

C. Courses for Master's degree programme

1st Semester

FLA-501 NURSERY MANAGEMENT & PLANT PROPAGATION TECHNIQUES

2+1

Theory

UNIT -1

Scope and importance of nursery. Constraints' in nursery business. Classification of nursery. Site selection and layout nursery. Workers protection standards.

Propagation structures in a nursery--mist unit, fog unit, cold frames, hot beds, low polytunnel, greenhouse, lath house etc. site selection and installation.

.UNIT –II

Management practices of field nursery--regulations, site selection, layout, water & nutrient management etc

Management practices for container nursery-site selection, layout, standing ground, types of containers, media, potting systems, water and nutrient management etc Pro-tray nursery.

Mother plant block management, annual propagation programme, propagation techniques of ornamental plants.

Pest & disease management -IPM & plant health care (PHC)

Weed management .Lifting, grading, packing and storage of field grown ornamental crops.

Accessioning, Labeling& record keeping.

Marketing of nursery produce.

UNIT-III

Seed collection, processing & storage of ornamental trees & shrubs. Seed security. Seed testing.

Concept of seed quality and factor affecting it.

Practical

Layout of nursery. Identifying types of nurseries. Selection of mother plant for propagation of ornamentals. Propagation techniques. Seed sowing & Seedling raising. Lifting, labelling wrapping of balled plants. Lifting & packing of seedlings & rooted cuttings. Storage of bare rooted plants, balled& burlapped plants. Seed collection and storage. Purity & viability test of seeds.

FLA-502 ENVIRONMENTAL CONTROL OF GROWTH & DEVELOPMENT IN ORNAMENTALS 2+1

Theory

UNIT I

Concept of growth & development of ornamental plants.

UNIT 2

Brief idea on plant environment and its factors. Micro & macro climate. Seed germination and seedling growth in relation to light and temperature. Plant growth & flowering in relation to light----- Quality, Intensity and Duration. Importance of supplementary lighting, night breaks, Use of filters in greenhouse flower production. Importance of Dark period, ripeness to respond, Phytochrome, its mechanism in flowering of ornamental plants. Photoperiodism.

Growth and flowering of ornamentals in relation to effect of spatial variation to temperature. Vernalization & devernalization; perceptive organs and maturity factors .Injurious effect low & high temperature.

Interactional factors in light and temperature on flowering of ornamentals. Air components & their

functions. Influence of harmful gases on flowers. Soil climate & its influence on plant growth.

Practical

Seed germination under different quality of light. Measurement of leaf area; working principle of leaf area meter. Estimation of pigment factors in leaf & flowers. Working principles of spectrophotometer. Measurement of light intensity under different growing structures.

FLA 503 GREENHOUSE MANAGEMENT

2 + 1

Objective

Understanding the principles, theoretical aspects and developing skills in protected cultivation of flower crops.

Theory

UNIT I

Prospects of protected floriculture in India; Types of protected structures – Greenhouses, polyhouses, shade houses, rain shelters etc.,

UNIT II

Environment control – management and manipulation of temperature, light, humidity, air and CO₂; Heating systems -summer & winter cooling; ventilation---naturally ventilated greenhouses.

UNIT III

Beds & benches, Containers and substrates, media decontamination, watering systems and fertigation system.

Practical

Study of various protected structures, practices in design, layout and erection of different types of structures, practices in preparatory operations, soil decontamination techniques, practices in environmental control systems, practices in drip and fertigation techniques greenhouses. Cost economics of greenhouse construction. Visit to greenhouses.

FLO-504 NUTRITIONAL REQUIREMENTS OF ORNAMENTAL PLANTS 1+1

Objective Understanding the principles & mode of action and uptake of essential nutrients

Theory

UNIT -1

Essential plant nutrient, sources of these nutrients their role in growth and development of flowering plants. Principles of selection and application of fertilizers (in solid and liquid form). Organic floriculture---use of organic matter, biofertilizers, biostimulant etc.

UNIT II

Brief outline on mode of uptake, translocation, & transformation of major elements inside the plant. Critical nutrients level in some important flowering plants.

Practical

Methods of nutrient analysis in leaf and soil. Preparation of starter solution & liquid nutrient solution and methods of application.

FLA 505 PLANT GROWTH SUBSTANCES AND THEIR USES IN ORNAMENTALS

1+1

Understanding the principles & mode of action

Theory

UNIT –I

Different kinds of phytohormones. Brief outline of their history & synthesis. Role of auxin, GA₃, kinetin, inhibitors and retardants in ornamentals -- in propagation, vegetative growth, flowering, seed setting, bud & seed dormancy.

UNIT II

Factors affecting production of hormones in ornamental plants.

