



SCHOOL OF AGRICULTURE

DIPLOMA IN HORTICULTURE

Syllabus

2022

VISTAS - SCHOOL OF AGRICULTURE

Syllabus of Diploma in Horticulture (Applicable to the students admitted from 2022)

SEMESTER WISE COURSES

I year I Semester			
Sl. No.	Course No.	Course Title	Credit hours
1.	FSC H 101	Principles of Horticulture	2+1
2.	FSC H 102	Plant propagation and Nursery management	1+1
3.	AGR H 101	Principles of Agronomy and Agricultural Meteorology	1+1
4.	AGR H 102	Irrigation and Weed Management in Horticultural crops	1+1
5.	SAC H 101	Basics of Soil Science and Nutrient Management	1+2
6.	ENG X 101	Agricultural Engineering practices for Horticultural crops	0+1
7.	COM X 101	English Language and Computer Applications*	0+1
8.	PED X 101	Physical Education **	0+1
		Total Credits	6+9=15
		*Team teaching by Computer Science and English	
		**Continued in the II Semester	
I year II Semester			
1.	FSC H 103	Production Technology of tropical and subtropical fruit crops	2+1
2.	FSC H 104	Production Technology of temperate fruit crops	1+1
3.	VSC H 101	Production Technology of Vegetable crops	2+1
4.	AEN H 201	Fundamentals of Entomology	1+1
5.	PAT H 202	Fundamentals of Pathology	1+1
6.	VSC H 102	Crop Production – 1 (Vegetable crops)	0+2
7.	HOR H 101	Study Tour – I	0+1
8.	PED X 101	Physical Education*	-
		Total Credits	7+8=15

I year III Semester			
1.	FLG H 101	Production Technology of Flower crops	2+1
2.	VSC H 202	Protected cultivation of Horticultural crops	1+1
3.	FSC H 105	Dryland Horticulture	1 + 1
4.	AEN H 202	Pests and their Management in Horticultural crops	1+1
5.	PAT H 202	Diseases and their Management in Horticultural crops	1+1
6.	SST H 201	Seed Production Techniques in Horticultural Crops	1+1
7.	VSC H 202	Crop Production – II (Flower crops)	0+2
8.	HOR H 211	Commercial Horticulture - I	0+2
		Total Credits	7+10 =17
II year IV Semester			
1.	FLG H 202	Ornamental gardening and Landscaping	1+1
2.	MAP H 201	Medicinal and Aromatic crops production technology	1+1
3.	SPP H 201	Spice and Plantation crops Production Technology	2+1
4.	HOR H 203	Hi-Tech horticulture	1+1
5.	AMP H 201	Fundamentals of Livestock and Poultry Management	2+1
6.	AEC H 201	Agricultural Economics, Marketing and Finance	0+1
7.	AEX H 201	Extension Methods for transfer of Agricultural technologies	0+1
8.	HOR H 204	Practical training in Hill Horticultural crops	0+1
9.	HOR H 205	Study Tour – II	0+1
10.	HOR H 212	Commercial Horticulture II	0+2
		Total Credits	7+11=18
		Grand total	27+38=65

Note: PED X 101 course offered from first semester is registered in second semester and evaluation will be done at the end of second semester

I year I Semester

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3.	AGR H 101	Principles of Agronomy and Agricultural Meteorology	1+1
4.	AGR H 102	Irrigation and Weed Management in Horticultural crops	1+1
5.	SAC H 101	Basics of Soil Science and Nutrient Management	1+2
6.	ENG X 101	Agricultural Engineering practices for Horticultural crops	0+1
7.	COM X 101	English Language and Computer Applications*	0+1
8.	PED X 101	Physical Education **	0+1
		Total Credits	6+9=15
		*Team teaching by Computer Science and English	
		**Continued in the II Semester	

FSC H 101 - Principles of Horticulture (2+1)

COURSE OBJECTIVES

1. To understand the basic knowledge of horticulture crop cultivation
2. To impart knowledge on special practices in horticultural crops

THEORY

Horticulture – definition- scope and importance- nutritive value of horticultural crops - uses and health benefits- horticultural zones in India and Tamil Nadu - division and classification of horticultural crops - fruit, vegetable, spice, plantation, medicinal, aromatic, commercial flowers, landscape gardening and ornamental crops- propagation – cultivation methods of horticultural crops – irrigation methods – intercultural operations - special horticultural practices – maturity indices - harvesting methods and post-harvest practices – storage – cold chain

PRACTICAL

Identification of horticultural crops – fruits, vegetables, spices, plantation, medicinal, aromatic, flowers and ornamental crops – tools and implements - propagation methods- nursery techniques - layout for horticultural crops - field preparation – planting methods - training and pruning - irrigation methods - fertilizer application methods - calculation of fertilizer dose - weed management - special horticultural practices – maturity indices – harvest- post harvest practices, storage

COURSE OUTCOMES

1. The students will acquire the basic knowledge of horticulture crops cultivation
2. Students get hands on experience in propagation and special horticultural practices in horticultural crops

REFERENCES

1. Kumar, N. 2018. (8th Edition) Introduction to Horticulture, Scientific International Pvt. Ltd., New Delhi
2. Sharma, R.R.2005.Propagation of Horticultural Crops – Principles and Practices, Kalyani Publishers, New Delhi
3. Chadha. K.L. 2003. Handbook of Horticulture. ICAR Publications
4. <https://agritech.tnau.ac.in/>

FSC H 102 - Plant propagation and Nursery management (1+1)

Course objectives

1. To impart basic knowledge on plant propagation and nursery management of horticultural crops
2. To obtain knowledge on various plant propagation structures

THEORY

Importance of plant multiplication - site selection - nursery management - media and containers - soil sterilization – media preparation - manures and manuring - protray culture - mist chamber – humidifiers – greenhouses - glasshouses - cold frames, hot beds, poly-houses, phytotrons - tools and implements. Importance, advantages and disadvantages of sexual propagation – seed dormancy - types of dormancies - use of growth regulators in seed - - apomixis – types of apomixis - mono and polyembryony. Vegetative propagation - importance, advantages and disadvantages - methods of vegetative propagation – cutting – types of cutting - layering - methods of layering – grafting and budding - methods of grafting and budding. Propagation through specialized organs and micro-propagation.

PRACTICAL

Media for propagation of plants in nursery beds, potting and repotting. Preparation of nursery beds and sowing of seeds. Raising of rootstock. Seed treatments for breaking dormancy and inducing vigorous seedling growth. Preparation of plant material for potting. Hardening plants in the nursery. Practicing different types of cuttings, layering, grafting's and buddings including top grafting and bridge grafting etc. Use of mist chamber in propagation and hardening of plants. Preparation of plant growth regulators for seed germination and vegetative propagation. Visit to a tissue culture laboratory. Digging, labelling and packing of nursery fruit plants. Maintenance of nursery records. Use of different types of nursery tools and implements for general nursery and virus tested plant material in the nursery. Cost of establishment of a mist chamber, greenhouse, glasshouse, polyhouse and their maintenance. Nutrient and plant protection applications during nursery

Course outcomes

1. To get basic knowledge on plant propagation and multiplication
2. To learn practical experience on nursery development and maintenance

References

1. Hudson T. Harmann, Dale E. Kester, Fred T. Davies, Jr. and Robert L. Geneve. Plant Propagation – Principles and Practices (7th Edition). PHI Learning Private Limited, New Delhi – 110001
2. T. K. Bose, S. K. Mitra, M. K. Sadhu, P. Das and D. Sanyal, Propagation of Tropical & Subtropical Horticultural crops, Volume 1 (3rd Revised edition). Naya Udyog, 206, Bidhan Sarani, Kolkata 700006.
3. Guy W. Adriance and Feed R. Brison, Propagation of Horticultural Plants, Axis Books (India).
4. Chandha, K. L. (ICAR) 2002, 2001. Hand book of Horticulture. ICAR, New Delhi.

AGR H 101- Principles of Agronomy and Agricultural Meteorology (1+1)

Course objectives

- Basic principles and concepts of agronomy are explained to the students in detail since it is a basic subject which assumes significance in agriculture.
- To form basis for further learning of other agronomy courses in subsequent semesters.
- To expose students to the importance and scope of meteorology in agriculture.

Theory

Agriculture - Definition - Scope of agriculture in India and Tamil Nadu - Branches of Agriculture - Agronomy - Agronomic Classification of Crops - Principles and practices of agricultural operations - Tillage - Intercultural Operations, Implements and tools in Agriculture - Cropping Systems - Principles - Merits and demerits - Agroforestry Systems - Seeds and Sowing - Seed treatment - Optimum plant population - Crop geometry - Nursery - Transplanting - After cultivation - Manures and fertilizers - Methods of application - Harvesting - Meteorology - Agricultural Meteorology - Weather parameters and their role in crop production - Precipitation- Weather aberrations- Drought- Agro Climatic Zones of Tamil Nadu

PRACTICAL SCHEDULE

Identification of crops - Agro eco system - Acquiring skill and Practicing tillage implements and special purpose implements - Learning and acquiring skills in seed treatment - Practicing sowing and transplanting - Practicing application of organic manures and green manures - Inorganic fertilizers identification - Practicing various method of fertilizers - Fertilizer requirement calculation - Practicing earthing up - Measurement of growth and yield components - Visiting agromet observatory - Handling rain gauge, maximum, minimum, dry and wet bulb thermometers - Study of wind vane and anemometers - Evaporimeter - Collection of historic rainfall and temperature data - Computing mean of rainfall data and temperature data -Forecasts- Agro advisories

Course outcomes

1. The course syllabus emphasizes practical experience on various principles and practices involved in agronomy and agricultural meteorology.
2. Students will certainly be benefited and gain confidence to become a successful entrepreneur in agriculture.

References

Yellamananda Reddy, T. and G.H. SankaraReddi. 2014. Principles of Agronomy. Kalyani Publishers, New Delhi.

Mavi, H.S. 1996. Introduction to Agrometeorology, oxford and IBH Publishing Co., New Delhi.

AGR H 102- Irrigation and Weed Management in Horticultural crops (1+1)

Course objectives

- To acquire knowledge on importance of water management in agriculture and develop skills on various aspects of water saving technologies to produce more yield per unit of water.
- To understand the significance of weed management in crop production and develop skills on various weed management practices to major field crops to get higher productivity.

THEORY

Role of water in plant growth - Water resources and irrigation potential of Tamil Nadu - Importance of irrigation - Soil moisture constants - Permanent Wilting Point, Field capacity, Available Soil moisture and Saturation - Crop water requirement- Factors affecting water requirement - Critical stages for irrigation and water requirement of crops - Water use Efficiency - Methods of irrigation: surface, sub-surface sprinkler and drip irrigation - Micro irrigation: layout, suitability, merits and scope - Water management for different field crops - Quality of irrigation water - Agronomic practices for use of poor quality water (saline, effluent and sewage water) for irrigation.

