



Variation in Total Plankton Population Of River Gandar Near Muzaffarpur

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ABSTRACT

Zooplankton population had moderate density during the period of investigation and thus, it was concluded that the river Gandak maintained a better source for aquaculture, especially the pisciculture. Phytoplanktons were recorded very high during May-June. Zooplanktons were also abundant during warmer months of April-May and again in October. The higher number of planktons during warmer months is probably due to the gradual increase in water temperature and comparatively slow water current.

Keywords: Variation, Plankton Population, Gandak river, Muzaffarpur.

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INTRODUCTION

Gandak river is an International river. It emerges from Nepal and passes through the states of U.P. and Bihar before it outfalls in to Ganga near Patna. The catchment area of river Gandak is about 37,846 sq. kms. The presence of Phytoplankton and Zooplankton in any water body is most important factor for Aquaculture including fish production. Zooplanktons play an integral role in transferring energy to other consumers. They are abundant during warmer and post rainy months and attain their peak periods in the months of April-May and again in October generally. Zooplankton population is related with fish productivity as the former is food for the latter. Nine species of rotifers were observed in the river of Nagpur [1]. 24 species of rotifers from lake of Kolkata were reported [7]. On the basis of present findings, it was observed that river Gandak maintained a better source for aquaculture especially for the fish production due to great potentiality of plankton growth and their reproduction. Seasonal variation in planktonic population were sunshine, water temperature, pH, nitrite, phosphates and chlorides [4].

MATERIAL AND METHODS

Five sites of river Gandak were selected. Water from five sites were collected in every month of 2018 and 2019. Analysis of Water Samples done by standard methods. All planktons (Phytoplanktons and Zooplanktons) were identified and counted and results summarized in Tables.

RESULTS AND DISCUSSION

Observations were recorded and statistically analysed. Data is recorded in Table- 1, 2, 3, 4, 5A & 5B. From the data of the tables, it is evident that zooplankton population had moderate density during the period of investigation and thus, it was concluded that this river maintained a better source for aquaculture, especially the pisciculture having a great potentiality of plankton growth and reproduction. Temperature was considered to exert great influence on the growth and reproduction of biotic communities. Seasonal variation in phytoplankton and zooplankton was distinct at all five collection sites. The photoplankton population included the members of chlorophyceae (green algae), Bacillariophyceae (diatoms) and cyanophyceae (blue green algae) whereas zooplanktons were represented by protozoans, Rotifers, cladeoceran, copepods, ostracodes and few unidentified species. The maximum collection of phytoplankton was recorded in the Month of May-June in 2018 and 2019 (Table 3 & 4). The members of green algal species were found to be dominant over other groups throughout the

period of investigation. The total number of phytoplanktons collected from all sites of investigation was 2958 in 2018 (Table-1) and 2565 in 2019 (Table 2).

Zooplanktons play an integral role in transferring energy to other consumers. They were collected in abundance during warmer months of April-May and again in October in 2018 and 2019 (Table 3 & 4). The numerical variation in peak periods of different groups of Zooplankton was also distinct. Out of different Zooplanktons, rotifers were found to be dominant. The total number of Zooplanktons collected from all sites of investigation was 1815 in 2018 (Table-1) and 1685 in 2019 (Table-2).

During present investigation, the plankton density was found generally higher during warmer months probably due to the gradual increase in water temperature and comparatively slow water current. Thus, a significant positive relationship between plankton community and temperature was obvious during both the years of investigation. 44 species of rotifers were recorded from Champaran, Bihar [3 & 6]. 9 species of rotifers were reported from Nagpur by Arora [1]. 11 species of Brachinous were recorded from Rajasthan [2]. Seasonal variation in planktonic population depended upon water temperature, pH, Nitrite, phosphates and chlorides. However, some other factors such as dissolved oxygen, free carbonates, alkalinity and silica contents of a water body have also been found influencing the same [4]. There were many phytoplankton species that were highly nutritious to many aquacultured species, such as *Chaetoceros* sp., *spirulina* sp., *Isochrysis* sp. These species were nourishing and vital to shrimp larval nutrition during the early larval stages [5].

Table-1: Variation in Total Plankton Population of River Gandak Near Muzaffarpur During the year 2018

	Collection Center					Total	Mean	S.D.	C.V. (%)
	S ₁	S ₂	S ₃	S ₄	S ₅				
Total Plankton	1110	1149	1197	1317	1500	4773	1193	71.60	60
Total No. Zooplankton Contribution (%)	398	421	441	555	532	1815	454	69.70	15.35
Total No. Phytoplankton Contribution	712	728	756	762	760	2958	740	23.60	3.20

C.V. of Zooplankton = $[70 \times 100]/454 = 16.2\%$

C.V. of Phytoplankton = $[60 \times 100]/740 = 3.80\%$

Zooplankton show much greater variation than that of phytoplankton being the rate of 15.35 : 3.20 or 18 : 10

Table-2: Variation in Total Plankton Population of River Gandak Near Muzaffarpur During the year 2019

	Collection Center					Total	Mean	S.D.	C.V. (%)
	S ₁	S ₂	S ₃	S ₄	S ₅				
Total Plankton	1002	1043	1048	1133	1144	4226	1057	54.70	5.18
Total No. Zooplankton Contribution (%)	393	403	414	461	466	1685	1057	54.70	5.18
Total No. Phytoplankton Contribution	609	640	634	472	480	2565	639	25.92	4.05

