



5. B.Sc. (Hort.) THIRD YEAR FIRST SEMESTER

5.1 Diseases of Vegetables, Ornamental and Spice Crops [PPT 311] 3(2+1)

Etiology, symptoms, mode of spread, epidemiology and integrated management of diseases of the following vegetables, ornamental and spice crops: tomato, brinjal, chili, bhindi, cabbage, cauliflower, radish, knol-khol, pea, beans, beet root, onion, garlic, fenugreek, ginger, potato, turmeric, pepper, cumin, cardamom, nutmeg, coriander, clove, cinnamon, jasmine, rose, *Crossandra*, tuberose, *Geranium*. Important post-harvest diseases of vegetables and ornamental crops and their management.

Practical:

Observations of symptoms, causal organisms and host parasitic relationship of important diseases, examination of cultures of important pathogens of vegetables, ornamental and spice crops.

Reference Books:

1. Jindal, Krishan Kumar and Madhu Meeta (1994). Diseases of Ornamental Plants in India Daya publishing House, Tri Nagar, Delhi - 110 035
2. Verma L.R. and Sharma R.C. (1999). Diseases of Horticultural Crops: Vegetables, Ornamentals, and Mushrooms Indus Publishing Co., New Delhi.
3. Mishra, R.K., Singh A.K. and Sharma, A. K. (2013). Diseases of Vegetable Crops and Their Integrated Management: A Colour Handbook, NIPA
4. Singh, R.S. (1995). Diseases of Vegetable Crops. 3rd Ed. Oxford & IBH Pub. Co., New
5. Gupta, S.K. (2006). Disease problem in vegetable production, Scientific publication, Jodhpur.
6. Gupta V.K. (2011). Diseases of major vegetable crops, Kalyani publication New Delhi.



5.2 Fundamentals of Extension Education [EXT 311]

2(1+1)

Extension education: meaning, definition, nature, scope, objectives, principles, approaches and history. Forestry extension: process, principles and selected programmes of leading national and international forest institutes. People's participation in forestry programmes. Motivation of women community, children, youth and voluntary organizations for forestry extension work. Rural Development: meaning, definition, objectives and genesis. Transfer of technology programmes like lab to land programme (LLP) national demonstration (ND), front line demonstration (FLD) Krishi Vigyan Kendras (KVK), Technology Assessment and Refinement Programme (TARP) etc. of ICAR. Communication: meaning, definition, elements and selected models. Audio - visual aids: importance, classification and selection. Programming planning process - meaning, scope, principles and steps. Evaluation: meaning, importance and methods. Scope and importance of Participatory Rural Appraisal (PRA) & Rapid Rural Appraisal (RRA). Management and administration: meaning, definition, principles and functions. Concepts of human resource development (HRD), rural leadership.

Practical:

Visits to study structure, functions, linkages and extension programmes of ICFRE institutes/voluntary organizations/Mahila Mandal, Village Panchayat, State Deptt. of Forests/All India Radio (AIR). Exercises on distortion of message, script writing for farm broadcasts and telecasts, planning, preparation & use of NPVA like poster, chart, flash cards, folders etc. and AVA like OHP & 35 mm slide projector transparencies. Identification of local leaders to study their role in extension work. Evaluation of some selected case studies of forestry extension programmes. Preparation of Village Agricultural productions plan.

Reference Books:

1. Dhama, O.P. and Bhatnagar, O.P. Education and communication for Development.
2. Reddy, A.A. Extension Education.
3. Ray, G.L. Extension communication and Management
4. Singh Katar, Rural Development.



5.3 Organic Farming [SAC 311] 2(1+1)

Introduction, concept, relevance in present context; Organic production requirements; Biological intensive nutrient management-organic manures, vermicomposting, green manuring, recycling of organic residues, biofertilizers; Soil improvement and amendments; Integrated diseases and pest management – use of biocontrol agents, biopesticides pheromones, trap crops, bird perches; Weed management; Quality considerations, certification, labeling and accreditation processors, marketing, exports.

Practical:

Raising of vegetable crops organically through nutrient, diseases and pest management; vermicomposting; vegetable and ornamental nursery raising; macro quality analysis, grading, packaging, post harvest management.

Reference Books:

1. Sharma, Arun K. Hand book of organic farming. Agrobios, Jodhpur, India.
2. Thapa, U. and Tripathi, P. Organic farming in India problem and prospect. Agrotech Publishing academy, Udaipur, India.
3. शर्मा अरुण के. जैविक खेती सिद्धांत तकनीक एवं उपयोगिता, एग्रोबायोस, जोधपुर (राज.)।
4. Panda, S.C. Soil management and organic farming. Agrobiosis, Jodhpur, India.
5. Gahlot D. Organic Farming components and management. Agrobios, Jodhpur, India.

