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Diversity of blue green algae in rice fields of nagbhid tehsil,dist. chandrapur, maharashtra, india

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ABSTRACT: Blue Green Algae (Cyanobacteria) are mostly present in paddy fields and are valuable to maintain soil fertility in them through nitrogen fixation therefore blue green algae are considered to be very useful in agriculture. The role of Blue green algae is considered very useful in Agriculture. The role of blue green algae in nitrogen fixation and enhancement in soil fertility has been extensively studied worldwide; Rice is the principal crop of Nagbhid Tehsil, District Chandrapur, Maharashtra. Cultivated on 25803 hectares out of 51900 hectares of total area under cultivation of crop. This study is aimed to characterize the abundance of blue green algae in paddy field areas of Nagbhid Tehsil. In present investigation, 45 species of Blue green Algae were identified. Both Heterocystous and non Hesterocystous forms were observed. Maximum number of species represented the genera Nostoc, Anabeana, Oscillatoria, Microcystis, Lyngbya.
KEYWORDS: Cyanobacteria, diversity, paddy fields, Nagbhid Tehsil

I. INTRODUCTION

Cyanobacteria also known as blue green algae is a large group of structurally complex and ecologically significant gram-negative prokaryotes which are abundantly present in rice fields and also maintain the fertility of this ecosystem. The paddy field ecosystem provides a suitable habitat for the growth of blue green algae with respect to their requirements for light, water, High temperature and nutrient availability. This could be the reason for more abundant growth of Cyanobacteria in paddy soils than in upland soils (Roger and Reynaud, 1982 and Konda and Yasuda 2003).

Cyanobacteria play an important role in maintenance and buildup of soil fertility (Board, 2004), consequently, increasing rice growth and act as a natural biofertilizer (Song et. al, 2005). Species of Nostoc, Anabeana, Scytonema, Oscillatoria, Lyngbya and many more other genera are widespread in the soils of Indian rice fields and are responsible to contribute significantly to increase the fertility of that soil. Various Workers have studied the cyanobacterial flora of rice fields of our country (Rao et. al 2008; Nayak and Prasanna 2007; Chaudhariet. al 2011; Dasgupta and Ahmed, 2013; Singh et. al, 2014;Thajamanbi et. al, 2016; Basavaraja. and Naik., 2019) and few attempts have also been carried out to explore their diversity in the state of Maharashtra (Gonzalves and Gangla, 1949; Patil and Satav, 1986; Madane and Shinde, 1993; Patil and Chougule, 2009; Kamble, 2017; Ghadge and Karande, 2019) however, Information of Systematic study on blue green algae from Nagbid Tehsil is inadequate. The agro-climatic conditions of the rice fields of Nagbhid tehsil favors the growth of Cynobacterial population. Hence, the current study has been aimed at doing a thorough study of Diversity of blue green algae from these areas.

II. MATERIALS AND METHODS

Study Area: Mohadi Area which is located 10 km from Nagbhid towards north (Longitude 79°40’0” E and Latitude 20°35’0” N). Talodhi Area is located 15 km from Nagbhid Towards south (Longitude 79°40’0” E and Latitude 20°35’0” N). Navegaon Pandav area is located 0.9 km from Nagbhid Towards East (Longitude 79°40’0” E and Latitude 20°35’0” N). Nagbhid area is located 0.2 km from Nagbhid city Towards West (Longitude 79°40’0” E and Latitude 20°35’0” N) of Nagbhid Tehsil Dist. Chandrapur, Maharashtra

Collection, Preservation and identification of samples: Samples were collected in Rainy season from 4 different sites of Nagbhid Tehsil, Dist. Chandrapur, Maharashtra. The sampling was done randomly from both soil and water of the paddy fields. The algal samples were preserved in 4% formalin and slides were prepared by staining with methylene blue and mounted in glycerin. Detail

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studies were made by examining specimens under a binocular microscope. The strains were identified based on their morphological features and cell structures by following the monographs of (Desikachary, 1959 and Prescott, 1951)

III. RESULT AND DISCUSSION

An extensive study was made to find out the diversity and occurrence of blue green algal population in different study sites of NagbhidTahsil, district Chandrapur, Maharashtra state has revealed a total of 45 species of blue green algae as shown in table.1, out of them 24 are heterocystous and 21 are non heterocystous species as shown in table.2 and table.3 respectively.

