



TAXONOMY OF BLUE GREEN ALGAE OF RICE FIELD OF MANGALDOI SUB DIVISION, DARRANG DISTRICT ASSAM INDIA

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Abstract

In present studies total 77 number of aquatic blue green algal species were identified from Feb. 2017 to Jan. 2019, belonged to the families *Chroococcaceae*, *Nostocaceae*, *Oscillatoriaceae*, *Scytonemataceae*, *Rivulariaceae*, Out of which we observed 40 numbers of species are non heterocystous type and 37 numbers of species are heterocystous type.

Key words: Blue green algae, heterocystous, non heterocystous, rice field, 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. (Rai and Bergman, 2002; Jaiswal *et al.*, 2008; Karthikeyan *et al.*, 2009; Anamika Singh and Hema Joshi, 2018), Cyanobacteria have enormous potential in serving humanity in many ways. Their diazotrophic nature, wide distribution pattern and capability to enter into N₂-fixing symbiosis make them attractive research interest. Cyanobacteria have a long history of usage in agriculture as biofertilizer (Whitton, 2000). They improve the texture of soil and increase the biochemical quality of the soil which forms a rapidly multiplying cover of microscopic plants. They have highly colonization with almost all types of soils. (Bold and Wanne, 1978) These strains are having special concern in microbiology as they are widely used as biofertilizer. *Nostoc punctiforme*, *Nostoc ellipsoforum*, *Nostoc muscorum* and *Nostoc paludosum* are the four different species of *Nostoc* selected for the study while they have taken single species of *Scytonema i.e.*, *Scytonema hofmanni*. (Anamika Singh and Hema Joshi, 2018).

Materials and Methods

Water samples were collected from seven different

location of Mangaldoi sub-division of Darrang District, Assam. To perform the proposed taxonomical study in a precise manner, the Mangaldoi Sub-division is specified into seven selected sites. During the field survey, specimens are being collected in wide mouthed bottles, test tubes, polythene bags, plankton net. Scalpel, blade, forceps are being used to collect blue green algae from running water. 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. Species of different levels of water is being collected by using pipes & tubes. 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 (Version 2.0) Published by North Carolina department of Environmental Quality, 2016.

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

Taxonomic Account

1. *Microcystis robusta*: (Clark) Nygaard, 1932, Kryptogamenflora, Leipzig, 135, fig. 58; Prescott, 1951,

The Algae of Western Ghat Lakes, Bulletin, 31: 456, pl. 102, fig. 1-4; Desikachary, 1959, Cyanophyta, 85, pl. 17, fig. 7-10.

Colonies at first round, latter irregularly elongate and clathrate; sheath distinct, latter gelatinizing; cells 6-9 μ diam; spherical, without gas-vacuoles.

2. *Microcystisbengalensis*: Banerji, 1938, Myxo. of Lower Bengal, I, J. Indian bot. Soc., 15 : 295, figs. 2A and B; Desikachary, 1959, Cyanophyta, 89, pl. 19, fig. 5 & 6.

Colonies irregularly branched long and broad. Varying greatly in form and size, 30-280 μ broad and 120-800 μ long, of partial colonies which break off and divide again to form compound colonies; sheath thick stratified, often distinct; daughter colonies mostly elongated, irregularly branched like the parent, margins of colonial mucilage not distinct ; cells spherical with gas-vacuoles, 3.5-6 μ diameter.

3. *Microcystis elongata*: Geitler, 1932, Kryptogamenflora, Leipzig, 137, fig. 59d; Desikachary, 1959, Cyanophyta, 89, pl. 18, fig. 7 & 8.

Colony elongate, sometimes clathrate, up to 1 mm in length, unconstructed, colonial mucilage distinct, occasionally lamellated, hyaline, refractive; cells often closely arranged, grouping absent, arrangement not uniform, 3.9-5.2 μ broad, gas-vacuoles present.

4. *Microcystis lamelliformis*: Holsinger, 1955, The Plankton algae of three Ceylon lakes, Hydrobiologia, 7:15, fig. 3; Desikachary, 1959, Cyanophyta, 91, pl. 19, fig. 1 & 2.

Colonies free floating, cells spherical, 3-4 μ diameter, loosely aggregated, cells sheath well marked; pseudo vacuoles numerous, small and more or less rounded.

5. *Microcystisaeruginosa*: Kutzing, 1847, Tab. Phycologicae, 1:8, pl. 8, fig. 1; Geitler, 1932, Kryptogamenflora, Leipzig, 137, fig. 59d; Prescott, 1951.

Colonies when young or round slightly longer than broad, when old become cloth rate with distinct hyaline mucilage, cells 3-7 μ in diameter spherical, generally with gas vacuoles.

6. *Microcystis flos-aquae*: (Wittr) Kirchner, 1898, Engler and Prantl, Natürlichen Pflanzenfam, 1: 56, fig. 49(N); Geitler, 1932, Kryptogamenflora, Leipzig, 14: 138, fig. 59, e, f; Desikachary, 1959, Cyanophyta, 94, pl. 17, fig. 11 and pl. 18, fig. 11.

Colonies free floating, irregular, roughly rounded, cells spherical, cell content blue green with conspicuous pseudo vacuoles. Cells 2.0-5.5 μ in diameter, nanocytes present.

7. *Microcystiselabens*: (Breb) Kutzing, 1846, Tab. Phycologicae, 1:6, pl. 8; Geitler, 1932, Kryptogamenflora, Leipzig, 145, fig. 65; Desikachary, 1959, Cyanophyta, 97, pl. 18, fig. 12 & pl. 20, fig. 6-7.

Colony spherical, or flat and expanding, blue green or olive-green, when old together with a number of daughter colonies; cells oblong, 2-4.5 μ broad, 4.2-8.5 μ long with gas vacuoles.

8. *Chroococcus giganteus*: West, 1892, Alg. Engl. Lake Dist., Trans. Roy. Mic.Soc., 741, pl. 10, fig. 60; Geitler, 1932, Kryptogamenflora, Leipzig, 227, fig. 109a; Desikachary, 1959, Cyanophyta, 101, pl. 26, fig. 1.

Cells mostly two, seldom three or four together in groups, bright blue-green, without sheath 5.4-5.5 μ broad, with sheath 67-70 μ broad; sheath 5.4-6 μ thick, lamellated, colourless.

9. *Chroococcus macrococcus*: (Kutzing) Rabenhorst, 1863, Krypto. Fl. Sachsen, 1:70; Forti, 1907, Sylloge Algarum, 5:8; Frey, 1929, Myxo. d'Afr.equat. franc.: 43, fig. 45; Desikachary, 1959, Cyanophyta, 101, pl. 27, fig. 3, 9 & 10.

