# .- Products of Plant Origin

***Text under revision. Not yet approved by academic staff.***

# Tree Module

## Prof. Luigi Bavaresco

COURSE AIMS AND INTENDED LEARNING OUTCOMES

The aim of the course is to provide students with the biological, agronomic and product knowledge in order to understand and manage agri-food supply chains based on arboreal plant products (fruit) intended for human consumption.

INTENDED LEARNING OUTCOMES

Knowledge and ability to understand

At the end of the course, students will know and understand:

1. The geographical spread of the most cultivated, produced and consumed fruit trees in the Italian and global agri-food landscape.
2. The fundamental elements of a fruit tree's morphology and physiology in both its life cycle and annual cycle, with specific reference to fruiting.
3. The role of environment (climate and soil), genotype (species, cultivars, clones and genetic selection innovations) and cultivation techniques (pruning, irrigation, fertilisation, defence, etc.) on the productive and qualitative result of an orchard.
4. Fruit preservation techniques and the most common types of processed fruit products.
5. The main nutritional and commercial qualities of fruit.
6. The salient elements of fruit production strategies aimed at safeguarding the environment and the healthiness of food: organic, integrated, sustainable.

Understanding and applying knowledge

At the end of the course, students will be able to:

1. Understand the main fruit species for human consumption and the main areas of the world for their supply.
2. Apply their acquired knowledge to the genetic, environmental and cultural choices of fruit tree species so as to understand the direct link between product and field (orchard).
3. Apply their acquired knowledge in the field of fruit cold storage with the aim of obtaining a product of high overall quality.
4. Apply their acquired knowledge to the industrial transformation of fruit, in order to set up a production chain with that particular destination in the orchard.
5. Apply the cultural principles of environmental sustainability with particular reference to integrated and organic production.
6. Apply their acquired knowledge to put together sustainable production chains aimed at high nutritional and/or commercial final product quality.

Autonomous judging skills

At the end of the course, students will be able to:

1. Choose the fruit with the most suitable characteristics for the various industrial and market destinations (juices, jams, dried, frozen, etc.).
2. Propose certain choices in the field to fruit producers to obtain fruit with particular product characteristics, knowing that the quality of a transformed product depends primarily on the quality of the raw material.

Communication skills

At the end of the course, students will be able to:

1. Appropriately use the scientific language and specific lexicon of fruit growing to describe and transfer their knowledge both in writing and orally.

Learning ability

At the end of the course, students will be able to:

1. Increase their knowledge of the various fruit tree species through the consultation of dedicated texts, scientific and educational magazines, even beyond those aspects discussed during lectures.

COURSE CONTENT

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|  | ECTS |
| Commodity-food classification and the geographical spread of plant products, in particular those derived from fruit. Elements of morphology and physiology, the life cycle and annual cycle (vegetative and reproductive), with particular reference to fruiting. | 1.0 |
| The fruit agro-ecosystem: role of the environment (climate and soil), the genotype (varieties and rootstocks) and cultivation techniques (setting and management of crowns and soil) on the quality and health of the fruit produced, with particular reference to wine and table grapes. Notes on the environmental-economic sustainability of production, PDO, organic and integrated products. | 1.0 |
| Fruit ripening and harvesting indices, cold storage techniques, in a normal and controlled atmosphere. Industrial processing of fruit: use of different species for various types of products. The main nutritional and commercial qualities of fruit. | 1.0 |
| Tutorials. Focus on some of the main fruit varieties and species on the market. Examples of the sensory evaluation of fruits. Visits to orchards and fruit storage and/or processing facilities. | 1.0 |

READING LIST

***Book adopted:*** Various Authors, *Arboricoltura generale*, Pàtron Editore, Bologna, 2012.

***Recommended readings:*** S. Sansavini - P. Ranalli, *Manuale di ortofrutticoltura*, Edagricole, Bologna, 2012.

TEACHING METHOD

1. Theoretical frontal lectures in which the main topics of the course will be addressed.
2. Classroom tutorials on the pomological and organoleptic characteristics of certain types of fruit.
3. A daily excursion in the fruit and wine growing area.
4. The presentation files of the frontal lectures and tutorials are considered an integral part of the teaching material and are made available to students.
5. At the end of each credit point of the course, students will also be provided with a reading list that can be consulted, should they wish to explore the topics covered more deeply.

