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Chlorococcalean Diversity in Residential Unmanaged Water Bodies of English Bazaar Block in Malda District

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Abstract—*Assessment of Chlorococcalean diversity in unmanaged water bodies from English Bazaar block of Malda district was carried out in summer season from April to June 2018. Algal samples were collected from 10 unmanaged water bodies in residential areas during one season April-June. According to Fritsch's classification (1935) the order divided into 8 families. Out of 8 families 4 families were recorded in that season, with 15 different genera. These are Coelastraceae, Hydrodictyaceae, Chlorococcaceae, Chlorellaceae. Morphology-based identification was carried out using the keys of T. V. Desikachary (1959); Keys of N. Anand etc. A total of 15 genera and different species were recorded from 10 sampling sites during the study and it was observed that, the quantitative dominance of the algal family in summer is gradation: Coelastraceae >Hydrodictyaceae > Chlorococcaceae = Chlorellaceae.*

1. INTRODUCTION

English Bazaar Block is among of the one block of Malda district. Within this area the 10 unmanaged ponds were selected as study sites. These ponds receiving mostly swage and drainage water and is being mostly used by the slum dwellers for nister purposes. These water bodies supported several orders of algae among which Chlorococcales most dominant with respect to density; similar observation was reported by Chaturvedi, 1996.

2. MATERIALS AND METHODS

Water Samples were collected from the surface layers from the different sample area. Samples were collected in polyethylene bottles, after washing the bottles with the same water. The sampling was done uniformly between 07:00 a.m. to 09:00 a.m. and brought to the laboratory immediately and observed under microscope. Collected samples were processed to obtain monoculture. CHU10 media was used with various dilutions for successful culture maintenance. From the pure culture thus obtained the cellular micromorphometry was studied using HDMI Camera fitted, software enabled compound microscope (Olympus CX21i, Toup Cam).Morphology-based identification was carried out using the key's of T.V. Desikachary (1959), key of N. Anand etc. The cultures were maintained at room temperature.

3. MORPHOMETRICAL MEASUREMENT

Chlorococcum infusionum (Schrank)Menegh

Cells are uniform, most are 10- 18µm in diameter, chloroplast completely filling the cell cavity, small hyaline region in the chloroplast that contain pyrenoid.

Place of collection -pond, mode of occurrence-free floating, pH value of water- 8.1 9

Chlorella vulgaris Beijernnik

Cell solitary, unicellular, green, spherical, cross wall thin, chloroplast cup shaped with a distinct pyrenoid at the centre, cell 5- 7 µm in diameter.

Place of collection -pond, mode of occurrence-epiphytic.

Hydrodictyon reticulatum (L.)Lagerh.

Cells are elongate, cylindrical, formed sac like reticulum, cell arranged in hexagons to form the net, three cells meet at each angle of the mess, cells 6.14- 6.36 cm long and 1.12-1.20 cm broad.

Place of collection –unmanaged pond, mode of occurrence-free floating, pH value- 8.14

Monactinus simplex (Meyen)Corda

Coenobia 4 celled, cells arranged in a plate, outer cells have one elongated outward pointing process, inner cells polygonal, cells 15.4-16.5 µm long and 8.4-8.8 µm broad.

Place of collection- pond, mode of occurrence- epilithic.

Pediastrum duplex Philipose 1967

Colonies ellipsoidal, 16-32 rectangular or polygonal cells present with slight lens shaped perforations in between them;

marginal cells have short processes with two short spines, cells 16.6-17.5 µm in diameter.

Place of collection- pond, mode of occurrence-epilithic.

Pediastrum tetras Prescott 1961

Colonies 4 celled, outer margin of the peripheral cells with deep incisions, the lobes extended into horn like processes, cells 7-8 µm long and 9-10 µm broad.

Place of collection- pond, mode of occurrence-epilithic, pH of water- 9.13

Sauridium tetras (Ehrenberg)Hegewald

Coenobia 8 celled, circular, 22-24.6 µm in diameter, cells without intercellular spaces, maginal cells divided into 2 lobes with a deep single linear incision, inner cell 4-6 sided with a single linear incision, cells 6.3-6.6 µm in diameter.

Place of collection- pond, mode of occurrence-epiphytic.

