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Plant Genomics 2019: Virulence of Fusarium circinatum is associated with perturbation of phytohormone homeostasis in Pinus pinaster seedlings -Laura Hernandez Escribano - National Institute of Agricultural and Food Research and Technology

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Plants have developed complex molecular strategies to face the attack of a pathogen in order to maintain their survival, and phytohormones are known to play a crucial role in plant-pathogen interactions. The aim of this study is to elucidate the role of phytohormones in Fusarium circinatum virulence, the causal agent of pitch canker disease, known as one of the most important pathogens of conifers worldwide.

Methodology and Theoretical Orientation: For this purpose, by a dual RNA-sequencing approach, we determine the expression profiling of both organisms during the interaction at 3, 5 and 10 days post-inoculation.

Findings: Pinus pinaster showed moderate resistance at the early time points. This may be explained, at least in part, by the early recognition, the induction of pathogenesis-related proteins

and the activation of complex phytohormone signaling that involves crosstalk between three main protagonists: Salicylic acid, jasmonic acid and ethylene. Moreover, we hypothesise the key steps where the pathogen could be manipulating host phytohormone balance to its own benefit, contributing to pathogen virulence. Upon examination of the pathogen transcripts, we propose that F. circinatum prevents salicylic acid biosynthesis from the chorismate pathway by the synthesis of isochorismatase family hydrolase (ICSH) genes, perturbs ethylene homeostasis in the host by expression of genes related to ethylene biosynthesis, and could be blocking jasmonic acid signalling by COI1 suppression.

Conclusion and Significance: Targeted functional testing using F. circinatum mutants in future studies would be needed to support this hypothesis.