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# Impact of Physico-Chemical and Biological Parameters on Zooplankton Composition and Abundance in Freshwater Lake of Mulukanoor Karimnagar District, Telangana

**V. Rajani**
Department of Zoology, Kakatiya University, Warangal, Telangana State, India

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ABSTRACT

The plankton constitutes the basic food sources of any aquatic ecosystem, which Supports fish and other aquatic animals. Zooplankton diversity is one of the most important ecological parameters in water quality assessment. Zooplankton is good indicator of the changes in water quality because they are strongly affected by environmental conditions and respond quickly to changes in water quality. In the present paper, Zooplankton diversity in relation to physico-chemical parameters of the Mulukanoor Lake located in Krimnagar District, Telangana state.The study was carried out for a period of one year from June 2015 to May 2016 to evaluate the relationship and influence between different water quality parameters and the abundance of zooplankton population. The physico-chemical parameters includes Temperature, Electrical Conductivity, Total Dissolved Solids, Water Transparency, PH, Dissolved Oxygen.Free $Co_2$, Total Alkalinity, Total Hardness, Chloride, Biological Oxygen Demand, Phosphate, Nitrate and Ammonia were analyzed. All the values of these parameters were found within the prescribed standard limits. Therefore this lake has rich number of species biodiversity of aquatic animals. Four different groups of zooplankton were identified in this study which includes Rotifera, Cladocera, Copepoda and Ostracoda. Zooplankton diversity and abundance refers to variety within in the community. Numerically rotifers were dominant group throughout the study period. The season wise zooplankton analysis showed a maximum average abundance of species in Post-Monsoon season, minimum abundance in monsoon season due to the different environmental and inflow characteristics of the water body. The composition of zooplankton rotifers was dominant Rotifera(56%) followed by cladocera (23%), copepod (13%) and ostracoda (8%).Therefore it can be now concluded that this lake is highly potential to take up commercial fisheries.

**Keyword:** Zooplankton diversity, Physico-Chemical parameters, Mulukanoor Fresh Water Lake.

## I. INTRODUCTION

The water is the universal solvent occupies the first place in the priority list of the life on the planet, the earth. The water is said as the liquid of life and it is the essence of all living processes. A healthy aquatic environment is largely governed by its physico-chemical characteristics and its stability. Biological production in any aquatic body is directly correlated with its physico-chemical status (Sharma et. al., 2013). The physical and chemical properties of freshwater bodies are characterized by the climatic, geochemical, geomorphological and pollution, it is very important to study the physico-chemical factors influencing the biological productivity in the water bodies (Sahni and Yadav, 2012).The quality of water affects the species composition, abundance, productivity and physiological conditions especially, the indigenous population of aquatic organisms.(Wetzel,2001). The alteration in physico-chemical parameters leading to eutrophication has become a widely recognized the problem of water quality deterioration. In recent years increase in human population, demand for food, land degradation of many freshwater resources. (Ray et al.,2000). Eutrophication is a global phenomenon associated with nutrient enrichment of aquatic ecosystem. Several studies have been made so far to understand the physico-chemical properties of lakes, ponds, and reservoirs in India. (Jain et al.,1996, Mohanraj et al.,2000, Thorat and Masarrat 2000).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 such as fish. Nearly all fish depend on zooplankton for food during their larval phases, and some fish continue to eat zooplankton for their entire lives (Madin *et al.,* 2001). Zooplankton forms a major link in the energy transfer at secondary level in aquatic food webs between autotrophs and heterotrophs (Deivanai *et al*., 2004). The distribution and diversity of zooplankton in aquatic ecosystem depends mainly on the physico-chemical properties of water (Harikrishnan and Abdul Azis, 1989).Moreover, zooplankton communities are sensitive to anthropogenic impacts and their study may be useful in the prediction of long-term changes in lake ecosystems, as these communities are highly sensitive to environment fluctuations (Ferrara *et al.,* 2002; Kehayias *et al.,* 2014) . Changes in zooplankton abundance, species diversity and community composition can indicate the change or disturbance of the environment; it has been reported by several studies that zooplankton can serve as an indicator of changes in trophic dynamics and the ecological state of lakes related to changes in nutrient loading and climate(Kehayias *et al*., 2014). The filtering capacity of zooplankton has significant implications for the eutrophic state of a lake. Zooplankton community structure (species density and species composition) is potentially affected by both “natural” lake water chemistry and lake morphology, and anthropogenic changes in lakes and watersheds (An *et al.,* 2012; Dodson *et al.,* 2000). A change in the physico-chemical condition sin aquatic systems brings a corresponding change in the relative composition and abundance of organisms thriving in the water; therefore, they can be used as a tool in monitoring aquatic ecosystems; zooplankton have been considered as ecological importance organisms (Jose *et al.,* 2015).

