

RESEARCH PAPER

A check list of blue green algae (Cyanobacteria) from the paddy field of Ranchi district (Jharkhand)

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The blue green algal flora found in the paddy field of Jharkhand is comparatively poorly known. Only few workers described the blue green algae principally growing in water habitats. In this investigation total 68 taxa of blue green algae belonging to 20 genera viz., *Microcystis*, *Aphanothece*, *Aphanocapsa*, *Gloeothece*, *Gloeocapsa*, *Merismopedia*, *Synechococcus*, *Arthrospira*, *Oscillatoria*, *Phormidium* Lyngbya, *Nostoc*, *Anabaena*, *Anabaenopsis*, *Cylindrospermum*, *Aulosira*, *Calothrix*, *Gloetrichia*, *Rivularia*, *Scytonema* have been listed, identified, recorded first time from the various places of Ranchi district.

Key words : Blue, Green, Algae, Habitats

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INTRODUCTION

The blue green algal flora found in the paddy field of Jharkhand is comparatively poorly known and rest chiefly up on the workers Purti (2008) and Thakur (2008). Dubey (2003) and Singh (1961). All these workers described the blue green algae principally growing in fresh water, pond, damp soil, salt water and on unusual habitats. The blue green algal flora growing in rice field soil of Jharkhand has not been studied so far except Purti (2008). Who studied the paddy field blue green algae from khunti district. Since Dey (1939) reported suggesting that the fertility of the tropical rice field mainly depends on the activity of certain nitrogen fixing blue green algae. The blue green algae of paddy field soil of India, Japan, Bangladesh and Srilanka has been studied by various workers, Prescott (1951); Wtanabe (1954) and Okuda and Yamaguchi (1956). Bunt (1961); Rabenhorst (1865); Roger *et al.* (1967); Wyatt and Silvey (1969); Mitra (1951); Bendra and Kumar (1975); Ghosh and Saha

(1997); Sardesh and Goyal (1981); Somani (1987) Anand and Revathi (1987); Singh *et al.* (1996); Devi (1997); Adhikary and Sahu (2000); Kulasooriya (2008); Venkataraman (1986); Nayak (2001); Budel (2002) and Dubey (2003). Javaid (2011) and Thamizh and Sivakumar (2012). The nitrogen fixing blue green algae are now being extensively used to supplement or replace chemical nitrogen fertilizer which is costly in short supply and the BGA technique of augmenting the fertility of the soil has how been well-established and standardised. However, a study of indigenous blue green algal flora of a region is very essential before attempting to introduce the BGA technique.

RESEARCH METHODOLOGY

Algal specimens were collected from different habitats of paddy field like free floating, running, still water, water logged soil dried soil, submerged or attached condition, terrestrial as well as muddy areas. Collected

all algal samples were brought to the biotechnological lab of post graduation department of Botany R.U Ranchi. Soil sample were also collected in plastic bags from places where no visible algae were seen. The soil samples were consolidated and 20 gm of the sample were placed in sterile Petri dishes. Saturated with sterile glass distilled water on sterilized modified Bold Basal media cultural solution and incubated under continuous fluorescent light (200 FTC) at the cultural surface and 28+3°C temperature in a dust free culture cabinet. Adequate precaution was taken during handling and culturing of algae to avoid contamination by air born algae. After two weeks of growth the illumination duration was reduced to 8 hrs a day and the cultures were allowed to grow for another 3 to 4 weeks. Identification was done with the help of available literature and standard monographs Desikachary (1959).

