

AGRON-: HORTICULTURE

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UNITS	CONTENTS	CONTACT HRS.
I	<p>Scope and importance, classification of horticultural crops and nutritive value, area and production, exports and imports, fruit and vegetable zones of India and of different states, nursery techniques and their management, soil and climate, vegetable gardens, nutrition and kitchen garden and other types of gardens – principles, planning and layout, management of orchards, planting systems and planting densities. Production and practices for fruit, vegetable and floriculture crops. Principles objectives, types and methods of pruning and training of fruit crops, types and use of growth regulators in horticulture, water management–irrigation methods, merits and demerits, weed management, fertility management in horticultural crops- manures and fertilizers, different methods of application, cropping systems, intercropping, multi-tier cropping, mulching– objectives, types merits and demerits, Classification of bearing habits of fruit trees, factors influencing the fruitfulness and unfruitfulness. Rejuvenation of old orchards, top working, frame working, principles of organic farming, market chain management.</p>	
II	<p>Propagation: Need and potentialities for plant multiplication, sexual and asexual methods of propagation, advantages and disadvantages. Seed dormancy types of dormancy (scarification & stratification) internal and external factors, nursery techniques nursery management, apomixes – mono-embryony, polyembryony, chimera& bud sport. Propagation Structures: Mist chamber, humidifiers, greenhouses, glasshouses, cold frames, hot beds, poly-houses, phytotrons nursery (tools and implements), use of growth regulators in seed, types and stages of seed germination with examples and vegetative propagation, methods and techniques of division-stolons, pseudobulbs, offsets, runners, cutting, layering, grafting, formation of graft union, factor affecting, healing of graftage and budding physiological & bio chemical basis of rooting, factors influencing rooting of cuttings and layering, graft incompatibility. Anatomical studies of bud union, selection and maintenance of mother trees, collection of scion wood stick, scion-stock relationship, and their influences, bud wood certification, techniques of propagation through specialized organs, corm, runners, suckers. Micrografting, meristem culture, callus culture, anther culture, organogenesis, somaclonal variation hardening of plants in nurseries. Nursery registration act. Insect/pest/disease control in nursery, Cost of establishment of propagation structures.</p>	
III	Horticultural classification of fruits including genome classification.	

	<p>Horticultural zones of India, detailed study of area, production and export potential, varieties, climate and soil requirements, propagation techniques, planting density and systems, after care, training and pruning. Management of water, nutrient and weeds, special horticultural techniques including plant growth regulators, their solution preparation and use in commercial orchards. Physiological disorders. Post-harvest technology, harvest indices, harvesting methods, grading, packaging and storage of the following crops. Mango, banana, grapes, citrus, papaya, sapota, guava, pomegranate, bael, ber, amla, anona, fig, pineapple, jackfruit, avocado, mangosteen, litchi, carambola, durian, rambutan, bilimbi, loquat, rose apple breadfruit and passion fruit. Bearing in mango and citrus, causes and control measures of special production problems, alternate and irregular bearing overcome, control measures. Seediness and kokkan disease in banana, citrus decline and casual factors and their management. Bud forecasting in grapes, sex expression and seed production in papaya, latex extraction and crude papain production, economic of production.</p>	
IV	<p>Classification of temperate fruits, detailed study of areas, production, varieties, climate and soil requirements, propagation, planting density, cropping systems, after care training and pruning, self-incompatibility and pollinisers, use of growth regulators, nutrient and weed management, harvesting, post-harvest handling and storage of apple, pear, peach, apricot, plum, cherry, persimmon, strawberry, kiwi, Queens land nut (Mecademia nut), almond, walnut, pecan nut, hazel nut and chest nut. Re-plant problem, rejuvenation and special production problems like premature leaf fall, physiological disorders, important insect – pests and diseases and their control measures. Special production problems like alternate bearing problem and their remedies.</p>	
V	<p>Orchard & estate management, importance, objectives, merits and demerits, clean cultivation, sod culture, Sod mulch, herbicides and inorganic and organic mulches. Tropical, sub-tropical and temperate horticultural systems, competitive and complimentary effect of root and shoot systems. Biological efficiency of cropping systems in horticulture, systems of irrigation. Soil management in relation to nutrient and water uptake and their effect on soil environment, moisture, organisms and soil properties. Factors influencing the fruitfulness and unfruitfulness. Rejuvenation of old orchards, top working, frame working, Integrated nutrient and pest management. Utilization of resources constraints in existing systems. Crop model and crop regulation in relation to cropping systems. Climate aberrations and mitigation measures of Horticultural crops.</p>	
VI	<p>Weeds: Introduction, harmful and beneficial effects, classification, propagation and dissemination; Weed biology and ecology, crop weed association, crop weed competition and allelopathy Concepts of weed prevention, control and eradication; Methods of weed control: physical, cultural, chemical and biological methods. Integrated weed management; Herbicides: advantages and limitation of herbicide usage in India, Herbicide classification, formulations, methods of application; Introduction to Adjuvants and their use in herbicides; Introduction to selectivity of</p>	

