

Course title: Plant communication and trophic interactions: from plant behavior to sustainable cropping

Organizers

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Teachers

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Matias Erb	University of Bern, Switzerland
Toby Bruce	Keele University, UK
Velemir Ninkovic	Swedish University of Agricultural Sciences, SLU, Uppsala

Course credits

3 ECTS/HEC

Date

The course is scheduled for two weeks, consisting of one week independent preparation by the students and one week in person attendance on the course from 22nd – 27th January 2023.

Location

The in person part of the course will be held at Ekenäs herrgård, Flen, located approximately 125 km south-west of Stockholm.

Course overview

This course gives an overview of cutting edge research in plant behaviour showing how plant communications shapes interactions between plant individuals and between plants and insects. Plants are increasingly being viewed not as passive life forms but as organisms that exhibit sophisticated behaviors, engaging in complex interactions within ecosystems, both above and below ground. Focus is on how plant communication allows plants to solve challenges and how it can be exploited for sustainable plant protection and production. The course is valuable for students of plant ecology, agriculture, entomology, chemical ecology and plant protection.

Course Seminars

Day 1:

- The components of plant growth and their response to environmental conditions
- Plant communications between undamaged plants mediate tritrophic interactions

Day 2:

- Communication breakdown? Exploring the effects of climate change on plant-pollinator interactions.

Day 3:

- Challenges and opportunities for use of chemical ecology for pest management

Day 4:

- Herbivore induced plant volatiles as mediators of plant-plant interactions.

Course Structure

The course will cover two weeks of activities, including one week of literature reading and preparation of a scientific poster that represents the PhD project of the students. Followed by actual attendance on the course in person for 4 days at Ekenäs. This part will be based jointly on lectures and group work. Teachers will deliver lectures with topics based on their own research. Each teacher will recommend recent relevant publications in their area to the students to get a general background of the course topic. Additionally the student will intensify their understanding of a chosen topic during the course. As a complement to the lectures, students will conduct group work on selected topics and will deliver a short presentation of their work, which will be discussed with the teachers. The aim is to create a studious and relaxed atmosphere with plenty of opportunity for students to discuss science with each other and with the teachers.

Aim and Objectives

The aim of this course is to give PhD students an overview of the state of the art research in this area, illustrating how it affects issues of fundamental ecological interest and how it can contribute to novel approaches for the sustainable management of weeds and insect pests in cropping systems. Teaching will be carried out by internationally-recognized scientists. Topics will include plant self and neighbor recognition, allelopathy, invasive plants, defense signaling, plant-insect interaction and application of this knowledge for plant protection.

Expected Learning Outcomes

1. The student should be able to explain interactions between plants and their effect on higher trophic levels.
2. The student should be able to discuss different theories that may explain pest abundance in specific cropping systems.
3. The student should show ability to critically examine and discuss scientific texts.
4. The student should demonstrate ability to link theory to their own research
5. The student should be able to develop and orally present assigned scientific project in a comprehensible way.

Examination

Presentation of a poster and project application will function as the examination of the course.

Literature

Recent key papers and relevant review papers, specific to each seminar (2-4 per seminar) will be announced and sent by email two weeks before the course starts.