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ABSTRACT BOOK 2025

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Oral GUEST 2

ORAL GUEST 2: FUNCTIONAL CHARACTERIZATION OF EFFICACY AND MODE OF ACTION OF A SUSTAINABLE FUNGICIDE AGAINST GRAPEVINE PATHOGENS

Michele Perazzolli (1,2), Sofia Montanari (1,2), Andrea Nesler (3), Claudia M. O. Longa (2), Martin Hartmann (4)

(1) *Centre Agriculture Food Environment (C3A), University of Trento, Via Mach 1, 38098 San Michele all'Adige, Trento, Italy*
(2) *Research and Innovation Centre, Fondazione Edmund Mach, Via Mach 1, 38098 San Michele all'Adige, Trento, Italy*
(3) *Bi-PA nv, Technologielaan 7, 1840 Londerzeel, Belgium*
(4) *Institute of Agricultural Sciences, Department of Environmental Systems Science, ETH Zurich, Universitätsstrasse 2, 8092 Zürich, Switzerland*

Oomycetes (e.g., Plasmopara viticola) and ascomycete fungi (e.g., Botrytis cinerea and Erysiphe necator) are responsible for significant economic losses in grapevine production. Grapevine disease management involves frequent applications of synthetic fungicides, with potential negative impacts on human health and the environment. This study aimed to investigate the mechanism of action of a new fungicide based on choline pelargonate (CP, patent BE1026779B1) against crop pathogens under controlled and field conditions. CP inhibited mycelial growth and spore germination of B. cinerea and Phytophthora infestans (an oomycete closely related to P. viticola) in vitro, causing leakage of electrolytes, ultrastructural alterations of cellular membranes, and perturbation of lipid content. CP treatments decreased downy mildew and powdery mildew severity on grapevine leaves under greenhouse conditions with no phytotoxic effects. In particular, CP inhibited zoospore release and mobility of P. viticola and decreased spore germination of E. necator, indicating a mode of action mainly based on direct inhibitory effects against phytopathogens. However, translaminar effects and the expression of defense-related genes in CP-treated leaves were assessed to explore the possible priming effects. Field trials confirmed the efficacy of CP in two experimental vineyards and showed high efficacy against powdery mildew under field conditions. To assess potential side effects on non-target microorganisms, bacterial and fungal communities were isolated from grapevine leaves and bunches of control and CP-treated plants. Amplicon sequencing analysis showed that phyllosphere communities differed according to vineyard location and time point. Moreover, CP showed negligible effects on microbial communities that were partially influenced by the composition of the indigenous microbiota. CP is a promising fungicide against grapevine pathogens and represents a viable alternative to reduce the use of conventional fungicides.