

IMAS MASTER Proposal of M2 Internship

Academic Year 2023 - 2024

PROJECT TITLE AND SUMMARY:

Development of a molecular method for the detection of *Oidium neolycopersici* and application to the exploration of its reservoirs and its quantification in the air.

This internship is part of the ANR BEYOND project which aims to set up epidemiological surveillance and prophylaxis of plant diseases based on observations both near and distant (<https://beyond.paca.hub.inrae.fr/>). One of the objectives of the project is to develop new molecular detection tools for plant pathogens, including the obligate biotrophic ascomycete fungus *Oidium neolycopersici*, the main causal agent of tomato powdery mildew in greenhouses (Kiss *et al*, 2001. *Myc. Res.*; Bardin and Gullino, 2020. *Plant pathology in the 21st century*).

Under laboratory conditions, this fungus has been shown to attack various plant species from different botanical families in addition to tomato (Whipps *et al*, 1998. *Plant Pathol.*; Huang *et al*, 2000. *Plant Pathol.*), but knowledge of the host plants that this fungus can attack under natural conditions is lacking. How the inoculum of this fungus is perpetuated between growing seasons on alternative hosts (wild or cultivated) is therefore unknown. However, such knowledge is essential to reduce the primary inoculum of the fungus and thus better manage epidemics.

Various protection tools, including biocontrol (microbial preparations, plant extract or salts), are available to manage the disease in greenhouse tomato crops. Treatments are carried out either as a preventive measure on a systematic basis, or as a curative measure as soon as symptoms appear, with results that are sometimes unsatisfactory for each strategy. Positioning treatments according to the presence of inoculum of the fungus in the air surrounding the tomato crop may improve the efficacy of protection while reducing their use.

In order to determine the reservoirs of *O. neolycopersici* and quantify the spores present in the air before the disease appears on tomatoes, it is necessary to develop reproducible, sensitive and selective tools to detect and quantify the fungus.

HOST UNIT:

Unité Pathologie Végétale –INRAE PACA center (https://www6.paca.inrae.fr/pathologie_vegetale)

MAIN ACTIVITIES:

In recent years, a molecular test for the quantification of tomato powdery mildew by qPCR has been developed in our laboratory. During the course of the internship, the activities will be to:

- Finalize the development of the qPCR test.
- Explore potential reservoirs of primary inoculum from samples of weeds, ornamentals and other crops already being collected by the laboratory.
- Evaluate different sampling methods for airborne spores,
- Monitor airborne inoculum in tomato experimental plots.

EXPECTED SKILLS:

- Skills in plant pathology.
- Knowledge (and possible use) of molecular techniques for quantifying microorganisms (qPCR)
- Ability to work in a research team.

INDEMNISATION:

- about 600 € / month

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Organization: INRAE

Location: Unité Pathologie Végétale –INRAE PACA center – 67 Allée des chênes - 84140 Montfavet

Duration: 6 months; Dates : between February and July 2024

Level : Master 2; Internship profile : Research