ASSESSMENT METHOD AND CRITERIA

Final oral exam, which will consist of three general questions relating to the spread of fruit-growing, factors in the fruit agro-system, the annual and life cycle, cultivation techniques, the pomological and nutritional evaluation of fruit, cold storage and industrial transformation, quality standards (maximum 10 marks each). Within each question, the mark is divided in:

5 marks: objective correctness of the answer provided;

2 marks: ability to make connections between different topics, proving to have an overall view of the subject;

3 marks: ability to be synthetic and to confront the topics with a command of the language and a critical eye, also presenting them with a personalised interpretation.

NOTES AND PREREQUISITES

Participation in the tutorials is recommended as the topics covered will also be the subject of the final exam.

The necessary prerequisites are a knowledge of basic scientific subjects.

Information on office hours available on the teacher's personal page at http://docenti.unicatt.it/.

# Herbaceous Plants Module

## Prof. Stefano Amaducci

COURSE AIMS AND INTENDED LEARNING OUTCOMES

The course aims to provide students with the biological, botanical, agronomic and product knowledge for the understanding and management of agri-food supply chains based on herbaceous plant products for human consumption. During the course, the main problems and challenges of agri-food supply chains are presented and discussed, with particular attention to environmental and productive aspects.

INTENDED LEARNING OUTCOMES

Knowledge and ability to understand

At the end of the course, students will be able to:

* Describe the main current and future challenges of crop production;
* Describe the economic role and nutritional importance of the main herbaceous products;
* Describe the main types of agriculture, highlighting in particular the sustainable production methods;
* Describe the main components of foods of plant origin;
* Describe the plant cell and explain the function of the vacuole, the cell wall and the main cellular organelles;
* Know the main tissues and organs of plant species of agricultural interest;
* Illustrate the biological cycle of herbaceous plant species;
* Describe the main cultivation phases of cereals, identifying for each phase the influence that environmental and agronomic factors have on the yield composition and on product quality;
* Describe the main methods for determining the quality of flour;
* Understand the effect of the cultivation technique and choice of genotypes on determining the quality of herbaceous plant products;
* List the factors that contribute to determining the presence of mycotoxins in cereals and illustrate the main strategies for limiting their levels.

Understanding and applying knowledge

At the end of the course, students will be able to:

* Understand the relationships between agronomic choices, environmental conditions and production results;
* Understand the trade-offs underlying the main production choices in order to develop sustainable cultivation strategies.

Autonomous judging skills

At the end of the course, students will be able to:

* Evaluate the main critical points of herbaceous production chains and suggest the most appropriate operational choices for the pursuit of specific production objectives.

Communication skills

At the end of the course, students will be able to:

* Appropriately use the scientific language and specific lexicon of fruit-growing in order to describe and transfer their knowledge both in writing and orally.

Learning ability

At the end of the course, students will be able to:

1. Extend their knowledge on all the herbaceous species, through the consultation of dedicated texts, scientific and popular journals, even beyond the aspects addressed in class.

COURSE CONTENT

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| --- | --- |
|  | ECTS |
| Introduction to the course.  Importance of herbaceous plant products for human nutrition.  Quality and nutritional value of herbaceous plant products. Introduction to FAO statistics, food security, and the current and future challenges in agriculture. | 1.0 |
| Brief notes on the botany and physiology of herbaceous crops: the plant cell and tissues; plant morphology and reproduction.  Brief notes on agronomy and crops: the sustainable management of plant agricultural production. | 1.0 |
| Coverage of the main herbaceous food crops and related products:  cereals, pseudo-cereals, oilseeds, protein crops, sugar crops and horticulture. | 2.0 |

READING LIST

R. Baldoni, L. Giardini (2001) – Coltivazioni erbacee – Cereali e Proteaginose. PATRON, Bologna.

R. Baldoni, L. Giardini (2001) – Coltivazioni erbacee – Piante oleifere, da zucchero, da fibra, orticole ed aromatiche. PATRON, Bologna.

Further materials for in-depth study, together with the slides presented in class, will be provided during the course.

TEACHING METHOD

Frontal lectures during which the course topics will be presented and discussed;

The lectures will be held with the aid of PowerPoint presentations provided to the students before the lesson;

At the end of each chapter, a series of questions and sample exam questions will be presented.

ASSESSMENT METHOD AND CRITERIA

A final written exam, consisting of 21 closed-ended questions and 3 open-ended questions on the entire course programme. Each correct closed-ended question will carry 1 mark, while each open-ended question will carry a maximum of 3 marks. Students will have 90 minutes to complete the exam.

The exam is designed to assess primarily the student's reasoning ability and analytical rigour with respect to the course subjects, as well as their communication skills and command of the language.

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