IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A TAXONOMICAL STUDY OF NATURAL POPULATIONS OF BLUE GREEN ALGAE OF RICE FIELD NEAR BRICK INDUSTRIES OF MANGALDOI SUB DIVISION DARRANG.

Matiur Rahman[1],Ranee Das[2],G C Sarma[3]

University of Science and Technology, Meghalaya. Techno City, 9th Mile, Kling Road, Baridua,Ri-Bhoi Meghalaya-793101

ABSTRACT

Distribution of natural populations of blue green algae was studied in the rice fields near brick industries for two years and 45 numbers of blue green algal species were recorded. The taxonomic distribution of the species is discussed.

Keywords: Rice field, brick industries, taxonomy, Darrang District,Assam

INTRODUCTION

Blue green algae, constitute a fascinating group of prokaryotic photosynthetic organisms, some of them fix atmospheric nitrogen by which they can increase fertility in the tropical rice field. Many workers have studied the Cyanobacterial flora of rice fields of our country (Singh,1961; Aiyer, 1965; Tiwari,1972; Kolte and Goyal 1985; Saikia and Bordoloi,1994; Shaji and Panikkar,1994 and Suseela and Goyal,1995).The present paper describes the blue green algae recorded from the selected rice fields near brick industries of Mangaldoi sub-division of Darrang District, Assam, the study was carried out from from September 2017 to September 2019.

MATERIALS AND METHODS

During the field survey, specimens are being collected in wide mounted bottles, test tubes, polythene bags, plankton net,Scalpel. Sampling bottle is filled up with specimen along with water collected from the area to its one third capacities, the remaining parts is for aeration. Few samples will be collected from the same area in each case. Most of the methods and techniques are used on the basis of "Standard Operating Procedures for the Collection and Analysis of Aquatic Algae" June 2016(Version2.0) Published by North Carolina department of Environmental Quality.2016.

[1] *Ph.D. Research Scholar, Department of Botany, University of Science and Technology, Meghalaya, Techno City, 9th Mile, Kling Road, Baridua, Ri-Bhoi Meghalaya-793101, Email: rahman.matiur0376@gmail.com, Mobile: (+91)99544 10933*

[2] *Research guide, Professor, Department of Botany, University of Science and Technology, Meghalaya, Techno City, 9th Mile, Kling Road, Baridua, Ri-Bhoi Meghalaya-793101, Email: ranee.das@gmail.com, Mobile: (+91)99541 89393*

[3] *Retired professor, Department of Botany Gauhati University Email: gcsbotgu@gmail.com. Mobile(+91)9435047026*

Identification: Identification of collected species was carried out by consulting keys given by Bharadwaja (1933&1935), C.B.Rao1935-38), Fritch (1935) Smith(1950), Desikachary,(1959)Randhawa,(1959),and some literature, monographs of algal taxonomy also studied. However Desikachary's (1959) classification is followed in arranging the genera and species

RESULTS: The identified blue green algae are structurally different in shape size and structure. Some are non-heterocystous others heterocystous shown below:-

TAXONOMIC ACCOUNT

Microcystis Kutzing

Microcystis robusta (Clark) Desikachary, 1959, 85,Pl. fig.7-10.

Fig no.1

Colonies are round, lateral irregularly elongate and clathrate; sheath distinct, latter gelatinizing; cells 6-9.6µm diam; spherical, without gas vacuoles.

Habitat : Free floating.

Microcystis flos-aquae (Wittr) Desikachary,1959, Cyanophyta 94,pl17,fig 11 and pl. 18 fig.;

Fig no.2

Colonies free floating, irregular, roughly rounded, cells spherical, cell content blue green with conspicuous pseudo vacuoles. cell 2.0-5.4 µ diam; nanocystes present.

Habitat: Free floating.

Chroococcus Naegeli

Chroococcus cohaerens (Barb) Desikachary,1959, Cyanophyta,111,pl.26,fig.3&9.

Fig no.3

Thallus slimy, or gelatinous, blue or dark green; cells single or up to2-8 in groups, without envelope 2-7 µdiam., and with sheath2.5-76µ diam., colony 7-15 µ; sheath thin, colourless unlamellated.

Habitat: Free floating.

Gloeocapsa (Kutzing)

Gloeocapsa decorticans (Agardh) Geitler,1932 Kryptogamenflora Leipzig, 14; 184, fig.83b; Desikachary,1959,

Fig no.4

Thallus blue green, cells spherical or sometimes oval, blue-green, single or up to2-4 together; without sheath 3-4 µin diam., colourless, thick,distinctly lamellated.

Habitat: Attached to leaf.

Gloeocapsa atrata (Turp) Geitler,1932, Kryptogamenflora Leipzig, 188; Desikachary,1959, Cyanophyta, 116, pl,24 fig. 8

Fig no.5

Thallus crustaceous, mucilaginous, blackish, cells without sheath 3.5-4.54µ in diam., With sheath 9-14.5 µin diam., pale blue green, sheath colourless, lamellated.

Habitat: Water logging areas.

