



YBN UNIVERSITY

Established by the Act of Government of Jharkhand Act 15, 2017
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As per Section 2(f) of UGC Act. 1956

SCHOOL OF AGRICULTURAL SCIENCE

COURSE STRUCTURE/SCHEME

FOR

DIPLOMA IN HORTICULTURE (DHOR)

(One Year Course)

Applicable w.e.f. Academic Session

[2023-2024 till revised]

ONE YEAR DIPLOMA IN HORTICULTURE (DHOR)

Objectives:

- 1) To create awareness about horticulture practices.
- 2) To familiarize with horticulture crop management practices, standards and certification

Duration of the Course:

Minimum duration: 1 year

Maximum duration: 2 years

Course Fee: Rs. 40,000

Minimum Age: No bar

Maximum Age: No bar

Eligibility:

10+2 Senior secondary pass-outs

Syllabus for Diploma in Horticulture (One year)
(DHOR)

Course Curriculum(Semester-I)

COURSE CODE	COURSE TITLE	C R E D I T S	DISTRIBUTION OF CREDITS				EXAM.		END SEM	TOTAL MARKS	
			L	T	P	C	MI D-I	IA			
1Y1HRT101	Basics in Horticulture	5	3	2	0	5	20	20	60	100	
1Y1HRT 102	Plant Propagation and Nursery Management	5	3	1	1	5	20	20	60	100	
1Y1HRT 103	Fundamentals of Agronomy	5	3	2	0	5	20	20	60	100	
1Y1HRT104	Soils and Fertility Management for Horticultural Crops	5	3	1	1	5	20	20	60	100	
1Y1HRT105	Soil and Applied Microbiology	5	3	2	0	5	20	20	60	100	
1Y1HRT106	Basics in Applied Entomology	5	3	2	0	5	20	20	60	100	
Total Credits			30								

Syllabus for Diploma in Horticulture (One year)
(DHOR)

Course Curriculum(Semester-II)

COURSE CODE	COURSE TITLE	C R E D I T S	DISTRIBUTION OF CREDITS				EXAM.		END SEM	TOTAL MARKS	
			L	T	P	C	MI D-I	IA			
1Y2HRT 201	Production Technologies of Fruit Crops	5	3	1	1	5	20	20	60	100	
1Y2HRT 202	Ornamental Gardening and Landscaping	5	3	2	0	5	20	20	60	100	
1Y2HRT 203	Production Technologies of Vegetable Crops	5	3	1	1	5	20	20	60	100	
1Y2HRT 204	Basics in Plant Pathology	5	0	1	4	5	20	20	60	100	
1Y2HRT 205	Farm Machinery for Horticultural Crops	5	0	1	4	5	20	20	60	100	
1Y2HRT 206	Internship	5	0	0	1	5	20	20	60	100	
Total Credits			30								

SYLLABUS (FIRST SEMESTER)

1Y1HRT 101 :BASICS IN HORTICULTURE

Objectives

To impart the basic knowledge in horticulture and serve as a platform over which advanced technologies of horticulture can be built up.

THEORY

Unit-I : Scope and Importance of Horticulture

Scope and importance of horticultural crops – divisions of horticulture – area and production – export and import – global scenario – classification of horticultural crops – nutritive value – horticultural zones of India and Tamil Nadu – research institutes related with development of horticulture.

Unit-II : Establishment of Orchard and Factors Influencing Crop Production

Establishment of orchard – principles, planning and layout – different planting systems – factors limiting horticultural crop production – manures and manuring – weed management – irrigation methods – influence of soil – physical and chemical properties and climatic factors – light, temperature, photoperiod, relative humidity, rainfall, micro climate and pollution.

Unit-III : Nursery Management and Cropping Systems

Nursery techniques – vegetable garden – nutrition garden, kitchen garden and other types of gardens – cropping systems – intercropping, multi – tier cropping – cover cropping – planting methods – mulching – principles of organic farming.

Unit-IV : Growth and Development

Bearing habits – flowering, pollination and fruit set – unfruitfulness – fruitdrop – causes and prevention – training and pruning – use of growth regulators – rejuvenation of old orchards.

Unit-V : Protected Cultivation and Post – Harvest Technology

Basics of protected cultivation – green house components – structure for environmental control – post – harvest technology – importance and causes for post – harvest losses – maturity indices – harvesting methods.

PRACTICAL

Different features of orchard – planning and layout of orchard – tools and implements – different planting systems – nursery beds – training and pruning of fruit crops – preparation of fertilizer mixtures and field application – use of growth regulators – assessment of bearing habits – weed management – irrigation systems – structures for protected cultivation – judging the maturity indices of horticulture crops – harvesting methods and post – harvest handling.

Practical Schedule

- 1) Study of different features of orchard.
- 2) Planning, layout and planting of fruit trees.
- 3) Identification of tools and implements.
- 4) Preparation of nursery beds and sowing vegetable seeds and transplanting of vegetable crops.
- 5) Practicing training of fruit trees.
- 6) Practicing pruning of fruit trees.
- 7) Identification of growth regulators – preparation and application.
- 8) Preparation of fertilizer mixtures and field application.

