
Niche construction of the pathogen *Agrobacterium tumefaciens* in plant host: a functional genomics insight

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Abstract

The *Agrobacterium tumefaciens* virulence genes and T-DNA are carried by the tumor-inducing (Ti) plasmid. When transferred into the plant host nucleus, the *A. tumefaciens* T-DNA directs the synthesis of the plant hormones auxin and cytokinin, and that of the opines nopaline and agrocinopine. We combined plant and bacterial genomics and transcriptomics, as well as metabolomics to investigate the opine-mediated niche construction processes and virulence plasmid horizontal transfer in the plant pathogen *A. tumefaciens*. We measured the selective advantage conferred by the assimilation of the nopaline when *A. tumefaciens* colonizes the constructed niche that is the plant tumor (Lang et al. 2014 PLoS pathogens). We characterized the matured signal (arabinose-2-phosphate) deriving from the opine agrocinopine that is the "true" activator of quorum-sensing and Ti-plasmid transfer in *A. tumefaciens* (El Sahili et al. 2015 PLoS Pathogens). We showed that the GABA level in plant tumor downregulates quorum-sensing in the hosted pathogen population, hence reducing the dissemination of the virulence genes by conjugative transfer (Lang et al 2016 New Phytologist). Combining all these data, we propose an integrative and dynamic model of the niche-construction process that occurs when the *A. tumefaciens* pathogen population infects and invades the plant host.

Keywords: niche construction, pathogen, plant host, genomics, transcriptomics, metabolomics

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