Bioscene

Bioscene
Volume- 22 Number- 04
ISSN: 1539-2422 (P) 2055-1583 (O)

www.explorebioscene.com

A Study on Morphological Features of Cyanophycean Algae in Wardha River Ecosystem, Warora Taluka District Chandrapur

Ghonmode S. P.[1] & Wadhave N. S.[2]

[1] Research Scholar, Department of Botany, Nilkanthrao Shinde Science and Arts College, Bhadrawati, District- Chandrapur, Maharashtra, India

[2] Assistant Professor and Head Department of Botany, Nilkanthrao Shinde Science and Arts College, Bhadrawati, District- Chandrapur, Maharashtra, India

Abstract: This study focused on the morphological diversity of Cyanophyceae (Blue- green algae) genera found in the Wardha River within Warora taluka. Sampling was conducted at three sites along a 30 km reach between to capture spatial variation. Algal samples were collected from selected sites during the study period, fromMay 2024to May 2025,and analyzed using standard taxonomic and microscopical methods. A total of 09cyanophycean genera belonging to 04 family and 03 order were identified. The dominant genera included Oscillatoria, Merismopedia minima, Anabaena, Phormidium, lyngbya, Spirulina, Cylindrospermum, Arthrospora. The findings provide baseline data useful for ecological assessment, biomonitoring, and future molecular and toxin-based studies.

Keywords: Cyanophyceae, Morphology, Wardha River, Warora, Freshwater algae.

Introduction

Cyanophyceae (Cyanobacteria) represent one of the most ecologically significant algal groups due to their ability to perform oxygenic photosynthesis and nitrogen fixation. They play a crucial role in freshwater systems as primary producers. Morphological identification remains a widely used method in freshwater algal studies, particularly in regions where molecular resources are limited. The Wardha River, one of the major rivers in Maharashtra, receives agricultural runoff and domestic effluents along its course near Warora taluka. Limited documentation exists on the *cyanophycean* flora of this region. Hence, this study was undertaken to assess the *cyanobacterial* diversity and its relation to environmental parameters.

Material and Method

Study area

The Wardha river flows through Warora taluka in Chandrapur district, Maharashtra Total three sampling sites were taken for morphological study of *cyanophycean* algae of Wardha river water and algal material. On the basis of entry and exit of

Wardha river in Warora taluka Soit, Marda and Turana area were selected for study.

Sample collection

Samples were collected during the period of May 2024to May 2025.

- The fresh water samples and algal samples were collected monthly from the Wardha river area of selected sites.
- The samples were collected from a depth of 10 to 15 cm from Surface water samples were collected in plastic bottles of one liter's capacity.
- Floating Algal samples was collected with the help of sterilized forceps into small plastic bottles. Filamentous algae are collected through picking by hands; the algae were attached on to the rocks were collected by using scalpel and forceps and stored into the small plastic container. Samples were brought into the laboratory and analyzed.
- Collected samples were preserved in 4% formalin.
- The river water sample was centrifuged at 3000 rpm at room temperature and then fix into the 4% formalin then used for algal identification.

Microscopic Identification of Algal samples

Observe the glass slides under the proper magnification i.e. 40x. Under the electronic Compound light Microscope (Car) ZESS primo star and then take a photographs.Fresh and preserved algal material were observed under the microscope.Algae were identified with the help of standard books, floras[Desikachary, 1958; Textbook of algae (Kamat, 1975); The fresh water Algae (Prescott, 1984);Orlando Necchi Jr. Editor,River Algae; Springer,2016).

Observation

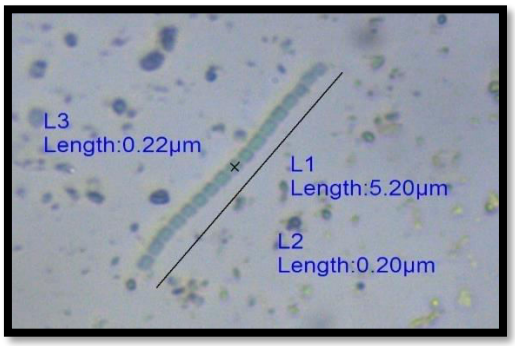
Sr. no.	Group and Species	Length (micrometer) L1	Width (micrometer) L2	Morphological characters
	Cyanophyceae			
1	*Anabaena sp.*	5.20	0.20	Filamentous, unbranched blue green algae, cells shape was spherical or barrel-shaped, heterocyst present at the ends of the filaments, sometimes intercalary. Bead like chain of cells was found.
2	*Cylindrospermum sp.*	4.45	0.13	Filamentous, unbranched blue green algae, cells shape was cylindrical, elongated, heterocyst present within the filament, not restricted to ends.

