

Syllabus for M Sc (Ag) Horticulture

I Semester

J-1061 : Fundamentals of Vegetable Production

- Unit1 : Importance, present position and future scope of olericulture in India. Food value of vegetables. Types of vegetable growing. Classification of vegetables.
- Unit2 : Soil and climatic requirements of vegetables (Chilling requirement and heat unit), Irrigation and drainage management. Nutrient and fertilizer management.
- Unit3 : Nursery management in vegetable growing. Intercultural operations (hoeing, weeding, staking, earthing-up, inter cropping and mixed cropping).
- Unit4 : Role of plant growth regulators (PGR) in vegetable growing. Use of plastic in vegetable cultivation. Protected cultivation of vegetable crops.
- Unit5 : Integrated Pest and Disease Management. Integrated Nutrient Management (INM). Hydroponics and Aeroponics

J-1062 : Propagation and Nursery Management

- Unit1 : Need for plant multiplication. Sexual and asexual method of propagation, their advantages and disadvantages. Seed : morphology, anatomy, maturity, seed dormancy, factors affecting dormancy and methods to overcome them. Apomixes – mono-embryony, poly-embryony.
- Unit2 : Methods and techniques of cutting, layering, grafting and budding, Factors affecting rooting of cuttings and layering. Anatomical studies of bud union. Stomatal effects and their influences.
- Unit3 : Establishment of horticultural nursery. Selection and maintenance of mother plants, collection of scion wood, rootstock. Lifting and packing of seedling from nursery. Nursery tools and implements.
- Unit4 : Propagation structures (glasshouse, polyhouse, mist chamber, cold frames, hot beds, lath house, humidifier etc). Role of polythene in propagation.
- Unit5 : Use of plant growth regulators (PGR) in sexual and asexual propagation. Disease and insect pest management of nursery plants. Micro-propagation.

J-1063 : Fundamentals of Ornamental Gardening

- Unit1 : History, importance, present position and scope of landscape gardening India. Principles of garden designs – initial approach, axis, focal point, mass effect, unity, space, divisional lines, proportion and scale, texture, mobility, light, tone and colour.
- Unit2 : Style of gardening (Formal garden, Informal garden, Wild garden) with special reference to Mughal garden, Japanese garden, Persian garden, French garden, Italian garden, English garden. Garden features : pavements and steps, fences and gates, hedges and edges, arch, pergola, screens and borders, lawn, flowerbeds, shrubberies, rosery, rockery, water body and bridges. Garden adornments – stone lanterns and basins, statues, towers, sundial, topiary, bird bath, saddle stones and floral clock,
- Unit3 : Specialized gardens : Indoor gardening, pots and containers, potting mixtures. Water garden, rock garden, roof garden, vertical garden, marsh or bog garden, sunken garden, gardening in the shade. Landscaping of highways, railway station and railway lines, along bank of rivers and canals, city, town and country-sides, public buildings, educational institutions, factories, places of historic importance, places of worship, small home ground, crematories and burning *ghats*.
- Unit4 : Flowering annuals : classification, colour scheme and grouping (monochromatic, analogous, complementary or contrasting). Ornamental trees – ecological adaptation, plantation and after care of trees. Ornamental shrubs – morphological characters and cultural practices. Ornamental climbers – description of ornamental climbers and their planting. Cacti and succulents, palm and cycads, ornamental grasses, bonsai.
- Unit5 : Garden practices : planting and transplanting, stopping and pinching, de-shooting and disbudding, defoliation, staking, pruning, shading, training and pruning, wintering, clipping or culling of hedges and edges, mulching. Floral ornaments and flower arrangement.

II Semester

J-2061 : Production Technology of Vegetables and Spices

Production technology of vegetable crops with special reference to their origin and distribution, soil and climate, land preparation, improved varieties, sowing and planting, irrigation, fertilisation, intercultural operations, training, pruning and staking, harvesting and yield, major insect-pests and diseases and their control, storage and marketing.

Unit1 : Solanaceous fruit vegetables (tomato, brinjal, chilli, capsicum), potato and okra.

Unit2 : Cole crops (cauliflower, cabbage, knol khol and broccoli) and Root crops (radish, carrot, beet root and turnip).

Unit3 : Peas and beans (pea, French bean, cowpea, broad bean), Green leafy vegetables (spinach, amaranth), and Bulb crops (onion and garlic).

Unit4 : Cucurbits (cucumber, muskmelon, watermelon, bottle gourd, bitter gourd, pumpkin and squashes, sponge gourd, ridge gourd) and Tuber crops (Colocasia, elephant foot yam, sweet potato, cassava).

Unit5 : Spices (cumin, coriander, fenugreek, fennel, ginger, turmeric)
Important physiological disorders of vegetable crops

J-2062 : Orchard Management

Unit1 : Establishment of orchard – selection of site, planning, selection and procurement of quality planting material, soil preparation, layout, planting systems, digging of pits, planting, after care of young plants.

Unit2 : Irrigation management of fruit trees ; water requirement and method and time of application. Abnormalities caused due to excess and deficiency of moisture. Fertiliser requirement of fruit trees, major and minor nutrients, nutrient deficiency and their remedies, foliar feeding.

