

Inconsistency Divergence in Zooplankton Configuration Density at Panchaganga River Near Kolhapur Area, Dist. Kolhapur, M. S.

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Abstract: *The present research paper deals with the study of Inconsistency divergence in Zooplankton Configuration density in Panchaganga River, near Jayanti nala, Dudhali nala, Kumbhar nala, Rajaram Bandhara, and Prayag Chikali areas district Kolhapur M. S. India during the period from June 2024 to May 2025. A total of 25 species were found in the river among these 11 species belong to rotifers, 6 belong to copepods, 5 belong to Cladocera's and 3 species belong to Ostracoda. Numerically rotifers were dominant group throughout the study period This study of season wise zooplankton analysis showed average abundance of species in winter season, lower in monsoon season and maximum occurrence in summer season due to different environmental condition of river water body water. This study of season wise zooplankton analysis showed average abundance of species in winter season, lower in monsoon season and maximum occurrence in summer season due to different environmental condition of river water body water*

Keywords: Panchaganga river –Zooplankton- Configuration density- Inconsistency divergence - kolhapur

I. INTRODUCTION

Information on species diversity richness evenness and dominance species evolution on biological physical and chemical component of the ecosystem is essential to understand detrimental changes in Environment and its ecosystem. Among all the other species the zooplanktons are the free floating and microscopic animal found in aquatic ecosystem. The zooplanktons are important for fishes as they are used as source of food. The Zooplanktons are classified in various groups viz. Cladocera, Copepoda, Rotifer and Ostracoda. Many workers have studied the zooplanktons of fresh water bodies both in India and abroad. The biodiversity of phytoplankton and zooplankton are also rich in nature (Kangasabapathian and Rajan, 2010). Zooplanktons are playing important role in biomonitoring of water pollution (Tylor et al., 2014). The availability of food is more due to decomposition of organic matter and the density of zooplankton might be high due to fewer predators (Shivashankar et al. 2013). The study of zooplankton is necessary to evaluate the fresh water reservoir in respect to their ecological and fishery status (Goswami and Mankodi, 2012). The Zooplanktons community fluctuates according to physicochemical parameter of the environment, especially Rotifer species change with biotic factors (Karuthapandiet al., 2012). The abundance and assemblage composition of zooplanktons are depending upon the dominance of water birds, fish, macro invertebrates and their food preference, (Russell et al., 2006). On the similar line Jafari et. al. (2011) studied the zooplankton diversity and compositions are correlated to the physicochemical environment of the Haraz River. Zooplanktons are heterotrophic in nature which play important role in food web by link primary producers to higher trophic level. The Zooplankton abundance was declined due to connection with redistribution number of individual in a water body less possibilities to stay in eutrophic zone where photosynthesis occurs (Dhembare, 2011). Zooplanktons are important in nutritive level, temperature, and



pollution used to determine the health of an ecosystem (Purushothama et al., 2011). From the earlier work on the zooplanktons, it appears that studies have been done on the zooplankton diversity in river but negligible work has been carried out on inconsistency divergence in Zooplankton Configuration density in Panchaganga near Kolhapur area and its nearby villages. The objective of present study is to determine inconsistency divergence in Zooplankton configuration of Panchaganga near Kolhapur area.

II. MATERIALS AND METHODS

Study area: The study area selected was Kolhapur area in Maharashtra state. The city of Kolhapur is the district head quarter. The total area of the district is approximately 7,685 km², and the Ichalkaranji city is known as Manchester of India for its export of textile goods and textile manufacturing industry. It is located at 16.70 74.470E. The city lies in the Panchaganga valley about 29km east of Kolhapur and 1 km north of the river.

III. COLLECTION OF SAMPLES AND BIOLOGICAL ANALYSIS

The survey of Zooplanktons from Panchaganga river near Kolhapur area was carried out from June 2024 to May 2025. Water samples were collected monthly between 9 am to 11 am. The data was articulated seasonally as summer, winter, and Monsoon. Then plankton samples were collected through 50 liters of water by standard plankton net made up bolting silk cloth No. 20 and the collected samples were fixed in 4% formalin. Needham and Needham, (1966). The Zooplankton are identified with the help of standard literature up to generic level by using standard keys of Adoni et al. (1985), Edmondson (1959), Pennak (1978), Reddy (1994), Dhanapathi (2000), Bhoyain and Asmat (1992). The qualitative and quantitative analysis of the organism is carried out by Sedgwick rafter cell as per the standard methods APHA (1998).

