

Fresh Water Cyanophycean Algae from Yelderi Dam Parbhani District (M. S.), India

R. M. Mulani, M. D. Sonule

Department of Botany, DST-FIST, UGC-SAP Sponsored School of Life Sciences
Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India

Abstract: Cyanobacteria are having great number of economic value mainly in field of bio fertilizers, food, in medicine etc. The present survey of biodiversity of Cyanophycean algae indicates that this water body is suitable for algal growth and it shows the rich number of algal growth. In all three sites were selected for this study during 2013- 2014. In the present paper total 25 taxa of class Cyanophyceae were recorded. These taxa mainly belongs to order Nostocales and Chroococcales. Species like *Microcystis*, *Chroococcus*, *Gloeocapsa*, *Oscillatoria*, *Gloeotheca*, *Aphanocapsa*, *Rivularia* sp., *Spirulina*, *Nostoc*, *Anabena*, *Lyngbya*, *Plactonema*, *Cladopora* sp. etc. were recorded for the first time from Yelderi dam.

Keywords: Cyanophyceae, Trichomes and Heterocysts etc.

1. Introduction

The algae have been an interesting group for investigation because of their very primitive nature and a worldwide distribution in different water body [6]. Blue green or Cyanobacteria are phototropic prokaryotic organisms. They inhabit almost all known photic habitats. They play important role in maintaining aquatic life remain as an important group of organism present at the base of food web [9].

Cyanobacteria are also called as “Blue – green alga” is relatively simple, primitive life forms of earth, closely resemblances to the bacteria. They are morphologically diverse group of unique photosynthetic organisms which shows the great importance because of their very long existences for well over 3.5 billion years and cosmopolitan distribution in all aquatic body i.e. terrestrial, fresh water and marine [2,3,5].

Recently many workers have worked on algal diversity from different localities of India. Some researchers only have done the study, based on Cyanobacterial biodiversity in relation to certain physico-chemical parameters of water. [1, 4, 7, 8] Some observations were also reported from the Marathwada with references to biodiversity.

Parbhani district is famous for the cultural and geological things. The area has tropical climate and large number of water bodies. Still very small literature is available on algal diversity in the same area. The area receives tropical climate and many large moderate size water bodies scattered over the land surface. The present paper shows the algal diversity Yelderi dam in Parbhani district from Marathwada region in Maharashtra.

2. Materials and Methods

During the present investigation collection of algal samples were done with the help of planktonic net, by handpicking method and forceps during the July 2013- June 2014 from three localities of water body from dam. Algal growth was

recorded from the marginal side, submerged in water, free floating and attached form submerged in water body. Collections of samples were done during the morning period in clean polythene bags and sample bottles. A small amount of sample was used for the taxonomical identification and remaining samples were preserved in 4 % formalin. Taxonomic identification of algal species was done on the basis of morphological types, cell dimensions, trichomes, filaments shape, sheath thickness, size and position of akinetes /heterocyst. Algal taxa was identified and systematized according to standard literature [3].

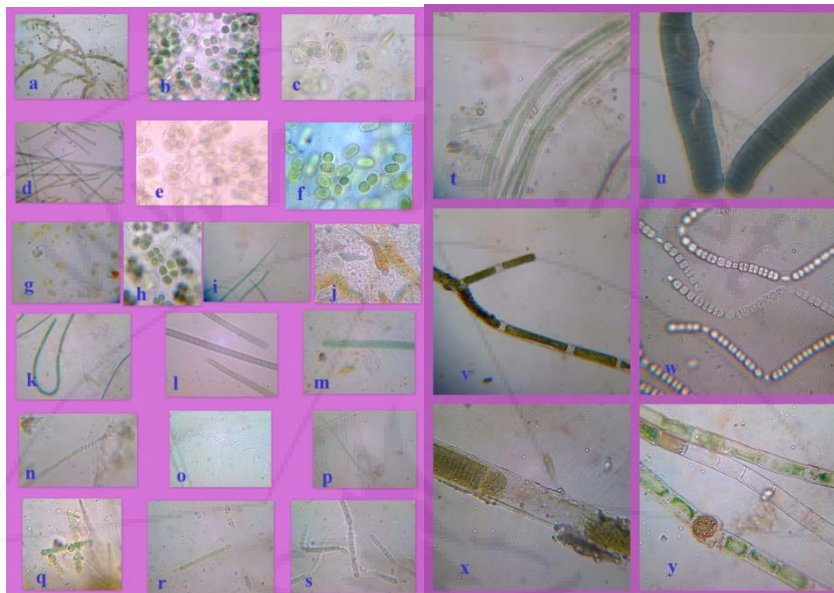
3. Result and Discussion

In the present study total 25 species were recorded from three different localities of the Yelderi dam. In this study mainly the algal species found in the colonial form and not in single. The recorded species were mainly collected from the free floating, submerged and attached in the diverse form. The present study it has been noted that nitrogen fixing strains like *Nostoc* and *Oscillatoria* are abundant in this area.

