QUANTITATIVE ANALYSIS OF ZOOPLANKTON COMMUNITY IN KHADKPURNA RESERVOIR, DEULGAON RAJA, DIST. BULDHANA, (M. S.), INDIA

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Abstract
The zooplankton community in Khadkpurna reservoir is comprised of rotifer, Cladocera, Copepoda and Ostracoda. Total 34 species and 29 genera of zooplankton obtained in this study, out of that number of species rotifer are 18, Cladocera 8, Copepods 5 and 3 Otracodes are found during study period.

Introduction:

Zooplankton are small animals that float freely in the water column of lakes and oceans and whose distribution is primarily determined by water currents and mixing. The zooplankton community of most lakes ranges in size from a few tens of microns (Protozoa) to >2 mm (macrozooplankton). In terms of biomass and productivity, the dominant groups of zooplankton in most lakes are Crustacea and Rotifera and these protocols emphasize those groups. Zooplankton play a pivotal role in aquatic food webs because they are important food for fish and invertebrate predators and they graze heavily on algae, bacteria, protozoa, and other invertebrates. Zooplankton communities are typically diverse (>20 species) and occur in almost all lakes and ponds. Zooplankton are rarely important in rivers and streams because they cannot maintain positive net growth rates in the face of downstream losses.

Material and Methods:

Estimation of zooplankton density was made by counting 1ml sub-sample of the well mixed standard sample in a Sedwick Rafter counting chamber, the counts were converted to number of organism per liter of water.

Results and Discussion:

Rotifer:

Rotifers in general quantitatively found from 0.67 ±0.5164 to 10.83 ± 1.3292 in 2021 and 0.5 ± 0.8367 to 9.33 ±2.3381. The comparative study by taking 't' test was ranged from 0.368 to 2.19. In rotifer total 6 genera are recorded including 18 species. For comparative analysis of Rotifer from all six sampling sites of both years taking 'f' test was 0.769443. Rotifera species were recorded more in winter season than monsoon and summer. Maximum number of rotifer found in the month of Octobers and January in both the years 2021 and 2022 and minimum in may 2021, August 2022, showing **Table no. and Graph no. I**. Rotifers are chiefly fresh water forms and presence of rotifer in abundance is indicate suitable condition for their survival.(Dhanapati,2000) In rotifera species *Keratella sp.* and *Brachionus sp* .were abundant reported by **(Kedar *et al.*, 2008)** in abundance in Rishi Lake,Karnja In various water bodies of Central India (**Kaushik and Sexena 1995)** have also reported genus Brachionus in abundance.Occurance of genus *keratela* with *Brachionus* indicate nutrient rich status of water body. According to (**Goel and Charan 1991)** *K. tropica* and *Brachionus Calyciflorus* are the pollution tolerant species and indicate accumulation of organic matter ,and theses species reported dominant in polluted fresh water lake of Kolhapur. (**Munde *et al.*, 2020)** studied on diversity of zooplanktons and seasonal variation of density in sukhana dam. Shannon and Weaver diversity index during 2021 of Rotifers was 1.788905 while in 2022 it was 1.778936 and Simpsons Diversity index of Rotifers during 2021 was 5.965954, in 2022 it was 5.850722 both index values are significant. Richness and Evenness was estimated by the standard formulae of Pielou showing graph no. 4.24 and 4.25.

Cladocera:

Quantitative analysis of Cladocera was found from 3.5 ± 1.3784 to 6 ± 3.4641 in 2021 and 4.17 ± 1.7224 to 8.17 ± 2.4833 in 2022. Comparative 't' value ranged from 0.2 to 2.487. Cladocera were found more in summer than mansoon and winter. By taking 'f' value from all six sampling sites of both years observed value was 0.530548. Total 8 species of cladocera was found in 5 genera. Number of cladocera were more in April and May, minimum in the month of July in 2012 and 2013, showing **Table no. and Graph no. II. (Gadekar *et al.*, 2014)** also found that Cladocera were minimum in Monsoon but they recorded that maximum cladocera found in winter. In present study due to favorable temperature and availability

of food like suspended detritus, bacteria and nanoplakton the abundancy of Cladocera increases. Similar result recorded by **(Raut *et al.*, 2012)** they found Cladocera dominated in summer season over other zooplankton. In monsoon season the physico-chemical factor like dissolved oxyson, temperature, turbidity, transparency also play an important role to controlling the density and diversity of Cladocera. **(Edmonson,1965 and Baker 1979)**. Among cladocera *Alona sp.* and *Moina* were most abundant. (**Prashanthakumara *et al.*, 2016 and Mukhopadhay *et al.*, 2007)** studied on variation in zooplankton diversity in waters contaminated with composite effluents. Shannon and Weaver diversity index during 2021 of Cladocera was 1.781968 while in 2022 it was 1.787866 and Simpsons Diversity index during 2021 was 5.878163, in 2022 it was 5.954099 both index values are significant. Richness and Evenness was estimated by the standard formulae of Pielou showing graph no. 4.24 and 4.25.

