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ROLE OF SECONDARY METABOLITES IN PLANT PROTECTION BY THE PLANT-SYMBIONT *Trichoderma*

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Several species belonging to the genus *Trichoderma* are mycoparasites used as biocontrol agents of a wide range of aerial and soil-borne plant pathogens. Biocontrol by *Trichoderma* involves competition, mycoparasitic activity and induction of the plant defense response. Mycoparasitism by *Trichoderma* is a complex process, upon recognition of a host they form specialized structures, secrete a complex set of cell wall degrading enzymes, and produce secondary metabolites that affect membrane structure. Secondary metabolites, can be synthesized via pathways involving non-ribosomal peptide synthases (NRPS) and polyketide synthases (PKS). These enzymes require the addition of a prosthetic group called panthotein, which is incorporated by a 4-phosphopantetheinyl transferase (PPTasa). To determine whether PPTasa mutation affected the production of metabolites synthesized through the NRPS and PKS pathway, we obtained mutants carrying a deletion, and over-expressed versions of the PPTasa gene in *T. virens.* The null mutants showed fluffy phenotype, albino spores and are affected in the production of siderophores and antibiotics (non-ribosomal peptides and polyketides).

This approach allowed us to identify novel antibiotics produced by *T. virens*. In order to determine the relevance of such secondary metabolites for plant protection we analyzed the behavior of the mutants both *in vitro* and *in vivo*. The mutants clearly overgrow the host, but are incapable of killing it through their secondary metabolites even *in vitro*. In addition, the null mutant and wild type were used in seed germination assays *in vitro*, using tomato seeds, both strains promoted growth of tomato seedlings. However the null mutant showed less effect than the wild type strain. Secondary metabolites are also believed to participate in induction of plant defense responses. We have analyzed the plant response at the level of gene expression in the interaction with the mutant in order to establish the role of these compounds during the symbiosis.