IV. RESULT AND DISCUSSION

The present study reports the zooplankton diversity composition from the Panchaganga river near Kolhapur area District Kolhapur (M.S.) India. In total, 25 species of zooplanktons belonging to families and 4 classes viz. Rotifera, Cladocera, Copepoda and Ostracoda were recorded from the Panchaganga River along the suburbs like near Jayanti nala, Dudhali nala, Kumbhar nala, Rajaram Bandhara, and Prayag Chikali areas. The class Rotifera represents 11 species, Cladocera 5 species, Copepoda 6 species and Ostracoda 3 species. The species recorded during the study with their occurrence in summer monsoon and winter presented in table 1. Purushothama et al. (2011) studied the physico chemical profile and zooplankton community composition in Brahmana Kalasi tank, Sagara, Karnataka. Their study reports 18 species of Zooplanktons from the Brahmana Kalasi Tank. Likewise, several records on hand about zooplankton diversity, abundance, composition and durational deviations from the different fresh water bodies (Jayabhaye, 2010; Jadhav et al., 2012; Watkar and Barbate, 2012; Annalakshmi and Amasth, 2012; Singh et al., 2012; Gaike et al., 2012).

Rotifera were the dominant group among the Zooplankton community with 11 species. The Brachionus, Keratella, and Filinia were showed 39 % population of total zooplankton community. Whereas in the Cladocera, the Moina, Chydorus, Bosmina, Diaphanosoma are presented 23% population of total zooplankton community. In the Class Copepoda, the Mesocyclops, Microcyclops, Undinula, Thermocyclops, Nauplius were 30 % and, in the class, Ostracoda. Heterocypris and Stenocypris were 8% out of total population in Zooplankton community. On the similar line, Jose and Sanal Kumar (2012) carried out a study on durational deviations in the zooplankton diversity of river Achencovil and reported that in summer, rotifers were dominated (40%) followed by copepods (27%) and cladocera (23%). The rotifers were higher abundance during pre monsoon (37%) and monsoon (39%) while copepods formed the dominant group during post monsoon season (30%). During the present study, the population density was high in summer (47%) followed by winter (33 %) and monsoon season (20%) (Fig. 6). The Filinia genus was observed only in summer season. The total zooplankton density was high in summer season followed by winter and Monsoon (Fig. 2). In the summer season percent composition was as follows, Cladocera (23%), Copepoda (27%), Ostracoda (10%), Rotifera



(40%) (Fig.4), the winter percent composition of Rotifera was 37%, Cladocera (23%), copepod (30%) Ostracoda (10%), (Fig.3). In monsoon season percent composition of Rotifera was (39%), Cladocera (23%), copepod (30%), Ostracoda (8 %),(Fig. 5). Similar observations were reported by Ramakrishna (2014) from Yelahanka lake, Manickam et al. (2014) from Thoppaiyar reservoir Dharampuri district, South India and Gayathri et al. (2014) from Doddavoderhalli lake, Bangalore, Karnataka (Table 2).

The population density, composition and abundance of zooplanktons varies according to the season and type of freshwater body, its physicochemical parameters and biotic components was studied different workers (Thirupathiah et al., 2011; Patel et al., 2013). The result of present study indicated that zooplankton were maximum in summer season because of favorable environmental condition. The present information on the zooplankton composition and durational deviations from the Panchaganga river near Kolhapur area (M.S.) India is helpful for further diversity and conservation studies of invertebrates from Panchaganga River. It will be also useful create awareness of water pollution and maintenance of river aquatic ecosystem in future.