Table 1: Taxonomical features of species recorded from Yelderi dam

S.N	Name of the species isolates	Characteristic features
1.	<i>Microcystis aeruginosa</i> Kutz	Colonies when young rounded or slightly longer than broad, solid, when old and becoming clathrate, with distinct hyaline colonial mucilage; cells 3-7 μ in diam., spherical, generally with gas-vacuoles.
2.	<i>Chroococcus cohaerens</i> (Breb) Nag.	Thallus slimy or gelatinous, blue or dark green; cells single or up to 2-8 in groups, without envelope 2.5-(7) μ dim., and with sheath 2.5-7 μ dim, colony 7-15 μ ; sheath thin, colorless, unlamellated
3.	<i>Chroococcus palidus</i> Nag.	Thallus gelatinous, yellowish or colorless; cells single or 2-4, seldom up to 8 in elliptic oblong colonies, without sheath 5-8 μ , with sheath 7-11.5(13) μ broad, blue green, sheath colorless, unlamellated.
4.	<i>Gloeothece samoensis</i> Wille	Cells ellipsoidal, without sheath 4-5 μ broad, 8 μ long, cells yellowish or bluish green, in round colonies, mostly 2-4 μ in a common envelope, envelope colorless, unlamellated.
5.	<i>Aphanocapsa bioformis</i> A.Br.	Thallus olive green, gelatinous, often expanding; cells 4-7 μ diam., mostly with a spherical envelope, loosely arranged, 2-4 together in a common mucilaginous envelope.
6.	<i>Gloeocapsa polydermatica</i> Kutz.	Thallus mucilaginous, compact; cells spherical, without sheath 3-4.5 μ diam., blue green colour very thick, as thick as protoplast, very distinctly and many times lamellated.
7.	<i>Aphanocapsa koordersi</i> Strom	Colony spherical, dull green to blue green, 2-3 mm. in diam; cells loosely arranged or in groups of four, spherical, 2.2-2.8 μ in diam.
8.	<i>Spirulina meneghiniana</i> Zanard. ex Gomont	Trichome 1.2-1.8 μ broad, flexible, irregularly spirally coiled, bright blue green, forming a thick blue green thallus; spirals 3.2-5 μ broad and 3-5 μ distant from each other.
9.	<i>Spirulina princeps</i> W. et G. S. West	Trichome 4.5-5 μ broad, short, blue-green, regularly spirally coiled, spirals 11-12 μ broad and 9.5-11 μ distant.
10.	<i>Spirulina subtilissima</i> Kutz. ex Gomont.	Trichome 0.6-0.9 μ broad, regularly spirally coiled, bright blue green or yellowish, spirals 1.5-2.5(-2.8) μ broad, distance between the spirals 1.25-2 μ .
11.	<i>Oscillatoria annae</i> Van Goor	Trichome straight, dull blue green, slightly constricted at the cross walls, 7.5-8 μ broad; attenuated at the ends, up to 7 μ broad and bent, 1.5-3 sometimes up to 4 μ long, not granulated at the cross-walls; end-cell rounded, calyptra absent.
12.	<i>Oscillatoria acuta</i> Bruhl et Biswas, orth. mut. Geitler	Trichomes either solitary or parallel to each other aggregated in to bundles of moderate size, hardy, brittle, not constricted at the cross walls 4-6 μ thick, 70-400 μ long, narrow or acuminate towards the sub obtuse, non capitate, non, calyptrate apex, abruptly bent, cells 3-4 μ long.
13.	<i>Oscillatoria limosa</i> Ag. Ex. Gomont	Thallus dark blue green to brown; trichome more or less straight, dull blue green, brown, not constricted or slightly constricted at the cross walls, 11-20(-22) μ long, cross walls frequently granulated; end cell flatly rounded with slightly thickened membrane.
14.	<i>Oscillatoria princeps</i> Vaucher ex. Gomont	Trichomes blue green, brownish or violet, mostly forming a thallus, straight, 16-60 μ broad, blue green to dirty green, attenuated at the apices and bent; cells 1/11-1/4 as long as broad, 3.5-7 μ long; end cells flatly rounded, slightly capitate without or with slightly thickened membrane.
15.	<i>Oscillatoria subbrevis</i> Schmidle Forma	Trichomes single, 5-6 μ broad, nearly straight, not attenuated at the apices; cells 1-2 μ long, not granulated at the cross wall; end cell rounded, calyptra absent.
