

Syllabus for Assistant Professor, Horticulture Technology

FLORICULTURE AND LAND SCAPING

Unit 1: Production Technology of Flowers

Introduction to Flowers production ; Scope and significance in global trade, Global cut flower production and varietal diversity, IPR issues affecting trade, Commercial Greenhouse production of Major cut-flowers, filler and foliage crops.

Commercial cultivation of major flower crops in open environment. Growing environment requirements: Types of greenhouse. Environment control management: temperature, light, humidity, air, CO₂. Containers, substrates, and nutrient and weed management in protected cultivation, fertigation, soil requirements and artificial growing media, Special horticulture techniques like use of growth regulators, forcing and year round flowering and targeting for specific markets.

Pests and disease management and physiological disorders; Post harvest requirements of crops including quality standards, harvest indices packaging, storage and transport Economics of production of major flower crops, Marketing strategies, branding, value addition, export requirements etc.

Unit 2: Value addition in Floriculture

Production and export opportunities in value-added floral products, Supply chain management in the value addition process; Dried flowers, Raw material procurement, preservation, and storage, Techniques in dry flower making, Value addition of loose and cut flowers: flower arrangement styles, containers and accessories. Value chain in natural pigments and essential oils, Packing and storage, marketing and considerations for concrete and essential oils.

Unit 3: Landscape Design

Principles & Elements of Design, Formal and informal garden styles, Plantscape and hardscape components of landscape design , Major garden design types Landscaping for specific situations: institutions, industries, residents, hospitals, roadsides, traffic islands, dam sites, IT parks, corporates. Vertical garden, roof garden, bog garden, sunk garden, rock garden, Clock garden, colour wheels, temple garden. Bio-aesthetic planning, Eco-tourism and its relationship with landscaping, Theme parks waterscaping, xeriscaping, hardscaping

FRUIT SCIENCE

Unit-1: Introduction

Importance and scope of fruits and plantation crops, classification of fruits, soil and climatic requirements. General Concepts, national and international scenario of fruit production. National problems of fruit crops. Economic importance.

Unit 2: Propagation and Rootstocks

Recent trends in fruit propagation methods, Influence of rootstocks on fruit production of temperate, subtropical, tropical fruit crops and plantation crops. Nursery management practices and regulations. Use of protected structures.

Unit 3: Planting and Orchard Management

Planting systems and their impact on fruit crops, High density plantations systems in fruit crops, Cropping systems for efficient fruit production; Root Zone and Canopy Management, Factors

affecting Canopy Management-Techniques to manipulate the canopy for efficient light interception, utilization and distribution; Spacing considerations for efficient land area utilization in canopy management; Classification of canopies based on growth habit and characteristics, canopy development and management in relation to growth, flowering, fruiting, and fruit quality. Integrated and modern approaches in water and nutrient management.

Unit 4: Specific Fruit Crops and their Cultivation

Cultivation practices for specific fruit crops: mango, banana, citrus, papaya, guava, sapota, jackfruit, pineapple, annonas, avocado, aonla, pomegranate, ber, apple, pear, quince, grapes, plums, peach, apricot, cherries, litchi, loquat, persimmon, kiwifruit, strawberry; Cultivation of nuts: walnut, almond, pistachio, pecan, hazelnut Minor fruits: mangosteen, carambola, bael, wood apple, fig, jamun, rambutan, pomegranate in relation to importance and Background: Origin, distribution and importance, major species, rootstocks and commercial varieties of regional, national and international importance, eco-physiological requirements. Propagation, Planting and Orchard Floor Management: Propagation, planting systems and densities, training and pruning, rejuvenation and replanting, intercropping, nutrient management, water management, fertigation, use of bio-fertilizers, role of bio-regulators, abiotic factors limiting fruit production. Flowering, Fruit-Set and Harvesting: Physiology of flowering, pollination management, fruit set and development, physiological disorders- causes and remedies, crop regulation, quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; insect and disease management.