- 9) Practicing weeding including chemical weed control.
- 10) Layout of different irrigation systems and irrigation methods.
- 11) Study of bearing habits of horticultural crops.
- 12) Study of different structures for protected cultivation.
- 13) Study of different media for protected cultivation.
- 14) Practice in judging the maturity indices of fruits and vegetables.
- 15) Study of harvesting methods.
- 16) Visit to green houses.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Chadha, K.L. 2002. Hand book of Horticulture, ICAR, New Delhi.
- 2) Jitendra Singh 2006. Basic Horticulture. Kalyani Publishers, New Dehli.
- 3) Kumar, N. 1997. Introduction to Horticulture, Rajalakshmi Publication, Nagercoil.
- 4) Kushal Kumar Misra and Rajesh Kumar.2014. Fundamentals of Horticulture. Biotech Books.
- 5) Peter, K.V. 2014. Basic of Horticulture. New India Publishing Agency.
- 6) Pradeep Sinha. 2014. Text Book of Horticulture. Sublime Publications.
- 7) Vijayakumar U.M.Rao.2008. Horticulture terms – Definition and terminology. IBD Publishers

1Y1HRT 102: PLANT PROPAGATION AND NURSERY MANAGEMENT

Objectives

Plant propagation is one of the fundamental agricultural operations which involves multiplication and perpetuation of seeds and planting material to achieve uniform stand of crops with high yield potential. This course deals with different methods of plant propagation and strategies for nursery management of various fruit crops. Knowledge of tools and implements is essential to carry out all scientific horticultural operations and also nursery management practices.

THEORY

Unit-I : Methods of Propagation

Scope and importance – propagation – overview – methods of sexual and asexual propagation – advantages and disadvantages of sexual and vegetative propagation.

Unit-II : Principles and Methods of Seed Propagation

Seed propagation – seed dormancy – internal and external factors – nursery techniques – protray culture – apomixis – monoembryony, polyembryony – principles – utilization.

Unit-III : Propagation Structures

Propagation structures – mist chamber – cold frames – hot beds – humidifiers – green houses – glass houses – tools and implements – use of growth regulators in seed and vegetative propagation – physiological and anatomical basis of vegetative propagation.

Unit-IV : Asexual Propagation Techniques

Methods and techniques of cuttings, layering, grafting and budding – factors influencing rooting of cuttings, layering, budding, grafting – stock scion relationship – root stock influences – Propagation through specialized organs – – tuber, bulb, corm, bulbils, rhizome, runner, offshoot, crown, slips and sucker.

Unit-V: Micro Propagation

Micro propagation – culture media – culture conditions – meristem culture – callus culture – micro grafting – hardening of plants in nurseries – clonal orchards – nursery registration act.

PRACTICAL

Nursery bed preparation – seed treatment – seed sowing – – tools and implements – potting medium – containers for propagation of nursery plants – potting – repotting – liquid manures – propagation structures – – mist chamber, cold frames, hot beds, poly house, shade net house – raising of rootstocks and scion preparation – different techniques and practices of cutting, layering, grafting and budding – use of specialized organs – rejuvenation – project preparation for commercial nurseries – visit to private nurseries and tissue culture laboratory – working out economics.

Practical Schedule

- 1) Preparation of nursery bed, seed treatment and sowing.
- 2) Identification of various tools and implements.
- 3) Preparation of pot mixture and study of various containers.
- 4) Practices in potting, repotting and liquid manures.
- 5) Study of special structures for propagation viz., mist chamber, cold frames, hot beds, poly house, shade net house.
- 6) Raising of rootstocks and scion preparation.
- 7) Mist propagation techniques.
- 8) Practice in propagation by cuttings.
- 9) Practice in propagation by layering.
- 10) Practice in propagation by budding.
- 11) Practice in propagation by grafting.
- 12) Use of growth regulators in propagation.
- 13) Practices in separation and description of plant parts used for propagation.
- 14) Rejuvenation, top working and bridge grafting.
- 15) Practice in micro propagation and hardening methods.
- 16) Visit to tissue culture laboratory and controlled green houses and project preparation for commercial nurseries and visit to private nurseries.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Bose, T.K., S.K. Mitra, M.K. Sadhu and B. Mitra. 1991. Propagation of Tropical and subtropical Horticultural Crops. Naya Prakash 206, Bidhan Sarani, Calcutta, Six. India.
- 2) Hartmann, H.T., D.E. Kester, F.T. Davies and R.L. Greeneve. 1997. Plant propagation – Principles and Practices. Prentice Hall of India Private Ltd., New Delhi.
- 3) Peter, K.V. S. Rajan and Baby Lissy Markose. 2007. Propagation of Horticultural Crops. Horticulture Science Series-6. New India Publishing Agency.
- 4) Singh, R.S., R. Bhagava. 2014. Propagation of Horticultural Plants – Arid and Semi – Arid Regions. New India Publishing Agency.
- 5) Reddy, Y.T.N., T. Janakiram and D. Satyanarayana Reddy. 2001. Scientific Nursery Management. The House of Sarpan (Media), Bangalore.
- 6) Prasad, S. and V. Kumar. 1999. Green House Management of Horticultural Crops. Agrobios India, Jodhpur.