Table.1 Species composition of zooplankton at study area during June 2024 to May 2025

Sr.no	Zooplankton Groups	Family	Name of species	Summer	Winter	Monsoon
1	Rotifera	Brachionidae	Brachionuscaudatus	+	+	+
2			Brachionusfalcatus	+	+	+
3			Brachionusforficula	+	+	+
4			Brachionuscalyciflorus	+	+	+
5			Brachionusdiversicornis	+	+	+
6			Keratellachochlearis	+	-	+
7			Keratellatropica	+	+	+
8			Keratellacrassa	+	+	+
9			Microgaster	+	-	-
10			Opius	+	-	-
11	Cladocera	Filiniidae	Filiniaopoenis	+	-	-
1		Moinidae	Moina micrura	+	+	+
2			Moina Brachiata	+	+	+
3		Chydoridae	Chydroussphaericus	+	-	+
4			Bosmina longirostris	+	-	+
5	Copepoda	Sididae	Diaphanosomasarsi	+	+	+
1		Diaptomidae	Mesocyclops	+	+	+
2			Undinulavalgaris	+	+	+
3			Thermocyclops	+	+	+
4			Microcyclops	+	-	+
5		Naupliidae	Nauplius	+	+	+
6			Cyclops	+	+	+
1	Ostracoda	Cyprididae	Stenocypris	+	+	+
2			Heterocypris	+	+	+
3			Myodocopina	+	+	-



Table.2 Inconsistency Divergence in Zooplankton Configuration Density

Sr. no	Zooplankton groups	Summer	Winter	Monsoon	Grand Total
1	Rotifera(No/L)	611	397	256	1264
2	Cladocera (No/L)	358	254	156	768
3	Copepod (No/L)	409	327	201	937
4	Ostracoda (No/L)	156	110	57	323
5	Total. Zooplanktons (No/L)	1534	1088	670	3290

Plate 1

Zooplankton of Panchaganga River Near Ichalkaranji area M.S, INDIA.



Thermocyclops.



Microcyclop



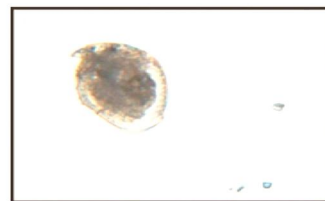
Moina brachiata



Moina micrura



Bosmina longirostris



Chydorus sphaericus



Diaphanosoma sarsi



Stenocypris.



