



INFLUENCE OF ARBUSCULAR MYCORRHIZAE ON GROWTH OF *TEPHROSIA PURPUREA* (L.) PERS.

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Abstract:

The potential for arbuscular mycorrhizal fungi (AMF) to influence the host species depends on their affinities and effect. In the present investigation *Acaulospora delicata*, *Glomus dimorphicum*, *Glomus fasciculatum*, *Glomus geosporum* were evaluated for their influence in improving the growth performance of *Tephrosia purpurea* Pers. After 45 and 90 days of inoculated plants showed better growth responses over control plants. The maximum mycorrhizal effect on experimental plants was observed by the *Acaulospora delicata* and *Glomus dimorphicum* in increasing height, biomass, AM spore number and percent root colonization.

Key Words: *Arbuscular Mycorrhizal fungi*, *Tephrosia purpurea*, *Acaulospora delicata*, *Inoculum*.

Introduction

The genus *Tephrosia purpurea* (L.) or Sarpunkha is a wild legume, grows throughout India belonging to family Leguminosae (Sub family- Papilionaceae).

Microorganisms are present in great number near the fine feeder roots of most of the plant species and they play vital role in numerous physiological processes. These microbial processes are symbiosis. The most widespread symbiosis of plants is the mycorrhizal association between root-inhabiting fungi and the feeder roots (Marx, 1997), K. Sambandan, 2014).

Mycorrhiza refers to an association or symbiosis between plants and fungi colonize the cortical tissue of roots during periods of active plant growth. AM fungi belonging to the phylum Glomeromycota are vital components of almost all land ecosystems. Frank (1885) coined the term "Mycorrhiza", VAM which is an obligatory parasite belonging to the order Glomales (Morton and Benny, 1990). It enhances productivity of cereals, pulses, oil seed, vegetables and ornamental plants (Boddington and Dodd, 2000). AM fungal inoculation showed better performance in total seedling biomass and P uptake in plant species (Bukhari and Rodrigues, 2008), (Kumar and Aggarwal, 2009).

In the present study analysis has been made to see the effect of AM fungi *Acaulospora delicata*, *Glomus dimorphicum*, *Glomus fasciculatum* and *Glomus geosporum* on different growth parameters of *Tephrosia purpurea* after 45 and 90 days of inoculation.

Materials and Methods

Study site:

The study was undertaken in polyhouse of Department of Botany and Recognised Research Lab. Dahiwadi College Dahiwadi affiliated to Shivaaji University, Kolhapur (M.S.) India. Located at 17° 40' N 74° 30' E. The climate is an inland of Maharashtra. The temperature has a relatively high range between 15° C to 45° C. Maximum temperature exceeds 40°. Every summer and typically ranges between 38 to 45 ° C. It receives very little rainfall from June to September and is considered as a drought prone place by the government. Sometimes there is no rainfall during rainy season. The winter temperatures are significantly higher and humidity is low in this season.

Sample Collection and Processing:

Soil samples from the root zone of *Tephrosia purpurea* were collected to a depth of 5.30 cm. The soil samples were wet-sieved for spores using the technique of Gerdemann and Nicolson (1963) and quantification of AM spores was done by grid line intersect method (Adholeya and Gaur, 1994). Root samples were rinsed with tap water and cut into 1 cm pieces and performed with trypan blue according to rapid clearing and staining method of Philips and Haymann (1970). The percent AM root colonization was calculated by using the following formula.

$$\text{Percent AM root Colonization} = \frac{\text{Total no of root segments colonized}}{\text{Total no of root segments examined}} \times 100$$

Mass Multiplication and inoculation of AM spores:

Dominant AM spores are *Acaulospora delicata*, *Glomus dimorphicum*, *Glomus fasciculatum* and *Glomus geosporum* isolated from rhizosphere of *T. purpurea*, were mass produced by funnel technique (Menge and Timmer, 1982) using maize as host. Seedlings of *T. purpurea* were grown in earthen pots (size 25 ×25) under polyhouse conditions in sterilized soil. To each pot 10% inoculum of AM fungi was added. The effect of different treatments was recorded after 45 days and 90 days of inoculations on various growth parameters. Roots and shoots were harvested and weighted separately for their fresh weight and oven dried to 70°C for dry weight.

