STUDIES ON THE DIVERSITY OF THE AM FUNGI FROM RHIZOSPHERE SOILS OF HIBISCUS CANNABINUS L

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ABSTRACT

Microorganisms form a vibrant living community in the soil contributing a number of nutrient transformations. Among the *Mycorrhizae, Arbuscular Mycorrhizal fungi* (AMF) are the most prevalent type in rhizosphere soil for mobilizing phosphorous. AMF is a potent biofertilizer, nutrient remedifier, ecofriendly and used in agriculture, forestry and horticulture. Biodiversity richness of microbes has long been of interest, but less is known about AMF in rhizosphere soil. Hence the present study was planned to isolate and identify the diversity of AMF in rhizosphere soils of *Hibiscus Cannabinus* (Deccan hemp or kenaf) potential fiber yielding crop collected soil samples were used for analysis of physic chemical parameters at isolation and quantification of AM fungal spores and spore caps by a modifies wet sieving and decantify technique. Identification was done through lacto phenol cotton blue mounting and observed under binocular research microscope. Totally 24 AM fungal species were isolated, only these species such as *Glomus aggregatum, G. fasiculatum, Gigaspora margarita* were dominant. Further study is to be planned for mass cultivation of isolated species.

Key Words: AMF, *Hibiscus cannabinus*, *Glomus*, *Gigaspora.*

INTRODUCTION

Mycorrhizae is a nonpathogenic symbiotic soil fungi which invade on or in the root system of host plant plays a significant role in the solubulization of the plant communities in all terrestrial ecosystem (Smith and read 1997). AMF are widespread in their distribution both among plant species and over geographical area. (Bagyaraj 1991). One major reason for the limited research in AMF is the problems associated with identification and culture of AMF. Deccan hemp or kenaf (*Hibiscus Cannabinus*) is another potential non-ward fiber crop belonging to the family Malvaceae which produces consistently greater yields and is less susceptible and lodging. Kenaf is cultivated for its best fibers which resembles and substitute for jute fibers. The present study has been designed to study the diversity of AMF associated with *Hibiscus Cannabinus* and collected from 3 different localities of Perambalur district, Tamilnadu, India.

MATERIALS AND METHODS

Collection of rhizosphere Soil:

Soil samples were collected from study area of Perambalur district, Tamilnadu, India. Five healthy plants were selected and rhizosphere soil samples were collected at 0-70cm soil depth and stored in sterile container, kept at 5-10°C (Dickson 1984). *Hibiscus Cannabinus* root samples were washed thoroughly to remove soil particles and cut into several small segments and fixed in FAA (Philips and Hayman 1970). Estimation of AM fungal spores (number of spores per sample bag) was carried out using 100gm of soil sample of each study site.

Soil Analysis

Soil samples collected from each study was mixed thoroughly and portion of soil was analysed for pH, $Ec_{Se,}$ N, P, K,Zn,Cu, Mn and Fe (Black *et al 1965*) (olsen *et al* 1954) (Jackson 1973).

Assesment and quantification of AM fungi (Krishna and dart 1984)

$$\text{Percentage of root colonization} = \frac{\text{Total Number of positive segments} \times 100}{\text{Total Number of AM root segments observed}}$$

Isolation and quantification of AM fungal spores and sporocarps was done by –Geredemann and Nicolson 1963).

Identification of AM fungi:

Intact spores were picked from filter paper and mounted--and observed under binocular research microscope. The morphology of spores and sporocarps of AMF using Synoptic keys of (Mortan and Benny 1990) (Schenck and Perez1990 and Walker and Trappe 1993).

RESULT AND DISCUSSION

The present study was undertaken in three different localities from Perambalur district of Tamilnadu, India. The physico chemical characteristics study areas was given in the table 1. High levels of potassium, nitrogen, phosphorous, copper, Manganese were noticed. Totally 24 AM fungal spores were recorded in the range from 54.0-81.0. Generally the soils were nutrient deficient but colonization with AMF with increased availability of nutrients. Our study was correlated with species and colonization of host plants in different cultivated and non-cultivated soils. Similarly (Rajeshkumar.S 2006) reported that AMF distribution is dependent on the host plant and also the influence of certain ecological factors such as C, pH, soil moisture and fertility.