5.4 Introduction to Major Field Crops [AGRO 311] 2(1+1)

Classification and distribution of field crops, definitions and concept of multiple cropping, mixed cropping, intercropping, relay and alley cropping, cultural practices for raising major cereals, pulses, oil seeds and fodder crops, green manuring, crop rotation.

**Practical:**

Identification of crop plants, seeds and weeds. Preparation of cropping scheme. Application of herbicides in field crops.

Reference Books:

1. Modern Techniques of raising field crops - Chida Singh
2. Crop management under rainfed and irrigated condition - S.S.Singh
3. Agronomy of field crops - S.R.Reddy
4. Text book of field crop production - Edited by R. Prasad (ICAR)

5.5 Medicinal and Aromatic Crops [PSMA 311]**3(2+1)**

History, scope, opportunities and constraints in the cultivation and maintenance of medicinal and aromatic plants in India. Importance, origin, distribution, area, production, climatic and soil requirements, propagation and nursery techniques, planting and after care, cultural practices, training and pruning, nutritional and water requirements. Plant protection, harvesting and processing of under mentioned important medicinal and aromatic plants. Study of chemical composition of a few important medicinal and aromatic plants, extraction, use and economics of drugs and essential oils in medicinal and aromatic plants. Therapeutic and pharmaceutical uses of important species. Medicinal Plants: Betelvine, periwinkle, *Rauwolfia*, *Dioscorea*, Isabgol, *Ammi majus*, *Belladonna*, *Cinchona*, *Pyrethrum* and other species relevant to local conditions. Aromatic Plants: *Citronella* grass, khus grass, *flag* (baje), *Lavender*, *Geranium*, patchouli, *Bursera*, enthe, musk, *Ocimum* and other species relevant to the local conditions.

Practical:

Collection of medicinal and aromatic plants from their natural habitat and study their morphological description, nursery techniques, harvesting, curing and processing techniques and extraction essential oils.

**Reference Books:**

1. Prajapati, N.D. A Hand book of medicinal Plants.
2. Prasad, G. A manual of Medicinal trees.
3. Purohit, S.S. Medicinal Plant Cultivation-
4. Trivedi, P.C. Medicinal Plants:A ethnobotanical Approach
5. Manjunath, S.S. Safed Musli: A White Gold
6. Purohit, S.S. Ausadhya podhon Ki Saral Kheti

**5.6 Introductory Agro-forestry [IAF 311]
2 (1+1)**

Agroforestry - definition, objectives and potential. Distinction between agroforestry and social forestry. Status of Indian forests and role in India farming systems. Agroforestry system, sub-system and practice: agri-silviculture, silvipastoral, horti-silviculture, horti-silvipastoral, shifting cultivation, taungya, home gardens, alley cropping, intercropping, wind breaks, shelterbelts and energy plantations. Planning for agroforestry - constraints, diagnosis and design methodology, selection of tree crop species for agroforestry. Agroforestry projects - national, overseas, MPTS - their management practices, economics of cultivation - nursery and planting (*Acacia catechu*, *Dalbergia sissoo*, *Tectona*, *Populus*, *Morus*, *Grewia*, *Eucalyptus*, *Quercus* spp. and bamboo, tamarind, neem etc.)

Practical:

Identification and seeds and seedlings of multipurpose tree species. Nursery practices for poplar, *Grewia optiva*, *Morus alba*, *Acacia catechu*, *Dalbergia sissoo*, *Robinia*, *Leucaena* etc. Visit to agro-forestry fields to study the compatibility of MPTS with agricultural crops: silvipastoral, alley cropping, horti-silviculture, agro-silvipasture, fuel and fodder blocks. Visit to social forestry plantations - railway line plantations, canal plantations, roadside plantations, industrial plantations and shelterbelts. Rapid assessment of farmers needs for green manure, fodder, fuel wood in selected villages. Economics and marketing of products raised in agro-forestry systems.

