



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

5.1 Farming Systems and Sustainable Agriculture [AGR 301]

2(1+1)

Sustainable agriculture: Introduction, definition, goal and current concepts, factors affecting ecological balance and ameliorative measures; Land degradation and conservation of natural resources, LEIA & HEIA; Irrigation problems, waste lands and their development; Organic farming: definition, principles and components; Farming systems: definition, principles and components, IFS models for wetland, irrigated dryland and dryland Separate situations.

Practical:

Preparation of cropping scheme for irrigated situations; Preparation of cropping scheme for dryland situations; Study of existing farming systems in nearby villages; Preparation of integrated farming system model for wetlands; Preparation of integrated farming system model for drylands; Preparation of enriched Farm Yard Manure; Preparation of Vermicompost; Visit to urban waste recycling unit; Study of profitable utilization of agricultural wastes; Visit to poultry and dairy units to study resource allocation, utilization and economics; Visit to an organic farm to study various components and utilization; Study of degraded lands.

Reference:

1. Cropping and Farming System- S.C. Panda
2. Principles and Practices of Agronomy - S.S. Singh
3. Farm management - S.K. Tondon and S.P. Dondhyal
4. Cropping system in the Tropics - S.P. Palaniappan and K. Sivraman
5. Farm Planning and Management - C.H. Biaghun

5.2 Principles of Plant Biotechnology [GPB 301]

3(2+1)

Theory:

Concepts of Plant Biotechnology: History of Plant Tissue Culture and Plant Genetic Engineering; Scope and importance in Crop Improvement:



Totipotency and Morphogenesis, Nutritional requirements of in-vitro cultures; Techniques of In-vitro cultures, Micro propagation, Anther culture, Pollen culture, Ovule culture, Embryo culture, Test tube fertilization, Endosperm culture, Factors affecting above in-vitro cultures; Applications and Achievements; Somaclonal variation, Types, Reasons: Somatic embryogenesis and synthetic seed production technology; Protoplast isolation, Culture, Manipulation and Fusion; Products of somatic hybrids and cybrids, Applications in crop improvement. Genetic engineering; Restriction enzymes; Vectors for gene transfer - Gene cloning - Direct and indirect method of gene transfer - Transgenic plants and their applications. Blotting techniques - DNA finger printing - DNA based markers - RFLP, AFLP, RAPD, SSR and DNA Probes - Mapping QTL - Future prospects. MAS and its application in crop improvement.

Practical:

Requirements for Plant Tissue Culture Laboratory; Techniques in Plant Tissue Culture; Media components and preparations; Sterilization techniques and Inoculation of various explants; Aseptic manipulation of various explants; Callus induction and Plant Regeneration; Micro propagation of important crops; Anther, Embryo and Endosperm culture; Hardening / Acclimatization of regenerated plants; Somatic embryogenesis and synthetic seed production; Isolation of protoplast; Demonstration of Culturing of protoplast; Demonstration of Isolation of DNA; Demonstration of Gene transfer techniques, direct methods; Demonstration of Gene transfer techniques, indirect methods; Demonstration of Confirmation of Genetic transformation; Demonstration of gel-electrophoresis techniques.

References:

1. Gupta, P.K. 1997. Elements of Biotechnology. Rastogi Publ.
2. Chopra, V. L. & Nasim A. (1990). Genetic Engineering and Biotechnology concepts, Methods and Application. Oxford and IBH.
3. Hackett P. B., Fuchs J. A. & Messing, J. W. (1998). An Introduction to Recombinant DNA Technology Basic Experiments in Gene Manipulations. 2nd Ed. Benjamin Publ. Co.
4. Singh, B. D. (2005). Biotechnology, Expanding Horizons, Kalyani.



5.3 Crop Pests and Stored Grain Pests and Their Management [ENT 301] 3(2+1)

Theory:

Stored grain pests: Coleopteran and Lepidopteran pests, their biology and damage, preventive and curative methods. Distribution, biology, nature and symptoms of damage, and management strategies of insect and non insect pests of rice, sorghum, maize, ragi (*Eleusine coracana*), wheat, sugarcane, cotton, mesta, sunhemp, pulses, groundnut, castor, gingerly, safflower, sunflower, mustard, brinjal, bhindi, tomato, cruciferous and cucurbitaceous vegetables, potato, sweet potato, colacasia, moringa, amaranthus, chillies, mango, citrus, grapevine, cashew, banana, pomegranate, guava, sapota, ber, apple, coconut, tobacco, coffee, tea, turmeric, betelvine, onion, coriander, garlic, curry leaf, pepper, ginger and ornamental plants.