### 1.1. Study area:

An important fresh water lake in Karimnagar District has been identified to assess its water quality. This lake is located at Mulukanoor. The objective of the study is to take up fish culture in this lake. Weir and Sluice are present in this lake. This lake shows good diversity of Icthyofauna along with other fauna.

**Fig-1 :** Overall View of Mulukanoor Cheruvu

## II. MATERIALS & METHOD

### 2.1. Collection of Sample:

The lake survey was carried out from June, 2015 to May; 2016.The water samples were collected during morning hours of the day usually in the first week of every month. The data was articulated seasonally as Monsoon Season(June-September);Post-Monsoon Season(October-January);Pre-Monsoon Season(February-May).Prior to sample collection, all the sampling bottles were thoroughly washed, sun-dried and rinsed with the same water to be collected in the lake. The sampling bottles were labeled with dates and collection sites and they were kept in a cool container maintaining temperature below 25°C till the analysis completed. For the analysis of chemical parameters the water samples were collected in plastic cans and brought to the laboratory, physico-chemical parameters were analyzed as the procedure given in APHA (2005);Kodarkar(1992);Bhalerao(1998).

### 2.2. Plankton analysis:

Plankton is the microscopic vegetation (Phytoplankton) and animals (zooplankton) in and around the euphotic zone in an aquatic atmosphere. Biological methods used for the plankton evaluation are pattern collection, maintenance, counting and identification of the aquatic organisms and processing and interpretation of biological information.

### 2.3. Collection of Plankton:

During the period of investigation monthly samples were collected by a plankton net made of silk bolting cloth silk no. 25 (Mesh size 56 µm). Water sample (50 liter) was filtered through the net from littoral and open water zones and carefully transferred to 50 ml bottle and preserved in 4% formalin. Preserved samples were examined under a binocular microscope with different magnification. Quantitative analysis was done on a Sedgwick Rafter Counter cell by taking 1 ml sample.Taxonomic identification was carried out with the help of standard literature by Michael (1986); Kodarkar (1992) and Dhanapathi(2000).

## III. RESULT & DISCUSSION

### 3.1. Physico-Chemical Parameters:

This detailed investigation enabled a comprehensive and systematic analysis on the seasonal physico-chemical and biological characteristics of this fresh water lake in Karimnagar district in three different seasons such as Monsoon Season, post monsoon Season and Pre-Monsoon season in one year and compared the results. The analytical data of the water samples were presented in Tables. During the study, physic-chemical and biological parameters of Mulukanoor Lake in Karimnagar District, Telangana. The study has been conducted for a period of one year from June 2015 to May 2016.The data on the physic-chemical parameters of Mulukanoor Lake presented (Table No-1).Temperature is an important factor of the environment. Water temperature is of enormous significance as it regulates various a biotic characteristics and activities of an aquatic ecosystem (Hutchinson, 1957). Electrical conductivity is the potential of substance to conduct electrical modern that is because of the presence of diverse ionic materials. Conductivity of water is an index of electrolyte content material of water and that's due to ionization of dissolved inorganic salts. It is an indicator of ionic composition and any alteration in its values reflect exchange in ionic awareness in a proportional way. In the present study the Electrical Conductivity maximum value 0.32(µmhos/cm) were recorded during Pre-monsoon season while;

