



BIODIVERSITY OF ALGAE IN GROUNDNUT FIELDS OF NAGPUR

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Abstract

Plant-Microbe interaction is a regular and continuous feature of Biological world. Algae constitutes an important group of soil micro-organisms. The biodiversity of the algal flora in the groundnut field was determined in three different regions. A total of 58 species under 33 genera belonging to Cyanophyceae, Chlorophyceae, Xanthophyceae, Euglenophyceae and Bacillariophyceae were observed. Cyanophyceae algae were found dominant followed by Chlorophyceae and Bacillariophyceae. Algal forms *Oscillatoria*, *Phormidium*, *Nostoc*, *Anabeana*, *Lyngbya* and *Calothrix* were found dominant in order of their number of species. Soil of Groundnut field was found to harbor a rich flora of Cyanophyceae members. The number of algal species observed in rhizosphere was more as compared to surface and non-rhizosphere soil samples.

Key Words: Biodiversity, soil algae, groundnut field, Cyanophyceae, Rhizosphere.

Introduction

Microalgae are ubiquitous components of the soil microflora. They are cosmopolitan in distribution as they require little moisture and diffused light for their growth.

The term rhizosphere effect indicates the overall influence of plant roots on soil micro-organism. The greater number of bacteria, fungi and algae are present in the rhizosphere soil than in non-rhizosphere soil (Lakshmi Kumari, 1961). These microorganisms play an important role in soil by increasing the fertility of soil by adding many amino acids, vitamins and growth promoting substances and organic matter, solubilizing phosphorus and making it available to plants (Wani, et. al 1979). Enhanced growth of algae in the rhizosphere of plants has been observed by many scientist (Hadfield, 1960, Tarar et. al 1981, 85). Apart from paddy very less work has been carried out on the algal flora of various crop fields, in spite of algal presence in abundance in the crop fields soil.

Soil algae have attracted the attention of phycologists for past few decades (Metting 1981, Bongale 1985, Prasad 2005, Auti and Pingle 2007, Jadhav 2010). Algal flora of paddy, banana, wheat and sugarcane fields has been well documented (Bongale and Bharati 1980, Santra 1983, Chaporkar and Gangawane 1984, Kolte and Goyal 1985, Kottawar and Pachpande 1986, Nayak et. al. 2001, Patil and Chaugule 2004, Prasad 2005, Auti and Pingle 2006). Hence, an attempt was made to study the biodiversity and to compare the algal flora of different regions such as

surface, rhizosphere and non-rhizosphere soil in groundnut field.

Material and Methods

A Groundnut field from Nagpur has been selected for the collection of algal and soil samples. Soil samples were collected from surface, non-rhizosphere (similar depth as that of rhizosphere but away from roots of the plant) and rhizosphere regions. Plants were removed with intact root system. The plants were tapped to remove adhering clumps. The roots were then washed in 1000ml of sterile distilled water in a beaker. Algal samples growing on moist soil surface of groundnut field were collected in sterilized collection bottles. Collected algal samples were brought to the laboratory for observation and identification. The algal members present in soil samples were studied using modified Chu-10 medium and BG-11 media. The identification of the algae was made with the help of standard literature (Desikachary, 1959, Prescott, 1970)

Result and Discussion

A total of 58 algal species belonging to 33 genera of algae has been enumerated from the study sites (Table 1). Highest number of species were observed in Cyanophyceae (46) followed by Chlorophyceae (6), Xanthophyceae (1), Euglenophyceae (1) and Bacillariophyceae (4). Highest number of species belonged to the genus *Oscillatoria* (7) followed by *Phormidium* (4), *Nostoc* (4), *Anabeana* (4), *Lyngbya* (3) and *Calothrix* (3). In sample collected from surface total of 33 species, 26 from non-rhizosphere and 36 from rhizosphere were identified. *Aphanocapsa biformis*, *Oscillatoria acuta*,

Symploca muralis and *Chlamydomonas mucicola* were observed in all three samples from different zone. Class Xanthophyceae was represented by only one species *Vaucheria amphibian* and from Euglenophyceae *Euglena gracilis* was the only species found in groundnut field. Classwise percentage contribution study of algae reveals that highest contribution was of Cyanophyceae (79.31%) followed by Chlorophyceae (10.34%), Bacillariophyceae(6.8%), Xanthophyceae(1.72%) and Euglenophyceae(1.72%) (Fig. 1).

Blue green algae were usually the best represented group in the present study. Similar results were reported by Nandi and Rout, 2000 and Deb, *et al.*, 2013 in soil samples of Silchar campus, Assam University. Cyanophyceae were dominant followed by Bacillariophyceae and Chlorophyceae was reported by Nimbhore and Jadhav 2014. Jadhav and Nimbhore 2015 reported total 41 species from Methi field of Aurangabad and Cyanophyceae as a dominant class. The member of family Oscillatoriaceae, Nostocaceae and Scytonemataceae exceeds in the soil samples of groundnut fields. Similar results obtained by Nandi and Rout 2000 and reported that soil samples represented mainly by *Oscillatoriaceae* and *Scytonemataceae*.

