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# Study on the Pattern of Some Selected Zooplankton in Two Perennial Water Bodies

**[*1]Rakhi Kumari**

[*1]Assistant Professor, Department of Zoology, J.L. College, Hajipur, B.R.A.B.U, Muzaffarpur, Bihar, India.

**Abstract**

Microcrustaceans have a wide distribution in freshwater habitats. In the present study the microcrustaceans consisted mainly of order cladocera, sub class-copepod, Ostracoda and their families. The population density of the zooplankton consisted mainly of cladoceran in the entire sample of both the lentic water bodies. Generally, cladocerans was represented by family sididae Daphnidae, Moinidae and Bosminidae. At site I, The peak of total cladoceran population (58 u/L) was recorded in August, 2024 and the lowest (4u/L) in May, 2024during the first year. In the second year, the peak (68 u/L) was observed in February, 2025 and minimum (12 u/L) in more than one months. While, the total cladocerans population density at site 2, was more abundant in comparison to site I. At this site the cladoceron showed their peak (78 and 116 u/L) in December, 2023 and February, 2023 during both the annual cycles whereas, the lowest (12 u/L) was recorded in October 2023 and May, 2025 respectively.

**Keywords:** Microcrustaceans, Sididae, Daphnidae and Bosminidae etc.

## Introduction

Water is a necessity for all living organisms without this elixir there would be no life. Life originated in water and the ultimate basis of it, the protoplasm is colloidal solution of complete organic molecules in water medium (70-90% water). Moreover, where water exists in nature it always holds life. So the study of a water body is the study of life as well. Water is essential at all levels of life, cellular to ecosystem. Nature has an innate mechanism to maintain its purity after every natural use. But it is unable to do this at this at the rate at modern humans add dirt to it. Nature does not know how to deal with several toxins and pollutants that are flowing from industrial and other wastes therefore, humans are bound to monitor the import of this activity on natural freshwater continuously. Water is a necessity for all living organisms without this elixir there would be no life. Life originated in water and the ultimate basis of it, the protoplasm is colloidal solution of complete organic molecules in water medium (70-90% water). Moreover, where water exists in nature it always holds life. So the study of a water body is the study of life as well. Water is essential at all levels of life, cellular to ecosystem. Nature has an innate mechanism to maintain its purity after every natural use. But it is unable to do this at this at the rate at modern humans add dirt to it. Nature does not know how to deal with several toxins and pollutants that are flowing from industrial and other wastes therefore, humans are bound to monitor the import of this activity on natural freshwater continuously. The limnological investigation of plankton have not received much attention in Bihar while some notable contributions are known through the works of Saha and Dutta munshi (1983), Bilgrami *et al.* (1985), Saha *et al* (1985) Bhowmick and Singh 1985, Das and Sinha (1994) and Paul 2003. Therefore, a comprehensive study of two lentic water bodies (Akilpur wetland and Gorardahn Das pond, Karinga, Chapra) were made for two years (2023-2025)

## Materials and Methods

Zooplanktons were sampled at forthighty intervals. Zooplanktons were collected from each lentic site by using No-25 (Mesh size 64) plankton net made of bolting silk. Fifty litres of water from different places of the water body was fittered through the polankton net. Theplankton filtered was presend in 4%. formalin and the analysis was made using sedgewick Rafter plankton counting cell (IM capacity). The identification of the zooplankton was carried out following Ward and whipple (1963) and Needham and Needham (1978). All organisims were counted and computed by using the formula:.

$$ni = \frac{(a.1000)c}{L}$$

Where,

ni = Number of planktons.

a = The mean numbers of zooplanktons per counting unit.

C = Volume of concentrated plankton in ml

L = Volume of sample of water sieved i.e 30 litres.ni = number of planktons.

a = the mean numbers of zooplanktons per counting unit.

***Corresponding Author:** Rakhi Kumari

C = Volume of concentrated plankton in ml
L = Volume of sample of water sieved i.e 30 litres.

**Results and Discussion**

**Crustacea**

Microcrustaceans have a wide distribution in freshwater habitats. In the present study the microcrustaceans consisted mainly of order cladocera, sub class-copepod, Ostracoda and their families. The population density of the zooplankton consisted mainly of cladoceran in the entire sample of both the lentic water bodies. Generally, cladocerans was represented by family sididae Daphnidae, Moinidae and Bosminidae. At site I, The peak of total cladoceran population (58 u/L) was recorded in August, 2024 and the lowest (4u/L) in May, 2024during the first year. In the second year, the peak (68 u/L) was observed in February, 2025 and minimum (12 u/L) in more than one months. While, the total cladocerans population density at site 2, was more abundant in comparison to site I. At this site the cladoceron showed their peak (78 and 116 u/L) in December, 2023 and February, 2023 during both the annual cycles whereas, the lowest (12 u/L) was recorded in October 2023 and May, 2025 respectively.

