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DIVERSITY AND ABUNDANCE OF ZOOPLANKTON OF GUNDALLI TANK, SHAHPUR, YADGIR DISTRICT, KARNATAKA

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Abstract: The present work aims to study the Diversity and Abundance of zooplankton in Gundalli Tank, Shahpur, Yadgir district for a period of one year from January 2016 to December 2016. Zooplankton community is also correlated with physicochemical parameters. Both qualitative and quantitative analysis were conducted by taking samples from five sampling stations of the tank. We have recorded 28 species, of which 11 species belong to Rotifera, 7 to Cladocera, 6 to Copepoda and 4 to Ostracoda. Zooplanktons are heterotrophic planktonic animals floating in water. They serve as good indicators of changes in water quality. This study also reveals that different groups of zooplanktons have their own peak periods of density, which is affected by local environmental conditions prevailing at that time.

Index Terms - Zooplankton, Diversity, Abundance, Gundalli Tank, Rotifera, Cladocera.

I . Introduction

Zooplanktons are the smallest organisms present in almost all the water body and they can be observed only through microscope. They invariably form an integral component for fresh water communities and contribute significant to biological productivity. Zooplankton acts as main sources of food for many fishes and plays an important role in early detection and monitoring the pollution of water. Zooplankton community distribution depends on some of the complex factors viz, change of climatic conditions, physical and chemical parameters and vegetation Most of the planktonic organisms are cosmopolitan in distribution. A number of studies has been carried out on the condition of ecology and freshwater bodies in various parts of India but in some parts of southern Karnataka, the ecological studies of freshwater bodies especially zooplankton studies is very scanty.

The study of freshwater fauna especially zooplankton even of a particular area is extensive and complicated due to environmental, physical, geographical and chemical variations involving ecological, extrinsic and intrinsic factors. This is particularly so with freshwater fauna (zooplankton), which plays a key role in

preservation and maintenance of ecological balance. Its basic study is wanting and is absolutely necessary. Zooplankton exhibits a bimodal oscillation in a Spring and Autumn in the temperate lakes and reservoirs (Wetzel 2001). This fluctuation is greatly influenced by variations in the temperature along with many other factors. Among several factors, temperature seems to exhibit the greatest influence on the periodicity of zooplanktons (Byars 1960; Battish and Kumari 1986; Prasad and Singh 2002). Water temperatures between 10–29°C are suitable for zooplankton development (Kaushik*et al*. 1992).

Zooplankton supports the economically important fish population. They are the major mode of energy transfer between phytoplankton and fish. A number of workers such as Ayyappan & Gupta (1980) Chakravarty (1985), Balkhi*et al* (1987) have reported on different aspects of zooplankton inhabiting Indian fresh waters.

The zooplankton community is composed of both primary consumers (which eat phytoplankton) and secondary consumers (which feed on the other zooplankton). They provide a direct link between primary producers and higher tropic levels like fish. Nearly all fish depend on zooplankton for food during their larval phases and some fishes continue to eat zooplankton throughout their entire lives (Madin*et al.*, 2001).

II . Material and Methods

Study area:

Gundalli is one of the Village in ShahapurTaluk in Yadgir District in Karnataka State. It is a perennial fresh water body. It lies between 77.13 ^{0}E Longitude and 16.77 ^{0}N Latitude. Its water spread area is 103.3738 hectares. The Water of this water body too is used mainly for agriculture. In addition to this, its water is also used for washing clothes, bathing the animals and other domestic activities.

Zooplankton sample Collection, Preservation, Identification and Density Analysis:

Water samples were collected from five stations in different locations of the tank during an early hours of the day (7am to 9am) to a period of 1 year (January 2016– December 2016) and such samples were pooled together to consider a final sample for analysis. The plankton net is made by the bolting nylon silk (mesh- size 50µm) is used for collection of zooplankton and which is conical shape and reducing cone with the bottle at its end. For a precise collection of zooplankton, the plankton net is towed horizontally and obliquely (for Qualitative) in surface water of the study area and for quantitative analysis, 10 liters of water samples were filtered out through the net. After transferring the sample in air tight plastic bottles, it would keep carefully with labeling and preserved immediately using 4% formaldehyde. Later, the collected samples were brought to laboratory and analyzed qualitatively under the microscope for different types of zooplanktons and identified using various authenticated monographs7- 11. After an accurate identification of each genus, the density of zooplankton was calculated as per the Lackey's drop method.

