A.S.D GOVT DEGREE COLLEGE FOR WOME(A)

(Re-Accredited by NAAC with 'B')

KAKINADA 533002, EASTGODAVARI, ANDHRA PRADESH

BOARD OF STUDIES OF HORTICULTURE

2023 – 2024

DEPARTMENT OF HORTICULTURE

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

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KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

II B.Sc HORTICULTURE THEORY SYLLABUS for the Academic Year 2023-2024

SEMESTER - III, COURSE – III

BASICS OF VEGETABLE SCIENCE (OLERICULTURE)

Course Outcomes

CO 1 : Distinguish the growing of vegetables according to season and climate

CO 2 : Get detailed knowledge on cultivation aspects of different vegetables

CO 3 : Understand and explain the special intercultural operations done in vegetable crops

CO 4 : Study of morphology and taxonomy of different vegetable crops

CO 5 : Identify the diseases and pests of vegetable crops and their management

SYLLABUS

Unit – 1 : Introduction to Vegetable Crops **12 Hrs.**

1. Importance of vegetable cultivation in India and Andhra Pradesh.
2. Classification and Nutritive value of vegetables.
3. Area and production of vegetables in India and Andhra Pradesh.
4. Export and import potential of vegetables in India. Constraints in vegetable production and remedies to overcome them.

Unit – 2 : Solanaceous and Leafy Vegetables **12 Hrs.**

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

Cultivation of (a) Brinjal (b) Tomato (c) *Capsicum* (d) Spinach (c) Coriander and (d) *Mentha*

Unit – 3 : Root and Tuber Crops **16 Hrs.**

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

Cultivation of (a) Carrot (b) Beet root (c) Tapioca and (d) *Colocasia*

Unit – 4 : Cole Crops **08 Hrs.**

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

Cultivation of (a) Cabbage and (b) Cauliflower

Unit – 5 : Leguminous Vegetables **12 Hrs.**

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

Cultivation of (a) Cluster bean (b) Cow pea and (d) *Dolichos*

Additional Inputs :

UNIT-1: Basic principles of crop production,
Types of vegetable production

UNIT-2: Cultivation of (a) Chilli (b) Microgreens

UNIT-3: Cultivation of (a) Potato (b) Sweet potato

UNIT-4: Cultivation of (a) Broccoli (b) Brussels sprouts

UNIT-5: Cultivation of (a) Soyabeans (b) Chick pea

Text books :

- **Bose T K et al. (2003)** Vegetable crops, Naya Udhyog Publishers, Kolkata.
- **Singh D K (2007)** Modern vegetable varieties and production, IBN Publisher Technologies, International Book Distributing Co, Lucknow.
- **Premnath, Sundari Velayudhan and D P Sing (1987)** Vegetables for the tropical region, ICAR, New Delhi

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II B.Sc HORTICULTURE PRACTICAL SYLLABUS for the Academic Year 2023-2024

SEMESTER - III, COURSE – III

BASICS OF VEGETABLE SCIENCE (OLERICULTURE)

Course outcomes : On successful completion of this course, the students shall be able to:

- Perform various tests for seed germination, viability and vigour.
- Make observations and record data on various growth stages of a given vegetable plant.
- Identify the pathogens and suggest control measures for diseases of vegetable crops.
- Practice suitable irrigation and fertigation methods for various horticulture crops.

1. Demonstration of seed germination test for a vegetable seed.
2. Demonstration of seed viability test.
3. Identification of vegetable seeds and vegetable crops at different growth stages.
4. Preparing vegetable nursery beds.
5. Raising vegetable seedlings in nursery bed and portrays.
6. Identification of major diseases and insect pests of vegetables.
7. Land preparation for sowing/ transplanting of vegetable crops.
8. Sowing/ transplanting of vegetables in main field.
9. Fertilizer application for vegetable growing.
10. Irrigation practices in a vegetable crop field.

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II B.Sc HORTICULTURE THEORY SYLLABUS for the Academic Year 2023-2024

SEMESTER - IV, COURSE – IV

BASICS OF FRUIT SCIENCE (POMOLOGY)

Course Outcomes

CO 1 : Realize the value of fruits in terms of human nutrition and economy of Nation.

CO 2 : Acquire knowledge related to various cultivation practices for different fruit crops

CO 3 : Demonstrate the special intercultural operations done in fruit crops

CO 4 : Examine the pests & diseases of fruit crops and develop skills to manage the same,

CO 5 : Develop knowledge on various entrepreneurial skills related to fruit science.

SYLLABUS

Unit – 1 : Introduction to Fruit crops **12 Hrs.**

1. Importance of fruit growing in India and Andhra Pradesh.
2. Nutritive value of fruits.
3. Area and production of India and Andhra Pradesh.
4. Export and import potential of fruits in India. Constraints in fruit production and remedies to overcome them.

