RESEARCH ARTICLE

Cyanophycian Algal Diversity of Bhadrawati Tahasil Paddy Soil of Chandrapur District (MS) India

Wadhave NS

Department of Botany N.S College Bhadrawati Maharashtra State(INDIA)

Email Id :nswadhave@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Wadhave NS (2014) Cyanophycian Algal Diversity Of Bhadrawati Tahisil Paddy Soil Of Chandrapur District (Ms) India. *Int. J. of Life Sciences*, 2014, Special Issue A2: 112-115.

ABSTRACT

Rice fields harbour a very luxuriant growth of different kinds of algae owing to their standing water,prevalent high temperature and high humitidy during the rice growing season. Cyanobacteria are widespread photosynthesis microorganisms among which some are able to fix atmospheric nitrogen. Cyanobacteria also have a unique potential to contribute to productivity in a variety of agricultural and ecological situations.Cyanobacteria have been reported from a wide range of soils. Bhadrawati Taluka has an area of 1121sqkm,the area under cultivation is around 51900hectors.Soil samples were collected from Bhadrawati, Chora, Chandankheda,Ghodpeth and Ghotnimbala studies and 74 algal taxa have been identified..

INTRODUCTION

Rice is the world's most important food crop. More than 40% of the world's population depends on rice as the major source of calories. Most of the rice in tropical countries is produced in lowland areas. To feed thedemand of global population, the world's annual rice production would have to increase from the present 528 million to 760 million by the year 2020. Nitrogen is a key input limiting rice production worldwide. To produce a ton of grain, the rice crop takes up an averge of 20 kg N ha-1 from the soil over 3-5 months to sustain rice productivity at present levels,the N removed in harvested produce or lost from the system must be replaced by N fertilizers or through biological N2 fixation (BNF).

Most of the world's rice production is in Asia where, for centuries, farmers have practiced a cultural system that ensured modest but stable yields, yet maintained a degree of N fertility in the soil. Additions of N through BNF balanced the losses of N through crop harvest and other mechanisms, creating a dynamic equilibrium (Ladha, 1997). This equilibrium was disturbed by the need to increase rice production and high-yielding rice varieties (HYVs) which can use additional N.in comparion with traditional varieties , the HYVs needs larger amounts of N from soil.. With irrigation, cultivation was Fritsch and John(1942) found a correlation between the composition of the algal flora and the soil characteristics. Lund (1947), observed that the number of alage in these soils vaied with the weather conditions. The development of soil alage in sodium padzolic soils and their relation to the cultivated plants were studied by shtina(1957). Granhall (1970), reported that Nostoc and Anabaena were the commonest nitrogen fixing algae in Swedish soils and had the greatest pH tolerance intensified to two and even three crops per year. Another trend detrimental to soil N fertility is the increase in area being cropped only to cereals.

Yield trends from long–term continuous cropping experiments conducted in the Phillipines, India, Indonesia, Thailand and Bangladesh Indicate that, even with the best available cultivars and scientific management, rice yield, has declined over time since the early 1980s (Flinn and De Datta , 1984; Cassman and Pingali, 1995; Nambiar and Ghosh , 1984[as cited in Pingali et al., 1997]). Farm monitoring data from the Phillippines showed that average wet season rice yields were 4.2t ha-1 in central Luzon and 4.7 t ha-1 in Laguna in the early 1980s. Since then, yields have gradually declined to such an extent that they were 0.5 t ha-1 lower in 1990 in both domains. In Ludhiana, Punjab, India, where an intensive rice– wheat double-cropped system is being practiced, average rice yield attained by 1980 was 4.0t ha-1 and has remained relatively constat, thereafter (Cassman and Pingali, 1995). Such declining or stagnant yields have raised concerns about the long- term substainability of intensive rice production systems.

MATERIAL AND METHODS

Experiments were conducted on five places of Bhadrawatitaluka.The soil samples were collected from a paddy field from depth of 15 to 20 cm by means of stainless steels augers from 15 to 20 well distributed spots,moving in zigzag manner from each individual sampling site after scrapping off the surface litter, if any,without removing soil.

Collected soil was mixed thoroughly by hands on a clean piece of cloth.From the soil samples,1 gm.ofsoil was used for each culturing and remaining soil samples were used for soil analysis B.G-11 culture medium was used. for the culturing different algae.

In rainy season natural algae were picked up with the help of forcep and collected in clean plastic bottle in the laboratory.The algal slide were made and identified the natural algae,with the help of standard literature.The culturing vessels with culture media were sterilized and autoclaved at 2lbs.pressure for 20 minutes prior to inoculation.. The sub-cultureswere prepared and a few cells were transfered to media for unialgal cultures for the identification of algae.