Gloeocapsa magma (Breb) Geitler, 1932, Kryptogamenflora Leipzig, 198; fig,93; Desikachary,1959, Cyanophyta, 120,

Fig no.6

Colonies spherical or irregularly arranged, 30-60 µ in diam,colourless, 2.5cm. thick cuticle like sheath; cells spherical, 3-7 µ in diam., blue green, mostly with a thin,0.5-1.5 µ in broad, colourless, unlamellated.

Habitat: In slow sand filters and free floating

Gloeocapsa pleurocapsoides (Novacek)Desikachary,1959, Cyanophyta, 118, pl,24 fig. 3

Fig no.7

Colonies composed of fewer, more or less roundish or irregular cells, dull olive or pale green, homogeneous, granular cells without sheath 5-9 µ in diam., sheath thin firm simple coloured yellowish brown or brownish in the peripheral part, 2-2 µ thick and lamellated.

Habitat: Free floating on water

Aphanocapsa Naegeli

Aphanocapsa pulchara

Desikachary,1959.cyanophyta,132,pl.fig.2.

Fig no.8

Thallus gelatinous, colourless, homogeneous dark green, tuberculate, attached or free; cells spherical or sub spherical, 3 - 4 µ diam., loosely arranged, single or in two or three
Habitat: Planktonic in tanks near brick industries.

Aphanocapsa banaresensis
Desikachary. 1959. Cyanophyta, 133, pl.22, fig.8
Fig no.9
Thallus soft, spherical, hyaline, up to 1.5 cm in diam., cells almost spherical,4-6.2 µ diam., sheath thick, unlamellated ,hyaline.
Aphanocapsa biformis (Leipzig), 158, fig01; Desikachery1959;Cyanophyta, 134,pl.21 fig.3&4
.
Fig no.10
Thallus olive green, gelatinous, often expending; cells 4-8µ diam, spherical, loosely arranged, 2-4 together in a common mucilaginous envelope.
Habitat: Water logging areas near rice field
Aphanocapsa grevillei(Hase) Desikachary, 1959, Cyanophyta,134, pl 21 fig.9.
Fig no.11
Thallus gelatinous, spherical or hemispherical light blue green; cells spherical 3.25-6.1 µm diam; homogeneous mucilage individual envelopes not distinct
Habitat: Stagnant water in rice field.
Aphanocapsa koordersi
Desikachary, 1959, Cyanophyta, 132, pl.23, fig, 1.
Fig no.12
Colony spherical, dull green to blue-green, 2-3 mm.in diam.; cells loosely arranged or in groups of four, spherical, 2.2-2.7µ in diam.
Habitat: Water lodging areas.
Aphanothece Naegeli.
Aphanothece stagnina (Spreng)
Desikachary, 1959, Cyanophyta, 137, pl 21, fig.10.
Fig no.13
Thallus gelatinous, spherical, ellipsoidal, pale blue-green, oblong, more or less ovoid or cylindrical,3-6.3µ in broad, 4.4 -11µ long, densely or sparsely arranged generally densely in the peripheral region of the colony and sparsely in the inside of the colony.
Oscillatoria **(**Vaucher)
Oscillatoria vizagapatensis (Rao) Desikachary, 1959, Cyanophyta, 205, pl. 39, fig. 18.
Fig no.14
Thallus blue-green; trichomes straight, pale blue-green, uniformly broad except at the extreme apex, 8-10µ broad; cells 1.5 -2µ long; end cell broadly rounded forming a cap.
Habitat: Stagnant water.

Oscillatoria perornata(Skuja) Desikachary, 1959, Cyanophyta, 205, pl. 41, fig. 8.

Fig no.15

Trichomes erect, apices briefly attenuated, well constricted at the cross-walls, 13-14µ broad, single; cells 2.5-6.4 µ long, end cell hemispherical, calyptra absent.
Habitat: Planktonic in lowlands of rice field.

Oscillatoria subbrevis(Schmidle) Desikachary, 1959, Cyanophyta, 207, pl. 37, fig. 2.

Fig no.16
Trichomes single, 5-5.1µ broad, nearly straight, not attenuated at the apices; cells 1-2µ long, not granulated at the cross-walls; end-cell rounded, calyptra absent.
Habitat: Planktonic in rice field.
Oscillatoria sancta(Kutzing) 1959, Cyanophyta, 203, pl. 42, fig. 10.
Fig no.17

Thallus dark blue, gelatinous; trichomes straight or bent, distinctly constricted at the cross-walls; ends briefly attenuated, 10-20µ broad; cells 2.4 -6µ long, slightly capitate, with a thickened membrane.
Habitat: wetland water having rice field.
Oscillatoria ornataKutzing ex Gomont ,Desikachary, 1959, Cyanophyta, 206, pl. 37, fig. 12.

Fig no.18
Thallus dark blue-green; trichome constricted at the cross-walls, 9-11µ broad, dull blue-green, cells 2-5µ long; apices slightly attenuated; end-cells rounded, not capitate.

Habitat: planktonic in low land.

