

**University of Agriculture and Life Sciences
Institute of Horticultural Science**

BSc in Horticultural Engineering

FINAL EXAM

GENERAL, COMMON "A" questions

1. The current situation and future perspectives of ornamental plant cultivation in the world and in Hungary
2. Ornamental plant production under covered areas: specialities of the cultivation technology of the main crops
3. Propagation and open-ground cultivation of ornamental plants
4. Major ornamental trees, ornamental shrubs and their applications
5. Modern technologies of nursery propagating material production and plant cultivation in woody plant nurseries
6. Structure and economic features of medicinal plant production sector with respect to the producers, actual problems and international tendencies
7. Large scale cultivation and primary processing of fruit drug producing medicinal plant species
8. Medium scale cultivation and primary processing of herba and leaf drug producing medicinal plant species in horticultural enterprises
9. The current situation and future perspectives of fruit growing in the world and in Hungary.
10. Introduces conception and regulations of integrated fruit production, the characteristics of growing technology and variety use.
11. Tillage, nutrient management and irrigation in modern integrated growing of fruit species.
12. Specific features of vegetable cultivation, current status, and perspectives for the future
13. Direct and indirect plant care in vegetable cultivation
14. Intensive vegetable producing technologies
15. Present situation and perspectives of viticulture on the world and in Hungary.
16. The role of the cultivar in the viticulture. Historical development of variety assortment, present situation and future perspectives. Hungarian grape breeding.
17. Phytotechnical operations of grapevine cultivation.

„B” Questions - CURRICULUM OF SPECIALIZATIONS

Specialization for floriculture and nursery

1. Significance, cultivar groups and cultivation of cut roses and cut chrysanthemums.
2. Botanical characterization and cultivation methods of gerbera and cut carnation. Harvest, postharvest, transport.
3. Cyclamen and primula cultivation, timing possibilities, change of market demand.
4. Cultivation of short-day flowering potted ornamental plants.
5. Description of the most important foliage ornamental pot plants (*Ficus* and *Araceae*), their propagation, cultivation and uses.
6. Sprouting and timing of ornamental bulbous species, biological and technological bases, sprouting technologies for different dates on the example of tulips and lilies.
7. Plug production of annual and biennial flowering bedding ornamental plants. Description of the species and groups of varieties suitable for planting in public flower beds.

8. Growing of geraniums and balcony plants. Major species and groups of varieties.
9. The most important perennial ornamental plants that can be planted in sunny flower beds and are suitable for public spaces. Establishment and maintenance of a perennial flower bed.
10. Perennial plants of shaded flower beds, lawn replacement plants (perennials and woody plants).
11. Species and varieties of ornamental plants belonging to the family *Cupressaceae* and the genus *Taxus*, their propagation and cultivation, their maintenance.
12. Species and varieties of ornamental plants belonging to the family *Pinaceae*, their propagation and cultivation. General phytogeographic, aesthetic and ecological characteristics of the use of pines.
13. Characterization, propagation and cultivation of flowering ornamental shrub species and important varieties, description of basic maintenance works.
14. Characterization of flowering ornamental tree species (and their important varieties) and ornamental tree species and varieties suitable for street decoration. Their propagation and cultivation in nurseries, description of basic maintenance works.
15. Specialities of propagation, cultivation and use of climbing shrubs.
16. Technical conditions and main characteristics of ornamental nursery cultivation in containers, characterization of the groups of plants grown in this way.
17. Technology of ornamental shrubs' open-ground cultivation.
18. Methods and technologies of woody plants' generative propagation
19. Methods and technologies of autovegetative propagation of woody plants
20. Methods of xenovegetative propagation of woody plants, rootstock-scion interaction

