Cellular compartment metabolomics: unravelling apoplast dynamics in grapevine-*Plasmopara viticola* interaction

Place of work/: GPS lab, C2 building, lab 37, office 48. BioISI, FCUL and LCP–A2MC - Laboratoire de Chimie et Physique - Approche Multi-échelles des Milieux Complexes (LCP-A2MC), Université de Lorraine, Metz, France

Supervisors: Andreia Figueiredo (FCUL) and Vincent Carré (LCP-A2MC)

Contact: (Email): aafigueiredo@fc.ul.pt

Apoplast is the first hub of plant-pathogen communication where pathogen effectors are recognized by plant defensive proteins and cell receptors, thus activating signal transduction pathways. As a result of this first contact, the host triggers a defence response that involves the modulation several signalling and stress molecules. Grapevine is a highly relevant crop in the world economy and one of the most polluting industries. The European elite grapevine cultivars are highly susceptible to various pathogens and several phytochemical applications each growing season are made to control the main grapevine pathogens. In the last years, there is an increasing demand for more sustainable agricultural practices, with several guidelines being established within the European Union (Directive 2009/128/EC) which fosters the need to develop new approaches to reduce the use of these phytochemicals.
Being the apoplast a communication hub in plant-pathogen, its metabolic characterization can lead to a better understanding of grapevine response mechanisms and the definition of more sustainable disease control approaches.
In this proposal, grapevine apoplastic fluid collected at several time-points of interaction with *Plasmopara viticola* will be analysed through an untargeted metabolomics approach by LC-MS/MS. High performance liquid chromatography system connected to a Fourier Transform Ion Cyclotron Resonance mass spectrometer will be used. To achieve the best compound separation, different separation conditions will be tested, and analysis conditions will be established. To confirm chromatographic peak assignment, MS/MS will be systematically conducted on the most intense mass peaks of each mass spectrum. Data will be analysed by different databases and the fragmentation patterns of unknown analytes will be compared with available chemical spectral libraries. The candidate will also benefit from the support of Marisa Maia at LCP-A2MC (also a member of GPS Lab), expert in HRMS for grapevine metabolomics. Putative metabolites will be assigned to biochemical pathways and the expression of genes associated to those biochemical pathways will be assessed by qPCR.
This thesis will be developed in Portugal (sample preparation, data analysis, pathway mapping and gene expression) and France (metabolomic analysis).

If you are interested contact us – ERASMUS+ program deadline 31st May
The student assigned for this proposal is eligible for a BioISI Junior fellowship (6 months).