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Effect of host plant, cultivation media and inoculants sources on propagation of mycorrhizal fungus *Glomus Mossae*

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Abstract:

Arbuscular mycorrhizal fungi are obligate symbiosis with more than 90 % of vascular plants Propagation of these fungi highly depended on biotic and abiotic factors host plant, nature of cultivation medium and the source of inoculunts which play Key role in successful propagation. In this study we used three hosts plant (millet, sudan grass and corn), three types of soilless media (sand, peat moss, soil and powder corn) and four sources of inoculunts (spore, hypha, fragment of root and fruit body). The study employed at green house conditions according to RCBD design and each treatment was triplicated.

The results showed that the propagation of AM fungi Glomus Mossae was highly depended on three tested factors. Corn plant showed the highest propagation potential as manifested by spores number which gives 20.9 spores/gm soil. The Infection incidence and intensity recorded highest percentage 43.2 % in millet plant. The sand medium showed the highest Glomus Mossae fungi propagation 22.9 spores/ gm soil As compared to soil medium. Root fragment and spore

as inoculation source expressed the highest propagation potential which recorded 54.8 spores/gm and 51.6 spores/ gm respectively.

Key words: mycorrhizal fungus Glomus Mossae

INTRODUCTION

Mycorhiza exactly means fungus root and defines the commonly positive association between the plant root and fungus. These specific fungi colonize plant roots and expand far into the soil, mycorrhizal fungal hypha in the soil is actually extensions of root systems and is more effective in nutrient and water absorption than the roots themselves. More than 90 percent of plant species in natural areas form a symbiotic relationship with the beneficial mycorrhizal fungi (***1997*** ، smith and read), only about 150 species of these fungi are known. mycorrhiza fungi infected a layer of cell called the cortex , found only on relatively young root. In agricultural field soils up to 50 meters of AM hypha per gram of soil have been observed and hyphae can expand more than 9 cm beyond the roots (Nasima, 2005). positive association between the plant root and fungus benefit plant nutrition, growth and survival due to their enhanced exploitation of soil nutrients. These fungi play a key role in nutrient cycling and also protect plants against environmental and cultural stresses. The establishment of AM fungi in the plant root has been shown to reduce the damage caused by soil-borne plant pathogens with the enhancement of resistance in mycorrhizal plants .The plant species must be able to form effective associations with arbusculare mycorrhiza fungi and be dependent on these associations for nutrient exchange. Only some plant families contain species that do not form mycorrhizal association (miyaska, 2003). The typical way of maintaining AM culture is soil-root inoculums .soil sterilized is

the most general medium which is inoculated with pure culture of AM isolate in a living root system (Sharma and et al , ***2000***) .the inoculums produced consists of a mixture of soil, spores , hyphae fragment and infected root pieces, this is production usually takes 3-4 months. This way is most used by the researches. It has a number of problems to production inoculums by this way firstly, very limited amount of inoculums can be produced by this methods, secondly the inoculums are so heavy to transport to the field of its application, thirdly, there is a risk of contamination with other microorganism and the lack of genetic stability under these propagation condition (***1997*** ، smith and read).

For the commercial growth of AM inoculants, a number of strategies has been followed time to time. at this time, two systems are offered soil and soilless technology like soilless technology hydroponic, aeroponic, root organ culture, were developed, soilless system provides production of higher number of spore/cm of infected root. It also reduces the risk of contamination and gives higher fungal propagules so, we aimed to yhis study to evaluate the more potential host plant, soilless type and inoculation source in mass propagation of AM fungus *Glomaus mossae* under green house conditions.

MATERIAL AND METHODS

1- Host plants

The plants host studied in this experiment (millet, sudan grass and corn) were conducted in pots under greenhouse conditions. The plants were chosen because they are economically important used for multiplication of mycorrhiza inoculums.

2- Planting media

The planting media used as a substrate for production of spore of mycorrhiza fungi (sand, peat moss, soil and powder of

cracked corn) these substrate were sterilized with auto cleaving over one hour. The experiment was set up in a completely randomized design each replicate consisted of three plastic pot (25 × 30 cm) used for the production of AMF spore.

3- Source of inoculants

A single spore culture of local isolate of *Glomus mossae* was obtained from directorate of research biofertilizer lab and inoculation sources were separated as (spore suspension, hypha, fragment of mycorrhizal root and fruit body)

Determine Number of Fungi spore

To determine number of spore, 10g of sample was mixed with 100ml of water and the suspension was followed through stacked sieves and collected in beaker 250 ml. Spores were spread on filter paper and number broken and unbroken spores was determine under dissecting microscope.

4- Determine Intensity of infection

Root samples were collected at the end of experiment. AM colonization of root was examined after staining with 0.1% acid fuchsin. Root segments, each approximately 1 cm long, were chosen at random from a stained sample and mounted on microscopic slides , 10 root segments were examined for each treatment. Slide with stained root segments were carefully observed under microscope model motic at 40 magnifications. Per cent root colonization was calculated using following formula:

$$\% \text{ colonization} = \frac{\text{number of colonized root pieces}}{\text{total number of colonized root pieces}} \times 100$$

RESULTS AND DISCUSSION

1-Effect of source of inoculants, host plant and medium plant on number of spore

The number of spore that survived are shown in table (1) a large number of spores were present in corn plant which reached to 20.9 spore /gm soil. On other hand number of spore in Rhizospher sudan grass and Millet plant decrease to 14.1, 18.5 spore/gm soil.

Results of table (1) indicted that source of inoculums as spore give the highest number of spore which reached to 25 spore /gm. since the number of spore was about 1.8 spore /gm in fruit body treatment.

