INTERNATIONAL JOURNAL OF PLANT PROTECTION
VOLUME 9 | ISSUE 2 | OCTOBER, 2016 | 430-433

● e ISSN-0976-6855 | Visit us : *www.researchjournal.co.in*

IJPP

RESEARCH PAPER

DOI : 10.15740/HAS/IJPP/9.2/430-433

Effect of *Golmus mosseae* on various host to record shoot, root length and plant dry weight

■ P.V. GAWANDE*, D.D.GULDEKAR AND P.S.MORE

Department of Plant Pathology, College of Agriculture (Dr.P.D.K.V.), NAGPUR (M.S.) INDIA

ARITCLE INFO

Received : 23.06.2016
Revised : 11.08.2016
Accepted : 25.08.2016

KEY WORDS :
Glomus mosseae, Guinea grass *(Panicum maximum*), Para grass (*Urochloa mutica*), Napier grass (*Pennisetum purpureum*), Marvel (*Dichanthium annulatum*), Wheat (*Triticum aestivum*), Sorghum (*Sorghum bicolar*), Maize (*Zea mays* L.), Bajara (*Pennisetum typhoideum),* Pea (*Pisum sativum* L.), Shoot, Root length, Plant dry weight

***Corresponding author:**
Email : prem.nath26@yahoo.com

ABSTRACT

Mycorrhizal fungi were species that intimately associate with plant roots forming a symbiotic relationship with the plants providing sugar for fungi and fungi providing nutrients such as phosphorus to the plants. Mycorrhizal fungi accumulate phosphate and transport large quantity of phosphate within their hyphae release to plant cell in root tissue. The present investigation entitled as effect of *Glomus mosseae* on various host to record shoot, root length and plant dry weight was conducted at Plant Pathology Section, College of Agriculture Nagpur, for mass multiplication of VAM ten different host was taken for study such as follows guinea grass *(Panicum maximum*), para grass (*Urochloa mutica*), napier grass (*Pennisetum purpureum*), marvel (*Dichanthium annulatum*), wheat (*Triticum aestivium*), sorghum (*Sorghum bicolar* L.), maize (*Zea mays* L.), bajara (*Pennisetum typhoideum*), pea (*Pisum sativum* L.), uninoculated control. Out of the ten host guinea grass (*Panicum maximum)* responded as most suitable host showing highest shoot length *i.e.* 86.33 cm, root length 38.00 cm and plant dry weight as 3.03 g. It was observed that plants having higher AM colonization showed AM production showing a positive correlation. They not only stimulate AM development but also accelerate root and shoot growth. The plant have longest root length and were highly colonized as compared to control.

How to view point the article : Gawande, P.V., Guldekar, D.D. and More, P.S. (2016). Effect of *Golmus mosseae* on various host to record shoot, root length and plant dry weight. *Internat. J. Plant Protec.*, **9**(2) : 430-433, **DOI : 10.15740/HAS/IJPP/9.2/430-433**.

INTRODUCTION

Vesicular Arbuscular Mycorrhizal fungi are ubiquitous plant root symbionts that can be considered as keystone mutualists in terrestrial ecosystem forming a link between biotic and abiotic components via carbon and nutrient fluexes, that pass between plant and fungi in the soil (Oneill *et al.*, 1995).

The presence of arbuscular mycorrhiza are symbiotic fungi found associated with roots of a wind range variety of plant species. In natural communities approximately 80 per cent of higher plants are obligatorily dependent on fungal associates and 18 per cent typically non-mycorrhizal. Arbuscular mycorrhiza fungi role in symbiotic partnership is provided with a

fine hypal network capable of extending the range of root hairs (Allen, 1991).The fungus receives many benefits including increased nutrient absorption. This means that in the plant world mycorrhizal symbiosis is the rale rather than exception (Harrison, 2005). The fine threads that make up the fungus branch between soil particles grow into decomposing organic matter even explore the shells of dead insects where they find phosphorus and other vital nutrients are passed back to the root of plants.

Vesicular Arbuscular Mycorrhiza allows the fungal symbionts to extent a greater amount of nutrients from the soil such as phosphorus nitrogen, zinc, boron and colonized by arbuscular mycorrhizal fungi benefits plant in a number of ways increased disease resistance, enhanced water relation and increased soil aggeration (Gerdemann, 1975; Hayman, 1982 and Newshan *et al*., 1994).

VAM inoculated plant showed good response in having greater shoot length, biomass and p content (Aggarwal *et al*., 2005). Plant in presence of AM fungi showed increased in term of shoot length, root length, fresh weight and dry weight (Mohd Ayoob *et al*., 2011).

Therefore, the studies were undertaken *in vivo* for the evaluation of suitable hosts for shoot, root length and plant dry weight.

MATERIAL AND METHODS

The present investigation entitled "Effect of *Glomus mosseae* on various host to record shoot, root length and plant dry weight." was carried out *in vivo* at Plant Pathology Section, College of Agriculture, Nagpur during 2013-14.

The following materials, equipments were used for the research work in the Plant Pathology Laboratory, College of Agriculture, Nagpur.