16.	<i>Lyngbya majuscula</i> Harvey ex Gomont	Thallus expanded, dull blue-green to brown; filaments long, curved or seldom; lamellated up to 11 μ thick, outside often rough, not coloured violet by chlor-zinc-iodide; trichome blue-green, brownish green or grey violet; not attenuated at the ends, mostly 20-40 μ broad; 2-4 μ long, end cells rounded.
17.	<i>Anabaena torulosa</i> (Carm) Lagerh ex Born. et Flah	Thallus mucilaginous, thin, blue green; trichome 4.2-5 μ broad, apical cell acutely conical; cells barrel shaped; heterocysts subspherical or ovoid 6 μ broad and 6-10 μ long; spores on both sides of the heterocysts developed centripetally, single or many, subcylindrical rounded ends, sometimes constricted in middle, 7-12 μ broad, episporium smooth and pale brown in colour.
18.	<i>Anabaena fuellebornii</i> Schmidle	Trichomes small floccose, mucilaginous, blue green mass coiled or straight, sheath diffluent, seldom single; cells cylindrical with rounded ends, 4-5 μ broad, mostly somewhat longer than broad up to 10 μ long, seldom up to 3/4 as extended as broad, end cell rounded; heterocysts barrel shaped, spores on one side of the heterocysts, single or in pairs, ellipsoidal or cylindrical somewhat swollen. Episporium yellowish with fine papille.
19.	<i>Anabaena variabilis</i> Kutzing ex Born. et Flah	Thallus gelatinous dark green; without any sheath, flexuous, 4-6 μ broad, more often 4.2-5 μ broad slightly constricted at the cross walls, end-cells conical, obtuse; cells barrel shaped, sometimes with gas vacuoles, 2.5-6 μ long; heterocysts spherical, barrel-shaped in series, 7-9(-11) μ broad, 8-14 μ long, episporium smooth or with fine needles, colourless or yellowish brown.
20.	<i>Nostoclinckia</i> (Roth) Bornet ex Born. et Flah	Thallus varying in size, punctiform, tuberculate, at first globose later irregularly expanding, gelatinous, blue green to violet, blackish green or brown; filaments densely entangled, flexuous highly coiled; trichomes 3.5-4 μ broad, pale blue green; cells short barrel shaped; heterocysts subspherical; spores subspherical, 6-7 μ broad, 7-8 μ long, episporium smooth.
21.	<i>Nostoc punctiforme</i> v. Populorum	Thallus sub-globose, Scattered or confluent, attached. Filaments flexuous densely entangled; sheath delicate, hyaline. Trichome cells short barrel-shaped or ellipsoidal, blue green; heterocysts broad; spores sub-spherical, or oblong. Episporium thick and smooth.
22.	<i>Rivularia</i> sp.	Trichomes unbranched, more or less irregular false branched; filaments more or less radical or spherical mucilaginous colony, hollow or solid; sheath more or less gelatinizing; trichomes ending in a hair, heterocysts basal or intercalary; often false branching at the base; homogonia single or in series gradually progressing towards the base from the meristematic zone.
23.	<i>Plectonema wollei farlow</i> ex Gomont	Filaments nearly straight or bent, forming a caespitose, expanded, free floating, blackish to yellowish green bundles; false branches sparse, mostly single arising at an oblique angle; sheath colourless, or golden yellow, when old distinctly lamellated, cells not constricted at the cross

		yellowish green, 28-47 μ broad, 49 μ long, end cells rounded.
4.	<i>Cladophora sp.</i>	Thallus long branched threads attached to the submerged rocks in shallow water body. Occurs in the form of bush like appearances. Individual cells are large, multinucleate, cylindrical and placed end to end. A branch arises as a later outgrowth of the parent cell near its upper end. Branches generally arise from the cell near the apex. Cells are cylindrical much longer than broad.
5.	<i>Lyngbya sordida</i> (Lanard.) Gomon	Thallus caespitose, fasciculate, bushy, dull or dirty yellowish green, up to 3 cm high; filaments more or less straight; sheath smooth, coloured violet with chlor-zinc-iodide; trichome olive-green, when dried purple, blue or yellowish green, distinctly constricted at the cross walls, ends not attenuated, 14-31 μ broad; 4-10 μ long; end cell rounded, with calyptra.



