Effects of drought stress, arbuscular mycorrhizal fungi and rhizobium treatments on nutrients concentration of roots, areal parts and soil in chickpea cultivation

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Abstract

Chickpea (*Cicer arientinum* L.) is one of the Leguminosae family members that has symbiotic ability with *Mesorhizobium ciceri* bacteria and arbuscular mycorrhizal (AM) fungi. To evaluate the effect of AM fungi (*Glomus mosseae, Glomus intraradices*) and *Mesorhizobium ciceri* bacteria at three soil moisture levels [28% (field capacity), 15% (-5 bar suction) and 9% (-10 bar suction)] on nutrients concentration of roots, areal parts of chickpea and post-harvest soil, a greenhouse factorial experiment was conducted, arranged as a completely randomized design, in sterilized soil. Results showed that moisture content had significant effect on potassium (K) concentration of roots, areal parts and post-harvest soil; the highest positive effect of moisture was at field capacity level. Rhizobium bacteria had significant effect on concentration of K and nitrogen (N) of the roots, phosphorus (P) of the areal parts, and post-harvest iron (Fe) concentration in the soil. AM fungi had significant effect on root P concentration of the roots; the highest effect was related to *Glomus mosseae*. Interaction of moisture and AM fungi was significant on concentration of root P and areal parts manganese (Mn); the highest effect was related to *Glomus mosseae* treatment at field capacity moisture level. Interaction of moisture and rhizobium bacteria was significant on concentration of root N and P, and areal parts Mn and Fe; the highest effect was related to rhizobium treatment at field capacity moistute level. Interaction of AM fungi and rhizobium bacteria was significant on root P concentration; the highest effect was related to rhizobium and *Glomus mosseae* treatment. The highest root N concentration was related to combination of AM fungi and inoculation with rhizobium treatment at field capacity moisture level.

Keywords: Mycorrhizal fungi, Rhizobium bacteria, Drought, Nutrients.

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