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SELECTION OF AN EFFICIENT AM FUNGI FOR *SORGHUM BIOCOLOR* L. (MOENCH)

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ABSTRACT

An efficient AM fungi for *Sorghum biocolor* L. (Moench) were assessed in pot experiment. *Sorghum biocolor* was grown in pots inoculated with spores of AM fungi like *Acaulospora scrobiculata, Glomus mosseae, Glomus fasciculaturm, Glomus intraradices* and *Gigaspora margarita*. Plants with different treatment of AM fungi were evaluated for AM fungi spores' number, percentage of colonization, biomass, soot and root length and biochemical parameters after 90 days of showing. The results showed that *Glomus fasciculatum* and *Acaulospora scrobiculata* had significantly increased in growth of *Sorghum biocolor* when compared with other treatment and also control.

KEYWORDS: AM fungi, *Sorghum biocolor.*

INTRODUCTION

Microorganisms are part of the soil biota and affect many ecological processes, such as decomposition rate, nitrogen (N) fixation, nutrient cycling and solubilization of insoluble phosphate, mobilization of nutrients, directly contributing to productivity and functioning of agricultural ecosystems.

Mycorrhizae, a term describing a range of mutualistic associations between soil fungi and plant roots is no doubt he most frequent example of compatibility between plant and the microbes. Susceptibility of plants to parasites is considered a relatively rare phenomenon in

nature; however a striking exception to this rule is presented by mycorrhizial associations. The arbuscular mycorrhizal fungi (AMF) are one of the most important groups in the soil and in the rhizosphere (Smith and Read., 2008). Factors like soil management and edaphic and climatic conditions are more determining to the plant development than the fungus species specificity, which makes evident the importance of evaluating AMF root colonization capacity under different soil managements.

AMF are beneficial for the whole plant community, because their uptake of nutrients and water from the soil, and transport them to the colonized plant roots during the exchange of acquired compounds with their host, and the host offers protection and supplied photo assimilates to the AMF (Auge *et al*., 2001).

MATERIALS AND METHODS

Spores of AM fungi was isolated from the rhizosphere soil of agricultural plants from, Thiruvarur District Tamil Nadu, India. They were mass multiplied and identified according the method by Ferguson and Woodhead (1984).

In pot experiments, *Sorghum bicolor* was grown in sterilized soil with low nutrients fertility in a greenhouse for 90 days. The soil was autoclaved twice for two hours at 123°C at 1.3 atmospheres (Antunes and Cardoso, 1991). The *Sorghum biocolor* seeds were sterilized for 15 minutes with hydrogen peroxide (H_2O_5) (Sreenivasa *et al*., 1993). Whereas, sterilized *Sorghum biocolor* seeds were sown in sterile soil containing pots. Plants were inoculated with five native AM mycorrhizal fungi like *Acaulospora scrobiculata, Glomus mosseae, Glomus fasciculaturm, Glomus intraradices* and *Gigaspora margarita* sepáratele accordingly to the procedure described by Nielsen and Jensen (1983). *Sorghum biocolor* seeds were sown above the layer of the inoculum, 5 cm below the soil surface. Three plants were grown in each pot and maintained triplicates. Untreated plants containing pots considered as control. Plants were maintained in green house for 90 days.

Plants were taken from the pots after 90 days. The percentage of infection in their roots was evaluated after dying with Trypan blue (Krishna and Bagyaraj, 1982) by estimating the percent root colonization. Per cent root infection was estimated by the fromula:

$$\% \text{ of infection} = \frac{\text{No. of intersections with arbuscular infections}}{\text{Total number of intersections counted}} \times 100$$

The length, fresh and dry biomass of shoot and roots were measured. And also estimate total chlorophyll (MacKinney's method, 1941), total carbohydrates (Dubois *et al.,* 1956), total proteins (Lowry *et al.*, 1951) and total aminoacids (Jayaraman, 1981).

