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METABOLICOFFEE – HOW PRIMARY METABOLISM MODULATES COFFEA SPP. - HEMILEIA VASTATRIX INTERACTIONS?

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Coffee leaf rust (Hemileia vastatrix) is the most important disease of Coffea arabica. This project aims to identify coffee's primary metabolic components essential for growth and development that are simultaneously involved in plant defense responses. We studied the interaction of two contrasting coffee genotypes [C. arabica S4 Agaro and Kawisari hybrid (C. arabica × C. liberica)] inoculated with different H. vastatrix races to establish compatible (susceptible - S) and incompatible (resistant - R) interactions. Mock-inoculated leaves were used as control (C). Leaves were collected during the infection process, and the fungal colonization was cytologically evaluated. Inoculated and mock-inoculated coffee leaves were prepared and, metabolites, proteins, and starch were extracted from a single sample using a fractionated extraction method. At IPK, metabolite analysis by GC-TOF was undertaken while using the Golm Metabolome Database (GMD). The microscopic evaluation of H. vastatrix pre-penetration stages revealed a high rate of urediniospore germination and appressoria differentiation over the stomata which ensured the success of the infection. For both genotypes, starch content increased along the infection process. A preliminary Principal Component Analysis (PCA) was performed on GC-TOF data showing a clear separation of the two coffee genotypes. In the Kawisari genotype, the PCA analysis of sugar-related features revealed an evident split between samples C, R and S, at each time point. The role of these metabolic features in the coffee defense responses will be discussed.