# Albilineans Microarray

## Gene expression analysis of Xanthomonas albineans during leaf scald in sugarcane

### ABSTRACT

Action 1: Carrying out expriments to study gene expression during sugarcane leaf scald pathogenesis

Xanthomonas albilineans is the causal agent of leaf scald disease of sugarcane, and a xylem-invading plant pathogenic bacterium. The objective of this project is to identify candidate genes by investigating the full breadth of the response of X. albilineans to sugarcane host environment during the colonization of the xylem .
Bacterial gene expression will be quantified using the microarray technology that was recently successfully used by Professor Caitilyn Allen to investigate the full breadth of the response of Ralstonia solanacearum to tomato environment.

Custom microarrays specific to the transcriptome of the X. albilineans strain GPE PC73 were designed and produced by NimbleGen (Madison, WI, USA). These arrays are specific to following sequences:
- the 3209 protein-coding sequences annotated in the genome of the X. albilineans strain GPE PC73,
- all intergenic regions identified in the genome of the X. albilineans strain GPE PC73,
- 505 ESTs of Saccharum officinarum corresponding to either orthologs of rice genes involved in defense mechanisms or either EST present in many copies (30 à 300) in the databases which therefore may be constitutively expressed.

We prepared sugarcane plants infected by the X. albilineans strain GPE PC73. We prepared total RNA from several samples collected on the stem of these sugarcane infected plants. To prepare these total RNA, we used the protocol developped by Professor C. Allen to prepare RNA from samples collected on the stem of tomato plants infected by R. solanacearum, a pathogenic bacterium that spreads into the xylem. We also prepared total RNA from liquid cultures of the X. albilineans strain GPE PC73. These RNA will be soon analysed by Nimblegen using the arrays produced as part of this project. The Professor Caitilyn Allen's team will participate to the statistical analyses of the microarray experiments. Differential analyses of microarrays experiments of RNA prepared from samples collected on the stem of infected sugarcane plants or from liquid cultures will lead to the identification of gene expressed during sugarcane leaf scald pathogenesis.

Action 2: Teaching Activities at Montpellier SupAgro
- Diagnostique et gestions des maladies bactériennes des plantes tropicales (Diagnosis and management of bacterial diseases of tropical crops). Three-hour intensive module for 22 Tropical IPM Masters students from francophone Africa at Montpellier SupAgro (January 26, 2009).
- Biologie évolutive et diversité du vivant (Evolutionary Biology and Diversity of Life) – Two-hour lecture on the evolution and phylogeny of plant pathogenic bacteria. Fifteen Montpellier SupAgro Master's students (April 20, 2009).
- Member of the Advisory Committee of Ph.D. student Melanie Marguerettaz (ED SIBAGHE, Université Montpellier 2, France; Monique Royer, Thesis Advisor)

**Keywords :** Microscopic (Gene/cell), Plant disease, Gene expression, Sugar cane

**Year :** 2008
**Project number :** 0802-012
**Type of funding :** AAP
**Project type :** AAP
**Research units in the network :** LGDP
**Start date :** 2008-10-15
**End date :** 2009-07-15

**Flagship project :** no

**Project leader :** Monique Royer
**Project leader's institution :** CIRAD
**Project leader's RU :** BGPI-PHIM

**Budget allocated :** 21340.62 €
**Total budget allocated ( including co-financing) :** 21340.62 €
**Funding :** RTRA

## PERSPECTIVES

Action 1: The candidate genes identified by the microarray analyses will be further studied. The expression of these genes will be studied by quantitative RT-PCR in the samples collected from the stem of sugarcane plants inoculated with the X. albilineans strain GPE PC73. Functional analysis of these genes will be performed with knockout mutants in which these genes will be inactivated. Professor Caitilyn Allen will partipate to this future project.

Action 2: Professor Caitilyn Allen will participate to the future student exchange programs between University of Wisconsin-Madison and Montpellier SupAgro. She also will partipate to the Advisory Committees of the future Ph.D. students of BGPI who will study pathogenicity of X. albilineans.