

**HORTICULTURE**  
**(DIPLOMA STANDARD)**

**SUBJECT CODE: 277**

**UNIT- I: BASIC HORTICULTURE AND PLANT PROPAGATION**

Horticulture – Definition, scope and importance, Division and classification of horticultural crops – Horticultural zones in India and Tamil Nadu – Cropping systems - Planting methods – Irrigation systems – Nutrient application methods in horticultural crops – Weed management - Training – Pruning, ringing, notching, disbudding and pinching – Crop regulation – Physical and chemical regulation - Special practices – Maturity indices – Harvesting methods, pre-cooling – Packaging - Storage of horticultural crops - Protected cultivation.

Propagation - Tools and implements - Media – Containers - Propagation - Preparation of nursery beds - Seed treatment - Sowing - Plug transplants / seedling production - Potting, depotting and repotting of plants - Methods of asexual propagation through cuttings, layering, grafting and budding - Types of cuttings - Types of layering - Potting of layers and hardening – Raising of rootstocks - Grafting methods - Separation of grafts - Potting and maintenance of grafted plants plant propagating structures - Mist chamber - Shade net – Uses - Hardening and maintenance - Application of growth regulators - Growth regulators for seed and vegetative propagation - Budding methods - Maintenance of budded plants - Nutrition and plant protection.

**UNIT- II: SOIL AND FERTILITY, IRRIGATION AND WEED MANAGEMENT**

Soil – Definition – Components – Physical properties of soil – Colour, Texture, structure, Bulk density, Particle density, Pore space; soil water, soil air, soil temperature and their significance in crop production. Soil chemical properties – Soil reaction, EC and CEC. Soil Organic Matter and its importance on soil properties – Essential nutrients for crop plants - Major, secondary and micro nutrients – Manures and fertilizers – Types – Straight, Complex, Compound, Mixed, Fortified and chelated fertilizers and their reactions in soil - Techniques to enhance fertilizer use efficiently.

Soil fertility – INM and IPNS – Problem soils – Acid, saline and alkaline soils - Their formation, reclamation and management.

Irrigation – Sources of water for irrigation – Water movement, soil–plant and atmosphere soil moisture constants – Available soil moisture - Effect of water stress on crop yield – Water use efficiency – Water requirement of major crops – Critical stages of water requirement – Irrigation scheduling – Types and advantages – Irrigation methods – Irrigation water use efficiency – Management of poor quality irrigation water. Weeds – definition and importance of weed control in crop production – Classification of weeds – Methods of weed control – Manual, mechanical, cultural, chemical and biological methods - Relative merits and demerits – Herbicide classification based on method of application – Weed control practices for major horticultural crops – Parasitic, problematic, aquatic and waste land weed management - Integrated weed management – Concepts and practices.

### **UNIT- III: PRODUCTION TECHNOLOGY OF FRUITS AND VEGETABLES**

Scope and importance of fruit cultivation – Area and production of fruit crops in Tamil Nadu – Selection and layout of orchard - Physical features in orchard - Study of cultural practices of Tropical fruits – Mango, Banana, Grapes, Papaya, Sapota, Guava, Jackfruit - Sub-tropical and temperate fruits – Pineapple, Avocado, Apple, Pear, with reference to soil, climate, varieties / hybrids methods of propagation, nutrient, irrigation and weed management practices – Training and pruning – Growth regulators – Maturity standards for harvesting – Post-harvest handling of fruit crops – Yield – Grading – packing – Storage and value added products. - Organic fruit production and Good Agricultural Practices.

Dry land horticulture – Importance, scope and distribution of arid and semi arid zones in India and Tamil Nadu. Crops suitable for dry land production – Important varieties, climate and soil requirements, commercial propagation methods - Spacing and planting systems - Cropping systems and intercropping – Mulching - Soil and moisture conservation methods – Anti-transpirants – Management of nutrients, water, weeds and

problem soils – Regulation of cropping – Training and pruning - Top working and rejuvenation – Use of plant growth regulators – Post-harvest handling.

Scope and importance of vegetable cultivation – Area and production in Tamil Nadu – Systems of vegetable cultivation – Kitchen garden – Truck garden and market garden – Gardening for processing. Climate – Soil requirement – Varieties / hybrids – Seed rate – Sowing nursery practices – Protray nursery – Transplanting – Manuring – Irrigation – Fertigation - Nutrient deficiency and their corrective measures - Weeding –chemical – Mechanical weed control – Use of growth regulators - Special horticultural practices (training, staking, pruning) – Physiological disorders and corrective measures – Maturity indices - Harvesting – Grading, sorting – Packing and storage and yield for important vegetable crop; Tomato, Brinjal, Chillies, Bhendi, Onion, Gourds – Bitter gourd – Ridge gourd – Snake gourd - Pumpkin - Water melon – Musk melon - Ash gourd -Tapioca – Yams – Colocasia - Cabbage – Cauliflower, Radish – Carrot Beet root, Amaranthus – Moringa – Potato – Cluster beans – Lab lab - Peas and Beans.

