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An assessment of Phytoplankton population in Gomati River at Jaunpur, Uttar Pradesh, India

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ABSTRACT

Studies on phytoplankton in the water of Gomati River at Jaunpur were made to know the diversity of phytoplankton from January 2013 to December 2013. This study revealed that the water of river Gomati has rich diversity of diverse phytoplankton.

INTRODUCTION

Planktons are very sensitive to the environment. They live in any alteration and the environment leads to the change in the plankton communities in terms of tolerance, abundance, diversity and dominance in the habitat. Therefore, plankton population observation may be used as a reliable tool for bio monitoring studies to assess the pollution status of aquatic bodies (Ali et al. 2009; Pathak 1991; Mishra & Mishra 2008; Singh et al. 2016; Singh et al. 2010; Singh et al. 2010; Srivastava et al. 2011; Singh 2001). The study of plankton may be an index of water quality with respect to industrial, municipal and domestic pollution has been reported earlier (Acharjee et al. 1995; Ali et al. 2009; Jha et al. 1997, Singh et al. 2016). This investigation was carried out on the surface plankton population in the aquatic ecosystem of Gomati river water. As a consequence, the phytoplankton populations of the Gomati River have been affected in terms of abundance and diversity. This study is aimed at evaluating the plankton diversity.

MATERIALS AND METHODS

Study area

Jaunpur is representing south eastern part of Uttar Pradesh (U.P.) 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. Two sampling sites were chosen from upstream (i) Gokul ghat (S_1), (ii) Jogiyapur ghat (S_2), respectively.

Phytoplankton Study

Plankton samples were collected by standard methods (APHA 1989) from predetermined sampling sites from the point of effluent outfall along with the downstream water stretch, arbitrarily designed two stations (i) Gokul ghat (ii) Jogiyapur ghat from January 2013 to December 2013. The collected samples were fixed in 5% formalin solution and brought to the laboratory for phytoplankton analysis. Counting and identification were done as per APHA (APHA 1989). Species diversity index was obtained by following Shannon Weaver methodology (Nath 1997).

RESULTS AND DISCUSSION

Phytoplanktons were collected from the river water during the study period from Stations I and II.

Station-I (Gokul ghat): The qualitative and quantitative monthly occurrence of phytoplanktons species at Station-I are given (Table 1; Figure 1). The mean number of species of phytoplanktons encountered from station-I of which 15 species belonged to Chlorophyceae, 8 species to Bacillariophyceae, 21 species to Cyanophyceae and 7 species to Euglenophyceae. Total phytoplankton population density ranged from 31 in December to 76 in June. A gradual increase in the total density of phytoplankton population was observed from January to May 2013. The annual mean percentage composition of different groups of phytoplnktons revealed to contribute nearly 29% of Chlorophyceae, 16% of Bacillariophceae, 41% of Cyanophyceae and 14% of Euglenophyceae.

Station-II (Jogiyapur ghat): A total number of 44 species of phytoplankton belonging to Chlorophyceae, Bacillariophyceae, Cyanophyceae and Euglenophyceae were identified and are presented (Table 2 & Figure 2). The changes in the total population density of different phytoplankton groups and their month-wise percentage composition were also depicted. The maximum density of 66 cells/ml was observed during June 2013 whereas the minimum density of 27 cells/ml was observed during January 2013. The annual mean percentage composition of different groups of phytoplanktons revealed to contribute nearly 23% of Chlorophyceae, 21% of Bacillariothyceae, 33% of Cyanophyceae and 23% of Euglenophyceae.

The knowledge of phytoplankton species composition and distribution to time and space are of great value especially in any running water system. The present study reveals some aspects of phytoplanktonic dynamics to explain their relations with the physicochemical parameters of river Gomati at Jaunpur. In the present investigation, the phytoplankton fluctuates monthly and its productivity was high during June and low during December as evidenced earlier by Ali et al. (2009), Singh et al. (2016), Singh (2013) and Srivastava et al. (2011). The phytoplankton comprises major portion in the river. The basic process of phytoplankton production was dependent

upon temperature, turbidity and nutrients as reported by A. Srivastava et al. (2010), Mishra and Mishra (2008), Pathak (1991), Singh (2001), Singh et al. (2010) and Sukumaran and Das (2002). In the present study, the low productivity of phytoplankton might be due to the grazing effect by zooplankton and fishes as evidenced earlier by Mathivanan and Jayakumar (1995), Biswas and Konar (2001) and Sadguru et al. (2002). In the present investigation, this observation clearly revealed that zooplankton represents a sensitive indicator of pollution compared to that of phytoplankton. It is concluded from this study that the plankton population of river Gomati at Jaunpur is highly influenced by the discharge from different industrial effluent and domestic sewage. The shift in the planktonic community structure and dominance of pollution tolerant forms at discharge zone indicated deterioration of water quality in this stretch of the river.

