Plant Protection And Disease Management

PLANT PROTECTION PRODUCTS AND RESIDUES

Sanja Baric

Learning Outcomes

The knowledge acquired will allow the understanding of European and national regulations on registration and application of plant protection products. The student will link the correct use of agrochemicals with the resulting residues on horticultural products. Students will also acquire tools to become constantly updated on the future evolution of the plant protection product portfolio.

Course Contents

- Review of the properties and the application of plant protection products
- European and national legislation on plant protection products
- Procedure for the approval of active substances of plant protection products including toxicological and ecotoxicological risk assessments
- Authorisation of plant protection products
- Sustainable use of plant protection products
- Maximum residue levels of plant protection products

Teaching Methods

18 hours of frontal lectures combined with class discussions; 12 hours of exercises.

Readings/Bibliography

Handouts and selected papers shall be given to the students during the course.

Assessment Methods

Final written exam at the end of the course.

Teaching Tools
PowerPoint presentations of the lectures as well as technical and scientific papers will be made available through the online platform of the Free University of Bozen-Bolzano.

ELEMENTS OF CHEMISTRY AND BIOCHEMISTRY OF AGROCHEMICALS

Youry Pii

Learning Outcomes
The course aims at providing students with the knowledge and expertise on the agrochemicals modes of action and the fate of these chemicals in the agro-ecosystem. This knowledge will allow the sustainable management of this agricultural practice for the protection of cultures.

Course Contents
Classification of agrochemicals. Agrochemicals and their metabolism within cells: mode of action of fungicides (interference with respiration, biosynthesis of sterols, chitin, tubulin and nucleic acids); mode of action of insecticides (neurotoxic and decoupling insecticides); mode of action of herbicides (interference with photosynthesis, biosynthesis of amino acids and biosynthesis of lipids). Agrochemicals metabolism in plants: reactions of oxidations, reduction, hydrolysis and conjugation. Agrochemicals fate in soil: movement (leaching, run-off, volatilization), adsorption (adsorption isotherms and adsorption coefficients) and degradation (photodecomposition, chemical and microbiological degradations). European and Italian legislation of agrochemicals, labeling and their storage. Practical exercise: determination of agrochemical adsorption and agrochemical degradation in soils.

Teaching Methods
The course consists of lectures (18 hours frontal lessons) during which the teacher will present all the topics foreseen in the course content. Practical lessons (12 hours) to be held in the laboraory by the teacher are also foreseen.

Readings/Bibliography
Gennari M. and Trevisan M. “Agrofarmaci - Conoscenze per un uso sostenibile” ISBN 978-88-8372-444-2
Müller F. “Agrochemicals : composition, production, toxicology, applications” ISBN 3-527-29852-5
Roberts T.R. “Metabolic pathways of agrochemicals” ISBN 0-85404-494-9; ISBN 0-85404-499-X

Assessment Methods
Assessment (at the end of the course) is carried out by oral examination, which will include:

i) questions to assess the knowledge and understanding of the course topics and

ii) questions designed to assess the ability of transferring the acquired skills to case studies. Also the knowledge acquired during the practical lessons will be assessed.

A single final mark will be awarded on the following criteria:

i) clarity of the answers

ii) ability to summarize, evaluate and establish relationships between topics

iii) independence of the judgment and

iv) the ability of reworking.

Teaching Tools

Course topics will be presented using Power Point presentation and at the end of each lesson a paper copy will be distributed directly to the students.

INTEGRATED PLANT DISEASE MANAGEMENT

Annamaria Pisi

Learning Outcomes

The course emphasizes the importance and need of the integrated management of plant diseases within the integrated pest management approach, with the least possible disruption to the agro-ecosystems and the least hazard to people, animals, and environment. The course will enable the students: to acquaint with the principles of an integrated approach to plant disease management; to become familiar with the basic principles involving fungal, bacterial, phytoplasma and viral based diseases in plants; to acquire knowledge of the environmental factors influencing plant diseases, to gain an understanding of the influence of plant pathogens in crop-ecology finalized in rationalise disease control; to know the most successful plant protection strategies by physical, genetic, cultural, chemical and biological means; to gain knowledge of the use of predictive models.

Course Contents

The mission of the course is addressed to the study of the integrated plant disease management strategies that incorporate conventional and novel biological, cultural, chemical, genetic and other environmentally sound and economically profitable approaches. Discussion of the principles of managing insects, diseases in the context of developing stable agricultural systems. During the course it will be provided the basis of understanding, interpretation, selection, development and application of the most effective methods of Integrated Crop Management, with the least disruption to the environment. A more detailed understanding of the effects of pest pressure on crop productivity and the development of threshold levels for action will be developed.

The course will provide the main elements involved in the integrated plant disease management: Exclusion — keep pathogens, vectors and infected plants out of disease-free areas. Eradication — destroy a disease organism after it has become established (destruction of infected plants, disinfection of storage bins, containers and equipment, and/or soil disinfection by fumigation, pasteurization, solarization or drenching). Protection – use a physical barrier such as a row cover. or chemical applications available to prevent a disease from becoming established. Resistance — plant resistant varieties. Therapy – use chemicals that are systemic in the plant. Avoidance – use good cultural practices such as planting date selection, seedbed preparation and water management to avoid disease.
Evaluation of the benefits and risks of the treatments and choose the best solution with the least negative environmental impact. The challenge, when using pesticides, is to pick the one that will cause the least harm to non-target organisms in the forest or landscape.
Discussion of the new scenario of crop protection created by the policy on the use of pesticides started 20 years ago by the European Union to reduce their impact on health and environment. It is a topic that should be known since the new legislation for crop protection is becoming a very complex practice, because it is based on technical means more and more difficult to use also for legislative limitation. The EU policy is changing the regulatory framework for the homologation and use of products for plant protection in member states and this will have an impact in the different European countries.

Readings/Bibliography
Handouts and selected paper will be given to the students during the lecture by the instructor.

Teaching Methods
The course will be subdivided in two parts: The first concentrated on the different control methods of the main plant pathogens, giving more emphasis and preference to host-resistance, cultural practices and biological control other than the use of pesticides. The second part in the laboratory for the identification of the main pathogens and better study the most advanced methods to control plant pathogens responsible of the most important crop diseases.

Assessment Methods
At the end of a course it will be a final exam that tests the acquired knowledge and abilities. The students should produce a power point presentation on a subject chosen with the instructor of about 15 minutes long. Then questions on the main subjects of the course will follow. The final grade will be calculated by arithmetic mean among the integrated courses.

Teaching tools
PC, slide projection and handouts.