minimum Electrical Conductivity value 0.15(µmhos/cm) were recorded during monsoon season. Similar observations are according to Kulkarni*et al.,* (2005) reported the highest values of conductivity during Pre monsoon Season in Bhatye estuary; Devika *et al.,* (2006);Mishra*etal.,*(2007).Total dissolved solids (TDS) is an important parameterin determining the water qu ality standards, and it accountsfor the various types of solids in dissolved form which maybe organic or inorg anic (Jayakumar etlal. 2009). In the present study the maximum TDS value 202.75mg/l were recorded during Pre-monsoon season while; minimum TDS value 159.75mg/l were recorded during monsoon season. Similar observations are according to Narayan et,

al. 2007; Jacklin Jemi and Regini Balasingh 2011.The Transparency of natural water is an indicator of productivity. During the present investigation the Transparency of water was found suitable for both irrigation and fish culture. In the present study the water transparency maximum value 65.75cm were recorded during Pre-monsoon season while; minimum water transparency value 31.62cm were recorded during monsoon season. Ramadevi (2007) reported that the Transparency of water was low in rainy and high in winter season.Mane and Pawar (2007) stated that Transparency refers to the clarity of water and it limits the growth of organisms thus more transparency more rate of penetration of sunlight.The Ph of the water body showed alkaline in nature ie. 7.4 to 8.5. This range is good for growth of aquatic organisms (Lendhe and Yeragi, 2004).Dissolved Oxygen (DO) content of the water body is an important parameter to be determined since the existence of aquatic life and is intimately linked with the availability of oxygen for their survival. The distribution of oxygen is a net result of consumption for oxidation of organic matter and replace from the atmosphere. All organisms require oxygen for the maintenance of life. The short and long term variation in the dissolved oxygen concentration in lakes, reservoirs and streams gets a good leisure of their trophic state (Goldman, 1979). In the present study the maximum DO value 9.35(mg/l) were recorded during monsoon season while; minimum DO value 4.05(mg/l) were recorded during Pre-monsoon season.In the present study maximum Free $Co_2$ value 5.85 mg/l were recorded during Pre-Monsoon season, while the minimum Free $Co_2$ value 2.28mg/l were recorded during Post-monsoon season. Similar observations are according to Bandela *et al.,* (1998); Datta and Bhagabati (2007);Telkhade *et al.,* (2008).Alkalinity is a capacity of water which helps to neutralize a strong acid (Shinde etlal. 2011).In the present study maximum TA value 174.50mg/l were recorded during Post-monsoon season while, the minimum TA value 105.25 mg/l were recorded during monsoon season. Similar observations are according to Moyle (1946).The Total Hardness of water is mainly due to the presence of various salts of calcium and magnesium. The salts contribute to the Total hardness of freshwater. In the present study maximum total hardness value 139.25mg/l value were recorded during Pre-monsoon season while the minimum total hardness value 78.75mg/l value were recorded during Post-monsoon season. Similar observations are according to Pailwan (2005).Chloride is considered to be a crucial aspect as it is one of the crucial ions in assessing the popularity of herbal water our bodies (Hutchinson, 1957).In the present study highest chloride value was 61.16mg/l in the month of May, while the lowest chloride value was 20.70mg/l in the month of August. In the present study the Chloride (mg/lit) was recorded maximum during Pre-monsoon season and minimum in monsoon season. Chloride contents in water our bodies were stated by many workers like Kedar et al.,(2007),Piska et al.,(2000),Ganapati (1962), Unni(1982).

