University of Zagreb Faculty of Agriculture
Svetošimunska cesta 25, 10000 Zagreb
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Plant pest management (296606)

Course coordinator

Assoc. Prof. Darija Lemić, PhD

Course description

Students will learn about the basic characteristic of plant protection products and methods which are used for the plant protection against animal pests (insects, nematodes, mites, and other animals) and the skills for their responsible use. Introductory lectures presents retrospective of evolution of chemical control against pests in modern agriculture. All groups of zoocides (insecticides, acaricides, nematocides, rodenticides, limacides, fumigants etc.) will be involved. Each group will be divided into subgropus regarding chemical properties and mode of action. Each subgroup will be presented through its good and weak points regarding the toxicological and ecotoxicological characteristics and possibilities for particular pest control. The module is consisted form five main parts as are: a) history of the development and the use of zoocides; development of the product- registration procedure; b) classification of zoocides (based on origin, chemical properties, modes of penetration); c) mode of action and application possibilities of each particular group of zoocides (chlorated hydrocarbons, ogranophosphates, carbamates, pyrethroids, insect growth regulators, naturalites, neonicotinoides, fenilpyrazoles, microbial insecticides, acaricides, nematocides, limacides and rodenticides), d) soil insect control and e) control of the storage pests – fumigation.

ECTS: **3.00**

Teaching hours: 30
Lectures: 18
Laboratory exercises: 8
Seminar: 4

Grading

Sufficient (2): 60-69 %
Good (3): 70-79 %
Very good (4): 80-89 %
Excellent (5): 90%

Lecturer

- Prof. Renata Bažok, PhD
- Prof. Dinka Grubišić, PhD
- Prof. Eustachio Tarasco, PhD

Associate teacher for exercises

- Helena Virić Gašparić, PhD

Associate teacher for seminars

- Assoc. Prof. Darija Lemić, PhD

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Type of course

- Graduate studies / Environment, agriculture and resource management (Compulsory course, 3 semester, 2 year)

General competencies

After completing the course students will be able to apply gained knowledge in their practical work on the farm. They will be able to select the proper insecticide product, calculate the dose or concentration, apply the product and analyze the results of the application. They will be able to analyze and discuss all available possibilities for particular pest control and to choose the option which is the most appropriate given into account ecological and economical concerns.

Types of instruction

- Lectures
- Auditory Exercises
- Practicum

  Work on preparation of the solutions for spraying, calculation of the necessary amount of pesticides in the dilution etc...
- Seminars

  Students will prepare the forms for successful reporting on the pesticide use on the farm.

Learning outcomes

Learning outcome	Evaluation methods
recognize the importance of major plant pests and choose one of the available methods for their control comparing their advantages and disadvantages;	written exam
explain the process of development and registration of plant protection product;	written exam
compare the main characteristics of the different groups of zoocides	written exam
demonstrate the advantages and disadvantages of the use of each group of zoocides based on understanding of their efficacy against pests as well as their good and weak toxicological and eco-toxicological properties;	written exam
select the appropriate plant protection product suitable for control of particular pest and prepare the protocol for its application in given conditions (calculate volume, dose, concentration etc.);	written exam
analyze the specificity of the control of soil PEST insects regarding the available products and methods for their control;	written exam
discuss the possibilities for the control of storage pests and compare fumigation with other available methods;	written exam

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Working methods

Teachers' obligations

Teaching according to the curriculum, monitoring the work of students, assessment and evaluation of students' work during the semester trough colloquium and two partial exams, quality monitoring to ensure output of competence, allows contact with students.

Students' obligations

Students are required to regularly attend the classes and the attendance is recorded by the professor. For the realization of the professor's signature, students are required during the whole semester to attend at least 80% of lectures and 80% exercises and seminars. If the student is absent from school more than allowed, without reasonable cause, professor's signature will be denied and the student is required to re-enrol the subject in the next academic year. Students are required to attend training courses and seminars, where they are expected to actively engage and participate in the discussion. During the exercises the student is required to pass the test.
For acquiring the final evaluation, students take a written two exams during the semester. For the realization of the final grade student is required to achieve the minimum points in both exams and test. Students who do not pass the course by the end of the semester are required to take the final exam during the regular examination periods.

