

SEMESTER-III

HORT 201: Temperate Fruit Crops**2 (1+1)****Theory**

Classification of temperate fruits, detailed study of 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 of apple, pear, peach, apricot, plum, cherry, persimmon, strawberry, kiwi, Queens land nut (Mecademia nut), almond, walnut, pecan nut, hazel nut and chest nut. Re-plant problem, rejuvenation and special production problems like pre-mature leaf fall, physiological disorders, important insect – pests and diseases and their control measures. Special production problems like alternate bearing problem and their remedies.

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.

Suggested Reading:

- Chattopadhyay T.K.2009.*A text book on Pomology-IV Devoted to Temperate fruits*. Kalyani Publishers.B-1/292,Rajinder Nagar,Ludhiana-141008
- Banday F.A. and Sharma M.K.2010.*Advances in Temperate Fruit Production*. Kalyani Publishers.B-1/292, Rajinder Nagar, Ludhiana-141008.
- Kaushal Kumar Misra.2014.*Text book of Advanced Pomology. Biotech Books*.4762-63, Ansari Road, Darya Ganj, New delhi-11002.
- Das B.C and Das S.N .*Cultivation of Minor Fruits*. Kalyani Publishers.B-1/292, Rajinder Nagar, Ludhiana-141008.
- Pal J.S.2010. *Fruit Growing* .2010. Kalyani Publishers.B-1/292,Rajinder Nagar, Ludhiana-141008.
- Mitra S.K, Rathore D.S and Bose T .K. 1992. *Temperate Fruit Crops. Horticulture and Allied Publishers*, Calcutta.
- Chattopadhyya, T.K. 2000. *A Text Book on Pomology (Temperate Fruits) Vol. IV* Kalyani Publishers, Hyderabad
- Chadha, T.R, 2001. *Text Book of Temperate Fruits*. Indian Council of Agricultural Research, New Delhi.
- David Jackson & N E Laone, 1999 *Subtropical and Temperate Fruit Production*. CABI, Publications.
- W S Dhillon. 2013. *Fruit Production In India*. Narendra Publishing House. New Delhi

HORT 202: Temperate Vegetable Crops**2(1+1)****Theory**

Importance of cool season vegetable crops in nutrition and national economy. Area, production, export potential, description of varieties and hybrids, origin, climate and soil, production technologies, post-harvest technology and Marketing of cabbage, cauliflower, knol-khol, sprouting broccoli, Brussels' sprout, lettuce, palak, Chinese cabbage, spinach, garlic, onion, leek, radish, carrot, turnip, beet root, peas, broad beans, rhubarb, asparagus, globe artichoke, Vegetable kale.

Practical

Identification and description of varieties/hybrids; propagation methods, nursery management; preparation of field, sowing/transplanting; identification of physiological and nutritional disorders and their corrections; post-harvest handling; cost of cultivation and field visits to commercial farms.

Suggested Reading:

- S. Thamburaj. 2014. *Text book of vegetable, tuber crops and Spices*. ICAR, New Delhi.
- B.R.Choudhary 2009. *A Text book on production technology of vegetables*. Kalyani Publishers. Ludhiana.
- T.K.Bose. 2002. *Vegetable Crops*. Nayaprakash. Kolkata
- P.Hazra. 2011. *Modern Technology in Vegetable Production*. New India Publishing Agency. New Delhi.
- T.R.Gopal Krishnan, 2007. *Vegetable Crops*. New India Publishing Agency. New Delhi.
- K.V.Kamath. 2007. *Vegetable Crop Production*. Oxford Book Company. Jaipur
- M.S.Dhaliwal, 2008. *Handbook of Vegetable Crops*. Kalyani Publishers. Ludhiana
- Singh, Umashankar, 2008. *Indian Vegetables*. Anmol Publications. Pvt.Ltd .New Delhi.
- K S Yawalkar, 2004. *Vegetable crops in India*. Agri-Horticultural Pub. House. Nagpur.
- M.K.Rana, 2008. *Olericulture in India*. Kalyani Publishers. Ludhiana
- P.Hazra. 2006. *Vegetable science*. Kalyani Publishers .Ludhiana
- Pratibha Sharma, 2007. *Vegetables : Disease Diagnosis and Biomanagement*. Avishkar Publishers. Jaipur
- Uma Shankar. 2008. *Vegetable Pest Management Guide for Farmers*. International Book Distribution Co. Publication. Lucknow.
- Nath Prem. 1994. *Vegetables for the Tropical Regions*. ICAR New Delhi
- K.L.Chadha. 1993. *Advances in Horticulture*. Malhotra publishing house. New Delhi
- Shanmugavelu, K.G. 1989. *Production technology of vegetable crops*. Oxford and IBH publishing Co. Pvt. Ltd, New Delhi.
- Bose, T.K. 2003. *Vegetable Crops*. Naya udyog publishers, Kolkata. 2002. Naya Prakash, Calcutta.
- Prem Singh Arya, 1999. *Vegetable Seed Production Principles*. Kalyani Publishers, New Delhi.
- Choudhery, B., 1990. *Vegetables*. 8th edition. National

