



MASTER OF SCIENCE PROGRAMME in “INTEGRATED PEST MANAGEMENT OF FRUIT TREES AND VEGETABLE CROPS” Academic Year 2026-2027

DESCRIPTION

The Master of Science Programme in “*Integrated Pest Management of Fruit Trees and Vegetable Crops*” is a two-year, multidisciplinary curriculum designed to train a new generation of highly skilled professionals and researchers. The programme aims to equip students with the scientific knowledge and practical competencies needed to develop and implement integrated, sustainable, and resilient pest management strategies across diverse agroecosystems, with particular emphasis on fruit and vegetable production systems.

The course adopts a systems-based and agroecological approach to plant health, addressing phytosanitary challenges within the broader context of food systems, environmental sustainability, and climate change. Students will gain a solid foundation in pest ecology, epidemiology, and risk analysis, alongside advanced knowledge of Integrated Pest Management (IPM) principles, including preventive strategies, biological control, and reduced-risk interventions.

A key component of the programme is the application of modern diagnostic, monitoring, and decision-support tools, including molecular detection methods, digital technologies, and precision agriculture approaches. Through a combination of academic instruction and practitioner-led activities, students will critically analyse IPM strategies for major pests affecting economically important crops, while also exploring the regulatory frameworks, policies, and institutional systems that govern plant health at national and international levels.

Special emphasis is placed on emerging and transboundary plant pests and diseases, equipping students to predict, prevent, and manage their spread in an increasingly globalised agricultural landscape. By integrating scientific innovation with practical implementation, the programme prepares graduates to contribute effectively to sustainable agriculture, food security, and plant health resilience.

At the end of the course students will know:

- ❖ Develop and implement integrated pest management (IPM) strategies for sustainable crop protection in diverse agroecosystems.
- ❖ Analyse the ecology, epidemiology, and risk factors of plant pests and diseases to support evidence-based decision-making.
- ❖ Apply advanced diagnostic and monitoring tools, including molecular techniques and digital/precision agriculture technologies.
- ❖ Design and evaluate preventive and control measures, including biological control and reduced-risk interventions.
- ❖ Assess and respond to emerging and transboundary plant pests, including strategies for prediction, prevention, and containment.
- ❖ Interpret and apply plant health policies, regulatory frameworks, and international standards (e.g., EU, EPPO, IPPC) in professional contexts.

The programme is carried out in collaboration with national and international Institutions and Universities. Lectures will be held by international scientists and practitioners, with a consolidated knowledge on covered topics. Students will also carry out several practical activities and assignments to develop their skills and competencies in the Master’s sector.

ORGANIZATION

First Year: 60 ECTS

Diploma: Master of CIHEAM Bari

Duration: from October 2026 to June 2027

Second Year: 60 ECTS

Diploma: Master of Science (MSc)

Duration: from November 2027 to October 2028

CANDIDATES’ PROFILE

Courses are addressed to new graduate students and young professionals interested in Agricultural Sciences, Biology or Biotechnology (with a basic background in plant protection), integrated pest management of crops, and plant protection issues.

Requirements:

Candidates should hold a university degree awarding at least 180 ECTS (three-year bachelor degree), or they must have completed four out of five years of studies, upon agreement between the sending university and CIHEAM Bari.

Working experience and other qualifications will be evaluated and considered an added value in the selection process. Applicants should possess strong proficiency in both spoken and written English and be familiar with the use of computational technologies.

ADMISSION

The selection of students is based on:

1. Screening of application-supporting documents
2. Online interviews.

APPLICATIONS

Online procedure

Deadline: 31 May 2026

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 selected candidates according to a ranking list.

Priority is given to students coming from CIHEAM Member countries and other African, Mediterranean, Western-Balkan and Middle Eastern Countries.

LANGUAGE OF INSTRUCTION: English

For further details about IPM:

www.iamb.it/education/master/ipm

Unit I- Guidelines and Regulations for IPM and Plant Health Systems: This module provides a comprehensive foundation in Integrated Pest Management (IPM) within the context of sustainable plant health systems. It explores the role of agrobiodiversity and agroecosystem management in enhancing natural pest regulation, alongside the importance of soil health and microbiomes in disease suppression. Students will examine key regulatory frameworks, including EU plant health policies and IPPC standards, and compare plant health regulations across Europe and Africa, highlighting their application within different agricultural systems.

