Production chain management

Integrated orchard and vineyard management (C. Andreotti/M. Tagliavini)

Learning outcomes The course will provide students with scientific and technical knowledge on the canopy and soil management in orchards, vineyards and nurseries. At the one hand, students will understand and critically consider the main factors involved in canopy architecture and its management. At the other hand, the course will allow the students to use the available scientific knowledge and the modern technical tools to improve the management of ground cover, irrigation and fertilizer supply, in order make the best use of the natural resources and enhance soil fertility. Students will be able to adapt this knowledge to specific environmental and agricultural conditions for developing production systems that reconcile yields, fruit quality and environmental sustainability.

Course contents

Students attending this class must possess basic knowledge of tree biology and physiology to fully understand the subjects presented during the course. These competences are obtained during the first level degree and in the first-year of the master program. The course is divided in two modules and will focus on the following topics:

A) MODULE Canopy management (prof. C. Andreotti)

- Introduction to the canopy structure (architectural models, fruiting habitus) and functionality (Teaching unit length: 2 hours)
  - Relation between the vegetative and reproductive cycles
  - Pruning as a tool to manage the competition between organs (roots, shoots, bud induction and differentiation, flowers, fruits, etc)
- Pruning techniques (Teaching unit length: 8 hours)
  - Dormant pruning
  - Summer pruning
  - Mechanical pruning
  - No pruning techniques
- Canopy training systems for low/intermediate/high density orchards (Teaching unit length: 6 hours)
  - Training systems for fruit trees
  - Training systems for grapevine
- Management of fruit load (Teaching unit length: 6 hours)
Alternate bearing and fruit thinning
Plant growth regulators to control tree growth and fruit quality
Control of ripening in grapevine
- Protection systems (*Teaching unit length: 2 hours*)
  Shading nets, hail nets, plastic tunnel against rain, wind barriers
- Production systems in nurseries (*Teaching unit length: 6 hours*)
  Production techniques
  Nursery management and legislation

B) MODULE Soil and water management (prof. M. Tagliavini)
- Management of root growth and root activity (*Teaching unit length: 4 hours*)
  Root distribution
  Environmental and cultural control on roots
  Beneficial use of interactions between roots and micro-organisms in the rhizosphere
  Root pruning
- Mineral nutrient supply (*Teaching unit length: 10 hours*)
  Nutrient needs
  Nutrient availability
  Nutrient cycling within trees and ecosystems
  Soil and foliar nutrient supply; fertigation techniques
  Management of nutrient-related physiological disorders
- Water management (*Teaching unit length: 10 hours*)
  Soil water availability and water needs
  Plant and soil-based methods for irrigation scheduling
  Water stresses and irrigation strategies for enhancing fruit quality
  Strategies to enhance WUE and reduce water losses
  Regulated deficit irrigation and partial root drying
  Irrigation systems
- Orchard- and vineyard-floor Management systems (*Teaching unit length: 4 hours*)
  Ground-cover vegetation and ground-cover systems
  Weed control methods
  Green Manure
- Control of soil sickness and replant problems (*Teaching unit length: 2 hours*)

**Teaching methods**
Frontal lessons make up 60% of the time allotted to this course. The remaining 40% of the time is dedicated to lab- and field-activities, and visits.

Readings/Bibliography

Lecture notes made available after the lesson on the on-line platform of unibz; handouts and articles provided by the instructor through internet services managed by unibz. Selected chapters from FAO Irrigation and drainage paper 66 (available online), Fundamental of temperate zone tree fruit production (2005) and Apple, Botany production and uses (2003).

Assessment methods

Oral exam at the end of the course on the entire program (frontal lessons and exercises/excursions). At least three questions on different subjects of the course will be asked. The number of questions is dependent from the quality and completeness of the answers given by the candidate.

Teaching tools

Frontal lessons using ppt presentations. Use of software the computer room. Field exercises with the use of scientific instruments. Field visits.