BOD determination is used for assessing the organic p ollution (Barai and Kumar 2013) and also used for the measurement of the amount of organic materials of an aquatic system supporting the growth of microorgani sms (Keramat 2008).In the present study maximum

BOD value 11.60mg/ were recorded during Post-monsoon season while, the minimum BOD value 4.42mg/l were recorded during Pr-monsoon season. Similar observations are according to Tiwari *et al.,* (1988); Mishra *et al.,*(1999);Narasimha Ramulu and Benarjee (2011).In the present study maximum phosphate value 2.41mg/l were recorded during monsoon season, while the minimum phosphate value 1.50mg/l were recorded during Post-monsoon season.In the present study maximum nitrate value 0.50mg/l were recorded during monsoon season while, the minimum nitrate value 0.18mg/l were recorded during Pre-monsoon season.Ammonia is introduced into the pond through dead phytoplankton, left over feed, lifeless and decayed organic matter. Ammonia is a toxic compound that may adversely have an effect on fish fitness.

**Table No-1: Monthly Variation of Physico-Chemical parameters at Mulukanoor Lake during the Year from June 2015 to May 2016**

| Month | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TEM | 28.35 | 27.32 | 28.17 | 27.87 | 26.47 | 25.42 | 24.47 | 23.50 | 26.55 | 27.47 | 28.62 | 29.60 |
| EC | 0.17 | 0.23 | 0.18 | 0.15 | 0.22 | 0.26 | 0.22 | 0.25 | 0.23 | 0.27 | 0.32 | 0.28 |
| TDS | 174.25 | 166.00 | 159.75 | 176.75 | 185.50 | 173.00 | 181.75 | 188.50 | 191.50 | 194.00 | 198.25 | 202.75 |
| TRS | 38.12 | 34.75 | 31.62 | 36.12 | 45.25 | 42.62 | 44.75 | 47.87 | 58.12 | 65.75 | 54.87 | 52.87 |
| PH | 7.45 | 7.35 | 7.32 | 7.55 | 7.40 | 7.27 | 7.42 | 7.37 | 7.25 | 7.12 | 7.52 | 7.20 |
| DO | 8.15 | 9.35 | 8.58 | 7.29 | 5.49 | 5.68 | 5.63 | 6.05 | 5.08 | 4.07 | 5.12 | 4.05 |
| $Co_2$ | 5.65 | 5.50 | 5.27 | 5.21 | 3.58 | 3.27 | 2.28 | 2.58 | 5.17 | 5.77 | 5.80 | 5.85 |
| TA | 107.50 | 127.50 | 115.75 | 105.25 | 149.25 | 157.25 | 163.75 | 174.50 | 144.25 | 153.50 | 156.25 | 137.50 |
| TH | 95.75 | 105.00 | 95.00 | 89.00 | 86.50 | 87.50 | 78.75 | 85.00 | 108.25 | 115.00 | 127.75 | 139.25 |
| CL | 25.75 | 23.60 | 20.70 | 22.93 | 27.12 | 29.93 | 31.36 | 33.28 | 54.93 | 44.77 | 54.53 | 61.16 |
| BOD | 5.47 | 6.45 | 4.57 | 7.47 | 8.55 | 9.50 | 10.47 | 11.60 | 4.42 | 5.55 | 4.50 | 4.42 |
| $Po_4$ | 2.13 | 2.30 | 2.41 | 2.28 | 2.37 | 2.16 | 1.60 | 1.50 | 1.59 | 1.68 | 1.80 | 2.22 |
| $No_3$ | 0.39 | 0.45 | 0.50 | 0.48 | 0.41 | 0.38 | 0.34 | 0.28 | 0.18 | 0.27 | 0.33 | 0.36 |
| $NH_4$ | 1.15 | 1.14 | 1.17 | 1.22 | 1.27 | 0.82 | 0.73 | 0.70 | 0.59 | 0.77 | 0.85 | 0.82 |

### 3.2. Zooplankton:

Zooplankton is a necessary part of sea-going biological community and contains minute creature lives that actively buoys or swim uninhibitedly. Zooplanktons are the littlest metazoans in all water bodies, extending in size from about 0.05 to 10mm.They give nourishment to numerous flavors of fish and are in this manner, crucial job in the sustenance web of lakes. Zooplanktons form a major link in the energy transfer at secondary level in aquatic food webs between autotrophies and heterotrophy (Deivanai et al., 2004).Zooplanktons provide the main food for fish and can be used as indicators of the tropic status of a water body. Zooplanktons have long been used as indicators of the eutrophication (Weber et al 2005).