HORT 203: Commercial Floriculture**3 (2+1)****Theory**

Scope and importance of commercial floriculture in India, production techniques of commercial flower crops like rose, marigold, chrysanthemum, orchid, carnation, gladiolus, jasmine, crossandra, anthurium, dahlia, tuberose, bird of paradise, china aster and gerbera for domestic and export market. Production techniques of flowers and foliage, filler materials, growing of flowers under protected environments such as glass house, plastic house etc., postharvest technology of cut flowers in respect of commercial flower crops, dehydration technique for drying of flowers, production techniques for bulbous.

Practical

Identification of commercially important floricultural crops. Horticultural practices in commercial crops. Sowing of seeds and raising of seedlings of annuals. Propagation by cutting, layering, budding and grafting of commercial flowers. Training and pruning of roses. Use of chemicals and other compounds for prolonging the vase life of cut flowers. Drying and preservation of flowers. Flower arrangement practices.

Suggested Reading:

- A.K.Singh.2006. *Flower crops, cultivation and management*. New India publishing agency, Pitampura, New Delhi.
- T.K. Bose, L.P. Yadav, P. Patil, P. Das and V.A. Partha Sarthy.2003. *Commercial flowers*. Partha Sankar Basu, Nayaudyog,206, Bidhan Sarani, Kolkata-700006
- S.K. Bhattacharjee and L.C. De. 2003. *Advanced Commercial Floriculture*. Aavishkar Publishers, Distributors, Jaipur (Rajasthan) India.
- Dewasish Choudhary and Amal Mehta. 2010. *Flower crops cultivation and management*. Oxford book company Jaipur, India.

Randhawa, G.S. Amitabha Mukhopadhyay, 2004. Floriculture in India. Allied Publishers Pvt. Ltd:
 Arora, J.S. 2006. Introductory Ornamental Horticulture. Kalyani Publishers, Ludhiana - 141 008.
 Prof. Bhattacharjee, S.K. Advanced Commercial Floriculture. Aavishkar Publishers Distributors, Jaipur - 320 003
 Prof. V.L. Sheela, 2008. Flower for trade. New India Publishing Agency, Pitampura, New Delhi-110088

HORT 204: Principles of Landscape Architecture

2(1 +1)

Theory

Historical Importance of Indian gardens, Gardens of ancient world, Definitions, Famous gardens of India and abroad, formal, informal, free style and wild gardens, basic themes of gardens viz. circular, rectangular and diagonal themes, Steps in preparation of garden design. Use of Auto CAD and Arch CAD in designing gardens. Factors affecting landscape design viz. initial approach, view, human choice, simplicity, topography etc., Principles of Landscape gardens viz. Axis, rhythm, balance, time and light, space, texture, form, mass effect, focal point, mobility, emphasis, unity and harmony etc.. Elements of landscape gardens viz. tangible and intangible elements. Bio-aesthetic planning, definition, objectives, Planning and designing of home gardens, colonies, country planning, urban landscape, Development of institutional gardens, planning and planting of avenues, beautifying educational institute, railway lines, railway stations, factories, air ports, corporate buildings, dams, hydro electric stations, river banks, play grounds, Gardens for places of religious importance viz. temples, churches, mosques, tombs etc, Importance, features and establishment of English garden , Japanese gardens , Mughal, gardens, Hindu gardens and Buddhist gardens, Xeriscaping, definition, principles and practice.