Practical

Preparation of stock solution of growth substances. Preparation of powder and paste formulation. Methods of application of plant growth substances in propagation, flowering and dwarfing.

FLA 506 WATER MANAGEMENT FOR ORNAMENTAL PLANTS 1+1

Theory

UNIT -1

Soil, plant and water relationship. Water movement in soil, concept and theories of water relation in soil. Measurement of soil moisture stress & growth of ornamental plants.

UNIT II

Irrigation techniques, time of irrigation in crops grown under different growing situations (field & container under different growing media). Drainage-principles & methods. Effect of excess water on growth of plants. Drainage requirement in relation to irrigation. Soil moisture stress & growth of ornamentals.

Practical

Estimation of soil moisture stress. Demonstration of different irrigation methods. Interpretation of soil and water analysis data. Study of drainage systems. Measurement of irrigation water.

2nd semester

FLA 551 BREEDING OF FLOWER CROPS AND ORNAMENTAL PLANTS 1+1

Objective

To impart comprehensive knowledge about the principles and practices of breeding of flower crops and ornamental plants.

Theory

UNIT I

Principles -- Evolution of varieties, origin, distribution, genetic resources genetic divergence- Patents and Plant Variety Protection in India.

UNIT II

Genetic inheritance -- of flower colour, doubleness, flower size, fragrance, post harvest life.

UNIT III

Breeding methods suitable for sexually and asexually propagated flower crops and ornamental plants-- introduction, selection, domestication, polyploid and mutation breeding for varietal development, Role of heterosis, Production of hybrids, Male sterility, incompatibility problems, and seed production of flower crops in relation to marigold, tuberose, carnation, gladiolus, and chrysanthemum.

UNIT IV

Breeding constraints and achievements made in commercial flowers rose, jasmine, marigold, chrysanthemum, tuberose and ornamental plants – petunia, hibiscus, bougainvillea, Flowering annuals (zinnia, dianthus, snap dragon) and few ornamental foliage plants.

Practical

Description of botanical features-- Cataloguing of cultivars, varieties and species in flowers, floral biology, selfing and crossing, evaluation of hybrid progenies, seed production-Induction of mutants through physical and chemical mutagens, induction of polyploidy, screening of plants for biotic, abiotic stresses and environmental pollution, *in vitro* breeding in flower crops and ornamental plants.

FLA 552 PRODUCTION TECHNOLOGY OF CUT FLOWERS 2+1

Objective

To impart basic knowledge about the importance and production technology of cut flowers grown in

India.

Theory

UNIT I

Scope of cut flowers in global trade, Global Scenario of cut flower production, Varietal wealth and diversity, area under cut flowers and production problems in India. Patent rights.

UNIT II

Growing conditions- open cultivation & protected cultivation. Crop specific requirements --Growing media, propagation and planting methods, influence of environmental parameters-light, temperature, moisture, humidity and CO₂ on growth and flowering.

UNIT III

Flower production – water and nutrient management, weed management, rationing, training and pruning, disbudding, special horticultural practices, use of growth regulators, physiological disorders and remedies, plant protection measures, production for exhibition purposes.

UNIT IV

Flower forcing and year round flowering through physiological interventions, chemical regulation, environmental manipulation.

UNIT V

Harvest indices, harvesting techniques, cut flower standards and grades. Post-harvest handling-methods of delaying flower opening, pre-cooling, pulsing, packing. Storage & transportation, marketing, export potential, institutional support, Agri Export Zones.

Crops: Cut rose, cut chrysanthemum, carnation, gerbera, gladioli, tuberose, orchids, anthurium, aster, liliun, alstroemeria, bird of paradise, heliconia, alpinia, ornamental ginger, bromeliads, dahlia, gypsophilla, limonium, statice, stock, cut foliage and fillers.

Practical

Botanical description of varieties, propagation techniques, mist chamber operation, training and pruning techniques, practices in manuring, drip and fertigation, foliar nutrition, growth regulator application, pinching, disbudding, staking, harvesting techniques, post-harvest handling, cold chain, project preparation for regionally important cut flowers, visit to commercial cut flower units and case study.

FLA 553 LANDSCAPING AND ORNAMENTAL GARDENING 2+2

Objective

Familiarization with principles and practices of landscaping and ornamental gardening.

Theory

UNIT I

Prospect of landscaping, history of landscape gardening. Principles of landscaping Landscape designs, types of gardens, English, Mughal, Japanese, Persian, Spanish, Italian, Vanams, Buddha garden; Styles of garden, formal, informal and free style gardens. Colour wheel.

UNIT II

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

UNIT III

Garden plant components- lawn, arches and pergolas, edges and hedges, arboretum, shrubbery, fernery, palmatum, , climbers and creepers, cacti and succulents, herbs, annuals, flower borders and beds, ground covers, carpetbeds, bamboo groves. Non-plant components.

