

DEPARTMENT OF HORTICULTURE

HORT 185

Credits 3(2 + 1)

FUNDAMENTALS OF HORTICULTURE AND NURSERY PRODUCTION

Theory

Fundamentals of Horticulture

Definition and importance of horticulture in national economy. Divisions of horticulture. Division of horticulture crops based on climate. Effect of climatic factors on production of fruits, vegetables, flowers and plantation crops.

Selection of site for establishment of an orchard, orchard plan and planting systems. Different methods of orchard culture. High density planting - merits and demerits.

Nutritional requirements of horticultural crops. Assessment techniques for nutritional requirements and methods of application of manures and fertilizers. Irrigation - assessment of irrigation requirements for different horticultural crops and methods of Irrigation.

Pruning and training, objectives and methods. Flower bud differentiation, factors affecting flower bud initiation, flowering, pollination and fruit set problems. Flower and fruit drop and control measures. Harvesting and maturity indices, grading, types of packing. Characteristics of packing material, storage methods and ripening techniques. Protocol of practices in cool chain technologies for fruits and flowers, marketing; types and techniques.

Nursery Production

Selection of site for commercial nursery and preparation of nursery plan. Plant propagation structures, containers and media. Principles and classification of plant propagation methods. Sexual propagation, merits & demerits. Seed germination, factors affecting germination and pre germination treatments. Seed production techniques. Types of seed, breeder seed, foundation seed and certified seed. Seed viability tests.

Asexual Propagation

Merits and demerits, Types of asexual propagation - cuttings, layering and grafting. Importance of grafting, terminology used in grafting - selection

criteria of scion and stock. Methods of budding and grafting. Incompatibility-types, symptoms and causes. Stock and scion relationship. Recommended methods of grafting for fruit and ornamental plants. Recommended rootstocks for fruit plants. Commercial propagation methods for fruits and ornamental plants. Nursery stock production and maintenance. Use of plant growth regulators in propagation of Horticulture crops. Micro propagation - advantages and disadvantages.

Practicals

1. Mapping of Horticulture zones of Telangana & India
2. Study of tools and implements and their use in Horticulture
3. Layout, fixing position of plants on field in different methods of planting
4. Methods of Irrigation and application of manures and fertilizers to different horticultural crops
5. Different methods of pruning and training
6. Field identification of nutrient deficiency symptoms
7. Field identification of vegetative and reproductive buds in different horticultural crops
8. Study of grading, packing of fruits and vegetables by visiting nearby commercial markets and export units
9. Study of pre-germination and viability tests of Horticulture crops seed
10. Preparation of seedbeds, sowing of seed and study of containers and propagation media
11. Preparation of layout for establishing a commercial nursery
12. Propagation of important fruit crops and ornamental plants through commercial methods of propagation
13. Preparation and application of plant growth regulators
14. Visit to commercial nurseries
15. Study of plant propagation structures
16. Visit to local biotech/tissue culture laboratories

References

- 1 Principles of Horticulture Denisen E L 1957. Macmillan Publishing Company, New York

2	Fundamentals of Horticulture	Edmond J B Senn T L Andrews F Sand Half acre P G 1963. Tata McGraw Hill Publishing Company, New York
3	Introduction to Horticulture	Kumar N 1990. Rajyalakshmi Publications, Nagarcoil Tamil Nadu.
4	Plant Propagation Principles and Practices	Hartman H T and Kester D E 1979. Prentice Hall of India, Private Limited Bombay
5	Plant Propagation	Sadhu M K 1996. New Age International Publishers - New Delhi
6	Propagation of fruit crops	Mukherjee S K and Majumder P K 1973. ICAR, New Delhi

HORT 287

Credits 3(2 + 1)

PRODUCTION OF FRUITS AND PLANTATION CROPS

Theory

Pomology

Area, production, Importance in national economy, nutritive value, soil and climatic requirements, propagation. root stocks, planting methods. training and pruning, nutrition, irrigation scheduling, intercrops. Problems in orchard management, flowering, fruit set, pollination, harvesting and harvesting indices, yield, grading, packing for internal and export markets, ripening and storage methods for major fruits crops like mango, banana, citrus, guava, sapota, grape, papaya, custard-apple, ber , pomegranate and phalsa.