**Family: Sididae**

*Diaphanosoma* sp. was the only representative of sididael, their occurrence was noticed at repeated intervals during both the annual cycles at site 1, whereas, Diaphanosoma

**Family: Daphnidae**

Daphnidae was represented by 4 species. At site I, only 3 species were collected in which *D. carinata* showed their maximum population density (26 and 32 u/L) during February, 2024 and 2025 in both annual cycles. Whereas, the minimum (2u/L) was recorded on several occasions. The other species, *Daphnia lumholzi* showed their maximum occurrence (18 and 24u/L) in February of both the year. *Cerlodaphmia* sp. was thinly populated and interruptedly encountered during the entire study period. At site 2, Daphniae was represented by a single species *D, carinata* which showed their peak population (26 u/L) in April,2012 and in September, 2025 (56 u/L) during the first and second annual cycles,usually their higher numbers were showed in summer months.

**Family: Bosminidae**

*Bosmia longirostris* was the only representative of Bosminidae which was present at all sites. At site I, *B. longirostris* was scarcely and sparsely present in all samples, the lowest number (2 u/L) was recorded in more than one month, whereas the highest (12 and 84u/L) was collected during October, 2023 and December, 2024 in both the years. At site2, *B. longirostris* showed a slight rise in population as compared to site I. The lowest population density (2u/L) was collected in October, 2023 during the first annual cycle whereas, in the second year, the lowest (64u/L) was recorded in more than one month. The highest population (28 and 46u/l) was recorded in December, 2023 and January, 2025 during both the annual cycles.

**Sub Class: Copepoda**

Copepad was commonly present in both the lentic environments and was represented by many families and their nauplii. At site 1, seasonal variations in abundance showed their population (32 and 14 u/L) in October, 2023 and November, 2024; while, the highest (110 and 82 u/L) in August, 2024 and February, 2025 during both the annual cycles repectively. At site2, the minimum population (24 and 18u/L) was observed in October, 2023 and February, 2025 and peak (88 and 66 u/L) in August, 2024 and July, 2025 in both the annual cycles

**Family: Diaptomidae**

Diaptomidae was represented by Diaptomus sp., Neodiaptomus, Diaphorous and Diaptomid nauplius at site, out of their species Diaptomus sp. was noticed in many samples. The minimum population (4 u/L) was recorded in November, 2013 and the highest (86 u/L) in August, 2024 in the first annual cycle. In the second annual cycle, the minimum (2 u/L) and maximum (32u/L) was collected during April and February, 2025 respectively. While, the other two species Neodiaptomus, diaphorous and diaptomid naupllie were recorded only in few samples at inturrupted intervals and did not depicted any seasonality At site2, Diaptomidae was represented by Diaptomus sp. And *Diaptomid nauplli*. The lowest (6 and 2u/L) of Diaptomus sp. population was recorded in April, 2024 and February, 2025, whereas the highest (48 and 28u/L) in August, 2024 and July,2025 respectively during both the annual cycles. The diaptomid naiplius was present occasionally in few samples.

**Family: Cyclopidae**

Cyclopidae of site I was represented by *Cyclops* sp., *Mesocyclops* sp., cyclopoid nauplius and their nauplli. Out of these, Cyclops sp. was the dominant species encountered in a large number of samples, their lowest numbers (10u/L) was recorded on February, 2024 and the highest (34u/L) in December, 2023 during the first annual cycles. Cyclops sp. cyclopoid nauplius, and nauplii were the representative of cylopidae at site 2. Similarly site 1, Cyclops sp. was the dominant species present throughout the year round. The lowest number (6 and u/L) was collected in May, 2024 and July, 2025 and highest (48 and 42 u/L) was encountered in March, 2024 and January, 2025 in both the years. Their dominance was found during winter and summer months in the first annual cycle and slightly different trends was observed in the second year. *Cyclopoid nauplius* was thinly populated, less abundant and occurs only a few samples. While the nauplii seasonal trends, the minimum (2u/L) was recorded in January, and October, 2024. Whereas, the maximum (28 and 22 u/L) in September, 2012 and June, 2013 in both the annual cycles.