**Reference Books:**

1. Chaturvedi O.P., Venkatesh A., Yadav R.S., Alam badre, Dwivedi R.P., Singh Ramesh & S.K. Dhyani. (2009). Agroforestry - Natural Resource Sustainability, Livelihood and Climate moderation. Satish Serial Publishing House. Delhi.
2. Deb Roy, R. (1994). Agroforestry - Sustainable agriculture and environment. In: Natural Resource Management for Sustainable Agriculture and Environment (Ed., (DebB.L.).Angkor Pub. Ltd., New Delhi.
3. Deb Roy, R. (1995). Agroforestry - Principles and practices. In: Sustainable Development of Dryland Agriculture in India (Ed. Singh, R.P.). Sci. Pub., Jodhpur.
4. Pathak, P.S. and Ram Newaj (2003). Agroforestry: Potentials and Opportunities, Agrobios (India), Jodhpur.
5. Pathak, P.S. and Sunil Kumar (2004). Forage and grazing resources in different agro-climatic regions in India In: S.S. Kundu, A.K. Mishra and P.S. Pathak (eds.). Buffalo production under different climatic regions. International Book Distribution Co. Lucknow,
6. Puri, S. and Nair, P.K.R. (2004). Agroforestry research for development in India: 25 years of experiences of a national programme. Agroforestry Systems.

**5.7 Breeding of Vegetable, Tuber and Spice Crops [PBG 311]
3(2+1)**

Centres of origin, plant bio-diversity and its conservation. Models of reproduction, pollination systems and genetics of important vegetable, tuber and spice crops. Self-incompatibility and male sterility, its classification and application in crop improvement. Principles of breeding self-pollinated crops, pure line selection, mass selection, heterosis breeding, hybridization, pedigree method, mass pedigree method, bulk method, modified bulk method, single seed descent method and back cross method. Polyploidy breeding. Mutation breeding. Principles of breeding cross pollinated crops, mass selection, recurrent selection, heterosis breeding, synthetics and composites. Application of



biotechnology in crop improvement. Crops: Solanaceous vegetables, cole crops, cucurbits, bulb crops, root crops, leafy vegetables, okra, leguminous crops.

Practical:

Floral biology and pollination mechanism in self and cross pollinated vegetables, tuber crops and spices. Working out phenotypic and genotypic heritability, genetic advance. Preparation and uses of chemical and physical mutagens. Polyploidy breeding and chromosomal studies. Techniques of F1 hybrid seed production. Maintenance of breeding records.

Reference Books:

1. Peter, K.V. and Kumar T. Pradeep. Genetics and breeding of vegetable crops. ICAR New Delhi.
2. Kumar, N. Breeding of Horticultural Crop. New India Publishing agency.
3. Gupta, S. K. Plant breeding theory and techniques. Agro. Bioss.
4. Kalloo, G. Vegetable breeding. Panima Education book Agency.
5. Rana, M.K. Breeding and protection of vegetables. New India Publishing Agency.

**5.8 Potato and Tuber Crops [VSC 311]
2(1+1)**

Origin, area, production, economic importance and export potential of potato and tropical, sub-tropical and temperate tuber crops; description of varieties and hybrids. Climate and soil requirement, season; seed rate; preparation of field; planting practices; spacing; water, nutrient and weed management; nutrient deficiencies. Use of chemicals and growth regulators; cropping systems. Harvesting practices, yield; seed production, economics of cultivation. Post-harvest handling and storage, field and seed standards, marketing. Crops to be covered – potato, *Tapioca*, sweet potato, arrow root, *Cassava*, *Colocasia*, *Xanthosoma*, *Amorphophallus*, *Dioscorea*, *Jerusalem artichoke*, horse radish and other under exploited tuber crops.

**Practical:**

Identification and description of potato, tropical & sub-tropical and temperate tuber crops; planting systems and practices; field preparation and sowing/planting. Top dressing of fertilizers and interculture and use of herbicides and growth regulators; identification of nutrient deficiencies, physiological disorders; harvest indices and maturity standards, post-harvest handling and storage, marketing. Seed collection, working out cost of cultivation, project preparation of commercial cultivation.

Reference books:

1. Chadha, K.L. (2001). Hand Book of Horticulture. ICAR, New Delhi
2. Thamburaj, S. and Singh, Narendra (2003). Text Book of Vegetables, Tuber Crops and Spices. ICAR, New Delhi.
3. M.S. Palaniswamy (2008). Tuber and Root Crops. Vol. 09 Horticulture Science Series, New India Publishing Agency, Pitam Pura, New Delhi - 110088.
4. Grewal, J.S., Sharma, R.C. and Saini, S.S. (1992). Agrotechniques for intensive potato cultivation in India, ICAR, New Delhi.
5. Chadha, K.L. and Nayar, G.G. (1994). Advances in Horticulture, Vol.8, Malhotra Publishing House, New Delhi.
6. Khurana, S.M.P. and Pandey, S.K. (2008). Aloo Ki Kheti. ICAR, New Delhi.