Plantation crops

Importance, present status, prospects, soil, climatic requirements, propagation, Cultural practices, harvesting, post harvest technology of coconut, cashew nut, oil palm, Betelvine, cacao, coffee and arecanut.

Practical

1. Identification and classification of mango varieties and hybrids
2. Identification and classification of citrus and banana varieties
3. Commercial methods of propagation of important fruit crops
4. Training and pruning in grape
5. Identification and classification of grape varieties
6. Papaya extraction methodology

7. Pruning in ber, pomegranate and phalsa
8. Identification of papaya varieties and description
9. Identification of guava and sapota varieties & their description.
10. Visit to Fruit Research Station, Sangareddy
11. Identification of varieties of coconut and cashewnut
12. Study of cultural practices in coconut plantation
13. Study of cultural practices in betelvine plantation
14. Visit to cashewnut, oil palm processing units
15. Visit to Research Stations and Commercial farms

References

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| 1. | Fruit growing in India | Hayes WB 1953. Kitabistan. Allahabad |
| 2. | Fruits Tropical and Subtropical | Bose T K and Mitra S K 1990. Nayaprakash, Calcutta |
| 3. | Text Book on Pomology Vol. II & III | T K Chattopadhyaya 1997. Kalyani Publishers, Ludhiana |
| 4. | Introduction of Spices, Plantation Crops Medicinal and Aromatic Crops | Kumar N Abdul Khader IBH Limited, Rangaswami B and Irulappan I 1997 Oxford and IBH Publishing Company, New Delhi |

HORT 288

Credits 3(2 + 1)

PRODUCTION OF VEGETABLES AND FLOWER CROPS

Theory

Vegetables

Commercial production of tomato, chillies, egg plant, cucurbitaceous vegetables, cole crops, leguminous vegetables, tubers like sweet potato, colocasia yams and tapioca, perennial vegetables and garlic including their seed production.

Flower crops

Importance of commercial flowers in Indian economy, constraints and solutions for commercial cut flower production in India.

Origin - classification, commercially important varieties, biotic and abiotic factors affecting commercial cut flower production. Special techniques for production of exportable quality blooms. Pre and post harvest handling of blooms for extension of shelf life. Marketing techniques for commercial flower

trade in India and abroad such as roses, chrysanthemums, carnations, and anthurium, gladiolus and flower fillers like tube roses, gyposphila and limoniums.

Landscape Architecture & Ornamental: gardening

History of gardening in India. Bio-aesthetic planning, Need for Bio-aesthetic planning places suitable for Bio-aesthetic planning. Principles of garden designs, styles of gardening, features of gardens. Landscape designs for civic areas, open and semi-open areas. Designing of courtyards and indoor landscaping. Soft landscape establishment and maintenance. Criteria for selection of plants for planting in groups, specimen plants, plan for beds and in open places. Establishment of theme parks. Memorial parks and botanical gardens.

Practicals

1. Raising of vegetables nurseries
2. Maintenance of vegetable crops in the plots
3. Seed production techniques in vegetables
4. Harvesting indices of different vegetable crops
5. Identification of important vegetable varieties
6. Visit to commercial vegetable gardens
7. Identification of rose rootstocks and important cut flower varieties
8. Identification of different sections of chrysanthemum pinching/pruning techniques for production of standard/spray type of blooms
9. Visit to local High-tech floriculture projects in farmers fields
10. Identification and description of important varieties of carnations and gerberas
11. Fertigation techniques followed in cut flower production
12. Study of different styles of garden designs.
13. Planning and execution of different garden designs
14. Identification of herbaceous perennials and foliage plants
15. Visit to nearby developed gardens
16. Planning and designing of public and private garden