Results and Discussions:

T. purpurea plant grown in the presence of AM fungi showed a general increase in plant

height, shoot biomass (fresh and dry), root biomass (fresh and dry), mycorrhizal parameters like percent colonization and spore number as those grown in soils without AM fungus (Table 1, 2). AM inoculation significantly increased the shoot length of *T. purpurea* after 45 days and 90 days increase shoot length was maximum in inoculation of AM fungi *G. dimorphicum* and *A. delicata* (Table1, 2). This shows the efficacy of AM fungi on growth of *T. purpurea*. Vaingankar and Rodrigues highlighted shoot and root biomass (fresh and dry), plant height was greatly affected by *G. intraradices* during the initial stages of growth, such positive effects of mycorrhizal inoculation on plant height were also observed by Long et al., (2010). Reena and Bagyaraj (1990) have reported that the present root colonization and AM spore count were increased by inoculation of AM fungi.

Table -1. Influence of Arbuscular mycorrhizal fungi on plant growth performance of *T. purpurea* after 45 days.

Treatments	Change in height cm	Fresh shoot weight gm	Dry shoot weight gm	Fresh root weight gm	Dry root weight gm	AM spore number /20 gm	Colonization %
C	10.03	0.29	0.03	0.33	0.02	25	9.83
T1	18.60	0.65	0.06	0.53	0.04	54	92
T2	18.80	0.68	0.07	0.58	0.05	57	95
T3	15.60	0.60	0.05	0.41	0.05	51	82
T4	16.30	0.55	0.06	0.53	0.04	53	70

*C - control, T1- *A. delicata*, T2- *G. dimorphicum*, T3- *G. fasciculatum* and T4- *G. geosporum*.

Fig1. Influence of Arbuscular mycorrhizal fungi on plant growth parameters – AM spore number/20gm and percent colonization of *T. purpurea* after 45 days

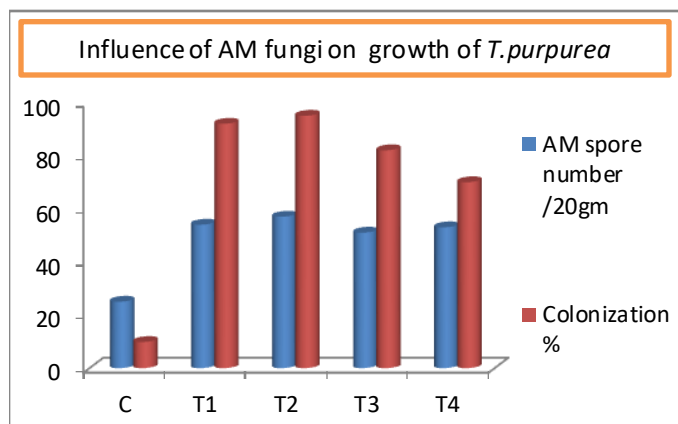


Table -2. Influence of Arbuscular mycorrhizal fungi on plant growth performance of *T. purpurea* after 90 days.

Treatments	Change in height cm	Fresh shoot weight gm	Dry shoot weight gm	Fresh root weight gm	Dry root weight gm	AM spore number/20 gm	Colonization %
C	20.97	1.14	0.14	0.42	0.17	53	10
T1	54.97	1.52	0.38	0.83	0.22	88	90
T2	62.10	2.06	1.27	0.85	0.23	94	96
	41.40	1.68	0.49	0.81	0.30	59	63
	41.97	1.52	1.52	0.83	0.22	94	88

*C- control, T1- *A. delicata*, T2- *G. dimorphicum*, T3- *G. fasciculatum* and T4- *G. geosporum*.

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