Practical

Study of garden equipments. Study of Graphic language, Use of drawing equipments, graphic symbols and notations in landscaping designing, Study and designing of different styles of gardens, Study and designing of gardens based on different themes, Designing gardens using Auto-cad/ archi-cad, Designing gardens for home, traffic islands, schools and colleges, public buildings, factories, railway stations, air ports, temples, churches, play grounds, corporate buildings/ malls. Designing and planting of avenues for state and National highways, Design and establishment of Japanese, English and Mughal gardens. Visit to public, institutional and botanical gardens.

Suggested Reading:

A.K. Tiwari and R. Kumar. 2012. *Fundamentals of ornamental horticulture and landscape gardening*. New India.
 H.S.Grewal and Parminder Singh. 2014. *Landscape designing and ornamental plants*
 R.K. Roy. *Fundamentals of Garden designing*.2013.New India publishing agency, Pitampura, New Delhi.
 Rajesh Srivastava. 2014. *Fundamentals of Garden designing*. Agrotech press, Jaipur, New Delhi.
 L.C. De. *Nursery and landscaping*.2013. Pointer publishers, Jaipur India.
 Bose, T.K. Malti, R.G. Dhua, R.S. & Das, P. 2004. Nayaprakash, Calcutta. Floriculture and Landscaping

Arora, J.S. 2006. Kalyani publishers, Ludhiana. Introductory Ornamental Horticulture. Kalyani publishers, Ludhiana.

Randhawa, G.S. and Amitabha Mukhopadhyay 2004. Floriculture in India. Allied Publishers Pvt. Ltd., New Delhi.

HORT 205: Postharvest Management of Horticultural Crops

3(2+1)

Theory

Importance of Postharvest Technology in horticultural crops. Maturity indices, harvesting, handling, grading of fruits, vegetables, cut flowers, plantation crops, spices, medicinal and aromatic plants. Pre-harvest factors affecting quality, factors responsible for deterioration of horticultural produce, physiological and biochemical changes during ripening, hardening and delaying ripening process. Respiration and factors affecting respiration. Postharvest treatments of horticultural crops. Quality parameters and specifications. Pre-harvest treatment and pre-cooling, pre-storage treatments. packaging methods and types of packages, Types of containers and cushioning materials. Methods of storage for local market and export. Modes of transport.

Practical

Practice in judging the maturity of various horticultural produce, determination of physiological loss in weight and quality. Grading of horticultural produce, post-harvest treatment of horticultural crops, physical and chemical methods. Packaging studies in fruits, vegetables, plantation crops, spices and cut flowers by using different packaging materials, methods of storage, post harvest disorders in horticultural produce. Visit to markets, packing houses and cold storage units.

Suggested reading:

- Verma, L. R. and Joshi, V. K. 2000. Post Harvest Technology of Fruits and Vegetables. Vol. I & II. Indus Publishing Co., New Delhi
- Wiils, McGlasson and Graham, J. 2007. Post Harvest- An Introduction to the Physiology and Handling of Fruits, Vegetables and ornamentals. Cab International
- Stanley, J. K. 1998. Post Harvest Physiology of Perishable Plant Products. CBS, New Delhi.
- Neetu Sharma and Mashkoo Alam, M. 1998. Post Harvest Diseases of Horticultural Perishables. International Book Distributing Co., Lucknow.
- Chadha, K. L. and Kalloo, G. 1993. Advances in Horticulture. Vol. 4 to 10. MPH, New Delhi.
- Hulme, A.C. 1970. Food Science & Technology - A Series of Monograph. The Biochemistry of Fruits and their Products. Vol.-1. Academic Press London & New York.
- Mitra, S. K. 1997. Post Harvest Physiology and Storage of Tropical and Sub-tropical Fruits. CAB International.
- Fellows, P. J. 1998. Food Processing Technology – principles and Practices. Ellis Horwood.
- Thomposon, A. K. 1996. Post harvest Technology of Fruits and Vegetables. Blackwell Science.
- Battacharjee, S. K. and De, L. C. 2005. Post Harvest Technology of Flowers and Ornamentals Plants. Ponteer Publisher, Jaipur, India.
- Pruthi, J. S. 2001. Minor Spices and Condiments – Crop Managements and Post Harvest Technology. ICAR, New Delhi.
- Shanmugavelu, K. G., Kumar, N. and Peter K.V. 2002. Production Technology of Spices and Plantation Crops. Agrobios (India).
- Saraswathy, S. *et. al.* 2008. Post harvest Management of Horticultural Crops. Agribios (India).81-7754-322-9.