Oscillatoria curviceps.Ag.exGoment
Fig no.19
Thallus light blue-green , trichomes more or less straight,bent at the end,Not attenuated,not constricted at the cross walls, cell 9-9.1µ broad, and 6.1-6.7µ long; end cells flat rounded, not capitate.
Habitat: Moist soil in rice field.
Phormidium (Kutzing) 1845, Phyt. Gener, 190; Smith, 1950, Fresh Water Algae of the United States of America, 596; Desikachary, 1959, Cyanophyta, 250.
Thallus leathery, attached or floating, thin, light or dark blue in colour; trichomes cylindrical, constricted at the joints, always enclosed by a watery gelatinous sheath, sheaths confluent with one another, colourless, thin, filamentous unbranched, cells barrel shaped, apices often attenuated, sometimes provided with calyptra.

Phormidium tenue (Menegh) Desikachary, 1959, Cyanophyta, 259, pl. 43, fig. 13.
Fig no.20
Thallus blue-green, thin, membranous, expanded; trichome straight or slightly bent, 1.5-3µ broad, slightly constricted at the cross-walls, attenuated at the ends, sheath thin, diffluent; cell 2.5-4µ long, septa not granulated, end cell conical, calyptra absent.
Habitat: Water logged areas
Phormidium microtomum(Skuja),Desikachary, 1959, Cyanophyta, 257, pl. 43, fig. 16.
Fig no.21
Thallus expanded, coriaceous, lamellose, dark greyish-green or light-bluish; filaments more or less straight, 6.5-8µ broad; sheath thin, colourless, later diffluent; trichome ends briefly or prominently attenuated, 6-6µ broad, well constricted at the cross-walls, cells 1/3-1/8 as long as broad, 0.8-1.4 µ long, contents blue-green to olivaceous, septa not granulated or indistinct, and finely granulated; apical cell rounded with a hyaline calyptra.
Habitat: Small pond water near rice field.

Phormidium stagnina(Rao)Desikachary, 1959, Cyanophyta, 265, pl. 45, fig. 16.

Fig no.22
Thallus blue-green and membranous, 12.8-14.4µ broad; trichome 8-9.7 µ broad, sheath hyaline, sometimes diffluent; cells small, 1.3-3µ long; end cell broadly rounded with a prominent calyptra.
Habitat: Stagnant water body.

Phormidium anomala(Rao) 1937Desikachary, 1959, Cyanophyta, 266, pl. 45, fig. 12.
Fig no.23
Thallus soft, mucilaginous, deep blue-green; trichome 8-10µ broad without constrictions at the cross-walls, sheath thin, colourless; cells disc shaped, 0.8-1.1 µlong; end cells present calyptra.
Habitat: Pond water and damp bricks of rice field.
2. Heterocystous
Cylindrospermum (Kutzing)
Cylindrospermum indicum(Rao) Desikachary, 1959, Cyanophyta, 369, pl. 64, fig. 11.
Fig no.24
Trichome deep constrictions at the cross wall, 3.6 µ broad, dark blue-green; cells quadrate, 3-4.3 µ long; heterocysts spherical, subspherical, one at each end of the trichome, 2.8-5.6 µ broad and 3-7.3 µ long; spores almost ellipsoidal, subterminal at either end of the trichome.
Habitat: water logged areas.
Nostoc Vaucher
Nostoc punctiforme (Kutzing) Desikachary, 1959, Cyanophyta, 374, pl. 69, fig.1.

Fig no.25

Trichome 3-4µ broad, cells short barrel-shaped or ellipsoidal, blue-green; heterocysts 4-6.5µ broad; spores sub-spherical, or oblong, 5-5µ broad and 5-7µ long.

Habitat: free floating in rice fields.

Nostoc spongiaeforme ver.Tenue (Rao)GeitlerDesikachary, 1959, Cyanophyta,380,Pl.68,fig.2.

Fig no.26

Trichome about 3-3.8 µ broad, blue-green to violet; cells subspherical those adjoining the heterocysts slightly 2.8-6 µ long, heterocysts sub- spherical or spherical, 4-5 µ broad and 5.5-8 µ long; Spores spherical, sub-spherical, 4.8-7.5 µ broad and 4.5-9 µ long

Habitat: Submersed

Nostoc ellipsosporium (Bornet) Desikachary, 1959, Cyanophyta, 383, pl. 69, fig. 5.

Fig no.27

Thallus gelatinous, expanded, filaments flexous, trichome about 2.5-4µ broad; cells cylindrical size 3.2-4.4 µ broad, 6-13.4 µ long; heterocysts sub-spherical 6-7µ broad, 6-14µ long; spores ellipsoidal, cylindrical, 5-7.2µ broad, 14-18.5µ long, epispore smooth.

Habitat: Water logging areas near rice fields.

Nostoc commune(Vaucher)Desikachary, 1959, Cyanophyta, 387, pl. 68, fig. 3.

Fig no.28

Thallus blue green, large, flat, leathery, filaments flexous; sheath thick, distinct, lamellated; trichome distinct, 4-5.5 µ broad, cells nearly spherical, heterocysts spherical, 5.8-7.1 µbroad, spores are large as vegetative cells.

Habitat: Rice field (Stagnant water.)

***Nostoc paremlioides*(**Kutzing)Geitler, 1932, Kryptogamenflora, Leipzing, 857, fig. 546; Desikachary, 1959, Cyanophyta, 389, pl. 70, fig. 3.

