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I "ANDALUCÍA AGRO-HUB"
PhD students Meeting

March 11-12th, 2024

VENUE:
Instituto de Hortofruticultura Subtropical y Mediterránea "La Mayora"
Campus de Teatinos, Universidad de Málaga, Spain

eez Estación Experimental del Zaidín
IAS INSTITUTO DE AGRICULTURA SOSTENIBLE
IBVF Instituto de Bioquímica Vegetal & Fotosíntesis
IHSM La Mayora Instituto de Hortofruticultura Subtropical y Mediterránea
Instituto de la Grasa

The chitin-triggered immunity suppression mechanisms of a fungal pathogen as a target for disease control using a non-transgenic RNA interference approach

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Fungal pathogens are the main destructive microorganisms for terrestrial plants and pose increasing challenges for global agricultural production. Chitin is a vital building block for fungal cell walls and a widely effective inducer for plant immunity that, through chitin-triggered immunity, can defend plants against fungi attack. That is why the phytopathogenic fungi have developed different virulence factors that allow them to suppress the activation of this defensive response. In this study, we hypothesized that the molecular machinery of chitin-triggered suppression previously identified in the cucurbit powdery mildew *Podosphaera xanthii*, in particular the effectors involved in the modification of chitin immunogenic oligomers (CDA) and in their degradation (EWCAs), could be appropriate targets for new antifungal strategies. For this, a RNA interference (RNAi) technology that consists of the application of double-stranded RNA (dsRNA) designed to suppress the expression of target genes was used to evaluate these molecular mechanisms as potential fungal targets, first through cotyledon infiltration assays and second for disease control through the spray-induced gene silencing (SIGS) strategy. The results obtained using the RNAi strategy significantly reduces the development of the fungus and the symptoms of powdery mildew disease in melon. In addition, by protecting these dsRNAs with "carbon dots" nanoparticles, a significant prolongation of disease inhibition of powdery mildew was observed over time, suggesting that it holds great promise as a novel and precise method for controlling cucurbit powdery mildew.

This work is part of the R+D+i project PDC2021-121373-C21, funded byMICIN/AEI// 10.13039/501100011033 and by the "European Union NextGenerationEU/PRTR"