Collection of host crop :

Different types of host crop such as Pea, Jowar, Bajra, Maize and Wheat were collected from local market and Guinea Grass, Para Grass and Napier grass were collected from Nagpur Agriculture College Farm and inoculums of *Glomus mosseae* were collected from Plant Pathology Section, College of Agriculture, Nagpur.

Equipments :

Standard laboratory equipments *viz.*, Scale, hot air oven, digital weighing balance, Pots of size 35×25 cm etc. were used.

Preparation of reagent :

Chemicals like sodium hypochlorite for surface sterilization of seed before sowing were used.

Selection of host plant :

To select the most suitable host plant species *viz.*, sorghum, bajara, maize, wheat, napier, paragrass, marvel, guniea grass, pea were tried for mass production of *Glomus mosseae* similarly traditional substrate (sand : soil) was selected for mass multiplication of *Glomus mosseae.* Pea used as uninoculated control. All host plants were selected on the basis of their suitability to the agro climatic condition of the area having thick root system for sizeable sporulation and colonization.

Pot and potting mixture :

Pots of size 35×25 cm were selected for the experiment. Pots were filled with sand soil (1:3) in the control pots only sand soil mixture raised. The substrates were thoroughly mixed before adding inoculums. A layer of inoculum consisting of AM colonized root pieces and soil containing spores 30/100g was spread over the pot mixture.

Surface disinfection and sowing of seeds :

Healthy seeds of all host plants were surface sterilized with 10 per cent solution of sodium hypochlorite for 1-2 minutes and washed several times with sterilized distilled water to remove sodium hypochlorite before sowing. Seeds were planted directly in the pots. Each treatment with different host was replicated thrice.

Multiplication and maintains of AM fungi :

The pots are regularly watered for maintains and multiplication of AM fungi.

Estimation of shoot, root length and plant dry weight:

Shoot, root length and plant dry weight of host plant *i.e.* guinea grass *(Panicum maximum*), para grass (*Urochloa mutica*), napier grass (*Pennisetum purpureum*), marvel (*Dichanthium annulatum*), wheat (*Triticum aestivum*), sorghum (*Sorghum bicolar* L.), maize (*Zea mays* L.), bajara (*Pennisetum typphodium),*

pea (*Pisum sativum* L.),were calculated at 30, 60, 90 days of plant growth.

RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under the following heads:

Effect of *Glomus mosseae* on shoot length root length and plant dry weight after 30, 60, 90 days of plant growth :

The data given in Table 1 indicate that all the treatments were found to be statistically significant over control after 30 DAP. T_9 found significantly superior followed by T_2, T_1 and T_7. Treatment 9 produces highest shoot length *i.e.* 74 cm and root length 28 cm, plant dry weight 2.43 g, followed by T_2, *i.e.* shoot length 65 cm, root length 25 cm plant dry weight 2.20 g, followed by T_1, shoot length 60 cm, root length 22.00 and plant dry weight 2.03 g. In T_7 shoot length was 48.33 cm, root length 20.33 cm and plant dry weight 1.13 g. The significant difference was observed over the uninoculated control. Lowest shoot and root height and plant dry weight were recorded in control *i.e.* 22.00 cm and 0.35 g, respectively.

The data given in Table 1 revealed that all the treatments were found to be statistically significant over control after 60 DAP. T_9 found to be best treatment as compared to all other treatment. The highest shoot length was recorded in T_9, *i.e.* 80.00 cm, root length was 31.00 cm and plant dry weight was 3.03 g, followed by T_2, shoot length 72.00 cm , root length 28.07cm and plant dry weight was 2.73, followed by T_1, shoot length was 66.00 cm, root length and plant dry weight was 25.00 cm, 2.63 g, respectively. In T_7 shoot length was 55 cm, root length and plant dry weight was 23 cm and 1.60 g, respectively. The lowest shoot length, root length and plant dry weight recorded in uninoculated control *i.e.* 27.33 cm, 15.00 cm and 0.39 g.

The data given in table, evident that all the treatments were found to be statistically significant over control after 90 DAS. All host positively response to shoot and root growth and plant dry weight also. T_9 found significantly superior followed by T_2 and T_1 followed by T_7. The highest shoot length was recorded in T_9. *i e.* 86.33 cm, root length 38.00 cm and plant dry weight 3.03, followed by T_2 shoot length 75.33 cm, root length 34.00 cm and plant dry weight 3.20 g, followed by the T_1 shoot length 68.00 cm, root length 31.00 cm and plant dry weight 3.10 g. whereas in treatment T_7 shoot length 63.67 cm, root length 32.67 cm and plant dry weight 2.2 g was recorded.

Significant difference in shoot length, root length and plant dry weight was observed in uninoculated control. Lowest shoot length, root length and plant dry weight was recorded in control *i.e.* 35.00 cm, 21.00 cm and 0.77 g, respectively.