Unit – 2 : Tropical Fruit Crops **12 Hrs.**

Origin, history, distribution, area and production, uses and composition, varieties, soil and climatic requirements, propagation, planting, training and pruning, manuring and fertilizer application, irrigation, intercropping, harvesting and yield, diseases and pests of the following tropical fruit crops:

Mango (b) Guava and (c) Papaya

Unit – 3 : Sub-tropical and Temperate Fruit Crops **12 Hrs.**

Origin, history, distribution, area and production, uses and composition, varieties, soil and climatic requirements, propagation, planting, training and pruning,

manuring and fertilizer application, irrigation, intercropping, harvesting and yield,

diseases and pests of the following sub-tropical and temperate fruit crops:

(a) Grapes (b) Pomegranate (c) Citrus and (d) Apple

Unit – 4 : Arid and Minor Fruit crops **12 Hrs.**

Origin, history, distribution, area and production, uses and composition, varieties, soil and climatic requirements, propagation, planting, training and pruning, manuring and fertilizer application, irrigation, inter cropping, harvesting and yield, diseases and pests of the following arid fruit crops:

(a) Amla (b) Dates and (c) Wood apple

Unit – 5 : Management Practices for Fruit Crops **12 Hrs.**

1. Sustainable Production Practices for Local Fruit Production.
2. Integrated Orchard Management/Principles of IPM.
3. Harvesting and Labor Concerns
4. Grading, packing, storage and marketing of fruits.

Additional Inputs :

UNIT-1: present status and future scope of tropical and subtropical fruits in india
UNIT-2: Cultivation of (a)Litchi (b)Sapota
UNIT-3: Cultivation of (a)Walnut (b) Almond
UNIT-4: Cultivation of (a)Strawberry (b) Jamun
UNIT-5: Climatic reqirement for different types of plants

Text books :

- **Chattopadhyay, T.K. 1997.** Text book on Pomology (Fundamentals of fruit growing), Kalyani Publishers, Hyderabad.
- **Chundawat, B.S. 1990.** Arid Fruit Culture, Oxford and IBH, New Delhi.
- **Gourley J H 2009.** Text book of Pomology, Read Books Publ., Canada

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II B.Sc HORTICULTURE PRACTICAL SYLLABUS for the Academic Year 2023-2024

SEMESTER - IV, COURSE – IV

BASICS OF FRUIT SCIENCE (POMOLOGY)

Course Outcomes : On successful completion of this course, the students shall be able to :

- Identify different varieties of tropical, sub-tropical and temperate fruit crops.
- Estimate and apply required dosage of fertilizer/manure/biofertilizer for a fruit crop.
- Use required PGR to check the leaf fall, flower fall and fruit fall in a crop species.
- Identify pest and diseases of various fruit crops and suggest control measures.

1. Study of varieties of Mango, Papaya and Guava.
2. Study of varieties of Grape, Pomegranate, Citrus and Apple.
3. Study of varieties of Amla, Dates and Wood apple.
4. Manure and fertilizer application including Biofertilizers in different fruit crops.
5. Methods of application, calculation of the required quantity of manure and fertilizers based on the nutrient content.
6. Use of growth regulators in Fruit crops.
7. Identification and collection of important pests in fruit crops.
8. Identification and collection of important diseases in fruit crops and herbarium preparation.
9. Visit to a local fruit market/commercial Orchard.

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II B.Sc HORTICULTURE THEORY SYLLABUS for the Academic Year 2023-2024

SEMESTER - IV, COURSE – V

PESTS AND DISEASES OF HORTICULTURE PLANTS AND THEIR MANAGEMENT

Course Outcomes

CO 1 : Develop a critical understanding of insect pests and plant disease symptoms.

CO 2 : Examine and identify the pests and diseases of vegetable crops and their management

CO 3 : Examine and identify the pests and diseases of ornamental crops and their management

CO 4 : Examine and identify the pests and diseases of fruit crops and their management

CO 5 : Classify the pesticides based on use, chemical nature, formulation, toxicity and action.

SYLLABUS

Unit – 1 : Basics of Entomology and Plant Pathology 12 Hrs.

1. Classification of Insects up to orders and families of economic importance; Study of insect pests (Distribution, host range, biology, nature of damage and management) in horticultural crops.
2. Disease triangle and disease pyramid; Plant Pathology : Definition
3. A general account on symptoms of plant diseases caused by Viruses and Bacteria.
4. A general account on symptoms of plant diseases caused by Fungi.

Unit – 2 : Pests and diseases of Vegetables Crops 12 Hrs.

1. Bhendi : Spotted boll worms, Red cotton bug, Yellow vein mosaic.
2. Cucurbits : Fruit flies, Pumpkin beetles; Downy and powdery mildews.
3. Potato : Potato tuber moth, Golden cyst nematode; Late blight.
4. Sweet Potato : Sweet potato weevil, Vine borer; Mottled necrosis.

Unit – 3 : Pests and diseases of Fruit crops 12 Hrs.

1. Coconut :.Rhinoceros beetle, Burrowing nematode; Ganoderma root rot, Grey blight
2. Banana : Banana weevil, banana aphids; Panama wilt. Bunchy top
3. Cashew : Tea mosquito bug. Cashew stem borer; Anthracnose, 2.Pink disease
4. Custard apple : Mealy bug, Fruit boring caterpillar; Anthracnose, Glomerella fruit rots.

Unit – 4 : Pests and diseases of Commercial Flower Crops **12 Hrs.**

1. Rose : Rose aphid, Dieback, and black spot
2. Marigold : Aphids, leaf spot, and bud rot
3. Gerbera : Thrips, white flies and Blossom blight
4. Gladiolus : Cut worms, leaf eating caterpillar and corm rot.

Unit – 5 : Management of Pests and Diseases **12 Hrs.**

1. Principles and methods of plant disease management.
2. Integrated Plant disease management.
3. Fungicides classification based on chemical nature; commonly used insecticides, fungicides, bactericides and nematicides.
4. Preparation of fungicidal solutions, slurries, pastes and their application.

