PRODUCTION OF FUNGAL CELL WALL-DEGRADING ENZYMES OF ENTOMOPATHOGENIC FUNGI AND ANTAGONISM AGAINST *Rhizoctonia solani*

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Introduction. *Rhizoctonia solani* causes crop damage by pruning the root system, which results in water and nutrient stress to the plant. Entomopathogenic fungi (EF) are used for biocontrol of insects; however, EF could inhibit *R. solani* growth through one or more mechanisms: competition for key nutrients, production of antibiotics and production of fungal cell wall degrading enzymes, There is evidence that *Lecanicillium lecanii* controls fungal pathogens (Askary *et al*., 1997). Solid-state fermentation SSF is a promising technology for production of fungal enzymes; and mycelium could be used for production of enzymes in order to evaluate the mycoparasitism against pathogenic fungi.
Main objectives of this study were to analyze the antagonisms of five EF strains and to determine which enzyme activity may contribute to their biological activities.

Methods. Strains of *Beauveria bassiana*, *L. lecanii. Trichoderma harzianum* and *R. solani* were utilized. SSF consisted of *R. solani* cell walls and mineral salts (Barranco *et al*., 2009); crude enzymatic extract was obtained after 5 days and enzymatic activities of endochitinase, exochitinase and glucanase were determinated. Evaluation of antagonist activity of EF was by a dual-culture *in* vitro assay in PDA plates (Quecine *et al*., 2008).

Results. Colony interactions demonstrate that *B. bassiana and L. lecanii* exhibited inhibition of the radial growth of *R. solani*, although less than *T. harzianum* (Figure 1). Maximum inhibition of *R. solani* growth was presented with *T.* harzianum, which was followed by *B. bassiana* 11, and the lower inhibition was recorded for *L. lecanii*.
The production of enzymes by the EF is listed in Table 1. Fungal cell wall from *R. solani* was used as carbon source. Induction of glucanases and chitinases was stronger for *T. harzianum* than for EF strains. However, these results suggest antagonism by EF and they can be explained by their enzymatic activities.

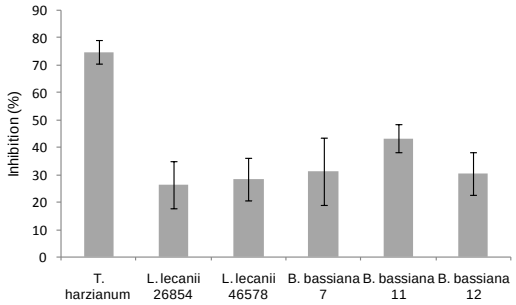

Fig.1 Evaluation of antagonist activity of *T. harzianum* and other strains of entomopathogenic fungi against *R. solani*.

Table 1. Enzymatic activities obtain by mycelium fungus in SSF.

Strain	Endo-chitinase	Exo-chitinase	Glucanase
T. harzianum	94.8 ± 19.1	188.6 ± 1.8	131.4 ± 21
L. lecanii ATCC 26854	28 ± 3.4	2.7 ± 1.2	51.8 ± 12.9
L. lecanii ATCC 46578	24 ± 3.7	9.4 ± 5.9	11.6 ± 2.6
B. bassiana 7	27.8 ± 2	1.9 ± 0.3	9.6 ± 0.1
B. bassiana 11	133.7 ± 32	10.4 ± 0.4	116.7 ± 7.5
B. bassiana 12	31.7 ± 2.5	5.7 ± 1.8	20.3 ±

Conclusions. Induced enzymatic activities suggested a role of fungal metabolites in the antagonistic behavior and potential biocontrol of EF against *R. solani*.

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