Results presented in this study indicated that planting media increased the number of spore were recorded at powder corn which reached to 22.9 spore /gm soil , while the soil media give the lowest number of spore which reached to 12.4 spore/gm The interaction between host plant as corn plant and planting med in as powder corn give highest number of spore which reached to 29.0 spore/gm when used corn plant with powder corn .

Based on data from table (1) The interaction between corn plant and spore inoculums give highest number of spore which reached to 28.9 spore/g in addition to The data presented in table (1) The interaction between powder corn as planting media with spore as source of inoculums give highest number of spore which reached to 34.6 spore/gm Finley The results showed that highest number which reached to 43.3 spore/gm were obtained from corn plant and powder corn and hypha fragment treatment.

Table (1) Effect of Source of inoculums, Type of host and Planting media on number of spore

Type of host	Planting media	Source of inoculums				Type of host × planting media
		spore	hypha	root	Fruit body	
Millet	sand	27.0	34.0	22.0	5.0	22.0
	peat moss	16.3	14.0	24.0	1.0	13.8
	soil	20.0	3.0	20.0	0.3	10.8
	Powder corn	41.3	37.6	30.3	0.0	27.3
Sudan grass	sand	26.0	33.0	21.0	3.6	20.9
	peat moss	15.3	13.0	23.0	0.3	12.9
	soil	18.0	3.0	19.0	0.3	10.0
	Powder corn	21.0	8.0	21.0	0.0	12.5
Corn	sand	31.0	36.6	24.0	8.0	24.9
	peat moss	20.0	18.0	25.0	2.0	16.2
	soil	23.0	6.0	23.0	2.0	13.5
	Powder corn	41.6	43.3	31.0	0.0	29.0
Source of inoculums		25.0	20.8	23.6	1.8	
						Host
Type of host × source of inoculums	Millet	26.1	22.1	24.0	1.5	18.5
	Sudan grass	20.0	14.2	21.0	1.0	14.1
	Corn	28.9	26.0	25.7	3.0	20.9
						Media
Planting media × source of inoculums	sand	28.0	34.5	22.3	5.5	22.6
	peat moss	17.2	15.0	24.0	1.1	14.3
	soil	20.3	4.0	20.6	0.8	11.4
	Powder corn	34.6	29.6	27.4	0.0	22.9

L.S.D 0.05	**host**	**inoculums**	**media**	**Host×Inoculums**	**Host× media**	**Inoculums × media**	**Host × noculums × media**
	0.42	0.48	0.48	0.84	0.84	0.97	1.68

2-Effect of source of inoculums, type of host and plant media on intensity of infection

The results showed that intensity of infection was increased with millet plant and corn plant which reached to 43.2 % , 42 % respectfully .

Also the results showed the root fragment increase intensity of infection to 54.8 % . results presented in this table indicated that sand media increase than intensity of infection to 54.4 % .

The interaction between millet plant and powder corn increase intensity of infection to 65.9 % , similarly it has been the interaction between millet plant and root fragment give high intensity of infection which reached to 63.3 % .

On other hand the interaction of sand media and hypha fragment give high intensity of infection which reached to 18.6 % , finally the interaction between millet plant and powder corn give high intensity of infection which reached to 91%

Table (2) Effect of Source of inoculums, Type of host and Planting media on intensity of infection

Type of host	Planting media	Source of inoculums				Type of host × planting media
		spore	hypha	root	Fruit body	
Millet	sand	70.0	85.0	51.6	8.3	53.7
	peat moss	19.3	25.0	68.3	5.6	29.5
	soil	40.0	8.3	46.6	0.0	23.7
	Powder corn	91.0	86.0	86.6	0.0	65.9
Sudan grass	sand	65.0	78.3	45.0	5.0	48.3
	peat moss	26.6	20.0	45.0	0.0	22.9
	soil	25.0	7.6	30.0	1.6	16.0
	Powder corn	71.6	21.0	53.3	0.0	36.5
Corn	sand	81.6	81.6	65.0	16.6	61.2
	peat moss	70.0	85.0	51.6	8.3	53.7
	soil	19.3	25.0	68.3	5.6	29.5
	Powder corn	40.0	8.3	46.6	0.0	23.7
Source of inoculums		51.6	44.2	54.8	4.2	
						Host
Type of host × source of inoculums	Millet	55.0	51.0	63.3	3.5	43.2
	Sudan grass	47.0	31.7	43.3	16	30.9
	Corn	52.7	50.0	57.9	7.6	42.0
Media						
Planting media × source of inoculums	sand	72.2	81.6	53.8	10.0	54.4
	peat moss	38.6	43.3	55.0	4.6	35.4
	soil	28.1	13.6	48.3	2.4	23.1
	Powder corn	7.5	38.4	62.2	0.0	42.0

L.S.D 0.05	host	inoculums	media	Host × Inoculums	Host × media	Inoculums × media	Host × Inoculums × media
	1.94	2.24	2.24	3.89	3.89	4.49	7.78

REFERENCES

1. Nasim, G.2005. The role of symbiotic soil fungi in controlling road side erosion and the establishment of plant communities .Cadernode pesquise serie biologia, Vol17 No 1 p119-136 .
2. Miyasaka, S.C.; Hable,M; Friday, J.B and Johnson,E.V.2003.Manual on arbuscular mycorrhizal fungi production and inoculation techniques .soil and crop management
3. Sharma, K.A., sing, C and Akhauri,P.2000.Mass culture of arbuscular mycorrhiza fungi and their role in biotechnology .indian.sci.acad.b66.no(4 and 5)pp223-238.
4. Smith, S.E, and Read, D.J. 1997. Mycorrhizal symbiosis. Academic press, London
5. Kormanik, P.P., Bryan, W.C. & Schultz, R.C.1980. Procedure and equipment for staining large number of plant roots for endomycorrhizal assay. – Canadian Journal of Microbiology 26: 536–538.