References

1. Vegetable Crops Thompson H C and Kelly W C 1959. Tata McGraw Hill Publishing Company Limited, Bombay

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| 2. | Vegetables for the Tropical Region | Premnath Velyudhan S and Singh O P 1987. ICAR, New Delhi |
| 3. | Production Technology of Vegetable Crops | Shanmugavelu K G 1989. Oxford & IBH Publishing Company Private Limited New Delhi |
| 4. | Vegetables | Chaudhary B 1992. National Book Trust, New Delhi |
| 5. | Commercial flowers | Bose T K Yadav L P 1989 Nayaprakash, Calcutta |
| 6. | The Rose in India | Pal B.P. 1991 Publication and Information Division, ICAR, New Delhi |
| 7. | Floriculture in India | Randhawa G G and Mukhopadhyaya A 1986. Allied Publishers Private Limited, New Delhi |
| 8. | Complete Gardening in India | Iyengar G S 1990. IBH Bangalore |
| 9. | Design elements of landscape gardening | Nambisan K M P 1992. Oxford & IBH Publishing Private Limited, New Delhi |
| 10. | Gardening in India | Bose T K and Mukhargee D 1989. Oxford & IBH Publishing Company Private Limited, Calcutta |
| 11. | Ornamental Horticulture in India | Randhawa G S 1973. Today & Tomorrow's Printers & Publishers, New Delhi |
| 12. | Floriculture and Landscaping | Bose T K Maiti R G Dhua R S Das P 2001. Nayaprakash, Calcutta |

HORT 385

Credits 3(2 + 1)

POST HARVEST TECHNOLOGY OF HORTICULTURAL PRODUCE

Theory

Importance of post harvest technology in horticultural crops, maturity indices, harvesting and handling of fruits, vegetables and cut flowers. Maturity and ripening process. Factors affecting ripening of fruit. Pre harvest factors affecting quality of fruits and vegetables. Application of hormones, fungicides and other chemicals, irrigation schedule. Factors responsible for deterioration of harvested fruits and vegetables. Chemicals used for hastening and delayed ripening.

Methods of storage, pre cooling, pre storage treatment, low temperature storage, controlled atmospheric storage, hypobaric storage, and low cost storage structures. Various methods of packing, packaging materials and transport. Packing technology for export, cushioning material, vacuum packing, poly shrink packing, specific Packing for export of mango, banana, grapes, vegetables cut flowers and ornamental plants.

Practicals

1. Practices in judging the maturity of various fruits
2. Practices in judging the maturity of various vegetables in that particular season
3. Sensory evaluation of fruits
4. Determination of physiological loss in weight, and total soluble solids (TSS)
5. Effect of temperature and relative humidity on quality and shelf life of fruits, flowers and vegetables
6. Packing methods and types of packing and importance of ventilation
7. Packing methods and types of exports of international trade
8. Effect of ethylene of ripening of banana or mango
9. Methods to prolong storage life in fruits and vegetables
10. Pre harvest and post harvest application of growth substances, in inhibiting (or) hastening of sprouting of bulbs end tubers
11. Visit to local market yards and cold storage units
12. Visit to local markets and packing industries

References

1. The Biochemistry of Fruits and their Products Hulme A C 1970. Academic Press, London
2. Post harvest biology and Handling of Fruits and Vegetables Hand N F and Salunkhe D K 1980. AVI Publishing Company, West Port, USA
3. An introduction to the Physiology and Handling of Fruits and Vegetables Wills R H H Lee T H Graham D McGlasson M Band Hann E C 1981. Granada Publishing Company. London.
4. Packaging of Fruits and Venkatarathnam L (Ed.) 1988. Agri-

Vegetables in India

Horticultural Society, Hyderabad

5. Post harvest Biotechnology of Flowers and Ornamental Plants Salunkhe D K Bhatt N R and Desai B B 1990. Nayaprakash, Calcutta
6. Hand Book of Fruit Science and Technology Salunkhe D K & Kadam S S 1995. Marcel Dekker, Incorporated New York

HORT 386

Credits 3(2 + 1)

PRODUCTION AND PROCESSING OF SPICES CONDIMENTS, AROMATIC AND MEDICINAL PLANTS

Theory

Importance, present status, export potential, soil and climatic requirements, varieties, propagation and planting, manuring, fertilization. Irrigation, other cultural practices and post harvest technology of the following crops:

Species: Black pepper, cardamom, cinnamon, clove, turmeric, ginger, coriander, fenugreek and cumin.

Aromatic plants: Lemon grass, citronella, palmarosa, vetiver, geranium, mint, davana.

Medicinal plants: Belladonna, Catharanthus roseus, Digitalis, Isabgol, Senna, Pyrethrum, Chlorophytum borivillianum, Rauwolfia serpentina, Opium poppy, Solanum khasianum Withenia somnifera, Tinospora cordifolia. Aloe vera.

