



CIHEAM
BARI

MASTER COURSES 2021-22



Master in Mediterranean Organic Agriculture



Academic Year 2021 - 2022



DESCRIPTION

The Master provides a 1 academic year curriculum whose main objective is to prepare a new generation of motivated students for professional and academic careers that promote the development of organic agriculture, with a focus on Mediterranean contexts.

The programme proposes a holistic view of the organic sector development, incorporating theoretical and methodological approaches to sustain the transition to organic agriculture through agroecological principles, and with a sustainable food system development perspective. The course provides deep insights into organic farming and food regulatory frameworks. Special emphasis is given to a full range of on-farm technologies and practices aiming to improve soil health and fertility and to manage pests and diseases. Economic and marketing issues are also addressed, leading students across an understanding of sustainable food value chains.

By the end of the course students will gain the following skills and competences:

- Understand the importance of sustainable production and advocate for ecologically comprehensive solutions, at different levels.
- Be acquainted with the legislative and policy framework of organic farming and with how to lead farms towards organic farming and agroecological principles.
- Know how to produce safe, high quality and sustainable organic food.
- Understand economic and market issues, analyse and design organic food value chains.
- Facilitate multi-actor networking for the development of the organic sector.
- Assess the agricultural, environmental, and socio-economic opportunities and constraints of organic agriculture in different areas across the Mediterranean region.

1. The programme includes 8 units and one project, for a total of 60 credits (see table below). Unit I and Unit II will be taught online.

Units	Credits	Dates
Unit I - Sustainability and resilience in agriculture and food systems	6	4-31 October
Unit II – Climate Smart Agroecology	6	1 - 28 November
Unit III - Organic agriculture principles, standards, regulations, and policies	8	6 – 30 December. 3- 14 January
Unit IV- Soil Management and fertility	8	24 January – 18 February
Unit V – Crop disease and pest management	8	21 February – 11 March
Unit VI – Organic market and value chain	8	14 March – 1 April
Unit VII – Sustainable farm management	8	4 April – 22 April
Project on Farm management in organic agriculture	8	25 April – 20 May



UNIT I: SUSTAINABILITY AND RESILIENCE IN AGRICULTURE AND FOOD SYSTEMS

Food systems encompass all the elements (environment, people, inputs, infrastructure, institutions, etc.) and activities relating to food production (cf. agriculture), processing, distribution, and consumption. They include the supply side and consumption elements, as well as the food environment that shapes access to food.

Over the last decades, food systems have come to the forefront of the debate on sustainable development (cf. Sustainable Development Goals - SDGs). Indeed, food systems are under an unprecedented confluence of pressures and are at the centre of a global nexus of environmental, social, and economic problems, as humanity is increasingly challenged to achieve sustainable food security amidst ecosystem degradation and biodiversity loss, resource scarcity, human population growth and climate change. Moreover, the COVID-19 pandemic has revealed the vulnerabilities and brought to light the flaws in current food systems, and also the need to improve their resilience and sustainability.

On the one hand, food systems are among the main contributors to sustainability challenges such as land degradation, climate change, biodiversity loss, etc. On the other hand, they are dramatically affected by these challenges facing humanity. Moreover, the dysfunction of modern food systems is a major cause of several societal issues such as food insecurity and malnutrition, rural poverty and livelihood vulnerability, social inequality. This has climaxed in different calls for the transformation of food systems and their transition towards greater sustainability and resilience. Transition to sustainable and resilient agrifood systems is the goal of many policies, strategies, and initiatives. While some initiatives focus on single stages of the food chain (e.g., sustainable agriculture, sustainable diets), others are more systemic and holistic (e.g., short food supply chains, alternative food networks). Food-related challenges are particularly pressing in the Mediterranean, where there is an urgent need for action.

AIMS

- ❖ Explain the concepts of sustainability, sustainable development, and resilience, and how to apply them to agriculture and food systems (cf. sustainable agriculture, sustainable diets, sustainable food systems).
- ❖ Explore the environmental, social, economic, and health-nutritional challenges affecting agriculture and food sustainability in the Mediterranean area and worldwide.
- ❖ Introduce examples of sustainability assessment approaches and show how they have been used in agriculture and food systems.
- ❖ Present policies, strategies, and initiatives to foster transition towards sustainability in agriculture and food systems in the Mediterranean area, the European Union and worldwide.