In the present investigation, 24 species of zooplankton were recorded and which belongs to four groups, i.e. Rotifrea, Cladocera, Copepoda and Ostracoda. Among the all, 12 species were belongs to rotifer, 6 species were belongs to cladocera,4 species were belongs to copepod and 2 species were belongs to ostracoda.

In the present study, among the various groups of zooplankton, the most dominant one was rotifers representing 50% of the zooplankton. Literature reveals that many workers have also reported rotifers to be the dominant group of zooplankton in freshwater systems (Gilbert and Bogdan, 1984; Jayanthi, 1994; Sivakami, 1996; Ezhili *et al*., 2013). This is attributed to the less specialised feeding, pathenogenetic reproduction and high fecundity (Sampio *et al*., 2002). Further, Gannan and Stemberger (1978) reported that rotifers respond more quickly to environmental changes while Sladecek (1983) considered rotifers as bioindicators of water quality.Sendacz (1984) observed high rotifer density to be a characteristic of eutrophic lakes. Nevertheless,Goldman and Horne (1983) reported that almost all fish, even large predators like pike and lake trout feed on rotifers during their early development. On the other hand, Sharma (1991) observed that *Brachionus* is particularly more suitable for feeding fish larvae. Thus, the present aquatic system which registered *Brachionus* in large numbers is specifically suited for aquaculture as *Brachionis* can be used as a livefeed organism decreasing the cost of aquaculture in addition to providing a healthy diet for fish larvae. In the present study 12 species of rotifer have been identified in Mulukanoor Lake. *Brachionus caudatus, Brachionus angularis, Brachionus diversicornis, Brachionus calciflorus,Brachionus falcatus,Aspalancha brightwelli, Keratella tropica and Keratella colchlerias* were more dominant among the rotiferans(Table No-2). High population was observed during Post Monsoon season followed by Pre Monsoon season and lowest populations observed during Monsoon season.Cladocerans are commonly called water fleas. In the present study 6 species to Cladocera has been identified in Mulukanoor Lake. *Ceriodaphnia carunata, Daphnia carinata, M.brachiata* was more dominant among the Cladocerans(Table No-3). During the present study period the highest cladocera population was observed during post-monsoon season while the lowest cladocera population was observed during monsoon season.Copepods are considered as an important food item for various kinds of fish and play a key role in the energy transformation at different trophic levels (Rajendran, 1973;Goswami and Singbal,1977). In the present study 4 species to Copepoda has been identified in Mulukanoor Lake *Nauphlius larva, Mesocyclops leukarti. Mesocyclops hyalimus* were more dominant among the Copepodes(Table No-4). During the present study period the highest copepoda population was observed during post-monsoon season while the lowest copepoda population was observed during monsoon season.In the present study 2 species to Ostracoda has been identified in Mulukanoor Lake. *cypris sps* were more dominant among the Ostracodes(TableNo-5). High population was observed during Post Monsoon season followed by Pre Monsoon season and lowest population observed during Monsoon season.

## IV. CONCLUSION

Present study it may be concluded that the lake ecosystem is suitable for fish Culture.This Lake and the study reveals that all the physico-chemical parameters are at nearly permissible limit at all four stations in this lake. This lake has shown rich biodiversity ofaquatic fauna. Therefore, it is suggested that the immediate measures are necessary to be initiated to avoid this is indicating that the selected lake is not polluted and rich diversity of planktons. As this lake is a good productive this indicates suitability for raising sustainable crop of planktivorus fishes and in addition to sources of drinking water.