Weeds - Definition, classification and characteristics, harmful and beneficial effect of weeds - Classification and characteristics of weeds of different agro ecosystems-lowland weeds, irrigated upland and rainfed land weeds - Classification and characteristics of weeds - Aquatic, parasitic and obnoxious weeds - Crop weed interactions - Critical crop weed competition, competitive and allelopathic effects of weeds and crops. - Principles and methods of weed management: Preventive, cultural, mechanical, chemical, biological and alternate methods - Classification and characteristics of herbicides and herbicide formulations - Integrated weed management practices for major field crops - Weed management practices for parasitic and problematic weeds

PRACTICAL

Measurement of irrigation water through water measuring devices (flumes and weirs) - Calculation of irrigation water requirement (problems) - Acquiring skill in land shaping for different surface irrigation methods - Operation and economics of sprinkler and drip irrigation systems - Scheduling of irrigation based on different approaches - On-farm irrigation structures - Visit to irrigation command area (Reservoirs and tanks) and water management institutes. Identification, classification and characterization of weeds of different eco-system - Practicing Skill development on cultural and non chemical weed management - Identification of herbicides and their usage and method of application - Practicing Skill development on herbicide application techniques - Practicing skill development on spray equipment's and spray fluid calibration - Calculation of different weed indices - Calculation of herbicide quantity and recommendation for different eco systems - Practicing skill development on mechanical methods of weed control using different types of weeders .

Course Outcomes

1. Students acquire theoretical knowledge and practical experience for increasing water use efficiency in agriculture
2. Students learn effective weed management practices to get higher crop productivity.

References

1. Michael, A.M. 1997. Irrigation: Theory and Practice Vikas Publishers
2. Prihar, S.S. and B.S. Sandhu. 1987. Irrigation to field crops: Principles and Practices. ICAR Publication.
3. Sankara Reddy, G.H. and T. Yellamanda Reddy. 1997. Efficient use of irrigation water. Kalyani Publishers
4. JaganathanR., and R.Jayakumar. 2003. Weed Science Principles, Kalyani Publishers, New Delhi.
5. Rao, V. S. 1983. Principles of Weed Science. Oxford and IBH Publishing Co. New Delhi.
6. Subramanian, S. A. Mohammed Ali and R. Jayakumar. 1991. All about Weed Control. Kalyani Publishers, New Delhi.

SAC H 101- Basics of Soil Science and Nutrient Management (1+2)

Course objectives

1. To impart basic knowledge about soil, its physical and chemical properties
2. To impart knowledge on soil fertility and nutrient availability
3. To understand the role of fertilizers and manures in nutrient supply to plants for better fertilizer use efficiency

THEORY

Soil - composition - Soil physical properties - Colour, Texture, Structure, Bulk density, Pore space, Soil water, Soil air, Soil temperature. Soil chemical properties - Soil pH and EC. - Soil Organic Matter and its importance on soil properties. Soils of Tamil Nadu. Problem soils - Physical constraints and their management - chemical constraints - Acid, saline and sodic soils - Management aspects - Irrigation water quality - Management of poor quality water.

Plant nutrients - Primary, secondary and micronutrients - Manures and fertilizers - Nitrogenous, Phosphatic and Potassic fertilizers - Secondary and micronutrient fertilizers - Mixed fertilizers and water soluble fertilizers - Nutrient use efficiency - methods of fertilizer application - INM - Soil testing and fertilizer recommendations.

PRACTICAL

Soil profile - Master horizon identification - Soil sample collection - Determination of soil texture by feel method - Bulk density, particle density and pore space - Determination of soil moisture - soil colour - Analysis of soil pH and EC - Determination of gypsum requirement for sodic soils - Irrigation water quality analysis and interpretation of data. Identification and application methods of manures and fertilizers. Identification of nutrient deficiencies symptoms in crops - Working out fertilizer requirement for straight and complex fertilizers, INM, organic agriculture - fertilizer recommendation based on STCR equation - Demonstration of DSSIFER and VDK softwares - Preparation of nutrients formulations for foliar spray - Preparation of enriched FYM and MN mixtures - Preparation of slow release fertilizers - Visit to compost unit / fertilizer mixing unit.

Course outcomes

1. Basic knowledge about Soil Science, its important physical and chemical properties. Importance of soil constituents on soil properties. Knowledge about problem soils and weed management.
2. Imparting knowledge on the essentiality of nutrients, soil fertility management, fertilizer recommendation and nutrient use efficiency.

References

1. Dilip Kumar Das. 2004. Introductory Soil Science, Kalyani Publishers, New Delhi.
2. Sahai, V.N. 2008. Fundamentals of Soils. Kalyani Publishers, New Delhi.
3. John Havlin, James Beaten, Samuel Tisdale, Werner Nelson, 2005.
Soil Fertility and Fertilizers - An introduction to nutrient management. 7th Edition,
Prentice Hall. Upper Saddle River, NJ.
4. Singh. S.S.1996. Soil Fertility and Nutrient Management. Kalyani Publishers. New
Delhi

ENG X 101 - Agricultural Engineering practices for Horticultural crops (0+1)

Course objective

1. To acquire knowledge on agricultural Processing equipment
2. To give hands on practice to understand important concept and practices of irrigation, and farm machinery, their use in agriculture and their operation

Practical

Farm Power and Machinery

Mechanization and its advantages and constrains. Farm power sources - Tractor, its controls and operation. Procedure for operating tractor and Power tiller. Tillage - objectives - type of tillage - ploughing methods - animal drawn tillage tools. Chisel plough, Mould board plough, disc plough. Secondary tillage - purpose- equipment for secondary tillage -cultivators, harrows and rotary tillers- their operation. Land shaping with levellers, ridgers and bund formers. Planting machines- tractor drawn seed drills and planters- their calibration and operation. Mechanization of rice cultivation- tractor and power tiller operated puddlers. Rice transplanting- raising rice nursery and use of transplanters. Weeding tools- manual long handled weeders for wet and dry land operation. Use of power operated weeders. Plant protection equipment- manual and power operated equipments- their operation and safe pesticide and weedicide application practice. Harvesting and threshing of crop, principle of operation of combine harvester.

Machinery used in mechanization of horticulture - auger diggers, vegetable nursery machine- machinery for lawn and garden maintenance, fruit harvesters, coconut tree climbers.

Agricultural Process Engineering

Physical properties of grains- size, bulk density. Importance and determination of moisture content of gains. Study of grain drying methods and grain drying practice using mechanical drying. Grain cleaning- exercises in operating winnower, and cleaner cum graders. Shelling and de-husking, practice with ground nut sheller. Paddy parboiling and milling- visit to mechanized rice mill. Operation of dhal mill and millet mill. Oil milling- operation of oil mill- visit to oil mill. Grain storage, methods of storing grains and exercise in study of quality of stored grain.

Irrigation Engineering

Measurement of agricultural land and understanding documents relating to land. Conventional irrigation practice- measuring irrigation water requirement. Methods of conserving and using water for irrigation, irrigation requirement based on soil moisture. Drip irrigation and fertigation systems, their layout- measuring discharge of dripper- maintenance and operation of drip and sprinkler irrigation systems. Study of different types of well. Irrigation structures. Agricultural pump and its operation and maintenance. Green house and its principles- visit to green house and study of its operation. Farm structures for housing animals, and waste disposal structures.

Renewable Energy

Bio gas plant- types, technique for proper operation of biogas plant. Solar electric pump system used in agriculture, study of electric fence. Study of gassifier and improved Chula. Application of biomass as energy source for agricultural operations. Exercise in use of solar tunnel dryers for drying agricultural produces.

Course outcomes

1. The students will gain experience in application of agricultural Engineering practices on the farm.
2. The student will be able to carry out simple operations in irrigation, operation of farm machinery, processing equipment and, renewable energy gadgets on the farm.

References

1. Jagdishwar Sahay. 2010. Elements of Agricultural Engineering. Standard Publishers and Distributors. Delhi.461 p. ISBN: 81-8014-044-X.
2. ChakravertyAmalendu and Paul Singh R. 2014.,Post-harvest technology adn food process engineering , CRC Press ISBN-13: 978-1-4665-5321-7
3. Sahay KM and Singh KK , 2001.,Unit operations of Agricultural Processing. Vikas Publishing House Pvt.Ltd.

COM X 101 - English Language and Computer Applications (0+1)

Course objectives

1. To make the students competent in day-to-day and Professional Communication skills
2. To understand about use of computer and to learn basic computer applications
3. To understand the basics of computers and its applications
4. To understand the basics of MS Word, MS Excel and MS PowerPoint

PRACTICAL

Listening: Listening Cloze (Comprehension) - Note Taking. Speaking: Self Introduction - Short Speech (Impromptu) - Welcome Address & Vote-of-Thanks. Reading: Reading Techniques - SQ4R - Skimming and Scanning. Writing: Paragraph Writing - Essay Writing - Letter Writing - Précis Writing. Integrated skills: Group Discussion - Resume writing - Interview Skills.

Course outcomes

1. The students will be familiarized with LSRW Skills -Speaking, Listening, Reading and Writing Skills in English and improve their presentation skills.
2. Students will have basic understanding of computers and its applications. They will acquire knowledge about the basic office packages, internet and agricultural websites.

REFERENCES

1. Hariharan,S, Sundararajan.N. Suresh.M. &Thangaraj.K. & et al., English for Effective Communication. Coimbatore, Thannambikkai publications, 2014. Third edition.
2. Hariharan.S, Sundararajan.N, Shanmugapriya.S.P. (2010), Soft Skills, MJP Publishers, Chennai- Republished at 2017.

Computer Applications

Practical

Computer Definition: Hardware - Input devices, Output devices, CPU, Memory concepts. Software Definition: System software & Application software; Operating System - Basics of GUI - Windows OS; Application Software - Basics of Open Source Software - Office package. Internet Definition - Applications of Internet; World Wide Web and Web Browsers, Search Engines; Basics of Computer networks - LAN, WAN and MAN; Wireless network - Wi-Fi. Connecting to internet; URL; Domain name; IP Address; Website Definition - Agricultural Websites - Agritech portal. Basics of Email: Sending and Receiving mails.. Introduction to MS Office: MS Word - opening, closing, saving and printing of documents; Text creation and formatting; Table handling- insertion, deletion, alignment; Find and replace; Spell check. MS Excel - opening, saving and closing spreadsheet. Formulas: Sum, Average, Count, Min and Max; Charts - line, bar and pie chart/graph. MS PowerPoint - creating, opening and saving a presentation; Working with slides; Insert: picture, clipart, smart art and shapes; Slide view; Animations – slide and text transition.

