



**PROF. RAJENDRA SINGH (RAJU BHAIYA) UNIVERSITY,  
PRAYAGRAJ**

**DOCTORAL ENTRANCE TEST (DET)  
(SESSION : 2022-2023 ONWARDS)  
DET Syllabus**

**AGRICULTURE HORTICULTURE**

**Unit-1 : PROPAGATION AND NURSERY MANAGEMENT FOR FRUIT CROPS**

Introduction, life cycles in plants, cellular basis for propagation, sexual propagation, apomixes, polyembryony, chimeras. Principles factors influencing seed germination of horticultural crops, dormancy, hormonal regulation of germination and seedling growth.

Seed quality, treatment, packing, storage, certification, testing. Asexual propagation-rooting of soft and hard wood cutting under mist by growth regulators. Rooting of cuttings in hotbeds. Physiological, anatomical and biochemical aspects of root induction in cuttings. Layering - principle and methods.

Budding and grafting - selection of elite mother plants, methods. Establishment of bud wood bank, stock, scion and inter stock relationship-incompatibility. Rejuvenation through top working - Progeny orchard and scion bank.

Micro-propagation-principles and concepts, commercial exploitation in horticultural crops. Techniques - in vitro clonal propagation, direct organogenesis, embryogenesis, micrografting, meristem culture. Hardening, packing and transport of micro-propagules. Nursery-types. structures. components, planning and layout. Nursery management practices for healthy propagule production.

**Unit-2 : LANDSCAPING AND ORNAMENTAL GARDENING**

Landscape designs, types of gardens, English, Mughal, Japanese, Persian, Spanish, Italian, Vanams, Buddha garden; Styles of garden, formal, informal and free style gardens.

Urban landscaping, Landscaping for specific situations, institutions, industries, residents, hospitals, roadsides, traffic islands, damsites, IT parks, corporates.

Garden plant components, arboretum, shrubbery, fernery, palmetum, arches and pergolas, edges and hedges, climbers and creepers, cacti and succulents, herbs, annuals, flower borders and beds, ground covers, carpet beds, bamboo groves; Production technology for selected ornamental plants.

Lawns, Establishment and maintenance, special types of gardens, vertical garden, roof garden, bog garden, sunken garden, rock garden, clock garden, colour wheels, temple garden, sacred groves.

Bio-aesthetic planning, eco-tourism, theme parks, indoor gardening, therapeutic gardening, non-plant components, water scaping, xeriscaping, hardscaping.

**Unit-3 : Tropical And Dry Land Fruit Production**

Commercial varieties of regional, national and international importance, ecophysiological requirements, recent trends in propagation, rootstock influence, planting systems, cropping systems, root zone and canopy management, nutrient management, water management, fertigation, role of bioregulators, abiotic factors limiting fruit production,

physiology of flowering, pollination fruit set and development, pest and diseases management physiological disorders-causes and remedies, quality improvement by management practices; maturity indices, harvesting, industrial and export potential, Agri. Export Zones (AEZ) and industrial supports.

Mango and Banana, Citrus and Papaya, Guava, Sapota and Jackfruit, Pineapple, Annonas and Avocado, Aon la, Pomegranate, Phalsa and Ber, minor fruits of tropics.

#### **Unit-4 : PRODUCTION TECHNOLOGY OF COOL SEASON VEGETABLE CROPS**

Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/hybrids, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post-harvest management, plant protection measures and seed production of:

Potato. Cole crops: cabbage, cauliflower, knoll kohl, sprouting broccoli, Brussels sprout. Root crops: carrot, radish, turnip and beetroot. Bulb crops: onion and garlic. Peas and broad bean, green leafy cool season vegetables.

#### **Unit-5 : SUBTROPICAL AND TEMPERATE FRUIT PRODUCTION**

Commercial varieties of regional, national and international importance, ecophysiological requirements, recent trends in propagation, rootstock influence, planting systems, cropping systems, root zone and canopy management, nutrient management, water management, fertigation, bioregulation, abiotic factors limiting fruit production, physiology of flowering, fruit set and development, abiotic factors limiting production, physiological disorders-causes and remedies, quality improvement by management practices; maturity indices, harvesting, industrial and export potential, Agri Export Zone (AEZ) and industrial support.

Apple, pear, quince, grapes, Plums, peach, apricot, cherries, hazelnut, Litchi, loquat, persimmon, kiwifruit, strawberry, Nuts-walnut, almond, pistachio, pecan, Minor fruits-mangosteen, carambola, bael, wood apple, fig, jamun, rambutan, pomegranate.

