Implanteus Graduate School
Academic Year 2021 – 2022

M1 internship proposal

Investigating the factors that modulate peach leaf curl infection

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. Leaf curl is particularly problematic. It's a fungal disease caused by the fungus *Taphrina deformans*. It affects the blossoms, fruit, leaves, and shoots of peaches and nectarines. Symptoms appears in spring as reddish areas on developing leaves. These areas become thick and puckered causing leaves to curl and distort. A significant development of this disease on the tree can lead to its weakening by loss of the foliage, to the loss of the crop caused by the dieback of the terminal branches and can lead to the death of the tree. The development of this fungus is affected by the efficiency of spore diffusion, which depends on climatic conditions. Indeed, precipitation, the duration of wet periods, temperature and the stage of development of trees are determining factors for its development (Rossi et al., 2006). Until now this disease has been well controlled by the use of fungicides. But it is problematic for the cultivation of organic peaches and is also in the perspective of reducing the use of pesticides.
A better understanding of peach leaf curl disease is needed to guide further researches.

Kay words: agro-ecology, epidemiology, mycology, genetic diversity

Objectives
The objectives of the internship are to progress in our knowledge of peach leaf curl disease and to decipher the factors that modulate the infection. Tree phenology, environmental variables and genetic diversity are the three main factors that will be studied.
The objectives will be addressed via:
- an in-depth bibliographic research
- scoring tree phenology and leaf curl symptoms in orchard
- a comprehensive analysis of available data

Available data and material
- observations from untreated orchards for varietal evaluation in experimental stations on three sites (Gard, Drome, Pyrénées-Orientales):
  - ~ 36 varieties monitored from 2017 to 2020 (4 years of grading) for 2 sites
  - ~ 21 varieties monitored from 2019 to 2021 (3 years of scoring) for 3 sites
- corresponding phenological notations
- meteorological data from the two sites
- INRAE orchards hosting a collection of large diversity and segregating progenies

During the internship, the student
will acquire skills in bibliographic search, plant pathology, plant experimentation, data analyses
will learn to:
- write a bibliographic review
- report and exchange with specialists of different disciplines, interact with professionals
- record observations in orchard
- 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 2022