1Y1HRT 103 :FUNDAMENTALS OF AGRONOMY

THEORY

Unit-I : Introduction to Agriculture and Agronomy

Agriculture – definition – scope of agriculture in India and Tamil Nadu – branches of agriculture – Agronomy – art, science and business of crop production. – Agronomical classification of crops – their importance – Major crops of India and Tamil Nadu. Factors affecting crop production – moisture, aeration, light, temperature and nutrients.

Unit-II : Basic Agricultural Operations

Basic principles of agricultural operations – tillage and tilth – objectives and types of tillage – primary tillage, secondary tillage and intercultural operations. Modern concepts of tillage. Implements and tools used in agriculture – seeds and sowing – seed treatment – Nursery – Transplanting. Cropping systems – definitions – principles.

Unit-III : Cultural Practices for Crops

Plant population and crop geometry. After cultivation – gap filling and thinning – Weeding and irrigation. Manures – organic manures – green manures – biofertilizers. Fertilizers – Methods of application – basal, split and foliar application. Organic farming – sustainable agriculture – definition, concepts. Meteorology – agricultural meteorology – definition – importance in Crop Production.

Unit-IV : Dry Farming Management

Dryfarming – definition – classification. Drought – definition – effects of drought on crop production – Drought management – Contingent crop planning. Soil moisture conservation approaches.

Unit-V : Watershed Management

Watershed management – definition – concepts – scope and importance. Water harvesting – farm pond, percolation pond.

PRACTICAL

Identification of crops in low land, irrigated upland and dry lands. Preparation of cropping scheme for different ecosystem – Acquiring skill and estimating the efficiency of tillage implements. Practicing the implements used for primary and secondary Tillage – Practicing the implements used in rice cultivation. Skill learning and practicing nursery bed preparation for low and irrigated uplands. Skill imparting practices in seed treatment – Use of bio fertilizers – Learning seed and seedling treatment, practicing sowing, transplanting, weeding and irrigation. Identification and application of organic manures and green manures – Inorganic fertilizers. Methods of utilization of organic wastes – Composting of coir pith. Measurement of growth and yield components of major crops. Visiting Agro – met observatory – Seed treatment technologies for dry farming. Preparation of contingency crop plan to mitigate aberrant rainfall situations – Visit to watershed.

Practical Schedule

- 1) Identification of crops in low land, irrigated uplands and dryland.
- 2) Preparation of cropping scheme for different ecosystem.
- 3) Acquiring skill in the use of primary and secondary tillage implements.
- 4) Practicing the use of special purpose implements (puddler, rotary weeders and cono-weeder).
- 5) Skill learning and practicing nursery bed preparation for low lands and irrigated uplands.
- 6) Practicing main field preparation.
- 7) Seed treatment techniques.
- 8) Practicing sowing and transplanting.
- 9) Practicing manual weeding and spraying of herbicides with different formulations.
- 10) Practicing application of organic, inorganic, green manures and biofertilizers.
- 11) Inorganic fertilizers – identification of fertilizers – calculation based on fertilizer schedule.
- 12) Visiting Agro met observatory and getting acquaintance with instruments.
- 13) Soil erosion and soil conservation practices. Water harvesting structure and their use.
- 14) Drought management technologies to mitigate drought in dryfarming agriculture.
- 15) Preparation of contingency crop plan for aberrant rainfall situations.
- 16) Visit to watershed area to study the impact of various soil and moisture conservation methods.
- 17) Orientation for practical Examination.

REFERENCES

- 1) Sankaran, S. and V.T. Subbiah Mudaliar. 1997. *Principles of Agronomy*. The Bangalore Printing and Publishing Co. Ltd., Bangalore.
- 2) Gopaldaswamy, N. 1994. *Agricultural Meteorology*, Rawat publications, Jaipur.
- 3) Balsubramaniyan, P. and SP. Palaniappan, 2010. *Principles and Practices of Agronomy*. Agrobios. Jodhpur – 342 002.
- 4) Panda S.C. 2010. *Agro Meteorology and Contingent crop Planning*. Agrobios (India), Jodhpur.
- 5) Sudhagar Rao, G.B, M. Thiruppathi, C. Ravikumar and K.P. Senthilkumar, 2015. *Basic Agronomy*, Manibharathi Publication, Tamil Nadu.

**1Y1HRT -104 SOILS AND FERTILITY MANAGEMENT FOR
HORTICULTURAL CROPS**

THEORY

Unit-I : Soil Physical Properties

Soil definition – it's major components – soil physical properties – soil texture, soil structure, bulk density, particle density, porosity – soil consistency – soil colour – soil water – soil air – soil temperature – their significance on crop production.

