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ABSTRACTS

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The potencial of the RNAi technology, via SIGS, in the control of *Botrytis cinerea* in horticultural crops

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Botrytis cinerea is undoubtedly one of the most important limiting factors for crop production worldwide, as it demonstrated by the enormous annual intake of fungicides used for their control to avoid crop losses that can reach 40% (Petrasch et al. 2019, *Mol. Plant Pathol*, 20, 877–892). However, this fungus has been categorized by FRAC as a high-risk pathogen for fungicide resistance development. Another problem is related with the diversity of fungicides available to growers, which according with the current European legislation on pesticides and the European Green Deal, will be reduced by 50% by 2030. For all this, new low-impact sustainable solutions, obtained through new phytoprotection tools, to control *B. cinerea* are needed. In this study, we intend to check if some emerging strategies such as RNA interference technology (RNAi) could be valid sustainable solution and alternative to the use of conventional chemical fungicides for the control of *B. cinerea* in crops of relevance. To achieve this goal, the SIGS (spray-induced gene silencing) approach, which concerns the exogenous application of double-stranded RNA (dsRNA), was tested. For it, ten double-stranded RNA (dsRNAs) were designed against the fungicide target's genes [*tub2* (β-tubulin), *bos1* (histidine kinase class III), *cyp51* (C14-demethylase in sterol biosynthesis), *cytb* (cytochrome b), *erg27* (3-ketoreductase), *mrr1* (transcription factor Mrr1) and *sdhB* (subunit B of the succinate-dehydrogenase)] and genes encoding proteins involved in virulence/pathogenicity of this fungus (Choquer et al. 2007, FEMS Microbiol. Lett., 277, 1–10) such as *sod1* (superoxide dismutase), *bmp1* (MAPK kinase) and *Bcpg2* (endopolygalacturonase). The preliminary results obtained in *in vitro* tests have shown that the application of the different dsRNAs, individually and in combination, have significantly reduced the development of the fungus on different culture media. In addition, this reduction was very promising on detached fruit and *in planta* assays, demonstrating the potential of this technique in the control of *B. cinerea*. On the other hand, the sustained release of the dsRNA-fungicides using nanoparticles as a carrier or stabilizer has also been analyzed. Today, more than ever, we need have new molecules with fungicidal action, such as the RNAi-based fungicides, for their inclusion in the rotations of the different *Botrytis*-control programs in the field.