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An assessment of Green algae (Chlorophyceae) diversity in different habitats of RiBhoi, Meghalaya

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Abstract

Meghalaya located in the North-Eastern region of India, is full of streams waterfalls, ponds, rivers and many other fresh water habitat. Present study was conducted to study the algae (Chlorophyceae) in different habitat in the RiBhoi district of Meghalaya located between 25°46' to 26°49' North latitude and 90°48' to 91° 50' east longitude. In the systematic treatment, detailed description of 28 genera consisted of 38 species belonging to 16 families and 7 orders have been identified and enumerated. Taxonomical information about freshwater green algae, distribution and ecological characteristics of each species were investigated.

Keywords: Algal flora, Aquatic ecosystem, Fresh water, Pollution.

1. Introduction

Algae are the vascular organ less primary producer of the earth. Algae are predominantly aquatic, found in fresh or saline water. Fresh water forms occur abundantly in ponds, lakes, streams, rivers and water reservoirs. Algae are found in different habitat on earth such as in the sea, rivers and lakes, on soil and walls, in animal and plants, in fact just about everywhere where there is a light to carry out photosynthesis. Microorganisms particularly in aquatic habitat have a very important role to play, what with more algal forms being identified for commercialization. For every one identified and proven species there must be several hundred natural forms, with different attributes. This is how the green revolution of the seventies was achieved for getting dwarf varieties of food grains. The global scenario has dramatically changed on the last few years. The emphasis is on preserving algal flora and genetic resources which tropical countries are richly endowed with. Country like India needs to be recognized for the occurrences of a wide range of aquatic forms like algae. However, it is an irony that when these issues are discussed the emphasis has always been laid on higher forms of flora and fauna.

Meghalaya located in the North-Eastern region of India, is full of streams waterfalls, ponds, rivers and many other fresh water habitat. About one third of the state is forested. The major portion of the state is covered by hill ranges with the altitudes ranging between 150 – 3000 m above mean sea level. The Meghalayan subtropical forests are considered to be among the richest botanical habitats of Asia. Its mountain forests are distinct from the lowland tropical forests to the north and south. The forests (covers 9496 sq. Km.) are notable for their biodiversity of mammals, birds and plants. The minimum temperature ranges between 1 – 3 °C during January, while the maximum temperature varies from 15–30 °C during August – September. The average annual rainfall is about 2600 mm over western Meghalaya, between 2500-3000 mm over Northern Meghalaya and about 4000 mm over south-eastern Meghalaya. The aim of present study is to summarize taxonomical information about freshwater green algae, distribution and ecological characteristics of each species.

2. Material and methods

Wide mouthed jars and bottles, plankton net, plankton bucket, plankton sampling bottle (25 ml), sharp blade, scalpel, string scale, measuring tape were used for collection of algae from different substrata. The collected specimen contained in bottles, polythene bags etc. were examined in the laboratory as soon as possible. The phytoplankton was studied first in order to avoid their death due to delay. The overnight collections and especially for out stationed collections it was essential that algae were preserved as possible to avoid deterioration. For this purpose samples were preserved in a corked bottle containing 4% formaldehyde. For preserving filamentous form appropriate quantity of 40% formaldehyde could be added

Identification of the algae was carried out on the basis of published literature on the algal taxonomy [1, 2]. The photomicrographs of all the identified species were taken with the help of a digital camera. As far as possible photographs of the species were taken with proper magnification and measurement was recorded in text. Water samples were analyzed in collaboration with local Public Analyst of the State Public Health Laboratory, Bamunimaidum, Guwahati, Assam using the methods followed by Bureau of Indian Standards (BIS). Libraries of University of Science & Technology Meghalaya, Guwahati University, Cotton Collage and Pragiyotish Collage were visited and consulted for available literature during the course of study. Laboratories of USTM used during this research. Fritsch classification (1935) has been followed in the arrangement of families.

