Proposition d'un sujet de stage au M2 ADAM (2019)

Titre	**Involvement of reactive oxygen species in signalling cross-talk in *Medicago truncatula* biotic interactions**
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Equipe(s)	**Equipe Signalisation Symbiotique, LIPM** Acceptez-vous que ce sujet soit également proposé à l'itinéraire PRO ? OUI ▣ NON ☐
Résumé	Plants establish symbiotic interactions with soil microbes that lead to improved plant nutrition. Thus, most plant roots can be colonised by arbuscular mycorrhizal (AM) fungi, and legume plants are also infected by nitrogen-fixing bacteria. Both the AM and the Rhizobium-legume (RL) symbioses require fine-tuning of plant immunity, but little is known about the interconnections between symbiotic and defence signaling pathways. In *Medicago truncatula* we have identified two LysM domain receptor proteins called MtNFP (for Nod Factor Perception) and MtLYK9 (LysM Receptor Kinase 9) that have dual roles in controlling symbiosis and plant immunity. Furthermore, while both proteins control plant immunity, they each specifically also control establishment of one symbiosis; the RL symbiosis for NFP and the AM symbiosis for MtLYK9. This suggests different mechanisms of control of immunity for different symbioses. One important component of both immune and symbiotic signaling is the regulation of reactive oxygen species (ROS) production via NADPH oxidases (RBOHs). **Objectives : To (i) determine the roles of ROS during symbiotic signalling and (ii) provide insights into the tight crosstalk that exists between symbiotic and defence signalling processes.** For these purposes, we have mutants in 2 *M. truncatula MtRboh* genes that have interesting symbiotic expression profiles, and we have set up new biosensors to measure the *in vivo* spatio-temporal dynamics of ROS production during plant-microbe interactions. To help understand how the same protein can control such contrasted outcomes, we have generated new point mutations in MtNFP that have novel phenotypes. **Methods**: Characterisation of *Mtnfp*, *Mtlyk9* and *MtRboh* mutants for their symbiotic and defence-related phenotypes; early detection of ROS production in WT and mutant plants in response to microbes or symbiotic and immune-related molecules, using biosensors and different detection methods (colorimetry, fluorimetry, confocal microscopy). Q RT-PCR of symbiotic and defence-related genes in WT and mutant plants in response to microbes or symbiotic and immune-related molecules. **References**: Gough C and Jacquet C. (2013) The Nod factor perception protein carries weight in biotic interactions. Trends in Plant Science. 10.1016/j.tplants.2013.06.001 Damiani I ….. Pauly N, Sentenac H. (2016) Nod factor effects on root hair-specific transcriptome of Medicago truncatula: Focus on plasma membrane transport systems and reactive oxygen species networks. Frontiers in Plant Science. 10.3389/fpls.2016.00794 Gibelin-Viala C, … C, Jacquet C, and Gough C. (2019). The *Medicago truncatula* LysM receptor-like kinase LYK9 plays a dual role in immunity and the arbuscular mycorrhizal symbiosis. New Phytologist. 10.1111/nph.15891