Table No-2: Shows Monthly Variation of Rotifera of Mulukanoor Lake during the Year from June-2015 to May 2016

| Sl. No | Name of the species | Monsoon | | | Post monsoon | | | | | Pre monsoon | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Tot |
| 1 | *Aspalancha brightwelli* | 6 | 4 | 3 | 4 | 10 | 8 | 7 | 9 | 7 | 6 | 4 | 5 | 73 |
| 2 | *Brachionus angularis* | 7 | 7 | 6 | 8 | 7 | 10 | 9 | 12 | 9 | 7 | 10 | 6 | 98 |
| 3 | *Brachionus caudatus* | 10 | 4 | 8 | 9 | 10 | 16 | 12 | 17 | 14 | 10 | 8 | 5 | 123 |
| 4 | *Brachionus calciflorus* | 4 | 8 | 7 | 2 | 8 | 6 | 7 | 8 | 7 | 9 | 4 | 8 | 78 |
| 5 | *Brachionusdiversicornis* | 5 | 6 | 5 | 4 | 6 | 12 | 7 | 8 | 8 | 9 | 9 | 3 | 82 |
| 6 | *Brachionus falcatus* | 10 | 5 | 1 | 3 | 6 | 4 | 6 | 3 | 9 | 6 | 10 | 12 | 75 |
| 7 | *Fillina longisepta* | 2 | 1 | 2 | 3 | 8 | 6 | 4 | 7 | 4 | 8 | 6 | 5 | 56 |
| 8 | *Keratella tropica* | 3 | 2 | 4 | 5 | 9 | 10 | 7 | 11 | 3 | 5 | 6 | 4 | 69 |
| 9 | *Keratella cochlearias* | 6 | 4 | 3 | 4 | 8 | 4 | 7 | 9 | 7 | 6 | 4 | 5 | 67 |
| 10 | *Lechane lunaris* | 4 | 6 | 0 | 7 | 6 | 8 | 6 | 5 | 5 | 7 | 5 | 6 | 65 |
| 11 | *Lecane monostyla* | 3 | 5 | 2 | 5 | 7 | 7 | 8 | 6 | 5 | 7 | 2 | 4 | 61 |
| 12 | *Testudinella patina* | 2 | 3 | 7 | 4 | 5 | 5 | 3 | 5 | 0 | 5 | 2 | 4 | 45 |
| | TOTAL | 62 | 55 | 48 | 58 | 90 | 96 | 83 | 100 | 78 | 85 | 70 | 67 | 892 |

Table No-3: Shows Monthly Variation of Cladocera of Mulukanoor Lake during the Year from June-2015 to May 2016

| Sl. No | Name of the species | Monsoon | | | Post monsoon | | | | | Pre monsoon | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Tot |
| 1 | *Alonlla sps* | 3 | 2 | 4 | 5 | 5 | 2 | 0 | 7 | 4 | 3 | 3 | 5 | 43 |
| 2 | *Bosminalongirostris* | 3 | 0 | 4 | 5 | 5 | 2 | 0 | 7 | 4 | 3 | 3 | 5 | 41 |
| 3 | *Ceriodaphniacarnuata* | 5 | 6 | 8 | 2 | 7 | 9 | 10 | 7 | 7 | 6 | 6 | 7 | 80 |
| 4 | *Daphnia carinata* | 5 | 4 | 1 | 6 | 10 | 11 | 9 | 10 | 6 | 5 | 5 | 6 | 78 |
| 5 | *Moina brachiata* | 2 | 6 | 4 | 5 | 8 | 9 | 12 | 10 | 5 | 4 | 4 | 6 | 75 |
| 6 | *M. macropa* | 3 | 0 | 3 | 2 | 6 | 4 | 2 | 11 | 5 | 3 | 3 | 4 | 46 |
| | TOTAL | 22 | 16 | 26 | 20 | 44 | 36 | 33 | 50 | 30 | 27 | 21 | 38 | 363 |