RESULTS AND DISCUSSION

In the present study five dominant native AM fungal species were used for this study which were isolated and identified from the rhizosphere soil of plants collected from agricultural soil. Isolated spores of AM fungus were used as the inoculum for this pot culture experiments. Spores of AM fungi such as *Acaulospora scrobiculata, Glomus mosseae, Glomus fasciculaturm, Glomus intraradices* and *Gigaspora margarita*as were selected.

In current study, the growing plants were treated with AM fungal spores individually and uninoculated pot were maintained as control. At the end of plant growth (90 days) to analyze what difference between inoculated and uninoculated plants in biomass, metabolities, AM fungal infection and spore count. Table 2 illustrate fresh and dry biomass of shoot, root and shoot and root length were measured in treated plants with control plants. The tables clearly scrutinize *Glomus fasciculatum* and Acaulospora scrobiculata as more effective strain as compared to other treated plants. These parameters were least in uninoculated control plants. The results were correlated with the findings of Bolanduazar, 2009 and Shind *et.al.,* 2013. The mean plant height of AM onion (dual inoculation) was 50 %increase with control.

The primary metabolites were analysed in all the treated plants and control plants, *Glomus fasciculatum* treated plants shows highly significance values of total chlorophyll (13.40±0.58), total carbohydrate (7.73±0.12), total protein (33.53±2.77) and total aminoacid (7.73±0.25) and as simultaneous *Acaulospora scrobiculata*>*Gigaspora margarita*>*Glomus mossaea*>*Glomus intrardices*> control. The data were maintained in graphical represention as Fig 1. Evidently, Priyadarshini, (2012) demonstrated that AM colonization in plants enhance the total chlorophyll contained in leaf.

The spore density and AMF root colonization significantly differ in five treatments, pointing out that*G. fasciculatum* had higher spore density and AMF root colonization (Table 3). Mycorrhizal root colonization depends on several factors and among them, root infection by external hyphae, the most relevant process for plant colonization. This colonization generally occurs, when there are favorable soil conditions. The plowing that the soil was submitted

under nutrients unbalanced the fungal system, breaking the hyphal net, decreasing the inoculums potential of AMF and consequently, its colonization (Alguacil *et al*., 2008).

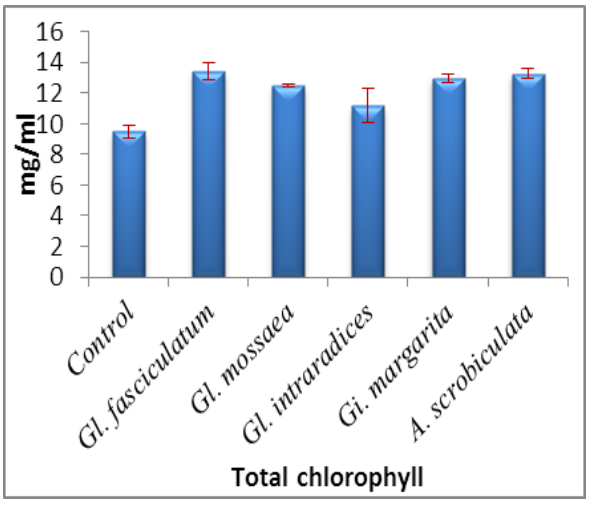
From the present study, it is concluded that the inoculation of *Sorghum bicolocur* with AM fungi can become a great boon to the agriculturists in minimizing the requirement of Phosphate fertilizer in maize grass cultivation.

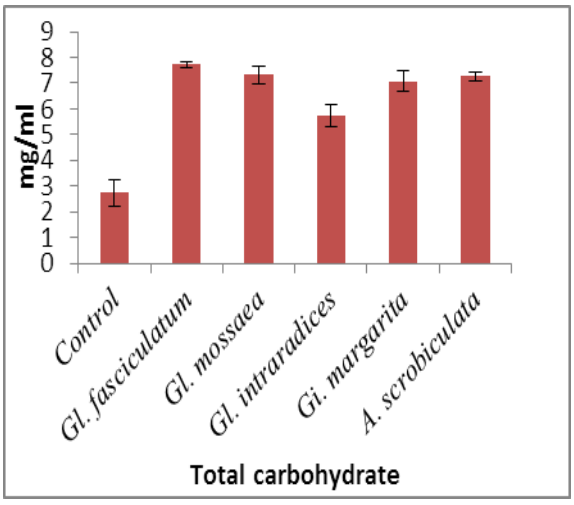
Table 1: Effect of AM fungi on Morphometeric analysis corn.