RESEARCH FINDINGS AND ANALYSIS

During the investigation total 68 taxa of blue green algae belonging to 20 genera viz., *Microcystis*, *Aphanothece*, *Aphanocapsa*, *Gloeotheca*, *Gloeocapsa*, *Merismopedia*, *Synechococcus*, *Arthrospira*, *Oscillatoria*, *Phormidium* Lyngbya, *Nostoc*, *Anabaena*, *Anabaenopsis*, *Cylindrospermum*, *Aulosira*, *Calothrix*, *Gloeotrichia*, *Rivularia*, *Scytonema* have been listed in present communication from various places of Ranchi districts such as Muri, Silli, Angara, Namkum, Tatisilway, Ormanjhi, Bundu, Kanke, Ratu, Dhurwa, Hatia, Karamtoli, Kokar, Booti, Bariatu throughout the paddy field soil of Ranchi district. Ten taxa of order Chroococcales, i.e. *Aphanocapsa bioformis*, *Aphanocapsa banaresensis*, *Gloeocapsa nigrescens* (Nag.), *Gloeocapsa compacta* (Kuetz.), *Microcystis stagnalis lemm*, *Merismopedia marssoni lenmermann*, *Merismopedia glauca*, *Synechococcus elongates* *Chroococcum minutous*, *Chroococcus tenax*. Thirty taxa of order Nostocales, i.e. *Arthrospira jenneri stizenb.* ex. Gomont, *Arthrospira platensis* (Nordst), *Spirulina laxissima*, *Oscillatoria amphibian farma minor*, *Oscillatoria amphibian* ag.ex.Gomans, *Oscillatoria proteus*, *Oscillatoria chalybea*, *Oscillatoria Formosa*, *Oscillatoria arnata Kuetz* ex.Gomont, *Oscillatoria curviceps* Ag.ex Gomont, *Oscillatoria subbrevis*, *Oscillatoria animalis* Ag.ex Gomont, *Oscillatoria terebriformic* Ag.ex Gomont, *Oscillatoria tenuis*, *Oscillatoria raoi*, *Oscillatoria obusa*, *Oscillatoria ocuta*,

Table 1: Taxonomic enumeration

Systematic description	
Class — Cyanophyceae	
Order — Chroococcales	
Family — Chroococcaceae	
1.	<i>Aphanocapsa bioformis</i>
2.	<i>Aphanocapsa banaresensis</i>
3.	<i>Gloeocapsa nigrescens</i> (Nag.)
4.	<i>Gloeocapsa compacta</i> (Kuetz.)
5.	<i>Microcystis stagnalis lemm</i>
6.	<i>Merismopedia marssoni lenmermann</i>
7.	<i>Merismopedia glauca</i>
8.	<i>Synechococcus elongates</i>
9.	<i>Chroococcum minutous</i>
10.	<i>Chroococcus tenax</i>
Order — Nostocales	
Family — Oscillatoriaceae	
1.	<i>Arthrospira jenneri stizenb.</i> ex. Gomont.
2.	<i>Arthrospira platensis</i> (Nordst)
3.	<i>Spirulina laxissima</i>
4.	<i>Oscillatoria amphibian farma minor</i>
5.	<i>Oscillatoria amphibian</i> ag.ex.Gomans
6.	<i>Oscillatoria proteus</i>
7.	<i>Oscillatoria chalybea</i>
8.	<i>Oscillatoria Formosa</i>
9.	<i>Oscillatoria arnata Kuetz</i> ex.Gomont
10.	<i>Oscillatoria curviceps</i> Ag.ex Gomont
11.	<i>Oscillatoria subbrevis</i>
12.	<i>Oscillatoria animalis</i> Ag.ex Gomont
13.	<i>Oscillatoria terebriformic</i> Ag.ex Gomont
14.	<i>Oscillatoria tenuis</i>
15.	<i>Oscillatoria raoi</i>
16.	<i>Oscillatoria obusa</i>
17.	<i>Oscillatoria ocuta</i>
18.	<i>Oscillatoria pseudogeminate</i> G.Schmid
19.	<i>Oscillatoria margaritifera</i>
20.	<i>Oscillatoria raciborskii</i> wolosz
21.	<i>Oscillatoria brevis</i> (Kuetz.)
22.	<i>Oscillatoria quadripunctulata</i> bruhl
23.	<i>Oscillatoria unigranulata</i> Singh, R.N
24.	<i>Oscillatoria willei</i>

Table 1 : Contd.....