Medicinal plant production

1. Significance as well as biological, chemical and technical background of primary processing of medicinal and aromatic plants with respect to the most important procedures and technologies
2. Biological and technological background of large scale production of poppy and mustard
3. Utilization areas of medicinal plants. Herbal preparations in Hungary and in the European Union with respect to the authorization procedures and trade
4. Biological active compounds of medicinal plants and biogenetic classification. Factors influencing biosynthesis and accumulation of molecules
5. Characterization and drug production of wild growing medicinal plant species with flower and/or fruit drugs (black elder, hawthorn, linden tree, common juniper, horse chestnut, dog rose)
6. Characterization and drug production of wild growing medicinal plant species with herba or bark drugs (goldenrod species, mistletoe, St. John's Wort, yarrow, horsetail, buckthorn)
7. Characterization and drug production of wild growing medicinal plant species with leaf and/or root drugs (stinging nettle, plantain, marshmallow, dandelion)
8. Characterization and drug production of exotic medicinal plants (*Ginkgo biloba*, *Eucalyptus* spp., *Ginseng* spp., *Aloe* spp., *Cassia* spp.)
9. Biological and technological aspects of drug production and primary processing of *Lavandula* species
10. Characterization of significant perennial medicinal plants belonging to the *Lamiaceae* and comparative evaluation of their production technologies (peppermint, garden thyme, lemon balm, sage)
11. Characterization of root drug supplying medicinal plants and aspects of specific production technologies (*Echinacea* spp., licorice)
12. Characterization and aspects of specific collection, growing and processing technologies of chamomile
13. Characterization of specific cultivation and primary processing of fatty oil supplying medicinal plants (safflower, oil pumpkin, flax)

Specialisation for fruit growing

1. Modern training systems in apple and pear growing. Training and maintenance of the most significant intensive training systems.
2. Modern training systems in stone fruit growing. Training and maintenance of the most significant intensive training systems.
3. Modern training systems of strawberries and raspberries. Introduce their growing technology.
4. Modern training systems of red and black currants. Introduce their growing technology.
5. Introduce the training systems in Hungary and show its growing technology.
6. Support systems in fruit orchards. Introduce aspects of choice and introduce parameters of major types.
7. Flower bud development of fruit species. Yield estimation methods and their role in harvest planning.
8. Fruit harvesting, preparation for the market and sale.
9. Introduce the types of modern fruit storage technologies with their characteristic parameters.
10. Introduce fruit quality parameters which determining the storability and shelf life of fruits. Storage losses and possibilities to reduce them during growing and storage.
11. Aspects of site selection in fruit production.
12. Adverse weather effects endangering fruit production. Possibilities of prevention and protection.
13. Quality assurance, quality control in fruit growing.
14. Design, authorization process and establishment of fruit orchards.
15. Maintenance of fruit orchards during the non-productive period.

Specialization in viticulture

1. Geographical distribution of grapevine. History and current state of world vitiviniculture (production area, yield, export, import, consumption).
2. Taxonomy of grapevine, (botanical and cultivar classification)
3. Hungarian wine regions.
4. Role of the soil in viticulture. Soil types, soil risk factors and parameters for grape cultivation in Hungary. The effect of soil on wine quality.
5. Classification of rootstock cultivars, their cultivation value characteristics. Evaluation of the most important rootstock cultivars. Rootstock wood production. Collection, storage and preparation of rootstock and scion canes.
6. Grapevine grafting. Methods of grafting. Biological background of grafting. Methodology and organization of graft preparation.
7. Structural elements of the grape plantation
8. Establishment of the vineyard, regulation and permission of vineyard establishment, melioration before grape planting. Planting of the vines (choosing the planting material, conditions of planting, planting methods). Pruning in the first years, development of the training system.
9. Phytotechnical operations. Bud differentiation, bud fertility, methods of bud fertility assessment. Bud fertility coefficients and their practical application.
10. Soil cultivation and protection in the vineyard. Nutrient supply and irrigation.
11. Maintenance and Sustainability of the vineyard (origin of gaps in the vineyard, replacement of missing vines, technical maintenance of the vineyard). Plant protection specialties of grape vineyards.
12. Characteristics and international directives of traditional-, integrated-, ecological- and biodynamic-grape cultivation.
13. Composition of grape berry and must (sugars, acids, polyphenols, aromas etc.). Grape berry development.
14. White winegrape cultivars
15. Red winegrape cultivars