UNIT II- Plant Health Management: Ecology and Alternative Control Strategies: This unit focuses on the application of ecological principles in plant health management, emphasizing sustainable and preventive approaches within Integrated Pest Management (IPM). It examines the role of crop rotation and soil management in disrupting pest life cycles and enhancing agroecosystem resilience. The unit also explores biological control strategies, including the use of beneficial insects, microbial agents, and botanical products. In addition, students will study the exploitation of host plant resistance as a key preventive tool, alongside the rational and responsible use of pesticides within IPM frameworks, with particular attention to efficacy, human health, and environmental safety.

UNIT III- Plant Virus Epidemiology, Diagnostics and Management: This unit provides comprehensive knowledge on the morphology, aetiology, epidemiology, and ecology of key plant pathogens, including viruses, viroids, and phytoplasmas affecting fruit and vegetable crops. It covers practical approaches for the timely detection of these agents through field inspections and laboratory diagnostics, integrating both conventional and advanced technologies. Emphasis is placed on innovative biotechnological tools for managing complex and emerging diseases. The unit also addresses certification schemes as essential instruments for preventing the introduction and spread of plant pests and diseases within the EU.

UNIT IV- Integrated Diagnosis and Management of Fungal and Bacterial Diseases: This unit covers the major fungal and bacterial diseases affecting fruit tree and vegetable crops, with emphasis on their distribution, ecological characteristics, epidemiology, and management in Mediterranean agroecosystems. It includes laboratory and field-based approaches for pathogen isolation, characterization, forecasting, and modelling to support effective disease management. The unit also addresses plant disorders caused by abiotic factors, such as physiological imbalances and nutrient deficiencies.

UNIT V- Insect and Nematode Pests in Crop Systems: Identification, Forecasting, and Control: This unit provides basic knowledge and key elements for identifying and characterizing insects and nematodes that affect crops. Students will learn the safe and sustainable use of agrochemicals and biorational pesticides for controlling important pests of fruit trees and vegetable crops. Furthermore, this unit will introduce innovative approaches of forecasting models related to the spatial and temporal spread of insects for prompt interventions and control strategies in the field.

UNIT VI- Post-Harvest Pest Management, Food Safety and Certification in Crop Supply Chains: 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 the environment and human health. Knowledge of the key critical control points during the 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 VII- Plant Health Surveillance, Biosecurity and Certification Systems: This unit focuses on preventive strategies to manage the introduction and spread of key pests and pathogens, including quarantine measures, contingency planning, and eradication approaches. It addresses plant health challenges in the context of climate change and invasive species, involving all stakeholders across the production chain. Advanced surveillance tools, such as remote sensing, GIS/GPS, and modelling approaches, are introduced to support decision-making in modern, precision agriculture.

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 are required to carry out an original scientific research project addressing a pest or plant/food health challenge in fruit and vegetable crops. Research activities are conducted at CIHEAM Bari and/or in the students' home countries, in collaboration with Italian and international universities, under academic supervision.

MSc thesis topics are aligned with CIHEAM Bari research priorities, ongoing research and cooperation programmes, and partnerships with public and private institutions.

Research areas include: sampling methodologies and technical protocols; pest monitoring, identification and detection; physico-chemical and molecular characterization; epidemiology; pest management and control; remote sensing, GIS and ICT applications in plant health; forecasting models; detection and control of mycotoxins and contaminants; and alternative control strategies for pre- and post-harvest stages.

Research activity is supported by the following teaching units:

UNIT-I: Research tools and methods: The unit aims to provide the students with theoretical and practical courses on relevant topics of research activity. Students will get practical skills through the design of proposals and the statistical analysis of the obtained data

UNIT-II: Scientific writing and proposals preparation: the unit aims to prepare the students for scientific writing, effective communication, and project preparation, following the guidelines, template, and tools for thesis writing