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VIRAL DISEASE CONTROL BY THE BIOCONTROL AGENT *Trichoderma harzianum* T-22 AGAINST *Cucumber mosaic virus* (CMV) IN TOMATO

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The study of biochemical and molecular mechanisms deriving from the host-pathogen-antagonist interaction is essential to understand the dynamics of infectious processes and can be useful for the development of new strategies to control phytopathogens, particularly viruses, against which chemical treatments have no effect. In this work, we demonstrate the ability of the rhizospheric fungus *Trichoderma harzianum* strain T-22 (T22) to control the disease induced by *Cucumber mosaic virus* (CMV) strain Fny in tomato (*Solanum lycopersicum var. cerasiforme*). In particular, we have studied the molecular and biochemical aspects of the interaction between T22 and tomato against CMV. We therefore focused on the substances and genes implicated in the plant defense pathway, such as reactive oxygen species (ROS), scavenging enzymes and phytohormone-mediated defense. Histochemical analysis showed a different increase in the superoxide anion ($O_2^{\bullet-}$) and hydrogen peroxide (H_2O_2) content in plants infected by CMV alone or within the presence of T22, indicating the involvement of ROS in plant defense responses. Expression analysis of the genes coding for the main antioxidant enzymes suggested a definite improvement in oxidative stress when plants were treated with T22 after inoculation with CMV. Gene expression analysis of the Coi-1 gene seems to show the activation of a defense response similar to the systemic acquired resistance (SAR). In conclusion, our data indicate that *Trichoderma harzianum* T-22 exerts an activity of CMV-induced disease control in tomato, an action that implies the involvement of ROS, pointing toward the its use as a treatment rather than as a preventive measure.