Additional Inputs :

UNIT-1: Introduction to pesticides and biopesticides
Introduction to beneficial insects
UNIT-2: Potato late blight fungus, spidermite
UNIT-3: Apple maggot,codling moth
UNIT-4: Botrytis cinerea,crown gal
UNIT-5: cultural methods,economic damage threshold

Text books :

- **Verma L R and R C Sharma 1999.** Diseases of Horticultural Crops – Fruits, Indus Publishing, New Delhi.
- Diseses of Horticulture Crops and their management, TNAU Publ. Agrimoon.Com
- **Jagatap G P, D N Dhutraj and Utpal Dey. 2001.** Diseases of Horticultural crops and their management, Agrobios Publications

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SEMESTER - IV, COURSE – V

PESTS AND DISEASES OF HORTICULTURE PLANTS AND THEIR MANAGEMENT

Course Outcomes : On successful completion this course, the students shall be able to :

- Identify the insect pests and microbial pathogens on various horticulture plants.
- Identify the disease symptoms and attribute them to a pest or a microbe.
- Suggest the dose and rate of application of a pesticide/fungicide to control the diseases in horticulture plants.

1. Study of characteristics of insect pests, microbial pathogens, nematodes causing diseases on different plants given in the theory syllabus.
2. Identification of disease symptoms on different plants given in the theory syllabus.
3. Observing and acquiring knowledge on pesticides, fungicides etc.,
4. Acquaintance with methods of application of common fungicides.
5. Field visit and acquaintance with disease of crops

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III Year B.Sc Degree Examinations at the end of V Semester 2023-2024

HORTICULTURE SEMESTER - V, COURSE – 6A Theory Syllabus

ORNAMENTAL HORTICULTURE

(Skill Enhancement Course (Elective)

Course Outcomes

CO 1 : Acquire a critical knowledge of ornamental gardening and its significance.
CO 2 : Identify and explain living and non-living components in an ornamental garden.
CO 3 : Acquire skills on propagation and planting of various ornamental plants.
CO 4 : Perform managerial skills related to ornamental gardening.
CO 5 : Demonstrate skills of designing and developing ornamental gardens in public places.

SYLLABUS

Unit -1: Introduction to Ornamental Horticulture (10h)

1. History, Definition, scope of gardening, aesthetic values; types of gardens in India.
2. Landscaping, basic principles and basic components.
3. Principles of gardening, garden components and adornments.
4. Lawn types, establishment and maintenance; methods of designing rockery and water garden.

Unit -2: Types of Ornamental gardens (10h)

1. Special types of gardens, trees, their design, their walk-paths, bridges, constructed features.
2. Garden structures – greenhouse, glass house, net house.
3. Values in landscaping; propagation-planting of shrubs and herbaceous perennials.

Unit-3: Plants in Ornamental gardens (10h)

1. Importance, design values, propagation, planting of following annuals, biennials and perennials:
   (a) Climbers (b) Creepers (c) Palms (d) Ferns (e) Grasses (f) Cacti (g) Succulents

Unit-4: Ornamental gardening – public utility (10h)

1. Cultural operations in ornamental gardens.
2. Bio-aesthetic planning, definition, need; round country planning; urban planning and planting - avenues, educational institutions, villages.
3. Beautifying railway stations, dam sites, hydroelectric stations, colonies, river banks, Planting material for play grounds.

Unit-5: Ornamental gardening in residences (10h)

1. Bottle garden, terrariums.
2. Vertical gardens, roof gardens.
3. Culture of bonsai, art of making bonsai

Additional Inputs :

UNIT-1: present status and future scope of tropical and subtropical fruits in india

UNIT-2: Garden types-Roof Garden,Sunken Garden

UNIT-3: cycads,

UNIT-4: childrens park,Highways

UNIT-5: Vegetable garden or kitchen garden

III. References:

1. Chadha, K.L. and Chaudhary, B. 1986. Ornamental Horticulture in India. Publication and Information division. ICAR, New Delhi.

2.K.V.Peter. 2009.Ornamental plants. New India Publishing Agency, New Delhi.

3.Arora, J.S. 2006. Introductory Ornamental Horticulture. Kalyani Publishers, Ludhiana

4.Bimaldas Chowdhury and Balai Lal Jana. 2014. Flowering Garden trees. Pointer publishers, Jaipur. India.

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HORTICULTURE SEMESTER - V, COURSE – 6A Practical Syllabus

ORNAMENTAL HORTICULTURE

(Skill Enhancement Course (Elective)

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify various components required for ornamental garden development.
2. Perform various skills related to establishment and maintenance of an ornamental garden.
3. Demonstrate skills of making developing a lawn and bonsai.
4. Make landscape design using CAD.

Practical (Laboratory) Syllabus: (30 hrs)

1. Identification and description of various plants grown in ornamental gardens.
2. Tools, implements and containers used in ornamental gardening.
3. Planning, designing and establishment of garden features viz. lawn, hedge and edge, rockery etc.,
4. Demonstration of types and styles of gardens using photos or videos.
5. Planning, designing and establishment of water garden, carpet bedding, shade garden, roof garden.
6. Preparation of land for lawn and planting.
7. Exposure to CAD (Computer Aided Designing)
8. Demonstration of bonsai making.
9. Study and creation of terrariums, vertical garden.

