Research Paper :

Interactions Between *Glomus fasciculatum* Fungi and *Rhizobium* on *Glycine max* Merr. (var DH-125)

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SUMMARY

Interaction between *Glomus fascicultum* and *Rhizobium phaseoli* and their effects on *Glycine max* (var. DH-125), was studied in a phosphorus dicient sandy loam. The number, dry weight and nitrogen content of the root nodules in plants inoculated with *G. fasciculatum* plus *R. phaseoli* were significantly increased compared to uninoculated or with only *R. phaseoli*. *Rhizobium phaseoli* inoculation did not have a significant influence on sporulation of *G. fasciculatumin* in the rhizosphere soils. However, *Glycine max* plants inoculated with *G. fasciculatum* recovered increased phosphorus content, dry weight and grain yield than unioculated plants. Only *R. phaseoli* inoculation resulted in the increased nitrogen content of the plant and grain yield. Dual inoculation of both the symbionts significantly increased plant height, shoot dry weight and nitrogen content over single inoculation with either *G. fasciculatum* or *R. phaseoli*. These results suggest that arbuscular mycorrhizal (AM) fungi along with *R. phaseoli* can greatly increase nodulation and nitrogen fixation in *Glycine max*.

Key words : *Glomus fasciculatum*, Nitrogen fixation, Nodulation, Phosphorus content, *Rhizobium phaseoli*, *Glycine max*

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Glycine max. (var. DH-125) is an important leguminaceous oil yielding plant. Seeds yield very good edible oil. A study on interaction between AM fungus and *Rhizobium* had been carried out. In legume, *Rhizobium* symbiosis can provide an economic source of available nitrogen (Ahmad *et al.*, 1981; Saxena *et al.*, 2002). The use of *Arbuscular mycorrhizal* (AM) fungi can improve phosphorus uptake and ultimately plant growth and yield (Barea, and Azcon-Aguiar, 1983; Rodrigues *et al.*, 2003). Phosphorus deficiency is an important limiting factor in nitrogen fixation and legume production (Jacobson, 1985). In recent years, a number of studies conducted on interaction between *Arbuscular mycorrhizal* fungi and *Rhozobium* on legumes (Lakshman, 1999) have shown that the growth and yield of nodulating soybean increase after inoculation of *Glomus mossae* in sterilized soil. Inoculation on different crop plants with *Arbuscular mycorrhizal* fungi and *Rhizobium* was found to have synergistic beneficial effect (Hazarika *et al.*, 2000; Sampathkumar and Ganesh kumar, 2003). The present study was undertaken with the objective of assessing the response of *Glycine max* to dual inoculation with *Arbuscular mycorrhizal* fungus *Glomus fasciculatum* and *Rhizobium* inoculation in the earthen pots using sterilized soils.

MATERIALS AND METHODS

Seeds of *Glycine max* (var. DH-125) were surface sterilized in 2% sodium hypochlorite and germinated in sterile sand. Two weeks old seedlings were selected for uniformity and transplanted singly into 15 x 15 cm pots containing 2 kg sandy loam soil and pure sand with initial pH of 6.7, organic matter content of 1.4% and an available P content of 2.6 ppm extracted with NH_4 and HCL and air dried, pulverized, passed through a 4 mm sieve and sterilized with 2.5% methylbromide. There were four inoculation treatments: Uninoculated control; Inoculated with *R.phaseoli* (referred to as 'Rp'), Inoculated with *Arbuscular mycorrhizal* fungus *G.fasciculatum* ('Gf) and (4) inoculated with *R. phaseoli* and *G. fasciculatum* (Rp+Gf). *Rhizobium phaseoli* inoculation was done by treating *Glycine max* seeds with a peat based culture 10^{-8} ml^{-1} before sowing. Mycorrhizal inoculation was done by placing the seeds over a thin layer of mycorrhizal inoculum at the time of sowing 25g mycorrhizal inoculum consisted of chopped root bits and the soil from a pot culture of Sudan grass, (*Sorghum bicolour*) which was infected by *G. fasciculatum* and grown for 4 months. The inoculum contained hyphae, vesicles, 142 chlamydospores per 50g soil and arbuscules of *G fasciculatum*. There were three replications