Plate 2

Zooplankton of Panchaganga River near Ichalkaranji area M.S.India

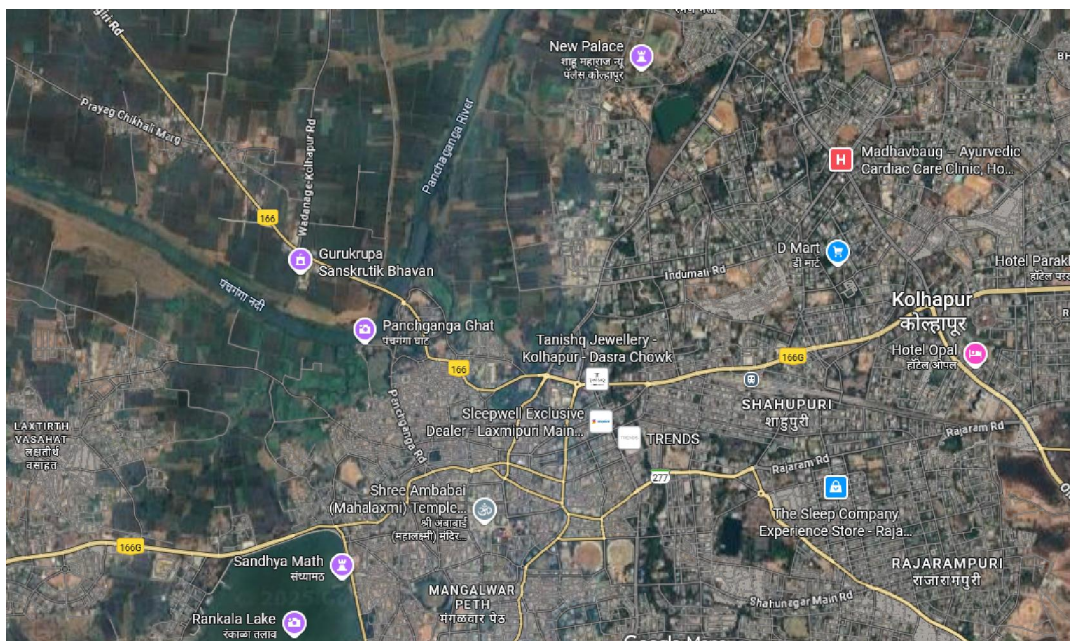
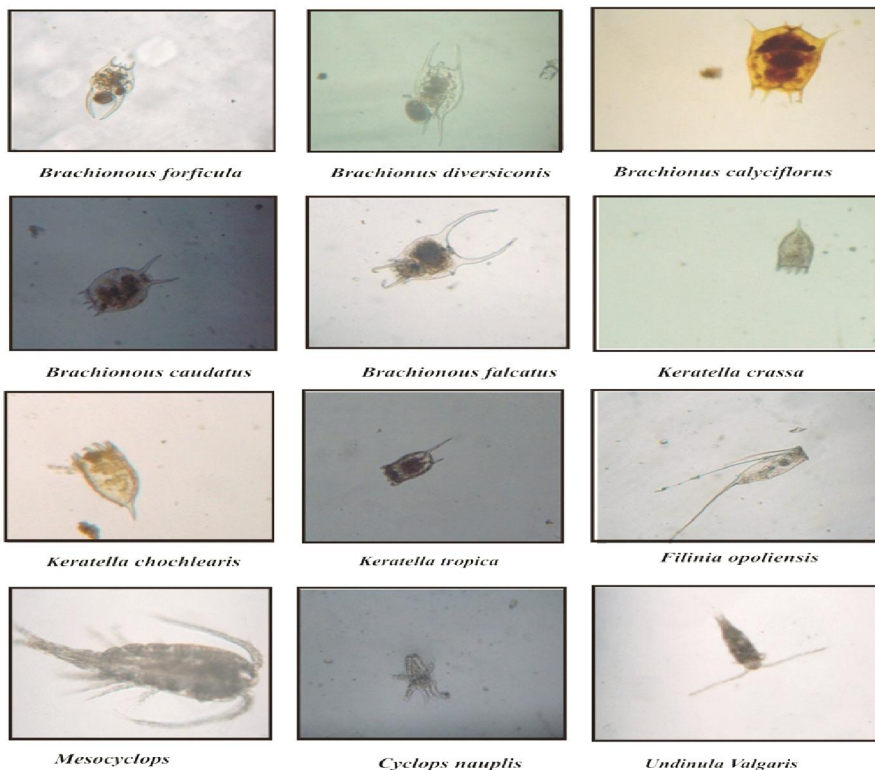