Kitinoja, L. and Kader, A. A. 2003. Small-Scale Postharvest Handling practice: A Manual for Horticulture crops (4th ed.). US Davis, PHT Research and information Center.

Jacob John, P. 2008. A Handbook on Post Harvest management of Fruits and vegetables. Daya Publishing House, Delhi-1081-7035-532-X.

Kitinoja, L. and Kader, A. A. 2003. Small-Scale Postharvest Handling practice: A Manual for Horticulture crops (4 ed.). US Davis, PHT Research and information Center.

<http://www.postharvest.com.au>

http://www.fao.org/infoods/index_en.stm

www.postharvest.ucdavis.edu

HORT 206: Weed Management in Horticultural Crops

2 (1+1)

Theory

Weeds: Introduction, harmful and beneficial effects, classification, propagation and dissemination; Weed biology and ecology, crop weed association, crop weed competition and allelopathy Concepts of weed prevention, control and eradication; Methods of weed control: physical, cultural, chemical and biological methods. Integrated weed management; Herbicides: advantages and limitation of herbicide usage in India, Herbicide classification, formulations, methods of application; Introduction to Adjuvants and their use in herbicides; Introduction to selectivity of herbicides; Compatibility of herbicides with other agro chemicals; Weed management in major field and horticultural crops, shift of weed flora in cropping systems, aquatic and problematic weeds and their control.

Practical

Identification of weeds; Survey of weeds in crop fields and other habitats; Preparation of herbarium of weeds; Calculations on weed control efficiency and weed index; Herbicide label information; Computation of herbicide doses; Study of herbicide application equipment and calibration; Demonstration of methods of herbicide application; Preparation of list of commonly available herbicides; Study of phytotoxicity symptoms of herbicides in different crops; Biology of nut sedge, bermuda grass, parthenium and celosia; Economics of weed control practices; Tours and visits of problem areas.

Suggested reading:

Crafts, A.S. and Robbins, W.W. 1973. *Weed Control*. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

Gupta, O.P. 1984. *Scientific Weed Management*. Today and Tomorrow Printers and Publishers, New Delhi.

Gupta, O.P. 2015. *Modern Weed Management*. Agro Bios (India), Jodhpur.

Naidu, V.S.G.R., *Handbook of Weed Identification*. Directorate of Weed Research, Jabalpur.

Rajagopal, A., Aravindan, R. and Shanmugavelu, K.G., 2015. *Weed management of Horticultural Crops*. Agrobios (India), Jodhpur.

Ramamoorthy, K. and Subbian, P., *Predominant Weed flora in hill –ecosystems*. Agrobios (India), Jodhpur.

Rao, V.S. 2000. *Principles of Weed Science*. Oxford & IBH Publishing Co., New Delhi.

Subramanian, S., Mohammed Ali, A. and Jayakumar, R. 1991. *All About Weed Control*. Kalyani Publishers, Ludhiana.

Tadulingam, C. and Venkatnarayana, D. 1955. *A Handbook of Some South Indian Weeds*. Government Press, Madras.

Thakur, C. 1977. *Weed Science*. Metropolitan Book Co. Pvt. Ltd., New Delhi.

HORT 207: Fundamental of Food Technology**2(1+)****Theory**

Food and its function, physico-chemical properties of foods, food preparation techniques, nutrition, relation of nutrition of good health. Characteristics of well and malnourished population. food elements – carbohydrate, fat and proteins. Energy, definition, determination of energy requirements, food energy. Mineral nutrition: macro and micro-minerals (Ca, Fe and P), function, utilization, requirements, sources, effects of deficiency. Vitamins: functions, sources, effects of deficiency, requirements of water soluble and fat-soluble vitamins. Balanced diet: recommended dietary allowances for various age groups.