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25.	<i>Phormidium tenue</i> (Menegh)
26.	<i>Phormidium autumnal.</i>
27.	<i>Lyngbya martensiana</i>
28.	<i>Lyngbya ymbya hieronymssil</i>
29.	<i>Lyngbya amajuscula</i>
30.	<i>Lyngbya dendrobia</i> bruhl et. Biswas.
Family — Nostocaceae	
1.	<i>Nostoc commune</i>
2.	<i>Nostoc linckia</i>
3.	<i>Nostoc piscinale</i>
4.	<i>Nostoc spongiaeforme</i>
5.	<i>Nostoc radiaus</i> Bhardawaja
6.	<i>Anabaenopsis circularis</i>
7.	<i>Anabaena Circinalis</i>
8.	<i>Anabaena lyengarii</i>
9.	<i>Anabaena azollae</i>
10.	<i>Cylindrospermum bruhl.</i>
11.	<i>Cylindrospermum michailouskoense</i>
12.	<i>Cylindrospermum Indicum Rao.</i>
13.	<i>Cylindrospermum musicola</i> Kuetz.
14.	<i>Cylindrospermum lichenifarme</i>
15.	<i>Aulosira prolifica</i> Bhardawaja
16.	<i>Aulosira fertilissima varteneus</i>
17.	<i>Aulosira cireinalis</i>
18.	<i>Aulosira fertilissima var. Robusta</i>
Family — Scytonemataceae	
1.	<i>Scytonema simplex</i> Bhardawaja
2.	<i>Scytonema varium</i> Kuetz ex. Bornet. Flah
3.	<i>Scytonema cincinnatun</i> Thuret
4.	<i>Scytonema bohneri</i> schmidle
5.	<i>Scytonema stuposum</i> (Ktzing Bornet) ex. Bornet. Flah.
6.	<i>Tolypothrix tenuis</i>
Family — Rivulariaceae	
1.	<i>Gloetrichia natans</i>
2.	<i>G. raciborskii</i> Woloszynska
3.	<i>G. intermedium</i>
Order — Stigonematales	
Family — Capsosiraceae	
1.	<i>Nostochopsis Labatous</i> Wood em. Geitler

Osillatoria pseudogeminate G. Schmid, *Osillatoria margaritifera*, *Osillatoria raciborskii* wolosz, *Osillatoria brevis* (Kuetz.), *Osillatoria quadripunctulata* bruhl, *Osillatoria unigranulata* Singh (1961) *Osillatoria willei*, *Phormidium tenue* (Menegh), *Phormidium autumnal.*, *Lyngbya martensiana*, *Lyngbya ymbya hieronymssil*, *Lyngbya amajuscula*, *Lyngbya dendrobia* bruhl et. Biswas Family Oscillatoria. Eighteen taxa of Genus Nostocales, i.e. *Nostoc commune*, *Nostoc linckia*, *Nostoc piscinale*, *Nostoc spongiaeforme*, *Nostoc radiaus* Bhardawaja, *Anabaenopsis circularis*, *Anabaena Circinalis*, *Anabaena lyengarii*, *Anabaena azollae*, *Cylindrospermum bruhl.*, *Cylindrospermum michailouskoense*, *Cylindro-spermum Indicum Rao.*, *Cylindrospermum musicola* Kuetz., *Cylindrospermum lichenifarme*, *Aulosira prolifica* Bhardawaja, *Aulosira fertilissima varteneus*, *Aulosira cireinalis*, *Aulosira fertilissima var. Robusta*. Six taxa of Scytonemataceae. i.e. *Scytonema simplex* Bhardawaja, *Scytonema varium* Kuetz ex. Bornet. Flah, *Scytonema cincinnatun* Thuret, *Scytonema bohneri* schmidle, *Scytonema stuposum* (Ktzing Bornet) ex. Bornet. Flah., *Tolypothrix tenuis*. Three taxa of Rivulariaceae and one taxa of Order Stigonematales i.e. *Nostochopsis Labatous* Wood em. Geitler have been summarized below according to the objective of the study.

LITERATURE CITED

- Adhikary, S.P. and Sahu, J.K. (2000).** Survival Strategies of Cyanobacteria accuring as crust in the rice fields under drought condition, *Indian. J. Microbial.*, **40**: 53-56.
- Anand and Revathi, G. (1987).** Blue - green algae from rice field of Tamil Nadu, *Phykos*, **26**: 17 - 21.
- Bendra, A. M. and Kumar, S. (1975).** Cyanophyceae of Meerut. *Phykos.*, **14**(1-2): 1-7.
- Budel, B. (2002).** Diversity and ecology of biological crusts *Prog. Bot.*, **63** : 386 – 404.
- Bunt, J.S. (1961).** Nitrogen fixing blue - green algae in Australian rice soil. *Nature*, **192** (4081): 479 - 480.
- Davi, G. A. (1997).** Nitrogen fixing blue-green algae from rice field soil of Manipur and their possible role as biofertilizer. Ph.D. Thesis, Manipur University, Imphal, India.
- Desikachary, T.V. (1959).** *Cyanophta*, Indian Council of

