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PHYTOPLANKTON COMMUNITIES OF LENTIC PERIPHYTON

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ABSTRACT

Periphyton was cultured and its phytoplankton communities were identified based on morphological features. This included 24 genera belonging to the 6 classes. Highest number of genera was found in Bacillariophyceae followed by Cyanophyceae and Chlorophyceae. Whereas a single genus was documented from class Euglenophyceae, Ulvophyceae and Xanthophyceae. Hence, the study is quite handy for the identification of phytoplankton species of lentic periphyton and their abundance. Thus knowing this could be beneficial in understanding the role of periphyton in primary productivity of aquaculture ponds and also gives fillip to sustainable aquaculture.

Keywords: Aquaculture, Lentic, Periphyton, Phytoplankton, Sustainable.

I.INTRODUCTION

In freshwater lentic ecosystem wide array of species diversity is associated with periphyton. In an aquatic system, micro-floral community living attached to the surfaces of submerged objects which includes bacteria, fungi, protozoa, phytoplankton, zooplankton, benthic organisms, organic detritus, and range of other invertebrates and their larvae is collectively defined as periphyton [1] It may dwell either on a degradable or non-degradable substrates present in an aquatic system[2]. Word 'lentic' refers to standing water which includes lakes, ponds, marshes, and ditches. Availability of light, nutrient, substrate and less physical disturbance makes lentic ecosystem as an ideal habitat for periphyton. Usefulness of periphyton in freshwater includes primary productivity, nutrient cycling and food web interaction [3]. In recent years periphyton is of great interest in monitoring water quality and sustainable aquaculture practices [4][5]. . Earlier, few studies were also undertaken to document the phytoplankton of lentic periphyton [6][7][8][9].Hence understanding the species composition of periphyton is of immense important in order to successfully maintain and manage freshwater ecosystem. In this context periphyton was raised on PVC pipes in cement tank followed by fortnightly application of manure. In this work we stick to easy, inexpensive morphology based identification method to discriminate between the phytoplankton species.

II.MATERIAL AND METHODS

PVC pipes were vertically hanged into outdoor cement tank (1.5 × 0.5 × 1.5m). Bottom of the tank was covered with 10 cm soil bed and filled with water. Manures such as cattle dung, single super phosphate and urea were applied once in 15 days (Gangadhar et al 2017). A month later the initiation of experiment, periphyton grown on pipes were collected by manual scraping. 1 gm of periphyton was mixed with 5ml of distilled water and vortexed for 2-3 min and observed under binocular microscope fitted with camera (Motic ecoline). Images were captured and processed by means of Motic Images Plus 2 software.

III.RESULT AND DISCUSSION

3.1, Brachysira sp. Kützing 1836 [11] [12] Fig. 1

Lanceolatedvalvessymmetrical to the apical axis, bivalve 4-9 µm wide and 15-45 µm long punctuatedstriae, rhombic valve.

3.2, Cymbella sp. Agardh [11] [12] Fig. 2

Valves asymmetric to the apical axis, symmetric to the trans apical axis.

3.3, Fragilaria sp. Lyngbye [12] [13] Fig.3

Oblong cells linked together to form ribbon like colony, two large chloroplasts per cell.

3.4, Gomphoneis sp. Cleve [11] [12] Fig.4

Clavate valves are symmetric to the apical axis, longitudinal lines, pseudoseptae present, multiseriatestriae.

3.5, Pinnularia sp. Ehrenberg [11] [12] Fig. 5

Valves with gibbous center,apices are rounded and subcapitate.

3.6, Pleurosigma sp. Smith [11] [12] Fig.6

Valves sigmoid, raphae sigmoid, two opposite end reflecting each other.

3.7, Ulnaria sp. Compère [15] Fig.7

Rectangular shaped in girdle view, elongated, narrow shape, identical valves, no raphae.

3.8, *Navicula sp.* (O. Müller) Bory de Saint-Vincent [11] [12] Fig.8

Elliptical valves, lanceolate in outline, capitates end, raphae are straight.

3.9, Haematococcus sp. Flotow [12] [13] Fig.9

Cells appear ovoid to ellipsoidal, protoplast attached to cell wall, coccoid stage is spherical with color ranges from green to red.

3.10, Kirchneriella sp. Schmidle [12] [13] Fig.10

Sickle shaped cell, colony of 2-64 cells in mucus envelope, uninucleated cell with single chloroplast.

3.11, Pediastrum sp. Meyen [12] [13] Fig.11

Multinucleated cell forming flat colony, cells connected together in concentric rings, cells are often lobed or notched sometime bear horn.