Tetraedron trigonum (Reinsch) de Toni

Cells flat and rectangular with the corners produced into narrow processes which usually branch twice and end in spines, the primary branches are at right angle to one another, diameter of the cell processes is 27-30 µm.

Place of collection- pond, mode of occurrence-epiphytic.

Acutodesmus acuminatus (Lagerheim)Tsarenko

Coenobia 4 celled, outer cell is lunate, pointed end, cells much longer than broad, 13.8-15.2 µm long and 1.9-3.3 µm broad.

Place of collection- pond, mode of occurrence-planktonic, pH of water- 7.18

Desmodesmus brasiliensis (Bohlin) Hegewald

Coenobia 4 celled, cells cylindrical or slightly ellipsoid with attenuated apices, longitudinal ridge from pole to pole on each side of the cell, end of the cell with 1-3 small teeth, 10-25 µm long and 2-7 µm broad.

Place of collection- pond, mode of occurrence-epiphytic.

Desmodesmus maximus (W. and G.S.West) Hegewald

Coenobia 4-8 celled, spines are significantly shorter than the length of the cell, cells 14-19 µm long and 4-6 µm broad.

Place of collection- pond, mode of occurrence-planktonic, pH value of water-9.12

Desmodesmus subspicatus (R. Chodat) Hegewald & A. Schmidt in Hegewald 2000

Coenobia 4 celled, radially arranged from a common centre, cells spindle shaped, cell 41-42 µm broad and 7-8.5 µm long.

Place of collection- pond, mode of occurrence-planktonic, pH value of water-9.12

Pactinodesmus pectinatus (Meyen) Hegewald,Wolf, Keller, Friedl and Krienitz

Coenobia 4 celled, more or less arranged at an angle of 90° to each other, cell usually curved, spindle shaped with acute tip, 21.3-27.23 µm long and 2.1-5.2 µm broad.

Place of collection- pond, mode of occurrence-planktonic, pH value of water-7.6

Scenedesmus acutus Horobagyi

Coenobia 4-5 celled, cells broadly elliptical, with acute tip, cells 15-17 µm long and 4-6 µm broad.

Place of collection- pond, mode of occurrence-planktonic, pH value of water- 9.6

Scenedesmus quadrispina Chodat

Coenobia 4 celled, cells 16-18 µm long and 4-5.5 µm broad, obtuse end, short spines present on both the poles of the terminal cells, cells cylindrical.

Place of collection- pond, mode of occurrence-planktonic, pH value of water- 7.4.