**Sub Class: Ostracoda**

Ostracods of lentic ecosystem was represented by a single species *Cypris* sp. which was found occasionally at site 2 and encountered at interrupted intervals throughout the study period. In the present findings, certain species of zooplankton disappeared in particular months only to reappear in the subsequent months. It is explicitly clear that at no time during the year there was total absence of zooplankton from the water bodies during the investigation. Weich(1952) opined that quantitatively there is likely to be less zooplankton in tropical than in temperate waters. The zooplankton recorded in present investigation have a cosmopolitan distribution since they have also been recorded from the tanks, Ponds reservoirs, lakes and rivers located in different latitude and agroclitic conditions. The zooplankton species of Indian freshwater bodies were reported by several workers which was quite comparable. Sewell (1934) recorded 10 rotifera, 15 cladocera and 10 copepoda from a freshwater tank of Bengal.

Nasar (1973, 77) recorded 16 rotifera and 11 cladocera from Bhagalpur ponds. Nasar (1977) recorded 12 rotifera, 8 cladocera, 3 copepoda and 3 ostracoda from other ponds of Bhagalpur. Laal(1984) found 10 rotifers from a freshwater pond at Patna. Balkhi (1984) recorded 33 rotifers from the Anchar lake. Sharma and Pant (1985) recorded 66 rotifera, 15 cladocera and 7 copepods from two kumayun Himalyan lakes. During the present investigation, the author recorded 22 species of rotifera, 7 cladocera, 7 copepoda and 1 ostracod from the lentic environments. During the present investigation, the rotifera occupied the first place among the zooplankton population in both sites. According to Alikuhni *et al*, (1955), Michael (1968), Saha *et al*, (1971); Nasar; Balkhi *et al.* (1984); Sharma and pant (1985), rotifera constituted the most abundant group of zooplankton, with rhythmic appearance and disappearances. The present investigations, conducted continuously for two years corroborates the finding of the above workers. The number of species and their differences gives general information about the stability of the environment, for expressing the differences and similarities of the qualitative composition of zooplankton community present at the different sites the qualitative similarity index seemed to be most adequate. Accordingly sites showed the greatest similarity, the same species occurred and dominated in the majority of the samples analysed. Copepoda showed the highest co-efficient of similarity, followed by rotifera and cladocera. The variety of habitats and abundance of food also effect seasonal succession in the zooplankton (pejler, 1957). Zooplankton populations are affected by various environmental factors (Greeberg, 1964). Temperature produces an important influence on the distribution of total zooplankton (Hutchinson, 1957; Bottrell, 1975; Hunt and Robertson, 1977; Mclaren, 1978; Landry, 1978; Orcuit and Porter, 1983). Earlier studies have emphasized the zooplankton does not show a peak when the temperature is low (Das and srivastava, 1956). While, in other evidence the low temperature is related to the zooplankton peak (Moitra and Bhowmick, 1968); hence, the temperature alone is not limiting factor for the raise and fall of the zooplankton population though it exhibits a significant role directly or indirectly to their growth and production (Nasar, 1977). During present investigation, the primary peak of zooplankton population was observed in summer and secondary peak during winter at site 2, while at site 1, where the primary maxima was recorded in monsoon and winter months while the secondary maxima was in winter and summer during both the annual cycles, respectively. The maximum number of rotifer species was recorded during summer months which coincided with the period of high temperature agreeing with the findings of Michael (1963). Summer periodicity of rotifers in tropical ponds has also been recorded by George (1966).

