Department of Horticulture

ACADEMIC PROGRAMME

Semester wise Course, Credits Allocation and Syllabus according to 6th Dean Committee of ICAR

S. No	Semester	Course code	Course Title	Credit Hours	Total credit hours
1.	I st	HOR-111	Fundamentals of Horticulture	3(2+1)	13+4 (odd+even)
2.	11nd	HOR-121	**Skill Enhancement course-VI** SEC-VI (Horticulture nursery management)	2 (0+2)	
3.	IIIrd	HOR-211	Production Technology of Fruit and Plantation Crops	2 (1+1)	
4.	IV	HOR-221	Production Technology of Vegetables and Spices	2(1+1)	
5.	V	HOR-311	Ornamental Crops, MAPs and Landscaping	2 (1+1)	
6.	VII	HOR -312	Introductory Agroforestry	2(1+1)	
7.	VII	HOR-411 B	***Elective Courses (Indicative)** Hi-tech Horticulture	4 (3+1)	17
			Total	17(9+8)	

1. Fundamentals of Horticulture 3 (2+1)

Objectives

1. To provide knowledge on different branches of horticulture viz. pomology, olericulture, floriculture and landscaping, spices and medicinal plants.
2. To provide knowledge on orchard management, propagation methods, cultural operations and nutrient management of horticultural crops.
3. To provide knowledge on different physiological aspects of horticultural crops.

Theory

Horticulture: Its different branches, importance and scope, Horticulture and botanical classification, soil and climate for horticultural crops. Plant propagation:

methods and propagation structures, seed dormancy and seed germination, Merits and demerits of sexual and asexual propagation ,Stock-scion relationship.

Principles of orchard establishment, principles and methods of training and pruning of fruit crops, Juvenility and flower bud differentiation, unfruitfulness in horticultural crops, pollination, pollinizers and pollinators, fertilization and parthenocarpy, importance of bio regulators in horticultural crops, irrigation and its methods, Fertilizer application in horticultural crops.

Practical

Identification and nomenclature of fruit, Layout of an orchard, pit making and system of planting, Nursery raising techniques of fruit crops, Understanding of plant propagation structures, Propagation through seeds and plant parts, Propagation techniques for horticultural crops, Container, potting mixture, potting and repotting, Training and pruning methods on fruit crops, Layout of different irrigation systems, Maturity studies, harvesting, grading, packaging and storage

Suggested readings

1. Basics of Horticulture by Jitendra Singh
2. Introduction to Horticulture by N. Kumar
3. Handbook of Horticulture by ICAR

2. Production Technology of Fruit and Plantation Crops 2(1+1)

Objectives

1. To educate about the different forms of classification of fruit crops.
2. To educate about the origin, area, climate, soil, improved varieties and cultivation practices of fruit and plantation crops.
3. To educate about the physiological disorders of fruit crops, palms and plantation crops.

Theory

Production status of fruit and plantation crops: Importance and scope of fruit and

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plantation crop industry in India; nutritional value of fruit crops; classification of fruit crops; Area, production, productivity and export potential of fruit and plantation crops. Crop production techniques in tropical, sub-tropical and temperate fruit crops: Climate and soil requirements, varieties, propagation and use of rootstocks, planting density and systems of planting: High density and ultra-high density planting, cropping systems, after care -training and pruning; water, nutrient and weed management, fertigation, special horticultural techniques, plant growth regulation, important disorders, maturity indices and harvest, value addition.

Fruit crops: mango, banana, papaya, guava, sapota, citrus, grape, litchi, pineapple, aonla, pomegranate, apple, pear, peach, strawberry, nut crops Jackfruit and minor fruits- date, ber, plantation crops-coconut, arecanut, cashew, tea and coffee.

Crop production techniques in palms and plantation crops: Climate and soil requirements, varieties, propagation, nursery management, planting and planting systems, cropping systems, after care, training and pruning for plantation crops, water, nutrient and weed management, intercropping, multi-tier cropping system, mulching, special horticultural practices, maturity indices, harvest and yield, pests and diseases, processing- value addition.

Palms: Coconut, Arecanut, Plantation crops: Tea, Coffee, Cocoa, Cashewnut

Practical

Propagation techniques, selection of planting material, varieties, important cultural practices for mango, banana, papaya, guava, sapota, grapes, Citrus (mandarin and acid lime), pomegranate, jackfruit, preparation and application of PGR's for propagation, Micro propagation, protocol for mass multiplication and hardening of fruit crops, Identification and description of varieties, selection, nursery practices, seedling selection, fertilizers application, nutritional disorders, pests and diseases of Coconut, Arecanut and cocoa, Tea and coffee and cashew, Visit to commercial orchard and plantation industries.

