B.Sc. Agriculture V- Semester

Principles of Integrated Pest and Disease Management	Credit hours: 3(2+1)

Theory:

Categories of insect pests and diseases, IPM: Introduction, history, importance, concepts, principles and tools of IPM. Economic importance of insect pests, diseases and pest risk analysis.Methods of detection and diagnosis of insect pest and diseases.Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Ecological management of crop environment.Introduction to conventional pesticides for the insect pests and disease management.Survey surveillance and forecasting of Insect pest and diseases.Development and validation of IPM module.Implementation and impact of IPM (IPM module for Insect pest and disease. Safety issues in pesticide uses. Political, social and legal implication of IPM.Case histories of important IPM programmes.

Practical :

Methods of diagnosis and detection of various insect pests, and plant diseases, Methods of insect pests and plant disease measurement, Assessment of crop yield losses, calculations based on economics of IPM, Identification of biocontrol agents, different predators and natural enemies. Mass multiplication of Trichoderma, Pseudomonas, Trichogramma, NPV etc.Identification and nature of damage of important insect pests and diseases and their management.Crop (agro-ecosystem) dynamics of a selected insect pest and diseases. Plan & assess preventive strategies (IPM module) and decision making. crop monitoring attacked by insect, pest and diseases . Awareness campaign at farmers fields.

References:

- Metcalf, R.L and Luckman W.H. 1982. Introduction to Insect Pest Management. Wiley Inter Science publishing, New York.
- G.S.Dhaliwal and Ramesh Arora 2001. Integrated Pest Management. Concepts and Approaches. Kalyani publishers, New Delhi.
- Dhaliwal GS &Arora R. 2001. *Integrated Pest Management: Concepts and Approaches.*KalyaniPubl., New Delhi.

- Larry P.Pedigo. 1991.Entomology and Pest Management. McMillan publishing company, New york.
- Yazdani G.S. and Agarwal M.L. 1979. Elements of Insect Ecology. Naroji publishing house, New Delhi.
- David, B.V. 2003. Elements of Economic Entomology, Popular Book Depot, Chennai.

Problematic Soils and their Management (New) Credit Hours: 3(2+1)

Theory:

Soil quality and health, Distribution of Waste land and problem soils in India. Their categorization based on properties. Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Eroded and Compacted soils, Flooded soils, Polluted soils.

Irrigation water – quality and standards, utilization of saline water in agriculture. Remote sensing and GIS in diagnosis and management of problem soils.

Multipurpose tree species, bio remediation through MPTs of soils, land capability and classification, land suitability classification. Problematic soils under different Agroeco systems.

References:

- Abrol, I.P. and Dhurvanarayana, V.V. (1998). Technologies for wasteland development, ICAR, New Delhi-110012.
- Agarwal, R.R., Yadav, J.S.P. and Gupta, R.N. (1982). Saline Alkali soils of India, ICAR, NewDelhi.
- Biswas, T.D. Naryanswami, G, Goswami, N.R; Sekhon, G.S. and Shastry, T.G. (1991). Soil related constraints in crop production. Tech. Bull. No. 15. Indian Society of Soil Science, New Delhi.
- Biswas, T.D. and Mukharjee, S.K. (1990). Text book of soil science, Tata McGraw till publishing co.
- Ltd. New Delhi.
- Cirsan Paul, J.(1985). Principles of remote sensing. Longman, New York.
- Lal, P.; Chhipa, B.R. and Purohit, A.K. (1994). Salt affected soils- A modern synthesis Agro, Botanical publisher, Bikaner
- Richards, L.A. (1954). Diagnosis and improvement of saline and alkali soils. USDA Hand book No. 60, Washington, DC USA.
- Somani, L.L.andTotawat, K.L. (1993). Management of salt affected soils and waters. Agrotech publishing Academy, Udaipur.

Production Technology for Fruit and Plantation Crops **Credit hours: 3(2+1)**

Theory :

Importance and scope of fruit and plantation crop industry in India; High density planting; Use of rootstocks; Production technologies for the cultivation of major fruits-mango, banana, citrus, grape, guava, litchi, papaya, apple, pear, peach and; minor fruits- pineapple, pomegranate, jackfruit, strawberry, nut crops; plantation crops-coconut, arecanut, cashew, tea, coffee & rubber.

Practicals:

Seed propagation.Scarification and stratification of seeds.Propagation methods for fruit and plantation crops including Micro-propagation.Description and identification of fruit.Preparation of plant bio regulators and their uses, Pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchard.

