PLANTS SYNTHESIZE THE PRIMING MOLECULE β-AMINOBUTYRIC ACID (BABA) IN RESPONSE TO STRESS.

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Plants can be sensitized to respond faster and/or stronger to stress situations by application of the non-protein amino acid β-aminobutyric acid (BABA), a well-known priming agent. BABA can increase resistance against a wide range of stresses, such as attacks by pathogens, nematodes, and arthropods, as well as abiotic stressors like heat, cold or salt. Plants treated with BABA can deploy more rapidly the signaling pathway most appropriate to counteract the given stress situation. For instance, against *Plectosphaerella cucumerina* infection, BABA priming leads to an ABA-dependent enhancement of the callose response at the sites of attempted penetration, and thus to increased resistance. With the present study we provide evidence that BABA, which has been considered a xenobiotic for more than 50 years, is actually produced by plants and regulated by stress. By using a sensitive and selective protocol developed in our laboratory and based on ultra-high pressure liquid chromatography tandem mass spectrometry (UHPLC-MS/MS), we were able to separate BABA from its two isomers alpha (AABA) and gamma (GABA) that are present in plant tissues, and to quantify it. Subsequent analyses revealed that BABA is present in various plant species, including Arabidopsis and crops like maize and wheat. Importantly, BABA levels were found to increase following infection with necrotrophic, biotrophic and hemibiotrophic pathogens, as well as after abiotic stress. The biosynthetic pathway and the regulation of BABA are currently under investigation. At the present, our results suggest that BABA may be a novel hormone helping plants to cope better with stress.

IDENTIFICATION OF VOLATILE ORGANIC COMPOUNDS EMITTED BY DIFFERENT GRAPEVINE GENOTYPES IN RESPONSE TO DOWNY MILDEW INFECTION.

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Vitis vinifera is susceptible to several pathogens including *Plasmopara viticola*, the causal agent of downy mildew. American grapevine species are resistant or tolerant to *P. viticola* and breeding programs have introduced resistance traits to susceptible cultivars. Although grapevine resistance to *P. viticola* has been widely characterized in resistant genotypes, the possible contribute of volatile organic compounds (VOCs) was not yet investigated. The aim of this work was the characterization of VOCs produced by resistant and susceptible genotypes in response to *P. viticola* inoculation, in order to identify VOCs associated to grapevine resistance. The susceptible *V. vinifera* cultivar Pinot noir, and the resistant genotypes Kober 5BB, SO4, BC4 and Solaris were grown under greenhouse conditions and they were subsequently inoculated with *P. viticola*. Leaves were harvested immediately before (0 dpi) and six days (6 dpi) after inoculation, and the lower disease severity in resistant genotypes as compared with Pinot noir was confirmed. A solid-phase microextraction-gas chromatography-mass spectrometry approach (SPME/GC-MS) was used to analyze VOCs emitted by the five genotypes studied. GC-MS chromatograms showed specific VOC emission profiles of the four resistant genotypes as compared with Pinot noir at 6 dpi. VOCs specifically emitted by resistant genotypes were then selected, and pure compounds were tested against *P. viticola* by leaf disc assays. Particularly, three sesquiterpenes, two aldehydes and one heterocyclic compound significantly reduced downy mildew severity on Pinot noir, demonstrating that VOCs could play an important role in the resistance against downy mildew by direct toxicity against *P. viticola*.

GENE RESPONSES OF GRAPEVINE AND *BOTRYTIS CINEREA* DURING THE LATENT INFECTION OF BERRIES ("NOBLE ROT").

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High throughput technologies allow deep investigations of molecular mechanisms involved in plant-pathogen interactions. In yet uncharacterized environmental conditions, *Botrytis cinerea*, the agent of grapevine grey mould, can develop as a latent infec-

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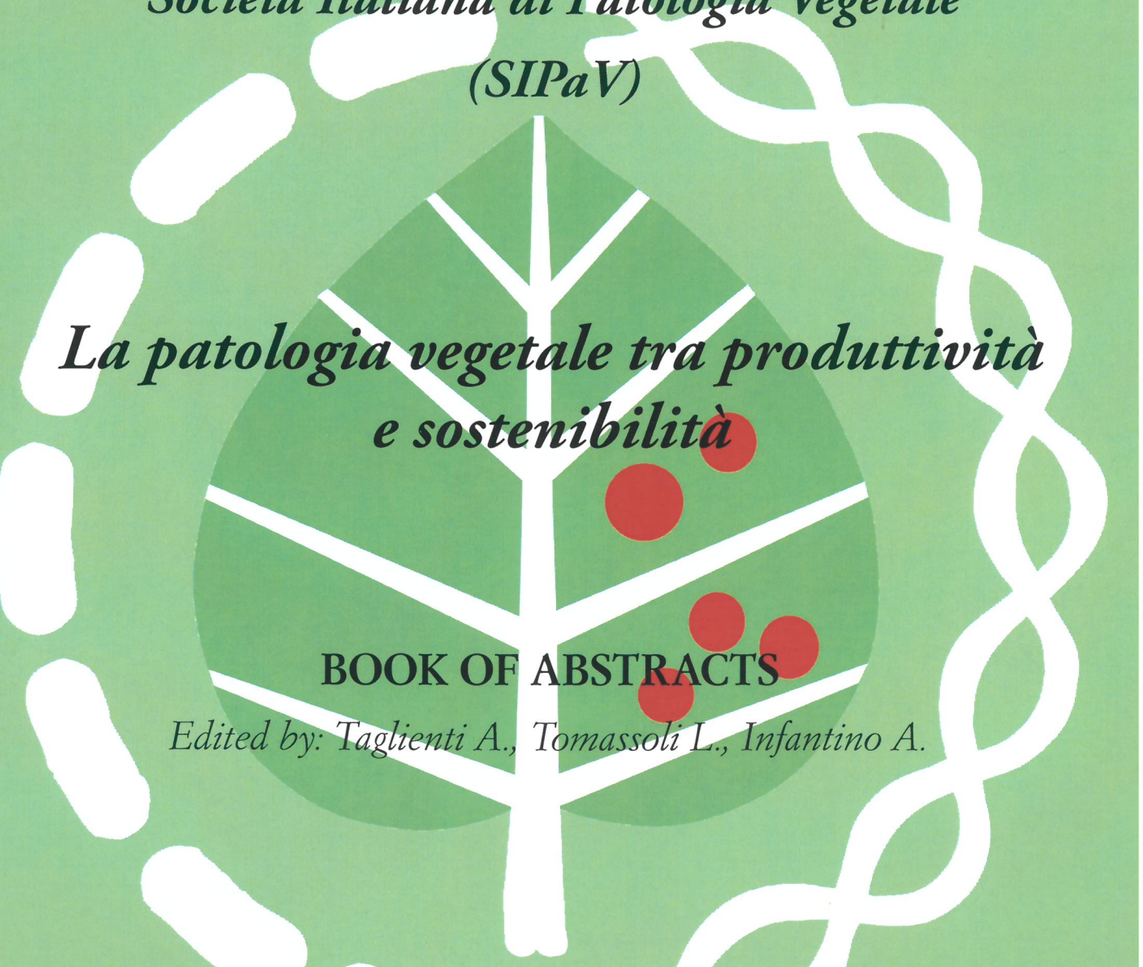

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