UNIT IV

Special types of gardens-vertical garden, roof garden, bog garden, sunken garden, rock garden, clock garden, temple garden, sacred groves.

UNIT V

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

Practical

Turf grasses - Types, species, varieties, hybrids; Selection of grasses for different locations; Grouping according to climatic requirement- Adaptation; Turfing for roof gardens.

UNIT III

Preparatory operations; Growing media used for turf grasses – Turf establishment methods, seeding, sprigging/dibbling, plugging, sodding/turfing, turf plastering, hydro-seeding, astro-turfing.

UNIT IV

Turf management – Irrigation, nutrition, special practices, aerating, rolling, soil top dressing, use of turf growth regulators (TGRs) and micronutrients, Turf mowing -- mowing equipments, techniques to minimize wear and compaction, weed control, biotic and abiotic stress management in turfs.

UNIT V

Establishment and maintenance of turfs for playgrounds, viz. golf, football, hockey, cricket, tennis, etc.

Practical

Identification of turf grasses, Preparatory operations in turf making, Practices in turf establishment, Layout of macro and micro irrigation systems, Water and nutrient management; Special practices – mowing, raking, rolling, soil top dressing, weed management; Biotic and abiotic stress management; Project preparation for turf establishment, visit to IT parks, model cricket and golf grounds, airports, corporates, Govt. organizations; Renovation of lawns; Turf economics.

FLA 602 PRODUCTION TECHNOLOGY FOR LOOSE FLOWERS 2+1

Objective

To impart basic knowledge about the importance and management of loose flowers grown in India.

Theory

UNIT I

Scope of loose flower trade, Significance in the domestic market/export, Varietal wealth and diversity.

UNIT II

Soil and climate requirements, field preparation, propagation, systems of planting, precision farming techniques.

UNIT III

Cultural practices-Water and nutrient management, weed management, rationing, training and pruning, pinching and disbudding, special horticultural practices, use of growth regulators, physiological disorders and remedies, plant protection.

UNIT IV

Flower forcing production for special occasions through physiological interventions, chemical regulation.

UNIT V

Harvest indices, harvesting techniques, post-harvest handling and grading, pre-cooling, packing and storage, transportation and marketing, export potential, institutional support, Agri Export Zones.

Crops: Jasmine, scented rose, chrysanthemum, marigold, tuberose, crossandra, nerium, hibiscus, barleria, celosia, gomphrena, non-traditional flowers (Nyctanthes, Tabernaemontana, lotus, lilies, champaka, pandanus).

Practical

Botanical description of species and varieties, propagation techniques, mist chamber operation, training and pruning techniques, practices in manuring, drip and fertigation, foliar nutrition, growth regulator application, pinching, disbudding, staking, harvesting techniques, post-harvest handling, storage and cold chain, project preparation for regionally important commercial loose flowers, visits to fields, essential oil extraction units and markets.

FLA 649 SEMINAR-I

1+0

4th semester

FLA 651

VALUE ADDITION IN FLOWERS

2+1

Objective

To develop understanding of the scope and ways of value addition in flowers.

Theory

UNIT I

Prospects of value addition, National and global scenario, production and exports, Women empowerment through value added products making, supply chain management.

UNIT II

Types of value added products. Value addition in loose flowers, garlands, veni, floats, floral decorations, value addition in cut flowers, flower arrangement, styles, Ikebana, morebana, free style, bouquets, button-holes, flower baskets, corsages, floral wreaths, garlands, etc.; Selection of containers and accessories for floral products and decorations.

UNIT III

Dry flowers– Identification and selection of flowers and plant parts; Raw material procurement, preservation and storage; Techniques in dry flower making – Drying, bleaching, dyeing, embedding, pressing; Accessories;

Designing and arrangement – dry flower baskets, bouquets, pot-pourri, wall hangings, button holes, greeting cards, wreaths; Packing and storage.

UNIT IV

Floral oil industry, recent advances. Extraction methods, Concrete and essential oils; Selection of species and varieties (including non-conventional species), extraction methods, Packing and storage, Selection of species and varieties, Types of pigments, carotenoids, anthocyanin, chlorophyll, betalains; Significance of natural pigments, Extraction methods; Applications.

Practical

Practices in preparation of bouquets, button-holes, flower baskets, corsages, floral wreaths, garlands with fresh flowers; Techniques in flower arrangement; Techniques in floral decoration; Identification of plants for dry flower making; Practices in dry flower making; Preparation of dry flower baskets, bouquets, pot-pourri, wall hangings, button holes, greeting cards, wreaths, etc.; Visit to dry flower units, concrete and essential oil extraction units.

FLA-699

SEMINAR II

1+0

FLA 700

MASTER'S RESEARCH

0+20