References:

- Bose. T.K., Kabir.J., Das.P. and Joy.P.P.(2000). Tropical Horticulture. NayaProkash. Calcutta.
- Singh, Amar (1986). Fruit Physiology And Production. Kalyani Publishers, New Delhi.
- Singh. S.P. (1997). Commercial Fruits. Kalyani Publishers, New Delhi.
- Mitra. S.K., Bose. T.K. and Rathore. D.S. (1991). Temperate Fruits. Horticulture & Allied Publishers, Calcutta.
- Parthasvathy. V. A. Chattopadhyay. P.K. and Bose. T.K. (2006). Plantation Crpos. NayaProkash, Kolkatta.
- Bal. J.S. (1997). Fruit Growing. Kalyani Publisher, New Delhi.
- Chandra, Atul and Chandra, Anju. Production and Post harvest technology of Fruits. NBS Publisher & Distributers, Bikaner.

Diseases of Field & Horticultural Crops & their Management-I

Credit hours: 3 (2+1)

Theory :

Symptoms, etiology, disease cycle and management of major diseases of following crops:

Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tungro; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose, Bajra :downy mildew and ergot; Groundnut: early and late leaf spots, wilt

Soybean: Rhizoctonia blight, bacterial spot, seed and seedling rot and mosaic; Pigeonpea: Phytophthora blight, wilt and sterility mosaic; Finger millet: Blast and leaf spot; black & green gram: Cercospora leaf spot and anthracnose, web blight and yellow mosaic; Castor: Phytophthora blight; Tobacco: black shank, black root rot and mosaic. Horticultural Crops: Guava: wilt and anthracnose;Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top;Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: Alternaria leaf spot and black rot;Brinjal: Phomopsis blight and fruit rot and Sclerotiniablight;Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic; Okra:Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot; Colocasia: Phytophthora blight; Coconut: wilt and bud rot;Tea: blister blight; Coffee: rust

Practical :

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for Herbarium; Note: Students should submit 50 pressed and well-mounted specimens.

References;

- Gupta, S.K. and Thind, T.S. 2006. Disease problems in vegetable production. Scientific Publishers,Jodhpur.
- Mehrotra, R.S. and Aggarwal, A. 2007.Plant Pathology (2nd.ed.) Tata McGraw-Hill Publishing Co Ltd., New Delhi.
- Pathak, V.N. 1980 Diseases of fruit crops. Oxford and IBH Publishing Co. Pvt. Ltd, . New Delhi.
- Singh, R.S. 2006. Diseases of fruit crops. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
- Singh, R.S.1994 Diseases of vegetable crops. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
- Gupta V K and Paul Y S (eds) 2002. Diseases of field crops. Indus Publishing Co. ND.
- Mehrotra R S and Aggarwal A.2007.Plant Pathology (2nd.ed.) Tata McGraw-Hill Publishing Co Ltd. ND.

- Rangaswamy ,G and Mahadevan,A .2001. Diseases of crop plants in India. Prentice hall of India Pvt LtdND.

Crop Improvement – I (*Kharif*)	**Credit hours: 2(1+1)**

Theory:

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibres; fodders and cash crops; vegetable and horticultural crops; Plant genetic resources, its utilization and conservation Floral biology, study of genetics of qualitative and quantitative characters; Important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops; Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional); Seed production technology in self pollinated, cross pollinated and vegetatively propagated crops. Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeonpea, etc. Ideotype concept and climate resilient crop varieties for future.

Practical :

Emasculation and hybridization techniques in different crop species; viz., Rice, Maize, Sorghum, Pearl Millet, Ragi, Pigeonpea, Urdbean, Mungbean, Soybean, Groundnut, Seasame , Caster, Cotton, Cowpea, Pearl millet and Tobacco. Maintenance breeding of different kharif crops. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in *Kharif* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

References:

- Manjit S. Kang 2004. Crop Improvement: Challenges in the Twenti-First Century (Edt). International,Book Distributing Co. Lucknow.
- Ram, H.H. and H.G. Singh. 1994. Crop Breeding and Genetics. Kalyani Publishers, New Delhi.
- Sharma, A.K. 2005. Breeding Technology of Crop Plants (Edt.). Yash Publishing House, Bikaner.

- Ram. H.H. 2005. Vegetable Breeding — Principles and Practices. Kalyani Publishers, New Delhi.

