

Abstract

Increasing use of fertilizers and chemical pesticides contaminated with heavy metals and the use of waste water for watering plants has increased concentrations of heavy metals in crops. One of the most toxic and dangerous elements to human health is arsenic. One way to reduce arsenic toxicity and prevent the absorption of these elements by plants is the use of mycorrhizal fungi and phosphate fertilizer. In this study, the effect of different species of mycorrhizal and phosphorus availability was examined on arsenic toxicity and fenugreek growth at contaminated soil in a pot study. The experimental design was a factorial with three mycorrhizal species and non-inoculation comprising the first factor, three arsenic contamination; control, 15 and 30 mg of arsenic kg^{-1} of soil as second factor and two phosphorus availability; control and 250 mg of P kg^{-1} soil as third factor that were applied with three replications. The experiment was conducted in 2012 at the Zabol University green house in Zabol, south Iran. Analysis of variance indicated that mycorrhizal hyphae expanding in the soil increased number of lateral branches, number of leaves, leaf area, stem height, shoot and root dry weight, and chlorophyll a and b and total chlorophyll, as well as carotenoids and chlorophyll index, length and volume of root, concentration of phosphorus, nitrogen, potassium and ash. In addition to, heavy metal accumulation in the mycorrhizal hyphae and prevent its transfer to the shoots significantly reduced arsenic concentrations in symbiotic plants. Phosphorus addition to soil has similar effect with mycorrhizal fungi inoculation. Arsenic also interferes with the absorption of nutrients in plant and reduced number of lateral branches, number of leaves, leaf area, stems height, shoot and root dry weight, and chlorophyll a and b and total, as well as carotenoids and chlorophyll index, root length and volume, the concentration of nitrogen, potassium and ash. Furthermore arsenic toxicity increased arsenic concentrations in shoots and concentration of proline and carbohydrates in the plant.

Keywords: Heavy metals, mycorrhizal fungi, Fenugreek, Phosphorus



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Title

**Effects of different mycorrhiza species and
phosphorus availability on the arsenic toxicity and
growth of fenugreek (*Trigonella foenum-graecum*) in
pollute soil**

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