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HORTICULTURE SEMESTER - V, COURSE – 7A Theory Syllabus

COURSE 7A: COMMERCIAL FLORICULTURE

(Skill Enhancement Course (Elective)

I. Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the significance of flowers in human life.
2. Acquire skills related to production techniques in floriculture.
3. Explain the breeding techniques of some flowering plants.
4. Demonstrate skills of protected cultivation in floriculture.
5. Perform skills in relation to post-harvest operations in floriculture.

SYLLABUS

Unit-1: Basic concepts of floriculture (10h)

1. Aesthetic, cultural and industrial importance of flowers; domestic and export marketing of flowers.
2. Floriculture - Importance, area and production in Andhra Pradesh and India.
3. Scope and importance of commercial floriculture in A.P., and India.

Unit-2: Production technology-1 (10h)

1. Production techniques of following flowering plants for domestic and export market:
   (a) Rose (b) *Chrysanthemum* (c) Marigold (d) Tuberose (e) *Crossandra* (f) Jasmine

Unit-3: Production technology-2 (10h)

1. Production techniques of following flowering plants for domestic and export market:
   (a) *Anthurium* (b) *Gerbera* (c) *Gladiolus* (d) *Dahlia* (e) *Heliconia* (f) Orchid

Unit-4:Plant breeding of flowering ornamentals (10h)

1. Objectives and techniques in ornamental plant breeding.
2. Introduction, selection, hybridization, mutation and biotechnological technique for improvement of following ornamental and flower crops.
   a)Carnation (b) *Petunia* (c) *Geranium* (d) *Cosmos* (e) *Hibiscus* (f) Snapdragon

Unit-5: Post-harvest practices in floriculture (10h)

1. Growing of flowering plants under protected environments such as glass house, plastic house, net house, etc.
2. Importance of flower arrangement; Ikebana - techniques, types, suitable flowers and cut foliage.
3. Post-harvest technology of cut and loose flowers in respect of commercial flower crops.
4. Dehydration techniques for drying of flowers, scope importance and status.

Additional Inputs :

UNIT-1: present status and future scope of tropical and subtropical fruits in india

UNIT-2: Lily,Tulip

UNIT-3: begonia,sunflower

UNIT-4: aster,foliage plants

UNIT-5: bunching and packaging,transport

III. References:

1. T.K. Bose, L.P. Yadav, P. Patil, P. Das and V.A. Partha Sarthy.2003. Commercial flowers. Partha Sankar Basu, Nayaudyog,206, Bidhan Sarani, Kolkata
2. S.K. Bhattacharjee and L.C. De. 2003. Advanced Commercial Floriculture. Aavishkar Publishers, Distributors, Jaipur, India.
3. V.L. Sheela, 2008. Flower for trade. New India Publishing Agency, New Delhi
4. Dewasish Choudhary and Amal Mehta. 2010. Flower crops cultivation and management. Oxford Book Company, Jaipur, India.

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HORTICULTURE SEMESTER - V, COURSE – 7A Practical Syllabus

COURSE 7A: COMMERCIAL FLORICULTURE

(Skill Enhancement Course (Elective)

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify different flowering plants of commercial value.
2. Perform skills in propagation of flowering plants.
3. Demonstrate skills of post-harvest handling of flowers.
4. Perform skills of floral arrangements or making floral products.

Practical (Laboratory) Syllabus: (30 hrs)

1. Identification of commercially important floricultural crops.
2. Propagation technique in *Hibiscus*/Rose/*Chrysanthemum*/tuberose.
3. Propagation technique in *Gladiolus*/carnation/*Petunia*
4. Sowing of seeds and raising of seedlings of a flowering plant.
5. Training and pruning of rose/Jasminum.
6. Drying and preservation of flowers.
7. Use of chemicals and other compounds for prolonging the vase life of cut flowers.
8. Flower arrangement practices.
9. Preparation of bouquets, garland,veni and gajara.

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HORTICULTURE SEMESTER - V, COURSE – 6B Theory Syllabus

COURSE 6B: : PRECISION FARMING AND PROTECTED CULTIVATION

(Skill Enhancement Course (Elective)

I. Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the importance of precision farming in present scenario.
2. Explain different types of green houses used for precision farming.
3. Acquire skills on construction of green houses.
4. Perform managerial skills related to precision faming under protected structures.
5. Demonstrate skills on cultivation high-value horticulture plants through precision farming.

Unit -1: Introduction to Precision Farming (10h)

1. Precision farming – Introduction and history, Importance and Scope.
2. Laser leveling, mechanized direct seed sowing seedling and sapling transplanting.
3. Mapping of soils and plant attributes.

Unit -2: Management in Precision Farming (10h)

1. Site specific input application.
2. Weed management, Insect pests and disease management.
3. Yield mapping in horticultural crops.

Unit-3: Types of Green Houses (10h)

1. Green house technology – Introduction viz. Importance, scope, advantages and dis-advantages.
2. Types of Green Houses based on shape, utility, construction and cladding materials.
3. Plant response to Greenhouse environment.

Unit-4: Construction of Green House (10h)

1. Planning and design of greenhouses.
2. Design criteria of greenhouse for cooling and heating purposes.
3. Green house equipment; Materials of construction for traditional and low cost green houses.
4. Irrigation systems used in greenhouses.

