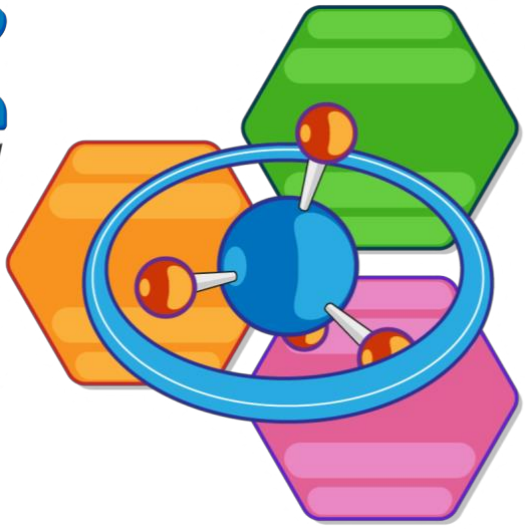
MERCK Young Chemists' Symposium 2021



Book of Abstracts

Rimini (IT)
Hotel Continental

22-24 November 2021

Società Chimica Italiana
Gruppo Giovani

Proceedings of the

Merck Young Chemists' Symposium

XX edition

Edited by: G. Annunziato, M. Atzori, C. Bonfio, S. Cinti, B. Coppola, M. Da Pian, C. Imparato, V. Lazazzara, E. Lenci, A. Malara, D. Morselli, E. Paone, F. Ponte, S. Rebeccani, L. Rivoira, M. Schlich.

ISBN: 978-88-94952-25-4

Metabolomic approach for understanding grapevine communication mediated by volatile organic compounds

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Plants can produce a wide variety of volatile organic compounds (VOCs), which play a crucial role in the interaction with other organisms and the regulation of plant responses against stresses. Different modes of action against phytopathogens have been attributed to biogenic VOCs, such as induction of plant resistance and direct inhibition of pathogen growth. In particular, the amount of some biogenic VOCs was higher in downy mildew-resistant compared with susceptible grapevine genotypes upon inoculation with *Plasmopara viticola*. Thus, biogenic VOCs indicate a possible involvement in the grapevine resistance mechanisms against this pathogen. This work aims at identifying the metabolic response of VOC-treated grapevine leaves and the potential activation of VOC-mediated resistance mechanisms. Susceptible grapevine leaf disks were treated with pure biogenic VOCs or with water as control. Functional and transcriptional analyses confirmed that two VOCs reduced downy mildew severity and increased expression level of defense-related genes in susceptible leaf disks. An untargeted metabolomics approach was applied using ultra-high pressure liquid chromatography-high resolution-quadrupole-time of flight-mass spectrometry (UHPLC-Q-TOF-MS) analysis to clarify the mechanisms of action of VOCs and the response of VOC-treated leaf disks. Preliminary results revealed marked differences occurred between VOCs-treated and control samples, indicating a clear metabolic response of receiver plants in response of biogenic VOCs. Principal component analysis (PCA) discriminated samples according to the time point and VOC treatment. Further data analyses will help to improve knowledge on the plant defense mechanisms activated by biogenic VOC.