Plant Physiology (1nd Year, 1rd Semester)

Credit value (ECTS) 4

Course category
Optional discipline

Discipline Code: A.EMIAIA.F.114

Course holder:
Professor PhD Doina Carmenica JITAREANU

Discipline objectives (course and practical works)

The course aims to provide students with knowledge on the latest basic and practical information from the interference of both biology and agricultural science fields, with the purpose of deepening the vital processes occurring inside the plants cultivated either under optimal or unfavorable life conditions.
Specific aims :
- the study of fundamental biological processes in plants: the absorption of minerals and energy and their transformation into other own organic substances, the breathing , the biosynthesis of organic substances
- the study of the growth and development processes of plants, but also the water use, fertilization, various hormone treatments etc, in order to stimulate these processes and mechanisms of resistance of plants to abiotic and biotic environmental conditions;
- the knowledge of the relationships between plant physiology and other biological and technical disciplines in the study of physiological processes and in developing the practical purpose of physiology .

Content (syllabus)

Course (chapters / subchapters)
Introduction to plant physiology: definition and objectives; research methods; connections with other sciences; plant physiology in Romania.
Plant cell physiology: physiological functions of cellular components; physical properties of the cellular material; physiological properties of living matter; exchange of water between the plant cell and the external environment.
Water regime of plants: role of water in plants' life; water states and forms in plants; water absorption by plants; water transport inside the plants; water elimination on plants.
Plant mineral nutrition: research methods for mineral nutrition; mineral absorption by plants; factors influencing the absorption of mineral elements in plants; the physiological role of mineral elements.
Photosynthesis: definition and importance in nature; carbon and light sources; the method of studying photosynthesis; organs and organelles of photosynthesis; photosynthesis mechanism; factors influencing photosynthesis; photosynthesis and production.

The transformation, the circulation and the deposition of organic substances in the plant: the synthesis and the transformation of organic substances in plants; the circulation of organic substances in plants; the deposition of organic substances in plants.
Plant respiration: definition and importance; methods for determining the aerobic respiration; respiratory quotient; the physiological mechanism of respiration; types of fermentation and the mechanism of anaerobic respiration
Plant growth: cell growth stages; growth mechanism; methods of measuring growth; growth regulating substances; correlations, apical dominance, regeneration and polarity; growth movements of plants (tropism and nastic).
Plant development: the characteristics of the development cycle; determinism of flowering stages; the influence of external factors on flowering; the influence of the internal factors on flowering; flowering itself; the fructification physiology

Practicum
Presentation of Plant Physiology Laboratory; Work safety rules; Laboratory equipment and utensils; Proper working practices in physiology lab.
Physical and physiological phenomena at the cellular level: Absorption and elution; Imbibition; Diffusion; Osmosis; Turgescence and plasmolysis; Cellular osmotic potential; Cellar suction force, Membranes' permeability.
Water regime of plants: Water absorption in plants; Water circulation in plants; Water elimination on plants.
Photosynthesis: Photosynthetic pigments; Methods of studying photosynthesis; The products of photosynthesis.
The transformation and circulation of organic substances in plant: the identification and transformation of carbohydrates; the identification and transformation of lipids; the identification and transformation of proteins; the circulation of the organic substances in the plant.
Aerobic respiration and fermentation: qualitative methods of studying the aerobic respiration; quantitative methods of studying the aerobic respiration; respiration's enzymes; fermentation.
Plant resistance to unfavorable abiotic factors: resistance to frost and winter, drought resistance, heat resistance.
Final colloquium for knowledge evaluation

Bibliography

1. Alina-Elena Marta, Mihaela Covașă, Carmenica Doina Jităreanu, 2025 - Fiziologie vegetală. Editura "Ion Ionescu de la Brad" Iași, vol I, ISBN 978-973-147-573-8, ISBN general 978-973-147-572-1, p. 185
2. Jitareanu Carmen Doina, Alina Elena Marta, 2018 – Fiziologie vegetala: manual de studiu pentru studenti, Edit. "Ion Ionescu de la Brad", Iaşi.
3. Jităreanu Carmenica Doina, 2007 – Fiziologia plantelor. Edit. "Ion Ionescu de la Brad", Iaşi.
4. Jităreanu Carmenica Doina, Toma Liana-Doina, Slabu Cristina, Marta Alina Elena, 2011- Lucrări practice de Fiziologia plantelor - Edit. Ion Ionescu de la Brad, Iași, ISBN - 978-973-147-076-4

5. Jităreanu Carmen Doina, Marta Alina Elena, 2020 – Lucrări practice de fiziologia plantelor, vol. I, Edit. “Ion Ionescu de la Brad”, Iaşi, ISBN: 978-973-147-356-7.
6. Jităreanu Carmenica Doina, Marta Alina Elena, Covașă Mihaela, 2022 – Lucrări practice de fiziologia plantelor vol II, Edit."Ion Ionescu de la Brad", Iasi.

Final evaluation

Type of evaluation	Methods of evaluation	Percentage of the final grade
Examination	Written examination	70%
Assessment of the activity during the semester	Verification tests, oral practice	30%

Contact person

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