3. Results and discussion

In the systematic treatment, detailed description of 28 genera consisted of 38 species belonging to 16 families and 7 orders have been identified and enumerated (Table 1). Their distribution, habits and habitats were recorded and keys were prepared. During the course of this investigation, algae were found to grow as aquatic, terrestrial, epiphytic, aerial, endophytic lithophytic organisms. For aquatic algal flora were found in both hot water (25-30 °C) as well as cold water (5-10 °C) bodies. The growth and distribution of algae affected by a number of physical factors such as water pH, turbidity and conductivity of water, temperature, biological oxygen demand (BOD), dissolved oxygen etc. During survey it has been observed that the temperature affects the population of algae. In January-February when the temperature is low (10-15 °C) there is less number of algal species was recorded. When temperature is high (25-35 °C) during April- May increases number of algal species was recorded. However, urbanization has led to the pollution of surface water bodies resulting in decline/extinction of some species.

3.1. Species and Habitat characteristics (Chlorophyceae)

Chlamydomonas angulosa O. Dill Cells broadly ovoid to cylindrical, often truncated entirely and with a prominent papilla. Contractile vacuoles 2, below the flagella, which are as long as or slightly longer than the cell body. Chloroplast a massive, parietal cup with large angular pyrenoids in the base; pigment –spot anterior and lateral. Cell 15 µm dia, 12 µm long. Habitat- Planktonic; Month -May; pH-6.46; Temp-36.8 °C; Turbidity-178; Conductivity-1033 ms; Dissolved oxygen- Nil; BOD at 27 °C for day= 108.0 Place- Industrial effluence of Kling Village

Eudorina elegans Ehrb Coenobia oval, cells usually 32, globose, either scattered or quaternate, eight at each pole, distributed in three parallel circles, at equal distances from each other, around the periphery of the coenobium. Size of Coenobium 170 µm long. Cells 8-10 µm diam. Habitat- Planktonic; Month -May; pH-6.7; Temp-36.8 °C; Turbidity-86; Conductivity-431 ms; Dissolved oxygen- 1.5; BOD at 27°C for day= 70.0. Place- Paddy field of Kling Village

Pandorina morum Ehrb. Var

Coenobium globose. Cells green, 16-32, arranged about the periphery. In the forms which produced the resting spores, the cells crowded together in the centre. Restring spores after becoming encysted bright red. In stagnant water. Size. Coenobium 26.9-60 µm. Cells 6.2 µm. diam. Habitat- Planktonic; Month -May ; pH-6.7; Temp-36.8 °C; Turbidity-86; Conductivity-431 ms; Dissolved oxygen- 1.5;

BOD at 27 °C for day= 70.0. Place- Paddy field of Kling Village

Tetraspora cylindrica (Wahl.) C.A. Agardh

Thallus an attached, irregularly lobed cylinder of firm mucilage which may be 1m long, narrowed at the point of anchorage. Cells scattered, with thick and sharply marked wall, showing arrangement in 4's when young 16-18µm in diameter. Habitat- Planktonic; Month -April ; pH-6.8; Temp-30.5; Turbidity-70.0; Conductivity-1034; Dissolved oxygen- 5.6; BOD at 27 °C for day= 20.2. Place- Industrial effluence of Kling Village

Tiffany, L.H. & Britton

Cells 8 µm broad, 10 µm long, ovoid enclosed in unstratified gelatinous sheath colonies usually fragmenting up to 15 µm in diameter. Habitat- Planktonic; Month -May; pH- 5.83; Temp-30.8; Turbidity-2.0; Conductivity-117 ms; Dissolved oxygen- 5.0; BOD at 27 °C for day= 50.0. Place- Stagnent water Kling Village

