UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Agrarie, Alimentari e Forestali
ACADEMIC YEAR	2018/2019
MASTER'S DEGREE (MSC)	AGRICULTURAL PRODUCTIONS AND TECHNOLOGIES
INTEGRATED COURSE	DEFENCE OF PLANT PRODUCTIONS - INTEGRATED COURSE
CODE	13948
MODULES	Yes
NUMBER OF MODULES	2
SCIENTIFIC SECTOR(S)	AGR/11, AGR/12
HEAD PROFESSOR(S)	TSOLAKIS HARALABOS Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	DAVINO SALVATORE Professore Ordinario Univ. di PALERMO TSOLAKIS HARALABOS Professore Associato Univ. di PALERMO
CREDITS	9
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**DAVINO SALVATORE** Tuesday 16:00 19:00 Edificio 5 Stanza P1-50 **TSOLAKIS HARALABOS** Wednesday 12:00 14:00 Studio del docente, edificio 5A Thursday 12:00 14:00 Studio del docente, edificio 5A

DOCENTE: Prof. HARALABOS TSOLAKIS

PREREQUISITES	Knowledges of Zoology, Agricultural Entomology, Plant Biology, Botany, Mathematics, General Plant Pathology
LEARNING OUTCOMES	For the course of Acarology and integrated defence students should be able to identify the orders of mites and the characteristics of the main families of pests and predators of agricultural interest. Recognize the main species of spider mites harmful to agricultural crops and know their bio-ethology and ecology. Recognize predatory mites and especially the phytoseiid mites collected in field. Understand the relationships between the various trophic levels in agricultural systems. Know and apply the different sampling techniques of insect pests and natural enemies in the field. Understand the different strategies and tactics of the integrated control of phytophagous populations. Be able to compile an integrated control plan for the main crops present in the Mediterranean areas. Be able to develop analytical and synthesis skills in the Integrated Pest Management of the agroecosystem in order to continue their studies autonomously. For the course of Integrated plant diseases management: Acquisition of general knowledge for drafting an integrated crop protection plan. Acquisition of specific knowledge on crops of economic interest. Ability to use technical language. Ability to organize and interpret the acquired data for the elaboration of an adequate integrated crop protection plan. To be able to independently evaluate and interpret the implications and results of phytopathological studies in order to best manage the farms. Ability to expose the results of phytopathology study to an unknowable public. Learning skills. Upgrade skills by consulting scientific publications and relevant texts in the agricultural sector. Ability to follow, using the knowledge acquired during the course, specific master's, keynotes and meetings. Ability to understand the contents of textbooks in order to transfer that knowledge to the professional worker involved in farm management.
ASSESSMENT METHODS	For the course of Acarology and integrated defence there will be a midterm presentation using Power Point in 15 minutes on a topic by the first part of the course (Acarology) chosen at random by the student from a series provided by the instructor. Will be evaluated the exposition skills, the synthesis ability and the appropriateness of the literature consulted (30%). Partecipation to this examination is not obligatory. Final oral comprehensive examination on Acarology (only for 20% for the students that have partecipated in the Power Point presentation, 50% for others), and on Integrated Pest Management (50%). Grading criteria: basic knowledge of the topics covered, sufficient exposure and analytical skills (18-20); Good knowledge of the topics covered, proper exposure of arguments and good train of thought on insect management issues, a satisfactory skill for organizing an IPM project (21-25); Appropriate knowledge of all topics covered during the course, good skills of the technical language and good skills of discussing on the topics regarding the pest management of mites and insects (26-28); Excellent knowledge of all topics covered in the course, excellent syllogistic skills and of discussing on issues concerning the Integrated Pest Management strategies, excellent ability to compile an IPM project, excellent properties of technical language (29-30 L). For the course of Integrated plant diseases management the exam will consist of an interview (final exam) where the student will have to answer 3-5 causal questions. The questions will be chosen by the teacher, both on the general part and on the special part of the study-program. The teacher will check the completeness of the knowledge throughout the study program. Voting will often be in thirtieth (from 18 - basic knowledge of the arguments - to 30 cum laude - excellent knowledge of the arguments and excellent communicative skills). The evaluation will be based on: 1) the correctness of the answers; 2) the language used; 3) the ability to make logical connections between the topics just discussed. The assessment of the preparation and the voting will take account of the student's acquisition of the expected results and the achievement of the training objectives described in the appropriate paragraphs. The final evaluation of the examination is given by the weighted average of the votes of the two courses.
TEACHING METHODS	Lectures (44 hours), laboratory (4 hours), practice in class (8 hours), practice in field (4 hours) for Acarology and integrated defence and lectures (22 hours) and laboratory (8 hours) for Integrated plant diseases management.