Thallus mucilaginous, somewhat broad, yellowish brown, more or less dilated; cells spherical, 2-4 together, also single, 25-50 μ diam., with sheath 30-80 μ diam.; sheath thick, colorless, lamellated.

10. *Chroococcusturgidus*: (Kutzing) Naegeli, 1849, Gatt. Einzell. Algen, 46; Tilden, 1910, Minneapolis 3, pl. 1, fig. 3; Desikachary, 1959, Cyanophyta, 101, pl. 26, fig. 6.

Cells single, or in groups of mostly 2, spherical, olive green or yellowish, cell without sheath 15-18 μ , with sheath 13-25 μ diam; sheath colourless, lamellated.

11. *Chroococcustenax*: (Kirchner) Hieronymus, 1892, Beitr. Biol. Pfl., 5:483, pl. 17, fig. 11; Geitler, 1932, Kryptogamenflora, Leipzig, 231, fig. 111a; Desikachary, 1959, Cyanophyta, 103, pl. 26, fig. 7 & 16.

Cells mostly in groups of 2-4, sometimes 8-16, blue-green or olive coloured, without sheath 16-21 μ , with sheath 20-26 μ in diam.; sheath colourless or yellow to brown, very thick, very distinctly lamellated, 3-4 lamellae.

12. *Chroococcus minutes*: (Kutzing) Naegeli, 1849, Gatt. Einzell. Algen, 46; Frey, 1929, Myxo.d'Afr.equat. franc., 39, fig. 42; Geitler, 1932, Desikachary, 1959, Cyanophyta, 103, pl. 24, fig. 4, pl. 26, fig. 4 & 15.

Cells spherical or oblong, single or in groups of 2-4, light blue-green, with sheath 6-15 μ diam. and without sheath 4-10 μ diam., colonies 10-13 μ broad, 15-20 μ long; sheath not lamellated, colourless.

13. *Chroococcus cohaerens*: (Breb) Naegeli, 1849, Gatt. Einzell. Algen, 46; Frey, 1929, Myxo.d'Afr.equat.

franc., 44, fig. 47; Geitler, 1932, Kryptogamenflora, Leipzig, 238, fig. 116e; Desikachary, 1959, Cyanophyta, 111, pl. 26, fig. 3 & 9.

Thallus slimy, or gelatinous, blue or dark-green; cells single or up to 2-8 in groups, without envelope 2-7 μ diam. and with sheath 2.5-7 μ diam., colony 7-15 μ ; sheath thin, colourless, unlamellated.

14. *Gloeocapsadecorticans*: (Agardh) Richter, 1925, Wille, *Nyt. Mag. Naturvid.*, 62:186; Geitler, 1932, Kryptogamenflora, Leipzig, 14:184, fig. 83b; Desikachary, 1959, Cyanophyta, 114, pl. 24, fig. 9.

Thallus blue green, cells spherical or sometimes oval, blue-green, single or up to 2-4 together; without sheath 3-5 μ in diam., sheath colourless, thick, distinctly lamellated.

15. *Gloeocapsamontana*: Kutzing, 1845, *Phyc. Gene.*, 173; Forti, 1907, *Sylloge Algarum*, 5:50; Desikachary, 1959, Cyanophyta, 123, pl. 24, fig. 14.

Thallus amorphous, broad, mucilaginous, cells spherical or sub-spherical, without sheath 2-5 μ broad, colony 13-28 μ broad; sheath lamellated, colourless, outer lamellae diffluent, homogeneous, finely granular, pale blue-green.

16. *Gloeocapsagelatinosa*: Kutzing, 1845, *Phyc. Generalis*, 174; Frey, 1929, *Myxo. d'Afr. equat. franc.*, 47, fig. 52; Geitler, 1932, Kryptogamenflora, Leipzig, 187; Desikachary, 1959, Cyanophyta, 114, pl. 27, fig. 6.

Cells light blue-green, with sheath 6.2-10 μ diam., without sheath, 2.5 μ in diam. sheath colourless, lamellated.

17. *Gloeocapsapolydermatica*: Kutzing, 1845, *Phyc. Generalis*, 1:15, pl. 20, fig. 3; 174; Geitler, 1932, Kryptogamenflora, Leipzig, 185, fig. 83c; Desikachary, 1959, Cyanophyta, 114, pl. 25, fig. 1.

Thallus mucilaginous, dark blue green, cells spherical, single or groups, cells without sheath 3-4.5 μ diam., with sheath 10-15 μ in diam. sheath colourless, lamellated.

18. *Gloeocapsa calcarea*: Tilden, 1910, *Minn. Bot. Studies*, ser. 2, 1:29; Geitler, 1932, Kryptogamenflora, Leipzig, 187, fig. 83a; Desikachary, 1959, Cyanophyta, 115, pl. 24, fig. 6.

Thallus with calcium incrustation, cells with or without individual sheath, 6-9 μ diam., blue-green, sheath colourless, colonies 25-50 μ in diam., with 4-16 cells.

19. *Gloeocapsapunctata*: Naegeli, 1849, *Species Algarum*, 22; Frey, 1929, *Myxo. d'Afr. equat. franc.*, 47; Geitler, 1932, Kryptogamenflora, Leipzig, 189; Desikachary, 1959, Cyanophyta, 115, pl. 23, fig. 2.

Thallus gelatinous, light blue-green; cells without sheath 1.5-2.8 μ diam., with sheath 3.5-7 μ broad, colourless, lamellated.

20. *Gloeocapsaatrata*: (Turp) Kutzing, 1845, *Phyc. Generalis*, 172; Forti, 1907, *Sylloge Algarum*, 5:57; Geitler, 1932, Desikachary, 1959, Cyanophyta, 116, pl. 24, fig. 8.

Thallus crustaceous, mucilaginous, blackish, cells without sheath 3.5-4.5 μ diam., with sheath 9-14.5 μ in diam., pale blue-green, sheath colourless, lamellated.

21. *Gloeocapsa nigrescens*: Naegeli, 1849, *Rabenhorst, Alg. Sachs.*, 63; Forti, 1907, *Sylloge Algarum*, 5:42; Desikachary, 1959, Cyanophyta, 117, pl. 24, fig. 15 & 17.

Thallus crustaceous, cells spherical, without sheath 3.3-6.8 μ diam. and with sheath 12-13.5 μ diam., in colonies of 30-125 μ diam., sheath broad, colourless, contents blue-green, homogeneous.