Copepods

Copepods are ranged from 3.33 ± 0.5164 to 10.67 ± 3.266 in 2021 and 4.83 ± 1.169 to 11.67 ± 5.9554 in 2022. The 't' value was 0.186 to 5.966. It shows the fluctuation all over the year but maximum number of copepods were found in January and less number found in April and May in both years. By calculating 'f' test from the all six sampling sites of both years was 0.850941. Copepods are Showing **Table no. and Graph no. III**. Number of Copepods recorded 5 species in 6 genera. Controversial result obtained from (**Pradhan 2014)** that they found dominancy of Copepods in summer month during study period. *Calanoid (diaptomus sp.),Eucyclopes sp., microcyclopes sp.* and Presence of Diatomus and cyclopes also observed by (**Pawar and Pulle 2005)** in Pethwadaj dam Nanded.

The Cladoceranes are primary consumers which feed on algae and fine particlulates thus it influence the energy of food chain and cycling matter in the dentritus. (**Sitare 2013). (Moran *et al.*, 2014)** studied zooplankton diversity of Kaliani river as well as (**Negi *et al.*, 2013, Malhotra 2014 and Mukherjee 2020)** studied on seasonal variations of zooplankton diversity. Shannon and Weaver diversity index during 2021 of Copepoda was 1.78582while in 2022 it was 1.783494 and Simpsons Diversity index during 2021 was 5.930203, in 2022 it was 5.901475 both index values are significant. Richness and Evenness was estimated by the standard formulae of Pielou showing graph no. 4.24 and 4.25.

Ostracodes:

During the first year of analysis Ostracoda was 0.33 ± 0.5 to 1.667 ± 1.033 while in second year it was 0.55 ± 0.5164 to 6.83 ± 1.7224. the 't' value ranged from 0.049 to 6.1. Ostracodes were recorded more in the month 0f April and May and less in August. In ostracodes *Paracondona euplectella* and *Cyclocypris sp*. wereabundant. 'f' value was 0.00319 throughout the study periods from all six sampling sites. Ostracodes are showing **Table no. and Graph no. IV**. The highest density od ostracoda found in summer by (**Sontakke and Mokashe 2014)** in Kagzipura Lake. Water level decreases in summer and metabolic activities of biotic component increases. This result found by them and (**Jayebhaye 2010)** worked on river kayadhu, near Hingoli city, Hingoli district, Maharashtra. perennial tank in Warangal district, A.P. As compared to other zooplankton population Ostrcoda shows minimum population, similar observation are got by (**Lahane and Jaybhaye 2013)** according to them Ostracoda population are less due to the feeding pressure of fishes and Ostracoda are small Crustaceans having bivalve carapace enclosing the laterally compressed body, (**Karanovic 2012).** Shannon and Weaver diversity index during 2021 of Ostracoda was 1.78091 while in 2022 it was 1.795655 and Simpsons Diversity index during 2021 was 5.87216, in 2022 it was 5.460698 both index values are significant. Richness and Evenness was estimated by the standard formulae of **Pielou (1966)** showing graph no. 4.24 and 4.25.

Table I: Comparison of Rotifers in all six sampling sites during 2021-2022.

Rotifer	**2021**		**2022**		**'t'**
Month	**Mean**	**SD**	**Mean**	**SD**	**test**
January	10.83	1.3292	9.33	2.3381	1.366
February	7.17	1.169	6.5	0.8367	1.136
March	1.17	0.4082	1.33	1.0328	0.368
April	1.67	0.5164	2	1.0954	0.674
May	0.67	0.5164	0.5	0.8367	0.415
June	1.67	0.5164	1.5	0.5477	0.542
July	1.67	0.5164	1.5	0.5477	0.542
August	2.67	1.2111	2.17	1.472	0.643
September	2.33	1.0328	1.33	0.8165	1.861
October	7.5	1.2247	5.5	1.8708	2.191
November	6.33	2.8752	6	4.3359	0.157
December	5.67	3.4448	7.33	1.9664	1.029

Graph I: Comparison of Rotifers in all six sampling sites during 2021-2022.

