1. Improving growth, flower yield, and water relations of snapdragon (*Antirhinum majus* L.) plants grown under well-watered and water-stress conditions using arbuscular mycorrhizal fungi

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Abstract:

The influence of arbuscular mycorrhizal (AM) fungus Glomus deserticola (Trappe and John) on plant growth, nutrition, flower yield, water relations, chlorophyll (Chl) contents and water-use efficiency (WUE) of snapdragon (Antirhinum majus cv. butterfly) plants were studied in potted culture under well-watered (WW) and water-stress (WS) conditions. The imposed water stress condition significantly reduced all growth parameters, nutrient contents, flower yield, water relations, and Chl pigment content and increased the electrolyte leakage of the plants comparing to those of nonstressed plants. Regardless of the WS level, the mycorrhizal snapdragon plants had significantly higher shoot and root dry mass (DM), WUE, flower yield, nutrient (P, N, K, Mg, and Ca) and Chl contents than those nonmycorrhizal plants grown both under WW or WS conditions. Under WS conditions, the AM colonization had greatly improved the leaf water potential (Psi(w)), leaf relative water content (RWC) and reduced the leaf electrolyte leakage (EL) of the plants. Although the WS conditions had markedly increased the proline content of the leaves, this increase was significantly higher in nonmycorrhizal than in mycorrhizal plants. This suggests that AM colonization enhances the host plant WS tolerance. Values of benefit and potential dry matter for AM-root associations were highest when plants were stressed and reduced under WW conditions. As a result, the snapdragon plants showed a high degree of dependency on AM fungi which improve plant growth, flower yield, water relations particularly under WS conditions, and these improvements were increased as WS level had increased. This study confirms that AM colonization can mitigate the deleterious effect of water stress on growth and flower yield of the snapdragon ornamental plant.

Keywords: arbuscular mycorrhiza; flower yield; snapdragon; water relations; water stress

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2- Arbuscular Mycorrhizal Fungi and Spermine Alleviate the Adverse Effects of Salinity Stress on Electrolyte Leakage and Productivity of Wheat Plants

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Abstract

A pot experiment was conducted to investigate the possible role of arbuscular mycorrhizal (AM) fungi, spermine and their combination in alleviating the adverse effects of salinity stress on electrolyte leakage (EL), root colonization and productivity of wheat plants. Two levels of salinized underground water were used (6.09 dSm(-1) and 10.63 dSm(-1)). At three studied growth stages, salinity stress markedly increased the electrolyte leakage of wheat leaves and the effect was increased with increasing the salinity level. Although the application of low salinity level did not decrease shoot dry weight and grains number of wheat plants, it significantly decreased grain yield and harvest index of these plants. The highest salinity level markedly reduced all yield parameters. The imposed salinity stress significantly decreased total carbohydrates, protein and moisture level of the developed wheat grains. Conversely, the level of ash and fibers was increased in response to the applied stress. The inoculation with arbuscular mycorrhizal fungi mitigated the detrimental effects of salinity on EL, yield parameters and grains quality of wheat plants when compared to non-mycorrhizal treatments. The highest root colonization with AM fungi was observed at the booting stage, whereas the lowest one was reported at the tillering phase. Exogenous application of spermine reduced EL and improved the productivity of wheat plants grown in the stress conditions. Interestingly, the dual treatment with AM fungi and spermine added more enhancement of wheat yield in both control and salt stress conditions via reduction of EL and increase

of mycorrhizal colonization.

Keywords: Arbuscular mycorrhiza; electrolyte leakage; salinity; spermine; wheat; yield

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3. Induction of defense responses in common bean plants by arbuscular mycorrhizal fungi

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Abstract:

Interaction between arbuscular mycorrhizal fungi as a bio-agent and Rhizoctonia root rot disease of common bean plant was investigated in this study under natural conditions in pot experiment. A mixture of Egyptian formulated AM (Multi-VAM) in suspension form (1 x 10(6) unit L(-1) in concentration) was used at dilution of 5 ml L(-1) water. The results demonstrated that colonization of bean plants with AM fungi significantly increased growth parameters, yield parameters and mineral nutrient concentrations and reduced the negative effects on these parameters as well as both disease severity and disease incidence. Different physical and biochemical mechanisms have been shown to play a role in enhancement of plant resistance against Rhizoctonia solani, namely, improved plant nutrition, improved plant growth, increase in cell wall thickening, cytoplasmic granulation, and accumulation of some antimicrobial substances (phenolic compounds and defense related enzymes)

Keywords: POD; PAL; PPO; Rhizoctonia solani; Root rot

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4. CONTROL OF BROWN SPOT PATHOGEN OF RICE (BIPOLARIS ORYZAE) USING SOME PHENOLIC ANTIOXIDANTS

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ABSTRACT

Bipolaris oryzae is the causal agent of rice brown spot disease and is responsible for significant economic losses. In order to control this disease, three phenolic antioxidants were tested (salicylic acid, benzoic acid and hydroquinone). The antifungal activity of the tested substances were investigated against *B. oryzae* at different concentrations *in vitro,* as well as the efficacy of their exogenous application in controlling rice brown spot disease under field conditions. *In vitro*, benzoic acid or salicylic acid at 9 mM completely inhibited the growth of *B. oryzae.* Under field conditions, spraying of benzoic acid at 20 mM led to a significant reduction in disease severity (DS) and disease incidence (DI) on the plant leaves, in addition to a significant increase in the grain yield and its components. Some biochemical responses were also detected, where the application of the previous treatment led to a significant increase in the total photosynthetic pigments (chlorophyll *a* and *b* and carotenoids) in rice leaves and in the total carbohydrate and protein contents of the yielded grains.

Keywords: Benzoic acid; Bipolaris oryzae; Hydroquinone; Salicylic acid; Systemic resistance

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5. Bioconversion of poultry wastes. I--Factors influencing the assay and productivity of crude uricase by three uricolytic filamentous fungi

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Abstract

The optimum temperature for biomass yield and uricase production by uricolytic fungi, Aspergillus terreus, A. flavus and Trichoderma sp. was at 30 degrees C. The time required for maximum production of uricase and biomass yield was 4 days for two Aspergillus species and 6 days for Trichoderma sp. The optimum pH was at 6.4 for A. terreus and pH 6.6 for A. flavus and Trichoderma sp. The maximum fungal biomass yield was achieved in medium supplemented with 4% poultry waste. The best carbon sources for the production of uricase and mycelia yield were glycerol, sucrose and maltose by A. terreus, A. flavus and Trichoderma sp., respectively. Uric acid was found to be the best nitrogen source for production and activity of uricase by the three tested fungi. The addition of some vitamins to the culture media increased the maximum biomass yield of all the isolates, although no significantly increased uricase production was found.

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