Fig no.29

Trichome 4-4.5µ broad; cells short barrel-shaped, sub-spherical; heterocysts spherical, 6µ broad; spores oval 4-4µ broad, 7-7µ long.

Habitat: Water logging areas.

Nostoc verrucosum(Vaucher) Desikachary, 1959, Cyanophyta, 388, pl. 70, fig. 1.

Fig no.30

Trichome 3-3.5µ broad, cells short barrel-shaped, shorter than broad; heterocysts 5-6µ broad, sub-spherical; spores oval, 4-5µ broad, 6-8µ long.

Habitat: Water logging areas.

Anabaena (Bory)

Anabaena sphaerica(Fremy), Desikachary, 1959, Cyanophyta, 393, pl. 71, fig. 10.

Fig no.31

Thallus blue green, trichomes straight, moniliform, 5-5µ broad, with an indistinct mucilaginous sheath; cells spherical, rounded; heterocysts sub-spherical, 5-7.1µ diam; spores on one or both sides of the heterocysts, 7.2-13µ broad, 11-18.1µ epispore smooth.

Habitat: Stagnant water body near rice field and wetland water body.

***Anabaena oscillarioides*(**Bory)Desikachary, 1959, Cyanophyta, 417, pl. 71, fig. 7.

Fig no.32

Trichome 4.2-6µ broad; cells barrel-shaped, cells rounded; heterocysts spherical or oval, 6-8µ broad, 6-10µ long; spores on both sides of the heterocysts; single, oval, 8-10µ broad, 20-40µ long.

Habitat: Stagnant water body.

Anabaena fertilissima (Rao) Desikachary, 1959, Cyanophyta, 398, pl. 74, fig. 1.

Fig no.33

Trichome single, long sporogenous i.e. spores in long chain, trichome 506µ broad; cells 3-5µ long; heterocysts 6.4-8.3 µ broad, rare, intercalary; spores with a smooth hyaline outer wall, 4.8-7µ broad and 3.2-8.7 µ long.

Habitat: Free floating water body.

Fig no.34

Anabaena anomala(Fritsch) Desikachary, 1959, Cyanophyta, 398, pl. 73, fig. 2.
Trichomeirregularly aggregated, moniliform, apical cell rounded, apex obtuse; cells generally 2-3µ broad, spherical, about 3.4 µ long; heterocysts rare, commonly single, intercalary, spherical, 3.5-5.3 µ broad.
Habitat: water body at rice field.
Anabaena vaginicola(Fritsch) Desikachary, 1959, Cyanophyta, 401, pl. 73, fig. 5.
Fig no.35
Trichomes mucilaginous sheath, 4-4.5µ broad, single trichome with sheath 11.5µ broad; cells sub-quadrate; apical cell acuminate conical; heterocysts cylindrical, 4-5µ broad, 6-10µ long, spores oblong, contiguous with the heterocysts, 6.4 -10µ broad and 12-16.4 µ long.
Habitat: Stagnant water and wetland water body.
Anabaena iyengarii (Bharadwaja) Desikachary, 1959, Cyanophyta, 406,pl. 78, fig. 2.
Fig no.36
Trichome single, 5.2-6.2 µ broad; cells barrel-shaped; heterocysts barrel-shaped, rarely spherical, 7.3-8.4µ broad and 7.3-10.5µ long; spores 8.4-10.3 µ broad and 10.5-21µ long, smooth and yellowish brown.
Habitat: Stagnant water body.

***Anabaena doliolum* (**Bharadwaja) Desikachary, 1959, Cyanophyta, 410, pl. 78, fig. 3.

Fig no.37
Trichome single, straight, curved or slightly coiled, 3.6-4.2µ broad, slightly tapering at the ends, with conical apical cell, cells barrel-shaped; heterocysts barrel-shaped, 5.2-6.2 µ broad and 6.3-9.5 µ long; spores ellipsoidal, 4.2-6.2µ broad and 6.3-11.4 µ long.
Habitat: Stagnant water near rice fields.

Anabaena spiroides(Klebahn) Desikachary, 1959, Cyanophyta, 395, pl. 71, fig. 9.
Fig no.38
Thallus single, free-floating, regularly spirally coiled, with thick and mucilaginous sheath, spirals 45-53µ broad and 40-50µ distant; cells spherical, 6.5-8µ broad, mostly somewhat shorter than broad, with gas-vacuoles; heterocysts sub-spherical, 6.2-6µ broad; spores at first spherical, later elongate, slightly bent, in optical longitudinal section hexagonal, next to the heterocyst or away from it, 10-12µ broad.
Habitat: Stagnant water body near rice field.

Aulosira(Kirchner)
Aulosira pseudoramosa (Bharadwaja) Desikachary, 1959, Cyanophyta, 430, pl. 81, fig. 7.
Fig no.39
Trichome constricted at the cross-walls; cells cylindrical, rarely barrel shaped, 6.3-10.5µ broad; heterocysts absent in young trichomes, intercalary, 6.3-10.5µ broad and 6.3-18.8µ long
Habitat: water logged.
Aulosira aenigmatica (Fremy), Desikachary, 1959, Cyanophyta, 428, pl. 81, fig. 15.
Fig no.40
Trichome pale blue-green, 5.4-6µ broad, more or less constricted at the cross-walls; heterocysts as broad as or slightly broader than the trichome, spores variously situated, 6-7µ broad.
Habitat: Stagnant water.

