Course Unit	Biopesticides and Biocontrol			Field of study	Agricultural and animal production		
Master in	Biotechnological Engineering			School	School of Agriculture		
Academic Year	2020/2021	Year of study	1	Level	2-1	ECTS credits	5.0
Type	Semestral	Semester	2	Code	5010-509-1202-00-20		

Workload (hours)	135	Contact hours	T	TP	PL	TC	S	E	OT	O
			25	-	25	-	-	-	4	-

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tuturial; O - Other

Name(s) of lecturer(s): José Alberto Cardoso Pereira, Paula Cristina Santos Baptista

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Understand the concepts of plant protection and the role of the biotechnology in this field
2. Know the biological control agents and their mechanisms of action
3. Acquire practical experience in the isolation and in the screening of microorganism as biocontrol agents
4. Know the process of production and formulation of biopesticides (bio-insecticides, - fungicides and -herbicides)
5. Enhance technical skills related to the application of microorganisms in different biotechnological processes to control crop enemies

Prerequisites

Not applicable

Course contents

Plant protection, biological and biotechnical control. Biological control agents (parasites, predators and pathogens) and their mechanisms of action. Biological control throught the use of microorganisms (fungi, bacteria and viruses) and their mechanism of action. Production and formulation of biopesticides, especially of entomopathogens and antagonists.

Course contents (extended version)

1. Concepts of plant protection
   - Pests, diseases and weeds
   - Symptoms, damage and losses
   - Control measures
2. Biological and biotechnical control
   - Concepts, history and advantages over the use of chemical pesticides
   - The use of arthropods, entomopathogens and plant extracts to control pests
   - Biological control using microorganisms and their mechanisms of action
   - Biological control of pests, diseases and weeds
   - The biotechnical control: semiochemicals, the autocidal fight, the Insect Growth Regulators
3. Entomopathogenic and antagonistic microorganisms
   - Isolation and selection
   - Biosynthesis of toxic secondary metabolites
   - Biotic and abiotic factors affecting their action
4. Production and formulation of biopesticides (bio-insecticides, -herbicides, -fungicides)
5. Biopesticides available on the market: advantages and limitations of their use

Recommended reading

1. Articles published in Biocontrol Science and Technology / Biological control / BioControl
2. Bellows T. S. , Fisher T. W. (1999). Handbook of biological control. Acad. Press, 1046p
3. Garcia-Tejero F. D. (1998) Plagas Y Enfermedades de las Plantas Cultivadas. 9ª Ed. , Ediciones Mundi-Prensa
4. Hall F. R. , Menn J. J. (2010) Biopesticides: Use and Delivery (Methods in Biotechnology), Humana Press
5. Van Driesche R, Bellows Jr. TS (2012) Biological Control, Springer

Teaching and learning methods

Theoretical classes: Lectures of theoretical contents supported by audio-visual media. Practical classes: Realization of practical laboratory experiments, analysis of case studies and the preparation of a project regarding the development of biopesticides

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
   - Presentations - 50% (Project idea focusing the biotechnological application of microorganisms in the biocontrol)
   - Final Written Exam - 50% (The theoretical component will be assessed by one written test)
2. Alternative 2 - (Regular, Student Worker) (Final, Supplementary, Special)
   - Final Written Exam - 100% (The exam includes a practical component)

Language of instruction

English

Electronic validation

José Alberto Cardoso Pereira, Paula Cristina Santos Baptista	Albino António Bento	Paula Cristina Azevedo Rodrigues	Elsa Cristina Dantas Ramalhosa
10-11-2020	10-11-2020	10-11-2020	10-11-2020