

**MSC IN HORTICULTURE – FINAL EXAM TOPICS
2022/2023, SUMMER SEMESTER
for Students enrolled from September 2021**

KNOWLEDGE OF OBLIGATORY SUBJECTS

Biologically active substances of horticultural crops

1. How can we group the biologically active components accumulating in horticultural crops? Which factors may influence their accumulation and utilisation by the human organism?
2. What is the difference between lipids and volatile oils? Characterize both types of active compounds according to their chemical constitution and their role in the plants and human organisms! Give some examples, too!
3. Which are the major chemical groups of the polyphenols, what is their role in our nutrition, which plant sources do you know?

Plant physiology and plant molecular biology

4. Plant hormones in a changing environment
5. Water deficit and temperature stresses
6. Seed and fruit physiology

Geobotany and vegetation ecology of plants: adaptation in natural and sinantropic ecosystems

7. Importance and characteristics of the global and regional biodiversity: historical and geobotanical patterns of species' distribution. Aspects in the evolution of cultivated plants, gene-centers.
8. Life forms, structure and function in plants: challenge at individual and community level in different biomes in the time of the global change.
9. Morpho-phenological and molecular traits serving ecological adaptation in plants. Limiting abiotic factors influencing plant behavior. Relationships among populations helping the survival in various (extreme) ecological conditions. Horticultural aspects.

Plant molecular genetics and genom editing

10. Characterization of the most important biomolecules in plants and their role in cell function (DNA, RNA, proteins, gene expression)
11. Structure of the plant genome and the application of molecular marker techniques in horticultural plant breeding
12. Genetic background of economically important characters and the significance of genome editing

Natural resources and nature protection

13. Environmental management aspects of renewable natural resources
14. Environmental management aspects of non-renewable natural resources
15. The main tasks, goals and current issues of nature conservation

Operation and regulation of production systems

16. Role of the C4 photosynthetic system in adaptation of plants, more intensive utilization of water and in increased biomass production
17. Inter (index of aggressivity)-, and intraspecific competition of plants in agrarian systems and discrepancy of biomass calculated to individuals and unit area
18. Energy sources of different ecological systems (natural, quasi natural, bio, agrarian, greenhouse, indoor, etc) in relation to the sun energy (solar constant, efficiency of light) and fossil energy (coal and oil) and change their role in different form of production

KNOWLEDGE OF THE SPECIAL CLASSES

Ornamental Plants Specialisation

1. Developmental phases of ornamentals, different methods of growth regulation in ornamental plant growing
2. *In vitro* techniques in modern ornamental plant growing
3. Supplementary bulb-tuber and cut flower cultures (growing freesia, Dutch iris and gladiolus)
4. Growing special cut flowers, such as Flamingo flower plant, Bird of paradise flower, Calla Lily, Agapanthus plant, Peruvian lily
5. Supplementary potted flower cultures such as Hydrangea, Azalea, Gloxinia and Impatiens New-guinea
6. Dendrological regions of Hungary, possibilities of plant usage of each region
7. Fundamentals of ornamental plant usage, gardens as artificial plant communities, classification of ornamentals according to their role in the plant population
8. Plant usage of green areas with different purposes and properties
9. Fundamentals of indoor plant usage
10. The importance of perennial ornamental plants and their most important application areas
11. Cultivation and maintenance of ornamental plants that require extreme growing conditions (succulents, aquatic and aquarium plants)
12. Morphology, physiology, growing and maintenance techniques of orchids and bromeliads, and their economical importance
13. Current research directions in the cultivation and application of ornamental plants

Specialisation Medicinal and Aromatic Plants

Up to-date technologies of medicinal plant production course:

1. Propagation technologies in MAP production. Utilisation and breeding of cultivars.
2. Characteristics of plant care measures in cultivation of MAPs: nutrient supply, irrigation and plant protection
3. Harvesting and primary processing of MAP species
4. Specialities of secondary processing and extraction of MAP plants

Special medicinal plant production course

5. Important plant species for the food industry, general characteristics and presentation of their cultivation methods.
6. Important plant species for cosmetics, general characteristics and presentation of their cultivation methods.
7. Important plant species for medicines in the past and also in the future (new innovations): 2 – 2 sample species in each case.

Medicinal and spice plants in nutrition and therapy course

8. Evaluation of *dietary supplements* with special respect to motivating and limiting factors in their consumption
9. Evaluation of *traditional herbal medicines* with special respect on the advantages and disadvantages of the establishment of this product category
10. Characterisation of active substances used by the pharmaceutical industry, examples for species and indications.