Unit-5: Farming in Green House (10h)

1. Net house cultivation, Passive solar green house, Green house drying.
2. Choice of crops for cultivation under greenhouses: Capsicum, Cucumber, Broccoli, Cabbage, Spinach, Lettuce.
3. Cost estimation and economic analysis.

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HORTICULTURE SEMESTER - V, COURSE – 6B Practical Syllabus

COURSE 6B: : PRECISION FARMING AND PROTECTED CULTIVATION

(Skill Enhancement Course (Elective)

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify various material and equipment required for green house construction.
2. Perform various skills related to preparation of soil and other media for cultivation under a protected structure.
3. Demonstrate operational skills related to equipment in a green house.
4. Make the calculation related to input-output economics.

Practical (Laboratory) Syllabus: (30 hrs)

1. Study of different types of greenhouses based on shape, utility.
2. Study of different types of greenhouses based on construction and cladding materials.
3. Testing of soil and water to study its suitability for growing crops in greenhouses.
4. Growing media, Soil culture- type of soil required.
5. Study of irrigation, drainage - flooding and leaching.
6. Soil pasteurization in peat moss and mixtures, Rock wool and other inert media.
7. Nutrient film technique (NFT), Hydroponics.
8. Study of cultivation of a crop in green house.
9. Economics of protected cultivation.

III. References:

1. Balraj Singh. 2006. Protected cultivation of vegetable crops. Kalyani Publishers, Ludhiana.
2. Brahma Singh, 2014.Advances in Protected Cultivation. New India Publishing Agency. New Delhi.
3. Jitendra Singh, 2015.Precision Farming in Horticulture. New India Publishing Agency. New Delhi.
4. Reddy, P. and Parvatha. 2011. Sustainable crop protection under Protected Cultivation. Springer Publications. USA.

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HORTICULTURE SEMESTER - V, COURSE – 7B Theory Syllabus

COURSE 7B: POST-HARVEST MANAGEMENT OF HORTICULTURAL CROPS

(Skill Enhancement Course (Elective)

I. Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the basic concepts in post-harvest handling of horticulture produce.
2. Explain maturity and harvesting indices of horticulture products.
3. Acquire skills on identifying factors for post-harvest losses in horticulture.
4. Perform managerial skills related to storage of horticulture products.
5. Demonstrate skills on packaging and forwarding horticulture products to market.

SYLLABUS

Unit -1: Introduction to Post Harvest Technology (10h)

1. Importance of Postharvest Technology in horticultural crops; Pre-harvest factors affecting quality.
2. Maturity, types of maturity and factors affecting maturity of horticultural crops.
3. Maturity indices, harvesting, handling, grading of fruits- Mango, Banana, Papaya, Citrus and Guava.

Unit -2: Maturity and harvesting indices (10h)

1. Maturity indices, harvesting, handling, grading of:
   a) Vegetables - Tomato, Cabbage, Onion
   b) Cut flowers - Rose, *Chrysanthemum*, Tuberose
   c) Plantation crops - Coconut, Cashew nut, Coffee

Unit-3: Post harvest problems and treatments (10h)

1. Factors responsible for deterioration of fruits, vegetables, cut flowers.
2. Physiological and bio-chemical changes during ripening; Hastening and delaying ripening process.
3. Postharvest treatments of horticultural crops –VHT, HWT, irradiation, fungicidal and chemical.

Unit-4: Storage of Horticulture products (10h)

1. Quality parameters and specification in fruits, vegetables and cut flowers.
2. Structure of fruits, vegetables and cut flowers related to physiological changes after harvest.
3. Methods of storage for local market and export.
4. Pre-harvest treatment and pre-cooling, pre-storage treatments.

Unit-5: Storage and packaging (10h)

1. Different systems of storage.
2. Packaging methods and types of packages, recent advances in packaging-vacuum packaging, poly shrink packaging, grape guard.
3. Types of containers and cushioning materials, packing treatments and cold storage; Modes of transport

. **III. References:**

1. Jacob John, P. 2008. A Handbook on Post Harvest management of Fruits and vegetables. Daya Publishing House, Delhi
2. Battacharjee, S. K. and De, L. C. 2005. Post Harvest Technology of Flowers and Ornamentals Plants. Ponteer Publisher, Jaipur, India.
3. Neetu Sharma and Mashkoor Alam, M. 1998. Post Harvest Diseases of Horticultural Perishables. International Book Distributing Co., Lucknow.
4. Saraswathy, S. et. al. 2008. Post harvest Management of Horticultural Crops. Agribios (India).

Wiils, McGlasson and Graham, J. 2007. Post Harvest- An Introduction to the Physiology and Handling of Fruits, Vegetables and ornamentals. Cab International

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HORTICULTURE SEMESTER - V, COURSE – 7B Practical Syllabus

COURSE 7B: POST-HARVEST MANAGEMENT OF HORTICULTURAL CROPS

(Skill Enhancement Course (Elective)

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify the maturity and harvesting indices of horticulture products.
2. Perform various skills related to manual and mechanical grading of horticulture products.
3. Identify causes for losses of horticulture products in store houses.
4. Demonstrate skills on packaging and transport of horticulture products.

