



▲ Setting up a garden experiment to evaluate specificity of a pathogenic fungus on a wide variety of plant species (host-specificity test)

▼ Experimental contamination of the grass *Taeniatherum caput-medusae* by the smut *Ustilago phrygica*



## Study of interactions in a Pathogen / Mycoparasite / Antagonist system for the development of an efficient pathogen biological control strategy



Cocoa pods

How to optimize the control in Africa, and in Cameroon in particular, of the most aggressive casual agent of the Black Pod Disease (*Phytophthora megakarya*, BPD) of cocoa? How to minimize the cost of treatments and to preserve the environment while maintaining the quality of cocoa? These are new challenges for the biological control of BPD.

In order to satisfy the increase in worldwide demand for cocoa, the general trend among farmers in Africa, where 69% of the worldwide production is concentrated, is to increase the size of cocoa plantations. This strategy is currently constrained by the intensification of disease pressure, mainly due to BPD, afflicting up to 90% of local production.

Given the absence of disease-resistant varieties of cocoa and the need to develop strategies that will both protect the environment through minimal use of fungicides and also be compatible with the cultural practices of the African farmers, more consideration has been given to an integrated pest management approach, including biological control of BPD.

Several isolates of the fungus *Trichoderma asperellum* collected in Cameroon have shown mycoparasitic and antagonistic properties and efficient control of the pathogen *P. megakarya* in laboratory bioassays under controlled conditions. Determining whether this candidate would be a good biological control agent in the field and developing methods to help reach this decision requires study of the population dynamics, genetics, and adaptive capacity of the pathogen under the pressure of this mycoparasite as well as research into the mechanisms underlying the interactions between *Phytophthora* and *Trichoderma*. In collaboration with the *Institut de Recherche Agricole pour le développement* (IRAD) in Cameroon, EBCL and Cirad have designed a developmental project with basic scientific questions involving biological control and: (i) evaluation of the diversity and population dynamics of *Trichoderma asperellum* and the main species of *Phytophthora* in Africa; (ii) investigation of their evolution in time and space (through functional genomics); and (iii) study of the mechanisms underlying the interactions within the Pathogen/Mycoparasite/Antagonist complex.

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