

# Internship proposal

## Assessing plant resistance to transmission of viruses

Level	Master 1 or Master 2
Organism	INRA, Plant Pathology Unit ( <a href="https://www6.paca.inra.fr/pathologie_vegetale_eng/">https://www6.paca.inra.fr/pathologie_vegetale_eng/</a> )
Location	INRA PACA, Domaine Saint Maurice, 67 Allée des Chênes – 84140 Montfavet Avignon
Duration	To be defined (depends on whether a Master 1 or a Master 2 student is recruited)

### Context

Plant resistance to viruses is a highly effective and low-input approach to control epidemics in agricultural crops. The extent of epidemic limitation depends on which step(s) of the viral infectious cycle is/are targeted and impeded by plant resistance (infection of a healthy plant, within-plant colonisation, transmission to new plants). Thus, to assess the potential of a given plant resistance, experimental approaches must be developed to quantify its effect on the different steps of the viral infectious cycle.

For this, modified viruses that express a Green Fluorescent Protein (GFP) constitute a fantastic tool to visually monitor viral infection. Indeed, after viral infection, the location and intensity of fluorescence allows the measurement of infection efficiency and colonisation speed, and the comparison of both steps of the viral infectious cycle in different host genotypes (susceptible vs resistant).



### Objectives

Using a virus that infects pepper (*Potato virus Y*, PVY), and modified to express the GFP, the internship has two main goals:

- Developing a protocol to automate image analysis via the software ImageJ (<https://en.wikipedia.org/wiki/ImageJ>) to be able to measure fluorescence location and intensity in numerous infected leaves.
- Experimentally measure infection efficiency and colonisation speed in different pepper cultivars using the previously developed protocol

Motivation letter and CV must be sent to Loup Rimbaud ([loup.rimbaud@inrae.fr](mailto:loup.rimbaud@inrae.fr))

## Candidate profile

### Main activities:

- Scientific investigation
- Literature review
- Phytopathology and experiments on plant and viral material in greenhouses
- Image analyses
- Statistical analyses
- Writing

Technical skills: plant biology, phytopathology, biostatistics. Knowledge in virology and image analysis will be appreciated.

Social skills: Team-spirit, scientific rigour, curiosity, inventiveness, reactivity.

Languages: English.

## Team and Supervision

The plant pathology unit at INRA aims at developing rational, efficient and sustainable disease control methods against bacterial, fungal and viral diseases of fruits and vegetables typically produced in the Mediterranean basin. Within the unit, the Virology Team mainly aims at (1) identifying the present, emerging and potentially future viral threats in these crops, (2) developing diagnostic tools, and (3) expanding knowledge on epidemiological and evolutionary processes at different spatial scales for a better control of the induced diseases.

[https://www6.paca.inra.fr/pathologie\\_vegetale\\_eng/](https://www6.paca.inra.fr/pathologie_vegetale_eng/)

Supervisor: Loup Rimbaud (Research scientist)