22. *Gloeocapsa stegophila* var. *crassa*: Rao, 1937b, *Myxophyceae of the United Provinces*, III, *Proc. Indian Acad. Sci.*, B, 6:344, Fig. 1D; Desikachary, 1959, Cyanophyta, 119, pl. 24, fig. 3.

Thallus soft, yellowish brown; cells spherical, subspherical or elongated, 4-6.4 μ broad or rarely 6.4-9.6 μ long, sheath golden yellow, sometimes striated; colony with sheath 8-15 μ broad and 9.6-19.2 μ long, sheath up to 3.2 μ thick.

23. *Gloeocapsa coracina*: Kutzing, 1845, *Phycologicae generalis*, 174, pl. 6, fig. I, 1; Forti, 1907, *Sylloge Algarum*, 5:56; Desikachary, 1959, Cyanophyta, 121, pl. 24, fig. 11.

Thallus crustaceous, lubricous, round small, with sheath 6-14 μ and without sheath about 3 μ broad, in groups of 9-75 μ diam., lamellated, homogeneous, blue-green.

24. *Gloeocapsa magma*: (Breb) Kutzing, 1845, *Tab. Phycologicae*, 1:17, pl. 22, fig. 1; Frey, 1929, *Myxo. d'Afr. equat. franc.*, 50, fig. 57; Geitler, 1932, Desikachary, 1959, Cyanophyta, 120, pl. 24, fig. 13.

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

25. *Gloeocapsa pleurocapsoides*: Novacek, 1992, *Prace Moravske Prirodo Moravya a Slezka Oddel. Bot.*, 7:1; Skuja, 1949, Desikachary, 1959, Cyanophyta, 118, pl. 24, fig. 3.

Colonies composed of fewer, more or less roundish or irregular cells, dull olive or pale green, homogeneous, granular, cells without sheath 5-10 μ in diam., sheath thin, firm, simple, coloured yellowish brown or brownish in the peripheral part, 2-3 μ thick and lamellated.

26. *Aphanocapsa pulchra*: (Kutzing) Rabenhorst, 1863, *Fl. Eur. Alg.*, 2:49; Geitler, 1932, Kryptogamenflora,

Leipzig, 155, fig. 69g; Frey, 1933, *Cyano. cotesd'Eur.*, 14, pl. 2, fig. 3; Desikachary, 1959, *Cyanophyta*, 132, pl. 21, fig. 2.

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

27. *Aphanocapsakoordersi*: Strom, 1923, *Algol.* notes, *Nyt. Mag. Naturvid.*, 61:128; Geitler, 1932, *Kryptogamenflora*, Leipzig, 155, fig. 68; Desikachary, 1959, *Cyanophyta*, 132, pl. 23, fig. 1.

Colony spherical, dull green to blue-green, 2-3 mm. in diam.; cells loosely arranged or in groups of four, spherical, 2.2-2.7 μ in diam.

28. *Aphanocapsabanaresensis*: Bharadwaja, 1935, *myxophyceae of the United provinces*, *Proc. Indian Acad. Sci., B*, 2:96, fig. 1B, Desikachary, 1959, *Cyanophyta*, 133, pl. 22, fig. 8.

Thallus soft, spherical, hyaline, up to 1.6 cm in diam., cells almost spherical, 4-6.2 μ diam., sheath thick, unlamellated, hyaline.

29. *Aphanocapsa biformis*: *Cyanophyta*, 134, p Agardh, 1878, *Rob, Kryptogamenflora*, Leipzig, 158, fig. in horst, *FL. Eur. Alg.*, 2:246; Geiter, 1932:201; Desikachary, 1959:21 fig. 3&4.

Thallus olive green, gelatinous, often expanding; cells 4-8 μ diam, spherical, loosely arranged, 2-4 together in a common mucilaginous envelope.

30. *Aphanocapsa greville i*: (Hase) Rabenhorst, 1863, *Fl. Eur. Alg.*, 2:50; Frey, 1929, *Myxo. d'Afr. equat. Franc.*, 25, fig. 25; Geiter, 1932, Desikachary, 1959, *Cyanophyta*, 134, pl. 21, fig. 9.

Thallus gelatinous, spherical or hemispherical light blue green; cells spherical 3.25-6.1 μ diam; homogeneous mucilage individual envelopes not distinct Habitat: Stagnant water in rice field. Locality: Maroi

31. *Aphanocapsa crassa*: Ghose, 1927b, *Myxophyceae of Rangoon, III, J. Burma Res. Soc.*, 17:239, pl. 2, fig. 3; Desikachary, 1959, *Cyanophyta*, 136, pl. 22, fig. 6.

Thallus gelatinous, delicate, brownish; cells generally single, globose, not very closely arranged, 7-12 μ thick, brownish green.

32. *Aphanothecestagnina*: (Spring) Desikachary, 1959, *Cyanophyta*, 137, pl. 21, fig. 10.

Thallus gelatinous, spherical, ellipsoidal, pale blue-green, oblong, more or less ovoid or cylindrical, 3-6.3 μ in broad, 4.4 -11 μ long, densely or sparsely arranged generally densely in the peripheral region region of the colony and sparsely in the inside of the colony.

33. *Oscillatoria vizagapatensis*: Rao, 1938, *Myxophyceae of the Madras Presidency, J. Indian bot. Soc.*, 17:89, figs. 1-3; Desikachary, 1959, *Cyanophyta*, 205, pl. 39, fig. 18.

Thallus blue-green; trichomes straight, pale blue-green, uniformly broad except at the extreme apex, 8-10 μ broad; cells 1.5-2 μ long; end cell broadly rounded forming a cap.

34. *Oscillatoria sancta*: (Kutzing) Gomont, 1892, *Monogr. Cscillariees*, 209, pl. 6, fig. 12; Desikachary, 1959, *Cyanophyta*, 203, pl. 42, fig. 10.

Thallus dark blue, gelatinous; trichomes straight or bent, distinctly constricted at the cross-walls; ends briefly attenuated, 10-20 μ broad; cells 2.5-6 μ long, slightly capitate, with a thickened membrane.

35. *Oscillatoria perornata*: Skuja, 1949, *Zur Susswasseralgenflora Burmas*, *Nov. Acta Reg. Soc. Uppsal.*, ser. 4, 14:47, pl. 8, figs. 7-9; Desikachary, 1959, *Cyanophyta*, 205, pl. 41, fig. 8.

