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PHYTOPLANKTON DIVERSITY IN KHYRA MANDIR TAAL, GONDA UTTAR PRADESH

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ABSTRACT

The seasonal variation of phytoplankton density and diversity were studied for a period of one year. In the present study total 23 genera of phytoplankton was observed between the study period. Out of 23 genera, 11 genera belonging to Chlorophyceae, 7 to Bascillariophyceae, 4 to Cyanophyceae and 2 Euglenophyceae The annual density shows that Chlorophyceae dominates and constituted 52.44% of the total phytoplankton population was followed by Bascillariophyceae (27.53%), Cyanophyceae (15.18%) and Euglenophyceae (5.26%).However, the overall phytoplankton was found maximum in summer, medium in winter and lowest in monsoon season.

KEYWORDS: Phytoplankton, Diversity, Density, KhyraMandir

Population dynamic, density and diversity of plankton in a waterbody are of great importance in imposing sustainable management policies as they vary from location to location and aquatic systems within the same location. The inadequate knowledge of plankton and their dynamics is a major drawback for the better understanding of the life process of fresh water bodies. Planktonic populations on which whole aquatic life depends is directly or indirectly governed by many biological conditions and tolerances of organisms to variations in one or more of these conditions**.**

Phytoplankton forms the vital source of energy in the aquatic environment and these are the base of aquatic food chain and food web and is the most important factor for production of organic matter in aquatic ecosystem. Phytoplankton diversity also help to determine the trophic status and water quality of waterbodies. The interplay of physical, chemical and biological properties of water most often lead to the production of phytoplankton, while their assemblage (composition, distribution, diversity and abundance) is also structured by these factors.

Phytoplanktons are the basic component of aquatic ecosystems and hence change in phytoplankton population has a direct link with the changes of water quality of any waterbody. Phytoplankton serves as a food for development and growth of zooplankton. Some of phytoplankton species gives reliable information about pollution status of aquatic bodies. So, these are called good indicator of water quality because they are strongly affected by environmental conditions and respond quickly. Thus the population dynamics of plankton have a great importance for imposing sustainable environmental management policies like Environmental Impact Assessment (EPA).

Though numerous works on phytoplankton diversity are being reported from different parts of India but there is scarcity of report from freshwater lentic waterbody of eastern Uttar Pradesh except some work (Prakash, 2001; Sinha *et al*., 2002). So, the present study was an attempt for studying phytoplankton dynamics of KhyraMandir Taal of Gonda district of eastern U.P.

MATERIALS AND METHODS

Phytoplankton samples were collected monthly with plankton net of bolting no. 25 with a mesh size 25µ attached with a collection tube at the base of net throughout the study period i.e. from July,2011 to June, 2012, between 9.00 to 10.00 am. 50 liter of surface water was sieved through the plankton net and sample was collected inside the collection tube. The sample was transferred to plastic bottle and preserved in 70% alcohol. Phytoplankton productivity was measured by using Sedge Wick Rafter Plankton counting cell and quantities are expressed as unit per liter of the taal water. The diversity of phytoplankton was studied under light microscope with magnification 10X initially and followed by 40X. The specimens were identified following standard literature (Alfred *et al*., 1973; Needham and Needham, 1962; Wetzel *et al*., 1991).

RESULTS AND DISCUSSION

In the present study, density and diversity of phytoplankton are analyzed on seasonal basis and presented in table 1 & 2. In the present study total 23 genera of phytoplankton was observed between the study periods. Out of 23 genera, 11 genera belonging to Chlorophyceae, 7 to Bascillariophyceae, 4 to Cyanophyceae and 2 Euglenophyceae (Table 1). The present study showedthat there were great fluctuation in diversity and density of phytoplankton in the present taal duringall the three seasons.

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Table 1: Seasonal alteration in Phytoplankton Diversity of KhyraMandir Taal

Phytoplanktons	Summer	Rainy	Winter
Chlorophyceae			
Chlamydomonas sp.	+	+	+
Closterium sp.	+	+	+
Chlorella sp.	-	+	-
Cledophora sp.	+	+	+
Desmidium sp.	+	+	+
Microspora sp.	+	+	-
Nitellasp	-	-	+
Pediastrum sp.	+	+	+
Scenedesmus sp.	-	+	+
Sirogyra sp.	+	-	+
	+	-	+
Bacillariophyceae			
Amphora sp.	+	+	+
*Cymbella*sp.	+	+	+
*Diatoma*sp.	-	-	+
*Fragilaria*sp.	+	-	+
*Naviculas*p.	+	+	+
*Nitzchia*sp.	-	+	+
Opephora sp.	+	+	+
Cyanophyceae			
*Micocystic*sp.	+	+	+
*Scytonems*sp.	+	+	-
*Oscillatoria*sp.	+	-	+
*Anacystis*sp.	+	+	+
Euglenophyceae			
Euglena sp.	+	-	+
*Phacus*sp.	+	-	+

