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IMPROVEMENT OF BIOMASS YIELD OF *TERMINALIA ARJUNA* L. THROUGH VESICULAR ARBUSCULAR MYCORRHIZAL FUNGI (*GLOMUS FASCICULATUM*) UNDER NURSERY AND FIELD CONDITION

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Present study carried out to assess the impact of indigenous VAM fungi on *Terminalia arjuna* showed that VAM fungi increased the biomass yields i.e. stem height, number of leaves and basal area within a period of 270 days. The plant inoculated either with inoculum of *Glomus fasciculatum* or with mixed VAM fungi did not differ significantly. It appears that *Glomus fasciculatum* could compete with other VAM forms present in mixed inoculum and establish an effective relationship with *Terminalia arjuna.*

Keywords: Biomass; Field; Nursery; *Terminalia arjuna;* VAM.

Introduction

Terminalia arjuna is a common tree found in dry tropical forest and is used in 'tussar' culture. It has several medicinal uses, is lopper for fodder, and is also used to shade avenues. Many commercially important hard wood forest trees are naturally infected with VA endophytes. However, little work has been done to improve seedling quality in forest trees nurseries by manipulation of these fungi and understand, levels of root colonization before transplanting. Adequate root colonization by VAM fungi in natural and artificially inoculated soils is of paramount importance in improving seedling vigour and it proves a useful index to predict the performance of seedling in artificial regeneration programmes in different stresses and agriculturally unproductive site. VAM fungi are known to increase the biomass in many forest trees[1-4], by providing enough phosphorus[5-7]. The present study was undertaken to assess the impact of mixed VAMF population and *Glomus fasciculatum* selectively on biomass yield of *Terminalia arjuna* in nursery and field condition.

Material and Methods

Terminalia arjuna seedling were raised in polythene bags (15 x 22 cm 200 gauge) filled with thoroughly sieved sterlized soil. Seeds were soaked in water for 12 days at room temperature both to break the dormancy and also to soften the hardseed coat. The seeds were surface sterlized by 0.05% sodium hypochlorite by 15 minute and rinsed with sterile distilled water[8]. Seeds were sown about 1.5 cm deep in the soil in the month of March and regularly watered and weeded. VAM inoculum (300 VAM spores/seed) was done by placing the inoculum 2 cm below the seed in the polythene bag filled with sterilized soil. The experiments were performed with the following treatments :

C : Soil, uninoculated control

T_1 : Soil + VAM_1 (*Glomus fasciculatum)* alone;

T_2 : Soil + VAM_2 (Mixed VAM Fungi). The percentage of different VAM Fungi in inoculum are as follows : *Glomus fasciculatum* - 20%; *Glomus mosseae* - 30%; *Glomus* sp. - 20%; *Gigaspora* sp. - 15%;

Table 1. Impact of VAM fungi on shoot height, number of leaves and basal area of *Terminalia arjuna*.

Treatment	Number of days	Observation after sowing in the month of March: Average Height (in cm)	Average Number of Leaves	Average Basal Area (in cm^2)	Percentage infectivity
C	30	8.6	6.8	0.053	-
	150	25.6	21.3	0.071	2
	270	55.6	22.7	1.101	5
T_1	30	12.6	11.5	0.091	45
	150	42.3	34.3	0.125	65
	270	116.8	40.7	1.131	75
T_2	30	11.5	10.2	0.081	35
	150	38.6	33.9	0.088	45
	270	109.8	38.9	1.121	64
T_3	30	10.9	9.3	0.079	30
	150	37.5	31.5	0.086	45
	270	99.4	35.7	1.120	54
T_4	30	9.9	9.1	0.074	29
	150	35.5	30.9	0.083	35
	270	98.3	34.9	1.113	49
T_5	30	7.3	6.5	0.071	1
	150	25.5	23.5	0.081	8
	270	55.9	28.0	1.107	10

Average of 10 plants.

Acaulospora and other unidentified forms - 15%.

T_3 : Soil : Sand (1:1) + VAM_1

T_4 : Soil : Sand (1:1) + VAM_2

T_5 : Soil : Sand (1:1)

10 plants were grown on each treatment. After 3 months seedlings were transplanted in experimental field. They were provided normal condition for growth. The biomass of different treated plants were determined by measuring their height, basal area as well as counting their leaves. The increase in total biomass were calculated on the basis of these readings. Spore density was estimated by the method of Gerdemann and Nicolson[9]. Root samples collected were gently cleared under tap water and stained according to technique of Phillips and Hayman[10], percentage of infectivity in roots was assessed using the grid line intersect method[11].

Results and Discussion

It is evident from Table 1 that the plant biomass i.e. stem height, number of leaves and basal area increased with increase of plant age in different treatment of *Terminalia arjuna*. However, the increase was more prominent in VAM (*Glomus fasciculatum*) inoculated plants. Maximum increase in mean height of shoot, number of leaves and basal area in Treatment

T_1 followed by T_2, T_3, T_4, T_5 and control. The percentage of infection was also found in same trend.

The effect of inoculation of VAM either alone or in combination was distinctly superior over uninoculated control[12-13]. Dual inoculation shows synergistic effects on shoot height, leaves and basal area. The host microbial interaction was found better in dual inoculated plants. t-test analysis shows that inoculating VAMF in *Terminalia arjuna* increase biomass production.

On the basis of the data presented here it can be concluded that application of VAMF increase height, leaves and basal area in *T. arjuna.* Since no significant difference in biomass resulted from application of *Glomus fasciculatum* and mixed VAM fungi. It appears that the *Glomus fasciculatum* even in presence of other VAM fungi is as efficient in increasing biomass production as that of *Glomus fasciculatum.* Thus, inoculation of *Glomus fasciculatum* in *Terminalia arjuna* can increase biomass yield in field condition. Finally, *Glomus fasciculatum* fungi was the best source of biofertilizer for the better biomass production of *Terminalia arjuna.* Hence, this VAM inoculation technology will be useful in successful afforestation and waste land development programmes in tropical countries.

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