Trichomes erect, apices briefly attenuated, well constricted at the cross-walls, 13-14 μ broad, single; cells 2.5-6.4 μ long, end cell hemispherical, calyptra absent.

36. *Oscillatoria ornata*: Kutzing ex Gomont, 1892, *Monogr. Cscillariees*, 209, pl. 6, fig. 12; Geitler, 1932, *Kryptogamenflora*, Leipzig, 944, fig. 599a; Desikachary, 1959, *Cyanophyta*, 206, pl. 37, fig. 12.

Thallus dark blue-green; trichome constricted at the cross-walls, 9-11 μ broad, dull blue-green, cells 2-5 μ long; apices slightly attenuated; end-cells rounded, not capitate.

37. *Oscillatoria subbrevis*: Schmidle, 1901, *Engler's Bot. Jahrb.*, 30: 243, pl. 4, fig. 7; Frey, 1929, *Myxo. d'Afr. equat. franc.*, 208, fig. 174; Geitler, 1932, Desikachary, 1959, *Cyanophyta*, 207, pl. 37, fig. 2.

Trichomes single, 5-5 μ broad, nearly stright, not attenuated at the apices; cells 1-2 μ long, not granulated at the cross-walls; end-cell rounded, calyptra absent.

38. *Oscillatoria curviceps*: Frey, 1933, *Cyano. cotes d'Eur.*, 117, pl. 30, fig. 5; Desikachary, 1959, *Cyanophyta*, 209, pl. 38, fig. 2.

Thallus light blue-green; trichomes straight, very little attenuated, not constricted at the cross-walls, 12.5-17.2 μ broad, cells 1.5-3 μ long; end-cells flat rounded.

39. *Phormidium microtomum*: Skuja, 1949, *Zur Susswasseralgenflora Burmas*, 51, pl. 8, fig. 26-27; Desikachary, 1959, *Cyanophyta*, 257, pl. 43, fig. 16.

Thallus expanded, coriaceous, lamellose, dark greyish-green or light-bluish; filaments more or less straight, 6.5-8 μ broad; sheath thin, colourless, later

diffluent; trichome ends briefly or prominently attenuated, 6-7 μ broad, well constricted at the cross-walls, cells 1/3-1/8 as long as broad, 0.8-1.5 μ long, contents blue-green to olivaceous, septa not granulated or indistinct and finely granulated; apical cell rounded with a hyaline calyptra.

40. *Phormidium stagnina*: Rao, 1938, Desikachary, 1959, Cyanophyta, 265, pl. 45, fig. 16.

Thallus blue-green and membranous, 12-8-14.4 μ broad; trichome 8-9.6 μ broad, sheath hyaline, sometimes diffluent; cells small, 1.3-2 μ long; end cell broadly rounded with a prominent calyptra. 2. Heterocystous.

41. *Cylindrospermum indicum*: Rao, 1936, The Myxophyceae of the United Provinces, India-II, Proc. Indian Acad. Sci., B., 3:169, fig. 2, D,E; Desikachary, 1959, Cyanophyta, 369, pl. 64, fig. 11.

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.

42. *Nostoc punctiforme*: (Kützing) Hariot, 1891, J. De Bot., 5:31; Frey, 1929, Myxo. d'Afr. equat. franc., 331, fig. 274; Geitler, 1932, Kryptogamenflora, Leipzig, 834; Desikachary, 1959, Cyanophyta, 374, pl. 69, fig. 1.

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

43. *Nostoclinckia*: (Rothmaler) Frey, 1933, Cyano. Cotes d'Eur., 175, pl. 58, fig. 1; Desikachary, 1959, Cyanophyta, 377, pl. 69, fig. 4.

Trichomes 3.5-4 μ broad, pale blue-green; cells short barrel-shaped; heterocysts sub-spherical; spores sub-spherical, 6-7 μ broad, 7-8 μ long.

44. *Nostoc piscinale*: Kützing, Kryptogamenflora, Leipzig, 838, fig. 529; Desikachary, 1959, Cyanophyta, 377, pl. 69, fig. 3.

Thallus blue green, olive green to brown, mucilaginous; filaments loosely entangled; trichomes not densely arranged; sheath distinct, 2.5-7 μ broad; heterocysts sub-spherical 4.6.5 μ broad, spore spherical, 5.6-7.2 μ diam., arranged in long chain.

45. *Nostoc spongiaeforme* var. *tenue*: Rao, 1936, Kryptogamenflora, Leipzig, 839, fig. 531; Desikachary, 1959, Cyanophyta, 380, pl. 68, fig. 2.

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, 4-6 μ

broad and 5.5-9 μ long; spores spherical, sub-spherical, 4.8-7.5 μ broad and 4.5-9 μ long.

46. *Nostocellipsosporum*: Bornet, Desikachary, 1959, Cyanophyta, 383, pl. 69, fig. 5.

Thallus gelatinous, expanded, filaments flexous, trichome about 2.5-4 μ broad; cells cylindrical size 3.2-4.5 μ broad, 6-13.5 μ long; heterocysts sub-spherical 6-7 μ broad, 6-14 μ long; spores ellipsoidal, cylindrical, 5-7.2 μ broad, 14-18.5 μ long, episore smooth.

47. *Nostoc calcicola*: Brebisson ex Bornet et Flah., 1843 Desikachary, 1959, Cyanophyta, 384, pl. 68, fig. 1.

Trichome 2.5 μ broad, pale blue-green; cells barrel-shaped, subspherical, rarely longer than broad; heterocysts subspherical, 4-5 μ broad; spores subspherical, 4-5 μ broad.

48. *Nostoc commune*: Vaucher ex Bornet et Flah., Vaucher, 1803, Desikachary, 1959, Cyanophyta, 387, pl. 68, fig. 3.

Thallus blue green, large, flat, leathery, filaments flexous; sheath thick, distinct, lamellated; trichome distinct, 4-5.6 μ broad, cells nearly spherical, heterocysts spherical, 5.8-7.2 μ broad, spores are large as vegetative cells.

49. *Nostoc paremlioides*: Kützing, Desikachary, 1959, Cyanophyta, 389, pl. 70, fig. 3.

Trichome 4-4.5 μ broad; cells short barrel-shaped, sub-spherical; heterocysts spherical, 6 μ broad; spores oval 4-5 μ broad, 7-8 μ long.

50. *Nostoc verrucosum*: Vaucher ex Bornet et Flah., Geitler, 1932, Kryptogamenflora, Leipzig, 854, fig. 43, 542 and 543; Desikachary, 1959, Cyanophyta, 388, pl. 70, fig. 1.