Chlorococcum diplobionticum Fries

Cells solitary, spherical forming a thin layer in a submerged substrate; cell wall thin; chloroplasts parietal covering almost the entire cell, cell measure 24 µm in diameter. Habitat- Planktonic; Month - May; pH- 6.36 ; Temp- 27.8 °C; Turbidity-188; Conductivity-275ms; Dissolved oxygen- 7.0; BOD at 27 °C for day= 6.0. Place- Industrial effluence of Kling Village

Chlorococcum humicola (Nag) Rab

Unicellular, solitary, sometimes aggregate and embedded in a gelatinous matrix; young cells are thin walled, spherical somewhat compressed. Chloroplast of young cell is parietal. Old cells increases in size and chloroplast diffuse contain several pyrenoids; cells vary in size and diameter of the cell ranges from 6.2- 9.12 µm. Habitat- Planktonic; Month -April; pH- 6.5; Temp- 29.8; Turbidity-68.0; Conductivity- 297ms; Dissolved oxygen-5.9; BOD at 27 °C for day= 8.0. Place- Industrial effluence of Kling Village

Chlorella vulgaris Beij

Cells small, spherical, thin walled; solitary or in groups of four to sixteen cells; chloroplast parietal and formed a triangular hyaline groove; cells 12µm in diameter. Planktonic and sometime they form a green layer on soil surfaces and contaminants of containers of water. Habitat- Planktonic; Month -April; pH- 6.5; Temp- 29.8; Turbidity-68.0; Conductivity- 297ms; Dissolved oxygen-5.9; BOD at 27 °C for day= 8.0. Place- Industrial effluence of Kling Village

Ankistrodesmus septatus Oettli

Diverse cells forms from a single culture. Bundle of numerous crescent- shaped, very slender cells. Cells very minute and slender, crescent shaped, fasciculate in irregular bundles composed of numerous individuals, which as the convexity of each is turned inwards diverse at each extremity of the bundle vary greatly in their compactness, as well as in the number of their cells. Habitat- Planktonic; Month - April ; pH-6.7; Temp- 32.5 °C; Turbidity-86.0; Conductivity-431 ms; Dissolved oxygen- 1.5; BOD at 27 °C for day= 70.0. Place- Paddy field of Kling Village

Hydrodictyon reticulatum (Linnaeus) Lagerheim

Coenobia reticulate net like, meshes pentagonal or hexagonal,

upto 15-20 cm long; cells elongate- cylindrical coenocytes with large central vacuole cell wall two layered, chloroplast single, parietal and with a single pyrenoids; cells upto 12.4-15.5 µm broad and upto 40- 62 µm long. Submerged, forming thick net in river (stagnant water). Habitat- Planktonic; Month - March ; pH-6.7; Temp- 32.5 °C; Turbidity-86.0; Conductivity-431 ms; Dissolved oxygen- 1.5; BOD at 27 °C for day= 70.0.

Place- Paddy field of Kling Village

***Geminella crenulatoecollis* Prescott**

Filaments uniseriate, long embedded in a broad gelatinous sheath; cells ovoids, subquadrate or oblique with broadly rounded at the poles, evenly spaced with a tendency to be paired; chloroplasts irregularly shaped; cells 4-6 µm broad and 8- 12 µm long; breadth of the filament with sheath 16-18 µm. Habitat- planktonic; Month -April; pH-7.18 ;Temp- 36.8; Turbidity-188; Conductivity-; Dissolved oxygen- Nil; BOD at 27°C for day= 108.0. Place- Industrial effluence of Kling Village

***Hormidium fluitans* (Gay) Heering**

Fresh water, grow in running water, filaments light yellow-green, bend, readily breaking up into cells; cells barrel shaped, 5.9-8 µm in broad and 8-20 µm in length with large chloroplast and with a dull pyrenoids. Collected from a running water ditches along with other species of green algae. Habitat- planktonic; Month -April; pH-7.18; Temp- 36.8; Turbidity-188; Conductivity-; Dissolved oxygen- Nil; BOD at 27 °C for day= 108.0. Place- Industrial effluence of Kling Village