#### **UNIT -IV: PRODUCTION TECHNOLOGY OF FLOWER CROPS AND LANDSCAPING**

Scope and importance of commercial flower crops – Area and production - Study of cultural practices of commercial loose flowers – Rose, Jasmine, Tuberose, Chrysanthemum, Marigold, Crossandra, Celosia, Nerium and Gomphrena. Floral concrete, pigment and dye extraction from loose flowers - Introduction to protected structures for cut flower production — Study of cut flower production techniques of Rose, Carnation, Gerbera, Chrysanthemum, Orchids, Anthurium, Gladiolus, Liliun, Alstroemeria and Heliconia. Post-harvest management of cut flowers – Floral decorations, bouquets and dry flowers – Grading, packing and marketing of flowers.

Scope and importance of ornamental gardening and landscaping – Principles – Styles of garden - Formal and informal garden – Features of garden - Garden components and adornments – Plant Components – Edges, hedges, flower beds, trophy, topiary, mixed borders – Non-plant components - Garden walls, fencing, steps, garden drives and paths, pavements, fountains, arches, pergolas, trellises, pools, etc. - operations in

maintenance of trees, annuals, shrubs, climbers, creepers, herbaceous perennials, ferns, cacti and succulents, palms and cycads – Sunken garden, roof garden, rockeries.

Operations in planting and maintenance of public garden, institutional garden, Industrial garden, residential complex garden - Operations in landscape maintenance for high ways, bus terminus, airports, city roads and IT parks - Lawn – Types of lawn grasses – Criteria for selection- methods of lawn establishment - Operation and maintenance – Problems and remedial management – Flower arrangements and dry flowers – Suitable plant selection and methods of arrangement.

#### **UNIT-V: PRODUCTION TECHNOLOGY OF SPICES, PLANTATION CROPS, MEDICINAL AND AROMATIC CROPS**

Scope and importance of spices - Area and production and productivity in Tamil Nadu – Study of cultural practices for the important spice crops Pepper, Cardamom, Turmeric, Ginger, Clove, Nutmeg, Cinnamon, Tamarind, Allspice, Curry leaf, Coriander, Fenugreek, Fennel, Cumin and Paprika with reference to soil, climate, varieties, propagation, planting – Irrigation – Nutrition and weed management - Cultural practices - Training and pruning – Harvesting - Yield – Post-harvest handling: Processing – grading and packing – Organic farming and GAP in spice production.

Scope and importance of plantation crops - Area - Production and productivity in Tamil Nadu – Study of cultural operations for the plantation crops Tea, Coffee, Rubber, Cocoa, Cashew, Coconut, Arecanut, Oil palm and Palmyrah with reference to soil, climate, varieties, propagation, cultural practices - Training and pruning – Harvesting - Yield – Processing – Grading and packing.

Medicinal and aromatic plants - Scope and importance - Medicinal plant wealth of India and Tamil Nadu - Area and production - Classification - Annual, biennial and herbaceous perennial - Medicinal and aromatic plants for tropical, sub-tropical and temperate region - Contract farming and Good Agricultural Practices - Soil and climatic - conditions, propagation and planting, irrigation, manuring, weed control, economic parts, harvesting, yield, post-harvest handling, curing and processing practices, storage

methods of medicinal plants: Glory lily, Medicinal Coleus, Senna, Periwinkle, Gymnema, Ashwagandha, Phyllanthus, Kalmegh, *Aloe vera* and Stevia - Aromatic plants: Japanesemint, Rosemary, Lemon grass, Citronella, Palmarosa, Vetiver, Geranium, Patchouli, Sacred and sweet basil.

## **UNIT- VI: INSECT PEST AND DISEASES OF HORTICULTURAL CROPS AND THEIR MANAGEMENT**

Pest - Categories – Causes for pest for outbreak. Pest management - Principles and components. Natural enemies in pest suppression. IPM – Management strategies for important insect pests groups – Chewing insects - Stem borers – Fruit borer – Sap feeders of important fruit, vegetable, spices, medicinal and plantation crops- Special pest management strategies in ware house, green house, poly house. Management techniques for plant parasitic nematodes.

