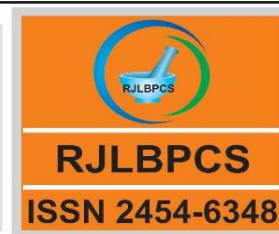




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**QUALITATIVE AND QUANTITATIVE STUDY OF ZOOPLANKTON FROM  
FRESH WATER TANKS OF KOLHAPUR DISTRICT, (MAHARASHTRA).**

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**ABSTRACT:** The study of fresh water fauna especially zooplankton, even of a particular area is an extensive and complicated phenomenon due to environmental, physical, geographic and chemical variation involving ecological extrinsic and intrinsic factors. Zooplanktons are the microscopic free swimming animal components of aquatic system. They are represented by a wide array of taxonomic groups; of which the members belonging to Protozoa, Rotifera, Cladocera and Copepoda are most common and often dominate the entire consumer communities. They have many remarkable features and are often armoured with spines, which hamper their predation by higher organisms. The ability of movement not only provide them an effective defense measure but also enable them to actively search and feed upon the phytoplankton. The members of zooplankton community are important for their role in trophic dynamics, energy transfer in the aquatic ecosystem. They provide food for fishes in the freshwater ponds, lakes, tanks and reservoirs and play a major role in the fish production. The seasonal fluctuations of the zooplankton population are a well-known phenomenon and zooplankton exhibits bimodal oscillations with a spring and autumn in the temperate lakes and reservoirs (Daniel and Lepedes, 1974). The zooplankton community of the fresh water tanks was studied by monthly, samples taken from June 2009 to Dec. 2010. The water bodies such as Tamdalage, Laxmiwadi, Vadgaon tanks. These Tanks are situated at 16° 46' 35" 05" N latitude, 74° 27'48.71 E longitude, 16° 47'23 19" N latitude, 74° 22'56.44" 11 E longitude and 16° 49.45" N latitude, 74° 18'22.50" E longitude respectively, near vicinity of Hatkanangle Tahsil of Kolhapur district, Maharashtra. The water of the tank is used for domestic, Agriculture and fishery activities. The qualitative and quantitative study of zooplankton is discussed in detail.

**Keywords** – Qualitative, Quantitative analysis, Zooplankton, Fresh water tanks.

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## 1. INTRODUCTION

The zooplankton includes animals suspended in water with limited powers of locomotion. The zooplankton having limited powers of locomotion, and animals capable of swimming independently of turbulence-the latter referred to as nekton- is often diffuse. Freshwater zooplanktons are dominated by four major groups of animals: protozoan's rotifer and two subclasses of the Crustacea, cladocerans and copepods. The planktonic protozoa have limited locomotion, but the rotifers, cladocerans, copepod, microcrustaceans, and certain immature insect larvae often move extensively in quiescent water. Many pelagic protozoa (5-300  $\mu\text{m}$ ) are meroplanktonic, in that only a portion, usually in the summer, of their life cycle is planktonic. These forms spend the rest of their life cycle in the sediments, often encysted throughout the winter period. Many protozoans feed on bacteria-sized particles (most cells  $<2\mu\text{m}$ ), and thereby utilize a size class of bacteria and detritus generally not utilized by large zooplankton. Although most rotifers (150 $\mu\text{m}$ -1mm) are sessile and are associated with the littoral zone, some are completely planktonic; these species can form major components of the zooplankton. Most rotifers are nonpredatory, omnivorous feed on bacteria, small algae, and detrital particulate organic matter. Most food particles eaten are small ( $<12\mu\text{m}$  in diameter). Most Cladocerans zooplanktons are small (0.2 to 3.0 mm) and have a distinct head; the body is covered by a bivalve carapace. Locomotion is accomplished mainly by means of the large second antennae. Planktonic copepods (2-4 mm) consist of two major groups, the calanoids and the cyclopoids. These two groups are separated on the basis of body structure, length of antennae, and legs. Several authors have worked out a number of faunal expeditions of aquatic bodies. The notable Indian contribution to the information of zooplankton i.e Sewell (1934),(Thakar & Sonawane 2013), who studied on plankton rotifers. Ganpati (1943), studied on the distribution of zooplankton in water bodies near Madras. George (1961), reported the seasonal distribution of rotifers in ponds and lakes. Gouder and Joseph (1961), reported the seasonal distribution of copepods. Govind (1963) investigated on the relationship between copepods and physico-chemical parameters in Tungabdhra reservoir, Karnataka. Biswas (1964), observed the species of cladocerans from lentic water bodies of North part of India. Michael (1968), worked on several aspects such as distribution and abundance of zooplanktons in different water bodies near Chennai. Rajendra (1973), observed the occurrence and abundance of copepods in lentic water bodies in Tamil Nadu. David et al. (1974) recorded the abundance of copepods in the tank situated in Malnadu and coastal tanks in Karnataka. Rao and Mohan (1982) carried out a detailed investigation on rotifers of Andhra predesh. Ayyappan and Gupta (1980) carried out an ecological studies on zooplankton of Ramasamudra tank Dakshina Kannada, Karnataka. Yousuf and