Vegetable growing specialization

1. Evaluation of vegetable growing technologies under cover
2. Water and nutrient control in vegetable growing
3. Evaluation of greenhouses and plastic greenhouses from a technical viewpoint
4. Soilless and isolated vegetable forcing technologies
5. Complex evaluation of tomato cultivation technologies
6. Complex evaluation of pepper cultivation technologies
7. Complex evaluation of melon and watermelon cultivation technologies
8. Complex evaluation of cucumber cultivation technologies
9. Complex evaluation of main cruciferous vegetable crops' (cabbage, kohlrabi, Chinese cabbage) cultivation technologies
10. Complex evaluation of main leafy vegetable crops' (lettuce, spinach, sorrel) cultivation technologies
11. Complex evaluation of main root vegetable crops' (carrot, parsley, celery, radish) cultivation technologies
12. Complex evaluation of bean and pea cultivation technologies
13. Complex evaluation of onion, garlic, leek cultivation technologies
14. Complex evaluation of button and oyster mushroom cultivation
15. Complex evaluation of sweet corn cultivation

Specialization Horticultural biotechnology and Plant breeding

1. Structure and function of nucleic acids
2. Gene structure and expression in eukaryotes
3. Gene transformation into plants, transgenic plants
4. Aims, history, main methods and results of biotechnology
5. Possibilities and techniques in application of molecular markers
6. Bioinformatics analyses: databases, examination of sequences, phylogenetic investigations
7. Detection of GMOs
8. Aims and benefits of genetic modifications in GM crops
9. Environmental risks, ethical issues and legal regulation of genetic modification in plants
10. Biosynthesis, structure and functions of proteins, properties of enzymes
11. Plant hormones and Plant growth regulators: roles in plant life and their biotechnological applications
12. Environmental biotechnology: plant/microbial interactions, phytoremediation
13. *in vitro* micropropagation and its role in biotechnological processes. Plant cell fermentations
14. Plant organelles and their roles in life functions (chloroplast in detail)
15. Transport processes in plants: transport of water and organic nutrients, mineral nutrition
16. Sexual reproduction in plants (flowering, seed and fruit biology)
17. Aims, tasks and steps of plant breeding
18. Domestication, gene centers, gene banks
19. Breeding by selection and crossing
20. Heterosis in plant breeding, significance of F1 hybrids
21. Ways of reproduction, fertilization systems
22. Importance of polyploidy in plant breeding

Environmental Management specialization

1. Basics and concepts of environmental management. Environmental management aspects of the most important environmental problems.
2. Chemical composition of the atmosphere and its pollutants. Sources, sinks and effects of air pollution. The concept and characterization of emission, transmission, immission.
3. Characterization and types of smog. The issue of atmospheric ozone. Greenhouse gases. Climate change. Impact of air quality on climate.
4. Causes, consequences and prevention of physical soil degradation processes.
5. Causes, consequences and prevention of chemical soil degradation processes.
6. The importance of soil life in soil quality.
7. The importance of soil organic matter, the possibilities of organic matter management.
8. Principles of environmentally friendly fertilization; nutrient management aspects of good agricultural practice.
9. The significance, parts and processes of composting.
10. Pollutants, their sources and regional variations in surface water and groundwater.
11. Protection against water damages, basics of flood protection.
12. Basics of drinking water treatment.
13. Characterization and classification of wastewater. Basics of communal wastewater treatment. The role of plants in wastewater treatment.
14. Basics of waste management. Waste classification, characterization, treatment.
15. Basics of the most important environmental chemical tests.

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