Practical:

1. Identification of pests, their damage symptoms and management of rice, sorghum, maize, wheat, sugarcane, cotton, pulses, Solanaceous and Malvaceous vegetables, cruciferous and cucurbitaceous vegetables, chilli, mango, ber, citrus and sapota.

References:

1. Agricultural Pests of India and South East Asia - by A.S. Atwal
2. Agricultural Pests of South Asia - by A.S. Atwal & G.S. Dhaliwa
3. Agricultural Insect Pests and their Control- by V.B. Awasthi
4. General and Applied Entomology - by K.K. Nayar, Anantha Krishna & David
5. Insect Pests of crops - by Pradhan S.
6. Indian Insect Life - by H.M. Lefroy
7. Hand book of Economics Entomology for South India - by T.V.R. Ayyar

5.4 Fundamentals of Agri- Business Management [AEC 301] 2 (1+1)

(Including Project Development, Appraisal and Monitoring)

**Theory:**

Agribusiness: Meaning, Definition, Structure of Agribusiness, (Input, Farm, Product Sectors). Importance of Agribusiness in the Indian Economy, Agricultural Policy. **Agribusiness Management,** Distinctive features, Importance of Good Management, Definitions of Management. **Management Functions,** Planning, Meaning, Definition, Types of Plans (Purpose or Mission, Goals or Objectives, Strategies, Policies, Procedures, rules, programmes, Budget) characteristics of sound plan, Steps in planning, **Organisation, Staffing, Directing, Motivation, Ordering, Leading, Supervision, Communication, control.** **Capital Management.** **Financial Management of Agribusiness:** Importance of Financial Statements, Balance sheet, Profit and Loss Statement, Analysis of Financial statements. **Agro-based Industries:** Importance and Need, Classification of Industries, Types of Agro-based Industries, Institutional arrangement, Procedure to set up agro-based industries, Constraints in establishing agro-based industries. **Marketing Management:** Meaning, Definitions, Marketing Mix, 4Ps of Marketing. Mix, Market segmentation, Methods of Market, Product life cycle. Pricing policy, Meaning, pricing method. Prices at various stages of Marketing. **Project,** definitions, project cycle, Identification, Formulation, Appraisal, Implementation, Monitoring and evaluation, Appraisal and Evaluation techniques, NPW, BCR, IRR, N/K ratio, sensitivity analysis, characteristics of agricultural projects: preparation of project reports for various activities in agriculture and allied sectors: Dairying, poultry, fisheries, agro-industries etc.

Practical:

Study of input markets: seed, fertilizers, pesticides. Study of output markets, grains, fruits, vegetables, flowers. Study of product markets, retail trade commodity trading, and value added products. Study of financing institutions cooperatives commercial banks, RRBs, Agribusiness Finance Limited, NABARD; Preparations of projects, Feasibility reports; Project appraisal techniques; Case study of agro-based industries.

**References:**

1. G.L. Cramer and C.W. Jensen (1979). Agricultural Economics and Agribusiness John Wiley & Sons, New York.
2. N. Omri Rawlins: Introduction to Agribusiness, Printice Hall Inc., New Jersey. 3. S.B. Harsh, L.G. Cornor and G.D. Schwab (1981). Managing the Farm Business, Printice Hall Inc., New Jersey.
3. Price J. Gittinger (1989). Economics Analysis of Agricultural Projects, John Hopkins University Press, London.
4. UNIDO (1972). Guidelines for Project Evaluation, United Nations, Oxford & IBH, New Delhi.
5. A.L. Boradway & Arif A. Broadway (2002). A Text Book of Agribusiness Management, Kalyani Publishers, Ludhiana.

5.5 Field Crops-I (Kharif) [AGR 302]**3(2+1)****Theory:**

Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of kharif crops, Cereals – rice, maize, sorghum, pearl millet and minor millets; Pulses : pigeonpea, mungbean and urdbean; Oilseeds: groundnut, sesame and soybean; Fibre crops: cotton, jute and sunhemp; and Forage crops: sorghum, maize, cowpea, cluster bean and napier.

