Plant Breeding (III-rd Year of study, VI-th Semester)

Credit value (ECTS) 4

Course category
Domain (Imposed)

Course holder:
Assoc. Prof. Dr. Dănuț SIMIONIUC

Discipline objectives (course and practical works)

The aim of the course is to acquire knowledge about the objectives of plant breeding, the sources of biological materials that can be used to achieve the breeding objectives and methods to improve a cultivar.

The practical trainning aims to familiarize students with the laboratory techniques used in plant breeding, ways to examin plant material used during breeding, as well as performing specific functions of molecular breeding techniques, in the field or in the laboratory.

Contents (syllabus)

Course (chapters/subchapters)
1. General introduction into plant breeding **2. Organization of the breeding process**
3. Germplasm variability
4. Objectives of Plant breeding 4.1. Definition, classification, factors that determine the choice of breeding objectives 4.1.1. Breeding for yield capacity 4.1.2. Breeding for quality traits 4.1.3. Breeding for resistance to diseases and pests 4.1.4. Breeding for different maturation periods 4.1.5. Breeding for resistance to falling and shaking 4.1.6. Breeding for resistance to low temperatures 4.1.7. Breeding for drought resistance 4.1.8. Varieties and hybrids breeding
5. GERMOPLASM USED IN PLANT BREEDING 5.1. Importance, classification, characterization 5.2. The centers of origin and genetics of plant material 5.3. Collection, organization, study and conservation of germplasm
6. CONVENTIONAL METHODS USED IN PLANT BREEDING 6.1. Importance of plant breeding methodology 6.2. Classification and characterization of conventional breeding methods 6.2.1. Selection 6.2.2. Hybridization 6.2.3. Inbreeding 6.2.4. Mutagenesis 6.2.5. Polyploidy

7. Alternative methods used in plant breeding
7.1. The importance of unconventional/alternative techniques
7.2. *in-vitro* cell and tissue cultures
7.2.1. Clonal propagation, cloning or micropropagation
7.2.2. Egg or embryo cultures
7.2.3. Anthers or ovary cultures
7.2.4. Induction of somaclonal variations
7.2.5. Protoplast cultures and somatic hybridization
7.3. Genetic transformation
7.3.1. Importance, methods used for gene transfer and confirmation of transgenesis
7.3.2. Applications of transgenesis in plant breeding
7.4. Molecular markers in plant breeding
7.4.1. Importance and types of molecular markers
7.4.2. Techniques for highlighting molecular markers
7.4.3. Choice of markers associated with characters of interest in improvement
7.4.4. Applications of molecular markers in plant breeding

Practicum
Organizing plant breeding activities in Romania
Plant breeding field activities
Determination of variability in autogamous and allogamous plants
Determinintion of heritability in allogamous plants
Determination of heterosis in allogamous hybrids
Obtaining and selecting inbred lines
Selection and analysis of elite wheat plants
Selection and analysis of elite maize plants
Selection and analysis of elite sunflower plants
Hybridization techniques
Preservation of germplasm sources
In-vitro tissue cultures in laboratory
Modern methods of plant breeding

References

1. **Leonte C.** 2003 – *Ameliorarea plantelor*, Ed. "Ion Ionescu de la Brad" Iaşi.
2. Creţu A., Simioniuc D., Creţu L., 2000 – *Ameliorarea plantelor, producerea şi multiplicarea seminţelor şi materialului săditor*. Ed. "Ion Ionescu de la Brad" Iaşi.
3. **Leonte C.**, 1996 – *Ameliorarea plantelor horticole*. Ed. Did. Şi Ped. Bucureşti.

References (not mandatory)

1. Badea Elena Marcela, 2003 – *Plantele transgenice în cultură*. Broşură. Bucureşti.
2. Cociu V. Şi colab., 1999 – *Progrese în ameliorarea plantelor horticole din România*. Vol. I, Pomicultura. Ed. Ceres, Bucureşti.
3. Creţu A.,1995 – *Ameliorarea plantelor, producerea şi multiplicarea seminţelor*. Caiet de lucrări practice, Uz intern, U.A.M.V. Iaşi.
4. Creţu L., 2004 – *Culturi "in vitro*. Ed. "Ion Ionescu de la Brad" Iaşi.
5. **Leonte C.**, 2011 – *Tratat de ameliorarea plantelor*. Ed. Academiei, Bucureşti.
6. Munteanu N., 2000 – *Ameliorarea plantelor ornamentale*. Ed. "Ion Ionescu de la Brad" Iaşi.

7. Muntean L., 2012 – *Ameliorarea plantelor, partea generală*. Ed. Risoprint, Cluj-Napoca.
8. Savatti M. şi colab., 2004 – *Tratat de ameliorarea plantelor*. Ed. Marineasa, Timişoara.
9. Sestraş R., 2004 – *Ameliorarea speciilor horticole*. Ed. Academic Pres, Cluj-Napoca.
10. Ţîrdea Gh., 1996 – *Genetică*. Curs, U.A.M.V. Iaşi.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Exam	Written and Oral final Exam	40%
Appreciation of the activity during the semester	Oral assessment during the semester, verification tests and final laboratory colloquium.	60%

Contact

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