INTEGRALE

Systemic biology of the plant/pathogen relation

Pathosystem model for an incompatible interaction: Arabidopsis thaliana /Phytophthora infestans

Type of activities: Research

Financing: Moerman project

Keywords: *Arabidopsis thaliana*, *Phytophthorainfestans*, microscopy, MAP, resistance.

Duration: February 2011 – February 2014

Dernière mise à jour: 2 March, 2012

Context :

The plants are constantly subjected to the attack of pathogens agents. However, in the natural ecosystems, the disease remains the exception opposed to our agrosystem completely depend of the pesticides. This sensitivity of cultivated species of plants is allotted to the resistance gene loss during them selection processes. In this context and in order to produce varietal sets more resistant to the diseases, it is essential to analyze and understand the complex molecular mechanisms associated at these resistances, particularly for the wild species similar to cultivated species or for model species such as *Arabidopsis thaliana*and*Medicagotruncatula*.

Description of the project :

Objectives

The objectives of the project are:

1) The use techniques of systemic biologyto analyze the network of interactions proteins/proteins whichles réseauxd'interactionsprotéines/protéineswhich determinethe "not host" relationbetween *Arabidopsis thaliana* and*Phytophthora infestans*.In experiments, this approach is based on the technologies of two-hybrid screening andof native electrophoresis on polyacrylamide gel.

2) The spatial-temporal observations of dynamic of H2O2, based on a molecular probe, by use fluorescent microscopy and confocal microscopy, during interaction between*Arabidopsis thaliana* / *Phytophthora infestans* (figure 1).

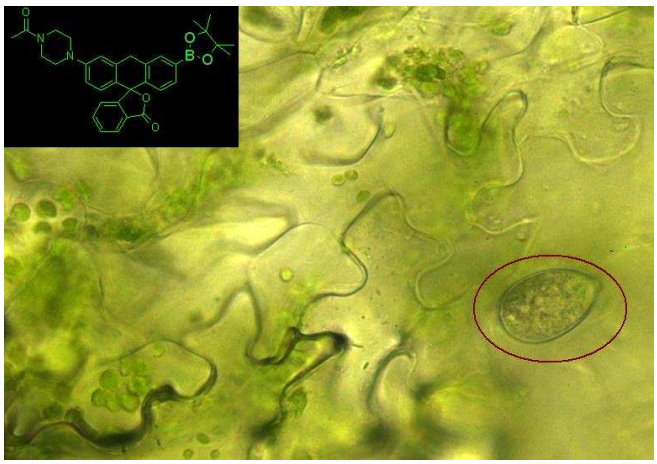

Figure 1: GX600, BF. Sporangiaof*P. infestans* (surrounded in red) putted on epidermal cellsof*A. thaliana*. In top on the left, sthe fluorescent probe structure.

Expected results

A best comprehension of plant/pathogen interactions will allow the development of sets of news pathway for crops managements against plant diseases.

CRA-W contribution

The CRA-W places at the disposalall infrastructures for growth, with controlled condition, of plants and *P. infestans*. The laboratory is equipped with all basic material to practice the molecular biology. A platform of microscopy is also accessible.

Main partners:

This project is one of the orientations of a biggest project entitled: "Systemic approach of interactions protein-proteins networks during plant/biologics agents relation" (Acronym: PLANTINTERACT). The participants being:

- TheGembloux agro bio tech with:
  - L'unité de Biologie animale et microbienne

Centre wallon de Recherches agronomiques

Wallonie

- Le Centre de Biologie cellulaire et moléculaire
- L'unité de bio-industrie
- L'unité d'entomologie fonctionnelle et évolutive
- Le centre de biophysiologie moléculaire numérique

- The CRA-W with :
  - Life Sciences Department
  - Valorisation of Agricultural ProductsDepartment
- The UCL,Departement of Chemistry, Institute of Condensed Matter and Nanosciences, Molecules, Solids and Reactivity

CRA-W Staff:

Sergio Mauro, Pascal Veys, Quentin Ledoux, YordanMuhovski et Cindy Wallon.

Contacts :

Sergio Mauro, Yordan Muhovski
CRA-W – DptScience du Vivant
Chée de Charleroi, 234
B 5030 Gembloux
Tel : +32 (0)81 62 73 83
Email : mauro@cra.wallonie.be, muhovski@cra.wallonie.be

Quentin Ledoux
CRA-W Département Valorisation des Production Agricoles
Chaussée de Namur, 24
B 5030 Gembloux
Tel : +32 (0)81 62 03 82
Email :q.ledoux@cra.wallonie.be

Publications

Ledoux, Q. , Marko, I. , Veys, P. , Mauro, S. (2011). *Plant/Pathogen Interaction: New Method to Monitor H_2O_2 Production in Living Cells*. Poster in: The 15th Sigma-Aldrich Organic Synthesis Meeting – Sol Cress Spa – Belgium, 01-02/12/2011.

Centre wallon de Recherches agronomiques
Wallonie