***Stichococcus mirabilis* Lagerheim**

Unicellular, solitary, sometimes in pairs, cells cylindrical, straight or slightly curved cells 83.2 µ long and 16 µ in breath; chloroplast parietal, homogenous and lies in one side of cell longitudinally, without any pyrenoids, free floating in ponds, ditches and pools. Habitat- Planktonic; Month -March; pH-6.7; Temp- 29.3; Turbidity-86.0; Conductivity-431 ms; Dissolved oxygen- 1.5; BOD at 27 °C for day= 70.0 Place- Stagnant water near USTM Girls' Hostel

***Cladophora glomarata* (L) Kütz**

Filaments branched; branching is usually lateral but sometimes appears to be dichotomous, branches arises from the upper end of the cell and is usually formed only from cell near the apical part of the filaments. Apical cell slightly attenuate, ending in bluntly pointed tip. Cell in main axis 40-65µm in diameter and 200-400µm long; cell in branches 15-40µm in diameter and 160-170µm long.

Habitat- Terrestrial; Month -April; Temp- 32.5 °C. Place- Hill side area of Kling Village

***Pithophora sumatrana* (Wittr) Mart.**

Freshwater filamentous, filament slender, braching pufusely; arising in one sequence only, 40 -60µm broad; cell ranging from 90-120µm in width. Akinates intercalary and arising from part of cell only, cylindrical or slightly swollen, measuring 230- 250 µm in length and 125-200 in breadth. Habitat- Terrestrial; Month -April; Temp- 32.5 °C.

Place- Hill side area of Kling Village

***Trentapohlia aurea* (L) Martius**

The plants are golden-red and orange in color; filaments are

branched variously, sometimes repeatedly; cells are slightly swollen below, but mostly cylindrical in the erect branches; cell walls are generally smooth. Cells in the main axis 12-28µm diameter and three times as long. Habitat-Epiphytic; Month -April ; pH-7.18 ;Temp- 36.8.

Place- Industrial effluence of Kling Village

***Trentepohlia torulosa* Wildmann**

Stratum thin, the filaments either being collected in small compact tufts or spreading forming a soft cushion, brown in colour. Vegetative filaments torulose and branched. Cells are ellipsoidal, subspherical and distinctly constricted at the cross walls. Cells are 24.8 µm in diameter and 30-35µm long. Cell membrane is thin and usually smooth. It is collected from the bark of betal nut tree

Habitat Epiphytic; Month -February; Temp- 23.8. Place- Kling Village

***Pleurococcus naegeli* Chodat**

Terrestrial, growing on damp soil, stone walls and tree trunks; plants are unicellular or with cells united into small aggregates; cell wall thin; chloroplast is a lobed plate without or sometimes with a pyrenoid. Cells are globose or angular, 16.6µm in diameter.

Habitat- Epiphytic; Month -April; Temp- 34.5;

Place- Kling Village

***Cylindrocystis crassa* D. By**

Planktonic, unicellular; cells cylindrical, with rounded poles. Cell wall thin inner cellulose layer and outer gelatinous covering; chloroplast two, stellate; No constriction in equatorial region; more than 2 pyrenoids; cells 30-35µm in length and 10-15 µm in breath. Collected from stagnant water ditches along with other unicellular diatoms and desmids. Habitat- Planktonic; Month - March; pH-6.7; Temp- 29.3; Turbidity-86.0; Conductivity-431 ms; Dissolved oxygen- 1.5; BOD at 27 °C for day= 70.0. Place- Stagnant Water Near USTM Girls' Hostel

***Spirogyra parvula* (Transeau) Czurda**

Vegetative cells 15.5 µm broad, 93 µm in long, each cell has one chromatophore of 2-4 turns, septa plain. Habitat- Planktonic; Month - January ; pH-6.7 ;Temp- 29.3; Turbidity-86.0; Conductivity-431 ms; Dissolved oxygen- 1.5; BOD at 27 °C for day= 70.0. Place- Stagnant water near USTM Girls' Hostel

