

# MSC IN HORTICULTURE – FINAL EXAM TOPICS

## 2022 AUTUMN SEMESTER

### KNOWLEDGE OF OBLIGATORY SUBJECTS

#### Plant geography and plant ecology

1. Plant populations and their main characteristics: architecture and grow forms, size and spatial structure, clones. Functional groups and life strategies, adaptation forms. The life cycle model.
2. Vegetation ecology of terrestrial ecosystems: interactions and adaptations in plant communities. How environmental factors affect the coexistence of species.
3. Species in space and time: distribution area, floral elements, adventive species. Migration of species in the constraints of a changing environment. Human impact and the consequences of the biological invasions.

#### Molecular genetics and gene technology of plants

4. Characterisation of basic molecules of life and their role in cell functions (DNA, RNA, proteins)
5. Organisation and distribution of DNA molecules in the organism (chromosomes, replication, cell division)
6. Constitution and functioning of eucariotic genes (central doctrine, mechanism of transcription, translation)

#### Propagation biology of plants

7. Dormancy and germination of seeds, germination biology.
8. Stability and changes in clonal propagating material. Maintenance of cultivars in clonal propagation.
9. Process of graft union formation, biological basis of scion-rootstock interaction

#### Plant ecosystems and their regulation

10. Ecological and production biological significance of C3 and C4 photosynthesis and CAM mechanism
11. What do the intraspecific and interspecific competition mean, how do they change and how can they be regulated in natural and agrarian systems, respectively?
12. How the plants defend themselves against consumer species including their morphological structures, physiological reactions and chemical compounds?

### KNOWLEDGE OF THE SPECIAL CLASSES

#### Ornamental Plants Specialisation

1. Overview of the Hungarian ornamental plant breeding program, Hungarian ornamental plant varieties in growing and in utilization
2. Developmental phases of ornamentals, different methods of growth regulation in ornamental plant growing
3. In vitro techniques in modern ornamental plant growing
4. Supplementary bulb-tuber and cut flower cultures (growing freesia, Dutch iris and gladiolus)
5. Growing special cut flowers, such as Flamingo flower plant, Bird of paradise flower, Calla Lily, Agapanthus plant, Peruvian lily
6. Supplementary potted flower cultures such as Hydrangea, Azalea, Gloxinia and Impatiens New-guinea
7. Dendrological regions of Hungary, possibilities of plant usage of each region
8. Fundamentals of ornamental plant usage, gardens as artificial plant communities, classification of ornamentals according to their role in the plant population
9. Plant usage for home gardens, weekend house gardens, school/ day-care gardens
10. Plant usage for public parks, pedestrian streets, downtown areas, public institutions, public pools, camping areas, hospital gardens and highways
11. Fundamentals of indoor plant usage
12. Growing and maintenance of aquatic plants
13. Growing and maintenance of high mountain perennials and their importance in ornamental horticulture
14. Morphology, growing and maintenance of cacti and other succulents
15. Morphology, physiology, growing and maintenance techniques of orchids and bromeliads, and their economical importance

## 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
5. Quality assurance systems in collection and production of MAPs.

### Cultivation of special medicinal plants and spices course:

6. Medicinal plants important for the food industry I. (*Trigonella foenum-graecum*, *Cynara scolymus*, *Theobroma cacao*)
7. Medicinal plants important for the food industry II. – Functional foods: *Camelia sinensis*, *Coffea arabica*. Important spices: *Salvia rosmarinus*, *Oregano* sp.
8. Medicinal plants important for the cosmetic industry: *Aloe*, *Melaleuca alternifolia*, *Calendula officinalis*.
9. Medicinal plants important for the pharmaceutical industry (*Artemisia annua*, *Cassia senna*, *Ephedra* sp., *Cinchona* sp., *Catharanthus roseus*, *Duboisia* sp.)
10. Medicinal plants important for the pharmaceutical industry - newly discovered species: *Vitex agnus castus*, *Cimicifuga racemosa*, *Serenoa repens*, *Prunus africana*.