RESULT AND DISCUSSION

Result of algal studies showed that,from the 5 places of Bhadrawati, 74 algal taxa could be identified from

Table 1: Showing cyanophycian algal diversity

S.N.	Name of Algae	Places of Occurance				
	CYANOPHYTA	**Bhadrawati**	**Chora**	**Chandankheda**	**Ghodpeth**	**Ghotnimbala**
1	*Microcystiselabens*	+	-	-	+	+
2	*Microcystisholsatica*	-	+	-	+	+
3	*Microcystisprotocystis*	+	-	+	-	+
4	*Microcystispulvarea Var. incerta*	+	+	+	-	-
5	*Microcystisrobosta*	-	+	+	+	-
6	*Chroococcuslimneticus*	-	+	-	+	+
7	*Chroococcus micrococcus*	+	+	-	-	+
8	*Chroococcus minor*	+	-	+	+	-
9	*Chroococcusspelaeus*	+	+	-	+	-
10	*Chroococcusturgidus*	-	+	+	+	-
11	*Gloeocapsarupestris*	+	-	-	+	+
12	*Aphanoapsabiformis*	-	+	-	+	+
13	*Aphanoapsaconferata*	+	-	+	-	+
14	*Aphanoapsafonticola*	+	+	+	-	-
15	*Aphanoapsamusicola*	-	+	+	+	-
16	*Spirulinagigantia*	-	+	-	+	+
17	*Spirulinasubtilissima*	+	+	-	-	+
18	*Oscillatoriaabscura*	+	-	+	+	-
19	*Oscillatoriaamoena*	+	+	-	+	-
20	*Oscillatoriaamphigranulata*	-	+	+	+	-

21	*Oscillatoriaannae*	+	-	-	+	+
22	*Oscillatoriachlorina*	-	+	-	+	+
23	*Oscillatoriacurviceps*	+	-	+	-	+
24	*Oscillatoriacurviceps Var. anqusta*	+	+	+	-	-
25	*Oscillatoriadecolorata*	-	+	+	+	-
26	*Oscillatoriaprinceps*	-	+	-	+	+
27	*Oscillatoriasalina*	+	+	-	-	+
28	*Oscillatoriatenuis*	+	-	+	+	-
29	*Phormidiumfaveolarum*	+	+	-	+	-
30	*Phormidiumjankelianum*	-	+	+	+	-
31	*Phormidiummucosum*	+	-	-	+	+
32	*Phormidiumuncinatum*	-	+	-	+	+
33	*Lyngbyaaerugineocorrulea*	+	-	+	-	+
34	*Lyngbyacorticicola*	+	+	+	-	-
35	*Lyngbyadendrobia Var. skujaii*	-	+	+	+	-
36	*Lyngbyarivunarianum*	-	+	-	+	+
37	*Lyngbyasemiplena*	+	+	-	-	+
38	*Schizothrixtenuis*	+	-	+	+	-
39	*Symplocaelegans*	+	+	-	+	-
40	*Hydrocoleussubincrustaceus*	-	+	+	+	-
41	*Cylindrospermumindicum*	+	-	-	+	+
42	*Cylindrospermummusicola*	-	+	-	+	+
43	*Nostoccalcicola*	+	-	+	-	+
44	*Nostoc commune*	+	+	+	-	-
45	*Nostocmicroscopium*	-	+	+	+	-
46	*Nostocpaludasum*	-	+	-	+	+
47	*Nostocspongiaeforme*	+	+	-	-	+
48	*Anabaena anemala*	+	-	+	+	-
49	*Anabaena fertilísima*	+	+	-	+	-
50	*Anabaena laxa*	-	+	+	+	-
51	*Anabaena naviculoides*	+	-	-	+	+
52	*Anabaena sphaerica*	-	+	-	+	+
53	*Anabaena variabilis*	+	-	+	-	+
54	*Camptylonamopsisiyengarii*	+	+	+	-	-
55	*Scytonematopsisworonichinii*	-	+	+	+	-
56	*Scytonemafremyii*	-	+	-	+	+
57	*Scytonemamillei*	+	+	-	-	+
58	*Tolypothrixbouteillei*	+	-	+	+	-
59	*Tolypothrixhyssoidea*	+	+	-	+	-
60	*Microchaetecalothrichoides*	-	+	+	+	-
61	*Calothrixbrevissima Var. moniliforme*	+	-	-	+	+
62	*Calothrixclavata*	-	+	-	+	+
63	*Calothrixepiphytica*	+	-	+	-	+
64	*Calothrixmarchika Var. intermedia*	+	+	+	-	-
65	*Calothrixmembranacea*	+	-	-	+	+
66	*Calothrixspiphytica*	-	+	-	+	+
67	*Gloetrichiaindica*	+	-	-	+	+
68	*Gloetrichianatans*	-	+	-	+	+
69	*Haplosiphonintricatus*	+	-	+	-	+
70	*Haplosiphonwelwitschii*	+	+	+	-	-
71	*Stigonemahormoides*	-	+	+	+	-
72	*Aphanothecenaegelii*	-	+	-	+	+
73	*Arthospirakhannae*	+	+	-	-	+
74	*Synechocystisaquatilis*	+	-	+	+	-

There are well marked seasonal and ecological changes in the paddy fields and the algal flora. Therefore, shows considerable variation during the year. The cultural conditions moreover are markedly different from those in nature. The qualitative and quantitative growth of the algae in nature, therefore, differs from what we find in culture.