References

- Computer Basics: Absolute Beginners Guide, Michael Miller, 8th Edition, Que Publication
- Learning Computer, Fundamentals, MS Office and Internet & Web Technology, Third Edition, Firewall Media Publication

I year II Semester			
9.	FSC H 103	Production Technology of tropical and subtropical fruit crops	2+1
10.	FSC H 104	Production Technology of temperate fruit crops	1+1
11.	VSC H 101	Production Technology of Vegetable crops	2+1
12.	AEN H 201	Fundamentals of Entomology	1+1
13.	PAT H 202	Fundamentals of Pathology	1+1
14.	VSC H 102	Crop Production – 1 (Vegetable crops)	0+2
15.	HOR H 101	Study Tour – I	0+1
16.	PED X 101	Physical Education*	-
		Total Credits	7+8=15

FSC H 103 - Production Technology of tropical and subtropical fruit crops (2+1)

Course objectives

1. To acquire knowledge on the production and postharvest techniques of tropical and subtropical fruit crops
2. To impart hands on experience on propagation techniques, special horticultural practices and harvesting of tropical and subtropical fruit crops

THEORY

Scope and importance- classification of tropical and sub-tropical fruits including genome classification - tropical and sub-tropical zones of India and Tamil Nadu – area and Composition and uses – origin and distribution – species and cultivars - climate and soil requirements - propagation techniques –rootstocks- main field preparation – spacing, planting density -cropping systems-after care - nutrients, water and weed management - training and pruning –special horticultural techniques including use of plant growth regulators - physiological disorders and remedies -maturity indices and harvesting, grading, packing and storage of Mango, Banana, Guava, Papaya, Sapota, Grape, Citrus, Jack fruit, Avocado, Pineapple, Mangosteen, Litchi, Loquat, Rambutan, Carambola, Durian, Bilimbi, Passion fruit, Breadfruit and Rose apple

PRACTICAL

Description and identification of varieties based on flower and fruit morphology in above crops. Training and pruning of grapes, mango, guava and citrus. Selection of site and planting system, pre-treatment of banana suckers, desuckering in banana, sex forms in papaya. Use of plastics in fruit production. Visit to commercial orchards and diagnosis of maladies. Manure and fertilizer application including bio-fertilizer in fruit crops, preparation and application of growth regulators in banana, grapes and mango. Seed production in papaya, latex extraction and preparation of crude papain. Ripening of fruits, grading and packaging, production economics for tropical and sub-tropical fruits. Mapping of arid and semi-arid zones of India. Botanical description and identification of ber, fig, jamun, pomegranate, carissa, phalsa, wood apple, West Indian cherry, tamarind, aonla, bael and annona.

Course outcomes

1. Learn about the importance, nutrition and production status of tropical and subtropical fruits
2. Acquire knowledge and practical experience on production technology of tropical fruits
3. Gain knowledge and practical experience on production technology of subtropical fruit crops

4. Demonstrate various propagation methods, important cultural practices and harvesting of tropical and subtropical fruits
5. To gain practical experience on training and pruning in tropical and subtropical fruits

References

1. Bose, T. K. 1996. Fruits of India – Tropical and sub – tropical. Nayaprakash, Calcutta
2. Bose, T. K. S. K. Mitra, and D. S. Rathore. 1998. Temperate Fruits - Nayaprakash, Calcutta
3. Bose, T.K., S.K. Mitra and D. Sanyal 2001, Fruits: Tropical and Subtropical (2 volumes) NayaUdyog, Calcutta.

FSC H 104 - Production Technology of temperate fruit crops (1+1)

Course objectives

1. To impart knowledge about the scope, importance, classification, area and production of temperate fruits
2. To study the cultivation practices of temperate fruit crops

THEORY

Scope, importance, classification, area and production of temperate fruits -areas, production, varieties, climate and soil requirements, propagation, planting density, cropping systems, after care training and pruning, self-incompatibility and pollinisers, use of growth regulators, nutrient and weed management, harvesting, post-harvest handling and storage, physiological disorders, important insect – pests and diseases and their control measures of apple, pear, peach, apricot, plum, **strawberry, sweet and sour cherry, black and raspberry, currants, apricot, kiwi, persimmon, Olive, Almond, walnut, pecan nut, pistachio nut , Macadamia nut, chest nut and hazel nut.**

PRACTICAL

Nursery management practices, description and identification of varieties of above crops, manuring and fertilization, planting systems, preparation and use of growth regulators, training and pruning in apple, pear, plum, peach and nut crops. Visit to private orchards to diagnose maladies. Working out economics for apple, pear, plum and peach.

Course outcomes

1. Learn about the Scope, importance, classification, area and production of temperate fruits
2. Acquire knowledge and practical experience on production of temperate fruits
3. Learn about the postharvest technology of temperate fruit crops
4. Gain knowledge and experience on HDP and UHDP in temperate fruits
5. Demonstrate various propagation methods, important cultural practices and processing techniques of temperate fruit crops

References

1. Veeraragavathatham, D., M. Jawaharlal, S. Jeeva and S. Rabindran 1996. Scientific Fruit culture, Suri Associates, Coimbatore
2. Bose, T. K. S. K. Mitra, and D. S. Rathore. 1998. Temperate Fruits - Nayaprakash, Calcutta
3. Chadha, K.L. 2001. Handbook of Horticulture. ICAR, Delhi

4. Dewasish Choudary and Amal Mehta, 2010. Fruit crops, Oxford book company, USA
5. David Jackson, Norman Looney, Michael Moorely, Bunker and Graham Thiele. 2011. 3rd edition. Temperate and Sub tropical fruit production, CABI Publishing, U.K.

PAT H 202 - Fundamentals of Pathology (1+1)

Course objectives

1. To study the basic concepts of Plant Pathology and causes of plant diseases
2. To know about pathogenesis and plant defense mechanisms
3. To study the general characters and classification of fungal kingdom Protozoa
4. To study the general characters and classification of Phylum Ascomycota and basidiomycota
5. Study of general characters of bacteria, virus, virusoids, algae.

THEORY

Plant Pathology- Definition – Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology. Causes and classification of plant diseases. Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa and phanerogamic parasites. Koch's postulates- Types of parasitism- Pathogenesis - Mode of infection – pre-penetration, penetration and post penetration - Role of enzymes and toxins on disease development-Effect of pathogen on physiological functions of the plants

PRACTICAL

Acquaintance with light microscope- Preparation of media for isolation and proving Koch's postulates- General characters of fungi – Types of mycelia -Types of vegetative, asexual and sexual spores- asexual and sexual fruiting bodies- Study of important taxonomic characters and symptoms produced by *Plasmodiophora*, *Pythium* and *Phytophthora*. Field visit for exposing students on different crop diseases- Study of important taxonomic characters and symptoms produced by *Ustilago*, *Sphacelotheca (Sporisorium)*, *Tolyposporium (Moesziomyces)*, and *Exobasidium*- Study of important taxonomic characters of *Agaricus*, *Pleurotus*, *Calocybe* and *Volvariella*- Study of important taxonomic characters and symptoms produced by *Athelium*, *Thanetophorus* and *Ganoderma*- Symptoms of bacterial diseases – leaf blight, leaf streak, canker, scab, crown gall, wilt and soft rot- Symptoms and vectors of viral diseases – mosaic, chlorosis, leaf curl, stem pitting, spotted wilt, necrosis, ring spot, vein clearing, leaf crinkle, rosette and bunched top- Symptoms of *Candidatus Phytoplasma*, Algae, Phanerogamic parasites and non-parasitic diseases

Course outcomes

1. Aware of basic principles of plant pathology, causes and importance of crop diseases.
2. Having knowledge of pathogenesis and plant defence mechanisms.
3. Having in depth knowledge of fungal kingdom protozoa.
4. Having in depth knowledge of phylum Ascomycota and Basidiomycota.
5. Knowing the general characters of bacteria, virus, virusoids and algae

References

1. Alice D, and Jeyalakshmi C 2014. Plant Pathology. A.E Publications ,Coimbatore
2. Agrios, G.N. 2005. Plant Pathology – (5th Edition). Academic Press, New York.
3. Kirk, P.M., P.F. Cannon, D.W. Minter and J.A. Stalpers, (2008). Ainsworth and Bisby's dictionary of fungi , 10th edition. CAB international Wallingford, UK.

VSC H 102 - Crop Production – 1 (Vegetable crops) (0+2)

Course objectives

1. To learn and acquiring skill on the package of practices of vegetable crops
2. To acquire practical knowledge on cultural practices in vegetable crops

Practical

Preparation of raised nursery bed - Seed treatment - container sowing - pest and disease management in nursery - Field lay out and main field preparation - ridges and furrows - manuring – direct sowing, transplanting - manuring - irrigation – earthing up and weed control - herbicide application – Special horticultural practices (Training/ staking/pruning) - Foliar application of nutrients and growth regulators - recording observations on growth, yield and quality – nutrient deficiency, physiological disorders and their management - pest and disease management – maturity indices – harvesting techniques ,grading, sorting and packing – working out cost of cultivation - visit to commercial nursery unit and precision farming fields.

Transplanted vegetable crops tomato / brinjal / **Direct sown vegetable crops:** bhendi / cluster bean /radish/amaranthus (Any one)

Course outcomes

1. Learning production practices and acquiring skill by practicing the techniques.
2. Learn practical aspects in cultivation of vegetables

References

1. Crop production guide. 2012. Tamil Nadu Agricultural University and Department of Horticulture, Government of Tamil Nadu

VSC H 101- Production Technology of Vegetable crops (2+1)

Course objectives

1. To understand the nursery management and important cultural practices in vegetable production
2. To impart knowledge on special horticultural practices in vegetable production

Theory

Scope and importance of vegetable cultivation – area and production in Tamil Nadu – types of vegetable cultivation – kitchen garden and market garden –vertical gardening -hydroponics - soil - climate – seed rate – nursery practices – transplanting – irrigation - fertigation - nutrient management – weed management-use of growth regulators - special horticultural practices(training, staking, pruning) – physiological disorders – maturity indices– duration - harvesting - yield – grading, sorting – packing storage - tomato, brinjal, chilli, bhendi, gourds - bitter gourd - ridge gourd, ash gourd – pumpkin – watermelon – onion - tapioca -potato - elephant foot yam - cabbage – cauliflower, radish – carrot - lab lab - cluster beans - amaranthus – moringa

Practical

Practicing the layout of kitchen / nutrition garden/ vertical garden - preparation of nursery bed - seed sowing - growing media preparation and protray sowing – nursery management - transplant production under net house conditions - main field layout – formation of ridges and furrows / beds - methods of manuring – transplanting – methods of planting systems –irrigation systems –flood irrigation, furrow irrigation - fertigation - application of growth regulators – weed management practices - earthing up - special horticultural practices (training, staking, pruning) -maturity indices– harvesting – grading, sorting – packing– storage structures - working out the cost of cultivation – visit to vegetable nurseries/protected vegetable cultivation unit

Course outcomes

1. Students gain knowledge on importance, nutrition and production status of tropical and subtropical vegetable crops
2. Students get practical knowledge on propagation methods, important cultural practices and harvesting of tropical and subtropical vegetable crops
3. To obtain practical experience on training and pruning in tropical and subtropical vegetable crops

References

1. Bose, T. K., Kabir, J., Maity, T. K., Parthasarathy V. A. and Som, M. G. 2002. Vegetable Crops Vol. I, II & III NayaProkash, Kolkata
2. Rai, N. and D. S. Yadav, 2005. Advances in Vegetable Production: Research co Book Centre, New Delhi.

AEN H 201 - Fundamentals of Entomology (1+1)

Course objectives

1. To study about basics, history and importance of entomology in different fields
2. To impart knowledge on insects morphology, physiology and detailed taxonomy of different insect orders

THEORY

Definition, division and scope of entomology. Comparative account of external morphonology-types of mouth parts, antennae, legs, wings and genitalia. Structure, function of cuticle and moulting and body segmentation, Anatomy of digestive, Circulatory, Sensory, respiratory, glandular, excretory, nervous and reproductive systems. Types of reproduction. Postembryonic development- eclosion. Matamorphosis. Types of egg larvae and pupa. Classification of insects upto orders, sub-order and families of economic importance and their distinguished characters. Plant mites – morphological features, important families with examples.

