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PHYCOFLORA ASSOCIATED WITH THE RHIZOSPHERE OF RICE FIELD

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ABSTRACT Phycoflora associated with the rhizosphere of rice field were isolatedat three different growth stages of rice plant i.e. seedling stage, flowering stage and fruiting stage. The soil samples from the samefield werecollected and cultured for algal composition termed as control. The number of phycoflora was greater in rhizosphere than the control. The maximum phycoflora were recorded at the flowering stage of the plant. Altogether 66 species under 24 genera were recorded from rhizosphere of rice plant of these 6 species under 4 genera belonged to Chlorophyceae, 1species under 1 genera belonged to Bacillariophyceae and 59 species under 19 genera belonged to Cyanophyceae. The members of Cyanophyceae were found dominant and a total of 28 species under 16 genera were recorded from control soil, of these 4 species under 2 genera belonged to Chlorophyceae and 24 species under 14 genera belonged to Cyanophyceae.

KEYWORDS : Phycoflora, Rhizosphere, Rice Field

INTRODUCTION:

India has a very rich and diversified algal flora. In the present century great advances have been made in the investigations of fresh water algae, marine algae and soil algae in many parts of the world and particular attention has been paid to their taxonomy, ecology and applied aspects but very rare attentation has been paid towards the rhizosphere phycoflora.The term Rhizosphere was introduced by Lorenz Hiltner (1904) to denote the region of soil which is influenced by plant roots. Rhizosphere microflora is quantitatively and qualitatively different from that of the soil. Extensive review of literature reveals that very few studies on rhizosphere algae have been made in the past. Starkey (1938) reported diatoms from rhizosphere of higher plants. Katznelson (1946) observed blue green algae from rhizosphere algae of tea plant. Gonzalves and Yalavigi (1960) worked on algae in rhizosphere of sorghum, wheat and cotton plants. Hodfield studied Rhizosphere effect on soil algae. Woodbine and Cullimore (1963) studied rhizosphere algae of pea plant. Gantar et al. (1991) conducted a survey on Cyanobacteria associated with roots of wheat plant. Prasanna et al. (2009) worked on diversity of Cyanobacteria in the rice rhizosphere. Kumar and Kumar (2010) recorded 12 taxa of algae living in close proximity of the rhizoidal system of mosses.Hifney et al. (2013) studied quantitative and qualitative variations in the various rhizosphere algae of 16 weed plants. In order to study phycoflora associated with the rhizosphere of rice field the present investigation was carried out.

MATERIALS AND METHODS:

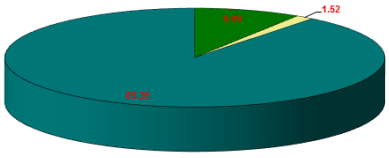
The present investigation was carried out to study the phycoflora associated with the rhizosphere of rice fieldat three different growth stages of plant i.e. seedling stage, flowering stage and fruiting stage by soil dilution plate count method (Hiltner,1904). The petriplates with agarized Bold`s basal medium were used for culturing of rhizosphere algae. A rice plant from field carefully uprooted and brought to the laboratory. The soil around roots was removed and collected in sterilized petriplate. 1gm of soil is dissolved in 100 ml of sterile distilled water. 1ml of suspension was inoculated into the plate containing agarized Bold`s basal medium. Liquid nutrient medium was poured in to the plates at the time of keeping those for incubation in algal culture chamber. Thealgal colonies were counted and observed after the 21 days under research microscope for identification and taxonomic study. The soil samples from same field was collected and cultured for algal composition termed as control.

RESULT AND DISCUSSION:

Table 1:Total occurrence of Algal taxa in Control and Rhizosphere of Rice plant:

Sr. No.	Class (% contribution)	Genera		Species	
		Rhizosphere	Control	Rhizosphere	Control
1	Chlorophyceae (89.39%)	04	02	06	04
2	Bacillariophyceae (1.52%)	01	--	01	--
3	Cyanophyceae (9.09%)	19	14	59	24
	Total	24	16	66	28

Graph 1: Class wise percentage contribution of Algal taxa in rhizosphere (values in percentage)



CHLOROPHYCEAE:

Gloeocystisgigas, Gloeocystisvesiculosa, Elakatothrixgelatinosa, Elakatothrixviridis, Protococcusviridis, Closteriumparvulum.