Similar results were recorded, Davi and Reddy

Table 1 : Effect of *Glomus mosseae* on shoot length, root length and plant dry weight after 30 DAS, 60 DAS and 90 DAS

Treatment no.	Botanical names	Common names	Shoot length (cm)	Root length (cm)	Plant dry weight (g)	Shoot length (cm)	Root length (cm)	Plant dry weight (g)	Shoot length (cm)	Root length (cm)	Plant dry weight (g)
T_1	*Urochloa mutica*	Para grass	60.00	22.00	2.03	66.00	25.00	2.63	68.00	31.00	3.10
T_2	*Pennisetum purpareum*	Napier	65 .00	25.00	2.20	72.00	28.07	2.73	75.33	34.00	3.20
T_3	*Dichanthium annulatum*	Marvel	32.33.	17.00	1.33	40.00	19.00	1.57	44.00	25.67	2.23
T_4	*Pisum sativum*	Pea	26.00	14.67	0.39	30.00	16.00	0.48	42.00	22.33	0.87
T_5	*Sorghum bicolor* (L.) Monech	Sorghum	34.00	15.00	0.41	40.00	18.00	0.57	45.67	26.00	0.92
T_6	*Pennisetum typhoideum*	Bajra	40.33	18.33	0.48	44.00	21.00	0.65	51.00	29.00	0.97
T_7	*Zea mays*	Maize	48.33	20.33	1.13	55.00	23.00	1.60	63.67	32.67	2.2
T_8	*Triticum aestivum*	Wheat	31.00	12.67	0.40	36.00	16.67	0.52	40.00	23.67	0.64
T_9	*Panicum maximum*	Guinea grass	74.00	28.00	2.43	80.00	31.00	3.03	86.33	38.00	3.30
T_{10}	*Pisum sativum*	Control	22.00	12.33	0.35	27.33	15.00	0.39	35.00	21.00	0.77
	F test	-	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
	S.E.±	-	0.33	0.66	0.35	0.44	0.39	0.44	0.45	0.59	0.31
	C.D.(P=0.05)	-	0.98	1.96	1.03	1.31	1.12	1.32	1.35	1.75	0.94

(2001). After VAM inoculation significant increase in mycorrhizal colonization, number of nodules, *i.e.* fresh and dry weight, length of root and shoot as compared to single inoculation or uninoculated control. Manimegalai *et al.* (2011); Varalaxmi *et al.* (2009); Ojha *et al*. (2008) and Tehmina *et al.* (2006).

REFERENCES

Aggarwal, A., Prakash, V., Sharma, D. and Sharma, S. (2005). Vesicular *Arbuscular mycorrhizal* (VAM) aids in growth of *Prosopis juliflora* and *Tecomella undulata* in arid/ semi arid climate. *J. Mycol. Pl. Pathol.,* **35** (1) : 184-187.

Allen, M.F. (1991). *The ecology of mycorrhiza Cambridge University.* Press, Combridge : 1- 33pp.

Davi, C.M. and Reddy, M.N. (2001). Growth response of groundnut to VAM fungus and Rhizobium inoculation. *Pl. Pathol. Bull.,* **10** : 71-78.

Gerdemann, J.W. (1975). VAM fungi in J.G, D. T. Clarkson. The development and functions of roots Academic Press, pp. 541 - 575, LONDON, U.S.A.

Harrison, M.J. (2005). Signaling in the arbuscular mycorrhizal symbiosis. *The Annual Review of Microbiolal,* **59** : 19 – 42.

Hayman, D.S. (1982). *Partial aspect of VAM advance in agriculture microbiology.* Oxford and IBH Publishing Co. Pvt. Ltd., pp.325 - 373, NEW DELHI, INDIA.

Manimegalai, V., Selvaraj, T. and Ambikapathy, V. (2011). Studies on isolation and identification of VAM fungi in *Solanum viarum* Dunal of Medicinal plants. *Adv. Appl. Sci. Res.,* **2** (4) : 621 – 628.

Mohd, Ayoob, Aziz, Irfan and Jite, P. Kaur (2011). Interaction effects of arbuscular mycorrhizal fungi and different phosphate levels on growth performance of *Catharanthus roseus* Linn. *Sci. Biol.,* **3** (3): 75-79.

Newsham, K.K., Fiter, A.H. and Watkinson, A.R. (1994). Root pathogenic and arbuscular mycorrhizal fungi determine fecundity of a systematic plants in field. *J. Ecol.,* **82** : 805 - 814.

Ojha, S., Chakraborty, M.R., Dutta, S. and Chatterjee, N.C. (2008). Infuence of VAM on nutrient uptake and growth of custard apple. *Asian J. Exp. Sci.,* **22** : (3) 221-224.

Oneill, E.G., O,neill, R.V. and Norby, R.J. (1995). Hieranchry theory as a guide to mycorrhizal research on large scale problems. *Environ. Pollu.,* **73** : 271-284.

Tehmina, A., Javid, A. and Shah, M.B. M. (2006). Correlation between plant growth and arbuscular mycorrhizal colonization in some rainy season grasses. *Pak. J. Bot.,* **38** (3): 843-849.18.

Varalaxmi, S., Reddy, S.V., Bhadraih, B. and Manoharachary, C. (2009). Response of growth, biomass and nutrient uptake in *Monordica charantia* to *Glomus fasciculatum*. *J. Mycol. Pl. Pathol.,* **39** : (2) 247.