UNIT-5: Modern Trends in Fruit Production

Crop modeling, precision farming, decision support system, crop regulation, export oriented and organic fruit production. Artificial intelligence in fruit production. Influence of stress factors on physiology and development of fruit crops. Strategies to overcome the stress effects. Innovative approaches in Fruit Breeding-Modern trends, inheritance patterns and breeding systems; variations and natural selections, spontaneous mutations, incompatibility systems in fruits, breeding for specific traits (plant architecture, stress tolerance, quality improvement), fast-track breeding (molecular and transgenic approaches, marker assisted selection and breeding) in important fruit crops.

VEGETABLE SCIENCE

UNIT-1: Introduction and production technologies

Importance & scope of vegetables. Vegetable Production under Climate Change. Area and production of vegetable crops in India, climatic and soil requirements, commercial varieties / hybrids, sowing / planting times and nursery raising, 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 techniques in vegetable crops. Off-season vegetable production.

UNIT-2: Vegetable Breeding

Origin, classification, cytogenetics, floral biology and breeding behaviour of different vegetables; methodology for the improvement of different self-and cross-pollinated vegetable crops including breeding for disease and insect resistance; Role of molecular markers in the evolution and characterization of vegetable crops. Breeding for abiotic stress tolerance. Transgenic vegetable breeding.

UNIT-3: Phytohormones

Introduction to phyto-hormones; Physiology and mode of action. Role of auxins, gibberellins, cytokinin's and abscisic acid; Application of synthetic hormones, plant growth retardants and inhibitors for various purposes in vegetable crops.

UNIT-4: Production Technology of Under-utilized Vegetables

Production technology, breeding, post-harvest management and plant protection measures of underutilized vegetable crops (Colocasia, Elephant foot yam, lima bean, Sweet gourd, spine gourd, pointed gourd and kale).

UNIT-5: Organic Vegetable Production

Organic farming in vegetable production. Importance, status, principles, perspective, concept and component of organic production of vegetable crops. Methods for enhancing soil fertility, mulching, raising green manure crops. Indigenous methods of compost, Panchagavya, Bio-dynamics, preparation and their application.

UNIT-6: Recent Trends in Vegetable Production

Precision Farming and Artificial Intelligence in vegetable production, Next generation phenotyping techniques in vegetable crop improvement. Vegetable Cropping systems, micro-greens for food and nutritional security. Protected cultivation in vegetables.

SPICES, PLANTATION, MEDICINAL & AROMATIC PLANTS (10 Questions)

Role of plantation crops in the national economy, Export potential of plantation crops, Intellectual Property Rights (IPR) issues related to plantation crops, Clean Development Mechanism (CDM) and its relevance to plantation crops, Classification and varietal wealth of plantation crops, Plant multiplication techniques, including in vitro multiplication, Systems of cultivation for plantation crops, Multitier cropping and its benefits, Precision farming techniques for plantation crops; Specific plantation crops and their cultivation: Coffee and tea, Cashew and cocoa, Rubber, palmyrah, and oil palm, Coconut and arecanut, Wattle and betel vine; Climatic and soil requirements for spice cultivation; Commercial varieties and hybrids of spice crops, Site selection and layout planning for spice cultivation, Physiological disorders in spice crops; Harvesting methods for spice crops, Post-harvest management of spice crops, Plant protection measures for spice crops, Seed planting material and micro-propagation techniques; Protected cultivation techniques for spice crops; Specific spice crops and their cultivation: Black pepper, Cardamom, Clove, Cinnamon and nutmeg, Allspice, Turmeric, Ginger and garlic, Coriander, fenugreek, cumin, fennel, ajwain, dill, celery, Tamarind, Garcinia,

POST HARVEST TECHNOLOGY)

Maturity Indices and Harvesting Practices; Respiration and transpiration processes in fruits and their implications; Understanding the physiological and biochemical processes involved in fruit ripening; Role of ethylene in fruit ripening and strategies for ethylene management; Factors contributing to post-harvest losses in fruits and their prevention; Pre-cooling techniques and treatments to maintain fruit quality prior to shipment. Post-harvest Treatments; Different storage methods; Common physical injuries; Packing methods and transportation; Fruit Preservation and Processing; Dried and Dehydrated Fruit Products, Nutritionally Enriched Fruit Products and Fermented Beverages, Branding, Packaging, Food Safety Standards.