MODULE
ACAROLOGY AND INTEGRATED DEFENCE

Prof. HARALABOS TSOLAKIS

SUGGESTED BIBLIOGRAPHY

1. Appunti di Acarologia agraria forniti dal docente 2. Slides delle lezioni 3.
Viggiani G. “Lotta biologica ed integrata”, Liguori Ed

AMBIT	50545-Discipline della difesa
INDIVIDUAL STUDY (Hrs)	90
COURSE ACTIVITY (Hrs)	60

EDUCATIONAL OBJECTIVES OF THE MODULE

The student will learn to distinguish the mites from the other arthropods and learn to recognize the morphological characteristics that distinguish the different families of mites. Learn the morphology and physiology of the main groups of mites, to recognize the different juvenile stages, understand the bio-ethological and ecological aspects of the most important species. Learn to adopt the appropriate sampling technique for the different phytophagous species and to estimate the economic thresholds. Learn the techniques of biological control, of chemical control and integration of the different kinds of measures designed to contain the populations of pests and to draw up the integrated control plans on different crops

SYLLABUS

Hrs	Frontal teaching
1	Introduction to acarology, course objectives; The importance of the mites in ecosystems and particularly in agroecosystems
3	Evolution of arachnids and classification. Arachnids and araneids: General and behavioral characteristics. The role of araneids in agroecosystems. Evolution and classification of mites: characteristics of different families of agricultural interest. morphological regions of the mites body. Segmentation. The integument. Dorsal and ventral integument in predatory mites, with particular reference to predatory mites of the family Phytoseiidae. The legs and various adaptations. Chaetotaxy of legs
3	Description of the gnatosoma. The mouthparts in predatory mites. Hypothesis of the chelicerae evolution. Chelicerae and dietary regimes. The gnatosoma of Phytoseiidae. The tritosternum and its role in nutrition. Evolution and adaptations of the various components of the gnatosoma. Gnatosoma of Tetranychidae. Gnatosoma of Tarsonemidae. Gnatosoma of Eriophyoidea. Gnatosoma of Ixodidae
2	Digestive system and its modifications. Circulatory system. Nervous system and sensory organs. Muscular system. Endosternum: function and relationship with the muscular system. Respiratory system
3	Reproduction of mites. Male and female reproductive system. Insemination apparatus: structure and function. Insemination apparatus: type phytoseiidae and type laelapidae. Porospermy, podospermy, tocospermy. Sexual behaviour of spider mites and predators. Embryonic development; The post-embryonic development. Hypopus forms. Phoretic mites. Molting process
3	Ecology and evolutionary adaptations of mites; Adaptation to the habitat and dietary regimen of the various families of mites. Characteristics of the families: Tetranychidae, Eriophyidae, Tarsonemidae, Tenuipalpidae, Tydeidae, Oribatidae, Phytoseiidae: classification of food substrates
2	The dispersal of spider mites and predators in agroecosystems. Webbing and the "life types" in tetranichid mites; The detection of prey by the predator
3	Tetranychus urticae: bio-ethology and pest management
6	Tetranychus evansi. Eotetranychus carpini. Panonychus citri. Panonychus ulmi. Polyphagotarsonemus latus. Steneotarsonemus pallidus. Eriophyoidea. Aculops lycopersici, Aceria sheldoni, Aculops pelekassi, Phytoptus avellanae, Calepitrimerus vitis, Colomerus vitis, Aculus fockeui, Eriophyes pyri, Epitrimerus pyri, Aculus schlechtendali