PRACTICAL

Insect collection and preservation. Identification of important insects. General body organization of insects. Study on morphology of grasshopper or cockroach. Preparation of permanent mounts of mouth parts, antennae, legs and wings. Dissection of grasshopper and caterpillar for study of internal morphology. Observations on metamorphosis of larvae and pupae. Dissection of cockroaches.

Course outcomes

1. To get knowledge about history of entomology and also learn about insects relation with other classes of Athropoda
2. To get knowledge on digestive, excretory, circulatory, respiratory, nervous system reproductive system, exocrine and endocrine gland function of insect.
3. Students expose to practical observations on external features of grasshopper / cockroach and other members of phylum Arthropoda and also learn methods of insect collection, preservation, display and storage
4. Students gain knowledge on taxaonomic characters of Apterygota and Exopterygota insect orders by practical Observing and theoretical learning.

5. Students gain knowledge on taxonomic characters of Entopterygota in insect orders by practical Observation and Theoretical learning

References

1. Richards O.W. and R.G. Davies. 1977. Imm's General Text Book of Entomology. Vol.I and II. Chapman and Hall Publication, London.
2. Chapman, R.F. 1998. The Insects: Structure and Function. Fourth Edition. Cambridge University Press.
3. Snodgrass, R.E. 1994. Principles of Insect Morphology. CBS publishers and distributors, New Delhi.
4. David, B.V. and V.V. Ramamurthy. 2011. Elements of Economic Entomology, Namrutha Publications, Chennai.
5. Srivastava, P. D. and R. P. Singh. 1997. An Introduction to Entomology. Concept Publishing Company, New Delhi.

I year III Semester

I year III Semester			
9.	FLG H 101	Production Technology of Flower crops	2+1
10.	VSC H 202	Protected cultivation of Horticultural crops	1+1
11.	FSC H 105	Dryland Horticulture	1 + 1
12.	AEN H 202	Pests and their Management in Horticultural crops	1+1
13.	PAT H 202	Diseases and their Management in Horticultural crops	1+1
14.	SST H 201	Seed Production Techniques in Horticultural Crops	1+1
15.	VSC H 202	Crop Production – II (Flower crops)	0+2
16.	HOR H 211	Commercial Horticulture - I	0+2
		Total Credits	7+10 =17

FLG H 101- Production Technology of Flower crops (2+1)

Course objectives

1. To impart knowledge on scope and importance of commercial floriculture in India
2. Commercial cultivation, post-harvest handling and value addition of loose and cut flowers
3. To know about the post-harvest handling and value addition of loose and cut flowers

Theory

Scope and importance of commercial flower crops - cultivation practices– rose, jasmine, tuberose, chrysanthemum, marigold, crossandra, celosia, nerium and gomphrena, china aster, hibiscus and ixora– Study of cut flower production of rose, carnation, gerbera, cut chrysanthemum, flowering and foliage fillers - post harvest management of cut flowers — floral decorations, bouquets and dry flowers – grading, packing and marketing of flowers.

Practical

Loose flowers– propagation and nursery practices – Seed treatment and sowing – planting material preparation- cuttings, layers and bulbs – practices in field preparation, layout and planting of loose flowers – practices in manuring, weeding, irrigation -practices in special operations - training, pruning and pinching, harvesting and postharvest handling – grading, packaging and storage; cut flowers - practices in propagation - fumigation, growing media and bed preparation – practices in after cultivation practices (manuring, weeding, irrigation) – practices in special operations- growth regulator application, netting, pinching, disbudding - harvesting and postharvest handling – grading, packaging and storage of cut flowers - visit to fields of commercial loose flower crops, cut flower units - working out input requirements and cost benefit ratio for loose and cut flowers.

Course outcomes

1. Learn about the Scope, importance of commercial flower crops
2. Acquire knowledge and practical experience on production of loose flower crops
3. Learn about the postharvest technology of loose and cut flower crops

References

- Arora, J.S 2010, Introductory Ornamental Horticulture. Kalyani publishers, New Delhi, India
- Kumar, N. 2018. (8th Edition) Introduction to Horticulture, Scientific International Pvt. Ltd., New Delhi.

VSC H 202 - Protected cultivation of Horticultural crops (1+1)

Theory

Scope and importance of protected cultivation in India and Tamil Nadu – growing structures - study of protected structures – designs and components, orientation and construction of protected structures– fumigation - different media –protray nursery raising – sowing - raised bed preparation inside the protected structures planting –training, staking and pruning techniques - fertigation and nutrient management – application of growth regulators - pest and disease management - protected cultivation techniques for tomato, cucumber and capsicum - protected cultivation techniques for rose, gerbera- economics of protected cultivation - visit to protected cultivation units.

PRACTICAL

Study of different types of greenhouses based on shape, construction and cladding materials; covering and roofing materials and ventilation systems. The study of fertigation requirements for greenhouse crops and estimation of E.C. in the fertigation solution; The study of various growing media used in raising of greenhouse crops and their preparation and pasteurization / sterilization; Visit to commercial greenhouses; Economics of protected cultivation.

Course outcomes

1. Learn about the scope, importance, principles and concepts of protected horticulture
2. Acquire knowledge and practical experience on protected cultivation of horticultural crops
3. Demonstrate various cultural practices of protected horticultural crops

References

1. Joe.J.Hanan. 1998. Green houses: Advanced Technology for Protected Horticulture, CRC Press, LLC. Florida.
- Paul V. Nelson. 1991. Green house operation and management. Ball publishing USA

FSC H 105 - Dryland Horticulture (1 + 1)

Course objectives

1. To impart knowledge on techniques and management of dry land horticulture
2. To study cultivation practices of dryland fruit crops

Theory

Dry land horticulture – Importance, scope and distribution of arid and semi-arid zones in India and Tamil Nadu. Crops suitable for dry land systems –Important varieties, climate and soil requirements, commercial propagation methods -Spacing and planting patterns -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 methods -top working and rejuvenation –Use of plant growth regulators –Post harvest handling –Economics of production.

Crops: Aonla, Ber, Pomegranate, Custard Apple, Jamun, Bael, Wood Apple, Manila Tamarind. Cluster beans, Senna, Periwinkle, Vetiver and Palmarosa

PRACTICAL

Description and identification of cultivars/varieties-nursery management -nursery preparation, seed sowing and raising seedlings / rootstocks, practicing propagation techniques of dry land horticultural crops. soil and moisture conservation practices -Practicing water harvesting methods –practices in nutrient management, crop regulation –harvesting and post-harvest practices -grading and packaging -visit to commercial dry land fruit orchards Crops: Aonla, Ber, Pomegranate, Custard Apple, Jamun, Bael, Wood Apple, Manila Tamarind. Cluster beans, Senna, Periwinkle, Vetiver and Palmarosa.

Course outcome

1. Students will be able to know about the dry land cultivation in India.
2. Students will learn about the methods of water and soil conservation
3. This course also gives information related selection of fruit crops suitable for cultivation in dry land region

References

1. Dhruva Narayana, V. V., G.S. Sastry and V.S. Patnaiak (1999). Watershed Management in India. ICAR, New Delhi.

2. Mohamad Shahid and Mohamad Raza (1987). Dry land Agriculture in India. Rawa Publications, Jaipur.
3. Murthy, J.V.S. (1994). Watershed Management in India. Wiley Eastern Publishers, New Delhi.
4. Panda, S.C. (2014). Dry land agriculture. Agrobios (India), Jodhpur – 342 002.

AEN H 202 - Pests and their Management in Horticultural crops (1+1)

Course objectives

1. To understand the fundamentals of insect's life, body structures and functions, economic importance, pest categories, injury and damage in horticultural crops.
2. To impart practical knowledge on pest management in horticultural crops

Theory

Understanding the basics of insect's life, distinguishing characters, life cycle and processes. Types of insect wings and legs-importance in flight and locomotion. Economic importance of insects - harmful and beneficial insects. Pest - Insects & non- insects: categories of insect pests- pest outbreak- pest monitoring - pest surveillance- forecasting - Economic Threshold Level. Pest management methods - cultural, physical, mechanical, behavioural, host plant resistance, botanical, biological control, chemical control and legal methods.

Crop pests- nature of damage and symptoms, life cycle and management: Field crops - rice, sorghum, maize, cumbu, ragi, blackgram, greengram, redgram, cowpea, groundnut, gingelly, sunflower, castor, cotton, sugarcane; Horticultural crops - greens, curry leaf, brinjal, tomato, bhendi, chillies, onion, cucurbits, crucifers, moringa, tapioca, coconut, turmeric, banana, mango, citrus, guava, grapes, sapota, rose, jasmine, tuberose, crossandra & major medicinal plants. - Pests of stored products and their management. Rodents and other non- insect pests and management.

PRACTICAL

Collection and preservation of insects-External features of grass hopper-metamorphosis & feeding habits- Characteristics of common & economically important insects; grasshoppers, preying mantis, dragonflies & damselflies, termites, thrips, bugs, greenlace wings, true flies, butterflies & moths, beetles & weevils, ants, bees & wasps. Sericulture: mulberry cultivation, rearing of mulberry silk worm, improved methods and appliances, management of pest & diseases. Apiculture-bee species, castes and their duties-colony management, bee enemies; bee keeping appliances, honey extraction and processing. Pests of stored products. Rodents and other non- insect pests. Study of economically important parasitoids and predators - botanicals in pest management- groups of insecticides in Study of formulations, label information and toxicity parameters of different insecticide groups - plant protection appliances. Nature of damage and types of injury caused by pests. Assessment of insect population and damage-Identification of injury and damage symptoms of field crops - rice, sorghum, maize, cumbu, ragi, blackgram, greengram, redgram, lablab, cowpea, groundnut, gingelly, sunflower, castor, cotton, sugarcane; horticultural crops-greens, curry leaf, brinjal, tomato, bhendi, chillies, cucurbits, crucifers, moringa, tapioca, onion, coconut, turmeric, mango, banana, citrus, guava, grapes, sapota, rose, jasmine, tuberose, crossandra and major medicinal plants.

Course outcomes

1. The students will be familiarized with basic understanding of insects, economic importance, categories of pests, detection of injury caused by pests and assessment of damage and concepts in monitoring and forecasting

2. Students learn various IPM strategies and inputs and pesticide application methods

References/ Text books

1. B.V. David & V.V. Ramamurthy. 2016. Elements of Economic Entomology, 8th Edition. Brillion Publishers, New Delhi.
2. Regupathy.A and R. Ayyasamy. 2019 (IV Edition). A guide on crop pests. Namrutha Publicaitons, Chennai.389 p.
3. Dhaliwal G.S., and Ramesh Arora.2004. Integrated Pest management concepts and approaches, Kalyani publishers, Calcutta.427p.
4. Muthukrishnan, N., N.Ganapathy, R.Nalini and R.Rajendran.2005. Pest Management in Horticultural Crops. New Madura Publishers, Madurai. 325p. ISBN: 81-902832-0-0
5. Srinivasan. G, R. Pandiyan and P. Karthik.2018. General and economic entomology (Diploma standard). Institute of agriculture, Kumulur, Trichy.163 p.