The annual density shows that Chlorophyceae dominates and constituted 52.44% of the total phytoplankton population was followed by Bascillariophyceae (27.53%), Cyanophyceae (15.18%) and Euglenophyceae (5.26%) (Table2).

In the present study the maximum density of phytoplankton was recorded in Summer season (1874 units/lit.) and minimum in winter season (1211 units/ lit.). The population density of Chlorophyceae, Bacillariophyceae, Cyanophyceae and Euglenophyceae ranges from 411-809 units/ lit., 189-483 units/ lit., 107-243 units/ lit and 39-81 units / lit., respectively

Table 2: Seasonal variations in Total Phytoplankton Counts (units/lit.) of KhyraMandir Taal

Group	Summer	Rainy	Winter	Total	% age
Chlorophyceae	809	411	654	1874	52.44
Bacillariophyceae	483	189	302	974	27.53
Cyanophyceae	243	107	187	537	15.18
Euglenophyceae	81	39	68	188	5.26
Total	1616	746	1211	3573	-

In the present study, a total of 11 genera of Chlorophyceae recorded and they exhibited highest density in summer season followed by winter and rainy seasons. Similar finding were found in various fresh water bodies in U.P. (Prakash and Ansari, 2000; Prakash, 2001; Sinha *et al*., 2002; Shinde, *et al*., 2012). Out of 11 genera of chlorophyceae6genera (*Chlamydomonas sp., Closteriumsp, Cledophora sp., Desmidium sp., Pediastrum sp.*and *Microspora sp*..) were present in all seasons and rest of 5 genera (*Chlorella sp*., *Scenedesmus sp. Nitellasp, Nitellasp*and*Ulothrix sp.*) were not noticed in all the seasons.

In the present investigation, a total of 7 genera of Bacillariophyceae recorded and they exhibited highest density in summer season followed by winter and rainy seasons. Similar finding were found in various fresh water bodies in U.P. (Prakash and Ansari, 2000; Prakash, 2001; Sinha *et al*., 2002; Shinde, *et al*., 2012). Out of 7 genera of Bacillariophyceae4 genera (*Amphora* sp., *Cymbella* sp., *Navicula* sp. and *Opephora sp.*) were present in all seasons and rest of 3 genera (*Diatoma*sp., *Fragilaria* sp. and *Nitzchia* sp.) were not noticed in all the seasons.

In the present study, a total of 4 genera of Cyanophyceae recorded and they exhibited highest density in summer season followed by winter and rainy seasons. Similar finding were found in various fresh water bodies in U.P. (Prakash and Ansari, 2000; Prakash, 2001; Sinha *et al*., 2002; Hassan *et al*., 2010). Out of 4 genera of cyanophyceae,2 genera (*Micocystic* sp. and *Anacystis* sp.) were present in all seasons and rest of 2 genera (*Scytonems* sp. and *Anacystis* sp.) were not noticed in all the seasons.

In the present study, only2 genera of Euglenophyceae were recorded and they exhibited highest density in summer season followed by winter and rainy seasons. Similar finding were found in various fresh water bodies in U.P. (Prakash and Ansari, 2000; Prakash, 2001; Sinha *et al*., 2002). Both 2 genera (*Euglena* sp. and *Phacus* sp.) were not noticed in rainy season.

CONCLUSION

The present study revealed that KhyraMandir Taal is a good productive in terms of density of different phytoplankton communities. Total 24 genera of phytoplankton were identified. Out of 24, 11 belong to Chlorophyceae, 7 to Bascillariophyceae, 4 to Cyanophyceae and 2 Euglenophyceae. Chlorophyceae was dominated over rest of the phytoplankton population. However, the overall phytoplankton was found maximum in summer, medium in winter and lowest in monsoon season. Presence of *Microcystis* specie is the indicator water pollution. Therefore, measures must be taken to minimize the water pollution by regulating human activities in watershed areas.

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