Entrepreneurship Development and Business Communication **Credit hours: 2(1+1)**

Theory :

Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; Assessment of entrepreneurship skills, SWOT Analysis & achievement motivation, Entrepreneurial behavior, Government policy and programs and institutions for entrepreneurship development, Entrepreneurial Development Process; Business Leadership Skills; Communication skills for entrepreneurship development, Developing organizational skill , Developing Managerial skills, Problem solving skill, Achievement motivation; time management; Supply chain management and Total quality management, Project Planning Formulation and report preparation; Opportunities for entrepreneurship and rural entrepreneurship.

Practical:

Assessing entrepreneurial potential, problem solving ability, managerial skills and achievement motivation, exercise in creativity, time audit, preparation of business plan and proposal writing, visit to entrepreneurship development institute and entrepreneurs.

References:

- Akhouri, M.M.P., Mishra, S.P. and Sen Gupta, R. 1989. Trainers Manual on Developing Entrepreneurial Motivation, NIESBUD, New Delhi.
- Bidgoli, H. 1989. Decision Support Systems: Principles and Practices, St. Paul, West Publishing Co.,USA.
- Mancuso, J. 1974. The Entrepreneurs Handbook (Vol. 192(, Artech House, Inc., USA.
- Patel, V.G. 1987. Entrepeneurship Development Programme in India and Its Relevance to Developing,Countries, Entrepreneurship Development Institute of India, Ahmedabad.
- Rao, T.,V. 1974. Development of an Entrepreneur, Indian Institute of Management, Ahmedabad.
- Dipak De & M.S. Rao.Entrepreneurial behaviour of farmers : An axiomatic theory. ISBN 81-85694-36-

Rainfed Agriculture and Watershed Management – (New) **Credit hours: 3(2+1)**

Theory:

Rainfed agriculture: Introduction, types, History of rainfed agriculture & watershed in India; Problems and prospects of rainfed agriculture in India ; Soil and climatic conditions prevalent in rainfed areas; Drought: types, effect of water deficit on physio- morphological characteristics of the plants, Mechanism of crop adaptation under moisture deficit condition; Water harvesting: importance, its techniques, Efficient utilization of water through soil and crop management practices,Management of crops in rainfed areas, Contingent crop planning for aberrant weather conditions, Concept, objective, principles and components of watershed management, factors affecting watershed management.

Practicals:

Studies on climate classification, studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons. Studies on cropping pattern of different dry land areas in the country and demarcation of dry land area on map of India.Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapo-transpiration demand of crops.Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation. Studies on cultural practices viz; mulching, plant density, depth of sowing, thinning and leaf removal for mitigating moisture stress. Characterization and delineation of model watershed.Field demonstration on soil & moisture conservation measures.Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed.

References:

- Singh, S.S., (1993). Crop Management Under Irrigated and Rainfed Conditions, Kalyani Publishers, New,Delhi.
- Murthy, J.V.S. (1994). Watershed Management Wiley, Eastern Limited, New Age International Limited,New Delhi.

Intellectual Property Rights	**Credit hours:**	**1(1+0)**

Theory:

Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, etc. Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights,

Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets. Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, Compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.

Origin and history including a brief introduction to UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights. Traditional knowledge-meaning and rights of TK holders.

Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

Practical Crop Production-I *(Kharif Crops)* **Credit hours: 2(0+2)**

Practical:

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

References:

- Singh, Chhidda; Singh P. and Singh, R. 2003. Modern Techniques of Raising Field Crops, Oxford & IBH Publishing Co., New Delhi.
- Singh, S.S. 1998, Crop Management: Under irrigated and rainfed conditions.

- Jaiswami, L.H. and Baldeo, B. 1990. Advances in Puulse Production Technology, ICAR, New Delhi. Thakur, C. 1979. Crop Production, Vol. I & II. Metropolitan Book Pvt. Ltd., New Delhi.
- Ahlawat, I.P.S. , Sharma, O.P. &Saini., G.S. 1998 Scientific Crop Production in India. Aman Publishing House, Madhu Market, Budhana gate, Meerut.
- Rathore, P.S. 1999-2000. Techniques and Management of Field Crop Production. Agrobios (India), Jodhpur. Rathore, P.S. and Sharma, S.K. 2003. Scientific Pulse Production. Yash Publishing House, Bikaner.
- Sharma, Kalicharan 1990 Bharat kipromokhfaslea. G.B. Pant Agricultural & Technology University, Nanital. Reddy, S.R. 2004. Agronomy of Field Crops. Kalyani Publishers, New Delhi.