3	*Merismopedia minima sp.*	0.36	0.35	Colonial, cells arranged in flat plates, colony form rectangular or square plates of 4, 8, 16, 32, or more cells. Number usually in multiples of 2 or 4. Cell shape was spherical to oval, small and uniform size. Arrangement of cell was found in rows and coloumns, giving a checkerboard or grid-like appearance.
4	*Lyngbya sp.*	23.28	0.54	Filamentous, unbranched, broad trichomes, enclosed in a distinct, firm mucilaginous sheath. Cell shape was cylindrical, often isodiametric or slightly longer than wide. Cell size large, but usually smaller than *o. princeps.* Apical cell rounded or sometimes calyptrate (with a cap like thickening). Thick sheath present.
5	*Oscillatoria princeps sp.*	13.90	2	Largest cyanobacteria, Filamentous, unbranched, forming long chain trichomes. Trichomes very broad, straight or slightly bent, sometimes appearing blue green to dark green. Cell shape are wider than long, disc shaped, coin like cell arrangement. Cell size very large compared to most cyanobacteria. Apical cells was rounded or conical, without a thickened cap. Sheath usually absent.
6	*Spirulina sp. 1*	1.47	0.09	Filamentous, unbranched, trichomes cylindrical, multicellular filaments. Characteristically arranged in spiral or helical coils. Spirals may be tight or loose depending on the species and environmental conditions. Cylindrical cell usually shorter than wide. Arrangement of cell was uniseriate. Sheath absent, trichomes are naked.

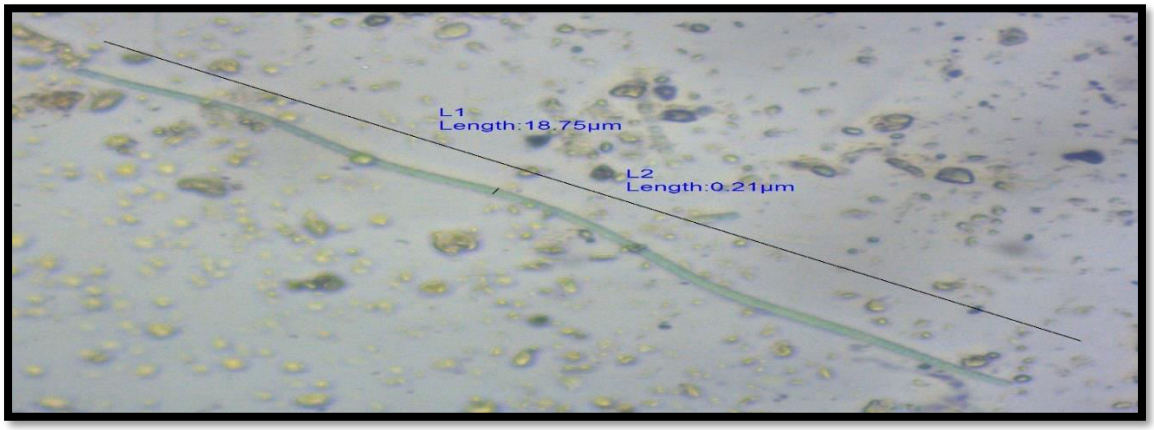
7	*Phormidium sp.*	10.65	0.50	Unbranched, cylindrical trichomes, sheath slightly coloured. Cell shape was short discoid to barrel shaped, arranged in a single row within the trichome. Apical cell rounded, hood shaped, not sharply pointed. Heterocyst absent.
8	*Spirulina sp. 2 (Arthrospora)*	19.74	1.24	Trichomes arranged spirally coiled. Cell shape was discoid, cylindrical arranged transversely in a single row within the trichome. Heterocyst absent.
9	*Oscillatoria limosa sp.*	16.55	0.48	Cells are cylindrical and contain dispersed granules though not aerotopes. The ends are typically rounded, conical or slightly bent, never having a calyptra. Sheath generally absent.

Table no. 2 :- Showing morphological characters, length and width of BGA

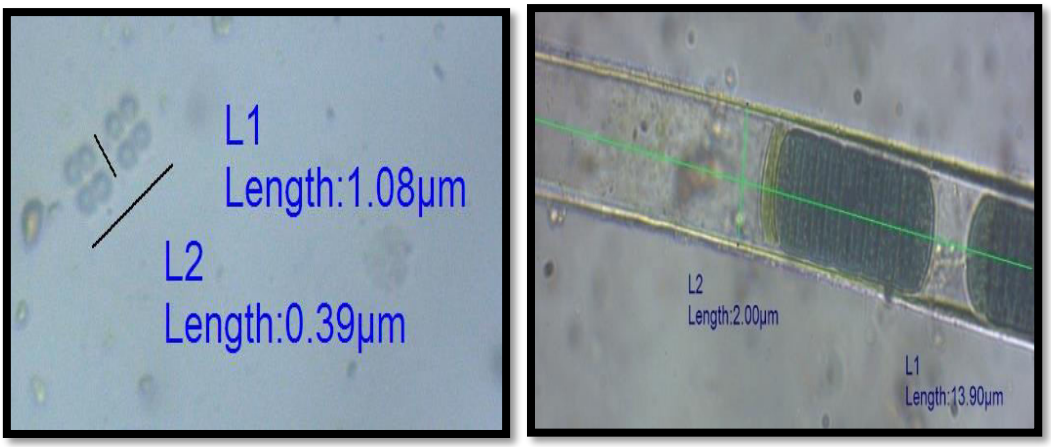
Some Photographs of Cyanobacterial Algae