LEARNING OUTCOMES

By the end of the teaching unit, students will be able to:

- ✓ Understand the concepts of sustainability, sustainable development, and resilience, and apply them to agriculture and food systems.
- ✓ Explain sustainability challenges regarding agriculture and food in the Mediterranean area and worldwide.



- ✓ Know how sustainability assessment approaches are used in agriculture and food systems with practical examples.
- ✓ Understand strategies, pathways, and actions for transition towards sustainability in agriculture and food systems.

UNIT II: CLIMATE SMART AGROECOLOGY

Agroecology is a relatively new discipline that studies the ecological complexity and functioning of the agroecosystem. It is one of the key disciplines to drive the transition of agriculture towards sustainable paths, facing challenges posed by climate change, but also the negative externalities from current intensive production systems. It focuses on biological processes and on how they interact and influence the functioning of agroecosystems and farming systems, to propose sustainable agricultural practices and solutions.

Biodiversity conservation and enhancement, sustainable management of natural capital and the provision of ecosystem services are of core interest for agroecology. Students will have the opportunity to explore how the agroecosystems are interlinked with the use of natural resources, the health of soil, plant, and the environment and how they cope with abiotic and biotic threats under a changing climate.

Nowadays, the conceptual development of agroecology goes beyond the aspects related to scientific discipline and discusses factors concerning economy, sociology, culture, and in general wellbeing of the sector actors. Smallholder farmers are considered as promoters of sustainable practices, agroecology strives for their autonomy, supports the community self-organization and co-learning, and bottom-up/place-based actions. While promoting its core values, agroecology is not immune to modern technologies and innovation. Synergies are developed between new technologies and nature-based solutions thereby resulting in 'smart' agroecology, whose approach to agri-food systems and to mitigation strategies helps face climate change and other global and local challenges.

All the topics listed above are discussed along the unit, taking into consideration basic principles and practices of agroecology, agroecosystem stability and resilience, predictions related to different climate change scenarios, the carbon footprint of agricultural production, including some assessment methods as well such as life cycle assessment of greenhouse gas emissions.

AIMS

This teaching unit aims to provide a broadly applicable knowledge base for increasing agroecosystems' resilience and production in a climate change scenario, with the following objectives:

- ❖ Understand the value of the agroecological approach to improve rural livelihoods and promote social equity.
- ❖ Explain agroecosystems' functioning.
- ❖ Examine agroecosystems' complexities and challenges.
- ❖ Review agroecological practices that enable more sustainable production.
- ❖ Understand how climate change affects agroecosystems' functioning.
- ❖ Identify sustainable management solutions to mitigate and adapt to climate change and other global drivers of change.



All along the course, practical sessions will be promoted to provide and improve students' skills, knowledge, and abilities to use specific tools and technologies that enable proper analysis of agroecosystems and biodiversity at different scales and support rational management of natural resources.

LEARNING OUTCOMES

By the end of the unit students will:

- ✓ Become familiar with social and cultural values promoted by agroecology.
- ✓ Become knowledgeable about ecosystem functioning, principles of agroecology and related practices.
- ✓ Acquire practical skills in integrated, multiscale agroecosystem analysis.
- ✓ Achieve basic knowledge on nature-based solutions for biodiversity and ecosystem service provision.
- ✓ Understand how climate change affects agroecosystems and sustainable management of natural resources.

UNIT III: ORGANIC AGRICULTURE PRINCIPLES, STANDARDS, REGULATIONS, AND POLICIES

Organic agriculture is a production system based on specific sustainability principles that rely upon the use of environmentally friendly practices and inputs. This is a sector governed by precise rules and regulations, covering farm conversion, production processes (for plants and animals, including aquaculture), food and feed processing and marketing. Control systems are also set up to ensure that producers comply with the rules and to certify the produce as organic. Rules also govern the import/export of products to different markets. At the same time, organic agriculture has a great impact on policies at national and international level and has a great impact on various agricultural and social policies.