Suggested Readings

1. Banday, F.A. and Sharma, M.K.2010 Advances in temperate fruit production. Kalyani Publishers, Ludhiana
2. Bose, T.K., S.K. Mitra and D. Sanyal 2001. Fruits: Tropical and Subtropical (2 volumes) Naya Udyog, Calcutta.
3. Bose, T.K., S.K. Mitra, A.A. Farooqi and M.K. Sadhu (Eds). 1999. Tropical Horticulture Vol.1. Naya Prokash, Calcutta.
4. Chadha, K.L. 2001. Handbook of Horticulture. ICAR, Delhi

5. Chadha, T.R. 2001 Textbook of temperate fruits. ICAR, New Delhi
6. Chattopadhyay, T.K. 2001. A Text Book on Pomology (4 volumes). Kalyani Publishers, Ludhiana.
7. Chattopadhyay. 1998. A textbook on pomology (sub-tropical fruits) vol.III. Published by M/s. Kalyani publishers, Ludhiana, New Delhi, Noida. UP.
8. Chudawat, B. S.1990. Arid fruit culture Oxford &IBH, New Delhi
9. Das, B.C. and Das S.N. Cultivation of minor fruits. Kalyani Publishers, Ludhiana
10. David Jackson and N.E. Laone, 1999. Subtropical and temperate fruit production. CABI publications
12. Kumar, N. 1997. Introduction to Horticulture. Rajalakshmi Publications, Nagercoil, Tamil Nadu.
13. Mitra, S.K., T.K. Bose and D.S. Rathore. 1991. Temperate fruits. Horticulture and allied Publishers, Calcutta.
14. Pal, J.S. 1997. Fruit Growing. Kalyani Publishers, New Delhi.

3. Production Technology of Vegetables and Spices 2(1+1)

Objectives

1. To educate about the different forms of classification of vegetables.
2. To educate about the origin, area, climate, soil, improved varieties and cultivation practices of vegetables and spices.
3. To educate about the physiological disorders of vegetables and spices.

Theory

Importance of vegetables and spices in human nutrition and national economy, kitchen gardening, brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders of important vegetable and spices (tomato, okra, brinjal, chili, capsicum, cucumber, bitter gourd , bottle gourd, sweet potato, pumpkin, French bean, peas; cole crops such as cabbage, cauliflower, knol-khol; bulb crops such as onion, garlic; root crops such as carrot, radish, beetroot; tuber crops such as potato; leafy vegetables such as amaranth, palak, perennial vegetables, spice crops like turmeric, zinger, coriander, cumin, black pepper, cardamom, fenugreek..

Practical

Identification of vegetables and spice crops and their seeds.. Propagation methods - rapid multiplication techniques - seed collection and extraction. Nursery raising. Direct seed sowing and transplanting. Study of morphological characters of different vegetables and spices. Fertilizers applications. Harvesting and post-harvest practices, , visit to spice gardens.

Suggested readings

1. Olericulture, Fundamentals of Vegetable Production (Vol.1) by K.P. Singh, Anant Bahadur
2. Vegetable crops by J. Kabir, T.K. Bose, M.G. Som
3. Vegetable crops (Production technology, Vol II) by M.S. Fagaria, B.R. Choudhury, R.S. Dhaka

4. Ornamental Crops, MAPs and Landscaping 2(1+1)

Objectives

1. To educate in detail about origin, area, climate, soil, improved varieties production technology of flowers and MAPs
2. To educate about concept, designing principles and components of landscaping
3. To educate about the physiological disorders of commercial flowers
4. To educate about the post-harvest management and value addition in flower crops and MAP

Theory

Importance and scope of ornamental crops; medicinal and aromatic plants and landscaping. Production technology of ashwagandha, isabgol, mint, aloe, ocimum, Periwinkle etc.; Production technology of plants like lemongrass, citronella, vetiver and palmarosa etc., Principles of landscaping; Landscape uses of trees, shrubs and climbers, Production technology of rose, gerbera ; gladiolus, tuberose chrysanthemum, marigold, carnation and Jasmine; Brief concept of Home landscaping, Carpet bedding, Topiary, Bonsai, Lawn, flower arrangement, Herbaceous Border, Hedge, Edge etc.

Practical

Identification MAPs and Ornamental plants (trees, shrubs, climbers, seasonal flower and house plants). Propagation of MAP, Bed preparation and planting of

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MAP; Nursery bed preparation and sowing of seasonal flower seeds; Propagation of ornamental plants by terminal/herbaceous cuttings; Establishment and maintenance of lawn; Training and pruning of ornamental plants and raising of hedge and edge; Planning and layout of garden.

