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PHYTOPLANKTONS DIVERSITY IN A IRRIGATION CUM FISH CULTURE RESERVOIR

Dr. Praveen Ojha,
Asst. Professor, Dept. Of Zoology
Kishori Raman P.G. College, Mathura, U.P.

ABSTRACT

Sixty-one genera of phytoplankton's were recorded out of which; twenty-nine genera of Chlorophyceae, twenty-one genera of Basillariophyceae, nine genera of Cyanophyceae and two genera of Dinophyceae are found at Barnoo reservoir. The present paper deals with the study of the seasonal changes in phytoplankton population. Qualitative and quantitative analysis of phytoplanktons were carried out during the year 2001-2003.

Key words: *Barnoo reservoir, phytoplankton's, qualitative and quantitative*.

Introduction

Phytoplanktons are universally distributed free floating minute natural inhabitants of aquatic ecosystem. They are the primary producers and constitute the very base of string of the food chain in all aquatic environments. The factors, which account for the seasonal variation of phytoplanktons are sunshine, water temperature, pH etc. Year to year fluctuation in phytoplankton quality is a general phenomenon in freshwater impoundment. Many workers such as Rao (1976), Singh *et al.* (1980), Ramkrishniah *et al*. (1982), Methew (1985), Adoni *et al*. (1985), Zafar (1986), Khatri (1987a), Sugunan (1998, 1991) Pulle and Khan (2003), have published their work on variation of phytoplantkons in reservoir. The present investigation has been undertaken to study the seasonal changes in phytoplanktons diversity in Barnoo reservoir during the year 2001-2003.

Material and Methods

Barnoo: a small irrigation reservoir of 75.6 ha water area is constructed on Barni river. It is situated at Sihora Tehsil of Jablapur district (M.P.). Location of the reservoir is at the longitude 80°7' 0"E and latitude 23°20'50"N. It was completed in the year 1966 – 67 with a view to irrigate 2137 ha land of 15 villages of Sihora block. As far as concern with the fisheries point of view it is controlled by a co-operative fisheries society. The water sample for seasonal qualitative and quantitative evaluation of phytoplanktons was collected from the reservoir for two consecutive years from 2001-2002 and 2002-2003. 50 lit. of water sample were passed out from plankton nets and filtered collected in the graduated tube of 25 ml of concentrated samples and kept in 5% formaline for further analysis. The genera of phytoplankton were identified through Needham and Needham (1962), Ward and Whipple (1956) and APHA(1998). Phytoplankton was counted by drop count method and the results were converted to organism l^{-1} of water.

Results and discussion

Seasonal diversity in total number and percentage of phytoplanktons were represented in table -1 and 2. In table -3 represent phytoplanktons diversity in different seasons while in table -4 showed dominance group of phytoplanktons abundance in different seasons at Barnoo reservoir.

The reservoirs in India exhibit moderate to very rich abundance of plankton, regulated largely by the seasonal variation in biotic factors (Jha, 2003). In the present communication in Barnoo reservoir among phytoplanktons Basillariophyceae (diatoms) (ranges 38.75 – 71.08%) was the dominant group during the year 2001-2002 followed by Chlorophyceae (16.06 – 45.77%), Cyanophyceae (12.59 – 12.86%) and Dinophyceae (0.53 – 2.89%) (Table-1& 2). In the year 2002-2003, Basillariophyceae dominated in summer and monsoon season while Chlorophyceae dominated in winter season (Table-4). Thus the study conform that the overall performance of Basillariophyceae (Diatoms) represented the most dominant phytoplanktons group in the Barnoo reservoir followed by Chlorophyceae, Cyanophyceae and Dinophyceae.

In the present study phytoplanktons occupies an important place in the production dynamics of an aquatic ecosystem. Its fluctuation and abundance is a function of interaction between physical, chemical and biological factors. In fisheries point of views, forms the basis of aquatic productivity being one of the vital components of the fish grazing chain.

Carter (1960) opined that in the tropics the amount of rainfall play a significant role in regulating the various seasonal biological rhythms. Sugunan (1980), have observed that the plankton density fluctuated with the change in inflow and out flow of the reservoir. Natarajan (1976) has been reported a direct relationship in Rihand reservoir between monsoon inflow and plankton density. Arnemo (1965) suggested that fluctuation in plankton's might be due to the seasonal influence on the food of plankton's. In Gularia reservoir the proliferation of plankton has been attributed to increase in winter temperature and photoperiodicity (Wishard and Mehrotra, 1988). Sreenivasan (1964) also reported that the production and fluctuation in phytoplanktons population were regulated by temperature, pH, alkalinity, carbon di-oxide and nutrients.

Plankton is an important link in the food chain and seasonal changes in its qualitative and quantitative composition are reflected is the growth of fish. Plankton population on which the whole aquatic life depends directly or indirectly is governed by the interacting of a number of physical, chemical and biological processes. In tropical waters, where the seasonal check to plankton growth is negligible when compared to the peak during winters in the temperate regions the productivity of waters is limited mainly to the availability of nutrients (Beauchamp, 1952).

The factors, which account for the seasonal variation of plankton, are sunshine, water temperature, pH, Nitrate and phosphates. Year to year's fluctuation in plankton quality is a general phenomenon in fresh water impoundment. During the present investigation qualitatively observed phytoplankton's were represented in table - 3.