Morphology	Shoot height (cm)	Root height cm	Shoot fresh weight	Shoot dry weight	Root fresh weight	Root dry weight
Control	53.67±5.89	14.00±0.58	2.40±0.68	1.03±0.03	2.80±0.38	0.70±0.25
Glomus fasciculatum	75.00±4.04	22.00±0.58	7.10±0.12	3.03±0.03	4.83±0.12	1.90±0.06
Glomus mossaea	69.33±1.45	18.00±0.58	6.13±.74	2.67±0.34	4.77±0.45	1.40±0.26
Glomus intraradices	65.33±6.12	18.33±0.33	5.53±0.28	2.47±0.34	4.43±0.38	0.93±0.09
Gigaspora margarita	62.67±1.45	20.67±0.68	6.73±0.20	2.77±0.18	4.00±0.10	1.63±0.19
Acaulospora scrobiculata	72.67±1.45	21.67±2.03	6.77±0.83	3.13±0.16	4.97±0.12	1.67±0.20

Table 2: Mass multiplication of AM fungi in Sorghum bicolour.

Treatment	% of AM Root Infection	No. of Spores in 100g soil
Control	-	-
Glomus fasciculatum	82	512±1.78
Glomus mossaea	69	408±1.18
Glomus intraradices	53	271±0.18
Gigaspora margarita	73	339±1.18
Acaulospora scrobiculata	79	389±1.09





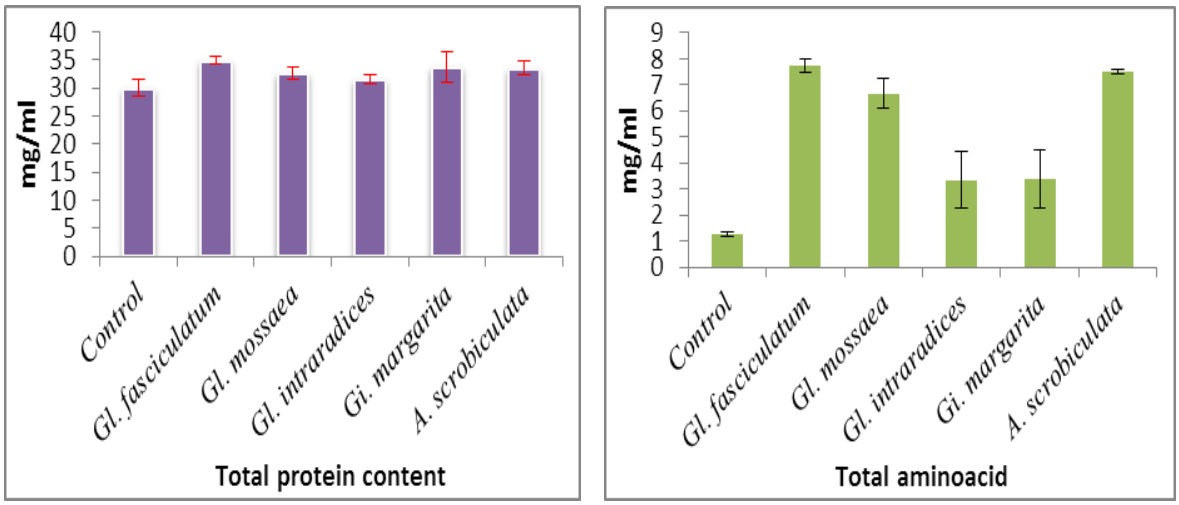


Fig 1: Estimation of metabolites in *Sorghum bicolour* leaf.

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