CHARACTERIZATION OF EFFICIENT RESISTANCE INDUCERS FOR CONTROL OF CROP DISEASE

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Downy mildew, caused by the obligate biotrophic oomycete *Plasmopara viticola*, is one of the most destructive grapevine diseases. *P. viticola* infects especially leaves and berries reducing photosynthetic activity, quality and quantity of grapevine production. Its control is based on the intense application of chemical fungicides, but concerns about the environmental impact of pesticide overuse have sparked an interest in efficient biocontrol alternatives. Enhancement of plant resistance by natural resistance inducers seems to be a promising strategy for controlling crop diseases. Several *Trichoderma* strains are active against numerous plant pathogens and they are frequently used as biocontrol agents. We previously demonstrated that treatments with *Trichoderma harzianum* T39 (T39) significantly reduced downy mildew symptoms by activating grapevine resistance both locally and systemically. Our aims were to test the efficacy of other *Trichoderma* strains against grapevine downy mildew and to characterize their mechanism of action in comparison to T39 and to the resistance inducer benzothiadiazole (BTH). The strain *T. atroviride* SC1 (SC1) was isolated from decayed hazelnut wood and it was patent as biocontrol agent against soil borne pathogens. Repeated foliar application of SC1 strongly reduced downy mildew symptoms on grapevine leaves, with efficacy of 80% and persistence of 7 days after three treatments at one-day interval before pathogen inoculation. The analysis of the mechanism of action revealed that SC1 induced systemic resistance in grapevine and it showed also direct activity against *P. viticola* sporangia. SC1 application did not affect grapevine growth, leaf dimension and chlorophyll content, indicating absence of apparent energy cost for resistance activation. On the other hand, BTH applications significantly reduced downy mildew symptoms but it negatively affected the grapevine growth. The evidence reported here suggests that SC1 could be a value biocontrol agent against downy mildew. However, future molecular characterization of grapevine genes involved in the resistance against downy mildew and the study of their spatio-temporal modulation by laser-capture microdissection will be necessary to better understand the key processes for grapevine self-protection and to develop robust plant protection products.