MIC-CERES

MIC-CERES - Microbial eco-compatible strategies for improving wheat quality traits and rhizospheric soil sustainability

ABSTRACT

Wheat (Triticum aestivum L. subsp. aestivum) is one of the most important sources for food, animal fodder and industrial raw materials. These past years, world-wide wheat production has not met demand, largely due to the adverse effects of climate change among others. Natural biofertilizers and bioprotectors are an environmentally friendly approach to increase crop yield, but we need to improve our understanding of the interactions between these microbes (either bacteria or fungi) and their host. The MIC-CERES project (http://umr-lstm.cirad.fr/principaux projets/mic-ceres) aims at describing the microbiome associated to tender wheat in different countries and to characterize the wheat response (by physiology, transcriptomic and proteomic approaches) to inoculations by phytobeneficial bacteria and endomycorrhizal fungi. Here we describe the first data of the wheat response to phytobeneficial microbes.

Keywords : Agroecology, Plant, Bio-aggressor, Cultivation technique, Gene expression, Protein/proteomic, Symbiosis, wheat

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Project type : AAP
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Flagship project : no

Project leader : Lionel Moulin
Project leader's institution : IRD
Project leader's RU : LSTM

Budget allocated : 282737 €
Total budget allocated (including co-financing) : 491805 €
Funding : Labex

GOAL

To characterize the wheat responses to beneficial and harmful microbes by both transcriptomic (RNAseq) and proteomic (proteome and phosphoproteome) analyses to better understand the wheat-microbes interactions.

ACTION

WP 1: Profiling of the wheat root-associated microbiomes
WP2 : Identification of inoculation parameters that maximize wheat performance under different environmental conditions
WP3 : Evaluation of molecular responses of wheat to beneficial microbes
WP4 : Field experiments in different agro-social-economic ecosystems
WP5 : Dissemination and training

RESULTS

1. Wheat inoculated with A. brasilense and G. mosseae (alone or combined) grew 2 to 3 times higher compared to control plants
(Fig 1 a&b).
2. The roots of plants inoculated by B. graminis weighed twiced over the control.
3. Glomus mosseae increase wheat growth and is able to reduce significantly the lesion length in leaves inoculated by the
pathogen Xanthomonas translucens (Fig 1 c).

PERSPECTIVES

The first results of the project show that wheat inoculation by arbuscular mycorrhizal fungi (G. mosseae) and symbiotic beneficial bacteria (A. brasilense and B. graminis) are compatible and produce significant phenotypes (growth, biocontrol). The next step is to analyze these plant phenotypes by transcriptomics and proteomics to decipher the mechanisms underlying the growth increase and resistance to the X. translucens infection.