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ABSTRACTS BOOK

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Promising future for *Botrytis cinerea* (Helotiales: Sclerotiniaceae) management using strategies based on *Xenorhabdus* and *Photorhabdus* (Morganellaceae) in vineyards

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Abstract

The pathogen *Botrytis cinerea* (Pers. Fr.) (Helotiales: Sclerotiniaceae) is a wound necrotrophic fungus that causes significant losses in grapevines worldwide. Several chemical and physical tools have been used to reduce fungal pathogen infections, but their efficiency and economic and environmental costs are under vivid debate. The use of microbial-based tools for pathogen management holds promise. In this study, we investigated whether the symbiotic bacteria of the entomopathogenic nematode, *Xenorhabdus* and *Photorhabdus* have antifungal capacity against *B. cinerea* and whether the effectiveness of the bacteria depend on the method of their usage. In particular, we evaluated the efficacy of the following control strategies: (i) bacterial cell-free supernatants, (ii) unfiltered ferments, (iii) crude bacteria isolates, and (iv) volatile organic compounds (VOCs). The antifungal efficacy of *X. bovienii*, *X. nematophila*, *X. kozodoii* and *P. laumondii* subsp. *laumondii* cell-free supernatants and the antifungal effect of *X. nematophila* and *P. laumondii* unfiltered ferments were tested in Petri dishes at 10 % of concentrations. A subsequent study evaluated the antifungal capacity of the crude isolate of *X. nematophila* and *P. laumondii* against *B. cinerea* compared with the fungicidal effect of the commercial *Bacillus amyloliquefaciens* (Serenade® ASO fungicide). Finally, two laboratory experiments investigated the effects of *X. nematophila* and *P. laumondii* VOCs on the growth and incidence of *B. cinerea* in Petri dishes and in harvested red grapes (treated with the bacterial VOCs simultaneously and preventively before the fungal infection). *X. nematophila* cell-free supernatant and unfiltered ferments inhibited 82 and 100 % of the *B. cinerea* mycelial growth compared to control (distilled water). Furthermore, *P. laumondii*-isolate controlled the mycelial growth of *B. cinerea* with similar efficacy to commercial *B. amyloliquefaciens*. We also found that VOCs emitted by *X. nematophila* and *P. laumondii* (vs control) reduced ~40 and ~60 % of *B. cinerea* colony growth after pathogen infection in Petri dishes, respectively. Moreover, *X. nematophila* and *P. laumondii* VOCs inhibited ~100 % of *B. cinerea* mycelial growth in harvested grapes when applied simultaneously with the *B. cinerea* infection. Finally, VOCs emitted by *P. laumondii* reduced approximately 20 % of *B. cinerea* incidence in harvested grapes. Overall, this study showed strong evidence of the potential antibotrytic use of those bacteria and helps to develop an innovative formulation of these bacterial products to develop an efficient biocontrol tool for grapevine growers.

Keywords: antifungal compounds, beneficial microorganims, bio-tools, *Vitis vinifera*.