# . - Products of Plant Origin

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

# Tree Module

## Prof. Alberto Vercesi

COURSE AIMS AND INTENDED LEARNING OUTCOMES

The aim of the course is to provide students with the biological, agronomic and product knowledge for the understanding and management of 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 role of genetic factors (species, cultivar, rootstock), environmental factors (soil, climate) and cultivation techniques (pruning, irrigation, fertilisation, soil management, etc.) in the productive and qualitative output of an orchard.
2. The morphology and physiology of a fruit tree, through its annual and life cycle.
3. The qualitative evaluation of the different types of fruit and their nutritional value.
4. The viticultural production chain for the production of wine grapes and table grapes.
5. The role of genetic, environmental and cultural factors in the fruit's ability to best preserve itself (in cold conditions).
6. Modern cold storage technologies that reduce waste to a minimum and lead to the consumption of fruit of excellent global quality.
7. The most common types of processed fruit products.
8. Quality standards for the marketing of fruit.

Understanding and applying knowledge

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

1. 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).
2. Apply their acquired knowledge in the production of wine grapes and table grapes to the transformation/preservation phase.
3. Apply their acquired knowledge in the field of fruit refrigeration to obtain a product of high global quality with minimal waste, avoiding the onset of physiopathy and phytopathy.
4. Apply their knowledge in the field of industrial fruit transformation to setting up a production chain in the orchard with that particular goal in mind (without using the waste from fresh produce for the industry).
5. Apply their acquired knowledge of quality standards to obtaining products of high commercial 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 a particular industrial destination (canned, juices, jams, dried, frozen, etc.).
2. Propose certain choices in the field to fruit producers in order 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 |
| Food classification and the worldwide and national spread of arboreal fruit growing. Role of the environment (climate and soil) on fruit production and quality. Organography and the multi-annual and annual life cycle of fruit trees. | 1.0 |
| Role of the environment (climate and soil), genotype and cultivation techniques (the fruit agro-system as a whole) in the quantitative and qualitative production of arboreal fruit cultivation. Main indices of fruit ripening and their nutritional composition. | 1.0 |
| Cold storage of fruit, the role of cold and controlled atmosphere storage, storage damage. Main varietal characteristics and products of the main fruit species cultivated in Italy (Olive, Vine, Hazelnut, Apple, Pear, Peach, Mango, Bananas). | 1.0 |
| Practical activities. Sensory evaluation of fruit. Visits to orchards and processing facilities. | 1.0 |

READING LIST

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

AA. VV., *Arboricoltura generale*, Pàtron Editore, Bologna, 2012.

TEACHING METHOD

1. Theoretical frontal lectures in which the main topics of the course will be addressed.
2. Classroom practical activities on the sensory (organoleptic) characteristics of certain types of fruit.
3. Educational visit in the fruit-growing area.
4. The slides presented in class are to be considered an integral part of the teaching material.
5. The slides (in pdf format) used during lectures will be provided weekly to students.
6. At the beginning of the course, students will be provided with a reading list to consult should they wish to study some of the topics covered in the frontal lectures in more detail.

ASSESSMENT METHOD AND CRITERIA

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

6 marks: objective correctness of the answer given;

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

2 marks: ability to summarise and address the topics with a command of the language and a critical eye, applying a personal interpretation to their presentation.

NOTES AND PREREQUISITES

Participation in the practical activities 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. Matteo Busconi

COURSE AIMS AND INTENDED LEARNING OUTCOMES

The Herbaceous Plants Module consists of 3.5 ECTS (28 hours) of lectures in the classroom and 0.5 ECTS (6 hours) of practical activities. The main objective of the course is to provide students with fundamental knowledge of the botanical and product-technological characteristics of herbaceous plant products intended for human consumption. The course is divided into 2 parts lasting 2 ECTS (16 hours) and 1.5 ECTS (12 hours). The first part focuses on botany (structure of the cell and of plants, outline of the reproduction methods and characteristics of fruits). The second part focuses on describing the morpho-anatomical, chemical-physical and technological characteristics of some of the main herbaceous crops. The practical activities will take the form of seminars on specific topics or crops (in class) or of study visits to local production plants.

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

- know and explain the main structures of the plant cell and the organisation of cells within the different tissues making up the primary and secondary body of the plant;

- know and explain the organisation of the different tissues constituting the main organs of the plant's body (leaves, roots and stem);

- know and explain the reproduction methods and the different types of fruit;

- know and explain the edible parts of the plant's body in a large variety of herbaceous species;

- know and explain the main morpho-anatomical, chemical-physical and technological characteristics of some of the most important herbaceous species, with a particular focus on: cereals (soft wheat, durum wheat, corn, rice and barley), tomatoes, soy, sugar beet and sunflower.

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| COURSE CONTENT | ECTS |
| Part A) Overview of general botany: the cell and the plant tissues. Plant morphology and reproduction: | 2 |
| Chemical composition of the plant | 0.4 |
| Organisation at the cellular level | 0.4 |
| Organisation at the tissue level | 0.4 |
| Organisation at the organ level | 0.4 |
| Plant reproduction and the different types of fruit | 0.4 |
| Part B) Morpho-anatomical, chemical-physical and technological characteristics of the main herbaceous crops: | 1.5 |
| Soft wheat (*Triticum aestivum* L.) and hard wheat (*Triticum durum* Desf.) | 0.4 |
| Corn (*Zea mays* subsp. *mays* L.) | 0.3 |
| Rice (*Oryza sativa* L.) | 0.2 |
| Barley (*Hordeum vulgare* L.) | 0.2 |
| Tomato (*Solanum lycopersicum* L.) | 0.4 |
| Practical activities | 0.5 |
| Classroom seminars and/or study visits to production plants | 0.5 |

READING LIST

C. Rinallo, *Piante alimentari, Biologia, Composizione chimica e Utilizzo*, PICCIN, Padua, 2018.

C. Rinallo, *Botanica delle piante alimentari*. PICCIN, Padua, 2005.

R. Baldoni-L. Giardini, *Coltivazioni erbacee – Cereali e Proteaginose*. PATRON, Bologna, 2001.

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

PowerPoint presentations will be made available during the course at the beginning of each new macro area.

TEACHING METHOD

Frontal lectures.

ASSESSMENT METHOD AND CRITERIA

The exam aims to assess the student's ability to learn and analyse, the completeness of their information from the course topics, as well as their mastery of scientific terminology and ability to reason on the topics covered in the assessment.

The assessment will consist of an interim written test and an oral exam. The written test, comprising 16 questions, is based on the first part of the course. The questions are multiple choice, requiring the student to choose the correct answer out of four options. The mark for this test ranges from 0 to 30/30; to pass, the student will need to achieve a minimum mark of 18/30. The oral exam consists of open-ended questions covering the second part of the course. The mark for the oral test ranges from 0 to 30/30. The final mark for the Herbaceous Plants Module will be taken as the mean of the marks obtained in the two tests. Honours will be reserved for students who, in addition to being complete and precise in their answers, will also have demonstrated a relaxed ability to argue their points.

The mark obtained in the **Herbaceous Plants Module** will then be averaged with the mark obtained in the **Tree Module** to obtain the final mark out of thirty for the **Products of Plant Origin** course, which will be registered.

NOTES AND PREREQUISITES

Participation in lectures and demonstrations is strongly recommended.

As it is introductory in nature, there are no prerequisites for attending the course.

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