M1 internship proposal

Characterization of the phenotypic variability of an interspecific peach x almond population against different pests and diseases

The future of fruit production lies in the production of quality fruit in low input systems. The peach tree is sensitive to many pathogens and pests, including viruses, fungi and insects. Prophylactic measures are insufficient and chemical control is widespread. These current practices are problematic from an environmental and health point of view and could encourage the emergence of resistant strains. The pool of resistance alleles available within the *Prunus persica* species is limited to feed variety breeding programs. For some targets, no resistance gene could be detected in the species. For other targets, major genes have been identified, raising questions linked to the durability of the resistances they confer. We are therefore looking for other sources of resistance in close species, such as the almond tree.

Objectives

In this context, and in collaboration with V. Decroocq (INRAE BFP Bordeaux), we have created an interspecific F2 peach x almond population from the self-fertilization of 2 individuals from a cross between Honey Blaze, nectarine of very good agronomic value, and DelCid, almond tree resistant to sharka. This population was genotyped by resequencing by colleagues from Bordeaux. Confined greenhouse tests have started to characterize the level of resistance of each individual in the population to the sharka virus (PPV). Parents of the population have partial resistance to green peach aphids and powdery mildew.

The objectives of the internship are to characterize this population for resistance to sharka, green peach aphid and powdery mildew, so as to conduct genetic analyzes and identify areas of the genome controlling these resistances.

Available material and infrastructures

The population includes 170 individuals. It was multiplied by grafting to allow, by controlled infections in different infrastructures, phenotyping of resistance (i) to sharka of 4 copies of each individual in a greenhouse of quarantine pest and (ii) to green peach aphid, in an insect-proof tunnel. Phenotyping of resistance to powdery mildew will also be carried out if the inoculum develops well in a tunnel.

During the internship, the student
will acquire skills in plant pathology, quantitative genetics and plant experimentation,
will learn to:

- grow peach trees in greenhouse and tunnels
- breed and multiply green aphids (*Myzus persicae*)
- inoculate plants, monitor and rate symptoms
- perform ELISA tests (detection of PPV virus)
- accomplish statistical analyses using R software
- discuss results, write a report and make an oral presentation

Hosting lab

DADI team: 'Diversity, Adaptation, Determinants and Integration' focuses on tomato and Prunus species
GAFL Research unit: Genetics and Breeding of fruit and vegetables
INRAE, Domaine St Maurice, BP 94, 84143 Montfavet Cedex

Responsibles for the internship

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Period : march-june 2021

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