UNIVERSITÀ DI PISA

PLANT BREEDING

ANDREA CAVALLINI

Anno accademico	2019/20
CdS	AGRIFOOD PRODUCTION AND AGROECOSYSTEM MANAGEMENT
Codice	064GG
CFU	6

Moduli	Settore/i	Tipo	Ore	Docente/i
MIGLIORAMENTO GENETICO DELLE PIANTE COLTIVATE	AGR/07	LEZIONI	64	ANDREA CAVALLINI

Learning outcomes

Knowledge
The student who successfully completes the course will be able to demonstrate a solid understanding of the basic principles of plant breeding and plant biotechnology. The main issues relating to the genetic improvement are genetics of quantitative traits, both classical and based on molecular biology, the genetic basis of the plant reproduction, the protocols for crop improvement and the classical methods to induce genetic variation in plants. The student will also be able to assess the possibility of using biotechnology for breeding.

Assessment criteria of knowledge
Evaluation will be carried out in progress by tests and / or meetings between the teacher and the student group that is attending the course

Skills
During the oral exam the student must be able to demonstrate his knowledge of the program of the course and be able to discuss the main problems of plant applied genetics thoughtfully and with propriety of expression.

Assessment criteria of skills
Periodic oral and written evaluation of learning

Behaviors
The student will be able to acquire and / or develop sensitivity to plant breeding issues

Assessment criteria of behaviors
Periodic checks of learning using numerical exercises and discussion in classes

Prerequisites
Basic knowledge of general, formal and molecular genetics

Teaching methods
Lectures, with slides
Laboratory on basic genetics methods
Download of teaching materials
Receptions, communications by means of e-mail
Intermediate tests
The attendance is advised

Syllabus
POPULATION GENETICS: the principle of Hardy-Weinberg and the maintenance of gene frequencies in populations.
GENETICS OF QUANTITATIVE TRAITS BASED ON BIOMETRICS: genetic basis of quantitative traits, heritability, methods for calculating heritability.

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GENETICS OF QUANTITATIVE TRAITS BASED ON MOLECULAR BIOLOGY: genetic and molecular markers, molecular markers assisted selection, quantitative trait loci, linkage disequilibrium.
CONTROL OF PLANT REPRODUCTION: genetic basis, incompatibility, male sterility.
SELECTION-BASED METHODS OF GENETIC IMPROVEMENT OF PLANTS: genetic structure of populations of self-pollinated and cross-pollinated species, breeding methods for self-pollinated, cross-pollinated and vegetatively propagated species.
INDUCTION OF GENETIC VARIABILITY: experimental mutagenesis, polyploidy and genetic improvement, interspecific hybridization.
MOLECULAR BIOLOGY AND GENETIC IMPROVEMENT: isolation of useful genes. Basics of genetic engineering and genome editing for plant breeding.

Bibliography

J.P. Russell: Genetica – Edises
G. Barcaccia, M. Falcinelli: Genetica e genomica, Vol. 2 e 3 - Liguori Editore
Handouts distributed by the teacher

Non-attending students info

Non-attending students can follow the lessons using the learning materials provided by the teacher before the course, on the E-learning site of the Department and following the register of classroom lectures. They can also ask the teachers ad hoc explanations, by appointment

Assessment methods

Final oral exam
Periodic written tests, consisting of a series of questions / exercises / problems to solve.

Additional web pages

No

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