**Proposal for a 6-month internship in 2022 (Master 2 degree):**

**Use of QTLs conferring resistance to late blight: genetic mapping in an interspecific tomato progeny and introgressions in a cultivated genetic background.**

As part of a previous project (DG-PHYTOM), chromosomes carrying resistance QTLs to late blight have been identified by the QTL-seq strategy, based on the sequencing of DNA bulks from plants exhibiting extreme phenotypes (Takagi et al. 2013, Plant J). These QTLs originate from accessions belonging to wild species, related to tomato. The confidence interval of the QTLs is quite large, covering almost the entire chromosome(s).

To decrease the size of the confidence interval of resistance QTLs, the student will develop locus-specific molecular markers (KASP markers, Semagn et al. 2013, Mol Breed) to genotype 200 F2 plants from an interspecific progeny. He will phenotype these plants for resistance to late blight. The genotyping and phenotyping data will be used to precisely map the QTLs involved in resistance, using dedicated QTL mapping software(s).

The newly mapped QTLs and others previously mapped by the team, will be introgressed into Rose de Berne, an heirloom cultivar of tomato, by marker-assisted breeding. The student will genotype backcross progenies with markers flanking QTLs and with markers distributed on other chromosomes, in order to select the plant with resistance allele(s) at the QTL(s) and with the genetic background of the cultivated parent on most of the rest of the genome. He will make the crosses using the selected plants as male parents, and extract the seeds from the fruits. Plants of BC6 generations will be further used, in the frame of the CapZeroPhyto project, to evaluate the durability of resistance to late blight.

Location of internship:

INRAE, UR1052, Unit Genetics and Breeding of Fruit and Vegetables

Team: Resistance to pests and pathogens, Diversity and Durability (ReDD)

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