Opine-niche construction and plasmid Ti transfer

Julien LANG, Armelle VIGOUROUX, Yves DESSAUX, Solange MORERA and **Denis FAURE***

Institute for integrative biology of the cell, CEA, CNRS, Université Paris-sud, Université Paris-Saclay, 91198 Gif sur Yvette CEDEX, France

* denis.faure@i2bc.paris-saclay.fr

Agrobacterium tumefaciens directs the production of opines in the transformed plant host, hence the construction of the opine niche. Some opines activate a quorum-sensing regulatory process that controls the conjugative transfer of the Ti plasmid.

We investigated how the constructed niche modulates propagation of the Ti plasmid in *A. tumefaciens* C58 population colonizing the plant tumor. We measured the fitness advantage conferred by the opine nopaline to the *A. tumefaciens* pathogens carrying the Ti plasmid (Lang et al 2014). However, we showed that gamma-aminobutyrate (GABA), which accumulates in plant tumor niche, downregulates quorum-sensing and Ti-transfer in the hosting pathogens because of the BlcC lactonase expression (Lang et al 2016 New Phytologist). Recently, we investigated niche extension process in nopaline-type *A. tumefaciens* C58. We showed that despite the possibility for the nopaline-type *A. tumefaciens* C58 to extend its niche through assimilation of octopine in the presence of nopaline, this pathogen had no selective advantage over octopine-type *A. tumefaciens* R10 in tumors resulting from a co-infection. A single nucleotide polymorphism in the *nocR* gene was sufficient to allow octopine assimilation by nopaline-type strains independently of the presence of nopaline. However, by comparing *nocR* mutantsa with their wild-type ancestor, we observed a fitness increase in octopine-rich transgenic plants, and a fitness decrease in tumors induced by octopine-type pathogen. Overall this work highlights the role of plant host and fitness trade-off in driving plant *A. tumefaciens* populations and Ti plasmid dynamics in the opine niche.

J. Lang, A. Gonzalez-Mula, L. Taconnat, G. Clement, D. Faure. 2016. The plant GABA signaling downregulates horizontal transfer of the *Agrobacterium tumefaciens* virulence plasmid. New Phytologist 210(3): 974–983.
J. Lang*, A. Vigouroux*, S. Planamente, A. El Sahili, P. Blin, M. Aumont-Nicaise, Y. Dessaux, S. Moréra and D. Faure. 2014. *Agrobacterium* uses a unique ligand-binding mode for trapping opines and acquiring a competitive advantage in the niche construction on plant host. PLoS Pathogens 10(10): e1004444. * equal contribution