CHARACTERIZATION OF TRICHODERMA HARZIANUM T39 INDUCED RESISTANCE AGAINST PLASMOPARA VITICOLA DURING ABIOTIC STRESSES

Roatti B.[1], Perazzolli M.[1], Gessler C.[2], Pertot I.[1]

[1]Department of Sustainable Agro-ecosystems and Bioresources, Research and Innovation Centre, Fondazione Edmund Mach (FEM), via E. Mach S. Michele all'Adige 38010, Italy; [2]Institute of Integrative Biology, Swiss Federal Institute of Technology (ETH), 8092 Zurich, Switzerland

Climate change will increase the temperature and decrease precipitations in several areas of the world, increasing heat and drought stress for plants. Abiotic stress response in plants is largely controlled by the hormone ABA while the defence against biotic stresses is controlled by salicylic acid (SA) and jasmonic acid (JA)/ethylene signalling pathways. ABA signalling plays a crucial role in the modulation of defence reactions under multiple stress exposure. Thus, environmental stress is an additional factor to consider when studying the plant defence responses. Downy mildew of grapevine (*Plasmopara viticola*) is one of the most destructive diseases and plants are treated with chemical fungicides to avoid substantial yield losses. To reduce the use of chemicals, a strong interest was recently focused on enhancement of plant defence. After treatment with a resistance inducer, plants react with a faster and/or stronger defence against pathogens. This defence mechanism is called induced systemic resistance (ISR). ISR protects from a broad spectrum of pathogens but is often inconsistent and likely to be influenced by the environment. Since abiotic stresses may strongly influence the induced resistance, the aim of this project was to study the effect of a heat and/or drought exposure of grapevine plants on the resistance induced by *Trichoderma harzianum* (T39) against downy mildew. Grapevine plants were maintained at different temperatures and irrigation regimes to simulate heat and drought stress for 14 days. Soil moisture was daily measured in each pot with a soil moisture probe and leaf water potential was measured using the Sholander pressure bomb. Treatments with T39 and water (control) were applied on days 12, 13 and 14. Plants were inoculated with a *P. viticola* suspension (1×10^5 sporangia/mL) and disease severity was evaluated one week after inoculation. Leaves were sampled before and after pathogen inoculation and ISR marker genes were analysed in real time RT-PCR. The exposure of plants to heat and drought stress given singularly did not affect the efficacy of the T39 treatment, while efficacy was negatively affected when the stresses were combined. The induction of grapevine ISR marker genes were attenuated in heat and drought stressed plants. The weaker efficacy of the T39-induced resistance in heat + drought stressed plants could be related to the attenuated induction of the defence-related genes. Our results indicate that ISR could be less effective in areas where climate change will take place and when plants are exposed to heat and drought stresses. Future climate change should, therefore, be taken into account in disease management and in evaluating the efficacy of resistance inducers.