Practicals

- 1&2. Identification and botanical description of different species
- 3&4. Identification and botanical description of aromatic plants
- 5&6. Identification and botanical description of different medicinal plants
7. Study of propagation methods of different spices
8. Study of propagation methods of aromatic plants
9. Study of propagation methods of medicinal plants
- 10&11. Study of field planting and other cultural practices of spices
12. Study of field planting and other cultural practices of medicinal plants
13. Study of field planting and other cultural practices of aromatic plants
14. Post harvest handling and processing of spices, medicinal and aromatic crops
- 15&16. Field visits to Research institutes and farmers fields

References

1. Introduction to spices, plantation crops, medicinal and aromatic crops
Kumar N Abdul Khader JBM Md Rangaswami P and Irulappan I 1997. Oxford and IBH Publishing Company Private Limited, New Delhi
2. Cultivation of Medicinal and Aromatic crops
Azhar Ali Farroqi and Sreeramu BS, 2001. United Press Limited.
3. Spices and Condiments
Pruthi J S 1976. National Book Trust, New Delhi.
4. Spices and Plantation crops
Shanmugavelu KG and Madhava Rao VN 1977. Popular Book Depot. Madras
5. Spices VoL. I
Purseglove J W E G Brown Gren CL and Robbins S R J 1980. Academic Press, New York
6. Spices VoL. II
Purseglove J W E G Brown Gren CL and Robbins S R J 1980. Longman, London
7. Cultivation and utilization of Medicinal and Aromatic plants
Atal E K and Kapur B M 1982. CSIR, New Delhi
8. Medicinal Plants of India and Pakistan
Dastur J F, 1982. Taraporevala Sons and Company Private Limited, Bombay
9. Medicinal Plants
Jain S K 1983. National Book Trust, New Delhi
10. Production technology of spices
Panda D J M 1994. Duijabardas Brahmeshwer Patna, Bhubaneswar
11. Fruits, spices and Plantation Crops
Ramaswamy N 1994. Lamino Krafts, Madras
12. Spices
Singh V B and Singh K 1996. New age International Private Limited, New Delhi

PROCESSING OF HORTICULTURAL PRODUCE**Theory**

Importance and scope of fruit and vegetable preservation industry in India. Present status and feature prospects of fruits procession industry in India. General principles of fruits and vegetables preservation and canning process. Types of spoilages - enzymatic and microbial spoilage - bio-chemical changes associated with spoilage and indications of spoilage of canned food.

High temperature pasteurization. Canning - containers for canning and can seaming technology, canning process and bottling. Raw materials for canning, bottling of important fruits and vegetable, Preparation of fruits and vegetables (products) for canning/bottled products and corrosion of cans. Low temperature - refrigeration, cold storage & freezing. Preservation by drying, ultraviolet and ionizing radiation and their effects. Sun drying and dehydration. Principles involved in drying, freezing dehydration, different methods of drying and dehydration of fruits and vegetables, different types of dryers for fruits and vegetables and their products, packaging and storage of dehydrated and dried products. Preservation by chemicals - desirable and undesirable effects - advantages and disadvantages. Preservation by salt, sugar, fermentation & freezing. Fruit products order, ISO-9000, HACCP standards and export standards. Utilization of processed waste materials. Preparation of different types of fruits and vegetables products like Jams, Jellies; Marmalades, Candies, Preserves Chutneys, Sauce fermented and unfermented Juice, Squashes, Cordials, Syrups concentrates.

Practicals

1. Microscopic examination of spoilage of fruits and vegetables
2. Estimation of reducing sugars
3. Estimation of total sugars
4. Estimation of titrable acidity
5. Estimation of ascorbic acid
6. Sensory evaluation
7. Preparation of the following products: Jams
8. Jellies
9. Squashes

- 10.Cordials
- 11.Ketchup
- 12.Sauces
- 13.Dehydration of fruits
- 14.Dehydration of vegetables
- 15.Fermentation of wines

References

- 1. Commercial Fruit and Vegetable Products
Crues W V 1958. McGraw Hill Book Company Incorporated, New York
- 2. Preservation of Fruits and Vegetables
Lal G Siddappa G Sand Tandon NGL 1993. ICAR, New Delhi
- 3. Fruit and Vegetables Preservation Principles and practices
Srivastava R P and Sanjeev Kumar 1994. International Book Distributing Company, Lucknow