- Agricultural Research, New Delhi, India, pp. 686.
- Dey, P.K. (1939).** The role of blue-green algae in nitrogen fixing in rice fields. *Proc. R. Soc. Lond.*, **127** (B): 121-139.
- Dubey, Jaishree (2003).** Seasonal variation in soil algal flora of central Indian region. *Indian J. Environ. & Ecoplan.*, **7** (1): 87 - 92.
- Ghosh, T.K. and Saha, K.C. (1997).** Effects of inoculation cyanobacteria on nitrogen status and nutrition of rice (*Oryza sativa* L.) in an Entisol amended with chemical and organic source of nitrogen, *Biol. Fertil. Soil.*, **24**: 123 - 128.
- Javaid, Arsad (2011).** Effect of biofertilizer combined with different soil amendments on potted rice plants schilean, *J. Agricultural Research*, **71** (1): 157-163.
- Kulasooriya, S.A. (2008).** *Biological nitrogen fixation: Fundamentals and utilization.* Science Education Unit, Faculty of Science, University of Peradeniya. pp. 143.
- Mitra, A.K. (1951).** The algal flora of creation Indian soils. Ph.D. Thesis, University of Landon, United Kingdom, pp. 140 - 160.
- Nayak, S., Prasanna, R., Dominic, T.K. and Singh, P.K. (2001).** Floristic abundance and relative distribution of different cyanobacterial genera in rice field soil at different crop growth stages, *Phykos*, **40** (1&2): 15-22.
- Okuda, A. and Yamaguchi, M. (1956).** Distribution of nitrogen fixing micro-organism in paddy soil in Japan. VI Cong. *Int. Sci. Sol. Rap. C*: 521 - 526.
- Prescott, G.W. (1951).** *Algae of western great lake area pub.* Crankbook Institute of Science Bulletin. No. 30: pp. 1 -496.
- Purti, N. (2008).** Blue - green algae from Khunti district, Jharkhand, India. *Biospectra*, **3** (1): 127 – 132.
- Rabenhorst, L. (1865).** *Flora europaea algarum aquae dulcis et submarinae.* Sectio II. Algas phycochromaceas complectens. pp. 1-319, 71 figs. Lipsiae (Leipzig) : Apud Eduardum Kummerum.
- Roger, P.A., Grant, I.F. and Reddy, P.M. (1985).** *Blue - green algae in India: A Trip Report,* I.R.R.I., Philippines, pp. 93.
- Sardesh, Pande, J.S. and Goyal, S.K. (1981).** Affect of pH on growth and nitrogen fixation by blue - green algae, *Phycos.*, **20**: 102 - 106.
- Somani, L.L. (1987).** *Biofertilizer in Indian agriculture.* Concept Pub. Co., New Delhi, India.
- Singh, N. I., Singh, S. M., Dorycanta, H. and Devi, G. A. (1996).** Blue- green algae from rice field soils of Mizoram. *Phykos.*, **35** (1 & 2): 143-146.
- Singh, R.N. (1961).** *Role of blue - green algae in nitrogen economy of Indian,* Agriculture ICAR, New Delhi, pp. 1 - 65.
- Thakur, C. (2008).** Marphotaxonomical studies of algae of unusual habitats of Ranchi district, Ph.D. Thesis, Ranchi University, Ranchi (Jharkhand) India, pp. 55 - 68.
- Thamizh, S. and Sivakumar, K. (2012).** Effect of cyanobacteria on growth and yield parameters in *Oryza sativa*, variety (ADT38). *Int. J. Dev. Res.*, **2** (6): 1008 - 1011.
- Venkataraman, L.V. (1986).** Blue - green algae as biofertilizer, In: *Hand book of microalgal cultures*, Richmond, A., (Ed.), and CRC Press, Boca Raton, Fla., pp. 455.
- Wtanabe, A. (1954).** Nitrogen fixing blue - green algae. *Int. Rice comm. Newsl.*, **12**: 13 - 15.
- Wyatt, J.T. and Silvey, J.K.G. (1969).** Nitrogen fixation by *Gloeocapsa*. *Science*, **165**: 908 - 909.

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