

Faculty of Biological, Agronomic and Environmental Engineering

BIRA2108 Plant production

[67.5h+22.5h exercises] 7 credits

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Language: French
Level: Second cycle

Aims

The course aims to integrate the basic knowledge in plant biology and plant physiology at the plant and canopy levels. It further aims to understand the mechanisms that underlie the growth and development of crops (agriculture, horticulture, pastures). Finally the course aims to understand the techniques allowing to control the parameters affecting yield, and the environmental impact of the cultures. These aspects will help the student to acquire the necessary skills for a rational management of crops and grasslands in the frame of a performing and sustainable agriculture.

Main themes

MODULE A: general principles and crop ecophysiology (3 ECTS theory + 1 ECTS field tours). Plant growth and development: morphology, phenology, physiological factors, plant-environment interactions, abiotic stresses. Application to some temperate, tropical and ubiquitous cultures.

MODULE B: pastures and range lands (1 ECTS theory). Species and types of soil cover (cultures, grasslands, range lands) in temperate and tropical regions, biogeography, environmental impact.

MODULE C: integrated management of annual ubiquitous crops (1 ECTS theory + 1 ECTS field tours). Integrative approach of cultural practices in the practical framework of a typical agriculture system in temperate region (North-West of Europe), through the study of the cultural calendar of the crops concerned. This approach allows to set the plant growth and development back in the context of the seasons and, hence, the time-course of environmental conditions and phenology.

Content and teaching methods

Content and methods: theoretical course with numerous field tours

MODULE A: growth and development. Construction of the vegetative system: phyllochrone, leaf area, tillering, subterranean organs (roots, tubers); floral transition, stem elongation, flowering, construction of harvested organs, maturation. Growth physiology at the plant and field level: light interception, leaf area index, photosynthesis and dry matter production, nitrogen absorption and use, translocation, source-sink relationships, yield components, quantitative aspects. Quantitative synthesis through modelling. Application to some ubiquitous (wheat, maize, potato), temperate (sugar beet) and tropical crops (rice, cacao). Practical notions: cultural practices (illustration based on culture systems), environmental impact, regional specificities throughout the world.

MODULE B: grassland species (Graminae and Leguminosae): growth and development, regrowth; knowledge of species and their ecology, type of soil cover, biogeography. Use: permanent and drift pastures, temporary pastures. Inventory methods. Yield elaboration and types of harvest. Cultural practices: sowing, mixtures, weeding, fertilisation, harvest and storage.

MODULE C: The soil use and soil management are presented for each month of the year, as well as stock fertilisation, soil improvement, sowings, conditions of installed cultures, fertilisation during de vegetative growing period, control of weeds, insects and fungal diseases, growth regulators, harvest, post-harvest (ensiling, storage, industrial uses). The rationale of the choice of cultural practices is discussed on the basis of illustrations (PowerPoint slides and field tours).

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Pre-requisites: courses of plant biology, plant physiology and genetics of the first three years of the Bioengineer program or equivalent

Support: syllabus, numerous field tours, PowerPoint slides, reference books, internet sites