Fig.1 Satellite view of Study area

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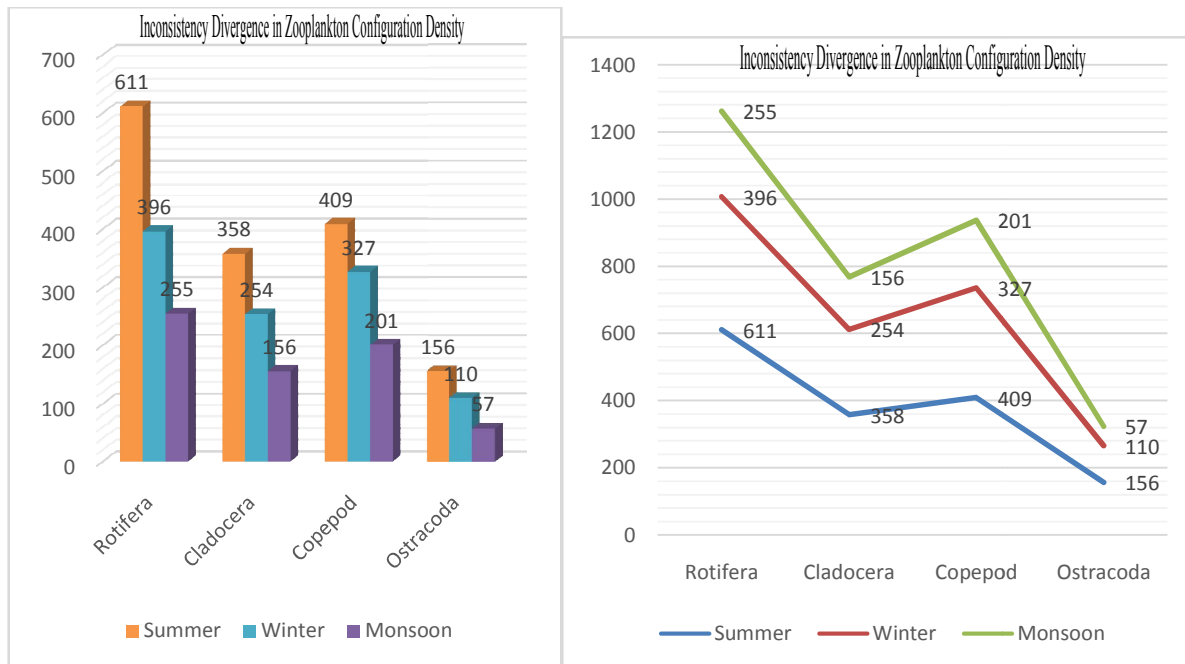


Fig. 2 Inconsistency Divergence in Zooplankton Configuration Density in Summer, Winter and Monsoon
(Analysis from June 2024 to May 2025)



