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Developing tools for Mycosphaerella fijiensis studies

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Mycosphaerella fijiensis is the causal agent of the black leaf streak disease, or Black Sigatoka, the most devasting fungal disease of banana around the world. Together with *M. fijiensis*, *M. musicola* and *M. eumusae* constitute the Sigatoka complex that causes significant effects on photosynthesis resulting in premature ripening of the fruit and consequent yield loss. The only solution has been costly and environmentally threatening fungicide control. *M. fijiensis* has a high diversity among subpopulations around the world and outcompetes *M. musicola* that is now mainly confined to higher altitudes. Meanwhile, *M. eumusae* is present on Pacific Islands and spreads into Asia and Africa. Despite the importance of these pathogens, their biology is largely unknown. We are developing genomic and molecular tools to improve the understanding of these pathogens. Protoplast isolation of Sigatoka complex pathogens enables the determination of electrophoretic karyotypes to study chromosomal variation among isolates from these pathogens. *M. fijiensis* isolate CIRAD086 (Cameroon) was sequenced and initial analyses indicate a genome size of 73.4 Mb, which is almost twice the genome size of the closely related *M. graminicola* pathogen of wheat. The genome sequence has a coverage of approximately 7.11X with 10,327 predicted open reading frames distributed over 395 scaffolds. In addition, three cDNA libraries from different *in vitro* conditions were developed and sequenced resulting in 32,392 ESTs. Altogether, this set of ESTs encompasses approximately 22.5 Mb of high quality sequence, with a 53.25% CG content and represent over 6000 unigenes. A set of 12 genes with a high expression profile in the different cDNA libraries as well as orthologs with known function in other pathogens were selected for further expression studies under *in vitro* and *in vivo* conditions.
This transcriptome database is an important resource for whole genome assembly and gene discovery in *M. fijiensis*.

Development of a detection method for Tropical Race 4 of Fusarium oxysporum f. sp. cubense

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Fusarium oxysporum f. sp. *cubense* (Foc) is the causal agent of Panama disease, the devastating threat that ruined the Gros Michel-based banana production in the early 1900s. The occurrence of a Foc *n*ew variant in South-East Asia that overcomes the resistance in Cavendish clones such as 'Gran Naine' is a major concern to current banana production worldwide. The threat imposed by this Foc variant, called Tropical Race 4 (TR4), could be counteracted by the introduction of