

RiPaBIOME

Rice pathogenic microBIOME: focus on bacterial and fungal within-plant pathogen interactions in West Africa.

ABSTRACT

Crop yields are threatened by numerous bioaggressors, so that successive or simultaneous attack of the same plant by various pathogen species is likely to be common within agrosystems. Such co-infections were recognized to modify the outcome of each infection, in terms of symptoms and multiplication of within-plant pathogen population, resulting in important epidemiological and evolutionary consequences.

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Flagship project : no

Project leader : Charlotte Tollenaere

Project leader's institution : IRD

Project leader's RU : IPME-PHIM

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Total budget allocated (including co-financing) : 19980 €

Funding : Labex

GOAL

Through a highly multi-disciplinary approach combining intensive field work, extensive molecular diagnostic, experimental assessment of interactions and population genetics, we will investigate the causes of the diversity of infection outcome in co-infection, the dynamics of within-host microbial assemblage, and the consequences of within-plant interactions.

The objectives are to document the epidemiology of important rice diseases within the agroecosystem and to provide an understanding of the complex interactions occurring when various pathogenic species co-infect the same plant.

RESULTS

The first task is to follow-up annual multi-pathogen epidemiological surveys of rice diseases. Farmer's interviews are associated with symptom observations and intensive sampling.

The second task is molecular diagnosis applying existing or newly designed multi-pathogen methods on collected leaf samples. Combining symptom-based observations and molecular diagnostic results will draw a comprehensive picture of the multiple diseases circulating in the studied rice fields.

Thirdly, we will perform experimental infections and co-infections to evidence positive or negative pathogen-pathogen interactions occurring in rice in co-infection context.

Finally, we will characterize the genetic composition and structure of pathogen populations for two emerging pathogens Xoc and Bo, in regard this presence/absence of co-infecting pathogen species. The identification of genetic structuration associated with the presence/absence of other pathogen species will be considered as evidence of a co-infection effect on pathogen evolutionary trajectory.

PERSPECTIVES

Taking into account the consequences of co-infection holds great promise for new insights to move forwards the “one plant / one pathogen” classical framework in plant pathology, and has important applications for the management of devastating rice diseases.