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THE EFFECT OF AM FUNGAL SPECIES *GLOMUS FASCICULATUM* ON GROWTH OF MEDICINAL HERB *ANDROGRAPHIS PANICULATA*

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ABSTRACT

The present study is about the isolation of Arbuscular Mycorrhizal (AM) fungal spores *Glomus fasciculatum* and inoculated in the seedlings of sterilized soil and unsterilized soil. Analyse the growth- shoot length, root length and biomass-seedling dry weight of *Andrographis paniculata* (Burm.f.) wallich ex Nees (Acanthaceae) due to the effect of AM fungal species *Glomus fasciculatum* at 20, 40 and 60 days interval at three different treatment like control, sterilized soil + VAM and unsterilized soil + VAM. The result is, in all the treatment seedling growth and biomass higher in unsterilized soil+VAM treated plant.

KEYWORDS: *Andrographis paniculata*, *Glomus fasciculatum*, Sterilized soil, unsterilized soil

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INTRODUCTION

Biofertilizers are the microbes, which provide nutrients to the plants for their growth through biological processes. Such microbes either in their independent active state or in a symbiotic association with the plants synthesize certain nutrients good for the plant growth or else they help in the uptake of the non-available nutrients. Mycorrhizae are one such symbiotic association between plant and fungi (Ramgopal *et al*., 2004).

The application of vesicular arbuscular mycorrhizal fungi to forest tree species is highly economical (Lee Tacon *et al*., 1988; Grove and Le Tacon, 1993). Plants colonized by mycorhizal fungi are better adopted to withstand drought in the nursery and field by phosphorous mediated system. VAM association helps the host plant by augmenting disease resistance and improving the structure of the soil (Bagyaraj *et al*., 1979; Vijayakumar, 2000).

The majority of terrestrial plants under natural conditions form arbuscular mycorrhizal (AM) symbiosis (Smith and Read, 1977; Trappe, 1987). AM fungi play an important role in determining the plant biodiversity and species composition in terrestrial ecosystems (Vander Heijden *et al*., 1998) and a functional ecosystem composed of a high biodiversity is not possible without AM fungi (Miller and Jastrow, 1992). Plants infected with AM fungi get more easily established on disturbed sites through improved mineral nutrition (Shiffestin and Medve, 1979) and provide a primary mechanism for phosphorus uptake from the soil (Hayman, 1982).

MATERIALS AND METHODS

Glomus fasciculatum VAM fungal spores are isolated from soil samples by the wet-seiving and decanting method (Gerdemann and Nicolson, 1963). Based upon microscopic characters, the VAM spores were identified. For identification and nomenclature, synoptic keys of the following authors were used: Raman and Mohankumar (1998).

AM fungal inoculum preparation

Onion plants were used as host for AM fungal inoculum preparation. Among the AM fungi identified the *Glomus fasciculatum* was selected for inoculum production. The rhizosphere soil of pots and cut off roots of onion plants were inoculated to the polythene bags as source of *Glomus fasciculatum* for the

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growth of *Andrographis paniculata*, the spores of *Gl. fasciculatum* and the infected roots of onion was collected in the polythene bags and the spores viability test was made by using AN and Hendrix (1988).

Glasshouse experiment

The *Andrographis paniculata* seeds were washed and surface sterilized with 30% H_2O_2 for 15 min. and thoroughly washed with distilled water for 3 times. The seeds were sown in seed pans with soil-sand mixture and transferred to earthen pots. After 15 days 1g soil inoculum with spores of *Gl. fasciculatum* and root fragments were inoculated in the seedlings of sterilized soil and unsterilized soils. Control was maintained and also replication was maintained for each treatment.

Biomass and phenology of the plants

At 20, 40, 60 days the growth parameters such as root and shoot lengths dry weights were measured.

RESULT AND DISCUSSION

The morphological growth parameters such as root and shoot lengths and dry weight of the seedlings of age old series as influenced by AM inoculation are given in the table. The morphological growth parameters were also improved according to the increase of age of the seedlings. In a similar fashion the AM inoculated unsterilized soil increased the root and shoot length and dry weight of the seedlings in all age old seedlings. The control soil has the poor response over the growth of the seedlings of *Andrographis paniculata*.

From the results of the study it is clearly known that AM fungal spore inoculation improved the growth of *Andrographis paniculata* compared to the uninoculated plant species. Maximum percentage of AM colonization and AM propagules were found in unsterilized soil with mycorrhizal inoculated plant in comparison to sterilized soil with mycorrhizal species and control.

The percecent infection of *Glomus sp.* was increased significantly in unsterilized soil than that of sterilized and control soils. Root length increased significantly in *Glomus fasciculatum* inoculated with unsterilized soil sample plants over the sterilized and control , the same trend of results were obtained in shoot length also. In the present study most of the plant species were found to be associated with *Glomus species*.

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There was no consistent correlation between the sporulation and root infection, as reported by Kheri *et al.* (1987) who studied the occurrence and intensity of AM in different plants. In the present study the plant height, root length, root and shoot dry weights were significantly higher in unsterilized soil plants inoculated with *Gl. fasciculatum* and control.

Table: 1 Changes in Morphological growth parameters and biomass in the seedlings of the *Andrographis paniculata* influenced by *Glomus fasciculatum*.

S. No	Biomass	20 Days		
		Control	Sterilized soil +VAM	Unsterilized soil +VAM
1	Shoot length(cm)	10.1±0.12	11.1±0.12	13.2±0.16
2.	Root length(cm)	5.3±0.41	6.0±0.16	7.2±0.16
3.	Seedling Dry Weight(g)	0.18	0.321	0.455

S. No	Biomass	40 Days		
		Control	Sterilized soil +VAM	Unsterilized soil +VAM
1	Shoot length(cm)	36.1±0.124	37.6±0.163	51±0.816
2.	Root length(cm)	11±0.081	16±0.12	22.1±0.08
3.	Seedling Dry Weight(g)	0.612	1.574	2.543

S. No	Biomass	60 Days		
		Control	Sterilized soil +VAM	Unsterilized soil +VAM
1	Shoot length(cm)	41.3±0.471	43±0.816	57.6±0.012
2.	Root length(cm)	13±0.08	23±0.816	25±0.014
3.	Seedling Dry Weight(g)	0.979	1.693	2.677

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