Studies of Phytoplankton Diversity in Ottu Reservoir, Sirsa (Haryana), India

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Abstract

Phytoplanktons are an important component of aquatic flora. Phytoplanktons are the chief primary producers and are of prime importance in aquatic ecosystem as the productivity of aquatic ecosystem is totally dependent on these. The diversity of phytoplankton components in the aquatic ecosystem serve as a reliable index for monitoring a water body. In this research examined the phytoplankton diversity in Ottu Reservoir, which is situated 14 k.m. away from Sirsa(Haryana). Samples were collected monthly from April 2012 to June 2013. Different Species of phytoplankton related to the member of four groups, namely Chlorophyceae (greens), Cyanophyceae (blue greens), Bacillariophyceae (diatoms) and Euglenophyceae were observed. During the present study period, a total of 26 species of Phytoplankton were recorded out of which Chlorophyceae was represented by 10 species, Cyanophyceae by 8 species, where as Bacillariophyceae and Euglenophyceae each represented by 6 and 2 species respectively. Climate of local environment factors are likely to have major impact on phytoplankton diversity of fresh water.

Keywords: Reservoir, phytoplankton, diversity, climate.

Introduction:

The plankton occur in all natural waters as well as in artificial impoundments like reservoirs, pond, irrigation cannels, etc. Planktons consisting of plant part are called as phytoplankton. Phytoplanktons are photoautotrophic and microscopic organism containing chlorophyll within their cells that inhabit the upper sunlit layer of almost all bodies of water. Phytoplankton obtains energy through the process of photosynthesis and must therefore live in the euphotic zone of water body. Phytoplanktons are the primary producer. They produce organic compounds and oxygen from carbon dioxide and water which sustain the aquatic food chain[5,6,8,9,10]. Phytoplanktons are responsiable for much of the oxygen present in the atmosphere. Phytoplanktons are extremely varying from photosynthesizing bacteria (Cyanobacteria) to diatoms and green algae. In terms of numbers, the most important algal group of phytoplankton includes Chlorophyceae, Bacillariophyceae, Cyanophyceae and Euglenophyceae.

Study Area:

The Ottu reservoir is situated about 14 k.m. from Sirsa district in Haryana. Ottu reservoir is a water body of the Ghaggar river and the river water is blocked at weir, as such the river does not have any water downstream. All river water was diverted to canal in Haryana. The Ottu Reservoir is situated between 29.29'21" North latitude and 74.53' 38" East longitudes. The Average depth of the reservoir is 2.2 m. and area of water body is about 67400 m^2.For experimentation, water samples were taken from bank of reservoir.

Materials and Methods:

The present study was carried out over a period of fifteen months from April 2012 to June 2013. The samples were collected monthly from the sampling site. Water samples for phytoplankton were directly collected from water and taken in wide mouthed polythene bottles of 500ml. Samples were preserved in Lugol's iodine solution and in 4% formaldehyde immediately after collection and were allowed for sedimentation for 5-6 days. The supernatant was removed after sedimentation. After that phytoplankton were identified and counted using Sedgwick rafter slide under microscope. The results of phytoplankton were expressed in units×10^3/l. Phytoplankton were identified [1,2,7,13].

Result and Discussion:

In Ottu reservoir, the phytoplankton population was represented by four groups' viz. Chlorophyceae (greens), Cyanophyceae (blue greens), Bacilloriophyceae (diatoms) and Euglenophyceae. During 15 months of study the total population of Chlorophyceae (greens) were fluctuate between 420 to 1660 units×10^3/l. The Chlorophyceae mainly represented by *Oedogonium sp., Microspora sp., Pediastrum duplex, Scenedesmus dimorphous, Ulothrix sp., Spirogyra sp,. Chlorella vulgaris, Closterium leibleinii, Zygnema sp. and Chara sp.. Spirogyra and Ulothrix sp.* seems as dominant species during the study period. In same reservoir, the second group Cyanophyceae from the 230 to 1720 units×10^3/l. It is mainly represented by *Synechocystis crassa, Cylindrospermum minimum, Microcystis aeruginosa, Spirulina sp., Oscillatoria chlorine, Oscillatoria formosa, Nostoc sp. and Anabaena spiroides*. *Microcystis aeruginosa* were recorded as highest during the study time period. *Fragilaria sp., Cyclotellam eneghiniana, Navicula viridula ,Synedra ulna, Diatoma vulgaris and Pinnularia sp.*were recorded in Bacilloriophyceae. It was ranges from 60 to 1120 units×10^3/l. Euglenophyceae from the 40 to 210 units×10^3/l. It is mainly represented by *Phacuscaudatus and Euglena sp.*. The monthly variations in each groups shown in table-1.

In total during study period the phytoplankton population ranges from 1190 to 3930 units×10^3/l and was noticed highest in the month of May 2013 in summer season and least in the month of September 2012 in monsoon season. Phytoplankton were dominant during warmer month in summer season. The high temperature is the principal factor for the phytoplankton growth[111], estimated the diversity of phytoplankton was greater during summer supporting the present studies. Phytoplankton count also registered higher value during non-rainy months[3,4,11,12,14,15].

Conclusion:

Present study shows seasonal diversity richness in summer followed by monsoon and winter. The monitoring of the phytoplankton assemblages carried out in Ottu Reservoir showed large seasonal variations in quantitatively terms the composition and structure of phytoplankton communities reveal changes in water quality, especially with regard to water temperature and other chemical properties.

Table - 1 : Monthly Variation of Phytoplankton population (units 10^3/l.) of Ottu reservoir during April 2012 to June 2013

S.N.	Month	Chlorophyceae	Cyanophyceae	Bacillariophyceae	Euglenophyceae	Total
1.	April	990	950	680	180	**2800**
2.	May	1010	1340	800	130	**3280**
3.	June	800	1120	640	110	**2670**
4.	July	710	850	520	110	**2190**
5.	August	420	230	530	40	**1220**
6.	September	480	260	400	50	**1190**
7.	October	890	660	450	40	**2040**
8.	November	1130	940	320	60	**2450**
9.	December	1400	530	130	80	**2140**
10.	January	1600	900	60	110	**2660**
11.	February	1660	620	940	150	**3370**
12.	March	1450	1100	1120	210	**3880**
13.	April	1270	1560	870	180	**3880**
14.	May	1210	1720	840	160	**3930**
15.	June	810	1100	500	140	**2550**
Total		**15830**	**13880**	**8800**	**1740**	**40250**

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