In the present study 36 species were observed in rhizosphere region and 33 and 26 species from surface and non-rhizosphere region of groundnut field respectively. Tarar *et al* 1981, 1985 reported highest number of algae in the rhizosphere of cotton, Lady's finger and some vegetable crop plants as compared to non-rhizosphere and surface soils of the same plant. Gonzalves and Yalvigi, 1960 reported that blue-green algae predominate in the soils and more algae were found in rhizosphere, much below the surface than at similar depths, away from the roots of plants. Hadfield, 1960 and Cullimore and Woodbine, 1963, also reported positive rhizosphere effect on the soil algae.

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Tables and Figures

Table. 1. Distribution of Soil algae in various region of Groundnut field

Sr . No.	Algal taxa	Surf ace soil	Non- Rhizosp here	Rhizosp here
Cyanophyceae				
1.	<i>Microcystis elabens</i>	+	-	-
2.	<i>Chroococcus gomontii</i>	-	-	+
3.	<i>Gloeocapsa decorticans</i>	-	-	+
4.	<i>G. polydermatica</i>	-	+	+
5.	<i>Gloeotheca rupestris</i>	+	-	-
6.	<i>Aphanocapsa biformis</i>	+	+	+
7.	<i>Aphanotheca naegelii</i>	-	+	+
8.	<i>Synechococcus aeruginosus</i>	+	-	-
9.	<i>S. cedrorum</i>	-	+	-
10.	<i>Merismopedia glauca</i>	+	-	+
11.	<i>Chloroglea fritschii</i>	+	+	-

1	<i>Oscillatoria acuta</i>	+	+	+
1	<i>O. animalis</i>	+	+	-
3.				
1	<i>O. amoena</i>	-	+	-
4.				
1	<i>O. curviceps</i>	+	-	+
5.				
1	<i>O. jasorvensis</i>	-	+	+
6.				
1	<i>O. salina</i>	+	-	+
7.				
1	<i>O. subbrevis</i>	-	-	+
8.				
1	<i>Phormidium angustissimum</i>	-	+	-
9.				
2	<i>P. bohneri</i>	-	+	+
0.				
2	<i>P. papyraceum</i>	+	+	-
1.				
2	<i>p. uncinatum</i>	+	-	+
2.				
2	<i>Lyngbya allorgei</i>	+	-	+
3.				
2	<i>L. martensiana</i>	-	-	+
4.				
2	<i>L. palmarum</i>	+	+	-
5.				
2	<i>Symploca muralis</i>	+	+	+
6.				
2	<i>Microcoleus chthonoplastes</i>	+	-	-
7.				
2	<i>Anabaenopsis circularis</i>	+	-	+
8.				
2	<i>Cylindrospermum indicum</i>	-	-	+
9.				
3	<i>Nostoc calcicola</i>	+	-	+
0.				
3	<i>N. commune</i>	-	+	-
1.				
3	<i>N. ellipsosporum</i>	-	+	-
2.				
3	<i>N. muscorum</i>	+	-	+
3.				
3	<i>Anabeana anomala</i>	-	-	+
4.				
3	<i>A. iyengarii var. tenuis</i>	-	+	-
5.				
3	<i>A. variabilis</i>	+	-	+
6.				
3	<i>A. laxa</i>	+	-	+
7.				

3	<i>Aulosira</i>	+	-	+
8.	<i>fertilissima</i>			
3	<i>A.</i>	-	-	+
9.	<i>pseudoramosa</i>			
4	<i>Plectonema</i>	+	+	-
0.	<i>hansgirgi</i>			
4	<i>Scytonema</i>	+	-	+
1.	<i>javanicum</i>			
4	<i>S.schmidtii</i>	-	+	+
2.				
4	<i>Calothrix</i>	-	-	+
3.	<i>epiphytica</i>			
4	<i>C.marchica</i>	+	-	+
4.				
4	<i>C.</i>	+	-	-
5.	<i>membranacea</i>			
4	<i>Westiellopsis</i>	+	-	+
6.	<i>prolifera</i>			
Chlorophyceae				
1.	<i>Chlamydomonas</i>	+	+	+
	<i>mucoicola</i>			
2.	<i>Chlorococcum</i>	+	-	+
	<i>humicola</i>			
3.	<i>C.vitosum</i>	-	+	-
4.	<i>Chlorella</i>	+	+	-
	<i>vulgaris</i>			
5.	<i>Scenedesmus</i>	-	+	-
	<i>bijugatis</i>			
6.	<i>Spirogyra</i>	+	-	+
	<i>maxima</i>			
Xanthophyceae				
1.	<i>Vaucheria</i>	-	-	+
	<i>amphibiana</i>			
Euglenophyceae				
1.	<i>Euglena</i>	+	-	-

	<i>gracilis</i>			
Bacillariophyceae				
1.	<i>Fragillaria</i>	+	-	-
	<i>brevistriata</i>			
	<i>f.elongata</i>			
2.	<i>Navicula</i>	-	+	+
	<i>anceps</i>			
	<i>var.linearis</i>			
3.	<i>Nitzschia</i>	-	+	+
	<i>palea</i>			
4.	<i>N.dissipata</i>	-	+	-
Total number of algal taxa observed		33	26	36

+ means present, - means absent