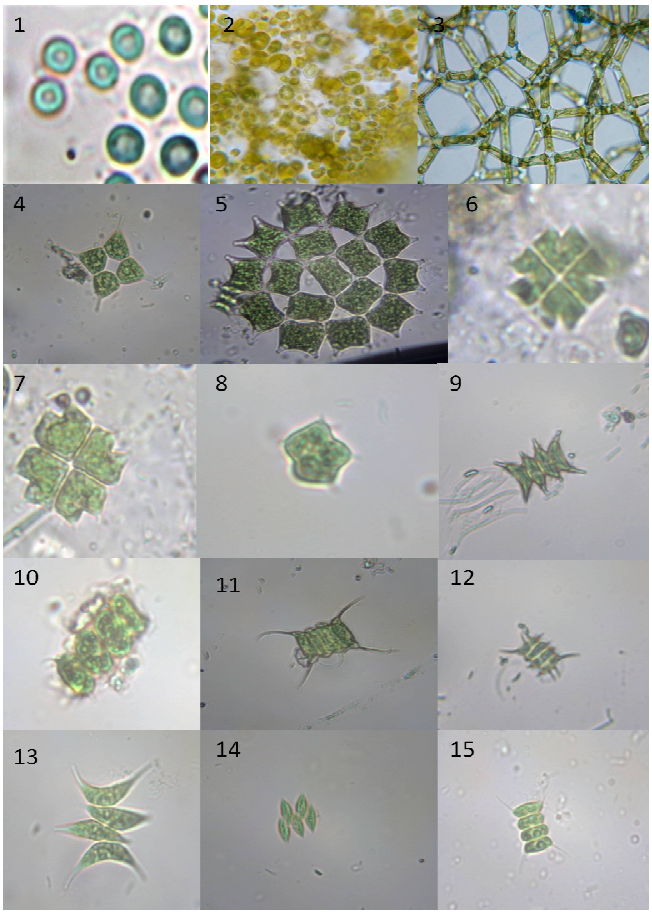


Figure 1: Photo plate

1. Chlorococcum infusionum 2. Chlorella vulgaris 3. Hydrodictyon reticulatum 4. Mmonactinus simplex 5. Pediastrum duplex 6. Pediastrum tetras 7. Stauridium tetras 8. Tetraedron trigonum 9. Acutodesmus acuminatus 10. Desmodesmus brasiliensis 12. Desmodesmus subspicatus 13. Pactinodesmus pectinatus 14. Scenedesmus acutus 15. Scenedesmus quadrispina.

4. RESULT AND DISCUSSION

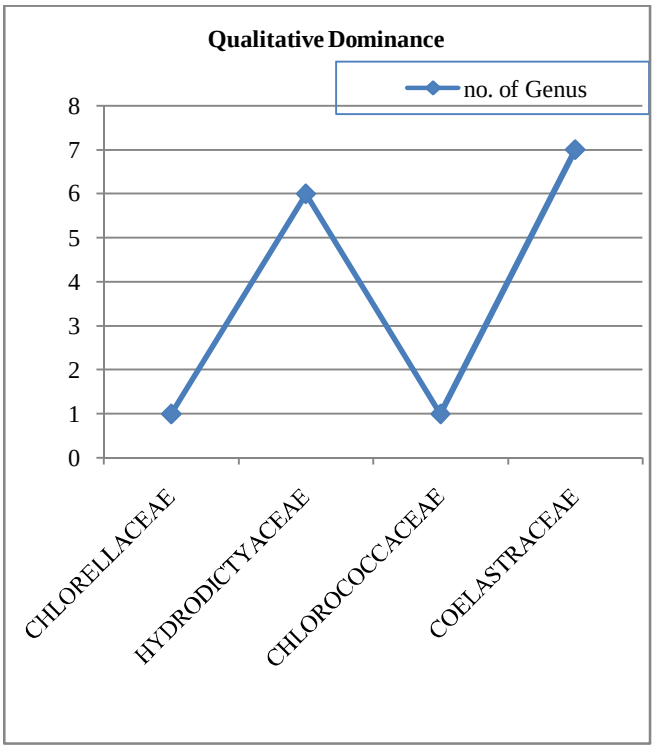
Different aquatic ecosystems of various ponds in summer, showed algal population with rich diversity of Chlorococcalean members. In higher pH the highest count of Chlorococcales were also observed. During sampling 15 genera with different species were recorded, of which one genus each of Chlorococcaceae and Chlorellaceae, six genus of Hydrodictyaceae and seven of Scenedesmaceae. Hence qualitative dominance was in the gradation of: Scenedesmaceae > Hydrodictyaceae > Chlorococcaceae = Chlorellaceae.

In this study the population of Scenedesmaceae members found to be the highest in summer in unmanaged water bodies under observation in the urban settlement area of Malda Town. Summer aquatic favour Chlorococcalean dominance where as they were found to be susceptible in winter aquatic ecosystem.

Table 1: Seasonal variation in the Density of Chlorococcalean Algae in unmanaged water bodies.

FAMILY	ALGAE	APRIL	MAY	JUNE
Coelastraceae/ Scenedesmaceae	Acutodesmus acuminatus	+++	++	+++
	Desmodesmus brasiliensis	+	++	-
	Desmodesmus maximus	++	+	++
	Desmodesmus subspicatus	++	+	-
	Pactinodesmus pectinatus	+	+	++
	Scenedesmus acutus	+	+	+
	Scenedesmus quadrispina	++	++	++
Hydrodictyaceae	Hydrodictyon reticulatum	+++	++	+
	Monactinus simplex	++	+	++
	Pediastrum duplex	+++	++	+
	Pediastrum tetras	++	+	+
	Stauridium tetras	+	+	+
	Tetraedron trigonum	++	++	+
Chlorococcaceae	Chlorococcum infusionum	+	++	+++
Chlorellaceae	Chlorella vulgaris	++	+	-

Whereas, '+' = 30-50% abundance, '++' = 50-80% abundance, '+++' = more than 80% abundance, '-' = nil



Graph 1: Showing the qualitative dominance of families.

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