FALDIM

Project title: **F**ormation of **A**pple-Phytoalexins and their detection by **L**aser **D**esorption **I**onization and related **M**ethods.

Acronym**: FALDIM**

Project duration: 36 months – Start date: 1.10.2017 End date: 30.09.2020

Key-words: Apple, Phytoalexins, Matrix Assisted and Matrix Free Laser Desorption Ionization, Fingerprint Analysis, Resistance, *Erwinia amylovora* , *Venturia inaequalis*

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Financial support from « Objectif Végétal »: 90,8 k€ (PhD grant from University of Angers)

Summary :

Context: Apple is an economically very important plant in modern agriculture and intensively treated with pesticides. Although very efficient in preventing diseases like apple scab and fire blight, the extensive use of pesticides causes a heavy environmental burden. Alternative concepts of plant protection therefore target the stimulation of the plant's immune system in order to fight infections. Phytoalexins are antimicrobial plant metabolites that are formed in response to infections and considered a key- factor in plants' immune defense. However the mechanisms of their formation as well as their chemical composition are barely explored. One reason for this lack of knowledge may be that conventional analytical methods (i.e. LC-ESI-MS) are unable to detect the totality of interesting compounds in a complex mixture.

Goals: The proposed project will apply, for the first time, a new analytical approach based on laser desorption ionization (LDI) to analyze infected apple tissues. Having a wider analytical window than conventional methods it is expected to identify new phytoalexins that are formed during infection process and to elucidate underlying metabolic mechanism. Eventually those compounds formed in sufficient yields will be isolated and used for further studies.

Methodology: Plants treated with an immune system activating agent (plant resistance inducers) as well as those exhibiting natural resistance and those of a susceptible control group will be all infected with apple scab and/or fire blight. Samples at different stages of the infection will then be analyzed by LDI but also by conventional analytical methods. Results will be compared in terms of the metabolomics profile of the three plant groups as well as in terms of the applied analytical methods. This will allow finding a well-adapted analytical strategy for a given sample set. Finally phytoalexins that are formed in large quantities will be isolated using chromatographic methods.