Trichome 3-3.5 μ broad, cells short barrel-shaped, shorter than broad; heterocysts 5-6 μ broad, sub-spherical; spores oval, 4-5 μ broad, 6-7 μ long.

51. *Nostochatei*: Dixit, 1936, The Myxophyceae of the Bombay Presidency-I, Proc. Indian Acad. Sci., B, 3:101, fig. 30; Desikachary, 1959, Cyanophyta, 389, pl. 67, fig. 2.

Trichomes 3.7-6 μ broad, densely entangled; cells spherical; heterocysts single, or in short chains of 2-5, almost spherical rarely slightly barrel-shaped, 3.6-5 μ broad and 5 μ long.

52. *Anabaena sphaerica*: Frey, 1929, Myxo. d'Afr. equat. franc., 361, 295; Geitler, 1932, Kryptogamenflora, Leipzig, 878; Desikachary, 1959, Cyanophyta, 393, pl. 71, fig. 10.

Thallus blue green, trichomes straight, moniliform, 5-6 μ broad, with an indistinct mucilaginous sheath; cells

spherical, rounded; heterocysts sub-spherical, 5-7 μ diam; spores on one or both sides of the heterocysts, 7.2-13 μ broad, 11-18.2 μ epispore smooth.

53. *Anabaena spiroides*: Klebahn, 1895, Flora, 80: 125, pl. 4, fig. 11; Geitler, 1932, Kryptogamenflora, Leipzig, 881; Desikachary, 1959, Cyanophyta, 395, pl. 71, fig. 9.

Thallus single, free-floating, regularly spirally coiled, with thick and mucilaginous sheath, spirals 45-54 μ broad and 40-50 μ distant; cells spherical, 6.5-8 μ broad, mostly somewhat shorter than broad, with gas-vacuoles; heterocysts sub-spherical, 6.2-7 μ broad; spores at first spherical, later elongate, slightly bent, in optical longitudinal section hexagonal, next to the heterocyst or away from it, 10-14 μ broad.

54. *Anabaena oryzae*: Fritsch, 1945. The genus *Anabaena*, J. Indian bot. Soc., 28: 135, figs. 1-16; Desikachary, 1959, Cyanophyta, 396, pl. 72, fig. 3.

Thallus greenish, soft and gelatinous, trichomes short, straight, densely aggregated, 306 μ broad; cells 3-5 μ long; heterocysts terminal and intercalary, 8-10 μ broad; spores single next to the terminal heterocyst, sub-spherical, 6-8 μ in diam.

55. *Anabaena fertilissima*: Rao, 1937, The Myxophyceae of the United Provinces, III, Proc. Indian Acad. Sci., B, 6:363, fig. 6A-C; Desikachary, 1959, Cyanophyta, 398, pl. 74, fig. 1.

Trichome single, long sporogenous *i.e.* spores in long chain, trichome 506 μ broad; cells 3-5 μ long; heterocysts 6.4-8.4 μ broad, rare, intercalary; spores with a smooth hyaline outer wall, 4.8-8 μ broad and 3.2-8.8 μ long.

56. *Anabaena khannae*: Skuja, 1949, Zur Susswasseralgenflora Burmas, 41, pl. 7, figs. 1-5; Desikachary, 1959, Cyanophyta, 396, pl. 75, fig. 2.

Trichomes 2.5-4 μ broad, cells barrel shaped, apex rounded; heterocysts terminal or intercalary, barrel-shaped; apex rounded, 3-3.5 μ broad, 3.5-6 μ long.

57. *Anabaena anomala*: Fritsch, 1945, The genus *Anabaena* etc., J. Indian bot. Soc., 28:146, figs. 60-73; Desikachary, 1959, Cyanophyta, 398, pl. 73, fig. 2.

Trichome irregularly aggregated, moniliform, apical cell rounded, apex obtuse; cells generally 2-3 μ broad, spherical, about 3.5 μ long; heterocysts rare, commonly single, intercalary, spherical, 3.5-5.5 μ broad.

58. *Anabaena vaginicola*: Fritsch, 1929, Freshwater Algae from Girqualand West. Trans. Roy. Soc. S. Afr., 18(1):87; Desikachary, 1959, Cyanophyta, 401, pl. 73, fig. 5.

Trichomes mucilaginous sheath, 4-4.5 μ broad, single trichome with sheath 11.5 μ broad; cells subquadrate; apical cell acuminate conical; heterocysts cylindrical, 4-5 μ broad, 6-10 μ long, spores oblong, contiguous with the heterocysts, 6.5-10 μ broad and 12-17.5 μ long.

59. *Anabaena fuellebornii*: Schmidle, 1901, Engler's Bot. Jahrb., 32:61, pl. 1, fig. 4; Geitler, 1932, Kryptogamenflora, Leipzig, 904, fig. 567e; Desikachary, 1959, Cyanophyta, 401, pl. 75, fig. 1.

Trichomes small, mucilaginous, blue-green mass, sheath diffluent; cells cylindrical, 4-5 μ broad, 7-10 μ long; heterocysts barrel-shaped 5.5-7 μ broad and 7-12 μ long; spores ellipsoidal, somewhat swollen on the sides about 10-16 μ broad and 20-34 μ long.

60. *Anabaena aphanizomenoides*: Forti, 1912, Desikachary, 1959, Cyanophyta, 405, pl. 71, fig. 4.

Trichome single, 3-4 μ broad, straight or slightly bent, slightly constricted at the cross-walls; cells barrel-shaped, with gas-vacuoles; heterocysts subspherical, 5.5-7 μ broad, 6-7.5 μ long; spores single, 9-12 μ broad, 12-16 μ long, with smooth colourless wall.

61. *Anabaena orientalis*: Dixit, 1936, The Myxophyceae of the Bombay Presidency, I, Proc. Indian Acad. Sci., B, 3:101, fig. 3D,E; Desikachary, 1959, Cyanophyta, 405, pl. 77, fig. 6.

Trichome single, straight 2.8-4.2 μ broad, cells cylindrical, 4-5 μ long, end-cell conical with rounded apex; heterocysts single, intercalary, 4.2-5.5 μ broad and 7.2-9.0 μ long; spore one on each of a heterocyst, 7.2-9.0 μ broad, 15-16.2 μ long.

62. *Anabaena jyengarii*: Bharadwaja, 1935, The Myxophyceae of the United Provinces, I, Proc. Indian Acad. Sci., B, 2:105, Fig. 6H-K; Desikachary, 1959, Cyanophyta, 406, pl. 78, fig. 2.