Suggested readings

1. Floriculture in India by G.S. Randhawa and Mukopadhyay
2. Introduction to spices, plantation crops, medicinal and aromatic plants by N. Kumar, Abdul Khadder, P. Rangaswamy, I. Irulappam
3. Textbook of floriculture and landscaping by Anil K. Singh and Anjana Sisodia
4. Commercial flowers (Vol 1 and 2) by T.K. Bose.

5. Introductory Agro forestry **2 (1+1)**

Objectives

1. To study Agro forestry as an alternate system of land use
2. To study different types of Agro forestry for soil and water conservation.
3. To study the characteristics of Agro forestry in terms it's potential for soil moisture conservation practices.

Theory

Agro-forestry: Definition and scope of Agroforestry system, Type of Agroforestry system, potential of Agroforestry in India, Prevailing agroforestry system in India;. Management of Agro-forestry system; Role of agroforestry in soil and water conservation; windbreak; Shelterbelt - definition, objectives.; Socio- economic aspects of Agroforestry system; Silviculture: Definition and scope, Propagation of tree species, Regeneration by seed, coppice, root suckers, Transplanting, stump, branch cutting; Nursery bed preparation and management; Silviculture of important tree species. Horticulture and forage crops-based agroforestry models developed by ICAR-IGFRI; Agroforestry models developed by Indian council of Forestry Research and Education.

Practical

Identification of tree species in agro-forestry, , Plant propagation methods, Pre-sowing seed treatment, Preparation of nursery bed exercise, practicing propagation techniques for trees, Afforestation method, practical training, pruning, coppicing,

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pollarding etc., natural and artificial regeneration, Virtual visit of agroforestry models developed by ICAR-IGFRI, ICFRE.

Suggested readings

1. Nair, P.K. R. 1993. An Introduction to Agroforestry, Kluar Academic Publisher
2. Chundawat D. S. and S.K. Gautham. 2017. Textbook of Agroforestry. Oxford & IBH Publishing, (ISBN: 9788120408326)
3. Parthiban, K. T, N. Krishnakumar and M. Karthick. 2018. Introduction to Forestry, Scientific Publisher, Jodhpur. 350p
4. Divya M. P. and K. T. Parthiban. 2005. A Textbook on Social Forestry and Agroforestry. Satish Serial Publishing, New Delhi (ISBN: 9384988952).

Elective course

6. Hi-tech Horticulture **4 (3+1)**

Objectives

1. To educate the students on the latest technology of hi-tech horticulture.
2. To educate students on the concepts and prospects of hi-tech horticulture.

Theory

Introduction and importance; Nursery management and mechanization; micro propagation of horticultural crops; Modern field preparation and planting methods; Protected cultivation: advantages, controlled conditions, method and techniques; Micro irrigation systems and its components; canopy management; high density orcharding; Components of precision farming: Remote sensing; Geographical Information System (GIS); Differential Geo-positioning System (DGPS); Variable Rate Applicator (VRA); application of
precision farming in horticultural crops (fruits, vegetables and ornamental crops); mechanized harvesting of produce.

Practical

Types of polyhouses and shade net houses, Intercultural operations, Micro propagation, Nursery- portrays, micro-irrigation, canopy management, visit to hi-tech orchard/nursery.

Suggested readings

1. Hi-tech Horticulture by T.A. More.

2. Greenhouse Operation and Management by Paul V. Nelson.
3. Hi Tech Horticulture (Pb) by S. Prasad, Dharam Singh and R.L. Bharadwaj. Agrobios
4. Instant Horticulture by S.N. Gupta. Jain Brothers. 488p.
5. Hydroponics for Beginners and Advanced: The Ultimate Hydroponic and Aquaponic Gardening Guide by Tom Garden, Webb Eleanor

7. **SKILL ENHANCEMENT COURSE (SEC):**

Horticulture nursery management **2(0+2)**

1. Plant Nursery Introduction – Definition, importance seedling supply chain, guideline for nursery raising.
2. Components of good nursery, nursery layout, inputs – container, nursery media, propagules, water fertilizers, chemical tools, equipments and machinery, input management – mother bed and sunken bed.
3. Plant propagating structures- introduction, green house, shade net house.
4. Plant propagation - sexual and asexual methods of propagation, Advantage and disadvantage. Grafting , Budding, Air layering, micro-propagation.
5. Quality of seedling- BIS, General quality standards for nursery plants, quality propagules production .