Applied Breeding and Sustainability (L. Dondini)

Learning outcomes

Students have to demonstrate a good knowledge about the breeding approaches to select plant material suitable for the conditions where it has to be grown and with the right quality for the end-users. An increased yield is still the most important trait but sustainable plant production requires plant adaptation to abiotic stresses as well as resistance to pests and diseases. It is important for students to know the approaches for plant selection for specific traits.

Course contents

Students should have a background in agriculture and horticulture, all with knowledge about basic elements of genetics.

Lectures are organised in two parts (frontal and lab practice).

Frontal lectures (18 hours)

Introduction: basic concepts about fruit trees and implications in fruit tree breeding.

Strategies for conventional (double-pseudo test cross) and advanced (principles of in vitro culture, somaclonal variability and in vitro selection, development of molecular markers for MAS) breeding.

Overview of the main breeding goals for sustainable production and related applications:

- Breeding for resistance to biotic and abiotic stresses
- Breeding for low input production (habitus, self thinning and self-fertility)
- Breeding of rootstocks

Application of genetic transformation for sustainable production in fruit tree species

Cisgenic plants and breeding by DNA editing

Lab practice (12 hours):

- Molecular marker analysis on a panel of genotypes for selected traits.
- Visit to an experimental farm

Readings/Bibliography

Handouts and selected papers
**Teaching methods**

The course will be divided in two parts:

the first part is focused on the main breeding strategies in fruit tree species and the relative applications for plant sustainable production.

the second part in the laboratory, to learn by experience a technique for DNA extraction and test plant DNAs by PCR by using markers linked to specific traits.

**Assessment methods**

oral exam:

One question about topics of the lab activities and two questions regarding topics of the frontal lectures.

**Teaching tools**

Beamer, equipments in the biotechnology lab

**Office hours**

Friday, but it is possible to have an appointment in a different time if requested