Practical Syllabus: (30 hrs)

1. Study of maturity indices of fruits, vegetables, flowers and plantation crops.
2. Determination of physiological loss in weight and quality
3. Grading of horticultural produce (manual and mechanical).
4. Post-harvest treatment of horticultural crops, physical and chemical methods.
5. Identification of pests and diseases of Horticulture products in storage.
6. Study of post-harvest disorders in horticultural produce.
7. Study of facilities of storage units and methods of storage.
8. Packaging in fruits, vegetables by using different packaging materials
9. Packaging in plantation crops and cut flowers by using different packaging materials.

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HORTICULTURE SEMESTER - V, COURSE – 6C Theory Syllabus

COURSE 6C: WATER MANAGEMENT IN HORTICULTURAL CROPS

(Skill Enhancement Course (Elective)

I. Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the importance of water for horticulture crops.
2. Explain different irrigation practices and factors influencing them.
3. Acquire skills on layout of sprinkler and drip irrigation.
4. Perform managerial skills related to water management in horticultural crop fields.
5. Demonstrate skills on efficient use of irrigation methods for different types of soils.

II. Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(*Syllabi of theory and practical together shall be completed in 80 hours*)

Unit -1: Importance of water for plants (10h)

1. Importance of water to plants, hydrological cycle; water resources in Andhra Pradesh and India.
2. Area of different crops under irrigation; function of water for plant growth.
3. Effect of moisture stress on crop growth; Available and unavailable soil moisture – distribution of soil moisture.
4. Water budgeting – kinds of water- rooting characteristics – moisture extraction pattern.

Unit -2: Water for horticultural crops (10h)

1. Water requirement of horticultural crops – net irrigation requirement, gross irrigation requirement.
2. Lysimeter studies, Plant water potential climatological approach – use of pan evaporimeter- Consumptive use of pan evaporimeter.
3. Definition of evaporation, transpiration, evapo-transpiration and potential evapo-transpiration.

Unit-3: Irrigation methods (10h)

1. Factor for crop growth stages – critical stages of crop growth for irrigation; irrigation scheduling – different approaches.
2. Soils quality of irrigation water, irrigation management practices for different soils and crops.
3. Methods of Irrigation- classification, border, check basin, Square and ring basin, furrow irrigation methods.

Unit-4: Modern methods of irrigation (10h)

1. Sub-surface pressurized methods; sprinkler- definition, adoptability, limitations.
2. Components and types of sprinkle irrigation system, layout, fertilizer applicator.
3. Drip irrigation system – definition, advantages, dis- advantages, components, fertilizer applicator, layout.

Unit-5: Water management (10h)

1. Water management problem, merits and demerits; Water use efficiency (WUE), factors effecting WUE.
2. Methods to improve economic use of water for irrigation.
3. Water use for maximum profit of garden/orchard ecosystem; water management for problem soils.

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HORTICULTURE SEMESTER - V, COURSE – 6C Practical Syllabus

COURSE 6C: WATER MANAGEMENT IN HORTICULTURAL CROPS

(Skill Enhancement Course (Elective)

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Determine water requirement of a crop plant.
2. Perform skills related to determination of soil moisture constants.
3. Operate equipment of sprinkler and drip irrigation.
4. Make layouts for different irrigation methods.

Practical (Laboratory) Syllabus: (30 hrs)

1. Determination of water potential.
2. Estimation of soil moisture constants.
3. Determination of soil moisture by air oven method.
4. Estimation of irrigation efficiency of horticultural crops,
5. Estimation of water requirements of horticultural crops.
6. Collection of field data for designing micro-irrigation system for orchard and vegetable crops.
7. Study of different components of drip irrigation system.
8. Study of different components of sprinkler irrigation system.
9. Study of fertilizer application system.

III. References:

1. Y P Rao and S. R. Bhakar, 2008. Irrigatin Technology Theory & Practices AgroTech Publishing Academy, Udaipur
2. A.M. Michael, 2002. Irrigation Theory and Practice. Vikas Publishing House Pvt. Ltd. New Delhi.
3. R.K. Shivanappan Drip Irrigation Keerthi Publishing House Pvt. Ltd., Coimbatore.
4. A.M. Michael and T.P. Ojha, 1999. Principles of Agricultural Engineering Vol-II, Jain Brothers, New Delhi

IV. Co-Curricular Activities (student field training by teacher: 05 hours**):**

a) Mandatory:

1. **For Teacher**: Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on determination of water potential and soil moisture, various irrigation practices, equipment for sprinkler and drip irrigation methods etc.
2. **For Student**: Individual laboratory work and visit to drip and sprinkler irrigation installation in a Horticulture University/ college and/or horticulture crop field, studying the layout and equipment, operation methods, irrigation schedule, fertigation, cleaning; culminating writing and submission
   of a hand-written Field Work Report (various crop plants, yield, economics) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report *(not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like determination of plant water requirements, transpiration in crops and use of anti-transpirants, traditional and modern methods of irrigation).
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on irrigation methods and water management in horticulture crops.
5. Collection of material/figures/photos related to water management for horticulture crops in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to irrigation facilities in a Horticulture University or college and/or crop field.
7. Invited lectures and presentations on related topics by field/industrial experts

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HORTICULTURE SEMESTER - V, COURSE – 7C Theory Syllabus

COURSE 7C: SOIL FERTILITY AND NUTRIENT MANAGEMENT

(Skill Enhancement Course (Elective)

I. Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the role of macro and micro nutrients in plant nutrition.
2. Explain different types of manures, chemical and biofertilizers used for horticulture plants.
3. Acquire skills on nutrient deficiency symptoms and status of nutrients in plants.
4. Perform managerial skills related to integrated nutrient management in horticultural crop fields.
5. Demonstrate skills on efficient use of fertilizers for different types of horticulture crops.

II. Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(*Syllabi of theory and practical together shall be completed in 80 hours*)

Unit -1: Introduction to Soil fertility and soil productivity (10h)

1. History of soil fertility, definition of soil fertility and productivity; essential nutrient elements and functions, deficiency symptoms.
2. Mechanism of Nutrient transport / uptake to plants and nutrient availability.
3. Acid, calcarious and salt affected soil characteristics and management

Unit -2: Soil organic matter (10h)

1. Role of micro-organisms in organic matter decomposition and humus formation.
2. Importance of C:N ratio and pH in plant nutrition soil buffering capacity.
3. Main objectives of INM, components of Integrated plant nutrient management (IPNM); soil fertility evaluation methods: chemical, biological and by visual symptoms, critical levels of different nutrients and hidden hunger in soil.
4. DRIS Approach, critical limit approach,

Unit-3: Manures and fertilizers (10h)

1. Manures and fertilizer classification and manufacturing process; properties and fate of major and micronutrient in soils.
2. NPK fertilizers: composition and application methodology, luxury consumption, nutrient reactions, deficiency symptom by visual diagnosis.
3. Secondary and Micronutrient fertilizers their types, composition, reaction in soil and effect on crop growth.
4. Time and methods of manures and fertilizers application; foliar application and its concept.

Unit-4: Modern methods of irrigation (10h)

1. Fertilizer control order; nutrient interactions, plant nutrient toxicity symptoms and remedial measures.
2. Effect of potential toxic elements in soil and plant.
3. Soil test crop response and targeted yield concept.

Unit-5: Water management (10h)

1. Biofertilizers: importance, types and use in horticultural crop.
2. Nutrients use efficiency (NUE) and management.

3. Use of vermicompost and residue wastes in crops.

III. References:

1. Mengel , et al., 2001. Principles of Plant Nutrition (5th Edition), Springer.
2. Yawalkar K.S, Agarwal J. P. and Bokkde, 1992. Manures and Fertilizers. Agri. Horticultural Publishing House, Nagpur.
3. Tandan HLS, 1994. Fertilizers Guide. Fertilizers Development Consultation Organizations, New Delhi.

Seethramaan, S. Biswas, B.C. Maheshwari, S. and Yadav, D.S. 1986 Hand Book on Fertlizers Technology. The Fertilizers Association of India, New Delhi

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HORTICULTURE SEMESTER - V, COURSE – 7C Practical Syllabus

COURSE 7C: SOIL FERTILITY AND NUTRIENT MANAGEMENT

(Skill Enhancement Course (Elective)

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Diagnose nutrient deficiencies in plants.
2. Estimate organic matter, major and minor nutrients in soil.
3. Determine the adulteration of fertilizers.
4. Perform skills related to INM and IPNM.
5. Perform skills related to application of soil amendments.

Practical (Laboratory) Syllabus: (30 hrs)

1. Determination of organic matter (Organic carbon) in soil and interpretations.
2. Determination of available Nitrogen in soil and interpretations.
3. Determination of available P in soil and interpretations.
4. Determination of available K in soil and interpretations.
5. Determination of available S in soil and interpretations.
6. Determination of exchangeable Calcium and Magnesium by Versenate (EDTA) Method.
7. Determination of soil Micronutrients
8. Fertilizer Adulteration test / Identification of Adulteration in fertilizer / Detection of adulteration in fertilizers (Rapid test)
9. Determination of Gypsum requirement of saline and alkali soils.
10. Determination of Lime requirement of acid soils.
11. Use of soil testing kit and use of leaf colour chart for nutrient deficiency diagnosis.
12. Study of various biofertilizers.

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HORTICULTURE SEMESTER - V, COURSE – 6D Theory Syllabus

COURSE 6D: DRYLAND HORTICULTURE

(Skill Enhancement Course (Elective)

I. Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the basic concepts of dryland horticulture and its prospects.
2. Acquire skills in relation to management of soil and water in dryland farming.
3. Demonstrate skills on various methods to check the water loss during farming.
4. Understand the cultivation practices of certain crops suitable for dryland farming.

Syllabus

Unit -1: Introduction to Dryland horticulture (10h)

1. Definition, importance and limitation of dry land horticulture.
2. Present status and future scope. Constraints encounter in dry lands.
3. Agro-climatic features in rain shadow areas, scares water resources, high temperature, soil erosion, run-off losses etc.

Unit -2: Soil and Water Management (10h)

1. Techniques and management of dry land horticulture: watershed development, soil and water conservation methods-terraces, contour bunds, etc.
2. Methods of control and impounding of run-off water-farm ponds, trenches, macro catch pits,etc.
3. *in-situ* water harvesting methods, micro catchment, different types of tree basins etc.

Unit-3: Methods for efficient water use (10h)

1. Methods of reducing evapotranspiration, use of shelter belts, mulches, antitranspirants, growth regulators, etc.
2. Water use efficiency-need based, economic and conjunctive use of water, Micro systems of irrigation etc. IFS concept and alternate land use systems.
3. *in-situ* water harvesting methods, micro catchment, different types of tree basins etc.

