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Transcriptomic and metabolic analysis of the plant hormones signalling pathways in the resistant "Calcutta 4" and susceptible "Williams" banana genotypes during the interaction with the pathogenic fungus *Pseudocercospora fijiensis*

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Statement of the Problem: Bananas (*Musa* spp.) represent one of the most important crops throughout the world. Black Sigatoka disease (BSD), caused by the ascomycete fungus *Pseudocercospora fijiensis*, is still one of the main phytosanitary problems facing the crop.

Methodology: In order to understand the physiological mechanism behind the plant defences in *Musa* during the interaction with *P. fijiensis,* a transcriptomic and metabolomic analysis were led with two *Musa* genotypes differing in their resistance to the BSD development: The susceptible genotype "Williams" and the resistant genotype "Calcutta 4". RNA-seq with Illumina technology, Nuclear Magnetic Resonance and Mass Spectrometry were the analytical techniques used for sample analysis.

Findings: The results clearly showed a fast and early plant response in the resistant genotype "Calcutta 4", mainly with the induction of a group of genes and metabolites involved in pathogen recognition, hormonal signal transduction and pathogenesis-related proteins whereas a poor induction of those physiological responses were detected in the susceptible genotype "Williams".

Conclusion & Significance: Our results support new insights about the role of JA-Et signalling pathways play in the response of the resistant banana genotype Calcutta 4 during the pathogen attack. Furthermore, it opens the possibility to explore whether these defence mechanism reported here are similar for other resistant *Musa* genotypes.

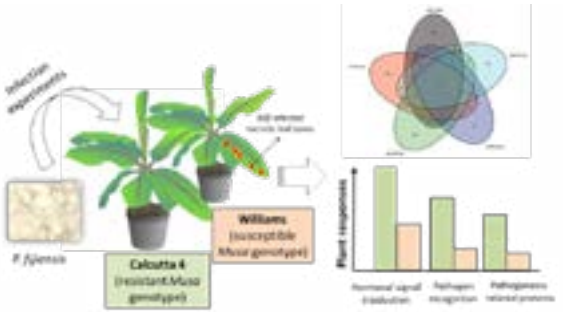

Figure 1: Schematic representation of the main biochemical responses induced during *Musa-M. fijiensis* interaction.

Recent Publications

1. Ospina F et al. (2017) Synthesis of positional isomeric phenylphenalenones. J. Org. Chem. 82(7):3873-3879.
2. Brkljaca R et al. (2017) Application of the Crystalline sponge method to revise the structure of the phenalenone fuliginone. Molecules. 22(2).pii.E211.
3. Ospina F et al. (2016) Synthesis of 8-Phenylphenalenones: 2-Hydroxy-8-(4-hydroxyphenyl)-1H-phenalen-1-one from *Eichhornia crassipes.* J. Org. Chem. 81(3):1256-1262.

4. Hidalgo W et al. (2016) Phenylphenalenones protect banana plants from infection by *Mycosphaerella fijiensis* and are deactivated by metabolic conversion. Plant Cell Environ. 39(3):492-513.

Biography

William Hidalgo pursued Master of Science Degree in Biotechnology from National University of Colombia (Colombia). He is a Chemist from University of Nariño (Colombia); Doctor in Natural Science from Friedrich Schiller University Jena (Germany). Since March 2017, he joined the Industrial University of Santander (Bucaramanga, Colombia) as an Assistant Lecturer and Researcher in the Chemistry School. His scientific background is focused on the study of plant chemical defenses especially in the biological system "Musa-*Mycosphaerella fijiensis*" (causing the Black Sigatoka Disease in Banana plants), biosynthesis of natural products (by using ^{13}C-tracer) and metabolomics studies by using NMR and MS spectrometry techniques. He has participated in several international conferences organized mainly by the International Society of Chemical Ecology and Latin American Association of Chemical Ecology, with a scientific contribution of ten international publications.

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