Unit-II : Soil Chemical Properties

Soil chemical properties – pH, EC, organic carbon – it's influence on soil properties, soil organic matter – composition, decomposition, carbon cycle, nitrogen cycle, soil micro – organisms.

Unit-III : Soil Fertility and Productivity

Soil fertility – definition, types, evaluation methods – soil productivity – definition – soil testing – definition, objectives – STL – functions – soil test based fertilizer recommendation – Soils of Tamilnadu – INM, IPNS, FUE.

Unit-IV : Manures and Fertilizers

Manures and fertilizers – definition, differences, classification – major nutrient fertilizers – N,P, K fertilizers – secondary and micronutrient fertilizers – complex and mixed fertilizers – losses of nutrients from soil – biofertilizers – plant growth regulators – Preparation of Enriched farm yard manure and micro nutrient mixtures.

Unit-V : Problem Soils and Irrigation Water

Problem soils – soil physical constraints – their management – soil chemical constraints – acid soil, saline soil, alkali soil, calcareous soil – formation, characteristics, reclamation – irrigation water – testing – quality indices – management of poor quality water.

PRACTICAL

Soil sampling – collection and processing – soil analysis – pH, EC, texture, bulk density, particle density, pore space – Determination of soil moisture – qualitative tests – manures, fertilizers, biofertilizers – method of application – Calculation of fertilizer dose for crops – foliar application – fertilizers, plant growth regulators – Identification of nutrient deficiency, toxicity symptoms in crops – preparation of enriched farm yard manure (EFYM), micronutrient (MN) mixture – visit to compost yard – irrigation water – quality analysis – interpretation.

Practical Schedule

- 1) Study of different soil types.
- 2) Soil sampling – skill learning in collection and processing.
- 3) Determination of soil texture by feel method.
- 4) Estimation of soil bulk, density particle density & pore space by measuring cylinder method.
- 5) Estimation of soil moisture by hot air oven – dry method.
- 6) Estimation of soil pH and EC.
- 7) Qualitative tests of manures, fertilizers and bio – fertilizers.
- 8) Calculation of fertilizer doses for different crops.
- 9) Foliar application of fertilizer nutrients.

- 10) Foliar application of growth regulators.
- 11) Identification of nutrient deficiency, toxicity symptoms in crops.
- 12) Preparation of enriched farm yard manure.
- 13) Preparation of micronutrient mixtures.
- 14) Visit to compost preparation unit.
- 15) Estimation of pH, EC in irrigation water.
- 16) Interpretation of irrigation water quality using analytical data.
- 17) Orientation for final practical examination.

REFERENCES

- 1) 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.
- 2) Kanwar, J.S. 1976. Soil fertility – Theory and Practice. ICAR, New Delhi.
- 3) Mengel, K. and E.A. Kirkby. 1987. Principles of Plant Nutrition. 4th Edition, International Potash Institute, Worblaufen – Bern, Switzerland.
- 4) Horst. 1995. Mineral Nutrition of Higher Plants. 2nd Edition. Marschner, Academic Press, Inc. San Diego, CA.

1Y1HRT105: SOIL AND APPLIED MICROBIOLOGY

Objectives

- To know the historical development of soil microbiology and the importance and distribution of soil microorganisms.
- To study the microbial transformations of C.N.P and Rhizosphere effect.
- To study the applied aspects of microorganisms.

THEORY

Unit-I: History Developments in Microbiology & Occurrence of Microorganisms

History developments in microbiology – contributions of Beijerinck, Winogradsky, Fleming and Waksman – Distribution and importance of soil microorganisms – Factors affecting the occurrence and activities of soil Microorganisms.

Unit-II : Transformation of Carbon & Nitrogen in Soil

Carbon and nitrogen cycle in nature – mineralization – ammonification – nitrification – denitrification and biological nitrogen fixation : Symbiotic and non – symbiotic microorganism – process of nitrogen fixation.

Unit-III : Rhizosphere Microorganisms and its Importance

Microbial transformation of Phosphorus – Rhizosphere and its importance in crop Plants – R:S ratio – microbial interrelationship in soil – beneficial and harmful relationships.

Unit-IV : Biofertilizers – Production & Quality Control

Bacterial Biofertilizers *Rhizobium*, *Azospirillum*, *Azotobacter*, *Gluconoacetobacter*, *Azorhizobium* and phosphobacteria – plant growth promoting rhizobacteria (PGPR) – Fungal biofertilizers. Ecto and endomycorrhizae – Algal biofertilizers: Blue green algae and *Azolla* – Production and quality control of Biofertilizers.

Unit-V : Application and Uses of Microorganisms in Different Fields

Industrial utilization of microorganisms associated with food and dairy products. Microbes in pest and disease management. *Bacillus thuringiensis*, *Trichoderma viride*, *Beauveria*, *Verticillium*, *Metarrhizium*.