PAT H 202 - Diseases and their Management in Horticultural crops

(1+1)

Course objective

To study the different plant diseases caused by plant pathogens and to know the principles of plant disease management

THEORY

Plant diseases - Definition, Causes of plant diseases - Fungi, Bacteria, Viruses and Mycoplasma - Survival and mode of spread of plant pathogens - Chemicals in plant disease management - Symptoms - Causal agent-management of Major diseases of Fruits (Mango, Banana, Grapevine, Sapota, Pomegranate, Papaya) - Vegetables (Tomato, Chillies, Brinjal, Bhendi, Cucurbits, Crucifers, Citrus, Onion, Garlic) - Plantation crops (Coffee, Tea, Rubber, Coconut, Arecanut) - Spices (Turmeric, Pepper, Cardamom, Coriander, Ginger) - Flowers (Rose, Jasmine, Crossandra, Chrysanthemum) - Medicinal plants-tuber crops- Management of post-harvest diseases - Mushroom Production and management

PRACTICAL

Observation of Plant Pathogens- Identification of symptoms of major diseases of Fruits, Vegetables, Plantation crops, Spices and Flowers. Collection and preservation of diseased specimens (Students should submit 25 preserved plant disease specimens)

Course outcome

1. The students will be familiarized about the plant diseases, identification of symptoms, and causal organisms
2. Students learn about favorable conditions and IDM practices for the control of plant diseases.

References

1. Diseases of crop plants in India By Rangaswami, G. and Mahadevan, A.
2. Diseases of fruits and vegetable crops recent management approaches By Chand G
3. Diseases of fruit crops By Singh. S. R

SST H 201 - Seed Production Techniques in Horticultural Crops (1+1)

Course objective

1. To Impart practical knowledge on quality seed Production.
2. To acquire knowledge on quality seed production and certification

Theory

Seed - importance - seed quality characteristics; Difference between seed and grain; Difference between grain production and seed production; Generation system of seed multiplication - nucleus, breeder, foundation and certified seed; Seed Multiplication Ratio (SMR) - Seed Replacement Rate (SRR); Principles of seed production - agronomic principles. Seed production techniques for varieties and hybrids of cereals and millets - rice, maize, sorghum and cumbu; Seed production techniques for pulses - varieties of greengram, blackgram and cowpea, varieties and hybrids of redgram; Seed production techniques for oilseeds - varieties of groundnut and sesame, varieties and hybrids of sunflower and castor; Seed production techniques for varieties and hybrids of cotton.-Seed production techniques for varieties and hybrids of tomato, brinjal, chilli bhendi, pumpkin, ashgourd, bittergourd, snakegourd, ribbed gourd and cucumber; Seed production techniques for varieties of cluster bean, lab lab, coriander and onion.–Seed extraction methods; Seed processing - drying, cleaning, grading and upgrading methods and machineries; Methods of seed treatment; Seed storage - methods and containers.-Seed certification - procedures - field Inspection - field and seed standards; Seed quality regulation - salient features of Seed Act (1966), Seed Rules (1968) and Seed Control Order (1983).

Practical

Identification of different crop seeds; Practicing pre-sowing seed treatments - dormancy breaking, seed priming, pelleting and polymer coating; Hybrid seed production techniques - detasselling, emasculation and pollination; Supplementary pollination techniques - rice and sunflower; Field inspection - identification of off types, pollen shedders, shedding tassels and rogueing; Identification of physiological and harvestable maturity indices of different crops; Visit to seed production plots; Seed extraction - wet and dry methods; Post-harvest inspection - paddy, pulses, groundnut, maize and cotton; Seed grading and upgrading techniques; Visit to seed processing unit; Seed moisture estimation, Conduct of germination test and seedling evaluation; Practicing pre-storage seed treatment and packaging; Visit to seed storage godown to study godown sanitation; Economics of seed production.

Course outcome

1. The students will be familiarized with production, management and post-harvest technologies in seed production of various horticultural crops

References

1. Agrawal, R.L. 1996. Seed Technology, Oxford & IBH Publishing Co., New Delhi.
2. Copeland, L.O. 1988. Principles of seed science and technology. Surjeet Publications, New Delhi.

3. Gregg, B.G., A.G. Law., S.S. Viridi and J.S. Balis. 1970. *Seed Processing*. National Seed Corp., New Delhi.
4. Trivedi RK and Gunasekaran M. 2014. Compendium on seed legislations. Seeds Division, DAC, MoA, GOI, New Delhi.
5. Amarjit Basra. 2008. *Handbook of Seed Science and Technology*. CRC Press.
6. Ramamoorthy, K and K.Sivasubramaniam. 2006. *Seed Technology: Ready Reckoner*. Agrobios (India), Jodhpur.

VSC H 202- Crop Production – II (Flower crops) (0+2)

Practical

Practical training and experience in production of commercial annual crops (marigold, celosia, gomphrena) – seed treatment – raising nursery - sowing seeds- field preparation- transplanting, basal manuring, irrigation, weed control, top dressing, after culture – growth regulators - plant protection – maturity indices and harvesting –maintenance of cultivation sheet - working out cost benefit ratio.

References

1. Arora, J.S. 1999. Introduction to ornamental horticulture. Kalyani Publishers, Ludhiana. India.

HOR H 211- Commercial Horticulture - I (0+2)

Organic Inputs and Composting

Practical

Agricultural, Industrial and Urban wastes - Nutrient potential of different organic manures - Preparation of FYM Compost - Composting methods - Preparation of enriched FYM - Coir pith composting - Sugarcane trash - Press mud - 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 vermicastings, vermiwash and storage - Vermicompost efficiency - Benefit Cost Analysis Application of vermicompost - Visit to Vermicompost unit.

Commercial Production of Biocontrol Agents

Objectives

- Focus on production of different biological control agents and scope in pest management, mass culturing hands on training, project preparation, and entrepreneurial skill development.

Practical

Entomology part

Categories of promising bio-control agents - Practicing methods of biological control - Setting up of bio-control laboratory - Preparation of project feasibility report - mass culture of host insects: *Corcyra*, pink mealy bug - Problems in production of host insects - Mass production of *Trichogramma* spp., *Bracon* spp., Green lace wing, Australian lady bird beetle - Problems in production of biocontrol agents - Quality control and assurance - Project Evaluation

Pathology part

Importance of biological control in plant disease management – Handling of equipments – sterilization techniques –Preparation of media- Collection of soil sample and Isolation of antagonists -*Trichoderma*, *Bacillus subtilis* - Maintenance of pure cultures - Morphological characterization of *Trichoderma* and *Bacillus subtilis*-Keys for the identification of lab contaminants - Assessing the efficacy *in vitro* - mode of action of antagonists - Fermentation systems and different kinds of formulations - Mass multiplication - Methods of delivery of biocontrol agents - Bio efficacy against plant diseases – Container content compatibility - packaging methods and shelf life studies of bio control agents-Cost Analysis and project preparation- Guidelines and requirements to establish a commercial bio control lab

Out comes

The students will learn the biocontrol agent's production techniques in such a way that they can start their own enterprise.

Reference

- [Pradyumn Kumar](#), [Jaswinder Kaur](#), [J. C. Sekhar](#), [Soujanya PL](#). 2017. Mass Production of Biocontrol Agents of Insect Pests. In book: [Industrial Entomology](#), pp.451-465.
- Baker, K.F. and Cook, R.J. 1974. Biological control of plant pathogens. W.H. Freeman and Co. San Francisco, U.S.A.
- Chet, I. 1987. Innovative approaches to plant disease control, John Wiley and Sons, New York.
- Dinakaran, D, G.Arjunan&G.Karthikeyan 2003. Biological control of crop diseases.
- Papavizas, G.C. 1985. *Trichoderma* and *Gliocladium*: biology, ecology and potential for biocontrol. Annu. Rev. Phytopathol. 23 : 23-54.
- Maheswari ,D.K and R.C Dubey 2008 .Potential micro organisms for sustainable agriculture. I.K International Publishing House Pvt.Lts , New Delhi

Prakasam, V., Raguchander, T. and Prabakar, K. 1998. Plant Disease Management. AE Publications, Coimbatore, India.

Ahamed S and Narain U 2007 . Eco friendly management of plant diseases. Daya Publishing house , New Delhi

Utkhede, R.S. and Gupta, V.K. 1996. Management of soil borne diseases. Kalyani Publishers, New Delhi.

Commercial Seed Production in Major Crops

Students shall raise the commercially important agricultural and horticultural crops for seed production based on the demand and resource availability and shall practice techniques involved in seed production of varieties and/or hybrids. The students shall also be trained on preparation of field layout, nursery and main field preparation, pre-sowing seed treatments, sowing and planting, certification and post-harvest seed handling.

Practical

Scope and importance of seed production - generation system of seed multiplication; Planning for seed production - varieties and hybrids; Verification of seed source; Selection of land - isolation - nursery and main field preparation - field layout - pre-sowing seed treatment; Sowing and planting design - planting ratio and border rows; Preparation of sowing report and seed farm registration. Practicing crop specific seed agronomic practices; Hybridization techniques and supplementary pollination; Identification of off-types and rogues - practicing rogueing; Field inspection - practicing field count, assessing field standards and seed yield estimation; Visit to private seed company. Assessment of physiological and harvestable maturity; Pre-harvest sanitation spray; Harvesting methods and threshing; Practicing seed extraction techniques and seed drying; Crop specific post-harvest seed inspection. Seed processing - cleaning, grading and upgrading methods; Processing machineries - operation and maintenance; Visit to seed processing unit - obtaining license for processing unit and seed sale; Assigning seed lot number, bagging, tagging and labeling. Seed sampling and testing - purity, germination and moisture; Pre-storage seed treatments and packaging; Visit to seed storage godown - study of godown maintenance and sanitation; Economics of seed production of varieties and hybrids.

References

- Agrawal, R.L. 1996. Seed Technology, Oxford & IBH Publishing Co., New Delhi.
- Singh, B.D. 2005. Plant Breeding Principles and Methods. Kalyani Publishers, New Delhi.
- Chopra V.L. 2001. Breeding Field Crops. Oxford Publications.
- Trivedi RK and Gunasekaran M. 2014. Compendium on seed legislations. Seeds Division, DAC, MoA, GOI, New Delhi.
- Amarjit Basra. 2008. Handbook of Seed Science and Technology. CRC Press.
- Ramamoorthy, K and K.Sivasubramaniam. 2006. Seed Technology: Ready Reckoner. Agrobios (India), Jodhpur.

Commercial nursery technology (0+2)

Objectives

- To enhance the technical expertise related to propagation of commercially important fruit crops.
- To integrate and apply academic skills through hands on training on propagation of commercially important fruit crops.
- To develop a professional leadership and inculcate entrepreneurial capacity by practical exposure for the students to effectively manage fruit nurseries.