Fig. 3: Inconsistency Divergence of zooplanktons in summer from study area

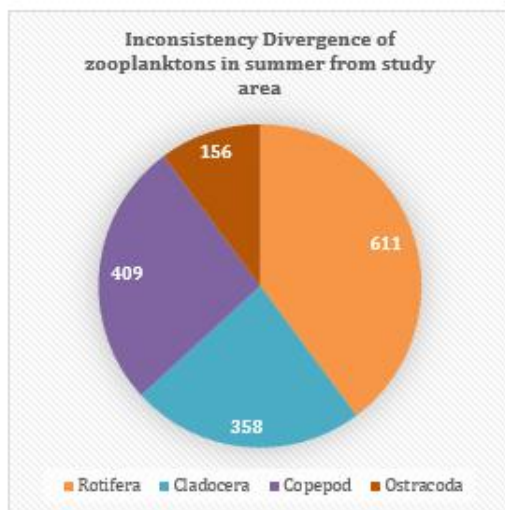


Fig. 4: Inconsistency Divergence of Zooplanktons in Winter from study area

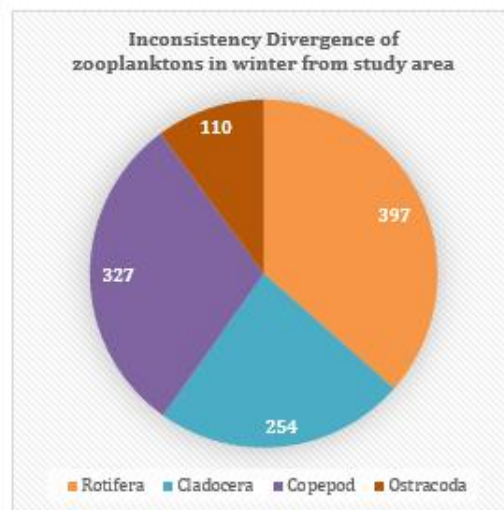


Fig. 5: Inconsistency Divergence of zooplanktons in monsoon from study area

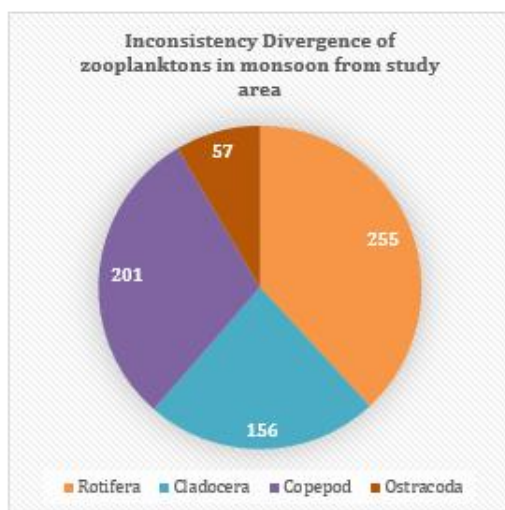
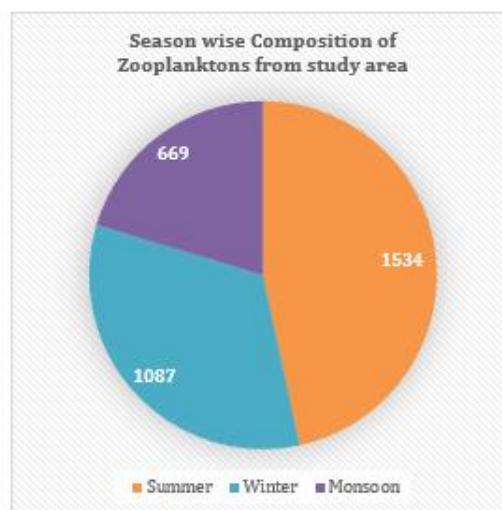


Fig. 6: Inconsistency Divergence of Zooplanktons season wise from study area



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REFERENCES

1. APHA, 1998. Standard methods for examination of water and waste water. 20th edn., American Public Health Association, Washington, D.C.
2. Dhanapathi, M.V.S.S.S. 2000. Taxonomic notes on the Rotifera, Indian Association of Aquatic Biologists, Hyderabad, Vol. 178 Pp.
3. Edmondson, W.T. 1959. Freshwater biology, Edward and Hipple (Eds), 2nd edn. John Wiley & Sons Inc., New York, Pp. 95-189.
4. Annalakshmi, G., Amasth, A. 2011. Studies on the hydrobiology of river Cauvery and its Tributaries: Sarasalar from Kumbakonam Region, Tamilnadu, with reference to zooplanktons. Int. J. Biol. Pharm. Technol., 3(1): 325-331.
5. Bhuiyan, A.M., Asmat, G.S. 1992. Freshwater zooplankton from Bangladesh. Gazi publishers, Dhaka, Bangladesh, Pp. 32-151.
6. Adoni, A.D., Joshi, G., Gosh, K., Chowasia, S.K., Vaishy, A.K., Yadav, M.,
7. Dhembare, A.J. 2011. Diversity and its indices in zooplankton with physicochemical properties of Mula Dam Water Ahmednagar, Maharashtra India. Eur. J. Exp. Biol., 1(4): 981-103.
8. Gaikhe, P., Mohite, M., Ningule, A., Kambale, A., Shejule, K. 2012. Seasonal zooplankton variation. In: Nagat Dam near Partur Dist Jalna, India. J. Biosci. Disc., 3(3): 362-365.
9. Gayathri, S., Latha, N., Mohan, M.R. 2014. Studies on population dynamics and seasonal abundance of zooplankton community in Doddavoderahalli lake, Bangalore. Int. J. Emerg. Trends Eng. Dev., 4(1): 50-55.
10. Goswami, A.P., Mankodi, P.C. 2012. Study on zooplankton of freshwater reservoir, Nyari- II Rajkot Dist, Gujarat, India, ISCA. J. Biol. Sci., 1(1): 30-34.
11. Jadhav, S., Borde, S., Jadhav, D., Humbe, A. 2012. Seasonal variation of zooplankton community in Sina Kolegoan Dam Osmanabad Dist, Maharashtra, India. J. Exp. Sci., 3(5): 19-22.
12. Jafari, N., Nabavi, S., Akhavan, M. 2011. Ecological investigation of zooplankton abundance in the river Haraz, Northwest Iran: impact of environmental variables. Arch. Biol. Sci. Belgrade, 63(3): 785-798.
13. Jayabhaye, U.M. 2010. Studies on zooplankton diversity of river Kayadhu, Near Hingoli City, Hingoli, Dist. Maharashtra. Int. Res. J., 11(12): 47-49.
14. Jose, R., Sanal Kumar, M.G. 2012. Seasonal variation in the zooplankton diversity of river Achencovil, Int. J. Sci. Res. Publ., 2: 11.
15. Kangasabapathi, V., Rajan, M.K. 2010. A preliminary survey of plankton in Irrukandudi Reservoir, Virudhunagar Dist, T.N. India, J. Phytol., 2(3): 63-72.
16. Karuthapandi, M., Rao, D.V., Xavier Innocent,
17. Patel, V., Shukla, S.N., Patel, V.K. 2013. Studies on the diversity of zooplankton and their seasonal variation in Govindgarh lake at Rewa (M.P), India. Indian J. Appl. Res., 3(11): 544-546.
18. B. 2013. Zooplankton composition and diversity of Umdasager, Hyderabad. Int.
19. J. Life Sci. Edu. Res., 1(1): 21-26. Manickam, N., Saravana, B.P., Santhanam, P., Muralisankar, T., Srinivasan, V., Radhakrishnan, S., Vijayadevan, K., Chitrarasu, P., Jawahar, A. 2014. Seasonal variation of zooplankton diversity in a perennial reservoir at thoppaiyar, Dharmapuri district, South India. Austin J. Aquacul. Mar. Biol., 1(1): 1-7.
20. Needham, J.G., Needham, P.R. 1966. A guide to study freshwater biology, 5th edn. Holden Day Inc. San Francisco, California, USA. 104 Pp.
21. Pennak, R.W. 1978. Freshwater invertebrates of United States, 2nd edn. John Wiley and Son, New York. 303 Pp.
22. Purushothama, R., Sayeswara, H.A., Goudar, M.A., Harishkumar, K. 2011. Physicochemical profile and zooplankton community composition in Brahmana Kalasi Tank, Sagar, Karnataka, India. Ecoscan., 5(3): 99-103.