Practical:

Rice nursery preparation and transplanting/seed bed preparation and sowing of Kharif crops; Calculations on seed rate; Sowing of soybean, pigeonpea, mungbean, maize, groundnut, and cotton; Effect of seed size on germination and seedling vigour of soybean/groundnut; Effect of sowing depth on germination of soybean; Identification of weeds in rice, maize and soybean fields and study of weed control experiments in these crops; Top dressing of nitrogen in maize and rice and study of fertilizer experiments on rice, maize, sorghum and millets; Study of yield contributing characters, yield calculations, harvesting and yield estimation of above crops; Study of crop varieties and important agronomic experiments; Study of forage experiments.

**References:**

1. ICAR Publication Hand book of Agriculture
2. Y.M. Iyyer, Field Crops
3. Rajendra Prasad Text book of field crops
4. B.M. Paugh Crop Production
5. RVSKVV Publication, Krishi Vijay

**5.6 Fundamentals of Rural Sociology and Educational Psychology [EXT 301]
2 (2+0)****Theory:**

Extension Education and Agricultural Extension – Meaning, Definition, Scope and Importance. Sociology and Rural Sociology, Meaning, Definition, Scope, Importance of Rural Sociology in Agricultural Extension and Interrelationship between Rural Sociology & Agricultural Extension. Indian Rural Society, Important characteristics, Differences and Relationship between Rural and Urban societies. Social Groups – Meaning, Definition, Classification, Factors considered in formation and organization of groups, Motivation in group formation and Role of Social groups in Agricultural Extension. Social Stratification – Meaning, Definition, Functions, Basis for stratification, Forms of Social stratification – Characteristics and Differences between Class & Caste System. Cultural concepts – Culture, Customs, Folkways, Mores, Taboos, Rituals and Traditions – Meaning, Definition and their Role in Agricultural Extension. Social Values and Attitudes – Meaning, Definition, Types and Role of Social Values and Attitudes in Agricultural Extension. Social Institutions – Meaning, Definition, Major institutions in Rural society, Functions and their Role in Agricultural Extension. Social Organizations – Meaning, Definition, Types of organizations and Role of Social organizations in Agricultural Extension. Social Control – Meaning, Definition, Need of social control and Means of Social control. Social change – Meaning, Definition, Nature of Social change, Dimensions of social change and factors of social change. Leadership – Meaning, Definition, Classification, Roles of a leader, Different methods of Selection of Professional and Lay leaders. Training of Leaders – Meaning, Definition,



Methods of training, Advantages and Limitations in use of local leaders in Agricultural Extension. Psychology and Educational Psychology – Meaning, Definition, Scope and Importance of Educational Psychology in Agricultural Extension. Intelligence – Meaning, Definition, Types, Factors affecting intelligence and Importance of intelligence in Agricultural Extension. Personality – Meaning, Definition, Types, Factors influencing the Personality and Role of personality in Agricultural Extension. Teaching – Learning process – Meaning and Definition of Teaching, Learning, Learning experience and Learning situation, Elements of learning situation and its characteristics. Principles of learning and their implication for teaching.

References

1. Chitambar, J.B.(1997). Introductory Rural Sociology Wiley Eastern Limited, New Delhi.
2. Vidya Bhushan and Such Deva, D.R., (2003). An Introduction to Sociology, Kitab Mahal, Allahbad.
3. Adivi Reddy, A (2001). Extension Education, Sree Lakshmi Press, Bapatla – 522 101, A.P.
4. Kundu C.L. and Tutoo D.N, (2001). Educational Psychology Streling Publsihers Pvt. Ltd, new Delhi.
5. Mangal S.K.(2000). Educational Psychology Prakash Brothers, Ludhiana
6. Chatterjee S (2000). Advanced Educational Psychology Books & Allied (P) Ltd, Calcutta.
7. Chauhan SS (2001). Advanced Educational Psychology Vikas Pub House Pvt. Ltd., New Delhi.

5.7 Post Harvest Management and Value Addition of Fruits and Vegetables

[HRT 301] 2(1+1)

Theory:

Importance of post harvest technology in horticultural crops. Maturity indices, harvesting and post harvest handling of fruits and vegetables. Maturity and ripening process. Factors affecting ripening of fruits, and vegetables. Pre harvest factors affecting quality on post harvest shelf life of fruits and vegetables.



