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Study of Phytoplankton diversity of the Gomati River at Jaunpur, Uttar Pradesh, India

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Abstract

Phytoplankton play a vital role in wetlands and river ecology. They provide food for other aquatic life and help to maintain the aquatic environment. Keeping this in mind, an attempt has been done to enumerate the phytoplankton available in Gomati river of Jaunpur areas of Uttar Pradesh state in 2013. the results revealed that 24 genera of different families are available in study areas. it was observed that species belongs to Bacillariophyceae are dominant. The present study highlights the diversity & importance of phytoplankton in study areas.

INTRODUCTION

The word plankton originates from the Greek word for "wandering." It refers to the astonishingly diverse group of plants and animals that spend some or all of their life cycle drifting in the water of oceans or freshwater lakes. Although many of these organisms are capable of locomotion, they are generally unable to move independently of currents and waves. This

lack of strong swimming ability separates plankton from nekton, which includes organisms that can control their movement in the water. Some planktonic organisms can be quite large, however, plankton is generally smaller than nekton, and most are best viewed with the aid of a microscope (Prescott 1969). Among balanced ecosystem, phytoplankton plays a significant role in providing food for a varied range of marine animals including whales, shrimp, snails and jellyfish. The increase of nutrients resources showed phytoplankton to grow out of control and form harmful algal blooms (HABs), Which produce hazardous toxic compounds that have harmful effects on fish, shellfish, mammals, birds, and even people (Mahajan 1988). The term Phytoplankton comes from the Greek term, phyto means Plants and planktons means drifter. Planktons are composed of tiny plant called phytoplankton. Phytoplankton is often an important link in the transformation of energy in ecosystem. Phytoplankton plays an important role to make climax community. The presence of Phytoplankton is indicator to pioneer community in rivers. Rivers are the major sources of drinking water, besides their usages in agriculture, washing, bathing etc. Only small amount of water that occurs in fresh water rivers, streams, lakes and tanks is available for the terrestrial life (Wetz el al. 2001).

Water pollution in India has come to a critical point. Almost all major river of India are facing the problem of pollution anthropogenic activities, urbanization, industrialization have influence the water resources quantitatively and qualitatively. Pressure on rivering ecosystems is enormously increasing due to fast industrial and urban growth. The growth and diversity of aquatic micro flora in river system is influenced by several physicochemical parameters. These factors affected the ecosystem of river. Many studies on water quality of fresh water have been conducted from all over India (Palharya & Malviya 1988). Thus, the present study was carried out to highlighting the role of changing water condition in determining the abundance and succession of phytoplankton in a set of samples collected in Gomati river at Jaunpur.

MATERIALS AND METHODS

Study area

Jaunpur is representing south eastern part of Uttar Pradesh and lie 82.6^0E longitude and 25.7^0 N latitude embracing an area of nearly 4038 km^2. Municipal and industrial sewage from different areas of city and industries are discharged into Gomati river

directly or indirectly (Ali et al. 2009; Singh et al. 2016a, 2016b). Four sampling sites from upstream and downstream were selected near Jaunpur N (25.7^0) and E (82.6^0) in about 8 km stretch area. For monitoring the river over a period of one year. Four sampling sites were chosen from upstream. Gokul ghat (S_1), Jogiyapur ghat (S_2), Miyapur ghat (S_3) and Ram ghat (S_4) respectively (Plate 1). The selection of upstream was based on the points where the communities most frequently collected water for drinking.

Phytoplankton Study

The specimen of phytoplanktons were collected from four different sampling sties in Gomati river at Jaunpur. The water samples were collected in sterile glass bottles. Sample was analyzed by following the methods as described by APHA (1985). The phytoplanktons were collected filtering 60 liters of water through a plankton net made up of bolting silk cloth No. 25. Sample was preserved in 5% of formalin solution for phytoplankton study respectively. The systematic identification of planktons was made by standard keys of Apha (1985) and Adoni (1985). Water samples were collected from four sampling sites in Gomati river at Jaunpur and enumeration was done by standard method (Singh et al. 2010).

Plate 1: Collection sites of phytoplenkton study at Jaunpur area of Gomati river, India, S1: Gokul Ghat; S2:Jogiyapur Ghat; S3: Miyapur Ghat; S4: Ram Ghat

RESULTS AND DISCUSSION

The present works highlights the diversity of phytoplankton in study areas. Most of the algae were planktonic, free floating and few are epizoic. The distribution and composition of phytoplankton's are listed in Table 1. The planktonic algal forms belong to Bacillariophyceae, Chlorophyceae, Cyanophyceae and Euglenophyceae. Out of 24 genera, Bacillariophyceae showed highest followed by Chlorophyceae, Cyanophyceae and Euglenophyceae (Figure 1). Similar groups of phytoplankton of river Gomati were also reported by many researchers (Ali et al. 2009; Singh & Preeti 2013; Singh et al. 2016). The availability of in the riverine ecosystem depends upon its physiographic. Reduced number of phytoplanktons had been reported from acidic water and it was supported by Lewitus et al. (1998). The maximum phytoplankton population found in post monsoon, it may be due to the favorable condition of the water. It was also observed that in monsoon season, the population reduced due to increased rainfall, and dilution effect of flood.