	herbicides; Compatibility of herbicides with other agro chemicals; Weed management in major field and horticultural crops, shift of weed flora in cropping systems, aquatic and problematic weeds and their control.	
VII	Fruit breeding - History, importance in fruit production, distribution, domestication and adaptation of commercially important fruits, variability for economic traits, breeding strategies, clonal selection, bud mutations, mutagenesis and its application in crop improvement – policy manipulations – <i>in vitro</i> breeding tools (important fruit and plantation crops).	
VIII	Present status and prospects of vegetable cultivation; nutritional and medicinal values; climate and soil as critical factors in vegetable production; choice of varieties; nursery management; modern concepts in water and weed management; physiological basis of growth, yield and quality as influenced by chemicals and growth regulators; role of organic manures, inorganic fertilizers, micronutrients and biofertilizers; response of genotypes to low and high nutrient management, nutritional deficiencies, disorders and correction methods; different cropping systems; mulching; containerized culture for year round vegetable production; low cost polyhouse; net house production; crop modeling, organic gardening; vegetable production for pigments, export and processing of Tomato, Brinjal, Chilli, Sweet pepper and Potato, Cucurbits, Cabbage, Cauliflower and knol-khol, Bhendi, Onion, Peas and Beans, Amaranthus and Drumstick, Carrot, Beet root and Radish, Sweet potato, Tapioca, Elephant foot yam and taro	
IX	Evolution, distribution, cytogenetics, genetic resources, genetic divergence, types of pollination and fertilization mechanisms, sterility and incompatibility, anthesis and pollination, hybridization, intervarietal, interspecific and inter-generic hybridization, heterosis breeding, inheritance pattern of traits, qualitative and quantitative, plant type concept and selection indices, genetics of spontaneous and induced mutations, problems and achievements of mutation breeding, ploidy breeding and its achievements, in vitro breeding; breeding techniques for improving quality and processing characters; breeding for stresses, mechanism and genetics of resistance, breeding for salt, drought; low and high temperature; toxicity and water logging resistance, breeding for pest, disease, nematode and multiple resistance of Tomato, Brinjal, Chilli, Sweet pepper and Potato, Cucurbits, Cabbage, Cauliflower and knol-khol, Bhendi, Onion, Peas and Beans, Amaranthus and Drumstick, Carrot, Beet root and Radish, Sweet potato, Tapioca, Elephant foot yam and taro	
X	Commercial flower production; Scope and importance; Global Scenario in cut flower production and trade, varietal wealth and diversity; Soil and Environment; Special characteristics and requirements; cut flower, loose flowers, dry flowers and floral oil trade. Propagation and multiplication; IPR issues related to propagation of materials; Greenhouse management; Soil/media decontamination techniques; Micro-irrigation; nutrition and fertigation; slow release fertilizers and bio-fertilizers; influence of environmental parameters, light, temperature, moisture, humidity and CO ₂ on growth and flowering; regulation for quality	

	flowers. Flower forcing and year-round flowering through physiological interventions; Chemical regulation; Environmental manipulation; Harvest indices; Harvesting techniques; Post-harvest handling; Pre-cooling, pulsing, packing, marketing; Export potential; Agri Export Zones. Crop specific production practices – Rose, Anthurium, Orchids, Carnation, Gladioli, Gerbera, Liliams, Heliconia, Bird of Paradise, Jasmine, Marigold, Tuberose, Crossandra, China aster, Chrysanthemum, Lotus, Tulip and Dahlia. Floral oil industry, floral concrete production, extraction methods, recent advances	
XI	Commercial landscape gardening- History, Plant identification and ecology, Materials of garden design, Design making by different garden styles and types. Expenses to model landscaping units of all category, Creativity and communication skills for landscape architect, Way of designing a commercial landscape project. Assessing site and plants adaptability for different locations, Landscape engineering (Topographical survey and designing concept), special techniques in garden landscaping (Burlaping, water-scaping, hard-scaping, lawn making, topiary styles specializing, bio-aesthetic planning). Preparation and drawing of site plan, Learning the basics in computer aided design (CAD) for developing a garden landscape plan, Handling soft landscape materials (AUTOCAD & ARCHICAD), GIS as a tool for spatial designing. Contemporary landscaping, Environmental landscaping, Industrial and institutional landscaping, Public and private garden making, play ground landscaping, Case study with the successful landscapist, Budget / Project cost estimating, Execution strategies, Assessing a successful design in site.	
XII	Origin and evolution of varieties, distribution, Genetic resources, genetic divergence, Plant introduction, selection and domestication, Inheritance of important characters, Genetic mechanisms associated with flower colour and flower size, doubleness, fragrance and post-harvest life, Plant Variety Protection Act. Specific objectives of breeding in flower crops, Methods of breeding suited to seed and vegetatively propagated flower crops, Introduction, selection, polyploidy and mutation breeding in the evolution of new varieties, Exploitation of heterosis, utilization of male sterility, self incompatibility problems and <i>in vitro</i> breeding. Breeding for resistance to pests, diseases, nematodes and other biotic and abiotic stresses in flower crops. Specific breeding problems and achievements made in rose, jasmine, chrysanthemum, marigold, tuberose, crossandra, arnati on, gerbera, gladioli, orchids and anthurium. Specific breeding problems and achievements made in China aster, petunia, liliams, heliconia, bird of paradise, hibiscus and bougainvillea.	
XIII	Sampling: Concept of population and sample; random samples; methods of taking a simple random sample. Tests of significance: Sampling distribution of mean and standard error; z and t-test (equality of means; paired and unpaired t-test); t-test for comparison of means when variances of two populations differ; Chi- square test for goodness of fit; independence of attributes, and homogeneity of samples; interrelation between t-test and F-Test Experimental Designs: Principles of experimental designs; completely	

	randomized, randomized complete block design (missing plot value in RBD); latin square designs; augmented block design; simple factorial experiments (mathematical derivations not required); analysis of variance (ANOVA) and its use including estimation of LSD (CD)	
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