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UTILIZATION OF ARBUSCULAR MYCORRHIZAL FUNGI FOR THE PROTECTION OF TOMATO PLANTS (*SOLANUM LYCOPERSICUM*) OF Cr(VI) TOXIC CONCENTRATIONS

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Abstract

Chromium (Cr) is a highly toxic non-essential metal for microorganisms and plants. In the cytoplasm, Cr toxicity is mainly related to reduction processes of Cr (VI) to Cr (III) through intermediate unstable states which form free radicals (Cervantes et al., 2001: FEMS Microbiol. Rev. 25: 335). Many agricultural systems are contaminated with heavy metals due to irrigation with industrial or residual waters.

In Mexico, the tomato (*Solanum lycopersicum*) is considered the most important horticultural species for its production value. Under natural conditions, over 80% of plants are colonized by arbuscular mycorrhizal fungi (AMF) (Smith and Read, 2007: Mycorrhizal Symbiosis). The extensive extraradical hyphal network of these fungi allows plants to increase nutrient uptake and translocation, and may increase tolerance to stress conditions, including the presence of heavy metals (Gaur and Adholeya, 2004: Current Sci. 86:528). Due to the problem of contamination by heavy metals (including Cr) and the need to counter it, in this work it was determined that the association of several species of AMF to tomato plants, has several benefits.

Tomato seeds were germinated and transplanted at 21 days, to pots and grown under greenhouse conditions, were watered with nutrient solution and exposed to different concentrations of Cr (VI) (0, 1000, 3000 and 6000 ppm). In each treatment, half of the plants (30) were inoculated with a consortium of the following species: *Glomus invermaium* Hall, *Glomus mosseae* (Nicol & Ger) Gerd & Trappe, *Glomus aggregatum* and *Gigaspora* Scheck & Smith sp. aff. *margarita*.

The plant survival was significantly improved in the treatments with AMF (70%) compared to the control without fungi (22%), in the treatment of 6000 ppm of Cr (VI). The dry weight of aerial parts increased 25% by the presence of AMF in the treatment of 3000 and 6000 ppm, while the root dry weight increased 300% and 30% by the presence of fungi in Cr (VI) at 1000 and 3000 ppm, respectively. We consider that the protection of tomato plants by association with AMF can be used as a strategy to improve the crop production in areas contaminated by Cr (VI) and possibly other metals.
