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ARTICLE

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STATUS AND DISTRIBUTION OF PERIPHYTON COMMUNITY IN RIVER GANGA

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The periphyton is valuable as natural indicator of contamination, as there most parts are sessile and consequently cannot keep away from contact with the waste effluents. The present study was made to understand seasonal variation of diversity and density in the large riverine ecosystem, the River Ganga. A total of 73 genera of phytoplankton, belonging to 10 classes and 6 phyla were recorded during the study. The Diatoms and Cholophyceae were found dominant during winter (2.29998 x 10^5unit/$cm^2$and 1.8433x 10^4unit/cm^2), while the Cyanophyta and the highest density was observed during Monsoon (1.17135x 10^5 unit/cm^2) months.

Introduction

Periphyton are the type of organism that gets attached to the substratum and grows in a localized environment. It is composed of different types of algae, cyanobacteria, heterotrophic microbes, and detritus which grows on the beds of streams, ponds, and rivers[1]. The periphyton is valuable as natural pointer of contamination, as they are for the most part sessile and consequently cannot keep away from contact with the waste effluents. It plays a significant role in the productivity of water bodies because the productivity of periphyton can be similar to or exceed phytoplankton[2]. Natural feed for aquatic organisms like small fish, grass shrimp, and other small consumers is at the base of the food web[3]. They grow on many different substrate types in the river, including mud sediments. Some of these substrate types have the potential to release nutrients to the attached periphyton and influence periphyton metabolism, although it may influence the trophic status of the river[2]. Periphytic algae can grow widely distributed in the aquatic environment, and cannot migrate in adverse conditions; therefore, as they can act as good indicators of environmental conditions[4]. Some species of cyanobacteria algae can be toxic, while the excessive growth and subsequent death and decay of toxic and non-toxic species can deplete oxygen[5]. These changes can impair the reproductive capacity or even kill fish and bottom-dwelling animals, taint potable water supply and reduce the aesthetic and recreational quality of streams and rivers[6].

Due to over increasing rate of human population throughout the stretches of river Ganges basin followed by discharge of effluents from the industries and other anthropogenic factors, the Ganges basin receives high ûuxes of nutrients and other pollutants. In view of this, to understand the current status of ecological health of the river the status of periphyton diversity and the associated microhabitat is required for developing conservation strategy.

Methodology

Firstly, an area was selected and measured by using a measuring scale. After that, the samples were collected by scraping the area with the help of a glass slide. The

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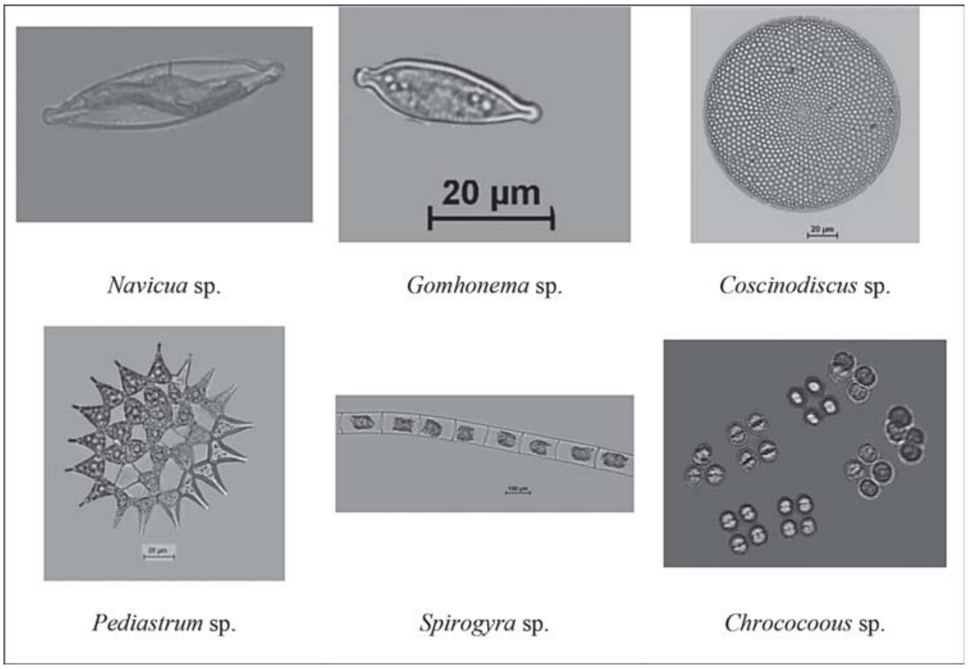

Fig. 1 Important Plankton Species of River Ganga

sample was collected in a container. Preservation was done immediately after collection in 4% neutral buffer formalin (NBF). Identification was done by employing a trinocular microscope (40x and 60x magnification) using standard keys.