Table –I: List of Blue Green Algae from Four Different Paddy Fields

Sr. No.	Name of Algae	Place of Occurrence			
		SITE 1	SITE 2	SITE 3	SITE 4
1	Nostoc calcicola	+	+	+	+
2	Nostoc commune	+	+	+	+
3	Nostoc humifusum	+	-	-	+
4	Nostoc ellipsosporum	+	+	+	+
5	Nostoc linkia	-	+	+	+
6	Nostoc microscopicum	+	+	+	-
7	Nostoc paludosum	+	+	+	+
8	Nostoc spongiaeforme	-	+	+	+
9	Anabaena anomola	+	+	+	+
10	Anabaena laxa	+	+	+	+
11	Anabaena bharadwajae	+	+	+	-
12	Anabaena variabilis	+	+	+	+
13	Anabaena torulosa	+	+	+	+
14	Microcystis robusta	+	+	+	-
15	Gloeocapsa deccorticans	+	+	+	+
16	Gloeocapsa rupestris	-	+	+	+
17	Gloeocapsa atrata,	+	+	+	+
18	Aphanocapsa biformis,	+	+	-	-
19	Aphanocapsa fonticola	+	+	+	-
20	Aphanothece naegelii	+	+	+	+
21	Oscillatoria amoena	+	+	+	+
22	Oscillatoria annae	+	+	+	+
23	Oscillatoria sancta	+	+	+	+
24	Oscillatoria curviceps	+	+	-	+
25	Oscillatoria animalis	+	+	+	+
26	Chroococcus limenticus	+	+	+	+
27	Phormidium foveolarum	-	+	+	+
28	Phormidium jenkelianum	+	+	+	+
29	Cylindrospermumlichenif orme	-	-	+	+
30	Lyngbya corticola	+	+	+	+
31	Lyngbya aerugineocorrulea	+	-	+	+
32	Lyngbya allorgei	+	+	+	+
33	Lyngbya lachneri	+	+	+	+
34	Schizothrix tenus	+	+	-	+
35	Scytonematopsisworonichinii	-	+	+	+
36	Scytonema millei	+	+	+	+
37	Tolypothrix bouteillei	+	+	+	+
38	Calothrix clavata	+	+	+	+
39	Calothrix epiphytica	-	+	+	+
40	Gloeotrichia indica	+	+	+	-

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41	Gloeotrichia natans	+	-	+	+
42	Haplosiphon baronii	-	+	-	+
43	Haplosiphon intricatus	+	+	+	-
44	Aulosira laxa	+	-	+	+
45	Synechocystis aquatillis	+	+	+	-

"+" : Present "-" : Absent

Table -II Heterocystous forms

Sr. No.	Type of cyanobacteria
1	Nostoc calcicola
2	Nostoc commune
3	Nostoc humifusum
4	Nostoc ellipsosporum
5	Nostoc linkia
6	Nostoc microscopicum
7	Nostoc paludosum
8	Nostoc spongiaeforme
9	Anabaena anomola
10	Anabaena laxa
11	Anabaena bharadwajae
12	Anabeana variabilis
13	Anabaena torulosa
14	Cylindrospermum licheniforme
15	Scytonematopsis woronichinii
16	Scytonema millei
17	Tolypothrix bouteillei
18	Calothrix clavata
19	Calothrix epiphytica
20	Gloeotrichia indica
21	Gloeotrichia natans
22	Haplosiphon baronii
23	Haplosiphon intricatus
24	Aulosira laxa

Table III Non-Heterocystous forms

Sr. No.	Type of cyanobacteria
1	Microcystis robusta
2	Gloeocapsa deccorticans
3	Gloeocapsa rupestris
4	Gloeocapsa atrata,
5	Aphanocapsa biformis
6	Aphanocapsa fonticola
7	Aphanothece naegelii
8	Oscillatoria amoena
9	Oscillatoria annae
10	Oscillatoria sancta
11	Oscillatoria curviceps
12	Oscillatoria animalis
13	Chroococcus limenticus
14	Phormidium foveolarum
15	Phormidium jenkelianum
16	Lyngbya corticola
17	Lyngbya aerugineocorrulea
18	Lyngbya allorgei
19	Lyngbya lachneri
20	Schizothrix tenus
21	Synechocystis aquatillis

In the present investigation rich diversity of heterocystous cyanobacteria with 24 species represented with 09 genera and 21 species with non heterocystous cyanobacteria represented with 10 genera have been reported. Out of 45 species highest number of Heterocystous forms were represented by Nostoc (08) followed by Anabeana(05), Scytonema, Calothrix, Gloeotrichia and Haphlosiphon are each represented by two species while Aulosira, Tolypothrix and Cylindrospermum are represented by single species. In the non heterocystousforms 05 species of Oscillatoria, 4 of Lyngbya, 3 of Gloeocapsa, 2 of Aphanocapsa and Phormidium each, Schizothrix, Aphanothece, Chrococcus, Microcystis, Synechocystis represented single species. Our observations are in coincidence with the findings of Prasanna and Nayak, (2007) who were recorded more heterocystous forms while studying cyanobacterial abundance and diversity in rice field soils of India. Similar observations made by others (Bharadwaj and Baruah, 2013; Tiwari et al 2015; M. Srinivas and Aruna, 2016). Nostoc and Anabeana were found to be dominant genera from paddy soils of Nagbhid Tehsil indicating lower nitrogen status in the rice fields similar type of results were concluded in the studies conducted by (Selvi and . Sivakumar 2012; Basavraja. and Naik., 2019;Ghadge and Karande, 2019;Thajamanbi et. al, 2016).

IV. CONCLUSION

As a conclusion, A thorough study and documentation of cyanobacteria provides us with enough information so as to understand the nutritional status of the soil which could be applied to make the agricultural practices sustainable and maintains soil fertility by limiting the use of chemical fertilizers which would cause a disbalance in nitrogen fixer and non fixer cyanobacteria ratio it will help us to eliminate the competition for nutrients by the non fixer cyanobacteria thus maintaining the overall fertility of the paddy ecosystem.

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