PRACTICAL

Enumeration of different kinds of microorganisms in soil – qualitative and quantitative method – Decomposition of organic matter. Isolation of rhizosphere microorganism. *Rhizobium*, *Azospirillum* and *Azotobacter* – Isolation of Phosphobacteria – observation of mycorrhizal roots.

Biofertilizers inoculants production – mother culture and starter culture – carrier materials – mixing and curing process – production of *Azolla* and BGA. Food spoilage – microorganisms involved in dairy products – Identification of biocontrol agents.

Practical Schedule

- 1) Conn's direct microscopic count of estimating soil microbial population.
- 2) Standard plate count of soil microorganism or Dilution plate technique.
- 3) Buried slide technique.
- 4) Isolation of Root nodule bacterium – *Rhizobium*.
- 5) Isolation and purification of *Azotobacter*.

- 6) Isolation and purification of *Azospirillum*.
- 7) Isolation and purification *Glucanacetobacter diazotrophicus*.
- 8) VAM Staining.
- 9) Isolation and purification of phosphobacteria.
- 10) Identification of endomycorrhizal fruiting bodies.
- 11) Isolation and purification of Blue Green Algae.
- 12) Bacterial Biofertilizer inoculants production.
- 13) Methods of application of biofertilizer and Quality control.
- 14) Mass production of fungal biofertilizer.
- 15) Estimation of rhizosphere microbial population an working out R:S ratio.
- 16) Isolation and estimation of microorganisms from spoiled dairy products.
- 17) Orientation for final practical examinations.

Reference Books

- 1) Alexander, M. 1985. Introduction to Soil Microbiology, John Wiley & Sons, New York.
- 2) Rangaswami, G. and Bagyaraji, D.J. 1992. Agricultural Microbiology. Asia Publishing House, New Delhi.
- 3) Subba Rao, N.S., 1995. Soil Microorganism and Plant Growth. Oxford & IBH New Delhi.
- 4) Subba Rao, N.S., 1994. Biofertilizers in Agriculture and Agroforestry. Oxford & IBH New Delhi.
- 5) Soil Microbiology, Ecology and Biochemistry. 4th Edn. Eldor Paul (Ed) Academic press Nov. 2014
- 6) Elsas, Jansson and Trevorrs (EDS) 2006. Modern Soil Microbiology. 2ndedn CRC press.
- 7) Roy A.K 2007. Rhizosphere Biotechnology: Plant Growth Retrospect and Prospect. Scientific Publishers (inda), Jodhpur.

1Y1HRT 106: BASICS IN APPLIED ENTOMOLOGY

Objectives

To impart basic practical knowledge on insects as pests and integrated management strategies and culturing of silkworms and honey bees.

PRACTICAL

Insect pest – Definition – Characters of an insect. Basic knowledge about insect groups – adaptations. Life history and immature stages of Insects, Pest – categories – causes for pest for outbreak. Field diagnosis of insect pest damage – assessment – surveillance. Integrated pest management – ETL and EIL. Different types of pest management strategies – Natural enemies – Production of predators and parasitoids. Insecticides – Groups – Use – Application methods. Productive insects – Culturing of mulberry silkworm, Honey bees – role – methods of bee keeping, bee enemies, lac culture – lac insects and lac products and other minor productive insects.

Practical Schedule

- 1) Structure of grass hopper – a typical insect pest.
- 2) Structural, anatomical and behavioral adaptations of different groups of insects. Life history and immature stages of Insects.
- 3) Pest – categories – causes for pest for outbreak. Insect pest damage – Identification assessment and surveillance.
- 4) Integrated pest management – ETL and EIL. Different types of pest management strategies.
- 5) Identification and mass multiplication of important predators.
- 6) Identification and mass multiplication of important parasitoids.
- 7) Identification and mass multiplication of important entomopathogens.
- 8) Groups of insecticides, their use and methods of application.
- 9) Mid Semester Examination.
- 10) Acquaintance with honey bee species, castes of bees and structural adaptations.
- 11) Acquaintance with Bee – keeping equipment and bee forage plants.
- 12) Studies on seasonal management and identification of enemies of honey bees.
- 13) Identification of Silkworm types – mulberry, Eri, Tasar and Muga silkworms and acquaintance with life stages of mulberry silkworm. Acquaintance with Mulberry varieties and preparation of mulberrycuttings.
- 14) Identification of rearing appliances of mulberry silkworm and acquaintance with methods of disinfection. Handling of silkworm in Chawki rearing and Late age rearing.
- 15) Pests and diseases of silkworms.
- 16) Identification of lac insect, lac products and other minor productive insects.
- 17) Final examination.

