

## BIOLOGICAL EFFECTIVENESS OF *BACILLUS* SPP. AND *TRICHODERMA* SPP. ON APPLE SCAB (*VENTURIA INAEQUALIS*) IN *VITRO* AND UNDER FIELD CONDITIONS

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### ABSTRACT

*Venturia inaequalis* causes great economic losses until near 100% in apple production industry in worldwide, generally its control is based in agrochemicals using, but irrational applications had causing resistance problems, so the use of biocontrol agents are an alternative for disease management. In the present research, the antifungal activity of *Bacillus* spp. and *Trichoderma* spp. for the control of apple scab *in vitro* and *in vivo* conditions were evaluated. The *V. inaequalis* strain was isolated from fruits and apple tree leaves with presence of disease symptoms. *Trichoderma* spp. and *Bacillus* spp. against *V. inaequalis* in duals cultures were evaluated; the antagonism by *Trichoderma* spp. was classified according to the Bell scale, while for *Bacillus* spp. the radial growth inhibition percentage was determined. On the other hand, secondary metabolites from *Trichoderma* spp. and *Bacillus* spp. against *V. inaequalis* was evaluated by means the microplate technique to determine the inhibition percentage. *In vivo* conditions, five formulated from *Bacillus* spp. and *Trichoderma* spp. under a randomized block experimental design and four repetitions was evaluated. The incidence and severity in fruits and leaves were variables evaluated. The results in dual cultures technique, showed maximum antagonistic effect by *Trichoderma* strains, and according to the Bell scale were identify in class 1. Regarding, the inhibition of *V. inaequalis* mycelia growth by the *Bacillus* strains ranged 33.4 to 41.3% for *B. subtilis* and *B. licheniformis*, respectively. The secondary metabolites from *T. yunnanense*, *T. harzianum* and *B. licheniformis* showed an inhibition percentage in 100% against *V. inaequalis*. The results from *in vivo* conditions showed decreased in incidence in 53.4% and severity in 63.7% in fruits, by using formulated *Bacillus* spp. at doses of 2Lh<sup>-1</sup>, meanwhile, foliage the incidence decreased in 66.7 by formulated *Trichoderma* spp. at doses of 2Lh<sup>-1</sup>, but in severity, all treatments has behaved similarly.

**Keywords:** Antagonism, biocontrol agents, Secondary Metabolites, plant disease.