Quadri (1985) observed the seasonal fluctuations of the major zooplankton communities of lake Manasabal, Kashmir. Saha and Pandit (1985) compared the density of zooplankton between lotic and lentic environment. Datta et al. (1987) worked on abundance of zooplankton in limnetic water of Kolkata. From ecological point of view rotifers, cladocerans, copepods and ostracods are considered to be most important components, which play a vital role in energy allocation in different trophic levels. The presence and dominance of zooplankton species play significant role in functioning of freshwater ecosystem. The qualitative and quantitative fluctuations have been considered essential for proper understanding of the factors influencing zooplankton population. Therefore present investigation is formulated to assemble the information regarding qualitative and quantitative study of zooplankton of these tanks.

## 2.MATERIAL AND METHODS

**Study Area:-**The Tamdalage, Laxmiwadi and Vadgaon tanks are perennial freshwater tanks located  $16^{\circ} 46' 35' 05''$  N latitude,  $74^{\circ} 27' 48.71$  E longitude ,  $16^{\circ} 47' 23' 19''$  N latitude,  $74^{\circ} 22' 56.44''$  E and  $16^{\circ} 49' 45''$  N latitude,  $74^{\circ} 18' 22.50''$  E latitude respectively, in the vicinity of Hatkanangle Tashil. These tanks are basically used for drinking water, for domestic purpose and fishery activities by local fisherman communities. These tanks are situated in hilly region. They have only rain water source. These tanks exhibit more fluctuations in its water level and characterized by more anthropogenic activities. The plankton samples were collected from different sites of each tank monthly by using plankton net having mesh size of  $50\mu$ , monthly basis during the year Jan 2009 to Dec. 2010. The 100 liter water sample was filtered through the plankton net in 100ml sampling bottle attached to the plankton net. The collected plankton sample was preserved in 4% formalin. The qualitative and quantitative analysis of Zooplankton was carried out in the laboratory with the help of Sedgwick- Rafter cell counting chamber. The samples were kept for setting for a period of 48 hrs. The zooplankton were identified as described by Needam and Needam (1962), Adoni et al. (1968), Michael (1984), Tonapi (1980), Trivedy and Goel (1984).The identified zooplanktons were also presented in percent composition and population dynamics. The results were expressed as organism/l for zooplankton. The zooplanktons were identified up to species level.

## 3.RESULTS AND DISCUSSION

Monthly variations in zooplanktons (org/l) of water samples of three tanks are presented. The numerical density of zooplankton was fluctuated from 61 to 757 organisms/ l at Tamdalge tank. It was recorded from 58 to 894 organisms/l at Laxmiwadi tank and from 110 to 1075 organisms/l at Vadgaon tank. The maximum density of zooplanktons was recorded in the month of March and minimum in September at

Tamdalge tank. It was noticed as high in the month of November and low in July at Laxmiwadi tank, whereas it was maximum in the month of December and minimum in July at Vadgaon tank. The seasonal variations in zooplanktons were recorded as maximum in winter and minimum in monsoon season in all these tanks. Comparatively, maximum density was recorded in winter and minimum in monsoon season in all these tanks respectively. Monthly variations in population density of zooplanktons (organisms/l) are presented. The zooplanktons from four major groups such as Rotifera, Cladocera, Copepoda and Ostracoda were identified. Among these group 27 species from 3 orders and 2 families were identified and recorded from Tamdalge, Laxmiwadi and Vadgaon tanks. Among Copepoda 10 species belonging to order Eucopepoda were identified and recorded. These are *Mesocyclops hyalinus*, *Paracyclops strigilipes*, *Neodiantomus fimbriatus*, *Rhinediaptomus indicus*, *Diantomus copepod*, *Calanoid copepods Eucyclopoid species*, *Cyclopoid copepod*, whereas Cladocerans are represented by *Monia macrocopa*, *M. rectirostris*, *M. brachiatastris*, *Daphnia pulex*, *Euryalona orientalis*, *Diaphanosoma sarsi*, *D. excisum*, *Macrothrix laticornis*. The Ostracodas are represented by *Spirocypris*, *Hyocypris gibba*, *Hemicypris fossulate*, *Stenocypris* from the plankton samples of these tanks. The Rotifera species like *Branchionus angularis*, *B. cadatus*, *B. falcatus*, *B. calyciflorus*, *B. vulgaris* were observed as common forms throughout the investigation period while *B. rubens* and *Keratella tropica* were recorded infrequently in the plankton samples of these tanks. Monthly variations in percent composition of zooplankton at Tamdalge, Laxmiwadi and Vadgaon tanks are recorded.