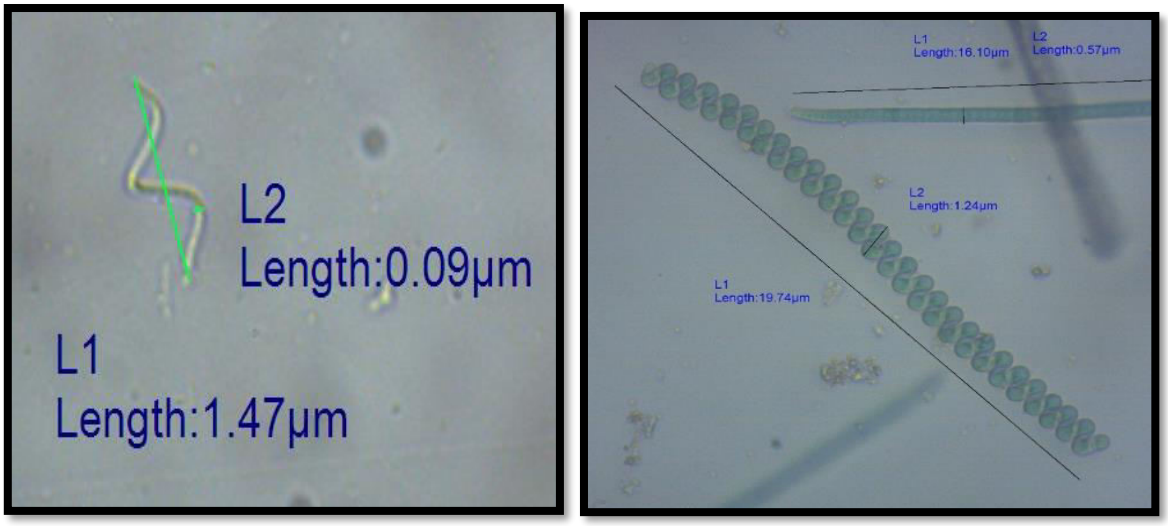
Anabaena sp. Trevisan, 1848



Anabaena sp. Showing heterocyst



Merismopedia minima spOscillatoria princeps sp.



Spirulina sp. 1 Spirulina sp. 2 (Arthrospora)

Oscillatoria limosa sp.

Systematic Position of Cyanobacterial Algae

Sr. no.	Division	Class	Order	Family	Genus	Species
1	*Cyano-phyta*	*Cyano-phyceae*	*Nosto-cales*	*Nostoca-ceae*	*Anabaena*	*Anabaena sp.*
						Cylindrospermum sp.
				Myxophy-ceae	*Spirulina*	*Spirulina sp. 1*
						Spirulina sp. 2 (Arthrospora)
			Chrooco-ccales	*Merismo-pediaceae*	*Merismopedia*	*Merismopedia sp.*
			Oscillato-riales	*Oscillato-riaceae*	*Lyngbya*	*Lyngbya sp.*
					Oscillatoria	*Oscillatoria princeps sp.*
						Oscillatoria limosa sp.
					Phormidium	*Phormidium sp.*

Table no. 3:- Showing systematic position of algae

Discussion:

In the present investigation, 09 genera of Blue green algae belonging to03 orders and 04 familieswere recorded. Out of which 02 genera belonged to heterocystous forms that was*Anabaena sp., Cylindrospermumsp.,* and 07 genera belonging to non-heterocystous forms that is *Spirulina sp.1, Spirulina sp. 2 (Arthrospora), Merismopedia minima sp., Lyngbya sp., Oscillatoria princeps, Oscillatorialimosa, Phormidium sp.,* were recorded. The diversity of *Cyanophyceae* observed in the study showed a direct relationship with water quality conditions. The presence of Nitrogen fixing genera (*Anabaena*) suggest that the system may experience nitrogen-limiting ecological conditions at certain points. The recorded genera were typical of nutrient-enriched tropical rivers, and the dominance of filamentous taxa indicates tolerance to flowing-water conditions. The Presence and prevalence of heterocystous taxa (*Anabaena*) in sites with low inorganic nitrogen indicate potential Nitrogen fixation supporting community productivity, which is a commonly observed ecological response. Morphological plasticitysuch as variation in filament width, sheath prominence, and heterocyst frequency

varied with environmental stressors including light availability, nutrient concentrations, and water flow.