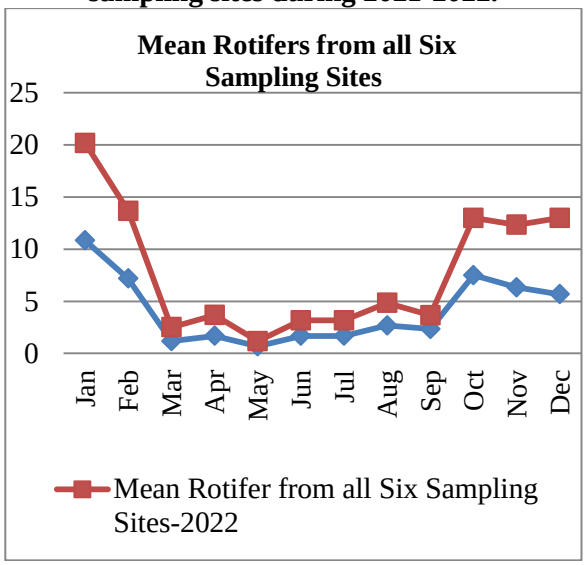


Table II : Comparison of Cladocera in all six sampling sites during 2021-2022.

Cladocera	2021		2022		't'
Month	Mean	SD	Mean	SD	test
January	6	1.4142	5.83	1.472	0.2
February	3.5	1.3784	5.5	1.5166	2.39
March	3.83	1.6021	5.5	1.5166	1.851
April	4.83	1.472	6	1.4142	1.4
May	3.83	1.169	4.17	1.7224	0.392
June	4.33	1.633	5.33	2.0656	0.93
July	5	1.4142	5.5	1.6432	0.565
August	5.17	1.6021	8.17	2.4833	2.487
September	4.33	1.7512	5	1.7889	0.652
October	4.67	3.6697	5.83	0.7528	0.763
November	6	3.4641	4.83	1.7224	0.739
December	4.5	1.0488	6.17	1.472	2.259

Graph II: Comparison of Cladocera in all six sampling sites during 2021-2022.

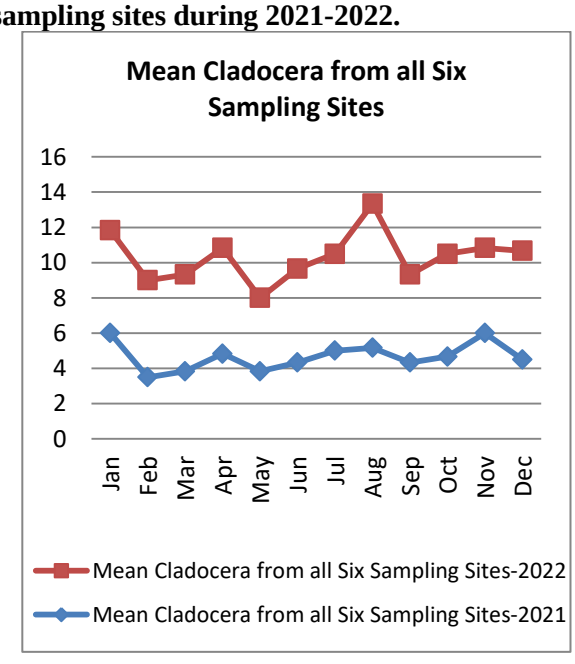


Table III: Comparison of Copepods in all six sampling sites during 2021-2022.

Copepods	2021		2022		't'
Month	Mean	SD	Mean	SD	test
January	3.33	0.5164	4.83	1.169	2.875
February	3.5	0.5477	5.33	0.5164	5.966
March	1.83	0.7528	2.5	1.0488	1.265
April	5	1.7889	6.5	1.0488	1.772
May	4.33	1.3663	6.17	1.472	2.236
June	5.17	0.9832	5.83	1.3292	0.988
July	5.17	1.3292	5.83	1.3292	0.869
August	6.25	1.7078	6	1.0954	0.302
September	5.17	0.7528	6.5	1.2247	2.272
October	10.17	4.0702	10.67	5.164	0.186
November	10.67	3.266	11.67	5.9554	0.361
December	4.67	1.633	6	2.1909	1.195

Graph III: Comparison of Copepods in all six sampling sites during 2021-2022.

