



Master of Science Programme in INTEGRATED PEST MANAGEMENT OF FRUIT AND VEGETABLE CROPS

Academic Year 2023-2024

DESCRIPTION

The Master of Science Programme provides a two-year curriculum whose main objective is to prepare a new generation of motivated students towards professional and academic careers that will promote integrated strategies for sustainable pest management of fruit and vegetable crops in the Mediterranean agroecosystems.

The Master course introduces the management of phytosanitary problems from an agroecological and food system perspective. Students will study the ecology and epidemiology of pests, their integrated management and preventive control measures, tools/products/interventions for diagnosis and monitoring. Academics and practitioners will bring students through the analysis and understanding of Integrated Pest Management (IPM) strategies for key pests of Mediterranean crops and on related policies, institutions, and services. A significant focus will be upon the management of emergent transboundary pests, and on measures for predicting, preventing and controlling their spread.

At the end of the course students will know:

- ❖ strategies to reduce the use of chemicals for crop protection, ensuring economic gaining while protecting the environment and human health;
- ❖ agroecological factors that influence the epidemiology of major phytosanitary problems and the range of preventative measures for their control;
- ❖ how to make early diagnosis and monitor outbreaks of pests through territorial surveillance, field inspections, use of field devices, lab tools and technologies;
- ❖ how to correctly plan treatments for pest control, and how to chose and manage products and control strategies;
- ❖ how to support, plan and implement solutions for reducing losses after harvest of crops;
- ❖ how to organize and manage key services to avoid the introduction and spread of pests and diseases.

The programme is carried out in collaboration with national and international Institutions and Universities.

International scientists and practitioners, with a consolidated knowledge on the covered topics, will give lectures.

Students will also carry out several practical activities and assignments, aimed at developing their skills and competencies in the Master sector.

ORGANIZATION

First Year: 60 ECTS

Diploma: Master of CIHEAM Bari

Duration: from October 2023 to June 2024

Second Year: 60 ECTS

Diploma: Master of Science (MSc)

Duration: from November 2024 to October 2025

CANDIDATES' PROFILE

Courses are addressed to new graduate students and young professionals with undergraduate studies in the fields of Agricultural Sciences, Biology or Biotechnology (with basic background in plant protection) background related to agronomic, horticultural and plant protection issues.

Requirements:

- Holding a University degree awarding at least 180 ECTS;
- Having completed four out of five years of University studies, upon agreement between the sending University and CIHEAM Bari (the year attended at CIHEAM Bari is recognized as final year in order to graduate at the University of origin);
- Good knowledge of **spoken and written English**;
- Personal access to **computer facilities**.

ADMISSION

Selection of students is based on:

1. Screening of documents uploaded online by candidates to support their application.
2. Online interviews.

APPLICATIONS through the CIHEAM Bari Platform
(<https://online-application.iamb.ciheam.org>)

Deadline: 31 May 2023

COSTS

Registration fee: 200.00€/year.

Tuition fee: 500.00€/month (travel, accommodation and insurance expenses not included).

SCHOLARSHIPS

CIHEAM Bari grants **full or partial scholarships** to candidates according to a ranking list.

LANGUAGE OF INSTRUCTION: English

For further information and application procedure: www.iamb.it

First-year programme

Unit I - Sustainability in agriculture and food systems (distance learning): it frames the concepts of sustainability applied to agriculture and food sectors. It provides elements for understanding the main agricultural challenges to design solutions and actions towards sustainable and resilient agri-food systems. The multi-dimensional nature of sustainability challenges will be analysed, getting students to reflect on processes for sustainability transitions in agri-food systems.

Unit II - Regulations, Guidelines and Tools for an IPM Implementation: this unit introduces the basic principles and strategic means for an Integrated Pest Management (IPM), to prevent deplorable product losses and to ensure safe pests control strategies in terms of human and environmental health. It provides focus on management of various plant pests and pathogens in the context of global climate change and spread of native and invasive pests; involving all key actors in the production chain, *i.e.*, farmers, research institutes, advisory services, and governmental bodies. This unit will introduce the regulations and directives to important topics referring to harmful regulated pests and emergent transboundary phytosanitary problems.

UNIT III - Conventional & Advanced Control Strategies of Pests & Diseases: this unit provides knowledge on the application and development of eco-friendly control strategies to plant pests for banning the use of pesticides for a sustainable and safe agriculture. Thus, this unit will introduce the use of innovative control methods and strategies, *i.e.*, exploitation of genetics and host resistance, biological control, semi chemicals approaches, sustainable rational use of pesticides, and ademption to regulatory and international standards of control.

