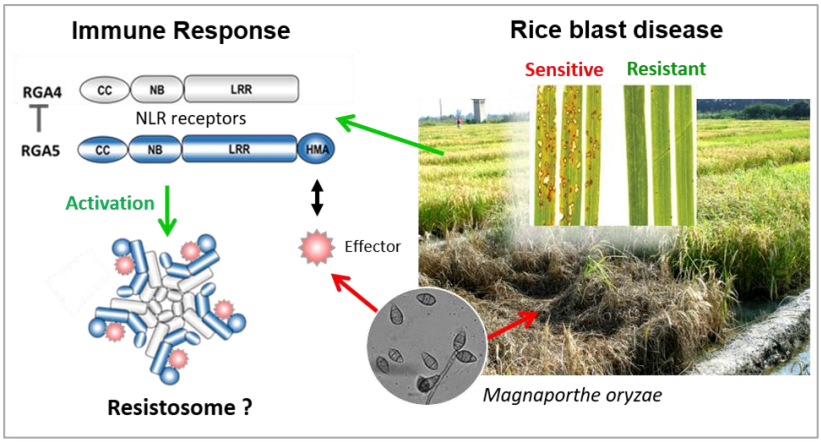
Proposition de stage de Master 2
au Centre de Biologie Structurale, Montpellier

BASES STRUCTURALES DE LA REPONSE IMMUNITAIRE PAR LES RECEPTEURS NLR RGA4 ET RGA5 DU RIZ

STRUCTURAL BASIS OF THE IMMUNE RESPONSE BY THE NLR RECEPTORS RGA4 AND RGA5 FROM RICE

Laboratoire: Centre de Biologie Structurale, INSERM/CNRS/Univ. Montpellier
Site web : www.cbs.cnrs.fr
Encadrant: Nathalie DECLERCK
Techniques : biologie moléculaire, biochimie préparative de protéines recombinantes, caractérisation biophysique et structurale, modélisation de structures 3D.
Contact : nathalie.declerck@cbs.cnrs.fr

Début du stage : entre le 1/01/2022 et le 1/02/2022
Durée du stage : 6 mois



The general objective of this project is to generate in-depth knowledge of the immune receptors in plants that make crops resistant to major pathogens. Ultimately, this research will contribute to the development of sustainable agriculture aimed at reducing the use of pesticides and improving crop yields by improving plant varieties and agricultural practices that preserve the environment and human health.

Our research focuses on the pair of immune receptors RGA4 and RGA5 from rice that act together to provide natural resistance against blast disease. Blast disease is caused by the fungus *Magnaporthe oryzae* and constitutes a major threat to world cereal production. RGA4 and RGA5 belong to the family of NLR (nucleotide-binding (NB) and leucine-rich repeat (LRR)) type proteins, the most important class of immune receptors and disease resistance proteins in plants. Upon binding of effector proteins secreted by the invading pathogen, NLRs rearrange into a macromolecular assembly called a resistosome that triggers the immune response, preventing the pathogen from spreading to the rest of the plant. The structure of the resistosome formed by singleton NLRs has been described recently but that formed by NLR pairs such as RGA4/RGA5 is still unknown.

The Master's student will join the group "Structural basis of plant immunity" of the CBS which has been collaborating for many years with INRAE to study the structure and activation mechanism of RGA4/RGA5, with the aim of engineering novel receptors providing improved resistance to crop disease. This work is based on a strongly interdisciplinary and integrative approach combining protein biochemistry, structural biology and biophysics, bioinformatics and plant molecular genetics. Current efforts are focused on the production of whole proteins and complexes for structural studies by crystallography and cryo-electron microscopy but also by innovative approaches of fluorescence correlative microscopy and mass spectrometry. During the internship, the Master's student will have the opportunity to contribute to different aspects of the ongoing work and to use different experimental techniques for the production and structural characterization of recombinant proteins.

This project is supported by an ANR grant that includes **funding for a PhD fellowship starting September 2022** on the internship topic.