### Special plant compounds in nutrition and therapy course:

11. Grouping of most important biologically active substances used in phytotherapy and nutrition according to the biogenetic system
12. Description of active substances occurring in spices universally (e.g. essential oils) and specifically (e.g. azotoids).
13. Evaluation of *dietary supplements* with special respect to motivating and limiting factors in their consumption
14. Evaluation of *traditional herbal medicines* with special respect on the advantages and disadvantages of the establishment of this product category
15. Characterisation of active substances used by the pharmaceutical industry, examples for species and indications.

## Specialisation in Fruit Growing

### From "Physiological questions of fruit bearing trees" subject

1. Describe the factors determining the shape and size of fruit trees. How can we manipulate the physiological processes with technological tools?
2. Describe the process of flower bud development of fruit trees, and the changing of their frost hardiness during dormancy.
3. Describe the process of fruit development, maturity and ripening of after ripening type fruits. Explain the hormonal background of fruit drops.
4. What is the reason of biennial bearing (alternate bearing) in orchards? What kind of technology can we eliminate it with?
5. List the internal and external factors determining the root development of fruit trees.

### From „Modern fruit growing" subject

6. Conditions and factors of modern fruit orchard establishment.
7. Training systems and orchard management technology of modern apple orchards.
8. Modern training systems and new elements of the orchard management technologies for stone fruits (cherries, peaches, apricots).
9. Training systems and orchard management technology of modern walnut orchards.
10. Possibilities for the modernization of berry production (strawberries and raspberries).

### From „Evaluation of fruit species and –varieties" subject

11. More important tendencies of apple breeding. Description of apple assortment having competitiveness on international market. Evaluation of role of historical apple cultivars in the current growing and breeding.

12. Tendencies and methods of pear breeding in the world. Important results of pear breeding. Characterisation of important characteristics of Japanese pear, Evaluation of cultivars suitable for growing in Hungary
13. More important tendencies and results of peach and apricot breeding in the world. Evaluation of new Hungarian cultivars and novelties suitable for adaptation
14. More important tendencies and the newest international results of European and Japanese plum cultivars
15. Main aspects and results of sweet and sour cherry in Hungary and abroad, Hungarian and foreign bred novelties.

### **Specialisation in Viticulture and Enology**

#### Biological and phytotechnical resources of viticulture

1. Botany of the grapevine. Grape species, their roles in cultivation and breeding.
2. Life cycle of a vineyard. Phenology and growth cycle of the grapevine.
3. Drought- and heat stress of grapevines.
4. Role of light, temperature and humidity in grape production. Effects of climate change on viticulture.
5. The role of biotic factors in grape production. Grapevine resistance breeding.
6. Concepts and roles of phytotechniques in grape production practices. Historical evolution of pruning systems.
7. Classification and description of phytotechnical practices.
8. Classification and description of grape pruning and training systems.
9. Biological resources of phytotechniques.

#### Quality oriented viticulture

10. Trends of the grape and wine industry based on worldwide statistics. Development of the concept of quality in viticulture.
11. Describe the factors affecting grape quality.
12. Roles of the vineyard and cultivation system in grape quality.
13. Possibilities of different cultivation systems (ecological, biological and biodynamic) in quality oriented viticulture.
14. Modern techniques in viticulture. Climate adaptation, precision viticulture.
15. Technologies and current topics of the production of pathogen-free propagation materials.

### **Specialisation in Vegetable Growing**

#### Soilless forcing

1. Concept of soilless vegetable production, its partition, economic significance and technical basis
2. Different growing media in use, forcing technologies in container and in rockwool production
3. Pepper (*Capsicum annum*) forcing with soilless technology
4. Tomato forcing with soilless technology
5. Soilless technology in forcing of pumpkin ones (*Cucurbitacea*)

#### Mushroom Growing

6. The economical 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

#### Vegetable seed production

11. Requirements of vegetable variety registration on EU level
12. Processing and treatments of vegetable seeds
13. Seed production of tomato and pepper
14. Seed production of melons and cucumber
15. Seed production of sweet corn, bean and pea

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