Activities

Understanding the various components (site selection, input, water, weed, pest, disease and labour management) involved in the establishment of commercial fruit nursery and planning day today activities in commercial nursery. Practical exposure to various propagation structures (*viz.*, mist chamber, shadenet) and studying the cost of erection of the structures - Practical exposure to various tools, implements and containers and their usage and maintenance - Practices in preparation of media for propagation of fruit plants and working out cost economics

1. Hands on training on raising of the rootstocks and different propagation methods *viz.*, cutting, layering, grafting and budding and after care of propagated plants and their recovery – Imparting skills to produce commercial fruit plants by using specialized plant parts *viz.*, rhizomes, suckers, runners etc., - Study on large scale commercial nurseries - Preparation of project for establishing a new venture with budget for execution – Concept of advertising the product and developing market strategies - Study on plant quarantine, quality standards for export and import of seeds and nursery plants produced in a commercial nursery and obtaining accreditation for a commercial nursery.

Deliverables

Students who undergo this course will gain practical knowledge and hands on experience in different aspects of a commercial fruit nursery.

Students' attitude in leadership quality, managerial skill and professionalism will be enriched.

References

- Kumar, N. 2018. (8th Edition) Introduction to Horticulture, Scientific International Pvt. Ltd., New Delhi
- Sharma, R.R.2005.Propagation of Horticultural Crops – Principles and Practices, Kalyani Publishers, New Delhi
- Sadhu, M.K.1989. Plant Propagation. Wiley Eastern Ltd., 4835/24, Ansari Road, Daryaganj, New Delhi 110 002.

Hybrid seed production in vegetable crops

Objectives

- To impart the concepts in hybrid seed production in vegetable crops.
- To integrate and apply academic skills to understand the practical experiences.
- To develop a professional leadership and entrepreneurship eminence in the field of hybrid seed production in vegetable crops

Syllabus

Understanding the concept and identifying the broad area for hybrid seed production in vegetable crops - Fixing the area of interest for individual or group in project activity in hybrid seed production (nursery, transplanting, nutrient management, rouging of off types, selfing and crossing, pest management, harvesting, seed extraction - cleaning- drying- grading- packing- seed lot assignment- testing-labelling - storage - cryo preservation - rationale for selecting the activity in hybrid seed production and formulating the anticipated methodology for execution - preparation of the project with budget for execution and marketing - nurturing the students potential and innovativeness in their area of interest and facilitating the project activity (planning, development and execution) - concept of advertising the product and developing market strategies for efficient selling - working out the cost economics - generating a reflective report about the project and the student's potential in academic and personal development.

Crops

Direct sown vegetable crop : Bhendi
Transplanted vegetable crop: Tomato

Course outcome

1. Entrepreneurship skill in handling commercial ventures in the domain of hybrid seed production is assured. Student's attitude in leadership quality, managerial skill and professionalism will be enriched

References

1. Singh, S. P. (1999). Seed production of commercial vegetables. Kalyani publishers. New Delhi.
2. Verma T.S. and S.C. Sharma (2000). Producing seeds of biennial vegetables in temperate regions. ICAR, New Delhi.
3. Vanangamudi *et al.* (2006). Advances in seed science and technology. Vol. 2. Quality seed production in vegetables. Agrobios (India), Jodhpur.

II year IV Semester

11.	FLG H 202	Ornamental gardening and Landscaping	1+1
12.	MAP H 201	Medicinal and Aromatic crops production technology	1+1
13.	SPP H 201	Spice and Plantation crops Production Technology	2+1
14.	HOR H 203	Hi-Tech horticulture	1+1
15.	AMP H 201	Fundamentals of Livestock and Poultry Management	2+1
16.	AEC H 201	Agricultural Economics, Marketing and Finance	0+1
17.	AEX H 201	Extension Methods for transfer of Agricultural technologies	0+1
18.	HOR H 204	Practical training in Hill Horticultural crops	0+1
19.	HOR H 205	Study Tour – II	0+1
20.	HOR H 212	Commercial Horticulture II	0+2
		Total Credits	7+11=18

FLG H 202 - Ornamental gardening and Landscaping (1+1)

Course objectives

1. To educate students on ornamental horticulture, types and styles of gardens and identification of ornamental plants suitable for landscaping
2. To impart practical knowledge on bonsai making and flower arrangements

THEORY

History, definitions, scope of ornamental horticulture, aesthetic values, Floriculture industry, Importance, area and production, industrial importance of ornamental plants and flowers. Importance, classification, design values and general cultivation aspects for ornamental plants viz. Annuals, biennales herbaceous perennials, grasses and bulbous ornamentals. Shrubs, climbers, trees, indoor plants, palms and cycads, ferns and sellagenellas, cacti and succulents, Importance, design and establishment of garden features/components viz. hedge, edge, borders, flower beds, bridges, paths, drives, fences, garden walls, gates, carpet bed, arbour, Patio, decking, retaining walls. Shade garden, sunken garden, roof garden, terrace garden, pebble garden, rockery, pools, waterfalls, fountains, bog garden, avenue planting, children garden, vertical garden, bottle garden and terrariums. Lawn types, establishment and maintenance. Importance of Garden adornments viz. floral clock, bird bath, statutes, sculptures, lanterns, water basins, garden benches etc., Importance of flower arrangement, Ikebana, techniques, types, suitable flowers and cut foliage, uses of, art of making bonsai, culture of bonsai and maintenance.

Practical

Identification and description of annuals, biennials, herbaceous perennials, climbers, shrubs, trees, indoor plants, ferns and sellagenellas, Palms and cycads and Cacti and succulents. Planning and designing and establishment of garden features viz. lawn, hedge and edge, rockery, water garden, carpet bedding, shade garden, roof garden, Study and creation of terrariums, vertical garden, study and practice of different types of flower arrangements, preparation of floral bouquets, preparation of floral rangoli, veni etc., Study of Bonsai techniques, Bonsai practicing and training. Visit to nurseries and floriculture units.

Course outcomes

1. To learn about the history, definitions, scope of ornamental horticulture
2. Students will learn about the different garden components

3. Students will learn the different types of garden
4. Attain knowledge on lawn making and maintenance
5. Gain practical knowledge on different types of flower arrangements and bonsai making

References

1. S. K. Bhattacharjee, S. K. 2004. Landscape Gardening and Design with plants. Aavishkar Publishers and Distributors, Jaipur.
2. Bose T. K., B. Chowdhury and S.P. Sharma 2001. Tropical garden plants in colour. Horticulture and Allied Publishers, Kolkata.
3. Randhawa, G. S. and A. Mukhopadyay. 1998. Floriculture in India. Allied publishers Limited, New Delhi
4. Lancaster, P. 1991. Gardening in India. Oxford and IBH publishers Pvt. Ltd., Calcutta.
5. Gopalamyengar. 1990. Complete gardening in India. IBH. Bangalore.
6. Kannan, M., P. Ranchana and S. Vinodh. 2017. A guide on ornamental gardening and landscaping. New India Publishing Agency, New Delhi
7. Kannan, M., P. Ranchana and S. Vinodh 2017. Tropical ornamental trees for landscape gardening, Westville Publishing House, New Delhi

MAP H 201- Medicinal and Aromatic crops production technology (1+1)

Course objectives

1. To gain basic knowledge on importance, scope, opportunities and constraints in cultivation of medicinal and aromatic crops
2. To impart knowledge on production technology of medicinal and aromatic crops

THEORY

History-importance – scope- opportunities and constraints –area and production - imports and exports - classification of medicinal plants - GAP, GMP guidelines, institutions for promotion of medicinal plants- extraction techniques- Marketing. Uses - soil and climate - varieties - propagation - nursery practices - planting and after care - nutrient management-irrigation-harvest - post harvest management-storage techniques- Chemical composition

Crops: Senna, Periwinkle, Glory lily, Ashwagandha, Medicinal coleus, Aloe, Long pepper, Isabgol , Medicinal solanum, Medicinal dioscorea, Rauvolfia, Sweet flag, belladonna, Cinchona, Pyrethrum, Ocimum, Davana, Mentha, Lemon grass, Citronella, Palmarosa, Vetiver, Geranium, Patchouli, Lavender, bursera, Musk

PRACTICAL

Identification – major medicinal crops – aromatic crops –morphological description-nursery techniques– harvesting-processing techniques- -senna – periwinkle – ashwagandha – glory lily – medicinal coleus – aloe -Mentha- ocimum – davana – lemon grass, palmarosa, citronella, vetiver - extraction- distillation- visit to commercial medicinal and aromatic plantations.

Course outcomes

1. Learn about importance, nutritive value and classification of spices and condiments
2. Acquire knowledge on production technology of spices
3. Acquire knowledge on production technology of condiments
4. Gain knowledge and practical experience on processing and value addition of spices and condiments
5. Demonstrate various propagation methods, special practices and post harvest practices of major spices and condiments

References

1. Atal. C. K. and B. M. Kapur. 1992. Cultivation and utilization of medicinal plants RRL. CSIR, Jammu Tawi.

2. Chadha, K.L.2010. *Advances in Horticulture*, Vol.11.Melhotra Publishing house, New Delhi.
3. Farooqi, M. M. Khan and M. Vasundhara. 2004. *Production technology of medicinal and aromatic crops*. Publ. Natural Remedies Pvt. Ltd., Bangalore – 561229.
4. Abdul Kareem, M. 2002. *Plants in Ayurveda*, FRLHT, Bangalore, Business Press, New Delhi.

SPP H 201- Spice and Plantation crops Production Technology (2+1)

Course objective

To impart knowledge and practical skills on concepts and production practices of Spices and Plantation Crops

Theory

Spice Crops

Scope and importance of spices- area – production and productivity – Study of production technology of the spice crops with reference to soil, climate, propagation, intercultural operations, irrigation and nutrient management practices- training and pruning – harvesting- yield – postharvest handling: processing – grading and packing- Value addition
Crops: turmeric, ginger, black pepper, **cardamom**, clove, nutmeg, cinnamon, curry leaf coriander and fenugreek

Plantation Crops

Scope and importance of plantation crops- area - production and productivity– Classification - Study of production technology plantation crops with reference to soil, climate, propagation, intercultural operations, irrigation and nutrient management practices- training and pruning – harvesting- yield – processing – grading- packing and value addition

Crops: coconut, arecanut, palmyrah, cashew, cocoa, tea, coffee, and rubber

Practical

Spices

Identification of different spice crops, Propagation techniques, selection of planting material, sowing, nursery maintenance, important inter cultural practices, Training and pruning Post harvest handling of important spice crops - Visit to various spice growing areas and spice industries.

Crops:

Turmeric, Ginger, Black pepper, Clove, Nutmeg, Curry leaf, Coriander and Fenugreek

Plantation

Propagation techniques, nursery management, selection of planting material, sowing, important inter cultural practices, Training and pruning post harvest handling of important plantation crops - visit to various plantation crops growing areas and plantation industries.

Crops: Coconut, Arecanut and Palmyrah Cashew, Cocoa , Tea, Coffee and Rubber

Course outcomes

1. Learn about importance, nutritive value and classification of spices and condiments
2. Acquire knowledge on production technology of spices
3. Acquire knowledge on production technology of plantation crops

References

1. Atal. C. K. and B. M. Kapur. 1992. Cultivation and utilization of medicinal plants RRL. CSIR, Jammu Tawi.
2. Chadha, K.L.2010. Advances in Horticulture, Vol.11.Melhotra Publishing house, New Delhi.
3. Farooqi, M. M. Khan and M. Vasundhara. 2004. Production technology of medicinal

HOR H 203 - Hi-Tech Horticulture (1+1)

Course Objectives

1. To learn about the present status of horticulture in India and abroad
2. To learn modern and innovative technologies used in horticulture field
3. Preservation and value addition in fruits and vegetables

To develop technical skills related to horticulture

THEORY

Introduction & 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; EC, pH based fertilizer scheduling, 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, tools and equipments identification and application, Micro propagation, Nursery-protrays, micro-irrigation, EC, pH based fertilizer scheduling, canopy management, visit to hi-tech orchard/nursery.