#### **Unit-6 : PRODUCTION TECHNOLOGY OF CUT AND LOOSE FLOWERS**

Scope of cut and loose flowers in global trade, Global Scenario of cut and loose flower production, Varietal wealth and diversity, area under cut and loose flowers and production problems in India-Patent rights, nursery management, media for nursery, special nursery practices. Growing environment, open cultivation of cut and loose flower, soil requirements, field preparation, planting methods, influence of environmental parameters, light, temperature, moisture, humidity and CO<sub>2</sub> on growth and flowering.

Flower production - water and nutrient management, fertigation, weed management, rationing, training and pruning, disbudding, special horticultural practices, use of growth regulators, physiological disorders and remedies, 1PM and IDM, production for exhibition purposes. Flower forcing and year round flowering through physiological interventions, chemical regulation, environmental manipulation.

Cut flower standards and grades, harvest indices, harvesting techniques. Post-harvest handling, Methods of delaying flower opening, prolonging self life, Pre-cooling, pulsing, packing, Storage & transportation, marketing, export potential, institutional support. Agri Export Zones.

Crops: Rose, chrysanthemum, carnation, gerbera, gladioli, tuberose, orchids, anthurium, aster, lilies, as cut flower nymphaea, jasmine, marigold, crosandra, celosia, gamphrena as loose flower.

#### **Unit-7 : PRODUCTION TECHNOLOGY OF WARM SEASON VEGETABLE CROPS**

Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/hybrids, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements. intercultural operations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures, Economics of crop production and seed production of:

Tomato, eggplant, hot and sweet peppers, Okra, beans, cowpea and clusterbean, Cucurbitaceous crops, Tapioca and sweet potato, Green Leafy warm season vegetables.

## **Unit-8 : PROTECTED CULTIVATION OF HORTICULTURAL CROPS**

importance and scope of protected cultivation, world scenario Indian situation present and future scope. Principles used in protected cultivation, energy management, low cost structures; Regulatory structures used in protected structure types of greenhouse/polyhouse/nethouse, hot beds, cold frames, effect of environmental factors viz temperature, light. CO<sub>2</sub> and humidity on growth of different vegetables, flowers and fruits, manipulation of CO<sub>2</sub> light and humidity and temperature for production of horticultural crops installation of micro irrigation and fertilization. Nursery raising in protected structures like poly-tunnels, types of benches and containers, different media for growing nursery under cover. Regulation of flowering and fruiting in horticultural crops. technology for raising tomato, sweet pepper, cucumber, crops, Jherbera, rose, chrysanthemum and straw berry in protected structures training and staking in protected crops, varieties and hybrids suitable for growing in protected structures. Problem of growing horticultural crops in protected structures and their remedies, insect and disease management in protected structures.

## **Unit-9 : BREEDING OF Semester HORTICULTURAL CROPS**

Origin; botany, taxonomy, genetics, breeding objectives, breeding methods (introduction, selection, hybridization, mutation), varieties and varietal characterization, resistance breeding for biotic and abiotic stress, quality improvement, Issue of patenting, PPVFR act. achievement and future trust in following selected crops.

Mango, papaya, banana, grape and citrus fruits. Potato, tomato, brinjal, hot pepper and sweet pepper. Okra, Pea and beans. Gourds, IV melons, pumpkins and squashes. Cabbage, cauliflower, carrot, beetroot, radish.

## **Unit-10 : POST HARVEST TECHNOLOGY FOR HORTICULTURAL**

Maturity indices, harvesting practices for specific market requirements, influence of pre-harvest practices, enzymatic and textural changes, respiration, transpiration. Physiology and biochemistry of fruit ripening, ethylene evolution and ethylene management, factors leading to post-harvest losses horticultural crops, pre-cooling. Spoilage, microbial and biochemical physical injuries and disorders. Treatments prior to transportation, viz. grading, precoding chlorination, waxing, chemicals, biocontrol agents and natural plant products. Methods of storage-ventilated, refrigerated, MAS, CA storage zero energy cool chamber, hypobaric storage. Packing methods and transport, principles and methods of preservation, food processing, canning preparation of fruit juices, beverages, pickles, jam, jellies, candies and tomato products. Dried and dehydrated products, nutritionally enriched products, fermented beverages, packaging technology management of processing waste, food safety standards.