Trichome single, 5.2-6.3 μ broad; cells barrel-shaped; heterocysts barrel-shaped, rarely spherical, 7.3-8.4 μ broad and 7.3-10.5 μ long; spores 8.4-10.5 μ broad and 10.5-21 μ long, smooth and yellowish brown.

63. *Anabaena ballygunghii*: Banerji, 1938, Studies on the Myxophyceae of Lower Bengal, II, J. Dept. Sci., Calcutta Univ., 1:98, fig. 2a-d; Desikachary, 1959, Cyanophyta, 409, pl. 77, fig. 4.

Trichomes fragile, circinate; cells spherical, 7-8.5 μ broad and 6.5-13.5 μ long; heterocysts somewhat spherical, single; spores single, ellipsoidal, smooth, colourless.

64. *Anabaena naviculoides*: Fritsch, 1945, The genus *Anabaena* etc., J. Indian bot. Soc., 28: 138, figs. 17-39; Desikachary, 1959, Cyanophyta, 410, pl. 72, fig. 2.

Trichome elongate, moniliform, apices acuminate; cells 3.5-5 μ , heterocysts intercalary, single, barrel-shaped, 5-6 μ broad, as long as or slightly longer than broad; spores ellipsoidal, ends acute and protracted, exospore thin, hyaline, more or less 11-12.5 μ long, 6-7 μ broad and 8.5-9 μ long, 5.5 μ broad.

65. *Anabaena doliolum*: Bharadwaja, 1935, The Myxophyceae of the United Provinces, I, Proc. Indian Acad. Sci., B, 2:105, Fig. 6A,D; Desikachary, 1959, Cyanophyta, 410, pl. 78, fig. 3.

Trichome single, straight, curved or slightly coiled, 3.6-4.2 μ broad, slightly tapering at the ends, with conical apical cell, cells barrel-shaped; heterocysts barrel-shaped, 5.2-6.3 μ broad and 6.3-9.4 μ long; spores ellipsoidal, 4.2-6.2 μ broad and 6.3-11.5 μ long.

66. *Anabaena variabilis*: Kutzing ex Bornet et Flah, 1845, Kutzing, Phyc. Gene., 210; Frey, 1929, Myxo. d'Afr. equat. franc., 360, fig. 294; Geitler, 1932, Kryptogamenflora, Leipzig, 876, fig. 558; Desikachary, 1959, Cyanophyta, 410, pl. 71, fig. 5.

Thallus greenish, gelatinous, trichome without any sheath, 4-5.8 μ broad, slightly constricted at the cross-walls, end-cells conical; cells 2.4-6.2 μ long; heterocysts spherical, 5.2-6 μ broad, 6-8 μ long; spores not contiguous with the heterocysts, barrel-shaped, in series, 7.6-9.5 μ broad, 8-14 μ long.

67. *Anabaena variabilis* var. *kashiensis*: (Bharadwaja) Fritsch, 1945, The genus *Anabaena*, J. Indian bot. Soc., 28:155, 158, figs. 88-92; Desikachary, 1959, Cyanophyta, 413, pl. 77, fig. 7.

Thallus greenish, gelatinous, trichomes 3.1-4.2 μ broad, blue-green, attenuated at the ends, without mucilaginous sheath; cells cylindrical; heterocysts single intercalary, cylindrical, 4.2-5.2 μ broad and 8.4-12.6 μ long; spores ellipsoidal or barrel-shaped, 4.2-6.3 μ broad and 6.3-10.5 μ long, smooth and colourless.

68. *Anabaena circinalis*: Rabenhorst ex Bornet et Flah, 1852, Desikachary, 1959, Cyanophyta, 414, pl. 77, fig. 2.

Trichome mostly circinate, seldom straight, 8-14 μ broad; cells spherical, with gas-vacuoles; heterocysts subspherical, 8-10 μ broad; spores cylindrical, 10-15 μ broad, 17-24 μ long.

69. *Anabaena utermohlii*: Geitler, 1932, Kryptogamenflora, Leipzig, 884; Desikachary, 1959, Cyanophyta, 415, pl. 74, fig. 2.

Trichomes single, free-floating; cells 4-4.5 μ broad, 4-6.5 μ long, often with gas vacuoles; heterocysts somewhat elongate, 4-4.5 μ broad, 4.7-5.7 μ long; spores 7-8 μ broad, 19-20 μ long, smooth and colourless.

70. *Tolypothrix byssoidea*: Geitler, 1932, Kryptogamenflora, Leipzig, 728, fig. 470, 471a; Desikachary, 1959, Cyanophyta, 502, pl. 103, fig. 3, 4.

Thallus brownish; filaments 10-14 μ in diam., false branched; sheath thin; trichome tubular, 9-10 μ broad, torulose; cells barrel shaped; heterocysts single.

71. *Calothrix castellii*: (Massal) Bornet et Flah, 1886, Revision des Nostocaceeheterocystees, 369; Geitler, 1932, Kryptogamenflora, Leipzig, 611, fig. 385; Desikachary, 1959, Cyanophyta, 529, pl. 114, fig. 7.

Thallus spongy, dull blue green; filaments bent, 17-11 μ broad, swollen at the base, 4-8mm long; sheath thin; trichome 8-11 μ broad, attenuated; heterocyst basal.

72. *Calothrix clavatoidea*: Ghose, 1927, On some Myxophyceae from Maymyo, J. Burma Res. Soc., 17(3): 253, pl. 4, fig. 3; Geitler, 1932, Kryptogamenflora, Leipzig, 621, fig. 394; Desikachary, 1959, Cyanophyta, 531, pl. 113, fig. 9.

Trichome single 20-28.5 μ long, straight or curved, swollen at the base and about 10-14 μ broad; sheath thin; cells at the base discoid, 10-13 μ thick, in the middle 2-3 times as long as broad, 3-4 μ in diam.; heterocysts basal, single, globose.

73. *Calothrixscytonemicola*: Tilden, 1910, Minnesota algae, 1:265, pl. 17, fig. 7; Geitler, 1932, Kryptogamenflora, Leipzig, 627, fig. 398; Desikachary, 1959, Cyanophyta, 537, pl. 112, fig. 14.

Filaments 7-8 μ in diam., the lower portion attached to the host, the remainder free and erect, ending in a pointed hair; sheath not distinct; heterocysts 5-8 μ in diam., basal, globose.

74. *Calothrixwembaerensis*: Geitler, 1932, Kryptogamenflora, Leipzig, 615; Desikachary, 1959, Cyanophyta, 525, pl. 107, fig. 3.