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Table 1: Seasonal variation of phytoplanktons No. l^{-1} and percentage (yr. 2001-02)

2001-2002	Summer		Monsoon		Winter	
Phytoplanktons group	**No.**	**%**	**No.**	**%**	**No.**	**%**
Chlorophyceae	1205	37.05	306	16.06	854	45.77
Basillariophyceae	2030	62.42	1354	71.08	723	38.75
Cyanophyceae	-	-	245	12.86	235	12.59
Dinophyceae	17	0.53	-	-	54	2.89
Total	3252	-	1905	-	1866	-

Table 2: Seasonal variation of phytoplanktons No. l^{-1} and percentage (yr. 2002-03)

2002-2003	Summer		Monsoon		Winter	
Phytoplanktons group	**No.**	**%**	**No.**	**%**	**No.**	**%**
Chlorophyceae	1319	41.67	219	11.83	890	46.9
Basillariophyceae	1751	55.33	1331	71.91	615	32.4
Cyanophyceae	76	2.4	262	14.15	303	15.96
Dinophyceae	19	0.6	39	2.11	90	4.74
Total	**3165**	-	**1851**	-	**1898**	-

Table 3 : Seasonal phytoplanktons diversity in Barnoo reservoir (yr. 2001-02 to 2002-03)

		Summer		Monsson		Winter				Summer		Monsson		Winter	
Chlorophyceae		**01-02**	**02-03**	**01-02**	**02-03**	**01-02**	**02-03**	**Basillariophyceae**		**01-02**	**02-03**	**01-02**	**02-03**	**01-02**	**02-03**
1.	Uronema	-	+	+	+	+	+	1	Cyclotella	+	+	+	+	+	+
2.	Microspora	+	+	+	+	+	+	2	Gyrosigma	+	+	+	+	+	+
3.	Scendesmus	+	+	+	+	+	+	3	Diatoma	-	-	-	-	+	+

4.	Mougeotia	-	+	-	-	+	+	4	Frustulia	-	-	+	+	+	+
5.	Pachycladon	-	-	-	-	+	+	5	Nevicula	+	+	+	+	+	+
6.	Characium	-	-	-	-	+	+	6	Nitzschia	+	+	+	+	+	+
7.	Volvox	-	+	+	+	+	+	7	Synedra	+	+	+	+	+	+
8.	Pediastrum	+	+	+	+	+	+	8	Achnenthes	+	+	+	+	+	+
9.	Treubaria	-	+	-	-	+	+	9	Tabellaria	+	+	-	-	+	+
10.	Oedogonium	+	+	+	+	+	+	10	Gomphonema	+	+	+	+	+	+
11.	Closterium	+	+	+	-	+	+	11	Amphora sps.	+	+	+	-	+	+
12.	Coelospharium	+	+	-	-	-	-	12	Cymbella	+	+	+	+	+	+
13.	Mesotaenium	+	+	-	-	-	-	13	Fragilaria	-	-	-	-	+	+
14.	Staurastrum	+	+	-	-	+	+	14	Asterionella	+	+	+	+	+	+
15.	Stauroneis	+	+	-	-	-	-	15	Pinnularia	+	+	+	+	+	+
16.	Clamydomonas	+	+	+	+	+	+	16	Meridian	+	+	+	+	+	+
17.	Netrium	+	+	+	-	-	-	17	Centronella	-	+	-	-	+	+
18.	Ulothrix	-	+	+	+	-	+	18	Camphyllodiscus	-	-	+	-	+	+
19.	Ankistrodesmus	+	+	+	+	+	+	19	Bacillariaperadoxa	-	+	+	+	+	+
20.	Gonatozygon	+	+	+	+	+	+	20	Diatomella	+	+	-	-	+	+
21.	Gonayaulax	-	+	-	-	+	-	21	Gomphoneis sp.	+	+	+	+	-	-
22.	Tetraspora	-	-	-	-	+		**Cyanophyceae**							
23.	Protococcus	-	+	-	+	+	+	1	Oscillateria	-	+	+	+	+	+
24.	Phacus	+	+	-	-	-	-	2	Spirulina	-	-	+	-	+	+
25.	Selenastrum	+	+	+	+	+	+	3	Nostoc	-	+	+	-	+	+
26.	Sphaerocystis	+	+	+	+	+	+	4	Gloeocapsa	-	+	+	-	+	+
27.	Sphaeroplea	+	+	+	-	-	-	5	Phormidium	-	-	+	+	+	+
28.	Enteromorpha	+	+	+	+	-	-	6	Synechocystis	-	-	+	-	+	+
29.	Coelastrum	+	+	+	+	+	+	7	Gleotricha	-	+	+	+	+	+
								8	Anabaena	-	+	+	+	+	+
								9	Microcystis	-	+	+	+	+	+
								Dinophyceae							
								1	Peridinium	+	+	-	+	+	+
								2	Glenodinium	+	+	-	+	+	+

Table 4: Seasonal dominating groups of phytoplanktons in the order of abundance in the yr. 2001-2002 to 2002-2003

2001-2002	Chlorophyceae	Bacillariophyceae	Cyanophyceae	Dinophyceae

Summer	2	1	-	3
Monsoon	2	1	3	-
Winter	2	1	3	4
2002-2003				
Summer	2	1	3	4
Monsoon	3	1	2	4
Winter	1	2	3	4