***Spirogyra satiformis* (Roth)**

Vegetative cells 117 µm× 209 µm; septa plane; Chloroplasts 3-6, making 0.5-2 turns; reproduction by zygospores and aplanospores; conjugation scalariform; conjugation tube formed by both gametangia, receptive gametangia cylindrical, zygospores ovoid to ellipsoid .100×125 µm. Habitat- Planktonic; Month- February ; pH-6.7; Temp- 32.5 °C; Turbidity-86.0; Conductivity-431 ms; Dissolved oxygen- 7.0; BOD at 27 °C for day= 70.0.

Place- Paddy field of Kling Village

***Zygnema indicum* Mishra**

Vegetative cells 22.7-28.3 µm broad, 35.4-82.8µm long. Conjugation only scalariforms; formed in the conjugation canal which is blued. Zygospores 21.8-26.3 × 29- 41.8µm, which are cylindrical, thick walled, blue with scrobiculate pits; exospores thin and smooth; mesospore slightly thick, smooth

and blue. Habitat- Planktonic; Month – March; pH-6.7; Temp- 29.3; Turbidity-86.0; Conductivity-431 ms; Dissolved oxygen- 1.5; BOD at 27 °C for day= 70.0. Place- Stagnant water near USTM Girls' Hostel

Zygnema patelli sp. nov

Filaments long, unbranched, vegetative cells cylindrical with two stellate chloroplasts with radiating arms from all the planes, each with one pyrenoids vegetative cell length 30.6-88.3 µm, and 23.8 -34.9 µm broad. Nucleous is situated between two chloroplast in the cytoplasmic bridge connecting them. Conjugation scalariform, zygospores formed in the conjugation tubes. The mature zygospores are ovoid, subglobose or elongate; some zygospore are dark blue while some are brown in colour, nucleous inter duas chloroplast situs. Habitat- Planktonic; Month - March; pH-6.7; Temp-29.3; Turbidity-86.0; Conductivity-431 ms; Dissolved oxygen- 1.5; BOD at 27 °C for day= 70.0. Place- Stagnant water near USTM Girls' Hostel

Zygnema pectinata (Voucher) Agardth

Filaments long, unbranched, vegetative cells cylindrical with two stellate chloroplasts. Cell length 62 µm and breadth 31 µm. Habitat- Planktonic; Month - March; pH-6.7; Temp-29.3; Turbidity-68.0; Conductivity-297 ms; Dissolved oxygen-5.9; BOD at 27 °C for day= 70.0. Place- Stagnant water near USTM Girls' Hostel

Zygonium punctatum Taft.

Filamentous; Cells cylindrical, length from half to several times the breadth are united in unbranched filaments; vegetative cells with axial discshaped stellate chloroplasts, massive and eushion like; cells 12-20 µm broad and 15-25 µm long. Habitat- Planktonic; Month- February; pH-6.7; Temp-32.5 °C; Turbidity-68.0; Conductivity-431 ms; Dissolved oxygen- 5.9; BOD at 27 °C for day= 8.0. Place- Paddy field of Kling Village

Gonatozygon monotaenium D. Berry. West and West

Cells 10-25 times longer than their diameter, cylindrical, apices slightly dilated, cell wall minutely and densely granulated; granules variable, sometimes very indistinct, sometimes strong and sharp, even papilliform. Cell length 82-284 µm; breadth 7.5—11.5µm; breadth of apices 86- 12 µm; diam zygospore 25-28 µm. Habitat- Planktonic; Month-February ; pH-6.7; Temp- 32.5 °C; Turbidity-68.0; Conductivity-431 ms; Dissolved oxygen- 5.9; BOD at 27 °C for day= 8.0. Place- Industrial effluence of Kling Village

