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Growth response of various types of arbuscular mycorrhizal (am) fungal inoculation in *Abelmoschus esculentus* W. & A.

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SUMMARY

Arbuscular mycorrhizal (AM) fungi play an important role in the improvement of plant growth. They are vital for the uptake and accumulation of ions from the soil and their translocation to the hosts because of their high metabolic rate and strategically diffuse distribution in the upper soil layers. The fungus serves as a highly efficient extension of the host root system. Minerals like N, P, K, Ca, S, Zn, Cu, and Sr are absorbed from the soil by arbuscular mycorrhizal fungi and are translocated to the host plant. The increased uptake of nutrients especially phosphorus is of particular importance because it is often correlated with improved growth of mycorrhizal plants. Present study represents an attempt to study the growth responses of selected arbuscular mycorrhizal fungal species on growth and biomass of *Abelmoschus esculentus.* Inoculation with different arbuscular mycorrhizal fungal species had varied effects on stem girth, leaf length, leaf area, leaf number, shoot and, root fresh and dry weights and total plant biomass. Similarly the number of pods, pod length, pod fresh and dry weights were also found to be more in the AM inoculated plants. Maximum plant biomass (1.71 g) was observed in plants inoculated with mixed inoculum (*Glomus bagyarajii* + *Glomus fasciculatum* + *Glomus geosporum),* and was least (0.56 g) in uninoculated control plants. Mycorrhizal efficiency index (MEI) of mixed inoculum in enhancing the plant growth was found to be maximum (67.2%), followed by *Glomus fasciculatum* (48.91%), while the mycorrhizal efficiency index (MEI) on inoculation with *Glomus bagyarajii* and *Glomus geosporum* was found to be 18%.

Key words : Arbuscular mycorrhizal fungi, Plant biomass, Mycorrhizal Efficiency Index (MEI).

Mycorrhiza refers to an association between plants and fungi that colonize the cortical tissue of roots during periods of active plant growth and play a very important role in the improvement of plant growth. AM fungi are vital for the uptake and accumulation of ions from the soil and their translocation to the hosts because of their high metabolic rate and strategically diffuse distribution in the upper soil layers.

The role of arbuscular mycorrhizal fungi in plant nutrient (Reddy and Bagyaraj, 1994) and water relation (Nelson and Safir, 1982) have been well documented. Researchers have demonstrated improved adaptations of arbuscular mycorrhizal plants in field soil and attributed this response to reduced water stress (Menge *et al.*, 1978). Thus, mycorrhizal attributes are of interest for increasing crop productivity.

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Numerous laboratory and field experiments have shown that arbuscular mycorrhizal fungi can dramatically improve plant growth (Gerdemann, 1968; Mosse, 1973; Tinker, 1975) and enhance the ability of roots to take up nutrients, especially phosphorous from the soil. The inoculation of different species of arbuscular mycorrhizal fungi *viz*., G*lomus fasciculatum, Glomus mosseae and Glomus macrocarpum* have been found to increase the yield and protein content of the crop (Mathur and Vyas, 1990; Sivaprasad *et al.*, 1990). Matsubara *et al*., 1994, studied the effect of arbuscular mycorrhizal fungal inoculation on vegetable crops. Earlier studies on arbuscular mycorrhizal fungi have also reported the beneficial effect of inoculation on plant growth in sterile soil with low available phosphorus (Gerdemann, 1964; Mosse and Hayman, 1971).

Abelmoschus esculentus (Bhendi) apart from being used as a vegetable, the plant has various other uses. The root and stem are used as a clarifier in jaggery preparation to avoid spoilage. The seeds, after roasting and pounding, are used as a substitute for coffee in Turkey. Present study represents an attempt to study the growth responses of selected arbuscular mycorrhizal fungal species on growth and biomass of *Abelmoschus esculentus*

MATERIALS AND METHODS

Pure cultures of *Glomus fasciculatum* **(**Thaxter**)** Gerdemann & Trappe emend. Walker and Koske ,*Glomus geosporum* (Nicolson & Gerdemann) Walker and *Glomus bagyarajii* Mehrotra were procured from GKVK, Bangalore. The inoculums procured consisted of mixture of soil, spores, and pieces of hyphae and colonized root pieces.

Seeds of *Abelmoschus esculentus* were surface sterilized for 20 minutes in 70% ethanol, washed in sterile water, then placed in moist sterile sand at room temperature until germinated. Uniform seedlings were planted in trays filled with sterilized sand and 30g of inoculum containing approximately 600 arbuscular mycorrhizal fungal spores and colonized root bits of various AM species. Non mycorrhizal plants were obtained by growing uniform seedlings in