TEMATICA PENTRU EXAMEN
PENTRU POSTUL NR. 5, PROFESOR,
din statul de funcțiuni al Departamentului de Horticultură
pe anul universitar 2025-2026

1. Plant physiology

1. Fundamental characteristics of the plants' life: autotrophy, onmipotency, reproduction cycle, metabolic self-regulation, adaptability to environmental conditions.
2. Water relations of plants. Absorption and xylem transport of water, regulation of stomatal transpiration. Osmoregulation and the physiological background of drought resistance and tolerance.
3. Photosynthesis: its role in the global energetics of the living world and in the primary production of organic nutrients. The main phases of photosynthesis: the light reactions and the assimilation of carbon dioxide. Mechanisms of harvesting and conversion of light energy by photosynthetic pigments, regulation of photochemical processes under varying light conditions.
4. Functional characteristics of the photosystems, generation of reducing power and of chemical energy storage. Photosynthetic electron transport pathways and photophosphorylation.
5. Photosynthetic carbon metabolism. Biosynthesis of new organic compounds in the Calvin cycle. Photorespiration. Adaptive roles of the C4 and CAM carbon assimilation pathways. Influence of environmental factors on photosynthesis.
6. Phloem transport and storage of organic nutrients in plants, intermediary metabolism of carbohydrates and lipids in crop plants. Biosynthesis of vitamins in plants.
7. Respiration of plants. Characteristics of anaerobic and aerobic respiratory processes, respiration under hypoxic conditions caused by waterlogging. Glycolysys, the oxidative pentosephosphate pathway, lactic and alcoholic fermantaion, the Krebs cycle, terminal oxidation and oxidative phosphorylation. The alternative, cyanide-resistant path of the respiratory chain in plants. Climacteric respiration, respiratory thermogenesis. Extramitochondrial oxidations and their role in plants. Respiration during storage of plant products.
8. Secondary metabolism of plants and the physiological functions of active compounds. Plant terpenoids, phenolics and secondary nitrogen compounds. Biopesticides and health-promoting metabolites in plants
9. The mineral nutrition of plants. Physiological functions of essential macro- and microelements. Transport of inorganic ions in plants. Physiological background of hydroponic cultures, aeroponic cultures and of the administration of fertilizers.
10. Nitrogen metabolism in plants. Nitrate reduction, assimilation of ammonium, symbiosis with nitrogen-fixing bacteria, intermediary metabolism of amino acids and storage of plant proteins, nitrogen mixotrophy and the internal nitrogen cycle of plants.
11. The main developmental phases in the life cycle of vascular plants. Diurnal and annual biorhythms, characteristics of the dormancy of seeds and buds. Asexual and sexual reproduction. Sporogenesis, gametogenesis, pollination and fecundation in flowering plants. Embryogenesis and endospermato-genesis during seed development. The process of germination. Regulation of flowering: vernalization and photoperiodic induction. Role of plant photoreceptors in onthogenesis. Fruit set and ripening. Characteristics of senescence in plants.
12. Roles of plant hormones and local growth regulators in the developmental processes.
13. Sensitivity of plants and types of plant movements. Autonomous movements, taxis, tropisms and nastic movements.

Sources of documentation:

1. Barker, A.V., Pilbeam, D.J. (2015): Handbook of Plant Nutrition, CRC Press, Boca Raton
2. Burzo, I., Toma, S., Crăciun, C., Voican, V., Dobrescu, A., Delian, E. (1999): Fiziologia Plantelor de Cultură, Întreprinderea Editorial-Poligrafică Știința, Chișinău
3. Dobrotă, C. (2010): Fiziologia Plantelor, Editura Risoprint, Cluj-Napoca
4. Durner, E.F. (2013): Principles of Horticultural Physiology, CABI, Oxfordshire
5. Erdei L. (2004): Növényélettan II. Növekedés- és Fejlődésélettan, Editura JATEPress, Szeged
6. Fodorpataki L. (2004): A Növények Fotoszintézise, Editura Kriterion, Cluj-Napoca
7. Fodorpataki L., Szigyártó L. (2013): A Növények Ökofiziológiájának Alapjai, Editura Kriterion, Cluj-Napoca
8. Fodorpataki L., Szigyártó L. (2008): A Növények Szaporodása és a Mesterséges Növényszaporítás Biotechnológiai Alkalmazásai, Editura Universitară Clujeană, Cluj-Napoca
9. Fodorpataki L., Szigyártó L., Bartha Cs. (2022): Növénytani Ismeretek, Editura Scientia, Cluj-Napoca
10. Fodorpataki L., Tompa B. (2022): A Növények Élettana II. Tápanyag-gazdálkodás, Anyagcsere, Editura Kriterion, Cluj-Napoca
11. Láng F. (2000): Növényélettan I. A Növényi Anyagcsere, Editura ELTE Eötvös Kiadó, Budapesta
12. Raven, P.H., Evert, R.F., Eichhorn, S.E. (1999): Biology of Plants, Freeman Publ., New York
13. Scott, P. (2008): Physiology and Behaviour of Plants, Editura Wiley, Sussex
14. Taiz, L., Zeiger, E., Moller, I.M., Murphy, A. (2018): Fundamentals of Plant Physiology, Oxford University Press, New York

2. Abiotic stress in plants

1. Mechanisms of plant acclimation to adverse environmental conditions
2. The role of antistress metabolites in optimization of plant production
3. Physiological markers of the influence of abiotic stress factors which alter plant production
4. Post-translational processes of environmental stress tolerance: ubiquitination, sumoylation, glutathionylation. The epigenetic basis of transgenerational stress memory
5. Phases of the antistress reaction in physiological processes of plants, resistance and tolerance against abiotic stress factors, the roles of priming and of hardening in the creation of crop plant varieties with enhanced stress tolerance
6. Mechanisms of tolerance of photo-oxidative stress associated with photosynthesis. Overproduction of reactive oxygen species and the antioxidative protection system in plants
7. Molecular processes in plants during acclimation to hypoxic stress caused by flooding
8. Salt stress and salinity tolerance in crop plants
9. Basic mechanisms of drought tolerance in plants, selection markers for drought tolerant cultivars
10. Stress reactions in plants caused by extreme temperatures
11. Mechanisms of plant defense against the toxicity of transitional metals and herbicides. The physiological basis of phytoremediation of contaminated soils and aquatic habitats

Sources of documentation:

1. Ahmad, P., Prasad, M.N.V. (2012): Abiotic Stress Responses in Plants. Metabolism, Productivity and Sustainability, Springer, New York
2. Fodorpataki L., Szigyártó L. (2013): A Növények Ökofiziológiájának Alapjai, Kriterion, Cluj-Napoca, pp. 329-446
3. Gaur, R.K., Sharma, P. (2014): Molecular Approaches in Plant Abiotic Stress, CRC Press, Boca Raton
4. Jenks, M.A., Hasegawa, P.M. (2014): Plant Abiotic Stress, Wiley Blackwell, Ames
5. Kanayama, Y., Kochetov, A. (2015): Abiotic Stress Biology in Horticultural Plants, Springer, Tokyo
6. Pareek, A., Sopory, S.K., Bohnert, H., Govindjee (2010): Abiotic Stress Adaptation in Plants, Springer, Dordrecht
7. Rout, G.R., Das, A.B. (2013): Molecular Stress Physiology of Plants, Springer, New Delhi
8. Shanker, A.K., Venkateswarlu, B. (2011): Abiotic Stress Response in Plants – Physiological, Biochemical and Genetic Perspectives, InTech, Rijeka
9. Tuteja, N., Gill, S.S. (2014): Climate Change and Plant Abiotic Stress Tolerance, Wiley Blackwell, Weinheim