Closterium incurvum Brebbisson

Cells 98 µm long, 12µm broad, and apices 3- 4 µm in diameter. Cells small, 8-9 time longer than broad, slightly curved, strongly curved, outer margins concave but not tumid in the middle, cell attenuated towards acute apices; cell wall smooth, chloroplasts ridged with four pyrenoids, arranged at a row. Habitat- planktonic; Month -March; pH-7.18; Temp- 36.8; Turbidity-188; Conductivity-; Dissolved oxygen- Nil; BOD at 27 °C for day= 108.0. Place- Paddy field of Kling Village

Closterium tumidum Johnson

Cells rather small, 8-9 times longer than their diameter, slightly curved, cell wall smooth or colourless chloroplast

with 4 or 6 ridges and 1-3 pyrenoids; terminal vacuoles with only one moving granule. Cell length 97 µm; breadth 15 µm. Habitat- Planktonic; Month -April; pH-6.36 ;Temp-34.5; Turbidity-28.0; Conductivity- 275 ms; Dissolved oxygen- 7.0; BOD at 27 °C for day= 6.0. Place- Industrial effluence of Kling Village

Cosmarium bioculatum Brebbisson ex Ralfs

Cell body small in size semi cells elongated ellipsoids, apex flattened, side view nearly circular, apical view elongated elliptical; long, 12.0 µm wide, isthmus 32.0 µm wide. Habitat- Planktonic; Month -March; pH- 5.83; Temp- 27.7; Turbidity-2.0; Conductivity- 117 ms; Dissolved oxygen- 5.0; BOD at 27 °C for day= 108.0. Place- Stagnent water Kling Village

Cosmarium hibernicum West.

Cells somewhat large, about twice as long as broad, slightly constricted, sinus wide and shallow depression; semicells broadly oblong-elliptic (subrotund), apex broadly rounded. Vertical view circular. Cell wall smooth. Chloroplasts parietal, several in each semi cell, in the form of rather narrow and irregular longitudinal bands, each with several small pyrenoids. Zygospore unknown. Cell length 62 µm; breadth 40.2 µm. Habitat- planktonic; Month -April; pH-6.36 ; Temp-29.7 °C; Turbidity-28.0; Conductivity-275 ms; Dissolved oxygen- 7.0; BOD at 27 °C for day= 6.0. Place- Paddy field of Kling Village

Cosmarium subalatum West & G.S. West. (Syn. Cosmarium alatum Kirchn)

Cells small, 1½ times as long as broad, deeply constricted, sinus narrowly linear with a slightly dilated extremity ; semicells widely truncate –pyramidal, sides 3- crenate (including the rounded basal and apical angles), crenations of equal size, or the basal one very slightly larger than the median and apical crenations, apex truncate and 4 crenate (including the apical angle) the two crenations between the apical angles considerably smaller than the angles themselves, all the crenations bigranulate except the basal ones which are trigranulate; within the margins minutely granulate, granules in radiating and subconcentric series, usually binate just within the crenation; Cell length 22.5 µm; breadth 14.5-21µm, breadth of isthmus 3.8-6.8 µm; thickness 10.5-12 µm. Habitat- Planktonic; Month -April ; pH- 6.5; Temp- 31.8 °C; Turbidity-68.0; Conductivity-; Dissolved oxygen-5.9; BOD at 27 °C for day= 8.0. Place- Paddy field of Kling Village

Eustrum platycerum Reinsch

Cells slightly longer than broad, constricted, sinus open each semicell has 3 lobes of which two side lobes have rounded apex, cell wall spiny, long cell 41 µm, lateral cell 38 µm, isthmus 12 µm wide. Habitat- Planktonic; Month -April ; pH- 6.5; Temp- 31.8 °C; Turbidity-68.0; Conductivity-; Dissolved oxygen-5.9; BOD at 27 °C for day= 8.0. Place- Stagnent water of Kling Village