Table No-4: Shows Monthly Variation of Copepoda of Mulukanoor Lake during the Year from June-2015 to May 2016

| Sl. No | Name of the species | Monsoon | | | Post monsoon | | | | | Pre monsoon | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Tot |
| 1 | *Diaptomus sp* | 0 | 1 | 1 | 2 | 2 | 10 | 6 | 2 | 4 | 0 | 4 | 0 | 32 |
| 2 | *Mesocyclopshyalimus* | 3 | 0 | 0 | 1 | 1 | 4 | 1 | 5 | 6 | 4 | 4 | 4 | 33 |
| 3 | *M.leukarti* | 2 | 2 | 5 | 3 | 6 | 3 | 7 | 3 | 0 | 2 | 5 | 6 | 44 |
| 4 | *Nauphlius larva* | 7 | 8 | 0 | 6 | 7 | 10 | 9 | 10 | 8 | 9 | 7 | 12 | 93 |
| | TOTAL | 12 | 11 | 6 | 12 | 16 | 27 | 23 | 20 | 18 | 15 | 20 | 22 | 202 |

Table No-5: Shows Monthly Variation of Ostracoda of Mulukanoor Lake during the Year from June-2015 to May 2016

| Sl. No | Name of the species | Monsoon | | | | Post monsoon | | | | Pre monsoon | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Tot |
| 1 | *cypris sps* | 0 | 8 | 10 | 9 | 8 | 6 | 7 | 5 | 4 | 5 | 5 | 6 | 73 |
| 2 | *Steno cypris sps* | 8 | 4 | 9 | 5 | 7 | 3 | 5 | 7 | 3 | 4 | 0 | 4 | 59 |
| | TOTAL | 8 | 12 | 19 | 14 | 15 | 9 | 12 | 12 | 7 | 9 | 5 | 10 | 132 |

Fig No-2: Shows Monthly Variation of Zooplankton population during the Year from June-2015 to May 2016 of Mulukanoor Lake

