

Biological Control of Pests and Diseases: Theory, Application and Perspectives

Earliest possible year	MSc. 1 year to MSc. 2 year
Duration	One block
Credits	7.5 (ECTS)
Course level	MSc
Examination	Final Examination written examination Written Exam in Lecturehall All aids allowed Weight: 100% 13-point scale, internal examiner
Teaching	Lectures, theoretical exercises, colloquia, tutorials and an excursion.
Block placement	Block 1, Week Structure: C
Teaching language	English, may be conducted in Danish
Optional prerequisites	250029 Plant Diseases, 124011 Plant Disease or Plant Protection in Horticulture (a DSH-course) and a basic zoologi- course
Areas of competence the course will address	Competences within basic science: Knowledge and understanding basic biology of organisms used for biological control of plant pests and diseases: This include the interaction of the biocontrol organisms with the target insect or plant pathogen. Diversity of biocontrol organisms and their behaviour in plant ecosystems and knowledge about natural regulation by indigenous organisms in plant cropping systems. Competences within technology and production: Understanding the status for commercial exploitation of biological control of pests and diseases both internationally and in the Nordic countries. Knowledge and understanding of the technology and biological information needed for the commercialization of biocontrol agents covering aspects such as production, formulation, application, legislation and registration. Competences obtained within Ethics and Values: Are able to consider ethical aspects related to the use of BCAs both in traditional and ecological plant production.
Course objectives	The purpose of the course is to give the student a thorough understanding of the principles and strategies of biological control of pests and diseases together with examples of proven and potential applications in agriculture and horticulture.
Course contents	The main elements covered in the course are: Definitions of biological control of pests and diseases of plants and

subject terminology.

Major groups of organisms used in biological control: their ecology, life cycles, mechanisms of action etc.

Isolation and selection of biological control organisms and their production, formulation and application,

Crop management practices including crop rotation etc. that regulate populations of pathogens and pests. Disease suppressive soils.

Monitoring populations and activity levels of biological control agents following application to the crop and release into the environment.

Pathogen antagonis interactions at cellular level. Aspects of risk assessment of biological control organisms, legislation and BCA registration.

Etical aspects and public acceptance related to commercial use will be addressed.

Selected examples of the use of fungal and bacterial antagonists, parasitoids and predators to control pests and diseases in field and glasshouse crops, orchards and forestry

Teaching and learning methods

Lectures, theoretical exercises, colloquia, tutorials and an excursion. In the lectures, basic principles, strategies and state-of-the-art developments in biological control of pests and diseases are presented. Some lectures are given by external and internal specialists on topics directly related to on-going research projects or covering commercial exploitation of BCAs and legislation and etical aspects. At the tutorials selected papers - typically from international scientific journals - are discussed and evaluated. The colloquia will be in the form of e-learning where computer databases, Web-based information and IT e-learning elements will be used.

Literature

Scientific papers and other types of course material will be handed out or uploaded on Campus Net

Responsible

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Home Page

<http://kursus.kvl.dk/biolcontrol-theory>

Study Board

Study Committee NSN

Scope

Lectures	18h
Theoretical exercises	10h
Colloquia	24h
Excursions	6h
Preparation	44h
Examination	4h

Sum: 206h

Biological Control of Pests and Diseases: Experimental Course

Earliest possible year	MSc. 1 year to MSc. 2 year
Duration	One block
Credits	7.5 (ECTS)
Course level	MSc
Examination	Final Examination Written examination and oral examination, all aids allowed Description of Examination: For final examination each team will present selected data. The presentation will be done orally in a seminar, as well as written (for example as a poster with proceedings or as a condensed report. Each team will act as opponent for another team. Weight: Report: 50 % Oral: 50% pass[1]/fail, internal examiner
Requirement for attending exam	Active participation in experimental work. At the minimum 75 % participation
Teaching	Experimental work in groups. Parts of the experimental work as projects. In addition colloquia and excursions
Block placement	Block 1, Week Structure: A Parts of the experimental work may take place at different time schedules, after agreement between student teams and their supervisors
Teaching language	English
Optional prerequisites	Participants from Denmark and abroad must have passed a number of fundamental courses of relevance, for example: zoology, esp. entomology; plant pathology; microbiology; ecology. Each applicant will be evaluated individually with respect to qualifications
Restrictions	25
Areas of competence the course will address	Competences within basic science 1) Knowledge to behaviour in a scientific laboratory 2) Comprehend experimental design and performance of studies on interactions between an organism and its natural enemies/antagonists 3) Evaluate laboratory and/or field data on organisms and their natural enemies/antagonists Applied science 1) Apply the principles obtained in experiments to similar situations 2) Make a judgement of the potential of an organism as a biological control agent

Ethics and Values

- 1) Are able to discuss own obtained data and related literature data in an ethical framework
- 2) Make judgement how non-target effects should influence the potential use of biocontrol agents

Objectives

The course aims to provide the students with an updated knowledge on biological control of pests and plant diseases, based on own experience in the laboratory and/or the field.

Contents

Students will learn modern methods used for experimental work in biocontrol using natural enemies of insects and antagonists of plant diseases. Experimental work with both natural enemies of insects (macro- and microorganisms) as well as antagonists to plant pathogens is included in the course. The course aims to allow the students to experience a range of modern methods, for example: field sampling, diagnosis of potential biocontrol agents, isolation in vivo and in vitro, bio-assays, genetical characterization.

Each group of students will perform parts of the experimental work as a project with a specific focus. The choice of focus will depend on students interest and practical possibilities.

Teaching and learning methods

The core of the course is experimental work in the laboratory and/or in the field. Students will be organised in teams and perform experimental work with pests and plant diseases and their antagonists. At colloquia the results are discussed.

Literature

Literature will be given at course start. In addition, the students must find literature of relevance. The literature will consist of:

- 1) Laboratory protocols for experimental work
- 2) Original scientific literature related to the experimental work

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Home Page

<http://kursus.kvl.dk/biocontrolexp>

Attendance fee

No

Study board

Study Committee NSN

Scope

practicals	70h
Colloquia	16h
Excursions	10h
project work	70h
examination	2h
preparation	38h

Sum 206h