AIMS

The aim of this unit is to make students knowledgeable about the following content:

- ❖ Introduction to organic farming, definitions, concepts, principles, and organic farming context.
- ❖ Farm context analyses prior to conversion to organic.
- ❖ Essential agroecological practices as tools for farming organically and linkage of these practices to farm conditions.
- ❖ Organic farming regulations in the EU and state of play in the Mediterranean countries.
- ❖ Import/export of organic products into the EU (TRACES).
- ❖ Export procedures from third countries.
- ❖ Regulations for organic seed production and trade.
- ❖ Control and surveillance: the Italian and EU experience.
- ❖ Regulatory framework of a certification body to certify organic products.
- ❖ Regulatory framework for inspection and control in organic agriculture.
- ❖ Organic certification procedures and required documents.
- ❖ National and international policies.



LEARNING OUTCOMES

By the end of the unit students are expected to:

- ✓ Become acquainted with organic agriculture as a regulated production system to achieve sustainability.
- ✓ Understand the rules relating to control and certification of organic produce and production processes.
- ✓ Be able to analyse farm conditions, applying tools and agroecological practices with a view to conversion to organic farming.
- ✓ Know organic certification procedures and the process of document preparation by operators.
- ✓ Be able to plan and conduct on-farm inspection audits according to ISO standards and organic regulations.
- ✓ Be knowledgeable about the role of policies in the development of organic agriculture in the Mediterranean countries.

UNIT IV- SOIL MANAGEMENT AND FERTILITY

Knowledge of sustainable management of the non-renewable soil resource is of utmost importance in organic farming. This unit will cover the basic principles of soil management and soil fertility using environmentally sustainable practices that aim to maintain or improve soil health and ensure production quantity and quality.

The unit will explore the main chemical, physical and biological principles that regulate the functioning of the soil as a living system (soil web), and whose understanding is fundamental for managing soil fertility in different environmental and climatic conditions. Organic farming practices aimed at soil fertility management will be described in detail but, at the same time, they will be addressed within the framework of a comprehensive and strategic approach. A comprehensive and systemic perspective will be provided about the concepts of organic farming as a potential self-sustaining biological system rather than one exclusively based on external inputs.

AIMS

- ❖ Illustrate the main (biological, physical, and chemical) soil components and processes.
- ❖ Introduce and describe both soil nutrients and their cycles and the basic plant nutrition/absorption principles.
- ❖ Explore the main agronomic practices (rotation, intercropping, cover crops, tillage management, weed control).
- ❖ Provide an overview of fertilisers and fertilisation practices allowed in organic farming.
- ❖ Discuss the reuse of plant residues and agricultural by-products.

LEARNING OUTCOMES

Students will learn about:

- ✓ Soil nutrient dynamics.
- ✓ Characteristics and behaviour of various fertilisers and by-products.
- ✓ How to apply annual or multi-annual fertilisation plans on organic farms.



- ✓ How to select and apply various cover crop species.
- ✓ How to read soil analyses.

UNIT V – CROP DISEASE AND PEST MANAGEMENT

Disease and pest management in organic farming is a challenge, especially considering the strict limitations on chemical control and the delicate balance between external inputs and ecosystem services on which management should be based.

The unit will cover (a) the basic principles of organic agriculture related to disease and pest control in organic farming; (b) plant protection products allowed for use in organic agriculture and prospects for sustainable chemical control; (c) biological control, side effects of control tools and approaches on ecosystem services, and strategies to preserve populations of natural enemies; (d) management of vector-borne plant pathogens in organic agriculture.

Emphasis will be placed on Mediterranean crops of economic/ecological/historical importance.

AIMS

- ❖ Introduce principles for disease and pest control in organic agriculture.
- ❖ Present plant protection products allowed for use in organic agriculture, their mode of action and novel products for pest control.
- ❖ Illustrate biological control strategies and rearing of beneficial insects.
- ❖ Address lifecycle of “Key pests” of Mediterranean crops and relevant control strategies.
- ❖ Describe novel techniques that can be used to assess study disease spread and transmission and control the most important pests in Mediterranean countries

LEARNING OUTCOMES

Students will learn about how to:

- ✓ Approach pest and disease control in organic farming.
- ✓ Select and apply products for pest and disease control.
- ✓ Increase the presence of beneficial insects at farm level.
- ✓ Design control strategies in accordance with EU regulation on organic farming.