Tolypothrix (Kutzing)

Tolypothrix byssoideaGeitlerDesikachary, 1959, Cyanophyta, 502, pl. 103, fig. 3, 4.
Fig no.41
Thallus brownish; filaments 10-14µ in diam., false branched; sheath thin; trichome tubular, 9-10µ broad, torulose; cells barrel shaped; heterocysts single.
Habitat: Free floating on marsh.

Calothrix Agardh
Calothrix castellii (Massal) Desikachary, 1959, Cyanophyta,529, pl. 114, fig. 7.
Fig no.42
Thallus spongy, dull blue green; filaments bent, 17-11µ broad, swollen at the base, 4-8mm long; sheath thin; trichome 8-11µ broad, attenuated; heterocyst basal.
Habitat: Stagnant water near rice field.

Gloeotrichia (Agardh)

Gloeotrichialongicauda(Schmidle) Desikachary, 1959, Cyanophyta, 558, pl. 117, fig. 1, 7.

Fig no.43

Thallus hemispherical; filaments radiating about 1mm long, 22-30µ broad; sheath not lamellated, hyaline; trichome gradually attenuated into a long hair; cells 6.3µ broad, 6.3-8.4µ long; heterocysts mostly many, 8.4-10.5µ broad and 12.6-42µ long, epispore colourless.

Habitat: Free floating on water body near rice field.

Gloeotrichia pilgeri (Schmidle) Desikachary, 1959, Cyanophyta, 558, pl. 118, fig. 8.

Fig no.44

Thallus hemispherical, 6-8.2µ diam.; filaments radiating, about 150µ long; sheath hyaline; trichome 6-7µ broad; cells torulose, isodiametric; heterocysts basal, often two and intercalary; spores ellipsoidal 9-11µ broad and 12-14µ long.

Habitat: Free floating

Mastigocladus(Lagerheim)

Mastigocladus indicus Desikachary, 1959, Cyanophyta, 573.

Fig no.45

Filaments 6.6-9.2µ broad, sheath fairly thick, hyaline and unlamellated; trichomes torulose or slightly constricted; cells barrel shaped, 2.7-6.5µ broad and 5.2-12.3µ long; heterocysts intercalary,ellipsoidal, 3.9-6.4µ broad and 7.9-14.1µ long, single.

Habitat: Free floating on water.

DISCUSSION: Highest number of blue green algae found under genus *Anabaena* is 17.78% (of heterocystous type) followed by *Oscillatoria* 13.33% (nonheterocystous type)

Table:1 Percentage of Non-heterocystous blue green algae in different taxon

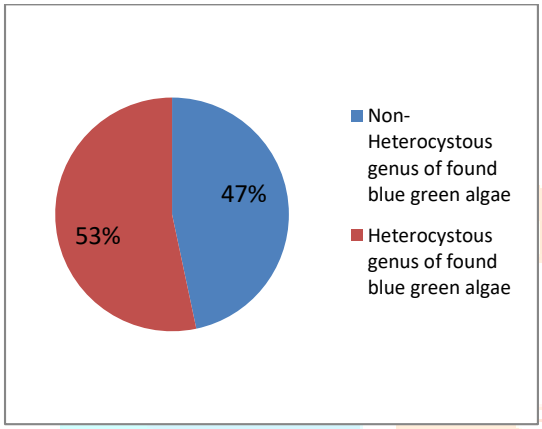
.	P/C of Non-Heterocystous **genus** of found blue green algae	P/C of Non-Heterocystous **species** of found blue green algae	Genus	Species	p/c of species in genus
Non-Heterocystous.	=07/15x100=**46.67%**	= 23/45x100=**51.11%**	**1. *Microcystis* (Kutzing) 1847**	***1. Microcystis robusta*** (Clark)	= 2/45x100 = 4.44**%**
				2. ***Microcystis flos-aquae*** (Wittr)	
			2. *Chroococcus* (Naegeli)	3. ***Chroococcus cohaerens*** (Barb)	1849 = 1/45x100 = 2.22**%**
			3. *Gloeocapsa* (Kutzing) Smith,1950	4. ***Gloeocapsa decorticans*** (Agardh) 5. ***Gloeocapsa atrata*** (Turp) 6. ***Gloeocapsa magma*** (Breb) 7. ***Gloeocapsa pleurocapsoides*** (Novacek)	= 4/45x100= 8.89%
			4. *Aphanocapsa*(Naegeli) 1849	8. ***Aphanocapsa pulchra*** (kutz) 9. ***Aphanocapsa banaresensis*** (Bharadwaja) 10. ***Aphanocapsa biformis*** (Agardh) 11. ***Aphanocapsa grevillei*** (Hase) 12. ***Aphanocapsa koordersi*** (Strom)	=5/45x100 =11.11%
			5. *Aphanothece*(Naegeli) 1849	13. ***Aphanothaceae stagnina*** (Spring)	=1/45x100= 2.22**%**