Filaments caespitose, 10-30 μ broad; sheath thick, gelatinous; cells at the base of filament about 8 μ broad, barrel shaped; heterocyst basal, mostly two; spores, cylindrical.

75. *Calothrixbreviarticulata*: West, 1892, Welwitsch's Afric. Algae., J. Bot. Lond., 35:240; Geitler, 1932, Kryptogamenflora, Leipzig, 611, fig. 389; Desikachary, 1959, Cyanophyta, 537, pl. 110, fig. 9.

Filaments single, at the base 15-16 μ broad, in the middle 11.5-12.5 μ broad, 15-20 μ long, attenuated at the apex; sheath thick, lamellated; trichome at the base 8.5 μ broad, in the middle 5.5-7.5 μ broad; cells discoid; heterocysts basal single, hemispherical.

76. *Calothrixdolichomeres*: Skuja, 1949, Desikachary, 1959, Cyanophyta, 540, pl. 109, fig. 1-5.

Table 1: Name and percentage of Non-heterocystous Blue green algae.

Types of genus.	Name of the genus.	Name of the species.	P.C of genus under Non heterocystous genus	P.C of species under under all genus
Non heterocystous (Total genus 7 numbers.)	1. <i>Microcystis</i>	1. <i>Microcystis robusta</i> (Clark) Nygaard.	7/40 x100 =17.5%	7/77 x100 = 9.09 %
		2. <i>M. bengalensis</i> Banerji		
		3. <i>M. elongata</i> Rao		
		4. <i>M. lamelliformis</i> Holsinger.		
		5. <i>M. aeruginosa</i> Kutz.		
		6. <i>M. flos-aquae</i> (Wittr.)		
		7. <i>M. elabens</i> (Breb.)		
	2. <i>Chroococcous</i>	8. <i>Chroococcous giganteus</i> West	6/40 x100 = 15 %	6/77 x100 = 7.79
		9. <i>C. macrococcus</i> (Kutz.)		
		10. <i>C. turgidus</i> (Kutz.)		
		11. <i>C. tenax</i> (Kirchn.)		
		12. <i>C. minutes</i> (Kutz.)		
		13. <i>C. cohaeren</i> (Breb.)		
	3. <i>Gloeocapsa</i>	14. <i>Gloeocapsa decorticans</i> (Agardh) Richter.	12/40 x100 = 30 %	12/77x100 = 15.58
		15. <i>G. Montana</i> Kutz.		
		16. <i>G. gelatinosa</i> Kutz.		
		17. <i>G. polydermatica</i> Kutz.		
		18. <i>G. calcarea</i> Tilden.		
		19. <i>G. punctata</i> Nag.		
		20. <i>G. atrata</i> (Turp.)		
		21. <i>G. nigrescens</i> Nag.		
		22. <i>G. stegophila</i> v. <i>crassa</i> Rao		
		23. <i>G. Coracina</i> Kutz.		
		24. <i>G. magna</i> (Bréb.) Kutz.		
		25. <i>G. pleurocapsoides</i> Novacek.		
Non heterocystous (Total genus 7 numbers.)	4. <i>Aphanocapsa</i> .	26. <i>Aphanocapsa pulchra</i> (Kutz.)	6/40x100 = 15	6/77x100 = 7.79
		27. <i>A. koordersi</i> (Hass.)		
		28. <i>A. banaresensis</i> Bharadwaja		
		29. <i>A. biformis</i> Agardh		
		30. <i>A. grevillei</i> (Hass.) Rabenh.		
		31. <i>A. crassa</i> Ghose		
	5. <i>Aphanothaceae</i>	32. <i>Aphanothaceae stagnina</i> (Spreng.) Agardh	1/40x100 =2.5	1/77x100 =1.29
	6. <i>Oscillatoria</i>	33. <i>Oscillatoria varagapatensis</i> Rao	6/40x100 = 15	6/77x100 = 7.79
		34. <i>O. sancta</i> (Kutz.) Gomont.		
		35. <i>O. perornata</i> Skuja		
		36. <i>O. ornata</i> Kuz. ex Gomont.		
		37. <i>O. subbrevis</i> Schmidle.		
	7. <i>Phormidium</i>	38. <i>O. curviceps</i> Agardh ex Gomont.	2/40x100 =5	2/77x100 =2.59
39. <i>Phormidium microtomum</i> Skuja				
40. <i>P. stagnina</i> Rao				

Table 2: Name and percentage of heterocystous Blue green algae.

Types of genus.	Name of the genus.	Name of the species.	P.C of genus under heterocystous genus	P.C of species under under all genus
Heterocystous (Total genus 6 numbers.)	<i>S. Cylindrospermum</i>	41. <i>Cylindrospermum indicus</i>	1/37x100=2.70	1/77x100=1.29
	9. <i>Nostoc</i>	42. <i>Nostoc punctiforme</i> (Kütz.) Hariot	10/37 x100 = 27.02	10/77x100 = 12.98
		43. <i>N. linckia</i> (Roth) Bornet ex Born		
		44. <i>N. piscinale</i> Kützing ex Born.		
		45. <i>N. spongiaeforme</i> var. <i>tenue</i> Rao		
		46. <i>Nostoc ellipsosporum</i> Bornet		
		47. <i>Nostoc calcicola</i>		
		48. <i>N. commune</i> Vaucher ex Born.		
		49. <i>N. paremlioides</i> Kütz. ex Born		
		50. <i>N. verrucosum</i> Vaucher ex Born		
51. <i>N. hatei</i> Dixit.				
Heterocystous (Total genus 6 numbers.)	10. <i>Anabaena</i>	52. <i>Anabaena sphaerica</i> West	18/37x100 = 27.02	18/77x100 = 23.37
		53. <i>A. spiroides</i> Klebahn.		
		54. <i>A. oryzae</i> Fritsch		
		55. <i>A. fertilissima</i> Rao		
		56. <i>A. thamae</i> Skaja.		
		57. <i>A. anomala</i> Fritsch		
		58. <i>A. vaginicola</i> Fritsch et Rich.		
		59. <i>A. fuellebornii</i> Schmidle.		
		60. <i>A. aphanizomenoides</i> Forti		
		61. <i>A. orientalis</i> Dixit		
		62. <i>A. iyengarii</i> Bharadwaja		
		63. <i>A. ballyganglii</i> Banerji		
		64. <i>A. naviculoides</i> Fritsch		
		65. <i>A. doliolum</i> Bharadwaja		
		66. <i>A. variabilis</i> Kützing ex Born.		
		67. <i>A. variabilis</i> var.		

Table 3: Percentage of the genus.