Etiology, symptoms and integrated management of important diseases due to fungi, bacteria, viruses, phytoplasma, phanerogamic parasites of Fruits: Mango, Banana, Citrus, Grapes, Guava, Sapota, Pomegranate, Papaya, Jack, Pineapple, Ber, Apple, Pear, Plum Vegetables: Brinjal, Tomato, Bhendi, chilies Cucurbits, Crucifers, Beans, Peas, Potato, Sweet potato, Radish and Cassava. Mushroom: Cultivation techniques of and *Pleurotus*, *Agaricus*, *Calocybe* and *Volvariella* Spices and condiments: Onion, Garlic, Chillies, Cardamom, Pepper, Turmeric, Ginger, Betelvine, Coriander, Fenugreek, Clove and Nutmeg Plantation crops: Tea, Coffee, Cocoa, Rubber, Ccoconut Arecanut and Cashew Flowers : Jasmine, Rose, Crossandra, Chrysanthemum, Tube rose, Carnation, Medicinal plants: Gloriosa, Stevia, Senna, Coleus, *Aloe vera*, *Solanum nigrum* and *Withania*.

## **UNIT-VII: POST HARVEST HANDLING AND VALUE ADDITION OF HORTICULTURAL CROPS**

Scope and importance of post harvest technology in horticultural crops - Washing, grading, sorting - pre cooling and pre treatments - Blanching & peeling methods – Post-harvest handling methods: Dehydration, Canning of fruits and vegetables - Thermal

processing - Low temperature processing - Cold storage - Controlled and atmospheric storage - Refrigeration truck, ripening chamber, packaging for horticultural crops - Value addition in horticultural crops : Definition - Need for value addition. General principles and method for value added products - Processing of value added products: Processing of fruits - Jam, Jelly, Squash, RTS and Candy. Processing of vegetables - Pickle, chutney, sauce and ketchup. Processing of spices - Spice powders and masala mix - Food safety standards: Principles National - Agmark, BIS, FSSAI, HACCP International - Codex, ISO.

### **UNIT - VIII: LIVESTOCK MANAGEMENT AND POULTRY PRODUCTION**

Significance of Livestock and Poultry in Indian economy- Various systems of livestock production - Livestock and Poultry census and its role on national Gross Domestic Product - Special and common nomenclatures used in Animal Husbandry practices – Breeds - Classification - White and Black cattle breeds - Breed characteristics of Sindhi, Kangayam, Umblacherry, Jersey, Holstein Friesian, Murrah and Surti - Signs of estrus cycle- Artificial Insemination - Housing management - Selection of site-space requirement - Calf and adult stock - Care and management of new born – heifer - Milch cattle and work bullocks - Clean milk production – Nutrition –Ration - Balanced ration - Desirable characteristics of ration - Classification of feeds and fodder - Concentrate and Roughage's - Composition and Requirement of ration for young and adult stock - Green fodder requirement and importance – Diseases – Classification – Viral - Foot and Mouth – Bacterial – Anthrax - Haemorrhagic septicemia - Black Quarters – Metabolic - Milk fever – Ketosis – Tympanites - Causative organism – Transmission – Symptoms - Control and Prevention - Farm Records - Record keeping - Insurance - Selection and culling of livestock.

Sheep and Goat farming - Classification of breeds - Exotic and indigenous – Nomenclature - Economic traits - Systems of rearing - Housing management - Care and management of young and adult stock – Nutrition - Common diseases - Sheep pox - Foot and Mouth - Blue Tongue – Enterotoxaemia - Ecto and endo parasites - Prevention and Control.

Poultry farming - Classification of breeds - Commercial strains of layer and broiler - Housing management - Brooding management - Deep litter - Cage system - Nutrition of Chick - Grower and Layer and Broiler – Diseases - Classification – Viral – Ranikhet - Infectious Bursal Disease – Bacterial - *E.coli-Coryza* - Salmonellosis – Protozoan – Coccidiosis - Causative organisms – Symptoms – Vaccination - Disease control and Prevention.

### **UNIT - IX: COMMERCIAL AGRICULTURE**

Hybrid Seed Production - Hybrids – Production of hybrid varieties – Development of inbreeds – Single cross evaluation – Prediction of double cross performance – Production of hybrid seed – Cytoplasmic, Genetic male sterility – Maintenance of Male sterile lines – Production of single cross hybrids – Production of double cross hybrid varieties - Manual emasculation and / or Pollination – Chemically induced male sterility – Merits and demerits of hybrid varieties – Floral biology, anthesis, pollination, selfing, emasculation and crossing technique in Rice, Sorghum, Pearl millet, Red gram, Castor, Sunflower, Cotton, Tomato, Bhendi - Harvesting – Physical and chemical indices – Extraction techniques – Seed processing – Use of cleaner, grader – Seed treatment – Seed packaging – Seed storage – Sanitation – Certification procedure.