UNIT VI – ORGANIC MARKET AND VALUE CHAIN

Nowadays, organic food value chains are run in an ever more complex and dynamic environment, characterised by new consumer demands, new technologies and solutions, changing structures and modes of cooperation. Strategic alliances among different stakeholders contribute to providing high-quality and differentiated food products and to distributing the rewards equitably across the chain. Marketing plays a key role in linking organic agrifood chains to the market. Overall, this unit aims to teach how organic agrifood chains face the challenge of continuously improving their competitiveness and profitability by producing sustainable food. The unit provides knowledge and methods to enter the organic market with a multi-stakeholder and supply chain perspective.

AIMS

This unit is intended to

- ❖ Provide a framework for concepts, definition and assessment of organic food quality, safety, and implications for human health.



- ❖ Address innovative, sound, and sustainable technologies and solutions that are in line with organic standards, regulations, and principles.
- ❖ Provide knowledge about value chain concept and functioning, by analysing its components and stages, actors, and services.
- ❖ Focus on the evolution of organic markets, organic food consumption trends and drivers.
- ❖ Introduce key concepts related to marketing strategies and consumer behaviour analysis.

LEARNING OUTCOMES

Students will be able to:

- ✓ Understand how much organic food is nutritious, safe, tasty, healthy.
- ✓ Understand how production, processing, post-harvesting, and packaging add value to organic food.
- ✓ Apply value chain development concepts and perform value chain analysis.
- ✓ Prepare business and marketing plans.
- ✓ Perform consumer behaviour analysis.

UNIT VII – SUSTAINABLE FARM MANAGEMENT

The unit will introduce sustainable farm management as a decision-making process concerning allocation of scarce resources for agricultural production, and in line with multiple management goals. The farm is viewed as part of the agroecosystem and placed in the wider agrifood system, describing methods for performance analysis as tools to drive farmers towards competitiveness and business, while respecting the environmental and social context. Topics are addressed by exploring theoretical models, monitoring methodologies, real-life cases and by developing strategies and possible future scenarios. As for the practical training, students will be challenged to analyse organic and conventional farms by assessing sustainability levels.

AIMS

The unit will provide an in-depth knowledge about:

- ❖ Farm economics principles, with an agri-environmental perspective, in particular as regards farm management, accounting and budgeting, economic analysis, business planning.
- ❖ Assessment of environmental, economic, and social sustainability of an eco-friendly enterprise using relevant analytical methods and calculation and analysis schemes.
- ❖ Tools for organising and managing an enterprise within a sustainable supply chain.

LEARNING OUTCOMES

Students will be introduced to:

- ✓ Decision-making process to improve producer competitiveness and profitability in the sustainable supply chain within the organic sector.
- ✓ Business planning.
- ✓ Use of indicators to assess environmental, economic, and social sustainability.



- ✓ Ways of managing an eco-friendly farm according to sustainability principles.

Project on Farm management in organic agriculture

Understanding the activity and daily life of a real organic farm is crucial to address the different challenges posed by soil management, production, processing, and market rules. The entire value chain developed on a farm will be examined, considering the structure, workforce, limitations in soil fertility management and pest and disease control, certification costs, access to information and knowledge, support to decision making on issues relating to environmental, economic, and social sustainability of the agrifood system, etc.

Also crucial will be the processing phase, the association of organic production with other European standards, the "Farm to Fork" strategy, in the framework of the European Green Deal, and finally the decision on the type of market in which the product will be placed.

AIMS

- ❖ Introduce students to the concepts of small organic farms, mainly related to family management including gender roles and importance.
- ❖ Present different forms of soil and pest management on a real farm, including the farmer's choice in managing average production.
- ❖ Deliver a range of technical and economic indicators to assess environmental, economic, and social sustainability of the decision taken.

LEARNING OUTCOMES

- ✓ Evaluate environmental and technical data allowing to understand and improve real farm's decision-making process.
- ✓ Set up an indicator toolbox to help describe and assess farm's performance and sustainability in a regional value chain.