

## The genetics of plant-plant interactions

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Plant-plant interactions like competition are ecological and evolutionary processes that deeply influence natural communities. Studying their underlying mechanisms may be a key to understanding the structure and functioning of plant communities, which may in turn help to predict the response of plant communities to global change. However, we are only beginning to understand the genetics of competition. Notably, the identity of the genes involved in plant competitive ability still deserves deeper investigation. This exciting challenge calls for a multidisciplinary approach at the frontier between evolutionary ecology and genomics.

In this study, we adopted an ecological genomics approach to test whether the genetics of competitive ability of a local population of the model annual plant *Arabidopsis thaliana* was dependent on the identity of the competitor species. In a common garden experiment, the response of 48 *A. thaliana* genotypes to competition was estimated by looking at a suite of nine plant traits (including a proxy of seed production) in six competitive environments: absence of competition, intraspecific competition and interspecific competition with four species frequently associated with *A. thaliana* in natural plant communities (i.e. *Poa annua*, *Stellaria media*, *Trifolium repens* and *Veronica arvensis*). In addition, the biomass of its corresponding competitor was estimated in order to quantify the competitive effect of *A. thaliana*.



*Plant-plant interaction. Photo provided by authors.*

We showed that variation in the identity of the competitor might promote maintenance of genetic variation of *A. thaliana* at the local population scale and species coexistence at the community scale. We also demonstrated that the optimal strategies of *A. thaliana* in response to competition depend on the identity of the competitor species. Finally, we found that the genomic regions associated with the response of *A. thaliana* to competition depend on the identity of the competitor. This genomic map allowed us to identify the candidate genes related to plant-plant interactions.