Unit3 : Growing and fruiting habits of fruit trees. Training and pruning in fruit trees. Clean cultivation, sod culture, intercropping, cover crops, filler crop.

Unit4 : Pollination and pollinizers. Unfruitfulness, factors affecting and remedial measures. Alternate bearing, factors affecting and remedial measures. Fruit thinning, fruit drop and fruit splitting

Unit5 : Rejuvenation of old and uneconomic orchards. Protection from insect-pest and diseases. High density planting system in orchards. Dryland farming in fruit crops

J-2063 : Production Technology of Ornamental Crops

Production technology of flower crops with special reference to their origin and distribution, soil and climate, land preparation, improved varieties, sowing and planting, irrigation, fertilisation, intercultural operations, training, pruning and staking, harvesting and yield, major insect-pests and diseases and their control, storage and marketing.

Unit1 : Rose, carnation, chrysanthemum and dahlia.

Unit2 : Gladiolus, tuberose, lilies, tulip and Alstromeria.

Unit3 : Marigold, gerbera, aster, orchids and jasmine.

Unit4 : Cultivation of cut flower crops, cultivation of loose flower crops, cultivation of cut foliage/cut greens

Unit5 : Greenhouse cultivation of important flower and ornamental crops

III Semester

J-3061 : Fundamentals of Fruit Production

- Unit1 : Importance, present position and future scope of fruit culture in India. Classification of fruit crops.
- Unit2 : Flowering and fruiting of fruit crops : inflorescence, forms of flower, blooming period, pollination and pollinizers, bearing habit, type of fruits, etc
- Unit3 : Soil and climatic requirements of fruit crops. Irrigation requirements of fruit crops : irrigation methods, time and amount of water application. Nutritional requirement of fruit crops : deficiency symptoms, fertilizer dose, method and time of application.
- Unit4 : Insect-pest management in fruit crops. Disease management in fruit crops.
- Unit5 : Marketing of fruit crops in India. Import and export of fruits and their products. Use of plant growth regulators (PGR) in fruit setting, fruit thinning, fruit drop, parthenocarpy, yield and quality of fruits.

J-3062 : Breeding of Vegetable and Ornamental Crops

- Unit1 : History of vegetable and ornamental breeding research and infrastructure in India. Centre of origin and genetic variability of vegetable crops. Mendel's laws of inheritance. Qualitative and quantitative inheritance. Self-incompatibility, male sterility. Heterosis and inbreeding depression. Mutation breeding. Hybridization techniques. Polyploidy in crop improvement. Biotechnology and genetic engineering.
- Unit2 : Self-pollinated vegetable crops : mechanism of self-pollination. Breeding procedures and techniques of self-pollinated vegetable crops.
- Unit3 : Cross pollinated vegetable crops, mechanism of cross pollination. Genetic composition of cross pollinated populations. Selection in cross pollinated populations, Hardy Weinberg Law. Breeding procedures and techniques of cross pollinated vegetable crops. Hybrid and synthetic varieties.
- Unit4 : Breeding of major vegetable crops : tomato, brinjal, chilli and capsicum, cauliflower, cabbage, onion, radish, carrot, pea, French bean, cucumber, muskmelon, watermelon, bottle gourd, bitter gourd, pumpkin and squashes, pointed gourd, okra, potato, Colocasia, elephant foot yam etc.
- Unit5 : Breeding of important flower crops : Rose, carnation, chrysanthemum, gladiolus, marigold, gerbera, aster, orchids, lilies, tulip, jasmine, dahlia, Alstromeria.

J- 3063 : Fundamentals of Preservation of Horticultural Crops

- Unit1 : History, importance, present position, and scope of preservation. General principles of fruit and vegetable preservation.
- Unit2 : Enzymatic and textural changes, respiration and transpiration of fruits and vegetables. Spoilage in fruit and vegetable preservation. Role of microorganisms in processing of fruits and vegetables.
- Unit3 : Brief history of scientific bottling and canning. Principles and guidelines for location and layout of fruit and vegetable preservation unit. Equipments for home and commercial production
- Unit4 : Methods of preservation. Preservation by drying and dehydration. Preservation by freezing. Preservation with sugar and chemicals. Preservation with salt and vinegar.
- Unit5 : Fermentation. Browning reactions. Food colours. Food flavours. Enzymes and other microorganisms in preservation of fruits and vegetables.