			6. *Oscillatoria* (Vaucher) Fritsch, 1949	14. ***Oscillatoria vizagapatensis*** (Rao) 15. ***Oscillatoria perornata*** (Skuja) 16 ***Oscillatoria subbrevis***(Schmidle) 17.***Oscillatoria sancta***(Kutzing) 18.***Oscillatoria ornata***Kutzing ex 19.***Oscillatoria curviceps***.(Ag.exGoment)	=6/45x100= 13.33**%**
			7. *Phormidium* (Kutzing)1845	20. ***Phormidium tenue***(Menegh) 21.***Phormidium microtomum*** (Skuja) 22.***Phormidium stagnina*** (Rao) 23.***Phormidium anomala*** (Rao)	=4/45x100= 8.89**%**

Table: 2 Percentage of Heterocystous species of found blue green algae

.	P/C of Heterocystous **genus** of found blue green algae	P/C of Heterocystous **species** of found blue green algae	Genus	Species	p/c of genus in species
Heterocystous.	=08/15x100=**53.33%**	= 22/45x100= 48.89**%**	**8.*Cylindrospermum* (Kutzing)1843**	24.***Cylindrospermum indicum***(Rao)	=1/45x100 =2.22%
			9.*Nostoc*(Kutzing)	25. ***Nostoc punctiforme*** (Kutzing) 26. ***Nostoc spongiaeforme ver. Tenue*** (Rao) 27. ***Nostoc ellipsosporium*** (Bornet) 28.***Nostoc commune***(Vaucher) 29.***Nostoc paremlioides***(Kutzing) 30.***Nostoc verrucosum***(Vaucher)	=6/45x100 =13.33%
			10. *Anabaena*(Borzy)1822	31. ***Anabaena sphaerica*** (Fremy) 32. ***Anabaena oscillarioides*(Bory ex Born)** 33. ***Anabaena fertilissima*** (Rao) 34. ***Anabaena anomala*** (Fritsch) 35. ***Anabaena vaginicola***(Fritsch) 36. ***Anabaena iyengarii*** (Bharadwaja) 37. ***Anabaena doliolum*** (Bharadwaja) 38. ***Anabaena spiroides***(Klebahn)	=8/45x100 =17.78%

			11.*Aulosira* (Bharadwaja)	39. ***Aulosirapseudoramosa***(Bharadwaja) 40. ***Aulosira aenigmatica*** Fremy	2/45x100= 4.44%
			12. *Tolypothrix*(Kutzing)	41. ***Tolypothrix byssoidea*** (Geitler)	=1/45x100 =2.22%
			13. *Calothrix* (Agardh)1824	42. ***Calothrix castellii*** (Massal)	1/45x100= 2.22%
			14. *Gloeotrichia*(Agardh) 1824	43.***Gloeotrichialongicauda*** (Schmidle) 44. ***Gloeotrichia pilgeri***(Schmidle)	=2/45x100 =4.44%
			15. *Mastigocladus* (Lagerheim)1886	45. ***Mastigocladus indicus*** (Geitler)	=1/45x100 =2.22%