Table 1: Population composition and monthly fluctuation of phytoplankton at Station-I (organisms/ml from January 2013 to December 2013)

Months	Chlorophyceae	Bacillariophyceae	Euglenophyceae	Cyanophyceae	Total phytoplankton
January	10	8	6	11	35
February	13	9	6	14	42
March	15	8	5	21	49
April	16	7	6	28	57
May	22	5	6	40	73
June	20	11	4	41	76
July	16	6	5	25	52
August	18	7	9	15	49
September	14	9	5	15	44
October	16	11	4	10	41
November	8	7	8	13	36
December	12	4	5	10	31
Mean	15	3	7	21	49

Table 2: Population composition and monthly fluctuation of phytoplankton at Station-II (organisms/ml from January 2013 to December 2013)

Month	Chlorophyceae	Bacillariophyceae	Euglenophyceae	Cyanophyceae	Total phytoplankton
January	6	4	7	10	27
February	7	6	9	9	37
March	8	10	8	17	43
April	11	9	10	6	45
May	14	8	7	21	50
June	18	11	10	27	66
July	16	11	6	19	52
August	11	9	5	13	35
September	10	5	6	12	33
October	11	5	6	14	30
November	12	6	7	16	41
December	5	8	4	11	28
Mean	13	12	13	18	44

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REFERENCES

Acharjee B, Dutta A, Chaudhury M and Pathak B. (1995). Phytoplankton species diversity indices in dighali beel, Assam. India Environ Ecol. 13(3) 660-662.

Ali N, Akhtar M. and Pandey AK. (2009). Studies on phytoplankton diversity in the river Gomati at Jaunpur (U.P.): Asian J. Env. Sci., 4 (1): 78-80.

Ali N, Akhtar M. and Pandey AK. (2009). Studies on the role of metallic pollution in river in ecosystem. Asian J. Env. Sci. 4(1): 92-94.

APHA (1989). Standard methods for examination of water and waste water, 17thEdn. (1989).

Biswas BK and Konar SK. (2001). Influence of hazardous industrial wastes on plankton in the river Damodar at Durgapur in West Bengal. Pollut. Res. 20(4), 583-588.

Jha AK, Latif A and Singh J.P. (1997). River pollution in India : An overview J. Environ Pollut. 4(2): 143-151.

Mathivanan V, Vijayan P. and Sabhanayakam S (2004). An assessment of water quality of river Cauvery at Mettur, Salem district, Tamilnadu in relation to pollution. Curr. Sci. 5 (2) 573-578.

Mishra SS and Mishra A. (2008). Assessment of physico-chemical properties and heavy metal concentration in Gomati River. Res. Env. Lif. 2: 55-58.

Nath D. (1997). Methods of evaluating primary productivity in small water bodies in fisheries enhancement in small reservoirs and flood plain lake, CIFRI. pp. 65-73 (1997).

Pathak SP. (1991). Screening of microorganisms in river Gomati water under various environmental conditions. Journal of Applied and Natural Science. 3(2): 298-302.

Singh A, Srivastava A and Pandey AK. (2010). Impact of pollution on plankton productivity of river Gomati at Jaunpur (U.P.). Environ. Ecol. 28 (1): 95-97.

Singh KP. (2001). Report on monitoring and assessment of the Gomati river quality. Industrial Toxicological Research Centre, Lucknow.

Singh NB, Pandey S and Ali SN. (2010). Heavy metal content in Gomati river water, Sediment and hydrobiota in Jaunpur (U.P.). Asian J. Env. Sci. 5(1): 53-57.

Singh P. (2013). Seasonal status of density of phytoplankton and zooplankton in Gomati river of Lucknow (U.P.), India. Journal of Applied Natural Science, 5 (1): 85-62.

Singh VP, Singh AK, Singh P, Singh SK and Singh A. (2016). Assessment of water quality in the river Gomati at Jaunpur (U.P.), India. Annals of Plant Sciences, 5 (3): 1312-1317.

Singh VP., Singh A, Singh AK, Singh P and Singh MP. (2016). Seasonal status of the density and diversity of phytoplankton in river Gomati at Jaunpur (U.P.), India. IJAR. 4(3): 1900-1905.

Srivastava S, Srivastava A, Negi MPS. and Tandon PK. (2011). Evaluation of effect of drains on water quality of river Gomati in Lucknow city using multivariate statistical techniques. Int. J. Env. Sci. 2 (1).

Sukumaran PK and Das AK. (2002). Plankton abundance in relation to physicochemical features in a peninsular man made lake Environ. Ecol., 20(4). 873-879.