PG DIPLOMA -INTEGRATED FARM MANAGEMENT

COMMUNICATION CENTRE

KERALA AGRICULTURAL UNIVERSITY

SYLLABUS

PG Diploma -Integrated Farm Management

LIST OF FIRST SEMESTER COURSES

Sl. No.	Department		Title of course	Credits
1	Agronomy	IFM 501	Basic agronomy and production technology of major crops	1+1
2	Agronomy	IFM 502	Concepts and principles of Integrated farming	2+1
3	Horticulture	IFM 503	Production technology for horticultural crops	1+1
4	Animal Husbandry	IFM 504	Livestock and poultry Management	1+1
5	Soil Science and Agricultural Chemistry	IFM 505	Manures, fertilizers, soil fertility management	2+1
6	Soil Science and Agricultural Chemistry/ Agronomy	IFM 506	Organic farming for sustainable agriculture	2+0
7	Plant protection	IFM 507	Principles of integrated pest and disease management	2+1
8		IFM 520	Project	0+3
Total				20

LIST OF SECOND SEMESTER COURSES

Sl No.	Department		Title of course	Credits
1	Agronomy	IFM 508	Cropping Systems and Sustainable Agriculture	1+0
2	Animal Husbandry	IFM 509	Integrated livestock farming systems	2+1
3	Aquaculture	IFM 510	Basics of Aquaculture	1+1
4	Agricultural Meteorology	IFM 511	Weather and climate risk management	2+0
5	Forestry	IFM 512	Agroforestry systems	1+0
6	Post Harvest Management	IFM 513	Post harvest management of horticultural produce	1+1
7	Agricultural Extension	IFM 514	Entrepreneurship Development and Management in Extension	1+1
8		IFM 520	Project	0+7
Total				20

1. **IFM 501 - Basic agronomy and production technology of major crops (1+1)**

Theory

Fundamentals and Definition of agriculture and agronomy –Agronomic classification of crops - Factors affecting crop growth – climatic factors - tillage and tilth - objective and principles - different kinds of tillage - seeds - sowing – and planting methods - crop density and crop geometry.

Soil fertility and productivity; Concept of essentiality of plant nutrients; Essential plant nutrients: Functions and deficiency symptoms. Manures and fertilizers - methods of application - bio fertilizers. Irrigation - principles and methods of irrigation; Weed management in crops- cropping systems -monoculture and multiple cropping - inter, mixed, relay, strip and multitier cropping. Cultivation practices for important field crops - rice, Pulses – Cowpea, red gram, black gram, green gram, groundnut, gingelly and cassava- Postharvest value addition in Rice

Lecture schedule (Theory)

1- Agronomy – definition and scope and principles
2- Classification of crops -Ontogenic, agrarian, botanical
3- Special classification of crops 4. Factors affecting crop growth
4- Methods of sowing/planting- direct seeding: broadcasting, dibbling and drilling, seed drills and other implements-transplanting
5- Tillage- definition- objectives – types of tillage- conservation tillage
6- Tillage implements-ploughs, harrows, cultivators, hoes and special purpose implements
7- Crop nutrition - Soil productivity and fertility-– classification of nutrients- Functions and deficiency symptoms of major and secondary nutrients
8- Manures and fertilizers – classification - organic manures
9-10- Fertilizers and fertilizer use- Management of fertilizers - Integrated Nutrient Management, biofertilizers
11- Weed management in crops
12- Irrigation- - principles and methods of irrigation
13- Cropping systems - monoculture and multiple cropping - inter, mixed, relay, strip and multitier cropping.
14- Cultivation practices for important field crops – rice
15- Cultivation practices for important Pulses – Cowpea, black gram, green gram
16- Cultivation practices for important Tuber crops- cassava
17- Cultivation practices of important oil seed crops- groundnut, gingelly
18- Integrated farming systems in Kerala

Practical

Visit and familiarization with major crops – seeds, growth habit, etc. (preferably a visit to a nearby crop museum)
Computation of seed rate and plant population
Fertilizer recommendations of major crops and computation of fertilizer requirement

Identification of major weed flora
Familiarization with herbicides
Sprayer calibration
Herbicide calculation

Practical schedule

1-2- Visit to crop museum and identification of field crops
3-4- Identification of seeds and planting materials of field crops
5-6- Identification of manures and fertilizers, Fertilizer recommendations and calculations
7-8- Methods of fertilizer applications- broadcasting, placement, foliar application and fertigation
9-10- Computation of seed rate and plant population
11-12- Seed testing – germination test, viability test
13-14- Identification of weeds in crops
15-16- Identification of herbicides and herbicide calculation
17-18- Yield attributes and yield estimation of field crops

Suggested Reading

1. Acquaah, G. 2005. Principles of Crop Production: Theory, Techniques and Technology. Prentice Hall.
2. Balasubramaniyan, P. and Palaniappan, S.P. 2001. Principles and Practices of Agronomy. AgroBios (India) Ltd., Jodhpur.
3. Brady, N.C. and Well, R.R. 2002.The Nature and Properties of Soils (13th ed.). Pearson Education, Delhi.
4. Chandrasekaran, B., Annadurai, K., and Somasundaram, E. 2010. A Text Book of Agronomy. New Age International (P) Limited Publishers.
5. Gupta, O.P. 2000. Weed Management - Principles and Practices. Agrobios (India) Ltd., Jodhpur
6. KAU [Kerala Agricultural University]. 2016. Package of Practices Recommendations:Crops (14th Ed.). Kerala Agricultural University, Thrissur, 401p.
7. Reddy, Y and Reddy, G. H. S. 2010. Principles of Agronomy. Kalyani Publishers, 527p
8. Reddy, S. R. 2011. Principles of Agronomy. Kalyani Publishers