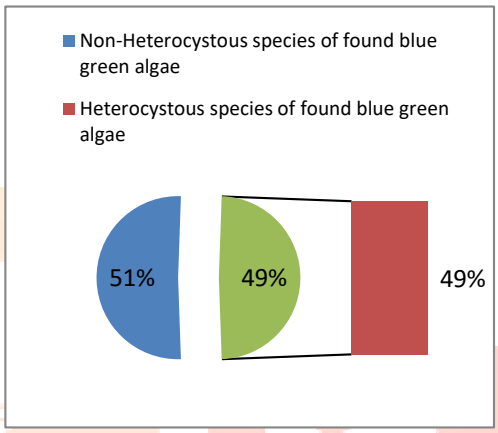


Fig: 1 Percentage of genus shows. **Fig : 2 Percentage of species shows.**

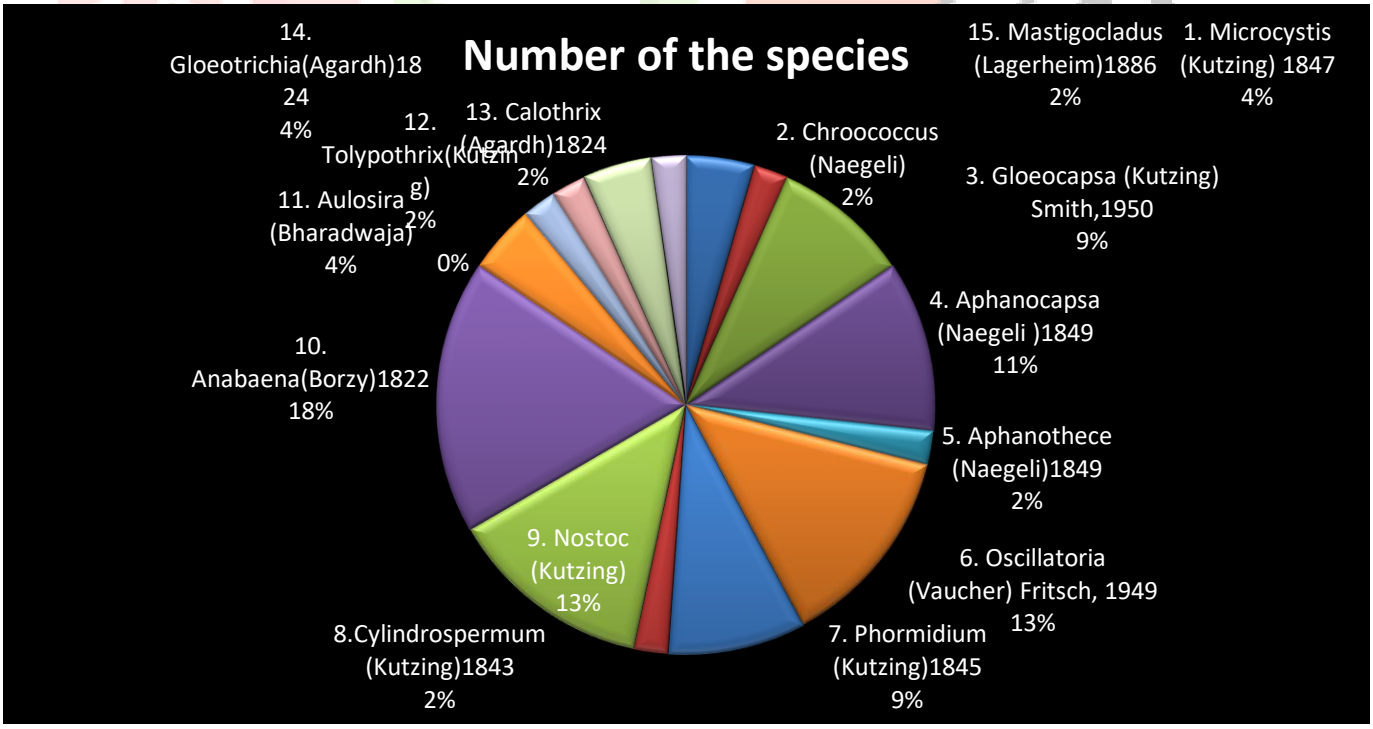


Fig.-3 Showing percentage of the species in genus.