Practical

Methods of measuring food ingredients, effect of cooking on volume and weight, determination of percentage of edible portion. Browning reactions of fruits and vegetables. estimation of energy value, proteins and fats of foods. Planning diet for various age groups.

Suggested Reading

Manay, S.N, Shadaksharaswamy, M.1998. Food-facts & Principles New Age International Publishers, New Delhi
Srilakshmi, B. 1995. Food Science. New Age International Publishers, New Delhi

PPA(H) 208: Fundamentals of Plant Pathology**3(2+1)****Theory**

Introduction to the science of phytopathology, its objectives, scope and historical background. Classification of plant diseases, symptoms, signs, and related terminology. Parasitic causes of plant diseases (fungi, bacteria, viruses, phytoplasma, protozoa, algae and flowering parasitic plants), their characteristics and classification. Non-parasitic causes of plant diseases. Infection process. Survival and dispersal of plant pathogens. Plant disease epidemiology, forecasting and disease assessment. Principles and methods of plant disease management. Integrated plant disease management. Fungicides classification based on chemical nature, Commonly used fungicides, bactericides and nematocides.

Practical

Familiarity with general plant pathological laboratory and field equipments. Study of disease symptoms and signs and host parasite relationship. Identification and isolation of plant pathogens. Koch's postulates. Preparation of fungicidal solutions, slurries, pastes and their applications.

Suggested Readings:

N.G. Ravichandra, 2013. Fundamentals of Plant Pathology. PHI Hall of India, New Delhi
R.S. Mehrotra, Ashok Agarwal. *Fundamental of Plant Pathology-*
Sambamurthy *A textbook of Plant Pathology-*
R.S.Singh *Introduction to principles of plant pathology*
Alexopoulos, C.J. Mims, C.W. and Blackwell, M. 1996. Introduction to Mycology Wiley Eastern Ltd., New York.
Mandahar, C.L. 1987. Introduction to Plant Viruses. Chand and Co. Pvt. Ltd., New Delhi.
Mehrotra, R.S. and Aneja, K.R. 1990. . An Introduction to Mycology. New Age International (P) Ltd., New Delhi.
Singh, R.S. 1982. Plant Pathogens - The Fungi. Oxford and IBH Publishing Co., New Delhi.
Singh, R.S. 1989. Plant Pathogens - The Prokaryotes .Oxford and IBH Publishing Co., New Delhi.
Dhingra and Sinclair 1993. Basic Plant Pathology Methods. CBS, Publishers & Distributors, New Delhi.
Agrios, G.N. 2006. Plant Pathology. Elsevier Academic press, London.

PPA(H) 209: Diseases of Fruit, Plantation, Medicinal and Aromatic Crops**2(1+1)****Theory**

Etiology, symptoms, mode of spread, epidemiology and integrated management of the diseases of fruits, plantation, medicinal and aromatic crops *viz* mango, banana, grape, citrus, guava, sapota, papaya, jack fruit, pineapple, pomegranate, ber, apple, pear, peach, plum, almond, walnut, strawberry, areca nut, coconut, oil palm, coffee, tea, cocoa, cashew, rubber, betel vine senna, neem, hemp, belladonna, pyrethrum, camphor, costus, crotalaria, datura, dioscorea, mint, opium, *Solanum khasianum* and Tephrosia. Important post-harvest diseases of fruit, plantation and medicinal and aromatic crops and their management.

Practical

Observations of disease symptoms, identification of casual organisms and host parasite relationship of important diseases. Examination of scrapings and cultures of important pathogens of fruits, plantation, medicinal and aromatic crops.