REFERENCES

- 1) Abrol, D. P. 2009. *Bees and Bee – keeping in India*. Kalyani Publishers, New Delhi. 705 p.
- 2) Dandin, S.B., and K. Giridhar. 2015. *Hand book of Sericulture Technologies*. Central Silk Board, Bangalore, 287 p.
- 3) David, B.V. and Ramamurthy, V.V. 2010. *Elements of Economic Entomology*. (Revised edition). Namurtha Publications, Chennai. 624 p.
- 4) Jonathan, E.I. 2010. *Fundamentals of Plant Nematology*, Devi Publications, Triruchirapalli. 232 p.
- 5) Mujeebur Rahmankhan and Shamim Jairajpuri, M. 2012. *Nematode Infestations – Part III: Horticultural Crops*, The National Academy of Sciences, Allahabad, 613 p.
- 6) Dhaliwal, G.S. and Ramesh Arora. 1998. *Principles of Insect Pest Management*. Kalyani Publishers, New Delhi. 395p.
- 7) Srivastava, K.P. 2003. *A Text Book of Applied Entomology*. Vol. I & II. Kalyani Publishers. 257 p and 319 p.

SECOND SEMESTER

1Y2HRT 201: PRODUCTION TECHNOLOGIES OF

Objectives

FRUIT CROPS

This course will provide the requisite knowledge and skill for cultivation of tropical, sub tropical and temperate fruit crops.

THEORY

Unit-I : Importance of Pomology

Definition – area and production of fruit crops in Tamil Nadu – orchard management – definition – selection and layout of orchard – physical features in orchard.

Unit-II : Production Technology – I

Study of cultural practices of the following fruit crops with reference to soil, climate, varieties, methods of propagation, nutrient, irrigation and weed management practices – training and pruning – role of growth regulators – maturity standards for harvesting – post harvest technology of fruit crops – yield – grading – packing – storage and value added products.

Mango, Banana, Grapes, Papaya and Aonla.

Unit-III : Production Technology – II

Sapota, Guava, Citrus, Jack, Pineapple and Avocado.

Unit-IV : Production Technology – III

Apple, Pear, Plum and Peach

Unit-V : Organic Production and GAP in Fruit Crops

Organic fruit production and Good Agricultural Practices in fruit crops

PRACTICAL

Layout of orchard – methods of planting – manuring and irrigation methods – training and pruning of different fruit crops – judging maturity standards of major fruit crops – pest and disease management in fruit crops – visit to commercial orchards – fruit processing Unit–orchard planning and budgeting – calendar of operation for important fruit crops – working out cost of cultivation for important fruit crops – Maintenance of orchard accounts and records.

Practical Schedule

- 1) Selection and layout of orchard and physical features in orchard.
- 2) Different planting systems in fruit crops.
- 3) Practices in mango propagation.
- 4) Practicing pruning in mango.
- 5) Practicing top working and rejuvenation of senile mango orchards.
- 6) Practicing sucker treatment for banana and planting.

- 7) Practices in grapes propagation.
- 8) Practicing training in grapes.
- 9) Practicing pruning in grapes.
- 10) Nursery practices for papaya.
- 11) Practicing papain extraction from Papaya.
- 12) Practices in sapota propagation.
- 13) Practices in guava propagation.
- 14) Nursery practices for citrus.
- 15) Irrigation management in fruit crops.
- 16) Working out cost economics of cultivation of fruit crops.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Chattopadhyay, T.K. 2007. A Text Book on Pomology (4 volumes). Kalyani Publishers, Ludhiana.
- 2) Radha, T. and L. Mathew. 2007. Fruit Crops (Horticultural Science Series Vol. III). New India Publishers, New Delhi.
- 3) Veeraraghavathatham, D., M. Jawaharlal, S. Jeeva and S. Rabindran 2004. Scientific Fruit culture, Suri Associates, Coimbatore.

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1Y2HRT 202: ORNAMENTAL AND LANDSCAPE GARDENING

Objectives

To study the basic principles and practices of landscape gardening, different styles of gardens, living and non-living components and special features in a garden and to make on-site analysis, designing with garden elements and principles manually and using softwares.

THEORY

Unit-I : History of Gardening and Principles of Landscaping

Ornamental and landscape horticulture – definitions – scope – importance of gardening – history of gardening – types of gardens – Hindu, Buddhist, Persian, Mughal, Japanese, English, French and Italian garden – formal, informal and beauty elements – basic principles of gardening.

Unit-II : Soft Scape Elements

Soft scape elements (living components) – trees – shrubs – shrubbery – creepers – climbers – herbs – annuals – hedges – edges – topiary – trophy – flowers and foliage beds – carpet beds – palmatum – ferns – rosarium – rockery – sunken garden – hanging baskets – cacti and succulents plants – basic function and utility – their culture – training and pruning – lawn – lawn grasses – methods of establishment – Maintenance of lawn – house plants – Indoor gardening – psychological and social aspects of ornamental plants.

Unit-III : Hard Scape Elements

Hardscape elements (non – living component) – garden adornments – fences – gates – arches – pergolas – walks – paths – roads – paving – borders and edges – water features – pools and ponds – cascades – falls – bridges – fountains – lights – planter boxes – trellis – gazebo – designing – basic function and utility – fabrication – establishment and maintenance – non living components for special situations.