10	The natural control; Definition of biological control; The applied biological control. Techniques of a classical biological control. Protective method; propagation method; inundative method. Introduction of exotic natural enemies; Enhancement of natural biological control. Identification of pests and natural enemies. Biological control agents; Viruses, bacteria, fungi, protozoa. Impact of diseases on populations of insect pests. Virus: recombinant baculovirus. Bacteria: Bacillus thuringiensis, Bacillus popilliae. Fungi: Entomophtora. Entomophaga. Erynia. Beauveria. Metarhizium. Hirsutella. Protozoa: Nosema spp. Impact of diseases on populations of insect pests. Nematodes: Steinernema feltidae, Heterorhabditis bacteriophora. Insect predators: Coccinellidae; Neuroptera; Insects Diptera parasitoids: Hymenoptera; Diptera. Mites: Phytoseiulus persimilis, Iphiseius degenerans, Cydnodromus californicus, Kampimodromus aberrans, Euseius stipulatus.
4	The chemical control: History of the chemical control, the current situation; Active ingredients: insecticides, miticides. Future of pesticides; Pesticides of plant origin; Phytotoxicity. Penetration mode. Mechanisms of action. Selectivity. Systemicity. Metabolism. Persistence. Problems caused by the use of pesticides: Resistance, Risorgence, Simplification of agro-ecosystems, bioaccumulation, Health Effects; selectivity; systemicity; Metabolism; Persistence. Choosing an insecticide; Varietal resistance strategies and tactics in the control of pest populations
4	Integrated Pest Management in olive groves, vineyards, citrus groves and greenhouses

Hrs	Practice
8	Practice in class: planning of an IPM (Integrated Pest Management) project on the following agroecosystems: olive grove, Citrus grove, vineyards, greenhouse
4	Practice in field: identification of symptoms of main mite pests and application of sampling tecniques

Hrs	Workshops
4	Laboratory: observations of the body and of gnatosoma in the different mite families, using a dissecting microscope and a differential interference contrast microscope (DIC), mass rearing tecniques of predaceous mites, preparation methods of mites on slides.

MODULE
INTEGRATED PHYTOPATIES CONTROL

Prof. SALVATORE DAVINO

SUGGESTED BIBLIOGRAPHY

Materiale distribuito nel corso delle lezioni.
Testi di riferimento
• Lorenzini G., Prncipi di Fitoiatria . Edagricole Bologna. 2001. ISBN: 88-506-0032-1
• Chet I., Innovative Approaches to Plant Disease Control . John Wiley & Sons Inc., 1987. ISBN: 0-471-80962-4.

AMBIT	21005-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30

EDUCATIONAL OBJECTIVES OF THE MODULE

The main goal is to provide a review of the current trends towards sustainable plant protection with particular regard to the environmental impact, based on an the analysis of the evolutionary scenario of plant protection. On the basis of epidemiological knowledge will be examined modern intervention and containment strategies taking as a reference point an integrated and biological approach. The student will acquire sufficient skills to be able to relate critically to the problems of pest management and to the management of plant diseases.

SYLLABUS

Hrs	Frontal teaching
1	Plant pathology related to crop management. Evolution of crop protection towards new sustainable models.
1	Introduction to Plant pathology diagnosis
4	traditional diagnostic tests, diagnostic tests through the use of biochemical markers, serological tests, nucleic acids detection, PCR, RFLP, SSCP, cloning and sequencing, phylogenetic analysis.
3	Epidemiology and study on previsional spread of diseases
4	Agrochemicals: Physical and chemical characteristics, classification, use, detention
9	Sustainable crop protection strategies in crops of economic interest

Hrs	Practice
2	decision support systems

Hrs	Workshops
6	DAS-ELISA test, nucleic acids extraction, PCR and Electrophoresis gel