Methods of grading

Evaluation elements	Maximum points or Share in evaluation	Grade rating scale	Grade	Direct teaching hours	Total number of average student workload	ECTS
I partial exam	60%	0-60 61-70 71-80 81-90 91-100	Insufficient (1) Sufficient (2) Good (3) Very good (4) Excellent (5)	10	45	1.5
II partial exam	30%	0-60 61-70 71-80 81-90 91-100	Insufficient (1) Sufficient (2) Good (3) Very good (4) Excellent (5)	6	30	1
Test	10%	0-60 61-70 71-80 81-90 91-100	Insufficient (1) Sufficient (2) Good (3) Very good (4) Excellent (5)	14	15	1
Total	100%	60-100		30	90	3

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Weekly class schedule

1. Retrospective of plant pests management; History of the development and the use of zoocides;The develoment of plant protection product, European and national regulations on registration and usage of PPPs
2. Formulations of zoocides, toxicological and ecotoxicological advantages and disadvantages of different formulations
3. Classification of insecticides based on chemical properties, mode of penetration, mode of action and available application techniques; Ecollogiacally friendly application techniques
4. Chlorated hydrocarbons, organophosphorous insecticides, carbamates and pyrethroides: mode of action, toxicology to human and beneficials ecotoxicology: fate and behavior in the environment
5. Insect growth regulators and naturalites (spinosyns and avermectins): mode of action, toxicology to human and beneficials, ecotoxicology: fate and behavior in the environment
6. Neonicotinoides and fenylpyrazoles - mode of action, toxicology to human and beneficials, ecotoxicology: fate and behavior in the environment
7. Presentation of essey prepared based on the given problem
8. Microbial insecticides based on Bacillus thuringiensis - mode of action, toxicology to human and beneficials, ecotoxicology: fate and behavior in the environment
9. Other microbial insecticides (viruses, fungus etc.)
10. Main characteristics of acaricides; Application of acaricides in the field and in the storage. Fungicides with acaricidal efficacy.
11. Main characteristics of nematocides and limacides; Application of nematocides and limacides in greenhouse environment and in the field.
12. Rodent control in closed and open space; Main characteristics of rodenticides and other agents with repelent action.
13. Calculation of the dose and concentration
14. Soil PEST insect control - available insecticides, and methods for their use; Seed treatment insecticides and their properties;
15. Control of pests on stored products L, S - Control of stored product pests- fumigation and other control strategies

Obligatory literature

1. Matsumura, F. Toxicology of insecticides. Plenum press New York, 1985. 598 pp.
2. Yamamoto, I., Casida, J.E. (eds). Nicotinoid Insecticides and the Nicotinic Acetylcholine Receptor. Springer-Verlag, 1999. 300 pp.
3. Ishaaya, I., Degheele (eds.): Insecticides with Novel Modes of Action. Springer-Verlag, 1998. 289 pp.
4. Entwistle, P.F., Cory, J.S., Bailey, M.J., Higgs, S. (eds.) Bacillus thuringiensis, An Environmental Biopesticide: Theiory and Practice. Willey, 1993. 310 pp.

Recommended literature

1. The Pyrethroid Insecticides A Scientific Advance for Human Welfare? Pesticides Science: vol. 27 1989. Special Issue. Society of Chemical Industry.
2. Rechcigl, J. E., Rechcigl, N.A. (eds.) Insect Pest Management: Technicques for Environmental Protection. CRC Press, 2000. 392 pp.
3. Rechcigl, J. E., Rechcigl, N.A. (eds.) Biological and Biotechnological Control of Insect Pests. CRC Press, 2000. 374 pp.
4. Campbell W.C. (ed.) Ivermectin and Abamectin. Springer-Verlag New York, 1989. 363 pp.

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Similar course at related universities

- Phytopharmacy - zoocides, University of Belgrade, Faculty of Agriculture
- Principi di fitoiatria, Università degli studi di Bari Aldo Moro
- Toxicology of Insecticides, Purdue University, Department of Entomology
- Plant protection, University of Hohenheim

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