Unit-IV : Landscape Designing and Executions

Basic concepts of designing gardens – site analysis – cliental preference – landscape drawing – types of drawing – plan view – elevation and perspective diagrams – manual drawing – computerized drawing – plan to scale/not to scale – symbols/legends – designing for residences – educational institutes – industrial garden – public parks – amusement and theme parks – trafficislands.

Unit-V : Conceptual Gardening and Horticultural Crafts

Bio – aesthetic planning – water garden – floating plants – oxygenating plants – bog garden – vertical garden – rock garden – roof garden – modern day special types of gardens – yoga and meditation garden – instant garden – xeriscaping – bonsai – plants for bonsai – methods of bonsai culture – terrarium – flower arrangement – types of flowers – concepts – styles – purpose – methods – cut foliage – its uses in flower arrangement – importance in flower arrangement – dry flower making – vegetable and fruit carving – plant jewels.

PRACTICAL

Identification of ornamental plants and garden components – study of form, size shape, texture, flowering season and flower colour of different living components – Identification and description of trees, shrubs, flowers beds, foliage beds, climbers and creeper, hedges, edges, cacti, succulents, ferns and palms. Evaluation of different garden sites in the campus based on the basic principles –

Study of different styles of garden – lawn – study of types of grasses – establishment, care and maintenance of lawn – art of topiary – identification, planning and designing of non – living components – principles and concepts in garden designing – preparation of landscape design plan for home, institution and industries – study on special types of garden – preparation of landscape project – study on horticultural crafts – bonsai, terrarium and flower arrangement – visit to various gardens.

Practical Schedule

- 1) Identification of ornamental plants.
- 2) Identification of different components – their form, size, shape, texture flowering and other beauty components.
- 3) Evaluation of different garden sites in campus.
- 4) Description of trees, shrubs, herbs and annuals.
- 5) Description of climbers, creepers, flowers and foliage beds.
- 6) Art of topiary, trophy and carpet beds.
- 7) Identification of lawn grasses.
- 8) Methods of establishment of lawn grasses.
- 9) Maintenance of lawn grasses.
- 10) Description of non – living components.
- 11) Study on beauty components.
- 12) Principles and fundamentals of designing garden.
- 13) Practices on manual and computer aided landscape designing.
- 14) Preparation of landscape plan for home, Institute and Industry gardens.
- 15) Preparation of landscape plan for public parks.
- 16) Practices on Horticultural crafts – bonsai, terrarium and flower arrangements, Vegetable and fruit carving.

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1Y2HRT 203: PRODUCTION TECHNOLOGIES OF VEGETABLE CROPS

Objectives

To impart knowledge on the scenario of advanced production techniques and production constraints in vegetables.

THEORY

Unit-I : Scope and Importance of Olericulture

Scope and importance – area and production, global and national scenario, institutions involved in vegetable crops research – export potential – constraints in vegetable production – classification of vegetable crops – types of vegetable nutrition garden, kitchen garden, truck garden, market garden, roof garden, floating garden – vegetable forcing – contract farming – rice fallow cultivation, river bed cultivation, rain fed cultivation, – GAP in vegetable production – export standards of vegetables.

Unit-II : Solanaceous and Malvaceous Vegetable Crops

Origin and distribution – area and production – composition and uses – climate and soil requirements – season – varieties and hybrids – seed rate – nursery practices – containerized transplant production and transplanting – preparation of field – spacing – cropping system – planting methods – manuring and nutrient management – water and weed management – mulching – nipping – fertigation – nutrient deficiencies – physiological disorders – growth regulators – sex expression – maturity indices – harvest – yield – seed production and storage of the following crops:

Tomato, brinjal, chilli, capsicum and bhendi.

Unit-III : Cucurbitaceous Vegetable Crops

Ash gourd, pumpkin, bottle gourd bitter melon, snake melon, ribbed melon, watermelon, muskmelon, coccinia, cucumber and gherkin.

Unit-IV : Legumes, Bulbs and Tuber Crops

Peas and Beans, amaranthus, onion, potato, tapioca and sweet potato.

Unit-V : Temperate Vegetables

Cauliflower, cabbage, knol – khol, turnip, beetroot and carrot.

PRACTICAL

Identification and description of vegetable crops – layout of kitchen garden – nursery practices and transplanting – preparation of field and sowing/planting for direct sown/transplanted vegetable crops – manures and fertilizer application/fertigation schedule and intercultural operations – mulching – growth regulators – nipping – identification of nutrient deficiencies – physiological disorders – harvest indices and maturity standards – post – harvest handling and storage – marketing – cost of cultivation – project preparation for commercial cultivation – visit to commercial vegetable growing areas.

