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Impact of Va-Mycorrizal Fungi in Plant Growth

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ABSTRACT

Vesicular Arbuscular Mycorthiza (VAM) is a mutualistic symbiotic association between soil inhabiting fungi and the roots of vascular plants. In this association, the host plant supplies photosynthetically derived carbohydrates to the fungus, while the fungus improves the plant's capacity to absorb mineral nutrients, especially phosphorus, from the soil environment.

In the present investigation 50 plant species were collected and analyzed for VAM colorization, spore population and physiochemical characteristics especially nitrogen phosphorus and potassium. However, 10 species of VAM fungi belonging to Glomus, scutellospora and sclerocystics were identified. All mycorafizan fungus infected plants shows increase high growth rate.

Keywords: VAM Fungi, AMF. biofertilizer, symbiotic association, Root colorization

INTRODUCTION

The presence of VAM fungi significantly improves plant growth and biomass, production. This is primarily due to enhanced phosphorus, uptake, improved mineral nutrition, and better physiological functioning. VAM association is particularly beneficial under nutrient deficient coil conditions and contributes to reduced dependence on chemical fertilizers. (Allen, 1991, Smith and Read, 1997)

Experimental observations have shown that mycorrhizal plants exhibit higher growth rates, improved root development and greater adaptability to environmental stress compared to non mycorrhizal plants. This demonstrates the important functional role of VAM fungi in plant productivity (Rhodes and Gendemann, 1975), taxonomy of fungi has been described by Kaushik (2000).

Different generia of VAM fungi such as Glomus, Scutellospore, and Sclerocystis anre commonly associated with plant roots. Among these, Glomus is considered the most dominant genus due to its widespread occurrence and high colonization potential. The potential economic benefit of the enhancement of phosphorus uptake through VAM fungi is found in the work of plecehetta and Morei (1996) Glycine max colorised by the VAM fungus.

The application of VAM fungi has considerable importance in agriculture,horticulture and ecological management. Their utilization promotes sustainable crop production, enhances soil fertility, reduces fertilizerrequirements and supports ecological stability. Thus VAM fungi play a vital role in improving plant growth and maintaining sustainable agricultural systems. Glomus intraradices produced 83% of maximum growth at a solution concentration of 0.110 mg/ml. Non-mycorrhizal plants required 0.148 mg/ml for the some rate of growth. This calculated to a saving of 230 kg P_2Os to the farmer. The percentage of infection is 76%. Then is no clear correlation between potassium content and VAM imfection.

However 10 species of VAM fungi belonging to glomus, Scutellospore and Sclerocystics were identified. the Genus glomus was a forminant number, which can be multiplied in large quantities and inoculated to economically and midecinally important plant like Nasavelia Zeylanica (L) DC. Annona Squamosa L. A Bitilor indicum L, Sweet, Sida, Brun, F. Citrus medica L, Commiphora berrji (Am.) Engl. Cajanus cajar (linn.) Mill and Cyarodon dactylonch) pass seedlings to increae the growth rode and biodiversity of plant.

Table 1- Mycorrhizal infection endogonaceous spore population and physiochemical characteristics of the rhizosphere soil of the some plant species at Saharanpur.

Plant species	VAM Infectgion %	Total VAM spores	pH	Physico- Chemical Characters			
				Ec mm hos/cm^2	N kg/acre	P kg/acre	K kg/acre
Ranunculaceae naravelia zeylanica (L) D.C.	28	389	66	2.2	7.6	8.3	182
Annonaceae Annona reticulate L	52	1179	7.2	3.6	8.9	1.2	203

Annona squamosa L.	59	1562	7.2	2.4	10.2	7.6	231
Artabotrys hexapetatus (L.F.) Bhandari	48	1176	7.5	4.4	15.6	8.2	246
Capparaceae Capparis sepiarie L	--	823	7.2	4.6	12.6	3.6	234
Pittosporaceae Pitioaportum floribundum W &A	42	1182	7.8	6.6	1.8	2.8	272
Polylacaceae	43	1066	8.2	2.3	46.8	12.4	316
Portylace pilosal L.	__	124	8.0	6.4	19.4	10.8	162
Portulaca quadrifude Linn	—	160	7.8	6.6	15.6	8.3	173
Malvaceae Abution undicum (L) Sweet	62	1132	8.3	6.8	18.8	8.6	179
Side acuta Burm.F	65	1443	7.8	4.3	19.6	7.9	232
Side rhombifolia Linn	60	1322	8.2	5.8	18.8	4.4	321
Tilliaceae Grewie pilose W & A	32	656	7.6	8.3	13.6	2.8	292
Greawia villosa Wild	33	862	7.6	8.6	11.6	3.4	284
Elacocarpaceae Elacocarpus tuberculatus, Roxb.	22	1132	7.4	7.8	12.2	1.6	362
Zygophyllaceae Trubulus ferrestris L	40	1061	7.4	2.2	12.8	10.8	321
Geraniaceae Averhoe bilmbi L	42	1410	7.9	4.4	13.6	8.3	232
Oxalis comiculata L	43	979	7.6	7.6	14.2	6.8	191
Rutaceae Citrus Medica L	78	2212	7.2	5.4	15.6	20.8	356
Clausena Dentate (wild) Roemer	62	1856	7.4	5.8	20.6	16.4	320
Toddalie Asiatica (L) Lam.	42	1126	7.6	8.3	10.4	14.3	345
Burseraceae Commiphora berryi (Am.) Engl.	38	889	7.2	2.6	13.6	4.8	322
Commiphora coudata (W&A) Egnl.	36	986	7.8	4.8	11.8	3.8	300

