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“Bridging the gap between increasing knowledge and decreasing resources”

## Effect of Endophytic Entomopathogenic Fungi as Biological Control Agents on the Production of Phytohormones in Tomato and Cotton

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### Abstract

This research aimed to establish two strains of the entomopathogenic fungus *Metarhizium anisopliae* 150 and 153 endophytically in tomato and cotton plants as an innovative biological control strategy against several pests and diseases taking into consideration the possible interaction between these fungi and their hosting plants. Therefore, two inoculation methods were applied using fifteen plants per treatment for a tomato experiment and ten plants per treatment for a cotton experiment; for the seed inoculation method, tomato and cotton seeds were soaked in a mixture of fungal spore suspension with an adjusted concentration to  $10^7$  spore  $\text{ml}^{-1}$  and an adhesion material for two minutes. Dry seeds were then planted in 11 cm pots and left to grow for one week under greenhouse conditions. A root inoculation method was conducted by establishing two treatments with clean tomato seedlings at the third leaf growth stage. Roots were washed and dipped in the same mixture for two minutes and re-planted in 11 cm pots. Cotton and tomato leaves were sampled for both inoculation methods. At the same time the same procedure was repeated with tomato plants which were additionally inoculated with *Phytophthora infestans*, the causal agent of the late blight disease. The plants were grown for two weeks under suitable conditions to develop the disease symptoms. Thereafter, leaves were also sampled. Collected samples were extracted for multiple phytohormones' analyses including salicylic acid, abscisic acid, jasmonic acid, indolic acetic acid and gibberellins using LC-MS. Our results demonstrated that phytohormones levels change in relation to plant species, inoculation method, pathogen presence and fungal bio-agent strain.

**Keywords:** Biological control, Endophytic entomopathogenic fungi, LC-MS, *Metarhizium anisopliae*, phytohormones, *Phytophthora infestans*