Separation

In the laboratory the plankton collected from the tank were poured into a broad petridish. The different planktons were isolated with a pointed painting brush using a binocular dissection microscope. For qualitative and quantitative analysis of zooplankton, collections were made using a modified Haron-Trantor net with a square metallic frame of 0.0625 m^2 area. The filtering cone was made up of nylon bolting silk plankton net (No. 25 mesh size 50 μ). This net was used for collecting zooplankton. The net was hauled for a distance of 10 m. A collected sample was transferred to labeled vial containing 5% formalin. After sedimentation, 100 ml of sample

was subjected to centrifugation at 1,500 rpm for 20 min and used for further investigation. In the laboratory the plankton were poured into a broad petridish. The different planktons were isolated with a pointed painting brush using a binocular dissection microscope. Counting of the rotifera, cladocera, copepod and ostracoda was carried out using a Sedgewick Rafter cell. The data was used only to express the relative abundance of the principle zooplankton groups (Needham and Needham 1962).

III . Results and Discussion

The obtained zooplankton forms were represented by four groups of Phylum viz Rotifera, Cladocera, Copepoda and Ostracoda Among these, Rotifera comprise of 11 species, Cladocera 7 species, Copepoda 6 species, Ostracoda 4. All the dominant group of zooplankton were present throughout the year.

Rotifers: These are considered as the most important soft bodied invertebrates and they play a major role in aquatic food chain and major food for fishes. In rotifers zooplanktons *like Brachinouscalcyfloru s*and *Brachinouscaudatus* found to be present throughout the year whereas cladocera was represented by *Bosminalongirostris, Alonadavididavidi, Macrothrix spinosa, Simocephalusexspinosus* and *Diaphonosoma species* According to observation the Brachionus species are very common in temperate and tropical waters.

Cladocerons: Cladocera is an order of small crustaceans commonly they are called by “water fleas”. It has been reported that the density and biomass of cladocerans was primarily determined by food supply. In the present study, similar observations were made where cladocerans were abundant when the food supply (phytoplankton) was maximum.

Copepods: These constitutes a major zooplankton communities occurring in almost all the water bodies, which serve food for many fish and play a vital role in ecological pyramids. The important factors which controlled the distribution of copepods were rainfall, river discharge and decreased phytoplankton abundance due to increased turbidity. In our studies the copepods recorded were *Cyclops strenuous, Cyclops scutifer and mesocyclopshyalinus.*

Ostracods: The ostracods are bivalve crustaceans found in both fresh and marine water. In the present study, only two species of ostracods were found and these are represented by Cypris species andheterocypris species.

The population of zooplankton in Gundalli tank consist of Rotifera, Copepoda, Cladocera, and Ostracoda . The total number recorded were 2809 per liter of which rotifera 1,061 (37.44%), Cladocera 932 (33.17%), Copepoda 553 (19.69), and Ostracoda 263 (9.37%). All the above mentioned zooplanktons were dominant throughout the year. Diversity analysis shows that rotifers have 12 species, Cladocera 8, Copepods 6, and Ostracoda 4. The diversity of zooplankton groups is mentioned in Table 1.

High richness of rotifer species was also recorded during these seasons in contrast to the findings of Ayoagui & Bonecker (2004). This may be ascribed to the low population of cladocerans and the relief of the rotifers from competitive suppression by the cladocerans. Aoyagui & Bonecker (2004) stated that zooplankton diversity can be increased by the removal of competitively dominant species.

Table 1: Composition of zooplanktons

Months	Zooplankton groups			
	Rotifera	**Cladocera**	**Copepoda**	**Ostracoda**
January 2016	144	298	124	136
Feb	506	298	616	262
March	1732	1544	1056	182
April	1907	379	1468	588
May	1959	648	1193	706
June	1972	1478	943	432
July	1565	1728	200	196
August	1313	500	649	328
Sept	1270	1660	156	73
Oct	164	896		78
Nov	144	298	124	136
December 2016	137	902	130	84
Total	12726	11181	6637	3159
% of Plankton Diversity	37.44	33.17	19.69	9.37

IV . CONCLUSION

Among the zooplanktons in Gundalli tank, 28 species belong to Rotifera, Cladocera, Copepoda and ostracods. The overall view in this study reveals that the fluctuation of zooplankton occurs distinctly in the study area and normally in rainy season there is a less population due to the dilution factors and its effects leads to less photosynthetic activity by primary producers. The population raises a bit higher level during winter season due to favorable environmental conditions and presence of excess of food in the form of bacteria and suspended detritus, but in summer where inflow is less to compare with other seasons resulted in stability of water body and availability of food is more due to decomposition of organic matter and the density of zooplankton might be high due to less predators.

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