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The functional roles of arbuscularmycorrhizal fungi in improving growth and tolerance of *Viciafaba*plants grown in wastewater contaminated soil

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Wastewater contaminated soil poses serious environmental and health problems in Saudi Arabia and requires technological solutions for mitigating potential environmental risks. In spite the efforts of the Agriculture Ministry and agencies of water resources to overcome those problems, they still exist. In this concern, the effects of an arbuscularmycorrhizal (AM) fungus (Glomusdeserticola Trappe and John) on growth, relative chlorophyll content and some mineral nutrients and heavy metal contents of broad bean (*Viciafaba*) plants grown in sterilized soil irrigated with different concentrations of wastewater were studied. Application of wastewater significantly reduced growth, chlorophyll content, nutrient contents, and levels of mycorrhizal colonization of bean plants comparing to control untreated plants, mainly at high concentrations. However, the rate of reduction was more pronounced in non-mycorrhizal treated plants. Mycorrhizal broad bean plants had significantly higher biomass, plant heights, leaf area, nutrients content (N, P, K), and relative chlorophyll content compared to those of non-mycorrhizal plants irrigated with or without sewage water. Under sewage water application, the AM colonization had greatly reduced the heavy metal contents (Zn, Co, Mn, Cu) in shoot and root tissues of the broad bean plants as compared to their equivalent non-mycorrhizal plants. This study indicates that growing broad bean plants with AM inoculum can minimize the heavy metals toxicity and increase growth and P uptake. In this regard, the AM fungi have a protective role to the host plants, and thus play important roles in soil contaminant immobilization processes. Therefore, the AM fungi are important in phytoremediation of heavy metals in wastewater contaminated soil.

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