Staurastrum bieneanum Rabenh. var .ellipticum Wille

Cells 30 µm long, 29 µm broad and isthmus 8µm in diameter. Cell wall slightly broader than the long, very deeply constricted, sinus widely open with an acuminate apex, semi cells narrow by elliptic with rounded angles, punctate. Habitat- Planktonic; Month -April; pH- 6.5; Temp- 31.8 °C;

Turbidity-68.0; Conductivity-; Dissolved oxygen-5.9; BOD at 27 °C for day= 8.0. Place- Paddy field of Kling Village

Staurastrum pseudotetracerum (Nordstedt) W.et G.S. West

Cells 30 µm long, 20 µm broad and isthmus 4 µm in diameter. Cell wall slightly broader than the long, very deeply constricted, sinus widely open with an acuminate apex, semi cells narrow by elliptic with rounded angles; cell wall punctuate. Habitat- Planktonic; Month -May; pH-6.7; Temp- 35 °C; Turbidity-86.0; Conductivity-431 ms; Dissolved oxygen- 1.5; BOD at 27 °C for day= 70.0. Place- Stagnant water Kling Village

Netrium digitus (Ehrenb.)

Cells of variable in size, generally large, 3-4 times longer than their diameter, not constricted, elliptic-oblong, gradually attenuated from the middle towards the apices which are rounded truncate; chloroplasts axile with about six longitudinal plates deeply notched at the free margins; cell wall smooth. Zygospore spherical, smooth and thick walled. Cell length 130- 384 µm; breadth 40-82, near apices breadth 18-40 µm. Habitat- Planktonic; Month -February; pH-; Temp- 32.5 °C; Turbidity-188; Conductivity-297 ms; Dissolved oxygen- 5.9; BOD at 27 °C for day= 8.0. Place- Girls hostel of USTM, Kling Village

Micrasterias oscitans Ralfs

A strictly acidophilus species, extremely rare in central. Length: 125-145 µm, B: 103-138 µm, I: 23-27 µm.

Habitat- planktonic; Month -April; pH-6.36; Temp- 35 °C; Turbidity-28.0; Conductivity- 275 ms; Dissolved oxygen- 7.0; BOD at 27 °C for day= 6.0. Place- Paddy field Kling Village

Nitella furcata (Agharkar and Kundus)

Axis and branches are also differentiated into nodes and internodes; without cortication and spine like cells at the nodes. Internodes a single, elongated, undivided cylindrical cell, several times longer than breadth. The branchlet have 3times rarely 4 times furcated appearance. Plant monoceous, has only oogonia at the first furcation and both antheridia and oogonia on other furcation above the first. Final fucation is sterile. Habitat- Benthic; Month - May; pH- 6.36; Temp- 35 °C; Turbidity- 28.0; Conductivity-275 ms; Dissolved oxygen- 7.0; BOD at 27 °C for day= 431 ms. Place- Water reserver of Kling Village

Nitella terrestris (Iyengar)

Axis and branches are also differentiated into nodes and internodes; without cortication and spine like cells at the nodes. Internodes a single, elongated, undivided cylindrical cell, several times longer than breadth. The branchlet have twice furcate appearance. Sexual reproduction is advance type of oogamy. Plant monoceous, with more than one furcation may bear the sex organ. Habitat- Benthic; Month - May; pH- 6.7; Temp- 35 °C; Turbidity- 86.0; Conductivity-431 ms; Dissolved oxygen- 1.5; BOD at 27°C for day= 431 ms. Place- Paddy field of Kling Village