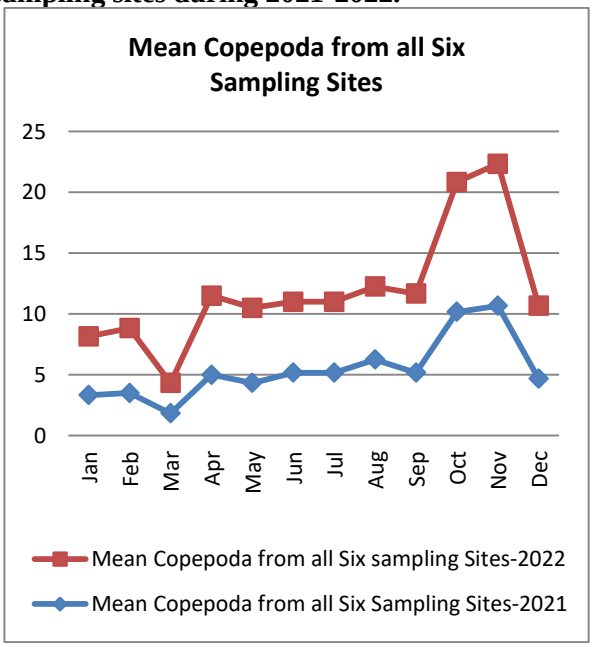
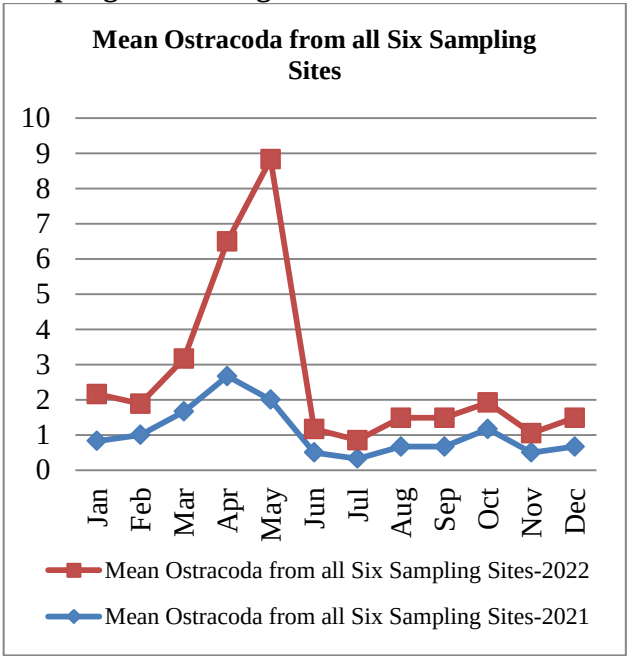


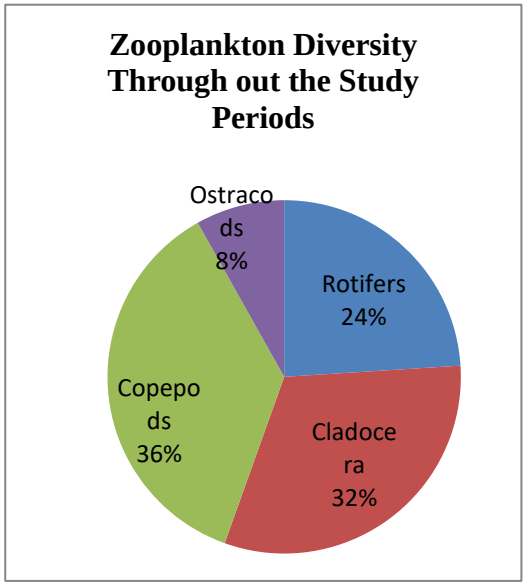
Table IV: Comparison of Ostracoda in all six sampling sites during 2021-2022.

Ostracoda	2021		2022		't'
Month	Mean	SD	Mean	SD	test
January	0.83	0.7528	1.33	0.8165	1.103
February	1	1.1667	0.89	1.3292	0.146
March	1.667	1.033	1.5	1.378	0.238
April	2.67	0.8165	3.83	1.3292	1.831
May	2	0.8944	6.83	1.7224	6.1
June	0.5	0.8367	0.67	0.8165	0.349
July	0.33	0.5	0.52	0.5477	0.605
August	0.67	0.83	0.82	0.9832	0.279
September	0.67	0.5	0.82	0.8367	0.377
October	1.17	0.8333	0.75	1.3292	0.646
November	0.5	2.3333	0.55	0.5164	0.049
December	0.67	1.8333	0.82	1.169	0.169

Graph IV: Comparison of Ostracoda in all six sampling sites during 2021-2022.



Graph V: Mean Average of Zooplankton Diversity throughout study periods 2021-2022



Conclusion:

Planktonic communities of Khadkpurna dam was comprised all four categories of zooplanktons belonging to Rotifers, Cladocera, Copepods and Ostracods. Near about 34 species of zooplanktons was observed from all six different sampling sites. From Which Rotifers are 18 different species was observed from all six sampling sites throughout the study periods. Cladocera observed 08 different species, Copepods are 05 species while th ostracods are 03 species was observed. The dominance of Rotifers was observed, highest number of species was observed during the winter season while lowest was observed during the summer season throughout the study periods. On the some sampling sites the Karetella species was observed, such species is a pollutant indicator species, which accumulate organic matter and it reported dominant in polluted fresh water bodies.

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