In maharashtra some researchers studied the algal diversity of major rivers. (S. P. Adhikary, S. K. Das, D. Khilar and L. K. Samad, 2010; P. B. Chatap, C. N. Dongarwar and P. M. Telkhade, 2023; Mallesh Reddy and Alka Chaturvedi, 2018 and 2017; N. R. Dahegaonkar, 2023).

Conclusion:

In India the *Cyanophyceae*is represented by 1232 taxa of 90 genera (Gupta,2012). From the Maharashtra state several workers have enlisted a number of taxa of *Cyanophyceae* from different habitats.But from the Chandrapur district there are only few studies are available.The Wardha River stretch in Warora supports a diverse cyanobacterial assemblage including both heterocystous and non-heterocystous taxa. In present work 30 km length ofWardha Rivers was studied by selecting 3 sites and identified 09algal genera belonging to 03 order and 04families.Also, the morphological study of algal species were done. This morphological inventory provide a baseline for future ecological monitoring.

Acknowledgements:

The authours expresses gratitude to research center and thanks to Dr. L. S. Ladke, Head of Institution; IHLR & SS Nilkanthrao Shinde Science and Arts College, Bhadrawati, District Chandrapur, Maharashtra.

References:

1. Adhikary, S. P., Das, S. K., Khilar, D., & Samad, L. K., (2010). Algal Flora of Mizoram, India. J. Indian bot. Soc. Vol. 89 (3&4)2010: 415-423.
2. Behera, Chhandashreeetal.(2021). Algal Diversity of Saltpans, Humma (Ganjam), Odisha, India. J. Indian bot. SocVol. 101 (1&2) 2021: 107 – 120.
3. Ble Alexis Tardy Kouassi etal. (2015). Cyanobacteria from a Shallow Reservoir in Cote d'Ivoire. Journal of Biodiversity and Environment Sciences (JBES) ISSN: 2220-6663 (Print) 2222-3045 (Online) Vol. 7 , no. 5, p. 136-149, 2015. www.innspub.net.
4. Chatap, P. B., Dongarwar, C. N., and Telkhade, P. M., (2023). Seasonal investigation of phytoplankton population in River Penganga at Kodsi near Korpana, Dist. Chandrapur, (M.S.). International Journal of Researches in Biosciences, Agriculture and Technology.I J R B A T, Issue (XI) Vol (II) May 2023: 240-242.
5. Dahegaonkar N. R., (2023). Limnological profile of river Erai near Chandrapur, Maharashtra, India. International Journal of Researches in Biosciences, Agriculture and Technology.I J R B A T, Issue(XI) Vol (I) Jan 2023:165-171.

6. Das, Sudipta Kumar, et al., (2012). Freshwater Algae of Cherrapunjee and Mawsynram, the Wettest Places on the Earth. Phykos 44 (2): 29-43 2012.
7. Desikachary T. V., (1958). I. C. A. R. Monographs on Algae. (Textbook)
8. G. Mahendra Perumal and N. Anand, (2007). Manual of Freshwater algae of Tamilnadu. (Textbook)
9. Prescott, G. W., (1984). The fresh water algae. (Textbook)
10. Mosleh, Mogeeb AA, (2012). A Preliminary Study on Automated Freshwater Algae Recognition and Classification System. BMC Bioinformatics 2012, 13(Suppl 17):S25 www.biomedcentral.com
11. Radka M u h l s t e i n o v a1.2. (2018). Seeking The True Oscillatoria: A Quest for a Reliable Phylogenetic and Taxonomic Reference Point. Preslia 90: 151-169, 2018.
12. Reddy, M., Chaturvedi, A., (2017). New records of fresh water Algae from India. Phykos 47 (1): 59-63 (2017). @Phycological Society, India.
13. Reddy, M., Chaturvedi, A., (2018). Study of Cyanobacterial diversity from the major rivers of Chandrapur district, Maharashtra. Phykos 48 (1): 36-45(2018). @Phycological Society, India.
14. Srivastava, Neha, etal, (2018). Fresh Water Algal Diversity of Central India. International Journal of Research and Development in Pharmacy & Life Science. July- August 2018; 7(4): 3039-3049.
15. Patil, Y. S., Thakur, H. A., Zaware, B. N., (2022). Enumerate and study of Chlorophyceae (Green algae) of Darna River, Nasik (M.S.). International Journal of Current Science (IJCSPUB). Volume 12, Issue 1 February 2022, ISSN: 2250-1770.