Practical Schedule

- 1) Preparation of nursery bed, containerized transplant production and sowing of vegetable seeds.
- 2) Preparation of field – raising of a transplanted vegetable crop.
- 3) Preparation of field, sowing of cucurbitaceous, perennial and leafy vegetable and tuber crops.
- 4) Identification and description of varieties and hybrids of solanaceous and leguminous vegetables.
- 5) Identification and description of varieties and hybrids of bhendi, cucurbits,

root and tuber crops.

- 6) Planning and lay out of kitchen /nutrition garden.
- 7) Study of rain fed and padugai land cultivation practices in vegetable crops.
- 8) Practices in manuring and fertilizer application in vegetable crops.
- 9) Practices in irrigation practices of vegetable crops.
- 10) Preparation of plant growth regulator spray solution – their usage in tropical vegetable crops.
- 11) Identification of nutrient deficiencies, physiological disorders and corrective measures in vegetable crops.
- 12) Maturity indices, harvesting and post – harvest handling of vegetable crops.
- 13) Practices in seed production techniques in vegetable crops.
- 14) Commercial vegetable production in protected structures.
- 15) Project preparation for commercial cultivation of tropical vegetable crops.
- 16) Visit to commercial vegetable production units.
- 17) Orientation for final practical examination.

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1Y2HRT 204: BASICS IN PLANT PATHOLOGY

Objectives

The subject covers the various principles of Plant Pathology and the principles involved in the plant disease management. Also classification of fungicides, methods of application of fungicides and employing the various bio – control agents used in the management of crop diseases are taught.

PRACTICAL

Field diagnosis and identification of crop diseases. Classification of plant diseases – Disease triangle – Disease surveillance, assessment and forecasting – Diagnosis of plant diseases – Protection of crops from air – borne, seed – borne, soil – borne and vector – borne plant diseases – Physical methods – soil solarization, Hot water treatment, Incineration, Chemical control of plant diseases – fungicides – Different group of fungicides and antibiotics in plant disease management – Biological control of plant diseases – Plant products and Antiviral principles – method of application, Identification and monitoring of fungal, bacterial, phytoplasmal and viral diseases – Mass production of *Trichoderma* and *Pseudomonas*.

Practical Schedule

- 1) Disease triangle.
- 2) Classification of plant diseases.
- 3) Field diagnosis and identification of crop diseases.
- 4) Disease surveillance, assessment and forecasting – Diagnosis of plant diseases
- 5) Protection of crops from air – borne, seed – borne, soil – borne and vector – borne plant diseases.
- 6) Physical methods – soil solarization, Hot water treatment, Incineration, Chemical control of plant diseases.
- 7) Fungicides – Different group of fungicides and antibiotics in plant disease management.
- 8) Biological control of plant diseases.
- 9) Plant products in disease management.
- 10) Antiviral principles.
- 11) Method of application.
- 12) Identification and monitoring of fungal, bacterial, phytoplasma and viral disease.
- 13) Mass production of *Trichoderma*.
- 14) Mass Production of *Pseudomonas*.
- 15) Identification of fungal and bacterial, Phytoplasmal crop diseases.
- 16) Identification of different groups of fungicides, bactericides, their preparation and use.
- 17) Orientation for Final Practical Examination.

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1Y2HRT205: FARM MACHINERY FOR HORTICULTURAL CROPS

THEORY

Unit-I

Farm Power Power sources for horticulture, IC engines – working principles, two stroke and four stroke engines, different systems of an IC engine.

Unit-II

Orchard tractors – types, Selection of tractors and cost of tractor power – Tractor and implement selection for different horticultural operations.

Unit-III

Plant protection, harvesting and orchard management machinery Plant protection equipment for orchards.

Unit-IV

Harvesting tools and equipment. Harvesting machinery for vegetable and fruit crops, tuber crops, tree and plantation crops.

Unit V

Lawn management machinery – lawn mowers and machinery.

PRACTICAL

Study of different components of IC engine, four stroke petrol engine, two stroke petrol engine. Identification of components of MB plough, disc plough, seed planters, their working mechanisms. Operation of tractor and implements – operation and maintenance power tiller – Study of different inter – cultivation equipments – pruners – Sprayers and dusters – their operation, repairs and adjustment – Harvesting tools and harvesters for horticultural crops – Field capacity and cost analysis

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Paper Code: 1Y2HRT 206

Title: Internship

- 1. Student will visit Industrial partner and learn intricacy of horticultural crops farming at their Farm.**
- 2. Internship Report will be submitted by the student at the End Semester Examination.**
- 3. Evaluation of Internship Report :**
 - (a) First Periodic Assessment of the progress after 02 Weeks** **20**
Marks
 - (b) Second Periodic Assessment after 04 Weeks** **20**
Marks
 - (c) End Semester Examination will consist of**
 - i) Evaluation of the Internship Report** **50**
Marks
 - ii) Viva voce of the Internship Report** **10**
Marks

Learning Outcome: This paper aims to impact field training to students to learn Organic farming
Mode of Teaching: Lecture/ Practical/Field Visit/Workshop