Optimalisation of drug quality

11. Drug quality requirements, presentation of the biotic factors that influence the drug quality
12. Presentation of those environmental and technological factors that influence the drug quality.

Specialisation in Fruit Growing

Fruit cultivar evaluation:

1. Most important international trends in apple breeding. Characterization of international assortment of competitive apple cultivars.
2. Pear breeding trends and methods in the world. The most important international results of breeding. Evaluation of the selection of cultivars recommended for cultivation in Hungary.
3. The main breeding trends and results of peach and apricot in the world. Evaluation of new Hungarian cultivars and cultivars suitable for domestic adaptation.
4. Main directions and latest international results of plum breeding. Evaluation of the domestic cultivar selection (in Hungary).
5. Main aspects and results of domestic and foreign breeding of sweet and sour cherry. New Hungarian and international cultivars.

Modern fruit growing based on physiology:

6. Conditions and factors for establishing modern orchards.
7. Modern growing systems and cultivation technology of apple orchards.
8. Characterization of modern growing systems of stone fruits and novelties in cultivation technology.
9. Characterization of the growing systems and cultivation technology of modern walnut plantation.
10. Possibilities and methods of modernizing the Hungarian berry fruit cultivation.
11. Describe the factors that determine the size and shape of fruit trees and bushes.
12. Describe the process of flower bud development of fruit-bearing plants and the changing of their frost hardiness during the development process.
13. Describe the process of fruit development and ripening of post-ripening species. Describe the hormonal background of natural fruit drop.
14. Describe the physiological causes of alternate bearing (biennial bearing) and the technological possibilities for its elimination.
15. What internal and external factors influence the formation and development of the root system of fruit trees?

Specialisation in Viticulture and Enology

1. Taxonomy of grapes; grape species and their role in viticulture and grapevine breeding
2. The vegetative sub-cycle of the annual biological cycle of the vine (bud dormancy, bud break, shoot growth, shoot maturation)
3. Reproductive sub-cycle of the annual biological cycle of the vine (bud differentiation, flowering, fertilization, fruit development and ripening)
4. Light, temperature and humidity in grape production. Impact of climate change on viticulture
5. The role of biotic factors in viticulture. Resistance breeding of grapes
6. The scope and place of phytotechniques in vine production technology. Historical development of pruning techniques
7. Classification and characterization of phytotechniques.
8. Classification and characterization of vine management practices and training systems.
9. Biological basis of phytotechnical operations
10. Trends in the vine and wine sector based on world statistics. The concept of quality and its evolution in viticulture
11. Give a brief description of the factors affecting the quality of grapes. Describe in detail the relationship between variety and quality.
12. Give a brief description of the factors affecting the quality of grapes. Describe in detail the relationship between the place of production and quality.
13. The role of plantation structure and technology in grapevine quality.
14. Potential of different viticulture systems (organic, biological and biodynamic viticulture) for quality viticulture.
15. Modern techniques revolutionizing viticulture. Climate adaptation in viticulture, precision viticulture.

Specialisation in Vegetable Growing

Soilless forcing and cultivar use

1. Concept of soilless vegetable production, its division, economic significance and technical basis
2. Substrates used in soilless cultivation, container and rockwool cultivation techniques
3. Pepper (*Capsicum annum* L.) forcing in soilless technology, characterization of cultivated types and varieties.
4. Tomato forcing in soilless technology, characterization of cultivated varieties
5. Soilless technology in forcing of cucurbits (*Cucurbitaceae*), characterization of cultivated species and varieties.

Modern mushroom growing technologies

6. The economic and environmental impacts of mushroom cultivation
7. Requirements of mushroom production (spawn, substrate, technology, growing unit)
8. Comparison of the different button mushroom (*Agaricus bisporus*) cultivation technologies
9. The intensive cultivation technology of oyster mushrooms (*Pleurotus* sp.)
10. Cultivation and economical potential of exotic mushroom species

Propagation material and nutritional role of vegetables

11. Evaluation of propagation methods in vegetables cultivation
12. Seedling cultivation of vegetables, characterization of seedling cultivation methods
13. Definition of vegetable seeds, their characteristics, seed treatment procedures
14. Nutritional role of cucurbits, cole crops, onions and root vegetables
15. Nutritional role of tomatoes, peppers, legumes and mushrooms

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