UNIT IV - Virus & Virus-like Diseases of Fruit Tree & Vegetable Crops: this unit introduces knowledge on the morphology, aetiology, epidemiology, and ecology of important plant pathogenic agents of diseases, *i.e.*, viruses, viroids and phytoplasmas, infecting fruit tree and vegetable crops in nature. The unit also presents “modus operandi” for a timely detection of biotic agents through on-farm field inspections and laboratory diagnostic techniques. This unit will make students acquainted to the application of conventional and highly advanced technologies in diseases diagnoses, besides to the innovative biotechnological tools to cope with the virulent nature of some important virus and virus-like diseases at the farm and territorial level. In addition, this unit will provide guidelines on the certification program as an important tool to prevent the dissemination and the introduction of new pests and diseases in the EU region.

UNIT V - Bacterial & Fungal Diseases of Fruit tree & Vegetable Crops: this unit introduces the most important bacterial and fungal diseases that affect the fruit tree and vegetable crops, together with their relevance, distribution, ecological features, epidemiological processes, and containment in the Mediterranean region. In addition, this unit will introduce different laboratory techniques, field forecasting and modelling strategies for the isolation, characterization, control, and management of these pathogens, respectively. Additional diseases elicited by the abiotic factors (physiological disorders, nutrients deficiency, etc.) will be introduced.

UNIT VI - Pests of Fruit Trees & Vegetable Crops: this unit provides basic knowledge and key elements for identifying and characterizing insects and nematodes that affect agricultural crops. Students will learn safe and sustainable use of agrochemicals and biorational pesticides for controlling important pests of fruit tree and vegetable crops. Furthermore, this unit will introduce innovative approaches of forecasting models related to spatial and temporal spread of insects for prompt interventions and control strategies in the field.

UNIT VII - Sustainable Post-harvest Control Strategies & Regulations: this unit will introduce various aspects related to post-harvest diseases, contaminants and nutritional losses normally occurring during the food chain processing, thus leading to significant hazards to environment and human health. Knowledge of the key critical control points during harvesting and storage stages of the production chain are essential in developing effective prevention strategies post-harvest. Thus, strategies of good agricultural practices, safe control and limitation of food contaminants, certification, and regulations to cope with post-harvest diseases will be introduced, for a safe and sound management of pests and post-harvest problems.

UNIT VIII - Conventional Approaches & Smart Tools for the Monitoring & Surveillance of Plant Pests & Diseases: this unit provides students with basic knowledge on the use of conventional methodologies and smart tools for driving decisions towards more sustainable natural resource management in agriculture. This unit also shed the light on futuristic remote sensing-based pests and diseases monitoring and surveillance using geographic information systems, global position systems and multi-model mechanistic approaches; all necessary for decision supporting systems in modern remote-controlled agriculture. In addition, this unit also provides guidelines and preventive action strategies against the entrance and diffusion of key pests and pathogens, in the frame of quarantine measures, contingency plans for priority pests and eradication systems.

Individual Mini-Research Experimental Project (IMREP):

An IMREP is an applied experimental research proposal that is built on students' knowledge acquired during the year from lectures and assignments. The student will carry out field and laboratory basic research experiment related to fruit tree and/or vegetable phytosanitary problem; on which he should discuss the outcome in the presence of a commission at the end of the academic year.

Action Learning Project (ALP):

An ALP is a team-working project that prone students to primarily exchange among them the scientific information related to the project and secondarily their own knowledge, skills, experience and passing by the social and cultural background. The ALPs' activities will consist in technical visits, meetings and professional interviews with researchers, farmers, stakeholders, policy makers, etc.

Seminars and webinars: Students will follow several seminars and webinars that will be held by international experts on the latest research and discoveries in the world of agriculture, in relationship with the topics introduced in each unit.

Second-year programme

Students, who successfully complete the first year and meet all the prerequisites set by the Institute, are selected to participate in the Master of Science Programme and carry out scientific research on an original topic related to pest/food health challenge for fruit and vegetable crops at **CIHEAM BARI** and/or in mobility in collaboration with Italian and foreign Universities.

Preparatory research methodologies

Scientific English. Bibliographic research. Scientific writing. Safe laboratory practices. Statistical analysis. Training course on conventional and advanced on laboratory/field techniques related to the research topic.

Supervised research work

Topics of MSc theses on pests/pathogens of fruit and vegetable crops are to be chosen among the following research lines:

Topics of MSc theses are to be chosen among the following research lines:

- Sampling methodology and technical protocols;
- Pest monitoring, identification and detection;
- Pest physico-chemical and molecular characterization;
- Pest epidemiology;
- Pest management and control;
- Remote sensing, GIS and information technology applications to plant health;
- Pest forecasting models;
- Detection and control of mycotoxins and contaminants in agricultural products;
- Alternative control means to be applied before and after harvest.