23. Ramakrishna, S. 2014. Zooplankton seasonal abundance in relation to physicochemical feature in Yelahanka Lake, Bangalore. Global J. Res. Anal., 3(6): 218 219.
24. Russell, J., Shiel, A., Justin, F., Costelloe, B.T., Julian, R.W., Reid, A.C., Peter Hudson, A., Powling, J. 2006. Zooplankton diversity and assemblage in Aride zone river of lake Eyre Basin, Australia. J. Mar. Freshwater Res., 57: 49-60.
25. Reddy, Y.R. 1994. Copepod, cladocera, diaptomidous guide to the identification of micro-invertibrate of the continental water of the world, Vol. 5. SPB Publisher, The Hague, Netherland.
26. Shivashankar, P., Venkataramana, G.V. 2013. Zooplankton diversity and their seasonal variation of Bhadra reservoir Karnataka, India. Int. Res. J. Environ. Sci., 2(5): 87- 91.
27. Singh, R.K., Pandey, M.K., Kumari, R., Ranjan, P. 2012. Study on the diversity and seasonal variation of zooplankton in Mahendra Nath Pond, Siwan, Bihar, Int.,J. Pharm. Biol. Arch., 3(4): 867 870.
28. Thirupathaiah, M., Sammatha, C.H., Sammaiah,C.H. 2011. Diversity of zooplankton in freshwater lake of Kamalapur, Karimnagar District (A.P) India. Ecoscan, 5(1 2): 85 87.
29. Tyor, A.K., Chopraand, G., Seema Kumari 2014. Zooplankton diversity in Shallow Lake of Sultanpur Nationasl Park, Gurgaon Haryana. Int. J. Appl. Biol. Pharm. Technol., 5(1): 35 40.
30. Verma, H.G. 1985. Work book or limnology, Prathibha Publishers, Sagar, India.
31. Watkar, A.M., Barbate, M.P. 2013. Studies on Zooplankton Diversity of River Kolar Saoner, Dist- Nagpur, Maharashtra. J. Life Sci. Technol., 1(1): 26 28.