C.V. of Zooplankton = $[30.74 \times 100]/418 = 7.63\%$

C.V. of Phytoplankton = $[25.92 \times 100]/639 = 4.90\%$

Zooplankton show much greater variation than that of phytoplankton being the rate of 7.35 : 4.05 or 18 : 10

Table-3: Correlation Between Phytoplankton and Zooplankton of River Gandak During 2018

PLANKTON	MONTHS											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Phytoplankton (X)	64	93	240	340	565	478	248	91	64	352	243	180
Zooplankton (Y)	55	70	158	326	338	205	51	55	50	212	157	123

$r = + 0.86$

$t = 5.329$ (Significant at 0.001 Level)

Table-4: Correlation Between Phytoplankton and Zooplankton of River Gandak During 2019

PLANKTON	MONTHS											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Phytoplankton (X)	49	84	179	290	420	435	312	92	73	268	257	96
Zooplankton (Y)	49	81	119	207	276	171	60	47	73	311	206	76

$r = + 0.70$

$t = 3.118$ (Significant at 0.001 Level)

Table 5 A: Water Analysis of River Gandak during (2018)

Temp.	pH	DO	FCO ₂	Phosphate	T.Alkalinity	Chloride	Silica
	r = +154 t = .734	r = +669 ¹ t = 4.321	r = +549 t = 3.08	r = - 576 t = 3.30	r = +455 ¹ t = 2.39	r = +798 ¹ t = 6.22	r = +726 ¹ t = 4.95
pH		r = -0.093 t = .44	r = -0.119 t = .56	r = +0.250 t = 1.21	r = -139 t = .66	r = +0.231 ¹ t = 1.11	r = +0.337 t = 1.67
DO			r = -448 t = 2.355	r = +0.364 t = 1.83	r = -0.260 t = 1.26	r = -592 ² t = 3.488	r = +448 ⁵ t = 2.353
FCO ₂				r = +0.796 t = .6168	r = +0.750 t = 5.321	r = -0.708 ¹ t = 4.715	r = -0.067 t = .317
Phosphate					r = -805 t = 6.36	r = -.752 ² t = 5.35	r = +239 t = 1.150
T.Alkalinity						r = -0.629 t = 3.29	r = -0.029 t = 5.35
Chloride							r = +500 t = 2.710

N =24

1 = Significant at 0.001 level 2= Significant at 0.005 level 3 = Significant at 0.01

4 = Significant at 0.025 level 5 = Significant at 0.05 level

Table- 5 B: Water Analysis of River Gandak during (2019)

Temp.	pH	DO	FCO ₂	Phosphate	T.Alkalinity	Chloride	Silica
	r = +726 ¹ t = 4.95	r = +896 ¹ t = 9.51	r = +297 t = 1.55	r = - 533 t = 1.46	r = +796 ¹ t = 2.39	r = +446 ¹ t = 6.17	r = +446 ⁵ t = 2.39
pH		r = +598 ² t = 3.50	r = -024 t = 110	r = +250 t = 1.21	r = -537 t = 2.98	r = +773 ¹ t = 5.71	r = +607 ² t = 3.58
DO			r = -196 t = .940	r = +614 ² t = 3.65	r = -0.694 ¹ t = 2.98	r = -693 ¹ t = 4.51	r = +394 t = 2.01
FCO ₂				r = +0.109 t = .518	r = +0.213 t = 1.02	r = -0.009 t = .046	r = -251 t = 1.21
Phosphate					r = -647 t = 3.98	r = -.464 t = 2.45	r = +245 t = 1.18
T.Alkalinity						r = -0.798 t = 6.21	r = -0.774 t = 5.73
Chloride							r = +0.764 t = 5.55

N =24

1 = Significant at 0.001 level 2= Significant at 0.005 level 3 = Significant at 0.01

4 = Significant at 0.025 level 5 = Significant at 0.05 level

REFERENCES

- Arora, H.C. (1966) : Rotifera as indicators of trophic nature of environment *Hydrobiol.* 27 (1&2) : 146-159.
- Nayar, C.K.G. (1986) : Rotifer fauna of Rajasthan, India. *Hydrobiol.* 35 (1): 168-185.
- Pandey, S. (1988) : Studies on the hydrobiological inter relationships of different types of water bodies of East Champaran, Ph.D. thesis, Bihar University, Muzaffarpur, 164-220.
- Philipose, M.T., Ramchandaran, V; Singh, S.B. and Rama Prabhu, T (1970): Some Observations on the weeds of Cultivable fresh Waters in Orissa. *J.Inland Soc. India.* 2:61-84.
- Singh, Rajesh (2019): Role of Phytoplankton & Zooplankton in fresh water aquaculture, www.pashudhanpraharee.com
- Singh, U.N. and Pandey, S. (1993) : The rotifer fauna of Champaran, North Bihar, Brachionus. *J. Proc Acad. Environ Biol.* 2(1): 137-142.
- Tiwary, K.K. and Sharma, B.K. (1977): Rotifers in the India Museum Tank, Calcutta. *Sci & Cult.* 43 : 280-282.

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