Unit-4: Modern methods of irrigation (10h)

1. Characters, special adaptation and cultivation practices of following horticultural crops:

   (a) Ber (b) Annona (c) Pomegranate (d) Tamarind

Unit-5: Water management (10h)

1. Characters, special adaptation and cultivation practices of following horticultural crops:
   (a) Fig (b) Wood apple (c) Marking nut (d) Carambola

III. References:

1. Chadha, K. L. (ICAR)2002, 2001.Hand book of Horticulture. ICAR, New Delhi
2. Chundawat, B.S. 1990. Arid Fruit Culture. Oxford and IBH, New Delhi.
3. P.L. Taroj, B.B. Vashishtha, D.G.Dhandar. 2004. Advances in Arid Horticulture. Internal Book Distributing Co., Lucknow.

T. Pradeep Kumar, B. Suma, Jyothi Bhaskarand K.N.Sathesan. 2008. Management of Horticultural Crops. New India Publishing Agency

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HORTICULTURE SEMESTER - V, COURSE – 6D Practical Syllabus

COURSE 6D: DRYLAND HORTICULTURE

(Skill Enhancement Course (Elective)

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Study the rainfall pattern and water deficit conditions in an area.
2. Perform skills on harvesting and conservation of rain water.
3. Identify the adaptation of plants to dryland areas.
4. Perform skills related to irrigation methods suitable to dryland areas.
5. Perform skills on checking evapo-transpiration.

Practical (Laboratory) Syllabus: (30 hrs)

1. Study of rainfall patterns.
2. Practicing contour bunding and trenching.
3. Studying micro catchments.
4. Studying soil erosion and its control in a dryland area.
5. Study of evapotranspiration and methods to control.
6. Practicing mulching methods.
7. Irrigation systems - Surface, Sub-surface; micro irrigation methods.
8. Study of special techniques of planting and aftercare in dry lands.
9. Study special horticultural practices in dry land plants.
10. Training and pruning in dry land plants.
11. Study of morphological and anatomical features of drought tolerant fruit crops.
12. Study of morphological and anatomical features of salinity tolerant fruit crops.

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HORTICULTURE SEMESTER - V, COURSE – 7D Theory Syllabus

COURSE 7D: PLANTATION CROPS

(Skill Enhancement Course (Elective)

I. Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the characteristics of plantation crops.
2. Realize the contribution of plantation crops in national economy.
3. Explain the soil and climatic requirements of some important plantation crops in India.
4. Demonstrate managerial skills on farming, reaping the products and post-harvest practices in relation to plantation crops.
5. Identify the physiological disorders, pests and diseases of plantation crops.

Syllabus:

Unit -1: Introduction to Plantation crops (10h)

1. Plantation crops: Definition, history and development, scope and importance; Differences between plantation and fruit crops
2. Area and production, export and import potential, role in national and state economy.
3. Important research stations on plantation and beverage crops and their role.

Unit -2: Oil yielding crops (10h)

Soil, climate requirements, varieties, propagation methods, cultivation practices, physiological disorders, pests, diseases and their management, post-harvest technology, yield and economics of:
(a) Coconut (b) Oil palm

Unit-3: Masticatory crops (10h)

Soil, climate requirements, varieties, propagation methods, cultivation practices, physiological disorders, pests, diseases and their management, post-harvest technology, yield and economics of:
(a) Areca nut (b) Betel vine

Unit-4: Beverage crops (10h)

Soil, climate requirements, varieties, propagation methods, cultivation practices, physiological disorders, pests, diseases and their management, post-harvest technology, yield and economics of:
(a) Coffee (b) Cacao

Unit-5: Nut and Industrial crops (10h)

Soil, climate requirements, varieties, propagation methods, cultivation practices, physiological disorders, pests, diseases and their management, post-harvest technology, yield and economics of:
(a) Cashew nut (b) Rubber

III. References:

1. Chadha,K.L. (ICAR)2002,2001.Hand book of Horticulture. ICAR, New Delhi
2. Kumar, N.J.B. M. Md. Abdul Khaddar, RangaSwamy, P. and Irrulappan, I. 1997. Introduction to spices, Plantation crops and Aromatic plants. Oxford & IBH, New Delhi.
3. Meena, S.R. 2020. Production technology for fruit and plantation crops. TNAU, Coimbatore,

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HORTICULTURE SEMESTER - V, COURSE – 7D Practical Syllabus

COURSE 7D: PLANTATION CROPS

(Skill Enhancement Course (Elective)

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify the plantation crops and their varieties.
2. Make layout of orchards of plantation crops.
3. Perform skills on propagation technics of plantation crops.
4. Identify the physiological disorders of plantation crops.
5. Identify the pests and diseases of plantation crops.

Practical (Laboratory) Syllabus: (30 hrs)

1. Identification and description of plantation crops and their varieties.
2. Designing and making layout of orchards.
3. Propagation methods and nursery techniques of plantation crops.
4. Studying physiological disorders of plantation crops.
5. Studying pests of plantation crops.
6. Study of diseases of plantation crops
7. Preparation of plant bio regulators and their uses.
8. Tapping and processing of latex in rubber.
9. Study special horticultural practices in dry land plants.
10. Training and pruning in Plantation crops.
11. Study of morphological and anatomical features of plantation crops.
12. Study of morphological and anatomical features of plantation crops.