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STUDIES ON THE RHIZOSPHERE ALGAE OF CULTIVATED VEGETABLE CROP-*HIBISCUS ESCULANTUS* L.

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The present investigation was undertaken to study the rhizosphere algae of cultivated vegetable viz.*Hibiscus esculantus*. The rhizosphere algae were studied at seeding, flowering and fruiting stages. The number of algae forms were more in rhizosphere soils than non-rhizosphere soil.

Keywords: *Hibiscus esculantus* L ; Rhizosphere algae.

Rhizosphere is an ecological niche which comprises the surface of plant roots and the region of surrounding soil in which the microbial population is affected by presence of roots. The present investigation was therefore undertaken to study the rhizosphere algae of *Hibiscus esculantus* commonly grown in Khandesh area. The rhizosphere algae were studied at seeding, flowering and fruiting of lady's finger plant i.e. *Hibiscus esculantus* L.Algae not only used to fix atmospheric nitrogen in soil but they also improved physico-chemical characteristics of soil[1]. Gonzalves and Yalavigi[2] have made the conclusion that the living plants furnish algae in its rhizosphere with more suitable condition for the growth and development.

The soil samples were collected from the root zone of vegetable crop viz. *Hibiscus esculantus* L. Rhizosphere soil, non-rhizosphere soil and surface soil were taken in brown papers and covered with filter papers to avoid contamination by air borne spores. Beneck's medium and Allen and Arnon's medium[3] were prepared for culturing of algae. The algae grown in culture were identified with recent publications and monographs.

The results of physico-chemical analysis of soil are shown in Table 1. The algal taxa which grew in cultures of surface and rhizosphere soil of *Hibiscus esculantus* are shown in Table 2.

In the surface soil of lady's finger in all 24 algal taxa were recorded. Out of which 19 taxa belong to Cyanophyceae and 5 taxa belong to Bacillariophyceae (Table 2).

In the non-rhizosphere soil eleven algal taxa were observed. Out of these, nine taxa belong to Cyanophyceae and two belong to Bacillariophyceae. In the rhizosphere soil at seeding stage 13 algal taxa were recorded which comprised 12 Cyanophycean algal taxa and one Bacillariophycean form. In the rhizosphere soil of flowering stage 20 algal taxa were recorded, out of which 17 taxa belong to Cyanophyceae and 3 taxa belong to Bacillariophyceae. In the rhizosphere soil at fruiting stage, 10 algal taxa were recorded. Out of these, 8 taxa belong to Cyanophyceae and 2 taxa belong to Bacillariophyceae (Table 2).

The physico-chemical characteristics of soil has profound effect on the soil microflora. pH, available nutrients and moisture content of soil determine the nature and abundance of algal flora in soil. The blue-green algae were dominant in alkaline cultivated soils and they exert a profound beneficial effect on physico-chemical properties of soil as it was reported by Singh[4], Marathe[5] and Subhashini and Kaushik[6].

The number of algal forms were more in surface soil than deep non-rhizosphere soils. Similar results were obtained by Tarar and Giri [7] and Murlikrishna *et al*[8]. The occurrence of more algal forms in top layers of soil could be due to alkaline reaction[9].

Present studies indicate that the number of algal forms were more in rhizosphere soils than non-rhizosphere soils. This might be possible due to the fact that root surface furnished good conditions for the growth and development of algae.[2] The rhizosphere effect was varied with maturity of root, depth of soil, age of plant and group of micro-organism[10].

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Table 1. Physico-chemical analysis of soil -

A) Physical analysis of soil expressed as % on ovendry basis:

Constituents	Percentage
Moisture content	09.70
Gravel	04.90
Coarse Sand	10.00
Fine Sand	18.00
Silt	34.20
Clay	23.90

B) Chemical analysis of soil:

Constituents	Value/quantity
Soil pH	7.7
Electric Conductivity	0.240
Organic Carbon	0.15%
Total Nitrogen	0.37%
Potassium Peroxide	605 kg/hector
Phosphorus Pentoxide	7 kg/hector

Table 2. Algae occurring in the surface, non-rhizosphere and rhizosphere soil of Lady's finger *(Hibiscus esculantus L.)* (+= Present, -=Absent)

Sr. No.	Algal texa	Surface soil	Non rhizo-sphere soil	Rhizosphere Soil		
				Seed-ing stage	Flowe-ring stage	Fruit-ing stage
1.	*Chroococcus macrococcus* (Kuetz.) Rabenh.	+	+	+	+	-
2.	*C. tenax* (Kirchn.) Hieron.	+	-	+	+	+
3.	*C.minutus* (Kuetz.) Nag.	+	+	+	+	-
4.	*C.Limneticus* Lemm.	+	-	-	+	+
5.	C. indicus Zeller.	+	+	-	-	+
6.	*Aphanocapsa banarensensis* Bharadwaja	+	-	+	+	-
7.	*A. grevillei* (Hoss) Rabenh.	-	-	+	-	+
8.	*Oscillatoria chlorina* Kuetz. ex Gomont.	+	+	+	+	-
9.	*O. chalybea* (Martons) Gomont Var. *insularis* Gardner	+	-	-	+	-
10.	*O. tenuis* Ag. ex Gomont	+	-	+	+	+
11.	*O. raoi* De Toni J.	+	+	-	-	-
12.	O. *irrgua* (kuetz.)Gomont	-	+	-	+	+
13.	*O. formasa* Bory ex Gomont	+	+	+	+	-
14.	*O. lecmermamii* Wolosz	+	-	-	-	-
15.	*O. acuminata* Gomont	+	+	+	+	-
16.	*Phormidium fragile* (meneghini) Gomont	+	-	+	+	+
17.	*P. laminosum* Gomont	+	-	+	+	-
18.	*P.autumnale (Ag) Gomont*	+	-	-	+	-
19.	*Lyngbya Perelegans Lemm.*	+	+	-	+	-
20.	*L.Semiplena* (C.Ag.) J. Ag. ex Gomont	+	-	-	+	-
21.	*L .acrugineo-coerulea* (kuetz.) Gomont	+	-	+	+	+
22.	*L. Mortensiana.* Menegh. ex Gomont	+	-	+	+	-
23.	*Fragillaria intermedia* Grun.	+	-	+	+	-
24.	*Caloneis beccariana* Grun.	+	+	-	-	-
25.	*Navicula Cry-ptocephalis* kuetz. Var.*Subsalina* Hustedt.	-	+	-	+	+
26.	*N. radiosa* Kuetz. Var. *minutissima* (Grun) Cleve	+	+	-	+	-
27.	*Pinnulria interrepta* W. Smith	+	-	+	-	-