A comparison of the algal flora in nature and in culture of the soils of BharawatiTalukashows that a number of forms like *Anabaena bharadwajae*, *Calothrix membranacea, Nostocsp., Cylindrospermummucicola* and species of *pharmodium, Lyngbya* and *oscillatoria* occur abundantly both in culture as well as in nature. *Scytonemafremyii* also grows abundantly both in nature and in soil culture but another species of *Scytonema*, *S. pseudohofmnni* is found to grow only in nature. Similarly *Tolypothrixbouteillei* is common in both culture and in nature. Some of the forms which occurred exclusively in nature are *Aulosira fertilissima*, *Gloeotrichianatans, Scytonemafremyii, Aphanocaps agrevilli, Aphanothae cenaegelli* and a few others. Out of these *A. fristchii, G natans,* and *S. coactile* grew very profusely in nature and their complete absence in soil cultures is, therefore , noteworthy. The algal flora of a particular region or crop fields depends on the climate,of the region,environment of the field and nature of cultivation.The interaction between the algal flora and the crop plant in a crop field.paddy have much important effects by the algal flora of the paddy field.

Paddy shows a variable environment for the growth of different types of algae at different seasons.Hence collection of algae and cultures of algae of different seasons were made to finalise the list of algae present in the paddy fields of Bhadrawatitaluka five different culture medians were used to avoid elimination of an alga from the list to culture condition. Soil analysis of the respective fields was made to correlate the presence of an alga in a particular type of soil, TableII. The soil analysis showed a pH range from 6.9 to 7.9 to state a alkaline condition.In all 74 taxa from paddy fields of Bhadrawati were isolated and identified.In the paddy field of Bhadrawati Anabaena and Nostoc were found frequently.

CONCLUSION

The present study revealed that fungal population varied according to the cropping seasons exhibiting relation with rainfall, humidity and temperature. Fungal population was increased considerably in response to rainfall and higher humidity. Higher temperature and dry atmosphere did not favours fungal proliferation. Maximum count of fungi remain prevalent in kharif cropping season while it was reported minimum at the seedling and harvesting stage of rice. Higher peak of population was confined in middle age of the cropping. Altogether 11 species of Tuberculariaceae fall under 02 genera were recorded throughout a survey from rice field soil. Population of Deuteromycetous fungi was reported higher over others.

REFERENCES

Cassman KG and Pingali PL (1995) extrapolating trends from long term experiments to farmer field: the case of irrigated rice systems in asia. In; Barnett v, payne r &stenier r (eds) agriculture substancebility: economic, envermonental and stablishlity considered pp 63-84. Jhonwiley & sone Ltd.

Flinn JC & de data SK (1984) Treinds in irrigated rice yields under intensive cropping at Philippine research stations. *Field crops res*., 9:1-15

Ladha JK (1997) role of biological nitrogen fixation in replenishing oil nitrogen pool in cropping systems. In; elmerich C etal. (eds) proceedings of the international congress on nitrogen fixation. Kiuwer academic press, the Netherlands (in press).

Pingali PL, Hossain M and Gerpacio RV (1997) Asian rice bowls: the returning crisis/ p 341. CAB international, Wallingford, oxon, UK.

Fritsch and John (1942) found a correlation between the composition of the algal flora and the soil.

Lund (1947) The number of algae in these soils varied with the weather conditions.

Shtina (1957) The development of soil algae in sodium padzolic soils and their relation to the cultivated plants.

Geanhall (1970) Nostoc and anabaena were the commonest nitrogen fixing algae in swedish soils and had the greatest $_{p}$H tolerance.

Singh PK, Dhar DW, Pabbi S, Prasanna R and Arora A (Editors), Biofertilizers:Blue Green Algae and Azolla, IARI, New Delhi. Venus Printers and Publishers, New Delhi,2000.

Singh NI, Dorycanta H, Devi GA, Singh NS and Singh SM (1997) Blue–Green algae from rice field soils of Nagaland. Phykos, 36:115-120.

Thajuddin N and Subramanian G (2005) Cyanobacterial biodiversity and potential applications in biotechnology. *Curr.Sci*., 89(1):47-57

Tirkey J and Adhikary SP (2005)Cyanobacteria in biological soil crusts of India. *Curr.Sci*, 89(3):515-521

Iris Pereira et al. (2009) Development of a biofertilizer based on filamentous nitrogen-fixing cyanobacteria for rice crops in chile. *J. Appl Phycol*.,21:135-144 DOI 10,1007/s10811-008-9342-4.