Suggested Reading:

- L.R. Verma and R.C. Sharma. *Diseases of horticultural Crops-*, Indus Publishers
 Srikant Kulkarni, Yashoda R. Hedge, *Diseases of Plantation crops and their management-* Agrotech publication Academy.
 S.L. Godara, BBS Kapoor, B.S. Rathore *Disease management of spice crops-*, Madhu Publications.
 Alfred Steferud *Diseases of Plantation Crops-*, Biotech books.
 R.S.Singh, *Plant diseases* –Oxford and IBH Publishing Co. Pvt. Ltd.
 L.Darwin Christdhar Henry and H. Lewin Devasahayam. *Crop diseases: Identification, Treatment and Management*. An Illustrated Handbook, New India publishing. Agency.
 Anna L *A colour atlas of Post Harvest Diseases and Disorders of fruits and vegetables* -. Snowdon, CRC Press.
 Pathak, V.N. 1980.*Diseases of Fruit Crops*.Oxford IBH Publishing Co. Pvt. Ltd., New Delhi.
 Ranga Swamy, G. 1988.*Diseases of Crop Plants in India*. Prentice Hall of India Pvt. Ltd., New Delhi.
 Singh, R.S. 1996.*Plant Diseases*. Oxford IBH Publishing Co. Pvt. Ltd., New Delhi.
 Saha, L.R. 2002.*Hand Book of Plant Diseases*. Kalyani Publishers, New Delhi.
 Arjunan, Karthikeyan, Dinakaran, Raghuchander, 1999.*Diseases of Horticultural Crops*. Dept. of Plant Pathology, TNAU, Coimbatore
 Chadha, K.L. 2002.*Hand Book of Horticulture*. ICAR, New Delhi.
 Anna L.Snowdon *A colour atlas of Post Harvest Diseases and Disorders of fruits and vegetables* .CRC Press, New Delhi.
 L.R. Verma and R.C. Sharma. *Diseases of horticultural Crops.*, Indus Publishers,New Delhi.
 Yashoda R. Hedge. *Diseases of Plantation crops and their management* .Srikant Kulkarni, Agrotech publication Academy.
 S.L. Godara, BBS Kapoor, B.S. Rathore. *Disease management of spice crops.*, Madhu Publications.
 Ranga Swamy, G. 1988.*Diseases of crop plants in India*. Prentice Hall of India Pvt. Ltd., New Delhi
 R.S.Singh, *Plant diseases*. Oxford and IBH Publishing Co. Pvt. Ltd.
 L. Darwin Christdhar Henry and H. Lewin Devasahayam, *An Illustrated Handbook*. New India publishing.Agency

AEN(H) 210: Non –insect Pests of Horticultural Crops and their Management 2(1+1)**Theory**

History, definition and economic importance of plant parasitic nematodes, phytophagous mites, rodents, horticulturally important birds, snails and slugs. General characters of aforementioned organisms, their morphology, taxonomy, classification, biology and behaviour symptomatology and management

Practical

Morphological study and identification of horticulturally important mites, nematodes, rodents, birds, snails and slugs etc. Collection, cleaning, and preservation as far as possible. Studies of symptoms of damage and habitat study. Sampling and estimation of population

Suggested Reading:

Upadhyay, K.D and Dwivedi, K. 1997. A text book of plant nematology. Amman Publishing House Aman publishing house, Meerut

Vasanth Raju David, B. 2001. Elements of economic entomology. Popular book Depot, Chennai.

Gopal Swaroop and Das Gupta 1986. ICAR, New Delhi. Plant Parasitic Nematodes of India Problems and Progress.

Nair, M.R.G.K. 1975. Insects and Mites of Crops in India. ICAR, New Delhi

Metcalf, R.L and Luckman, W.H. 1982. Introduction to Insect pest management Wiley Inter Science Publishing, New York.

Butani, D.K. 1984. Insects and Fruits. Periodical Expert Book Agency, New Delhi

E.I. Jonathan, I. Cannayane, K. Devrajan, S. Kumar, S. Ramakrishan, Agricultural Nematology. TNAU, Coimbatore.

EXT(H) 211: Human values & Ethics**1(1+0)****Theory**

Values and Ethics-An Introduction. Goal and Mission of Life. Vision of Life. Principles and Philosophy. Self Exploration. Self Awareness. Self Satisfaction. Decision Making. Motivation. Sensitivity. Success. Selfless Service. Case Study of Ethical Lives. Positive Spirit. Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Examination.