PHOTO PLATE

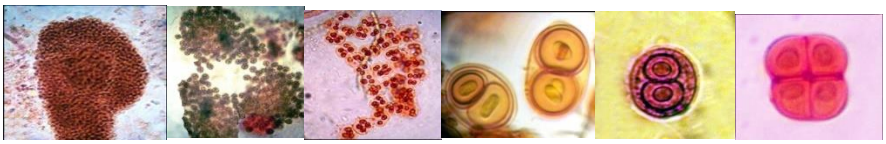


Fig 1 Fig 2 Fig 3 Fig 4 Fig 5 Fig 6

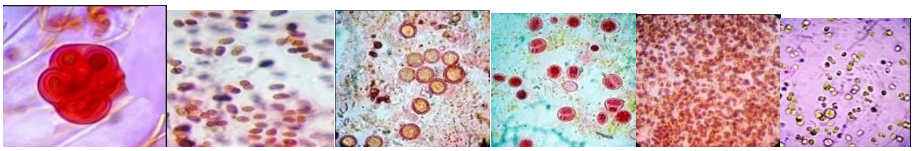


Fig 7 Fig 8 Fig 9 Fig 10 Fig 11 Fig 12

Fig 13 Fig 14 Fig 15 Fig 16 Fig 17 Fig 18

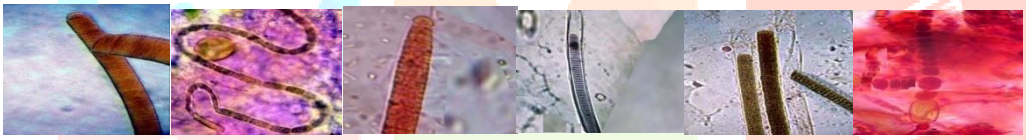


Fig 19 Fig 20 Fig 21 Fig 22 Fig 23 Fig 24

Fig 25 Fig 26 Fig 27 Fig 28 Fig 29 Fig 30

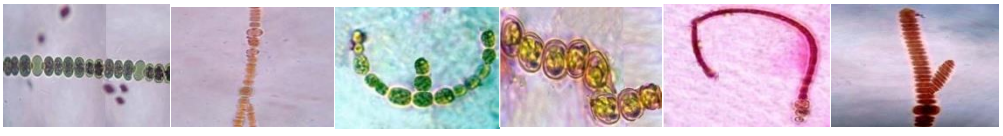


Fig 31 Fig 32 Fig 33 Fig 34 Fig 35 Fig 36

Fig***1.*** ***Microcystis robusta*** (Clark)Fig2. ***Microcystis flos-aquae*** (Wittr)Fig3.***Chroococcus cohaerens*** (Barb)Fig4.***Gloeocapsa decorticans*** (Agardh) Fig5.***Gloeocapsa atrata*** (Turp) Fig6.***Gloeocapsa magma*** (Breb)Fig7.***Gloeocapsa pleurocapsoides*** (Novacek)Fig8.***Aphanocapsa pulchra*** (kutz)Fig9.***Aphanocapsa banaresensis*** (Bharadwaja)Fig 10.***Aphanocapsa biformis*** **(**Agardh)Fig11.***Aphanocapsa grevillei*** (Hase)Fig12. ***Aphanocapsa koordersi*** (Strom)Fig13. ***Aphanothaceae stagnina*** (Spring)Fig14. ***Oscillatoria vizagapatensis*** **(**Rao)Fig15. ***Oscillatoria perornata*** **(**Skuja)Fig16***Oscillatoria subbrevis*****(**Schmidle)Fig17.***Oscillatoria sancta***(Kutzing)Fig18.***Oscillatoria ornata***Kutzing ex Fig 19.***Oscillatoria curviceps***.(Ag.exGoment) Fig 20. ***Phormidium tenue***(Menegh)Fig21.***Phormidium microtomum*** **(**Skuja)Fig22.***Phormidium stagnina*** **(**Rao) Fig23.***Phormidium anomala***Fig24.***Cylindrospermum indicum*****(**Rao)Fig25. ***Nostoc punctiforme*** (Kutzing)Fig26.***Nostoc spongiaeforme ver. Tenue*** **(** Rao)Fig27. ***Nostoc***

ellipsosporium (Bornet)Fig28.***Nostoc commune*****(**Vaucher***)*** Fig29.***Nostoc paremlioides*****(** Kutzing)Fig30.***Nostoc verrucosum***(Vaucher)Fig31. ***Anabaena sphaerica*** **(**Fremy)Fig32.***Anabaena oscillarioides*****(Bory ex Born)**Fig33. ***Anabaena fertilissima*** **(**Rao)Fig34. ***Anabaena anomala*** **(**Fritsch)Fig35.***Anabaena vaginicola*****(**Fritsch)Fig36.***Anabaena iyengarii*** **(**Bharadwaja)

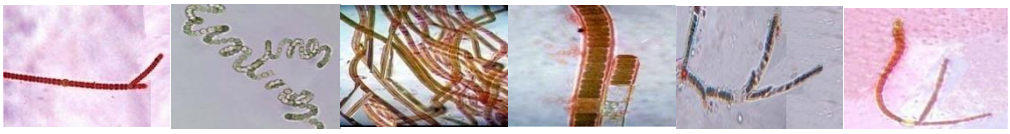


Fig 37 Fig 38 Fig 39 Fig 40 Fig 41 Fig 42

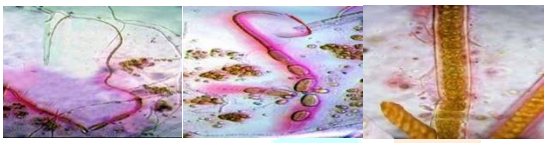


Fig 43 Fig 44 Fig 45

Fig 37.***Anabaena doliolum*** **(**Bharadwaja)Fig38.***Anabaena spiroides***(Klebahn)Fig39.***Aulosirapseudoramosa***(Bharadwaja)Fig40.***Aulosiraaenigmatica***FremyFig41.***Tolypothrix byssoidea*** (Geitler)Fig42. ***Calothrix castellii*** (Massal)Fig43.***Gloeotrichialongicauda*** **(**Schmidle)Fig44.***Gloeotrichia pilgeri***(SchmidleFig45.***Mastigocladus indicus*** (Geitler

REFERENCES

Anand,N.(1990): Selection of nitrogen fixing blue green algae tolerent to pestisides.In biotechnology of Biofertilizer for rice crops.(Ed.S.Kannaiyan Tamil Nadu Agricultural University.Coimbatore). 206-211 . APHA (2005) : Standard Methods for the Examination of Water and Waste Water. American Public Health Association, Washington, D. C.

B. Hazerica, P. D. (2001): Cyanobactera of rice field of Lakhimpur. Phykos, 40(1&2), 95-102.

Baruah P. P. Kakati B. Ahmed .I (2009): Some fresh water algae of oil Refinery Effluent Drains of Assam India. Our Nature 7:139-134.

Bharadwaja, N :(1935). Maxophyceae of the United province, India-1.proc.India Acad,SCI.

Bharadwaja, Y. (1933): Contribution to our knowledge of the Myxophyceae of India (Vol. 47).

Sahu, J.K. (2000). Growth and nitrogen fixation of cyanobacteria from rice fields of Puri district, Orissa, Adv. Plant Sci., 13 (1): 47-50.

Saikia, P. and Bordoloi, R. P. M. (1994). Blue -green algae of the rice fields of Barpeta, Nalbari and Kamrup district of Assam. Phykos, 33(1&2): 53-58. Das, A. K. (2009): Taxonomical studies on blue green algae of Bongaigaon district, Assam.Ph. D Thesis, Gauhati University, Guwahati, Assam. Deka, M. and Bordoloi, R.P.M. (1991). Studies on the blue green algae from the rice fields of Assam. Phykos, 30: 173-180 . Desikachary, T.V. (1959): Cyanophyta, Indian Council of Agricultural Research Publication, New Delhi, India.

Press.London,pp.791.

Srivastava D .K (2000) : Cyanobacteria from paddy fields of Durg District of Chattisgarh State. Phykos 39(1&2) 125-128.

Tiwari, G.L. and Shukla, H. M.(1996): Growth of cyanobacteria in rice fields. First Intenet.Symp. Microb exploit., Banaras Hindu University, CD-17:8.