### **Rotifera:**

In Tamdalge tank, the rotifer population showed optimum population in the month of September (45.08%), with its higher composition in July (39.60%) respectively. About 6 species from rotifera were identified, among these *Branchionus angularis* was most common forms observed at Tamdalge tank, while *B. caudatus*, *B. falcatus*, *B. calyciflorus* and *B. vulgaris* were restricted to winter and summer season. Maximum density of *B. falcatus* and *B. calyciflorus* were observed in winter season and moderate in summer as compared to other species of Rotifera during the year 2009 and 2010. In Laxmiwadi tank, the Rotifera group represented distinct peak in the month of July (65.08%), with its maximum density in June (58.64%). Among Rotifera *B. angularis*, *B. caudatus*, *B. falcatus*, *B. calyciflorus* and *B. vulgaris* were most commonly observed in winter and summer season. Comparatively *B. angularis*, *B. falcatus*, *B. calyciflorus* were dominant to other species such as *B. caudatus* and *B. vulgaris* during the year 2009 and 2010. In Vadgaon tank, the Rotifera population showed distinct peak in the month of October (58.89 %) with its maximum composition in July (39.60 %). Among these *B. angularis*, *B. caudatus*, *B. fulcatus*,

*B. calyciflorus* and *B. vulgaris* were most common forms. The *B. rubens* and *Kertella tropica* was observed with minimum population density. *B. angularis*, *B. caudatus*, *B. fulcatus*, comprises maximum population density as compared to other species of Rotifera at Vadgaon tank, whereas their absence was noted in the month of June. The occurrence of various forms of rotifera such as *B. angularis*, *B. caudatus*, *B. fulcatus*, *B. calyciflorus* and *B. vulgaris* and *Keratella tropica* was recorded in Vadgaon tank.

### **Copepoda:**

The maximum percent composition of Copepoda was recorded in the month of May (51.15%), with their higher density in April and June (54.84 %) and minimum percentage in October (10.35 %) at Tamdolge tank. In Laxmiwadi tank, the high percentage of copepod was observed in the month of April (44.51 %) with their high density in March (42.50 %) whereas its low percentage in August (29.02 %). In Vadgaon tank, the copepod population was recorded distinct peak in the month of September (21.96%) with their maximum density in January (20.90%) while minimum in the month of June (10.75 %). The copepod species such as *Cyclopid copepod*, *Calanoid copepod*, *Eucyclop species*, *Mesocyclops*, *Neodiaptomus*, *Paracyclops*, *Diaptomus copepod* etc were recorded. Among these copepod, most dominant species are *Calanoid copepod*, *Mesocyclops*, *Rhinediaptomus Spp.*, *Paracyclops*, *Diaptomus copepod*, *Cyclopid copepod*, observed in the winter and summer seasons, whereas their absence was noted in the month of September. **Cladocera:** Maximum percentage of Cladocera was recorded in the month of September (67.47%) and minimum in June (2.89%) at Tamdolge tank. It was recorded maximum in July (41.60%) and minimum in the month of June (25.38%), with their absence also noticed in the month of August at Laxmiwadi tank, whereas Cladocera was observed maximum in the month of July (97.64%) and minimum in October (11.95%) in Vadgaon tank. Comparatively Cladocera was observed in most of the months of study period at Tamdolge and Vadgaon tanks than the Laxmiwadi tank.

### **Ostracoda:**

In Tamdolge tank, Ostracoda was recorded maximum during June (27.88 %) and minimum in April (14.06 %) in summer season. Whereas, their absence was observed in the month of September. In Laxmiwadi tank, the maximum percentage of Ostracoda was recorded in the month of August (74.79 %) with their minimum appearance in the month of February (9.79 %), whereas Ostracoda were absent in the month of June and July. In Vadgaon tank, the maximum percentage of Ostracoda was recorded in June (55.77 %) and minimum in November (17.31 %) with their absence from July to September. The Ostracoda group represented by *Hemicypris fossulate*.

The order of dominance of various groups of zooplanktons were represented as-

In Tamdolge tank – Copepoda (40.15%) > Rotifera (29.15%) > Cladocera (22.50%) > Ostracoda (8.70%).

In Laxmiwadi tank Copepoda (48.55%) > Rotifera (21.35%) > Cladocera (20.65%) > Ostracoda (9.74%)

In Vadgaon tank Rotifera (41.33%) > Cladocera (35.49%) > Ostracoda (18.75%) > Copepoda (9.41%)

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