Table 1: Taxonomic enumeration of green algae

Sl. No	Species	Family	Order
1	<i>Chlamydomonas angulosa</i> O.Dill	Chlamydomonadaceae	Volvocales
2	<i>Eudorina elegans</i> Ehrenberg	Chlamydomonadaceae	Volvocales
3	<i>Pandorina morum</i> Erh. var. major	Chlamydomonadaceae	Volvocales
4	<i>Tetraspora cylindrical</i> (Wahneb) C.A Agardh	Tetrasporaceae	Volvocales
5	<i>Chlorococcum humicolum</i> (Naeg)	Chlorococaceae	Chlorococcales
6	<i>Chlorococcum diplobioticum</i> Fries	Chlorococaceae	Chlorococcales
7	<i>Chlorella vulgaris</i> (Beij)	Chlorellaceae	Chlorococcales
8	<i>Gloeocytis ampla</i> (Kütz) Lagerheim	Chlorellaceae	Chlorococcales
9	<i>Ankistrodesmus septatus</i> (Oettli)	Selenastraceae	Chaetophorales
10	<i>Hydrodictyon reticulatum</i> Lagerh	Hydrodictyaceae	Chaetophorales
11	<i>Geminella cranulato-collis</i> Prescott	Ulotrichaceae	Ulotrichales
12	<i>Hormidium fluitans</i> (Gay) Heering	Ulotrichaceae	Ulotrichales
13	<i>Stichococcus mirabilis</i> Lagerheim	Ulotrichaceae	Ulotrichales
14	<i>Cladophora glomarata</i> (L) Kütz.	Pithophoracea	Cladophorales
15	<i>Pithophora sumatrana</i> (Wittr) Mart.	Pithophoracea	Cladophorales
16	<i>Pleurococcus naegellii</i> Chodat	Pleurococcaceae	Cladophorales
17	<i>Trentepohlia aurea</i> L.(Martious)	Trentepohlieae	Cladophorales
18	<i>Trentepohlia torulosa</i> Wildman	Trentepohlieae	Cladophorales
19	<i>Cylindrocystis crassa</i> De Bary	Mesotaeniaceae	Conjugales/Zygnemales
20	<i>Spirogyra pervula</i> (Transeau) Czurda	Zygnemaceae	Zygnemales
21	<i>Spirogyra satiformis</i> (Roth)	Zygnemaceae	Zygnemales
22	<i>Zygnema indicum</i> Mishra	Zygnemaceae	Zygnemales
23	<i>Zygnema patelli</i> sp.nov	Zygnemaceae	Zygnemales
24	<i>Zygnema pectinata</i> (Voucher)Agardh	Zygnemaceae	Zygnemales
25	<i>Zygogonium punctatum</i> Taft	Mougeotiaceae	Zygnemales
26	<i>Gonatozygon monotaenium</i> D. Berry.	Gonatozygonaceae	Zygnemales
27	<i>Closterium incurbum</i> (Brebissol)	Desmidiaceae	Zygnemales
28	<i>Closterium tumidium</i> var Nylandicum Gronblad	Desmidiaceae	Zygnemales
29	<i>Cosmarium hibernicum</i> (West)	Desmidiaceae	Zygnemales
30	<i>Cosmarium subalatum</i> (West and G.S.west)	Desmidiaceae	Zygnemales
31	<i>Cosmarium bioculatum</i> (Brebisson)	Desmidiaceae	Zygnemales
32	<i>Euastrum platycerum</i> Reinsch	Desmidiaceae	Zygnemales
33	<i>Staurastrum bieneanum</i> Rabenh. var .ellipticum Wille	Desmidiaceae	Zygnemales

34	<i>Staurastrum psuedotetracerum</i> (Scott and Pnordst)	Desmidiaceae	Zygnemales
35	<i>Netrium digitus</i> (Ehrenb.)	Desmidiaceae	Zygnemales
36	<i>Micrasterias oscitans</i> Ralfs	Desmidiaceae	Zygnemales
37	<i>Nitella terresteris</i> (Iyengar)	Characeae	Charales
38	<i>Nitella furcata</i> (Agharkar and Kundus)	Characeae	Charales

4. References

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