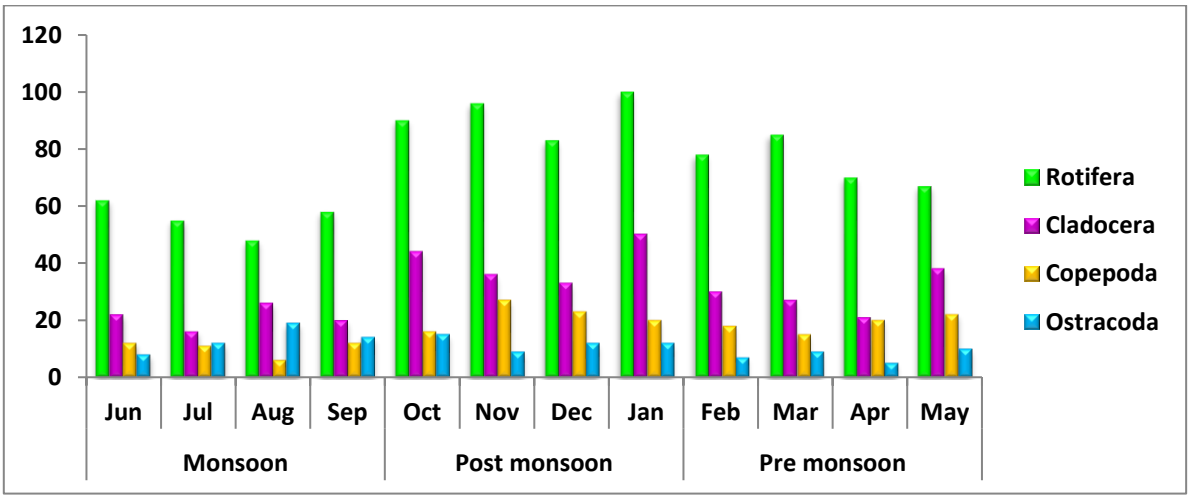
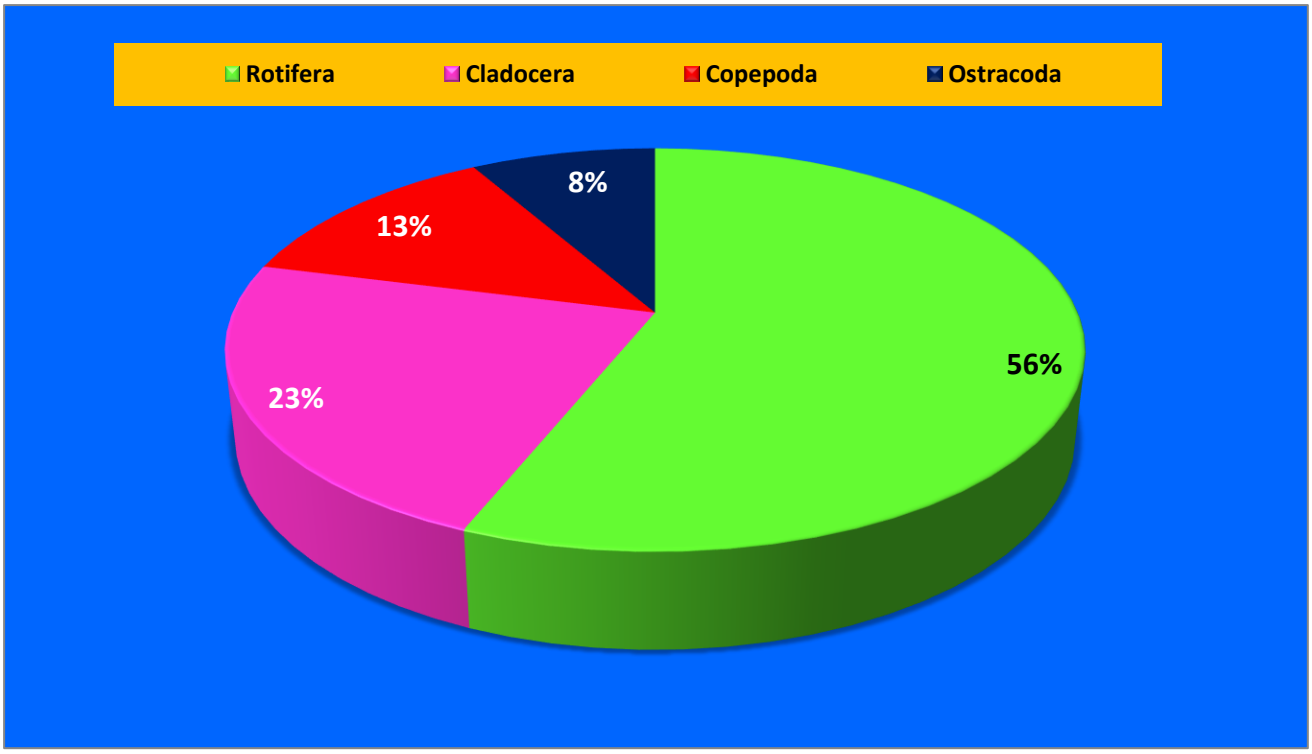



Table No-6: Monthly and Seasonal Variation of Zooplankton (Group Wise) Population in Mulukanoor Lake during the Year 2015-2016

| Sl. No | Name of the Group | Monsoon | | | | Post monsoon | | | | Pre monsoon | | | | Min | Max |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | | |
| 1 | Rotifera | 62 | 55 | 48 | 58 | 90 | 96 | 83 | 100 | 78 | 85 | 70 | 67 | 48 | 100 |
| 2 | Cladocera | 22 | 16 | 26 | 20 | 44 | 36 | 33 | 50 | 30 | 27 | 21 | 38 | 16 | 50 |
| 3 | Copepoda | 12 | 11 | 6 | 12 | 16 | 27 | 23 | 20 | 18 | 15 | 20 | 22 | 6 | 27 |
| 4 | Ostracoda | 8 | 12 | 19 | 14 | 15 | 9 | 12 | 12 | 7 | 9 | 5 | 10 | 5 | 19 |
| | Total | 104 | 94 | 99 | 104 | 165 | 168 | 151 | 182 | 133 | 136 | 116 | 137 | 75 | 196 |
| | Seasonal Wise Total | 401 | | | | 666 | | | | 522 | | | | 75 | 196 |

Fig No-3: Showing Group wise Distribution of Zooplankton population in Mulukanoor Lake during year June, 2015 to May, 2016

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