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A MEZŐGAZDASÁGI BIOTECHNOLÓGUS MESTERKÉPZÉSI SZAK ZÁRÓVIZSGA TÉTELEI A 2019/20. TANÉV ŐSZI ZÁRÓVIZSGA IDŐSZAKÁBAN

PLANT GENETICS AND PHYSIOLOGY

1. Mechanism producing genetic variability (cell division, gamete forming, recombination).
2. Mendelian and non-Mendelian inheritance (laws of Mendelian inheritance, deviations from Mendelian segregation, quantitative traits).
3. Consequences of chromosome number changes (polyploidy, aneuploidy).
4. Structure of plant chromosomes.
5. Linkage mapping and its application in plant breeding.
6. DNA replication and mutations.
7. Mobile genetic elements.
8. Eukaryotic genome structure and cytoplasmic inheritance.
9. The structure of eukaryotic genes, transcription and translation.
10. Levels of gene regulation.
11. Developmental genetics.
12. Population genetics.
13. Organization of the cell I. Compare eukaryotic and prokaryotic cells. Describe all membrane-bound organelles, give detailed function of the chloroplast.
14. Organization of the cell II. Cell wall, membranes, cytoskeleton, intracellular transport processes.
15. Carbohydrate metabolism.
16. General principles of stress physiology. The oxidative stress response.
17. Methods and applicability of classical and modern microscopy techniques.
18. Water management, mineral nutrition and salt stress in plants.
19. Effects of changing environmental factors on plants: light, UV, temperature extremes, hypoxia.
20. Signalling in plants. Roles of plant hormones.
21. Molecular biology of the generative phase of plants (flowering, seed and fruit biology).

METHODS AND RESULTS OF PLANT BIOTECHNOLOGY

1. Dedifferentiation and redifferentiation in plants – pathways of morphogenesis *in vitro* and their application possibilities in plant breeding.
2. Anther and pollen culture. Ovary and ovule culture. Direct and indirect somatic embryos. Haploid and doubled haploid plants, and their application in plant breeding.
3. Factors influencing the success of *in vitro* propagation: sterility, physical environment, medium components.
4. Stages and methods of micropropagation – medium and growth regulators requirements, problems during micropropagation (hyperhydration, phenolic browning, somaclonal variability) end their solution.
5. Biochemical and microbiological foundations of DNA manipulation. Gene cloning.
6. Plant transformation. Reporter genes, transgene expression in plants.
7. Gene libraries, hybridization and array techniques.
8. GMOs in agriculture (properties, advantages and potential hazards).
9. Techniques in protein research (chromatography, electrophoresis and detection).
10. Aims and achievements of biotechnology in grape and fruit crops.
11. Aims and achievements of biotechnology in ornamental, vegetable and medicinal plants.
12. Types of molecular markers: application and development of different markers.
13. Next generation sequencing techniques and genome projects.
14. Importance, application and detection of SNPs.
15. Classical and modern breeding strategies of woody-stem horticultural plant species.
16. Classical and modern breeding strategies of soft-stem horticultural plant species.
17. Description of omics (structural and functional genomics, transcriptomics, proteomics and metabolism).

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