). A perusal of Table 2 and 3 clearly highlights the quantitative and qualitative richness of lentic habitats in comparison to the lotic habitats. The rich diversity of cladocera in lentic habitats as compared to lotic habitats may be attributed to the rich autochthonous production and to some extent the allochthonous

production in these habitats. These findings are in concordance with the observations made by [31], [32], [33], [34] and [35].

The extensive survey also recorded a specific habitat preference in some species of cladocera recorded during present investigation. In this context *Alona rectangula*, *A. guttata*, *Chydorus sphaericus*, *Macrothrix rosea* and *Scapholeberis kingi* were abundant in the aquatic habitats with rich vegetation and macrophyte growth. Horizontally also the above mentioned Cladocera species recorded their prevalence in the littoral zones of the surveyed aquatic habitats. Looking at their strong affinity for vegetation these cladoceran species (*A. rectangula*, *A. guttata*, *C. sphaericus*, *M. rosea* and *S. kingi*) can be regarded as phytophilous species in conformity with [36], [37] and [38]. On the contrary some cladoceran species viz.,

Table 2:- Statistical Data of Crustacea Inhabiting Lentic Habitats of Jammu.

Crustacea	Density	Relative Density	Frequency	Relative Frequency	Abundance
<i>Daphnia rosea</i>	0.043	2.90	36.3	6.15	0.12
<i>Daphnia similis</i>	0.015	1.01	13.6	2.30	0.11
<i>Simocephalus vetulus</i>	0.024	1.62	18.2	3.08	0.135
<i>Simocephalus serrulatus</i>	0.008	0.54	9.0	1.52	0.09
<i>Ceriodaphnia reticulata</i>	0.134	9.06	50.0	8.47	0.26
<i>Ceriodaphnia cornuta</i>	0.067	4.53	31.8	5.39	0.211
<i>Scapholeberis kingi</i>	0.019	1.28	13.6	2.30	0.14
<i>Moina brachiata</i>	0.365	24.67	59.0	10.0	0.61
<i>Moina micrura</i>	0.035	2.37	18.1	1.51	0.20
<i>Macrothrix rosea</i>	0.020	1.35	22.7	3.84	0.092
<i>Macrothrix laticornis</i>	0.001	0.067	4.5	0.76	0.04
<i>Alona rectangula</i>	0.072	4.87	36.3	6.15	0.20
<i>Alona guttata</i>	0.006	0.40	4.5	0.76	0.14
<i>Chydorus sphaericus</i>	0.073	4.93	13.6	2.30	0.54

Table 3:- Statistical Data of Crustacea Inhabiting Lotic Habitats of Jammu.

Crustacea	Density	Relative Density	Frequency	Relative Frequency	Abundance
<i>Daphnia magna</i>	0.022	3.98	14.2	3.01	0.16
<i>Daphnia rosea</i>	0.008	1.44	14.4	3.03	0.06
<i>Moina brachiata</i>	0.11	19.93	57.14	12.13	0.19
<i>Moina micrura</i>	0.037	6.70	14.2	3.01	0.26
<i>Ceriodaphnia reticulata</i>	0.074	13.40	42.8	9.09	0.17

Moina micrura and *Ceriodaphnia cornuta* were recorded to be quite prevalent in the limnetic zone of water body and hence can be regarded as the open water or cladoceran species [39].

Daphnidae was recorded to be the dominant family with 8 cladocera species inhabiting the freshwaters of Jammu. It was followed by Chydoridae represented by 3 species while Moinidae and Macrothricidae recorded by 2 species each. The percental contribution of different families to the cladocera fauna followed a trend Daphnidae (53.3%) > Chydoridae (20%) > Moinidae (13.3%) > Macrothricidae (13.2%) respectively in the area investigated. (Fig.1)

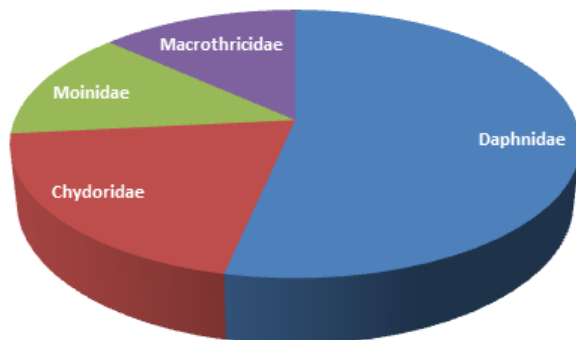


Fig 1. Pie Chart showing Percental contribution of different families to the cladoceran fauna in the freshwaters of Jammu.

A perusal of Table 2 & 3 reveals that *Moina brachiata* and *Ceriodaphnia reticulata* recorded maximum Density, Relative density, frequency and abundance in both lentic and lotic habitats investigated during present investigation. Dominance of these cladoceran species in freshwaters of Jammu can be attributed to their diverse habitat range and wide tolerance to the physico-chemical parameters [40], [41].

IV. CONCLUSION

The extensive survey of freshwater habitats (22 lentic and 6 lotic) during present study established presence of 15 species of cladocera belonging to 8 genera and 4 families in Jammu district of Union Territory of Jammu and Kashmir. Family Daphnidae was recorded as the most dominant family of cladocera contributing 8 species to the cladocera fauna of Jammu district. Further some cladocera species recorded specific habitat preferences.

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