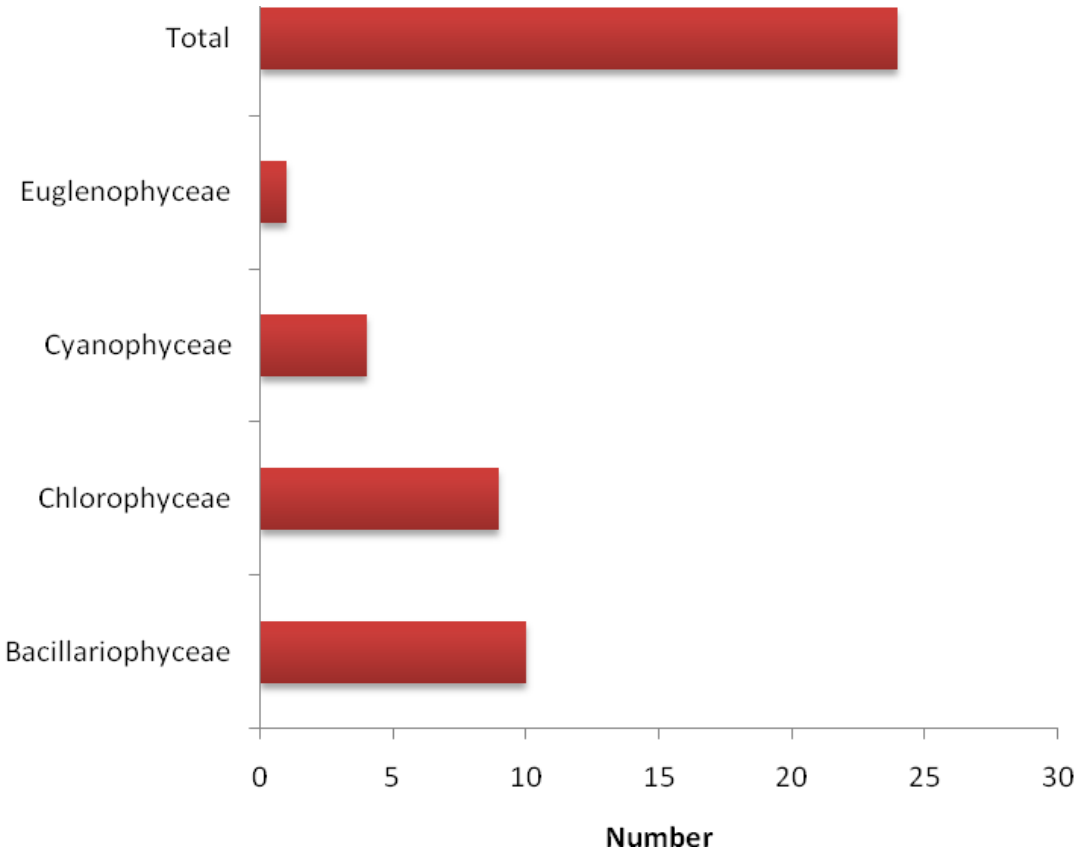

Figure 1: Diversity of phytoplankton in study areas

Table 1 : Diversity of phytoplankton in study areas

S.No.	Phytoplankton	Sampling Sites			
		S_1	S_2	S_3	S_4
A. BACILLARIOPHYCEAE					
	Cymbella cistula	+	+	-	+
	Cyclotella spp.	+	+	+	-
	Cymbella cysta	+	+	+	+
	Fragillaria sp.	+	-	+	+
	Melosira granulate	+	+	+	-
	Meridion circulare	+	-	+	+
	Navicula indica	+	-	+	+
	Nitzschia spp.	+	+	+	+
	Pinnularia braunni	+	+	+	+
	Synedra ascus	+	+	+	+
	Synedra ulna	+	+	+	+
	Tabellaria spp.	+	+	+	+
B. CHLOROPHYCEAE					
	Cladophora fracta	+	+	-	+
	Chlorella spp.	+	+	+	+
	Cosmarium spp.	+	+	+	+
	Oedogonium spp.	+	-	+	+
	Spirogyra spp.	+	+	+	-

	Ulothrix zonata	+	+	+	+
	Volvox globater	+	+	+	+
	Zygnema majus	+	+	+	+
	Chara spp.	+	+	+	-
C. CYANOPHYCEAE					
	Anabaena oryzae	+	-	+	+
	Anabaena spiroides	+	+	-	+
	Nostoc spp.	+	-	+	+
	Oscillatoria spp.	+	+	+	+
	Spirulina spp.	+	-	+	+
D. EUGLENOPHYCEAE					
	Euglena viridis	+	+	+	+
	Euglena acus	+	-	+	+

CONCLUSION

The present study concluded that Bacillariophyceae is more dominant in comparison to other genera in Gomati river at Jaunpur area of Uttar Pradesh, India. It was noted that the total phytoplankton is minimum in monsoon and maximum in post monsoon. It was also noticed that local community do washing clothes, discharging soap water, waste and domestic sewage directly into the Gomati River. Therefore, need proper awareness programmes regarding pollution and conservation of phytoplankton diversity in study areas.

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