3.12, Selenastrum sp. Reinsch [12] [13] Fig. 12

Cells strongly curved and often slightly sigmoid, lunate to subcircular with pointed tips, cells in colonies.

3.13, Senedesmus sp. Meyen [12] [13] Fig. 13

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Elliptical, elongated cells fuse together in rows touching with lateral walls; mucilaginous matrix may or may not present.

3.14, Tetraedron sp. Kützing [12] [13] Fig. 14

Cells are triangular or flattened; thin cell wall.

3.15, Anabaena sp. Bornet and Falhault [12] [13] Fig. 15

Filamentous, coiled or tangled, some time screw like coiled trichomes, deep constriction at cell wall, cells cylindrical.

3.16, Chroococcus sp. Nägeli [8] [12] Fig. 16

Usually 4-16 cells forms wide margin around cell, spherical cell, lamellated, gelatinous mat.

3.17, Merismopedia sp. Meyen [12] [13] Fig.17

Densely arranged spherical to oval cells, flat and rectangular colonies appears like a mat.

3.18, Oscillatoria sp. Gomont [12] [13] Fig.18

Unbranched filament with smooth layered strata, trichome straight to slightly curved or isopolar, short cylindrical or discoid cells.

3.19, Spirulina sp. Gomont [12] [13] Fig. 19

Filamentous, trichomes are screw like coiled, unattenuated ends.

3.20, Snowella sp. Elenkin [12] [13] Fig. 20

Unicellular, colonial, oval or spherical shaped colonies, spherical or slightly radiated cell, joined to the ends of stalks.

3.21, Phacus sp. Dujardin [12] [13] Fig. 21

Flagellated green in color, cells are flat and leaf like appearance, flagella, eyespot and flagellar swelling is seen.

3.22, Ulothrix sp. Kützing [12] [13] Fig. 22

Trichomes are attached and unbranched, cells are cylindrical to barrel shape,cell wall thick or thin, lamellate.

3.23, Tribonema sp. Derbès and Solier [12] [13] Fig. 23

Filamentous, flagellate or capsoid, barrel shaped cell, H shaped cell wall.

3.24, Microcystis sp. E. Lemmermann [12] [13] Fig. 24

Cells spherical, net like appearance, irregularly distributed with homogenousbluegreen content, colonies gelatinous.

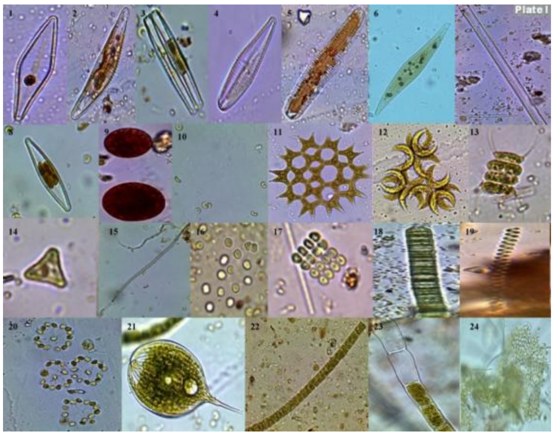

Fig.1.Brachysira sp. Fig.2.Cymbella sp. Fig.3.Fragilaria sp. Fig.4.Gomphoneis sp. Fig.5.Pinnularia sp. Fig.6.Pleurosigma sp. Fig.7.Ulnaria sp. Fig.8.Navicula sp. Fig.9.Haematococcus sp. Fig.10.Kirchneriella sp. Fig.11.Pediastrum sp. Fig.12.Selenastrum sp. Fig.13. Senedesmus sp. Fig.14. Tetraedron sp. Fig.15. Anabaena sp. Fig.16.Chroococcussp. Fig.17.Merismopediasp.Fig. 18.OscillatoriaspFig. 19.Spirulinasp. Fig.20.Snowella sp. Fig.21.Phacus sp. Fig.22.Ulothrix sp. Fig.23.Tribonema sp. Fig.24.Microcystis sp. [Magnification-100X]

IV.CONCLUSION

Our study systematically documented the phytoplankton species of lentic periphyton and provides a key identification strategy and their by facilitates as an identification guide. It is quintessential to know the species composition in order to understand their primary productivity and interaction with other micro-floral communities present along with it. Hence this study is important in this perspective too. Simple, inexpensive and sustainable culture strategy and copious species offered by lentic periphyton makes it an ideal resource in aquaculture practices.

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