

Master thesis offer on insect-plant interactions

Starting date: Desired start in March 2024
Duration: 6 to 12 month
Working Place: Nyon
Language: French or English
Contact: Laurie Magnin (PhD student Agroscope/ AgroParisTech)
Eve-Anne Laurent (Research engineer)
Email: laurie.magnin@agroscope.admin.ch

Life cycle analysis of the rape stem weevil (*Ceutorhynchus napi*) and its interactions with its host plant (*Brassica napus*) leading to oil seed rape yield loss.

Rapeseed is an important crop in northern European farming systems. In 2020, it represented 79% of the Swiss oilseed area (OFAG) and 54% of the French oilseed area (FranceAgriMer). It is recognized for its food quality oil and for its use in animal feed in the form of oilcake, which reduces imports. In addition, it has a definite agronomic interest in crop rotations.

It has become commonly accepted that a general transition towards more environmentally friendly agronomic practices is necessary (FAO). This is all the more urgent for rapeseed crops, which require numerous insecticide treatments. Indeed, due to the emergence of resistance in insects, this method of pest control cannot be effective in the long term (Thieme et al., 2010). In addition, an increasing number of plant protection products are being suspended, such as neonicotinoids in 2013 (Butler, 2018).

To provide enlighten advice on integrated pest management, a better understanding of the interactions of the rape stem weevil (*C. napi*) and its host plant, the oil seed rape, is needed. To analyze the impact of *C. napi* on the OSR crop yield three main mechanisms will be considered:

- i. The antixenosis allowing the plant to avoid the insects' attacks, in other words, it is all the traits enabling the plant to be less attractive towards its pests. This first lever is important at the beginning of the plant-insect interaction to reduce the attacks.
- ii. The antibiosis is the direct effect of the plant on the development and fitness of the insect. This second lever will come once the plant is already under attack.
- iii. The tolerance to the attacks of the insect pests, is the capacity of the plant to compensate or not to express detrimental symptoms after injuries. This last lever will directly come in answer to the insects' pests' attacks and will have a direct effect on the crop yield.

Objectives

The objectives of this master thesis will be:

- To correlate insects' oviposition puncture with larval abundance, plants symptoms and yield loss.
- To identify key factors influencing the antixenosis of the plants, possible resistance and tolerance.
- To evaluate genotypes influence on antixenosis, resistance and tolerance.



Characteristics of the work

- Trial set-up and data collection planning
- Data collection in the field and post collection manipulation in the laboratory (e.g. larvae counting, glucosinolates extraction)
- Visualization and analysis of results (on R)
- Writing of a scientific article or a thesis

Profile sought

You are interested in plant-insect interactions; you have a taste for fieldwork and the will to carry out rigorous scientific work. You have a good spirit of synthesis and the analysis of data does not frighten you.

What we are offering

A young and dynamic team, a scientific framework and the means to carry out quality research, all in an environment between lake and mountains.

Unpaid internship, but accommodation available for the duration of the internship on the experimental station 2 km from Lake Geneva.

Location and structure of the internship

Desired start in March 2024

AGROSCOPE (Swiss Confederation competence center for agricultural research)
Route de Duillier 50, P.O. Box 1012 1260 Nyon 1. Switzerland

Complete application (CV + cover letter) to be sent before November 15, 2023

Information and applications: laurie.magnin@agroscope.admin.ch