BACILARIOPHYCEAE:*Nitzschiapalea*

CYANOPHYCEAE:

Chroococcusdispersus, Chroococcusgiganteus, Chroococcuslimn eticus, Chroococcuslimneticus v. distans, Chroococcuspallidus, Chroococcustenax, Gloeocapsacompacta, Gloeocapsapolydermatica, Gloeocapsapunctata, Gloeocapsaquaternata, Gloeocapsastegophila, Gloeothecerupestris, Aphanocapsabiformis, Aphanocapsagrevillei, Aphanothecebullosa, Aphanothecepallida, Aphanothecesaxicola, Merismopediatenuissima, Myxosarcinaspectabilis, Hydrococcus, rivularis, Oscillatoriaanimalis, Oscillatoriaannae, Oscillatoriaannae v. major, Oscillatoriaamphibia, Oscillatoriaamphigranulata, Oscillat oriachalybea, Oscillatoriacurviceps, Oscillatoriamargari tifera, Oscillatoria martini, Oscillatoriaokeni, Oscillatoriaprinceps, Oscillatoriapseudogeminata, f. longa, Oscillatoriaquadripunctulata, Oscillatoriaquadripunctulata v. unigranulata, Oscillatoriasubbrevis, Phormidiumambiguum, Phormidiumambiguum v. major, Phormidi um corium, Phormidiummicrotomum, Phormidiummolle, Phormidi ummolle f. tenuior, Phormidiumretzii f. major, Phormidiumtenue, Lyn gbyabergii, Lyngbyadendrobia, Lyngbyalagerheimii, Lyngbyalax espiralis, Lyngbyasemiplena, Lyngbyaspiralis, Schizothrixfriesii, Symplocacartilaginea, Microcoleuslacustris, Hydrocoleumcanthar idosum, Cylindrospermumsphaerica f. cylindricum, Nostocellipsospo rum, Nostocpiscinale, Anabaena torulosa, Calothrixclavata, Caloth rixthermalis

Table 2: Colony forming units (C.F.U.) in control and rhizosphere of Rice (Oryzasativa L.) at different growth stages:

Sr.No.	Growth stage	Control	Rhizosphere
1	15 days	12	27
2	45 days	18	48
3	80 days	16	37

DISCUSSION:

Among the Cyanophyceaegenera like Oscillatoria (15), were found very dominantly Gantaret al. (1991) followed by Phormidium (15), Chroococcus (6), Lyngbya (6), Gloeocapsa(5), Aphanocapsa (5),Nostoc(2),Calothrix(2) and the genera like Schizothrix,Symploca, Microcoleus,Hydrocoleum,Cylindrospurmum and Anabaena were found with its single species each. An account of algal colonies isolated from control and rhizosphere shows maximum number of algal colonies were recorded in rhizosphere than control (Table 1). Algal

taxa isolated and cultured from control and rhizosphere at different growth stages are listed in Table 2.These taxa belonged to class Chlorophyceae, BacillariophyceaeandCyanophyceae. Classwise species and genera of algae from control and rhizosphere at 15 days, 45 days and 80 days growth stages is given in Table 3. Number of algal taxa increases from seedling stage to flowering stage and decreases at fruiting stages. Maximum number of algal taxa were recorded at flowering stage in (Table 3) Altogether 66 species under 24 genera were recorded from rhizosphere of rice plant of these 6 species under 4 genera belonged to Chlorophyceae, 1species under 1 genera belonged to Bacillariophyceae and 59 species under 19 genera belonged to Cyanophyceae. The members of Cyanophyceae were found dominant. Gonzalves and Yalavigi (1960), Gantar et al. (1991), Prasanna et al. (2009), Hifney et al. (2013) and Madhvi et.al. (2014) reported dominance of Cyanophyceae members from rhizosphere of jowar, wheat, cotton, pea and weed plants. During present study a total of 28 species under 16 genera were recorded from control soil, of these 4 species under 2 genera belonged to Chlorophyceae and 24 species under 14 genera belonged to Cyanophyceae. Maximum number of algal taxa were recorded in rhizosphere(66) than control (28). Similar kind of observations were made by Gonzalves and Yalavigi (1960), Gantar et.al. (1991), Prasanna et al. (2009).Rhizosphere and soil ratio is significant while studying rhizoshere algal flora. Gonzalves and Yalavigi (1960) reported dominance of *Chlorococcumhumicola*, *Hantzschiaamphioxys, Nostocsphaericum* and *Phormidiumfaveolarum*. Prasanna et al. (2009) observed abundance of Chlorococcum, Anabaena, Nostoc and Scytonema from rhizosphere of rice. Madhvi et al. (2014) recorded dominance of *Chlorella vulgaris, Chlorococcumhumicola, Chroococcus minor, Chroococcusturgidus, Merismopediatenuissima, Nostoc commune, Nostoclinkia, Nostocpunctiformae, Phormidiumambighum*and*Calothrixbraunii* in rhizosphere of rice plant. In present study maximum number of algal taxa in rhizosphere were recorded at flowering stage. Similar kind of results were reported by Gonzalves and Yalavigi (1960). While studying rhizosphere algal flora of jowar, wheat and cotton.Madhvi et.al. (2014) recorded algal population dynamics at optimum level in flowering stage of rice. Hence it is concluded that, rhizosphere algal flora of rice plant has been studied at three different growth stages of plant i.e. seedling, flowering and fruiting stage and compared with control soil. Maximum numbers of algal colonies were recorded in rhizosphere than control. Altogether 66 species under 24 genera were recorded from rhizosphere of rice plant. In control 28 species under 16 genera were recorded. Maximum numbers of algal taxa were recorded in rhizosphere than control. The number of algal taxa was greater in rhizosphere than control soil. Maximum numbers of algal taxa were recorded at flowering stage of plant.

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