Production of Bio-Control Agents - Introduction to bio-control agents – Importance – History and development - Classical examples of bio-control agents – Role in pest and disease management – Categories of bio-control agents. Setting up a bio-control laboratory. Mass culture of tobacco caterpillar (*Spodopteralitura*) and gram pod borer (*Helicoverpaarmigera*) - Synthetic diet – Mass production of SINPV and HaNPV. Mass production of *Trichogramma* spp., *Chrysoperla*, coccinellid predators, *Trichoderma viride*, *Pseudomonas fluorescens* and Entomo-pathogenic nematodes.

Production of Spawn and Mushroom – Mushroom - Introduction, importance - Present production and trade, scope for export, markets for mushroom and mushroom products – Mushroom morphology: Common edible mushrooms - *Pleurotus*, *Calocybe* – Poisonous mushrooms - Laboratory techniques: Equipments used, sterilization of

glassware, media preparation, pure culture techniques, sub-culturing and storage. Spawn: Types of spawn, mother spawn and bed spawn. Cultivation: Oyster mushroom, Milky mushroom – Problems in cultivation: Weed moulds, diseases, pests and abiotic disorders - Uses of mushroom : as food, nutraceutical and pharmaceutical values, composting coir-pith and other agro-wastes – Post-harvest technology: methods of preservation and value addition.

Organic Composting - Agricultural, Industrial and Urban wastes - Nutrient potential of different organic manures – Preparation of FYM Compost – Composting methods - Preparation of enriched FYM – Coirpith composting – Sugarcane trash – Pressmud - Farm wastes and farm weeds - Parthenium composting – Determination of maturity indices of composts – Commercial utility of organic manures – Visit to compost yard. Introduction to vermicompost – Types of Vermicompost - Materials for vermicomposting. Preliminary treatment of composting material – Small Scale vermicomposting – Large scale vermicomposting – Other types of vermicomposting – Requirements for vermicomposting – Bedding materials, container, pH, Moisture content, Temperature – Cover feed substrates - Selection of right type of worm species – Preparation of vermicompost beds – Collection of Vermicompost – Vermicompost efficiency – Transportation of live worms – Application of vermicompost .

## **UNIT - X: FARM MANAGEMENT, MARKETING AND EXTENSION EDUCATION**

Farm Management - Scope – Relationship with other sciences - Economic principles applied to the organization of farm business - Principles of variable proportions - Farm planning and Budgeting – Types and system of farming - Farm planning – Meaning - Need for farm planning -Types of Farm plans - Simple farm plan and whole farm plan - Characteristics of a good farm plan - Basic steps in farm planning - Farm budgeting – Meaning - Types of farm budgets – Enterprise budgeting - Partial budgeting and whole farm budgeting - Farm Risk Management - Distinction between risk and uncertainty - Sources of risk and uncertainty - Production and technical risks - Price risk - Financial risk - Methods of reducing risks - Horticultural Marketing – Nature and Scope - Concepts and definition of marketing - Scope of agricultural marketing -Classification of



markets - Structure, conduct – Performance - Market forces - Demand and supply - Characteristics of agricultural commodities - Marketing costs and marketing margins - Price spread. Marketed and marketable surplus - Marketing Functions and Institutions - Marketing functions – Packaging – Transportation - Grading and standardization – Warehousing – Processing - Cold storage - Marketing agencies and institutions - Cooperative marketing societies - Role of regulated markets – NAFED – TANFED – NHB - Commodity boards - Marketing of agricultural inputs - Market information and intelligence - AGMARKNET, DEMIC, DMI etc., - Usage of market information.

Agricultural Extension – Scope, principles - Teaching Learning Process. Communication – Meaning, definition, elements and their characteristics, types, models and barriers in communication. Diffusion – Elements - Adoption – Stages, adopter categories and their characteristics. Extension methods – Definition, classification - Individual contact, group contact and mass contact methods. Participatory Rural Appraisal techniques. Audio - Visual aids – Definition, advantages, classification, choice, criteria for selection. Farm Journalism – Definition, basic concepts, writing for media. Information and Communication Technology (ICT) – Computer networks, internet, video conferencing, agriportals, Kisan Call Centre, mobile phone. Photography – Basic concepts, advancements.