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Physico-chemical characteristics and diversity of zooplankton in Kallambella tank, Tumkur district, Karnataka, India

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Abstract
Study on water quality and zooplankton diversity of Kallambella tank, Tumkur district, Karnataka, India was conducted to check the status in the area and provide new insights into its ecology. The samples were collected during June 2016 May 2017. A total numbers of 4703 species were found in this tank. Among these rotiferous comprised of 12 species (41.36%), cladocera 5 species (30.55%), copepods 3 species (23.16%) and ostrocoda 2 species (4.9%). The result of present investigation are compared with the literature values and investigation reveals that there is fluctuation in the physico-chemical characteristics of the water.

Keywords: kallambella tank, physico-chemical parameter, diversity, zooplankton

Introduction
Zooplanktons occupy an important position in the tropic structure and play a major role in energy transfer of an aquatic ecosystem. It consists of protozoan, cladocera, capepoda and Rotifera etc., which serve as indicators of water pollution. Zooplankton provides fish with nutrients since fish requires proteins, fats, carbohydrates, mineral salts and water in the right portion [1]. Zooplankton distribution and their abundance is non-homogenous its depends on availability of nutrients and climatic conditions along with physico-chemical parameters, season, water depth and vegetation cover [2, 3]. Most of the species of plankton organisms are cosmopolitan distribution [4]. in ecologically, zooplankton are one of the most important biotic components influencing all the functional aspects of an aquatic system, such as food chain, food webs, energy flow and cycling of organic matter [5-9].

Study Area
The Kallambella tank a major perennial tank of the district and located at near Sira town, Tumkur district, which is 38km away from Tumkur city. Which falls under 13.5841N latitude and 76.9737 longitude E. This tank is used for drinking water and irrigation purposes.

Material and Method
Monthly zooplankton samples were collected randomly in different location of the tank during early hours (7am to 9am) to period of one year (June 2016 – May 2017) and water samples collected by using sterilized one litre wide mouth plastic container at each sampling station. Water quality parameters were analysed as per methods of BIS [10]. DO was fixed at sampling stations itself and further analysis was done in the laboratory. For the quantitative and qualitative estimation of plankton 50 litres of water samples were filtered by using the 125 mesh size plankton net and preserved in 4% formalin. Literature was used for taxonomic position and identification of the plankton [11, 12].

Table 1: Monthly Average Value of Physico-Chemical Parameters in Kallambella Tank.

Sl. No.	Parameter	Unit	Value
1	Water temperature	°c	24.9
2	P^H	-	7.42
3	Turbidity	NTU	10
4	EC	µs/cm	262
5	TDS	mg/l	178
6	Chloride	mg/l	12
7	Total Hardness	mg/l	90
8	Ca as $CaCO_3$	mg/l	50
9	Mg as $CaCO_3$	mg/l	40
10	Alkalinity	mg/l	22
11	NO_3	mg/l	01
12	DO	mg/l	5.8
13	BOD	mg/l	03
14	COD	mg/l	30
15	SO_4	mg/l	20

Table 2: Monthly Variation in Zooplankton Groups (No. ind/l) in Kallembella Tank

Month	Zooplankton				Total
	Rotifera	Cladocera	Copepoda	Ostracoda	
June-2016	92	162	118	08	380
July-2016	108	196	96	06	406
Aug-2016	78	178	82	12	350
Sep-2016	70	222	58	22	372

Oct-2016	111	178	202	26	517
Nov-2016	125	150	172	31	478
Dec-2016	130	112	120	35	397
Jan-2017	158	59	71	48	336
Feb-2017	248	76	44	18	386
Mar-2017	242	64	42	12	360
Apr-2017	282	32	36	06	356
May-2017	301	08	48	08	365
TOTAL	1945	1437	1089	232	4703

Results and Discussion

The physico-chemical parameter such as, temperature, pH, DO and an organic and inorganic constituent plays an important role in determine the nature and diversity of zooplankton in an aquatic environment. The importance of these factors has been stressed by several worker [13-16].

The obtained zooplankton forms were represented by 4 groups of phylum viz., rotifera, cladocera, copepod and ostracoda among these rotifer comprise of 12 species, cladocera 5 species, copepod 3, and ostracoda 2. The total number of species recorded were 4703 of which rotifers are 1945 (41.36%), cladocerans 1437 (30.55%), copepodas 1089 (23.16%) and ostrocodas 232 (4.9%). All the dominant group of zooplankton were present throughout the year.

Rotifers

Are the most important soft bodied metazoans having a very short life cycle among the plankton. Only 100 wisely spread rotifer species are planktonic and there life cycles are influenced by temperature, food and photoperiod [6]. In the present study total 12 species are recorded. Seasonally the highest value of 301 Org/l in the month of May 2017 while lowest value of 70 Org/l in the month of Sep-2016 (Table-2).

Cladocera

Is an order of small crustaceans commonly called water fleas. Around 620 species have been recognised so for, with many more undiscribed species. In the present studies there are 5 species of cladocera were found in these water bodies. In case of seasonal occurance of cladocera, the highest value of 222 Org/l in the month sep-2016 while lowest vaue of 08 Org/l in the month of May-2017 (Table 2).

Copepoda

Occur in all most all fresh water habitats, they are extremely abundant in fresh water and comprised a major component of most planktonic, benthic, and ground water communities including semi terrestrial situations such as damp moss and leave litter in humid forest [7]. In the present investigation 3 species of copepod were found in these water bodies. Seasonally found in highest value 202 Org/l in the month of Sep-2016 while lowest value of 36 Org/l in the month of April-2017 (Table 2).

Ostracods

Are bivalue crustaceans found in both fresh and marine water. In the present study only 2 species of ostrocodas were found and these are represented by Cypris species and Hetero Cypris species. Seasonally the highest value of 48 Org/l in the month of Jan-2017 while lowest value of 06 Org/l in the months of July-2016 and April-2017 (Table 2).

Conclusion

Overall view in this study the diversity of zooplankton depends upon the nutrient condition of water body, Abiotic factors, DO, BOD, food chain, soil water chemistry and temperature. Hence, there is a needed to conserve biotic and abiotic of water body. There was evidence from this study the human activities mostly the refuse dumping, domestic sewage, detergent run of as a result of washing activities and changing environmental conditions might be responsible for the fluctuation of zooplankton abundance and seasonal succession in this studied Kallambella tank.

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