In the present study *Glomus aggregatum, Glomus fasiculatum and Gigaspora margarita* were colonized very specific in the roots of the *Hibiscus Cannabinus.* However, very little information is available regarding their occurrence in the fiber yielding crops. Hence it is necessary to understand the mycorrhizal association and their diversity in fiber yielding crops for the waste management.

CONCLUSION

The present study was clearly highlight that soil edaphic factors favor root colonization and sporulation of AMF associated with the fiber yielding crops. Further study is to be need for proper selection of efficient AM fungi, mass cultivation to improve the growth and development of fiber yielding crops.

Table 1

Physico-chemical characterestics of rhizosphere soils of *Hibiscus cannabinus* from perambalur district

S.NO.	FACTOR	SOIL-1	SOIL-2	SOIL-3
1.	Soil type	Red sandy Loam	Clay loam	Brown clay loam
2.	pH	6.32±0.06	7.06±0.05	7.34±0.05
3.	Ec	1.78±0.04	1.48±0.04	1.18±0.04
4.	Organic Carbon	1.18±0.04	1.28±0.04	1.42±0.04
5.	Available P mg/kg	2.72±0.05	1.84±0.05	3.12±0.04
6.	Available N_2 mg/kg	488.6±3.31	665±4.70	682±4.62
7.	Copper mg/G	7.06±0.05	0.90±0.03	1.18±0.02
8.	Zinc mg/G	1.49±0.01	1.18±0.04	1.30±0.07
9.	Magnesium	2.34±0.05	2.06±0.05	2.13±0.07

S1-S3- Study Sites

Values are represented as Mean±SD

Table 2

Percent Root colonization spore density of AMF associated with *H. cannabinus* (n=5; mean ± SD)

Hibiscus cannabinus

S.No	Study site	Root Colonization	Positive for AMF in root	Total No.of spores in 100g/ml
1.	S1	73 ±0.66	*Glomus fasciculatum*	429±4.0
2.	S2	55±1.16	*Gomus aggregatum*	526±5.1
3.	S3	56±0.86	*Gigaspora margarita*	471±3.32

Table 3Isolation of AMF in rhizosphere soils of the connecting from perambalur Ditrict, TN, India

S.No	List of AM fungi identified	Under	Study Site		
			S1	S2	S3
1.	*Glomus aggregatum*	LAGR	+	+	+
2.	*Glomus ambisporum*	LABS	+	+	-
3.	*Glomus constictum*	LCST	+	+	-
4.	*Glomus desecticole*	LDST	+	-	+
5.	*Glomus geosporum*	LGSP	+	-	-
6.	*Glomus microcarpum*	LMRC	-	+	-
7.	*Glomus macrocarpum*	LMCC	-	+	-
8.	*Glomus mosseae*	LMSS	-	+	+
9.	*Glomus reticulatum*	LRTC	+	+	+
10.	*Glomus occulatum*	LOTM	-	-	+
11.	*Glomus intraradius*	LIRS	-	-	+
12.	*Glomus fasciculatum*	LFSC	+	+	+
13.	*Glomus etunicatum*	LETM	-	-	+
14.	*Sclerocytis pakistarica*	SPSA	+	+	+
15.	*Sclerocytis heterogene*	CHTG	+	+	+
16.	*Scutellospora heterogene*	CPRS	-	-	+
17.	*Scutellospora persica*	CPLC	-	-	+
18.	*Scutellospora verrucosa*	CURC	+	+	+
19.	*Acaulospora scorbiculata*	ASCB	+	+	+
20.	*Acaulospora delegate*	ADLC	+	-	+
21.	*Acaulospora bireticulata*	ABRT	+	+	+
22.	*Acaulospora marrourae*	AMRW	-	+	+
23.	*Entrophosphora colombiane*	ECB	-	+	+
24.	*Gigaspora margaite*	GMRG	+	+	+
‘+’-Present			‘-‘ Absent		

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