UNIVERSITÀ DI PISA

PLANT PRODUCTION AND BIOTECHNOLOGIES

CLAUDIO D'ONOFRIO

Anno accademico	2020/21
CdS	PLANT AND MICROBE BIOTECHNOLOGIES
Codice	002EG
CFU	3

Moduli	Settore/i	Tipo	Ore	Docente/i
PRODUZIONI VEGETALI E BIOTECNOLOGIE	AGR/03	LEZIONI	84	CLAUDIO D'ONOFRIO MARCO MAZZONCINI ALBERTO PARDOSSI

Learning outcomes

Knowledge
The course aims to provide students with the main knowledge relating to cropping systems and their management using biotechnologies in order to increase their sustainability, biotechnologies to improve crop production end quality in relation to the systems in which they are included. Students will be instructed on the main propagation techniques of plants of agricultural interest, including in vitro propagation. Crops in an artificial environment (hydroponic crops in greenhouses or climatic cells) will also be briefly treated. Knowledge will also be provided on the genetic-molecular processes that regulate the production and organoleptic composition of fruits, with particular reference to the management of biosynthesis of secondary metabolites of food.

Assessment criteria of knowledge
Final oral exam with an interview on the student's report on specific topics relevant for the subject of the course unit. During the oral exam, the student must be able to demonstrate his/her knowledge of the course material and be able to discuss the reading matter thoughtfully and with propriety of expression.

Skills
At the end of the course, the student will be able to discuss the main issues plant production and identify possible biotechnological solutions to improve agricultural systems.

Assessment criteria of skills
Discussion about a practical case studies in order to verify its ability to identify the problems of an agricultural system and suggest a possible biotechnological support.

Behaviors
The student will be able to acquire and / or develop sensitivity to issues related to agricultural system issues and possible low environmental impact biotechnology solutions.

Assessment criteria of behaviors
During the final exam and laboratory sessions, the degree of mastery, accuracy and precision shown by the student in carrying out the activities assigned by the teacher will be assessed.

Prerequisites
It is not required to indicate any recommended or mandatory propaedeutic but a list of topics considered useful / necessary: plant physiology, plant biology, molecular biology basics.

Teaching methods
Delivery: face to face
Learning activities:

- attending lectures
- participation in seminar
- preparation of oral/written report
- participation in discussions
- individual study
- Laboratory work
- Bibliography search

Attendance: Advised
Teaching methods:

- Lectures
- Seminar
- Task-based learning/problem-based learning/inquiry-based learning
- laboratory

Syllabus

Fundaments of plant productions (Claudio D'Onofrio)
Principles on the structure, architecture and life cycle of fruit trees. Main plant propagation techniques of agricultural interest, with particular reference to vegetative propagation, including nursery activities, and the use of in vitro cultures as an instrument for clonal propagation (micropropagation, recovery of immature embryos, somatic embryogenesis, artificial seed germplasm preservation). Fruit development and control of fruiting and production. Some aspects of molecular genetics applied to fruit tree species: molecular markers for varietal and clonal identification, QTL, genetic improvement and functional characterization of genes involved in fruit organoleptic composition. Will be examined case studies of which will be highlighted objectives, advantages and possible problems arising from the application of the different procedures.

Agricultural systems (Marco Mazzoncini)
The course will deal with: (i) national agricultural systems; (ii) field crops: cultivation areas, productivity, quality and final utilization; (iii) fundamental of agro-ecosystem structure and operating principles; (iv) agricultural system sustainability; (v) biotechnologies for improving agricultural system sustainability; (vi) biotechnologies for improving crop productivity and quality in relation to pedo-climatic condition and agricultural systems.

Intensive and artificial cropping systems (Alberto Pardossi)
Main characteristics of intensive cropping systems: greenhouse and nursery production of vegetables and ornamental plants. Notes on artificial cropping systems. Examples of biotechnological applications to horticultural and ornamental crops: control of flowering and fruiting; organoleptic and hygienic-sanitary quality of vegetables (with notes on bio-fortification); growth regulation of pot ornamental plants; post-harvest storage. Technical visit to experimental and commercial greenhouse and nurseries.

Bibliography

Arboricoltura generale. Pàtron. Ottobre 2012
ABiotecnologie sostenibili. Edagricole-New Business Media. 2017
Principi di Arboricoltura. EdiSES 2019
Orticoltura. Principi e pratica. A. Pardossi, G. Prosdocimi Gianquinto, P. Santamaria (a cura di). Edagricole-New Business Media. 2018
Recommended reading includes the following works: pdf of face-to-face lectures. Further bibliography will be indicated during the semester.

Assessment methods

Mandatory final oral examination. Voting in thirty-eight.
The final exam is an oral interview and possible presentation on a written project on a specific topic agreed with teachers. The teacher reserves the right to ask questions about the topic chosen.

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