Factors responsible for deterioration of harvested fruits and vegetables. Chemicals used for hastening and delaying ripening of fruits and vegetables. Methods of storage precooling, prestorage treatments, low temperature storage, controlled atmospheric storage, hypobaric storage, irradiation and low cost storage structures. Various methods of packing, packaging materials and transport. Packing technology for export. Fabrication of types of containers, cushioning material, vacuum packing, poly shrink packing, specific packing for export of mango, banana, grapes kinnow, sweet orange, and mandarin etc. Importance and scope of fruit and vegetable preservation in India. Principles of preservation by heat, low temperature, chemicals and fermentation. Unit layout - selection of site and precautions for hygienic conditions of the unit. Preservation through canning, bottling, freezing, dehydration, drying, ultraviolet and ionizing radiations. Preparation of jams, jellies, marmalades, candies, crystallized and glazed fruits, preserves, chutneys, pickles, ketchup, sauce, puree, syrups, juices, squashes and cordials Spoilage of canned products, biochemical, enzymatic and microbial spoilage. Preservatives, Colours permitted and prohibited in India.

Practical:

1. Practice in judging the maturity of various fruits and vegetables.
2. Conservation of zero energy cool chambers for on farm storage. 3& 4.
3. Determination of physiological loss in weight (PLW), total soluble solids (TSS), total sugars, acidity and ascorbic and content in fruits and vegetables.
4. Packing methods and types of packing and importance of ventilation.
5. Pre cooling packing methods for export or international trade.
6. Methods of prolonging storage life.
7. Effect of ethylene on ripening of banana, sapota, mango, sapota.
8. Identification of equipment and machinery used in preservation of fruits and vegetables.
9. Preservation by drying and dehydration.
10. Preparation of jam, jelly and marmalades.
11. Preparation of squash, cordials and syrups.



12. Preparation of chutneys, pickles sauces and ketchup.
13. Visit to local processing units.
14. Visit to local market yards and cold storage units.
15. Visit to local market and packing industries.

References:

1. The biochemistry of fruits and their production, Hulme BC (1970). Academic Press, London
2. Post harvest Biology and Handling of fruits and vegetables, (1980). AVI publishing Co., West port, USA.
3. An introduction to the physiology and handling of fruits and vegetables, Wills RHH, Lee, TH, Graham D, McGlasson MB and Hall, E C (1981). Granada publishing Co., London
4. Packaging of fruits and vegetables in India Venkatarathnam L (ed.) (1988). Agri-Horticultural Society, Hyderabad
5. Post harvest Biotechnology of flowers and Ornamental plants. Salunkhe DK, Bhatt NR and Desai BB (1990). Nayaprakash, Calcutta.
6. Commercial fruits and vegetable products, Cruess WV (1948). McGraw Hill Book Co., London
7. The Technology of food preservation, Desrosier NW (1959). AVI publishing Co., inc. Connecticut, USA.
8. Preservation of fruits vegetables, Lal G Siddappa GS and Tandon NGL (1986). ICAR, New Delhi

**5.8 Diseases of Horticultural Crops and Their Management [PPT 301]
3(2+1)****Theory:**

Economic Importance, symptoms, cause, disease cycle and integrated management of diseases of: citrus, mango, banana, grapevine, pomegranate, papaya, guava, sapota, apple, chilli, brinjal, bhendi, potato, crucifers, cucurbits, tomato, beans, onion, coconut, oil palm, betelvine, mulberry, coffee, tea, rose, chrysanthemum and jasmine.

**Practical:**

1. Diseases of beans, citrus, guava, & sapota;
2. Diseases of papaya, banana, pomegranate & ber;
3. Diseases of mango, grapes & apple;
4. Diseases of chilli, brinjal & bhendi;
5. Diseases of potato, tomato & crucifers;
6. Diseases of cucurbits, onion & betelvine;
7. Diseases of oil palm, coconut, tea, coffee & mulberry;
8. Diseases of rose, chrysanthemum and jasmine.
9. Field visits at appropriate time during the semester.

Note: Students should submit 50 pressed, well mounted diseased specimens in three installments during the semester.

References:

1. Diseases of Fruit Crops - Pathak V.N. (1980). Oxford & IBH Publishing Co. Pvt. Ltd.
2. Diseases of Tropical and Subtropical Field, Fiber and oil plants - Cook AA (1981). Mac Millan Publishing Co. New York.
3. Diseases of Crop Plants in India - Rangaswamy G (1988). Prentice Hall of India Pvt. Ltd. New Delhi.
4. Diseases of Ornamental Plants in India - Sohi H S (1992). ICAR, New Delhi.
5. Diseases of Vegetable crops - Singh R S (1994). Oxford & IBM Publishing Co. Pvt. Ltd. New Delhi.
6. Plant Diseases - Singh R S (1996). Oxford & IBM Publishing Co. Pvt. Ltd. New Delhi.