a-*Microcystis aeruginosa*, b-*Chroococcus palidus*, c-*Gloeocapsa polydermatica*, d-*Oscillatoria limosa*, e- *Chroococcus cohaerens*, f-*Gloeotheca samoensis*, g- *Aphanocapsa koordersi*, h-*Aphanocapsa bioformis*, i- *Oscillatoria acuta*, j- *Rivularia* sp., k-*O. princeps*, l-*O. annae*, m-*O. subbrevis*, n-*Spirulina meneghiniana*, o-*S. princeps*, p-*S. subtilissima*, q- *Nostoc punctiforme*, r-*Anabena fuellebornii*, s-*Nostoc likia*, t-*Lyngbya sordid*, u-*Plactonema wollei*, v-*Cladophora sp.*, w- *Anabena variabilis*, x-*Lyngbya majuscula*, y-*Anabaena torulosa*.

References

- [1] Bhosale, L. J., Patil, S. M., Dhumal, S. N. and Sathe, S. S. (2010). Occurrence of phytoplankton in the water bodies of Miraj Tahasil of Maharashtra. *The Ecoscan*. **4** (1): 73-76.
- [2] Chellapa, S. L. and Chellapa, N. T. 2004 Fresh water phytoplankton assemblage and the blooms of toxic Cyanophyceae of Campo Grande reservoir of Rio Crande do North State of Brazil, Indian. *Hydrobiology*. **7**:151-177.
- [3] Desikachary, T. V. (1959). Cyanophyta ICAR New Delhi Studies on the algal flora of kole lands in Thrissure District, Kerala.
- [4] Divya, K. S., Murthy, M. S. and Pattaiah, E. T. (2013). A comparative study of the growth of phytoplankton in surface water samples and in the formation of algal blooms. *International Journal of Innovative Research in Science, Engineering and Technology*. **2** (7): 2736-2747.
- [5] Gupta, G. and Kulkarni, P. (2014). Fresh water cyanophycean algae from Durg and Rajnandgaon dist. (C.G.), In dia. *International Journal of Science and Research*. **3** (8): 1337-1341.
- [6] Khan, M., Hussain, F. and Musharaf, S. (2011). A fraction of fresh water algae of Kalpani stream and adjoin area of distrit Mardan, Pakistan. *International Journal of Biociences*. **1**(3): 45-50.
- [7] Pawar, M. S. and Sonawane, R. S. (2011). Diversity of phytoplankton from three water bodies of Satara district Maharashtra, India. *Int. J. Bio Sci.*, **1** (6): 81-87.
- [8] Suresh, A., Kumar, P. R., Dhanasekaran, D. and Thajuddin, N. (2013). Biodiversity of microalgae in Western and Eastern Ghats, India. *Pakistan Journal of Biological Science*, **15**: 919-928.
- [9] Thakar, H. A. and Behere, K. H. (2008). Study of filamentous algal biodiversity at Gangapur dam Nasik dist. (M.S.). India. *The 12th World Conferences*: 456-461.

Authors Profile



Dr. R. M. Mulani received the M.Sc. in Botany from Shivaji University, Kolhapur in 1985 and received Dr. G.V. Joshi Gold Medal and Ph.D. degree from Mumbai University 1989. Presently working as Associate Professor in Botany at School of Life Sciences, Swami Ramanand Teerth Marathwada University, Nanded. He has 40 National and International Publication and he is a member of RRC for Botany to Mumbai University.



Miss. Sonule M. D. received the M.Sc. in Botany from Babasaheb Ambedkar Marathwada University, Aurangabad in 2009 and now she is working as Research Scholar pursuing M.Phil. Botany in the field of Phycology at School of Life Sciences, Swami Ramanand Teerth Marathwada University Nanded