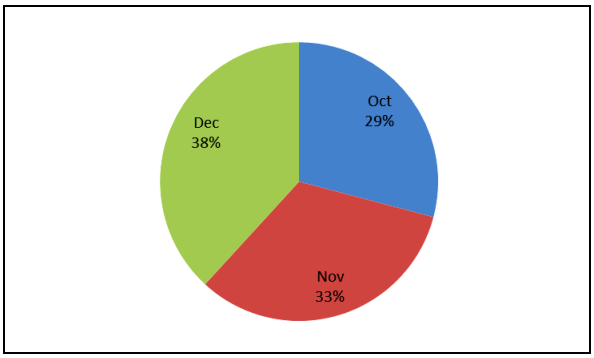


**Fig 1:** Abundance of Copepoda in 2023

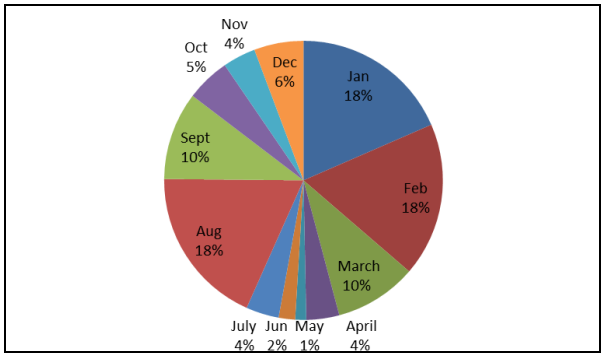


**Fig 2:** Abundance of Crustacea in 2024

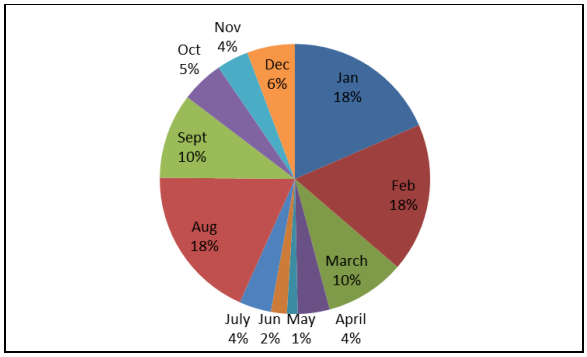


**Fig 3:** Abundance of total custacea in 2025

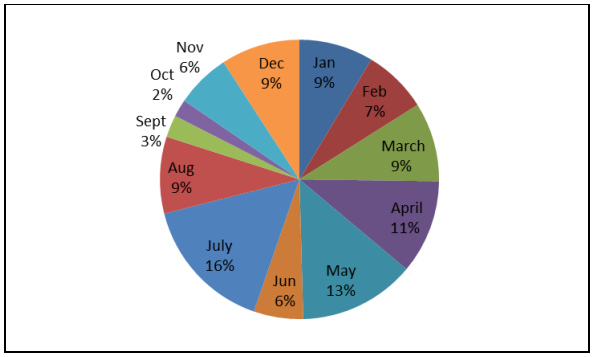


**Fig 4:** Abundance of Copepoda in 2024 at Site1

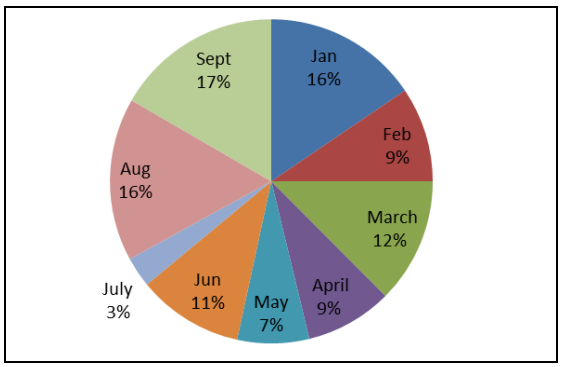


**Fig 5:** Abundance of Copepoda in 2025

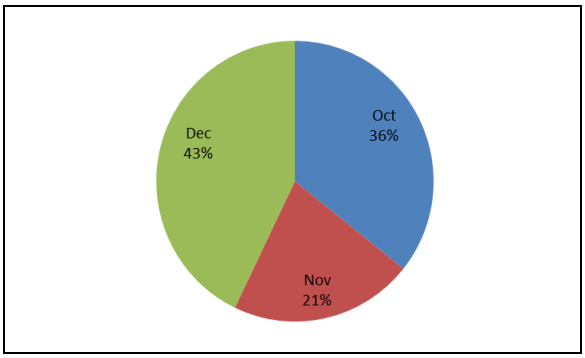


**Fig 6:** Abundance of Crustacea in 2023

## Conclusion

In the present study the microcrustaceans consisted mainly of order cladocera, sub class-copepod, Ostracoda and their families. The population density of the zooplankton consisted mainly of cladoceran in the entire sample of both the lentic water bodies. Generally, cladocerans was represented by family sididae Daphnidae, Moinidae and Bosminidae. At site I, The peak of total cladoceran population (58 u/L) was recorded in August, 2024 and the lowest (4u/L) in May, 2024during the first year. In the second year, the peak (68 u/L) was observed in February, 2025 and minimum (12 u/L) in more than one months. While, the total cladocerans population density at site 2, was more abundant in comparison to site I. The number of species and their differences gives general information about the stability of the environment, for expressing the differences and similarities of the qualitative composition of zooplankton community present at the different sites the qualitative similarity index seemed to be most adequate. Accordingly sites showed the greatest similarity, the same species occurred and dominated in the majority of the samples analysed. Copepoda showed the highest co-efficient of similarity, followed by rotifera and cladocera.

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