GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Biological Control of Crop Pests and Diseases (IOO2735)

Course size *(nominal values; actual values may depend on programme)*

Credits 5.0 **Study time 150 h**

Course offerings and teaching methods in academic year 2025-2026

A (semester 1)	English	Gent	lecture
			group work
			independent work
			practical

Lecturers in academic year 2025-2026

De Clercq, Patrick	LA21	lecturer-in-charge
Höfte, Monica	LA21	co-lecturer

Offered in the following programmes in 2025-2026	**crdts**	**offering**
Master of Science in Bioscience Engineering: Agricultural Sciences	5	A
Exchange Programme in Bioscience Engineering: Agricultural Sciences (master's level)	5	A

Teaching languages

English

Keywords

Biological crop protection, biocontrol, entomology, phytopathology

Position of the course

Biological control comprises the use of beneficial organisms for the suppression of harmful organisms. In many cropping systems biological control has become a key strategy for the management of pests and diseases and it is currently a cornerstone of many integrated crop protection programmes. The course will highlight the ecological background as well as the practical application of biological control in agricultural and horticultural systems. The biology and use of the main microbial (bacteria, viruses, fungi…) and macrobial (arthropods, nematodes) biocontrol agents will be discussed. There will be attention for the potential of biocontrol agents, as well as the challenges for their production and use in modern plant production systems.

Contents

Partim Biological control of pests (P. De Clercq)

- History of biological control
- Beneficial organisms:
  - Arthropods: mites and insects
  - Nematodes
  - Bacteria
  - Viruses
  - Fungi

- Types of biological control:
  - Natural and conservation biological control
  - Classical biological control
  - Augmentative biological control
- The interactions between natural enemies, their hosts or prey, and crops:
  - Interactions between arthropod natural enemies
  - Insect-plant interactions

- Mass rearing and quality assurance of biological control agents
- Methods to release and support populations of biological control agents in the field
- Benefits and risks of biological control:
  - Benefits for consumers and environment
  - Risk categories and risk assessment
  - Legislation

Partim Biological control of diseases (Prof. M. Höfte)

- History and definitions
- Benefits and applications
  - Soilborne diseases
  - Leaf diseases
  - Diseases of woody plants
  - Postharvest diseases
- Biopesticides and biostimulantia
  - Bacteria
  - Fungi
  - Mycoviruses and bacteriophages
  - Natural substances
  - Plant activators
- Mode of action
  - Growth stimulation
  - Direct antagonism
  - Stimulation of plant defense
- Management of the indigenous microbial population
  - Disease suppressive soils
  - Crop rotation and residue management
  - Organic amendments
  - Solarization and biofumigation
- New tools in biocontrol research
  - Genome analysis
  - Mutant construction
  - Metagenomics and metabolic networks
  - Breeding for rhizosphere-related traits
- Production, formulation and application strategies
- Barriers and bottlenecks
  - Constraints
  - Legislation
- Integration with other control strategies

Initial competences

Students should have followed introductory courses on Crop Protection or Crop Pests and Diseases

Final competences

1 To recognize or identify the main beneficial organisms used in biological crop protection
2 To explore the mode of action of biopesticides
3 To explain the ecological mechanisms that determine the relationships between crop pests and diseases on the one hand and their natural enemies and antagonists on the other
4 To understand the main strategies and methods employed in biological crop protection and their impact on populations of crop pests and disease epidemiology
5 To develop strategies for biological crop protection based on the technical, ecological, economical, and legal aspects of these systems
6 To apply the basic knowledge on integrated crop protection in order to solve practical questions and case studies

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Group work, Lecture, Practical, Independent work

Extra information on the teaching methods

Lectures, practicals, group discussion

Study material

Type: Slides

Name: Slides partim biological control of plant diseases
Indicative price: Free or paid by faculty
Optional: no
Language : English
Oldest Usable Edition : 2024
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : No

Type: Slides

Name: Biological control of plant pests and diseases: partim pests
Indicative price: Free or paid by faculty
Optional: no
Language : English
Available on Ufora : Yes

References

Helyer, N., N. D. Cattlin & K. C. Brown (2014). Biological control in plant protection: a colour handbook. CRC Press. 276 pp.
Hajek, A. (2004) Natural Enemies: An Introduction to Biological Control. Cambridge University Press, New York. 378 pp.
Van Driesche, R. G. & T. S. Bellows, Jr. (1996). Biological control. Chapman & Hall, New York, 539 pp.
van Lenteren, J. C. (2012). IOBC internet book of biological control. Version 6. http: //www.iobc-global.org/publications_iobc_internet_book_of_biological_control.html

Course content-related study coaching

Study coaching can be offered during contact hours; further, feedback is given via the electronic learning platform (Forum, personal e-mail contact)

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Oral assessment

Examination methods in case of periodic assessment during the second examination period

Oral assessment

Examination methods in case of permanent assessment

Participation

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

Oral exam and evaluation of participation in group discussions and seminars

Calculation of the examination mark

Both partims account for a similar proportion of the final score (50%)
Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.