Total Number of genus 13	Non heterocystous	$7/13 \times 100 = 53.84\%$
	Heterocystous	$6/13 \times 100 = 46.15$

Filaments false branched, erect, about 1mm long, aggregated in caespitose colonies, base not dilated; sheath mucilaginous, about 3µ thick, lamellated, persistent; cells at the base 7-8µ broad, distinctly constricted at the cross walls; heterocysts basal, hemispherical, 8-9.5µ broad and 7-19µ long.

77. *Gloeotrichiapilgeri*: Schmidle, 1901, Bras. Alg., Hedwigia, 40:54, pl. 4, fig. 14; Geitler, 1932, Kryptogamenflora, Leipzig, 641, fig. 408; Desikachary, 1959, Cyanophyta, 558, pl. 118, fig. 8.

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. ellipsoidal 9-11µ broad and 12-14µ long.

Results and Discussion

The identified blue green algae are structurally different in shape, size and structure. Out of 77 numbers of identified blue green algal species of rice field, 40 number of species (51.94%) arenon-heterocystous and other 37 number of species (48.05%) are heterocystous. Genus *Anabaena* having highest number of species that is $18.(18/77 \times 100) = 23.37\%$ is followed by *Gleocapsaha* $12/77 \times 100 = 15.58$, *Nostoc* $10/77 \times 100 = 12.98$, *Microcystis*, $7/77 \times 100 = 9.09\%$, *Chroococcus* $6/77 \times 100 = 7.79$ *Aphanocapsa*, $6/77 \times 100 = 7.79$ *Oscillatoria* $6/77 \times 100 = 7.79$ *Calothrix*, $6/77 \times 100 = 7.79$ *Phormidium*, $2/77 \times 100 = 2.59$ *Aphanothacea*, $1/77 \times 100 = 1.29$ *Cylindrospermum* $1/77 \times 100 = 1.29$ *Tolypothrix*, $1/77 \times 100 = 1.29$ *Gloeotrichia*, $1/77 \times 100 = 1.29$.

Conclusion

Algal species add readily available nutrition to crop plants in agricultural lands and ensure better crop nutrient

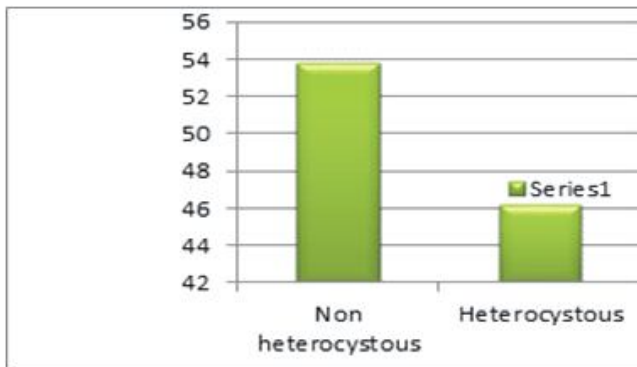


Fig. 1: Showing Percentage of Non heterocystous and heterocytuos genus.

Table 4: Percentage of species in genus.

Name of the genus.	% of the species in genus.
1. <i>Microcystis</i> (7)	9.09
2. <i>Chroococcus</i> (6)	7.79
3. <i>Gleocapsa</i> (12)	15.58
4. <i>Aphanocapsa</i> (6)	7.79
5. <i>Aphanothaceae</i> (1)	1.29
6. <i>Oscillatoria</i> (6)	7.79
7. <i>Phormidium</i> (1)	2.59
8. <i>Cylindrospermum</i> (1)	1.29
9. <i>Nostoc</i> (10)	12.98
10. <i>Anabaena</i> (18)	23.37
11. <i>Tolypothrix</i> (1)	1.29
12. <i>Calothrix</i> (6)	7.79
13. <i>Gloeotrichia</i> (1)	1.29

management. They improve the texture of soil and and increase the biochemical quality of the soil which forms a rapidly multiplying cover of microscopic plants. They have highly colonization with almost all types of soils. (Bold and Wanne, 1978). The study shown Genus *Anabaena* having highest number of species that is $18.(18/77 \times 100) = 23.37\%$ is followed by *Gleocapsaha* $12/77 \times 100 = 15.58$, *Nostoc* $10/77 \times 100 = 12.98$, *Microcystis*, $7/77 \times 100 = 9.09\%$, *Chroococcus* $6/77 \times 100 = 7.79$ *Aphanocapsa*, $6/77 \times 100 = 7.79$ *Oscillatoria* $6/77 \times 100 = 7.79$ *Calothrix*, $6/77 \times 100 = 7.79$ *Phormidium*, $2/77 \times 100 = 2.59$ *Aphanothacea*, $1/77 \times 100 = 1.29$ *Cylindrospermum* $1/77 \times 100 = 1.29$ *Tolypothrix*, $1/77 \times 100 = 1.29$ *Gloeotrichia*, $1/77 \times 100 = 1.29$ in rice field of Mangaldai sub division. In another study “Taxonomic Enumeration of blue green algae of tea garden area of Mangaldoisub division Darrang District Assam”. *Anabaena* 17.78% (of heterocystous type) was the most dominant species throughout the study period. Blue green algae are sensitive to environmental change

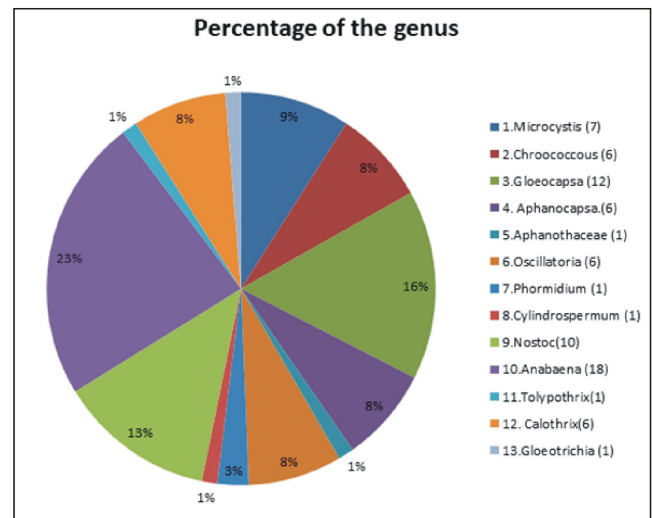


Fig. 2: Percentage of the species in genus.

and nutrient fluctuation has been suggested by Frempong, (1981); Tilman *et al.*, (1982); Sudhkar *et al.*, (1991).

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