Observation

A total of 73 genera of phytoplankton, belonging to 10 classes and 6 phyla were recorded in this study. The major algal groups represented as Bacillariophyceae (25 genera), Mediophyceae (2 genera), Coscinodiscophyceae (2 genera), Chlorophyceae (15 genera), Trebouxiophyceae (4 genera), Ulvophyceae (2 genera), Cyanophyceae (11 genera), Zygnematophyceae (8 genera), Dinophyceae (1 genus) and Euglenophyceae (3 genera). A total of 11 genera of zooplankton belonging to 4 phyla (Rotifera, Arthropoda, Ciliophora, and Amoebozoa) were recorded. Among zooplankton, Rotifera accounted for 3 genera followed by Cladocera (1 genus), Copepoda (2 genera) Ciliophora (3 genera), and Amoebozoa (2 genera).

The analysis of spatial pattern indicated high density of periphytic community at Prayagraj (48405 unit/cm^2) and the lowest at Balagarh (930 unit/cm^2) during pre-monsoon. During monsoon season, the highest dominance was recorded at Farakka (17700 unit/cm^2) and the lowest at Harshil (150 unit/cm^2). During the post-monsoon season, the highest abundance was observed at Bhagalpur (29734 unit/cm^2) and lowest at Fraserganj (3050 unit/cm^2) during winter, the highest at Kanpur (40150 unit/cm^2), and the lowest at Jangipur (3080 unit/cm^2). In the upper stretch highest density was found during winter (127835unit/cm$^{2)}$ and the lowest during monsoon (15590 unit/cm^2). The highest density of the periphytic community was found during pre-monsoon (150242 unit/cm^2) and the lowest during monsoon (83050 unit/cm^2) in the middle stretch. However, in the lower stretch, the highest density was found during post-monsoon (94061 unit/cm$^{2)}$ and the lowest during winter (44445 unit/cm^2).

Major Class-wise Description of the Community

Bacillariophyceae: The group Bacillariophyceae was recorded to be dominant in winter (229998 unit/cm^2) followed by post-monsoon (237370 unit/cm^2). Haridwar (22415 unit/cm^2) has shown vivid dominancy of Bacillariophyceae during pre-monsoon time and the lowest density at Balagarh (620 unit/cm^2). During Monsoon highest dominance was recorded at Jangipur (12000 unit/cm^{2}l) and the lowest at Harshil (150 unit/cm^2). During post-monsoon, the highest is at Prayagraj (33360 unit/cm^2) and the lowest at Fraserganj (320 unit/cm^2) while during winter, the highest is at Haridwar (33350 unit/cm^2) and the lowest at Fraserganj (233 unit/cm^2) were recorded. This group is represented by *Diatoma* sp., *Nitzschia* sp., *Navicula* sp., *Fragillaria* sp., *Synedra* sp., etc.

Chlorophyceae: The class Chlorophyceae belongs to the phylum Chlorophyta. The highest density was observed during winter (18433 unit/cm^2) followed by pre-monsoon (15633 unit/cm^2). The high density of this class was recorded at Prayagraj (5425 unit/cm^2) and the lowest at Harshil (40 unit/cm^2) during pre-monsoon. During monsoon highest dominance was recorded at Kanpur (3075 unit/cm^2) and the lowest at Patna (10 unit/cm^2). During post-monsoon highest at Kanpur (1910 unit/cm^2) and lowest at Patna (10 unit/cm^2) however, during winter highest at Godakhali (4940 unit/cm^2) and lowest at Tehril (10 unit/cm^2) were recorded. under the group, some recorded genera were *Microspora* sp., *Oedogonium* sp., *Pediastrum* sp., *Ankistrodesmus* sp., *Scenedesmus* sp, etc.

Cyanophyceae: The class Cyanophyceae belongs to the phylum Cyanophyta and the highest density was observed during Monsoon (117135 unit/cm^2) followed by post-monsoon (86452 unit/cm^2). The high density of this class was recorded at Berhampore (10843 unit/cm^2) and the lowest at Farrukhabad (20 unit/cm^2) during pre-monsoon. During monsoon, the highest dominance was recorded at Buxar (18720 unit/cm^2) and the lowest at Tehri (70 unit/cm^2). During post-monsoon highest dominance was recorded at Godakhali (15020 unit/cm^2) and the lowest at Harshil (30 unit/cm^2). During winter highest density was found at D. Harbour (5320 unit/cm^2) and the lowest at Fraserganj (70 unit/cm^2) was recorded. Cyanobacteria are represented by the genera *Oscillatoria* sp., *Microcystis* sp., *Lyngbya* sp., *Phormidium* sp., *Anabaena* sp., etc

Conclusion

In this study the present status of the river periphyton, growth, was recorded and habitat preference and distribution were documented. The findings showed a broader understanding in the seasonal variation of diversity and density in the large riverine ecosystem. ❐

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