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The Thesis Submitted for the Degree of Phd (in the field of Plant pathology)

**Induced resistance in two tomato cultivars
contaminated with fusarium wilt disease
using mycorrhizae species, Trichoderma and
Gr24 phytohormone**

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Abstract

Tomato with the scientific name *Solanum lycopersicum* is one of the suitable fruits for fresh consumption as well as processing (production of by-products). It is the second most important plant in the Solanaceae family after potatoes worldwide. Tomato wilting disease is one of the most important limiting factors for tomato cultivation especially in greenhouse condition. Fusarium caused by *Fusarium oxysporum f. sp. lycopersici*. Considering the vascularity of this fungus, the control process of disease will be high costs. In this study, the effect of two fungal species and also a strigolacton phytohormone on induce resistance of two tomato cultivars infected with fusarium wilting disease was investigated. In this greenhouse experiment, two cultivars of Captain and 4129 tomatoes and *Trichoderma reesei*, *Rhizophagus irregularis* and GR24 phytohormone (106µM) were used. For this purpose, a factorial experiment was used in a completely randomized design with three replications in different time periods after inoculation of the pathogen (0, 7, 15, 35 days). The effect of biocontrol treatments on changes of some antioxidant enzymes, phenol, total protein, disease severity and also gene expression analysis of some related gene to resistance in plants using real time PCR were assayed. Data analysis showed that the highest activity of all three enzymes with different values for both cultivars occurred during 35 days after inoculation. Among combined and single treatments, application of a combination of three biocontrol factors and GR24 phytohormone, respectively showed significant effect on increase of measured parameters compared with other treatments. Gene expression analysis of resistance genes in treated plants showed that three biological and hormonal agents have the the highest effect on expression of all three tested genes but for this treatment the maximum and minimum of gene expression were noted for chitinase and β glucanase genes respectively. Based on the results of this study it is suggested that application of all three agents in liquid form can be considered as a limiting factor for the growth of the pathogen on the seed surface besides inducing resistance against disease,

Keywords: *Trichoderma*, Disease severity, Biological control, Acquired resistance, Mycorrhiza