Course outcomes

1. Students will gather details knowledge on modern advanced technologies and their application in horticulture.
2. Students will gain detail knowledge on micro propagation in horticultural crops.
3. To Gain knowledge about precision farming.
4. To learn about the high density orchard in different horticultural crops.
5. To understand about importance and mechanism of precision farming in horticulture

References

1. Hi-tech Horticulture- T.A.More, MPKV,RahuriBalraj Singh,2005: Protected cultivation of vegetable crops.Kalyani publication
2. Patil M.T. & Patil,P.V.,2004 Commercial Protected
3. Floriculture. MPKV, Rahuri Commercial floriculture- Prasad &kumar
4. Green house operation & Management: Paul V. Nelson

AMP H 201 - Fundamentals of Livestock and Poultry Management (2+1)

Course objective

1. To impart the basic knowledge on livestock and poultry husbandry (cattle, buffalo, sheep, goat, swine and poultry) for enhancing productive and reproductive performance to improve the income of rural economy and effective utilization of livestock farm recourses.

THEORY

Importance of livestock and poultry in agriculture - livestock and poultry census - milk, meat and egg production status in India. State and Central Government operated Animal Husbandry Schemes - Common terminologies used in livestock and poultry - Various systems of livestock production - extensive, semi - intensive, intensive and Integrated farming system.

Dairy cattle management

Breeds of dairy cattle (Indian and exotic) - Sahiwal, Gir, Red Sindhi, Jersey and Holstein Friesian - Crossbreds - Characters of drought cattle Breeds - Kangayam cattle, Umbalachery - Breeds of buffalo - Murrah, and Surti - Economic traits of dairy cattle- Breeding methods - Importance - advantages - Selective breeding, cross breeding and grading up. Breeding Management - Definition of Oestrus cycle - Identifications of heat of all livestock species - Definition of Artificial insemination - merits and demerits - optimum time of artificial Insemination - LN2 container maintenance - Elements of Housing Management - Site selection - Types of housing - single row - double row system - head to head - tail to tail arrangement - merits and demerits - Floor space requirement for various categories of animals - Outlines of Care and management of new born calves - importance of colostrum feeding - Composition of colostrums - quantity and feeding schedule of colostrum - Management of pregnant and lactating animals - Care and Management of Work Bullocks - Methods of milking - hand milking - full hand method- stripping, knuckling - machine milking and its advantages and disadvantages - Clean milk production - Importance - Operation - Fodder management of livestock farming - Importance of green fodder - Drought Feeding management - unconventional feed - Foot and mouth disease, Hemorrhagic septicemia and anthrax - symptoms - vaccination schedule for dairy cattle - Biosecurity management - Prevention and control of Mastitis, metabolic diseases - Milk fever, Ketosis and Grass tetany - Mini metabolic profile testing - forecasting of Disease

Sheep and Goat Management

Identification of sheep breeds of Tamil Nadu - Ramnad white, Madras red, Coimbatore, Mecheri, Vembur Trichy black Chevaadu. Identification of Goat breeds - Salem black, Kanniadu, Kodi adu, Tellicherry and Jamunapari. Economic traits - Sheep and Goat - Systems of rearing - extensive - semi intensive, intensive and tethering. Floor space requirement for young and adult - Types of Goat housing - conventional housing - Elevated platform - advantages and disadvantages - Care and management of young and adult stocks - Feeding management of Sheep and Goat - common tree fodders - unconventional Fodder and feed - grazing - Prevention and control of diseases - PPR, Enterotoxaemia, blue tongue, Sheep pox,

Orf and Anthrax- symptoms - vaccination schedule - External and internal parasites management.

Swine management

Breeds of swine - Breed characters of large white Yorkshire - Housing management in pigs - floor space requirement for piglets, sow and boar- Care and management of new born piglets - piglet anemia - creep feeding - Feeding management of sow and boar - swill feeding - Prevention and control of diseases - swine fever and foot and Mouth disease - Porcine Circo virus

Poultry management

Introduction and Definition of broiler, layer and backyard poultry farming / Alternative poultry - Housing systems - cage and deep litter system. Merits and demerits - litter management in broiler housing. Floor space for broiler and layer - Care and management of broiler - brooding, feeding, lighting, housing and disease prevention and control measures - Care and management of layer - brooding, feeding, lighting, housing and disease prevention and control measures - Composition and formulation of ration - pre starter, starter and finisher for broilers: chick mash, grower mash and layer mash for layers - Prevention and control of Ranikhet disease, E.coli and Coccidiosis. - Aflatoxin - Farm records - Culling - Insurance of Livestock - Advantages

PRACTICAL

External parts of Cattle, Sheep, Goat and poultry / Methods of medication - Identification methods of livestock and poultry - Common restraining methods of cattle, sheep and goat and poultry - Demonstration of disbudding in calves and castration in cattle, sheep and goat - Determination of age by dentition method in cattle, sheep and goat - Study of type and design of livestock and poultry houses - Selection and judging of dairy and draught cattle - Identification of abnormality in quality of milk / visit of milk collection centers / processing plants /Visits of shandy - Identification of abnormality in quality of milk / visit of milk collection centers / processing plants / Visits of shandy - Calculation to find out requirement of farm yard manure per unit land major crops - Collection of five feed ingredients from native place market and pot culture of one variety of fodder - Feed mixing - Visit of feed mill - Visit to livestock farm - Veterinary University Training and Research Centre / Farm records maintenance - Preparation of brooder house and chicks management - Identification of good layer and poor layer in poultry, Cut up parts of broiler - dressing percentage calculation - Price fixation - Calculation of FCR for broiler and layer - Demonstration of Beak trimming, delousing, deworming and vaccination of poultry - Visit to various livestock and poultry farm.

Course Outcome

The students will acquire the basic needs of livestock and Poultry management.

Reference

Hank book of Animal husbandry by ICAR, New Delhi. March 2019,Fifth reprint of Fourth revised edition.

AEC H 201 - Agricultural Economics, Marketing and Finance (0+1)

Course objective

- To impart practical knowledge on basic aspects of agricultural economics including farm management, agricultural marketing and farm financial management

Practical

Farm Management: Discussion on land and water resources: land use pattern, operational holding, sources of irrigation and cropping pattern in Tamil Nadu. Estimation of cropping intensity and irrigation intensity. Visit to a TNAU / Govt. farm to understand farm layout, resource endowments (farm buildings, machineries, livestock's, irrigation facilities etc) present in the farm and to understand various records viz., DMS, Input Registers, Muster Roll, Stock Registers etc.; Preparation of an interview schedule to collect details on cultivation and marketing cost for annual and perennial crops from farmer; Visit to Farmers field to study the production and marketing problems and collection of farm level data. Depreciation: Methods and calculation of depreciation for farm asset. Estimation of cost of cultivation, income and cost of production for annual and perennial crops. Preparation of financial statements: income/cash flow and net-worth statements. Preparation of partial budget for a technology/modern variety.

Market and market institutions: Marketing channel for agricultural and horticultural crops and price spread estimation. Visit to a Farmer's market / Shandy / Wholesale agricultural market to study the marketing farm produce. Visit to study the role and functions of Regulated market and e-NAM. Visit to FCI / SWC / CWC. Guest Lecture / Visit to Agricultural / Horticulture produce Export firms. Visit to an Input Marketing firm to understand the marketing of inputs. Guest Lecture from the institution / Visit to Primary Agricultural Co-operative Society / Visit to a Commercial Bank / Regional Rural Bank/ NABARD. Revision of portions and preparation for examination

Course outcomes

At the end of this course the students will be exposed to practical knowledge on farm management, and marketing of agricultural commodities and role and functions of various financial and marketing institutions.

References / Text Books

- Subba Reddy, S, Raghu Ram. P., Neelakanta Sastry. T.V and I. Bhavani Devi, 2004, Agricultural Economics, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- Johl, S.S & Kapoor, T.R. 1973. Fundamentals of Farm Business Management. Kalyani Publishers. Ludhiana.
- Subba Reddy, S and P. Raghu Ram. 2011. Agricultural Finance and Management. Oxford & IBH. New Delhi.
- Acharya S.S. and N.L. Agarwal. 2002. Agricultural Marketing in India. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

AEX H 201 - Extension Methods for transfer of Agricultural technologies (0+1)

Objectives

- To develop knowledge on extension methods, e - Extension, social media techniques, rural institutions and adoption of technologies.
- To impart the skill to the students on extension methods, PRA tools - Social mapping, Resource mapping, transect walk, Seasonal calendar and Venn diagram, social media techniques, Preparation of interview schedule to assess the spread and acceptance of crop varieties and technologies released from Tamil Nadu Agricultural University.

Practical Syllabus

- Study on extension methods and the characteristics of extension worker. Practicing art of Public Speaking. Organizing and conducting Method and Result Demonstrations; trainings, meetings, campaigns, Exhibition and Farmers mela. Preparation of Leaflets, Folders, Poster, Charts and Pamphlets - Both digital and conventional mode, Organizing Front Line Demonstration (FLD), On Farm Trial (OFT) , Multi Location Trial (MLT) and Adaptive Research Trial (ART).
- Studying the organizational structure and functions of ADA / ADH. Studying the structure and functions of Krishi Vigyan Kendra. Exposure to various modes of presentation through Radio and Visit to local media channels to understand its' functions in technology transfer.
- Studying the contents and usage of Uzhavan App, Kisan Suvidha / Mobile Apps. Study on social Institutions - Panchayat, Self Help Groups and Farmers' Organizations.
- Practicing PRA Techniques - Social mapping, Resource mapping, Transect walk, Seasonal calendar and Venn diagram. Preparation of different data collection tools - observation, questionnaire, interview schedule. Interaction with farmers to study the adoption of TNAU released technologies.

Course Outcomes

- This course will facilitate the students to become a skilled and successful extension worker at grass-root level

References / Text Books

- Adivi Reddy A. 1971. Extension Education. Sree Lakshmi Press, Bapatla, Andhra Pradesh.
- Dahama OP & Bhatnagar OP. 2005. Education and Communication for Development. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- Ray, G.L.2006. Extension Communication and Management, Naya Prakash Publications, Kolkata.

HOR H 204 - Practical training in Hill Horticultural crops (0+1)

Practical

Hands on training on temperate horticultural crops at HRS, Kodaikanal. Training in coffee and other subtropical horticultural crops at Horticultural Research Station, Thadiyankudisai or Yercaud – visit to estates, factories, auction centres and blending units. Project preparation for the establishment of estates (14 days).