J-3064 : Post Harvest Technology of Horticultural Crops

- Unit1 : Importance of postharvest management in fruit, vegetable and ornamental crops. Components of quality, variability due to genetic, environment and cultural factors, stage and time of harvesting, water quality and relation. Pre and post-harvest factors related to post harvest deterioration of horticultural crops. Physiological and biological changes during and after maturity in horticultural crops. Post-harvest losses.
- Unit2 : Maturity indices. Hardening and delaying in ripening process in fruit crops. Time and method of harvesting. Pre and post-harvest treatments of horticultural crops. Methods of storage, types of storage - pre-cooling, controlled and modified atmospheric storage, low pressure storage. Grading, packing and transportation of horticultural crops
- Unit3 : Postharvest management of important fruit crops : mango, banana, papaya, guava, litchi, grape, apple, etc.
- Unit4 : Post-harvest management of important vegetable crops : Solanaceous fruit vegetables, cole crops, peas and beans, root and bulb crops, tuber crops, green leafy vegetables, cucurbits, okra, potato, etc.
- Unit5 : Factors affecting bud and flower development, senescence, carbohydrate and nitrogen metabolism. Role of applied sugars, growth regulators, metallic salts and other chemicals on delaying quality deterioration. Special features like bent neck, flower bud abscission, geotropic bending, foliage discolouration, pulsing, bud opening and holding solution etc. Post-harvest management of rose, carnation, chrysanthemum, gerbera, gladiolus, orchids, tulips, lilies, etc.

IV Semester

J-4061 : Production of Fruit Crops

Improved production technology of fruit crops with special reference to origin, history and distribution, soil and climate, land preparation, improved varieties, sowing and planting, irrigation, fertilisation, intercultural operations, training, pruning and staking, harvesting/picking, major insect-pest and disease control measures, storage and marketing.

Unit1 : Tropical fruits : mango, papaya, banana, jackfruit, pineapple, sapota, arecanut.

Unit2 : Subtropical fruits : guava, grapes, citrus, litchi, pomegranate, aonla, bael, ber.

Unit3 : Temperate fruits : apple, peach, pear, plum, almond and apricot, and other fruits of minor importance.

Unit4 : Study of important physiological disorders of fruit crops : Aonla necrosis, bitter pit of apple, yellow spot, granulation of citrus, shot berry, pink berry, hen and chickens of grapes, fruit cracking of pomegranate and litchi, multiple crown of pineapple, black tip, taper tip, tip pulp, girdle necrosis, sunburn, jelly seed, soft nose, stem end rot, internal fruit necrosis of mango.

Unit5 : Major problems of fruit growing – mango malformation, alternate bearing, spongy tissue in mango, bunchy top of banana, guava wilt, citrus canker, root wilt of coconut, yellow leaf disease of areca nut, etc.

J-4062 : Breeding of Fruit Crops

Unit1 : History and infrastructure of fruit breeding in India. Centre of origin of fruit crops. Objectives of fruit breeding. Breeding of major fruit crops with special reference to their origin and distribution, genetic diversity, germplasm resources, wild species, botany, floral biology, pollination, inheritance pattern, pre selection criteria, breeding objectives, breeding methods and achievements, improved varieties, and future research thrust.

Unit2 : Tropical fruits : mango, papaya, banana, jackfruit, pineapple, sapota, arecanut.

Unit3 : Subtropical fruits : guava, grapes, citrus, litchi, pomegranate, aonla, bael, ber.

Unit4 : Temperate fruits : apple, peach, pear, plum, almond and apricot.

Unit5 : Breeding for abiotic stress (salt tolerance, moisture stress, high and low temperature). Breeding for insect-pest and disease resistance.

J-4063 : Processing of Fruits and Vegetables

Unit1 : Treatment prior to processing the fruit and vegetables. Drying and dehydration of fruits and vegetables, smoking and sulphuring. Freezing of fruits and vegetables - freezing units, cold storage, etc.

Unit2 : Preservation with sugar - candy, preserve, crystallized fruit

Preservation with sugar, acid and chemicals - jam, jelly, marmalade,

Unit3 : Preservation with salt and vinegar – pickles, chutney, sauce/ketchup. Brine solution and brining.

Unit4 : Unfermented and fermented fruit beverages, ready to serve (RTS) drinks. Some other products from fruit and vegetable (mushroom processing, etc).

Unit5 : Quality control of processed products – FPO and AGMARK specifications. Government policy on import and export of processed fruit and food law. Chemical preservatives, vinegar. Importance of by-products from processing plant. Food poisoning and their control measures

J-4064 : Seed Production Technology of Vegetables and Flowers

Unit1 : History, importance, present position and future scope of vegetable and flower seed production in India. Seed, its morphology, anatomy and types.

Unit2 : Seed production techniques of major vegetable crops. Solanaceous fruit vegetables - tomato, brinjal, chilli and capsicum. Cole crops - cauliflower, cabbage, knoll khol and broccoli. Root crops carrot, radish beet root and turnip. Peas and beans – pea, French bean, cowpea, Cucurbits - cucumber, muskmelon, watermelon, bottle guard, bitter gourd, pumpkin and squashes, sponge gourd, ridge gourd. Onion, okra, spinach.

Unit3 : Seed production techniques of important flower crops. Rose, carnation, chrysanthemum, gladiolus, marigold, gerbera, aster, orchids, lilies, tulip, jasmine, dahlia, Alstromeria etc

Unit4 : Land/field standards in seed production. Seed standards and evaluation, seed testing. Seed processing. Seed packaging and storage. Seed certification, seed production and certification agencies.

Unit5 : Indian seed industry. Quality control of vegetable and flower seed. Seed policy. Quarantine.