Plant species	VAM Infectgion %	Total VAM spores	pH	Physico- Chemical Characters			
				Ec mm hos/cm^2	N kg/acre	P kg/acre	K kg/acre
Rhamnaceae Culubrine asiatica (Linn.)		802	6.3	1.6	122	4.8	186
Brongn Scutia myrtina (Burm) Kurz		562	6.5	1.8	123	5.2	188
Vitaceae Cayratia redata (Lour) Juss ex Gagn.		1002	6.6	5.6	131	11.2	252
Sapindiaceae Allophylus cobbe (L) Raeusch	55	1066	7.8	8.6	168	20.6	346
Dodonaea viscose N. Jacq.	36	904	7.3	7.9	166	16.4	232
Anacardiaceae Anacardium occidentale L.	32	518	5.6	2.3	172	3.6	298
Moringaceae Moringa olefera Lam Leguminaceae (or)	26	402	6.4	5.9	179	10.3	245

Papillonaceae							
Abrus Precatorius L.	**88**	**2106**	**6.8**	**2.0**	**186**	**26.3**	**423**
Alysicapus monilifer (L) DC	**62**	**1542**	**7.8**	**2.16**	**156**	**24.1**	**266**
Citoria femates L.	**62**	**2226**	**8.6**	**1.63**	**110**	**23.1**	**348**
Cajanus cajan (Linn.) Mill	**73**	**1184**	**7.4**	**2.15**	**88**	**21.2**	**298**
Crotaleria laevigata L.	**56**	**2166**	**6.8**	**6.62**	**44**	**8.6**	**346**
Erythruna suberasa Roxb.	**63**	**1986**	**7.0**	**8.38**	**178**	**23.6**	**422**
Mucuna Pruriens (L) DC.	**56**	**1988**	**7.6**	**1.2**	**176**	**21.1**	**343**
Phaseeolus angularis (Wild)	**79**	**1136**	**7.2**	**1.4**	**162**	**12.3**	**325**
Taphrosia purpurea (F) Pers. Caesalpiniaceae	**86**	**1002**	**6.6**	**2.2**	**136**	**6.3**	**318**
Cassia abusus L.	**76**	**886**	**7.3**	**1.6**	**142**	**24.2**	**319**
Cassia tora L.	**74**	**982**	**6.9**	**2.2**	**157**	**21.6**	**322**
Cassia auriculate L.	**76**	**1564**	**6.6**	**3.8**	**133**	**2.2**	**412**
Cassia siamea Lam.	**68**	**1466**	**6.6**	**4.2**	**143**	**3.5**	**343**
Cassia siamea Lam.	**44**	**884**	**6.0**	**4.3**	**136**	**5.6**	**496**
Commelinaceae Commelina benghalensis L.	**93**	**2062**	**6.9**	**1.6**	**121**	**24.4**	**356**
Commelina difusa Burm. F.	**98**	**1686**	**7.2**	**7.9**	**199**	**23.2**	**322**
Poaceae Chrysopogon fullus. (spreng.) chiov.	**26**	**1122**	**7.8**	**6.8**	**192**	**18.3**	**333**
Cyanodon dactylon (L) Pres.	**34**	**1236**	**6.9**	**3.3**	**198**	**26.6**	**326**

Table 2- VAM Species with unique code

Sl. No.	VAM Species	Code
1.	*Glomus aggregatum*	LAGR
2.	*Glomus fasiculatum*	LFSC
3.	*Glomus maculusum*	LMCL
4.	*Glomus microaggregatum*	LMAG
5.	*Glomus mosseae*	LMSS
6.	*Glomus radiation*	LRTD
7.	*Glomus tentebrosum*	LTNB
8.	*Sclerioeystis pakstanica*	SPKS
9.	*Scutellospora heterogama*	CHTG
10.	*Scutellospora weresubiae*	CWRS

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