Practical schedule Hands on training at HRS, Kodaikanal (7 days)

1. Practice in field or jungle clearing, lay out and planting temperate crops
2. Practice in nursery management
3. Practice in application of fertilizers, identification of nutrient deficiencies, foliar feeding of nutrients, mulching and weed management in temperate crops.
4. Practice in training and pruning, rejuvenation & replanting in temperate crops.
5. Identification of pests and diseases and their management temperate crops.
6. Practice in harvesting and handling of temperate crops.
7. Visit to market centers and public parks.
8. Final examination

Coffee training at HRS, Thadiyankudisai /HRS, Yercaud (7 days)

1. Practice in field or jungle clearing, lay out and planting of coffee and shade trees and identification of different varieties.
2. Practice in nursery management, fertilizer application, identification of different nutrient deficiencies and weed control.
3. Practice in shade regulation, training and pruning, identification of pest and diseases and their management.
4. Practice in harvesting, processing and grading.
5. Visit to different coffee estates, curing units, auction centres, coffee boards and markets.
6. Estate management, budgeting, preparation of projects for establishment of coffee estates
7. Hands on training on other hill horticultural crops
8. Final examination.

HOR H 205 - Study Tour – II (0+1)

Visit to places of commercial cultivation of flower crops, spices and plantation crops (other than coffee and tea) in Tamil Nadu – study of cropping system – varieties – adoption of scientific crop production technology – constraints in production – marketing – economic analysis.

Practical schedule

1. Tamil Nadu Agricultural University, Coimbatore campus.
2. Visit to arecanut area-Forest College & Research Institute, Mettupalayam – Eence Aromatics.
3. Visit to Kallar, Burliar ,Coonoor and Ooty.
4. Visit to ARS, Bhavanisagar.
5. Visit to Regional Research Station, Paiyur- Floriculture Units, Hosur, processing units.
6. Visit to Regional Research Station, Vridhachalam – Cashew&VRS,Palur.

HOR H 212 - Commercial Horticulture II (0+2)

Commercial Bee keeping

Objective

To promote students as entrepreneurs in beekeeping by enriching them with knowledge on honeybee species, apiary management, production of honey, beeswax and other byproducts

Practical Syllabus

Collection of bee species and general study - Understanding the economic importance of different bee species and their role in crop pollination; Bee products - honey, bees wax, bee pollen, propolis, bee venom and royal jelly - Identification of bee castes - Biology of bee species Hives and hive construction - Adaptations, communication and behaviour in honey bees- Identification of bee pasturage - Preparation of bee floral calendar- Site selection and establishment of an apiary; Bee keeping Appliances - Hiving of Indian bee feral colonies - Colony management practices - Management of bee colonies for honey Production - Management of bee colonies during honey Production season- lean season - Management of bee colonies for honey Production - Diagnosis and management of bee enemies diseases and poisoning- Introduction to meliponi culture - Quality testing and assurance - Value addition of honey and wax - Economics of bee keeping - Project preparation

Reference

Ghosh, G. K. (1994). Beekeeping in India. Asish Publishing House, New Delhi.

Atuar Rahman, 2017. Apiculture in India. Published by ICAR, New Delhi. ISBN: 978-81-7164-165-9.

Biofertilizer Production

Objective

This course is designed to provide knowledge about the role of microorganisms as biofertilizers. This course is framed to provide hands on training to the students on the isolation, purification, screening, mass production of bacterial, fungal, and algal biofertilizers. It also narrates about the dosage and method of application.

Practical syllabus

Microorganisms for crop nutrition – biofertilizers - types of biofertilizers - production and demand in India; Importance and contribution of biofertilizers in Agriculture and allied sectors. Sources of good quality strains for biofertilizer production.

Facilities and equipments required for laboratory scale and industrial scale production of biofertilizers. Raw materials required – glass wares, chemicals etc and types of carrier material and its specifications. Production of various bacterial biofertilizers in laboratory scale and large scale - *Rhizobium*, *Azospirillum*, *Azotobacter*, *Glucanoacetobacter diazotrophicus*, phosphate solubilisers, potash releasing microorganisms and PGPR. Selection and mass production of Azolla, Blue Green Algae, PPFM and AM fungi. Shelf life and storage of carrier and liquid based biofertilizers. Constraints in mass production of various biofertilizers. Storage and preservation of various microbial cultures.

Quality standards for different commercial biofertilizers - *Rhizobium*, *Azospirillum*, *Azotobacter*, *Glucanoacetobacterdiazotrophicus*, phosphate solublisers, potash releasers, PGPR, Azolla, Blue Green Algae, AM fungi and PPFM. Quality control laboratories in India.

Production of carrier based and liquid inoculants. Application technologies – form, dose, method and time of application of biofertilisers - *Rhizobium*, *Azospirillum*, *Azotobacter*, *Glucanoacetobacterdiazotrophicus*, phosphate solublisers, potash releasing, PGPR, Azolla, BGA, AM fungi and PPFM - Evaluation of plant response to biofertilizer application (Nodulation, earliness of germination, plant vigor and biometric observation including root development). Newer formulations of biofertilizers.

Calculation of commercial production cost – fixed - cost of building, equipments and glass wares and variable cost - raw materials, maintenance, labour cost etc. Formulation of a project for production of fixed quantum of various biofertilizers per annum. Economics of biofertilizer usage - B:C ratio.

Outcome

This course will provide knowledge about the role of microorganisms as biofertilizers. The students will acquire hands on training on the mass production of bacterial, fungal, and algal biofertilizers.

References

- Subba Rao, N.S (2006) Soil Microbiology (4th Edition of Soil Microbiology and Plant Growth). Oxford & IBH, New Delhi
- Rai, M.K (2006) *Handbook of Microbial Biofertilizers*. Food Products Press. New York.
- Trivedi, P.C (2008) Biofertilizers. Pointer Publications, New Delhi.
- Vendhan, R.T (2008) Techniques in Agricultural Microbiology. Agrobios (India)

Commercial Floriculture and Ornamental Gardening

Objective

To impart knowledge and practical skills on concepts and production practices of flower, experiential learning pathways in commercial landscape gardening

Practical Syllabus

Study on cultural requirements of commercial flower crops Jasmine, Rose, Chrysanthemum, Marigold, Tuberose, Crossandra, Cockscomb, Ornamental gardening - Formal and informal gardens - Components of garden - lawns and lawn making - study of important flowering annuals, flowering and foliage shrubs - flowering and foliage trees - creepers and climbers cacti and succulents - palms and cycads - Indoor plants - cut flowers - Flower arrangement- Bonsai culture, dry flower making.

Preparing ornamental garden design for home - Practices in lawn making; different methods of lawn making - Identification of important annuals, herbaceous perennials, shrubs' trees, cacti and succulents, creepers and climbers, bulbous plants and hedge plants - Preparation of pot mixture - potting and reporting practices in raising nursery for ornamental plants -

Interior decoration - Visit to commercial flower fields, botanical gardens and horticultural shows.

References

- Bose.T.K, R.G. Maiti, R.S. Dhua and P.Das. 1999. Floriculture and Landscaping. Naya prakash, Calcutta.
- Booth. N.K. 1983. Basic elements of landscape architectural design.
- Randhawa, G.S. and A. Mukhopadhyay, 2001. Floriculture in India. Allied Publishers Limited, New Delhi.
- TNAU Agritech Portal

Commercial mushroom production

Objective

The students will be exposed to commercial aspects of mushroom production and processing so as to start their own mushroom enterprise.

Practical Syllabus

Different types of mushroom, - Edible and poisonous type - edible mushrooms- *Pleurotus* and *Calocybe* – preparation of culture media- pure culture techniques- sterilizing techniques-media - glassware - maintenance of culture - Mother spawn production- Multiplication of bed spawn – Substrates -mushroom cultivation techniques for *Pleurotus* and *Calocybe*. - Maintenance of spawn running and cropping room-harvest-packing and storage of *Pleurotus* and *Calocybe*. - Project preparation for *Pleurotus* and *Calocybe* - Problems in cultivation of *Pleurotus* and *Calocybe* – pests, diseases, abiotic disorders -Post harvest technology of *Pleurotus*, *Calocybe*– methods of preservation – Packing methods and storage- *Pleurotus* and *Calocybe*- Recipe making and value added products

Outcome

- The students will learn about the mushroom production techniques in such a way that they can start their own enterprise.

Reference

- Krishnamoorthy, A.S., Marimuthu, T., and S. Nakkeran. 2005. Mushroom Biotechnology, Vijay Books. Sivakasi, India., Pub.ODL, TNAU, Cbe-3
- Mushroom Cultivation in India - 2007 by B C (Author), Suman (Author), V P Sharma (Author)

Broiler Production

Practical Syllabus

Preparation of poultry house for receiving new arrivals – Disinfection – Sanitation procedures – Arrangement of Brooders, brooding, spreading of litter and medication –

Medication schedule and vaccination - broiler chicks – Measures to control respiratory problems. Coccidiosis and their management problems – Feeding, watering, spacing – Management of litter – Use of growth promoters and feed additives – Improvement of feed intake and feed conversion efficiency – Composition of broiler feeds, feeding ages and consumption levels – Commonly used ingredients in feed mixing for broilers – Least cost feed formulation – Observation on feed consumption, use of stimulants – Recording of body weight of broilers during growth - Management of broilers during summer – winter – Examination of internal organs of poultry – Common basic post mortem findings to know the cause of death – Dressing procedures to prepare ready to cook broilers – Various poultry meat preparations – Maintenance of records – Marketing of broilers – Cost analysis – Economics of broiler farming..

Commercial Production of Value Added Horticulture produce (0 + 2)

Objectives

To enable students to gain hands on experience in commercial production of value added products and to train the students in establishing a commercial processing unit.

Activities:

General considerations in establishment of a commercial fruit and vegetable processing unit - Equipments used in commercial food processing unit - Preservation by heat - canning Preservation by salt - pickles, chutneys, sauces - Preservation by sugar - Jam, Jelly, Marmalade - Intermediate moisture processed food - candies, fruit toffee, fruit bar - Methods of dehydration - sun drying, mechanical drying, osmotic drying. Concentration - Juice, Pulp - Value added products from fermentation - Lactic acid fermentation, fruit wines. Low temperature preservation - Refrigeration - freezing. Waste management and value added products - pectin extraction - Guava cheese, orange peel candies. Visit to commercial processing units - Project preparation and working out cost economics

Deliverables:

Students who complete this course will gain enough confidence and technical skills to establish a commercial processing unit.

Establishment of commercial coconut nursery (0 +2)

Objectives

To impart practical knowledge on production of coconut nursery and practical exposure for the students to effectively manage the coconut nursery activities

Syllabus

Understanding the concept and establishment of coconut nursery - activity in establishment of coconut nursery-mother palm selection- seed nut selection – curing – nursery preparation – poly bag – media– sowing – irrigation – fertilizer – pest and disease management – seedling selection - preparation of the project with budget for execution and marketing-nurturing the students - concept of advertising the product and developing market strategies for

efficient selling - generating a reflective report about the project and the student's potential in academic and personal development.

References

4. Kumar, N. 2014. Introduction to Spices, Plantation crops, Medicinal and Aromatic plants. IBH Publishing Co. Pvt. Ltd., New Delhi.
5. Henry Louis, I. 2002. Coconut- The wonder palm, Hi – Tech Coconut Corporation, Nagercoil.