

## Preparing for Fusarium Wilt of Banana in Latin America and the Caribbean

### Supervisory team:

**Main supervisor:** Dr Daniel Bebber (University of Exeter)

**Second supervisor:** Prof Sarah Gurr (University of Exeter)

Dr Rachel Warmington (Eden Project), Prof David Studholme (University of Exeter), Prof Steve McCorrison (University of Exeter),

**Collaborators:** Dr Luis Pocasangre (EARTH University Costa Rica)

**Host institution:** University of Exeter (Streatham)

### Project description:

Fusarium wilt or Panama Disease, caused by the fungal pathogen *Fusarium oxysporum* f. sp. *cubense*, poses a potentially catastrophic threat to commercial banana production in Latin America and the Caribbean (LAC) due to the emergence of Tropical Race 4 (TR4) which has high virulence against the exported cultivar Cavendish. Efforts are underway globally to reduce disease dispersal and impact, via tissue culture variant selection, genetic modification, biosecurity measures, biological control and integrated pest management. While such measures offer hope, they must be commercially, economically and socially appropriate if they are to succeed. This PhD project comprises an interdisciplinary analysis of the potential impact of TR4 arrival in LAC and appropriate measures for its control. The project builds on ongoing work at Exeter University, in collaboration with UK and overseas collaborators. The project will have three components. Firstly, we will investigate the influence of soil microbes on suppression of TR4 in pot trials and in the field, in collaboration with the Eden Project in Cornwall. Research has shown that organic amendments like manure and biocontrol micro-organisms can enhance soil health and suppress TR4. The soil microbe community will be experimentally manipulated using additions of organic matter and available biocontrols. The effect of these amendments on infection will be tested on commercial Cavendish varieties, and the soil community monitored using DNA sequencing. Secondly, we will work with colleagues at Earth University in Costa Rica to establish larger field trials of organic soil amendments and biocontrols, to quantify responses of the soil microbiome and important organisms such as mycorrhizal fungi. Thirdly, we will conduct modelling studies in collaboration with the Exeter Business School and commercial partners in the UK and LAC, to determine the potential social and economic impact of TR4 arrival in LAC. Specifically, we will estimate the availability of organic soil amendments such as farm manure, the financial costs of their application, and their effects on soil fertility and banana yield in the absence and presence of TR4. We will model possible scenarios for the arrival and spread of TR4 in LAC, and estimate how different management responses would affect farmers financially. The models will help us to understand how TR4 could alter land use and agriculture in the region.