2. IFM 502 - Concepts and principles of Integrated farming (2+1)

Theory

Integrated farming Systems-Concept, Advantages and Components, Integrated Farming to Reduce Dependence on Energy, Exploiting bio-resource recycling in integrated farming system for saving energy, Components of Farming Systems – crop production, cattle rearing, goat and sheep rearing, piggery, duck rearing, Apiculture, fishery, mushroom cultivation, Agro forestry, biogas production, Agro-Ecology of Kerala and prevalent cropping situations, Rice Based Integrated Farming System, Factors influencing rice-based crop diversification, Rice ecosystems in Kerala, Varied types of rice-based farming systems -Rice with fish, Fresh-Water Prawn and Rice, Pokkali: A unique system, Rice-Fish Integration model, Duck-Fish Culture, Multilevel farming system, Coconut Based Integrated Farming System, Agronomic feasibility of coconut based mixed farming system, Types of coconut

based farming systems, Management of coconut, banana and pepper, Intercropping of Fodder Crops in Coconut Garden, Homestead Based Integrated Farming System, Home gardens worldwide, Homesteads of Kerala, Homestead based Integrated Farming for Sustainable Development, Successful Integrated Farming System models developed by Kerala Agricultural University.

Lecture schedule Theory

1-2 Integrated farming Systems-Concept, Advantages and Components,
3-4 Integrated Farming to Reduce Dependence on Energy,
5-6 Exploiting bio-resource recycling in integrated farming system for saving energy,
7-9 Components of Farming Systems – crop production, cattle rearing, goat and sheep rearing, piggery, duck rearing, Apiculture, fishery, mushroom cultivation,
10-11 Agro forestry, biogas production,
12 Agro -Ecology of Kerala and prevalent cropping situations,
13-15 Rice Based Integrated Farming System, Factors influencing rice-based crop diversification, Rice ecosystems in Kerala,
16-19 Varied types of rice-based farming systems -Rice with fish, Fresh-Water Prawn and Rice, Pokkali: A unique system,
20-21 Rice-Fish Integration model, Duck-Fish Culture, Multilevel farming system,
22 Coconut Based Integrated Farming System,
23 Agronomic feasibility of coconut based mixed farming system,
24-25 Types of coconut based farming systems, Management of coconut, banana and pepper,
26 Intercropping of Fodder Crops in Coconut Garden,
27-31 Homestead Based Integrated Farming System, Home gardens worldwide,
32-35 Homesteads of Kerala, Homestead based Integrated Farming for Sustainable Development
36 Successful Integrated Farming System models developed by Kerala Agricultural University.

Practical

Fields visits and visit to integrated farming research stations under Kerala Agricultural University

Practical schedule

1-3 - Rice based integrated farming system model

4-10 Integration of crop production, cattle rearing, goat rearing, piggery, duck rearing, Apiculture, fishery and mushroom cultivation -different models

11-15 Visit to integrated farming research stations under Kerala Agricultural University and get acquainted with various integrated farming models

16-18 Visit to integrated farmer’s field.

Suggested Reading

1. Balasubramanian P and Palaniappan SP. 2006. Principles and Practices of Agronomy. Agrobios.
2. Edens T. 1984. Sustainable agriculture and integrated farming system. Michigan State Univ. press.

3. Jayanthi C. 2006. Integrated Farming systems-A way to sustainable Agriculture. Tamil Nadu Agricultural University, Coimbatore
4. Joshi M and Parbhakarasetty TK. 2005. Sustainability through Organic Farming. Kalyani. Kolhapure A and Madhukar D. A text book of farming system and sustainable agriculture. Palaniappan SP and Anandurai K. 1999. Organic Farming - Theory and Practice. Scientific Publ.
5. Panda SC. 2004. Cropping systems and Farming Systems. Agribios.
6. Lampin N. 1990. Organic Farming. Farming Press Books.
7. Ravisankar D and Jayanthi C. 2015. Farming systems: concepts and approaches. Agrobios,

3. IFM 503 - Production technology for horticultural crops (1+1)

Theory

Horticulture - definition, importance, division and classification of horticultural crops. Importance of Horticulture in India and Kerala. Sexual and Asexual methods of Plant Propagation- Importance and scope of fruit cultivation, Classification of fruit crops; Climatic requirement, Site selection and layout, Production technology of following fruit crops- Mango, Banana, Papaya, Pineapple, Guava and Sapota Importance of vegetable cultivation for nutritional security, Classification- Production technology of following vegetable crops- Tomato, Chilli, Brinjal, Snake gourd, Bitter Gourd, Cucumber, Pumpkin, Cowpea, Okra, Amaranthus Plantation crops- importance-classification-production technology- of following plantation crops- Coconut, Rubber, Cashew and Cocoa; Spices, Importance- Classification –production technology of the following crops –Black Pepper, Small Cardamom, Ginger, Turmeric; Medicinal and Aromatic Plants

Lecture schedule (Theory)

1- Horticulture - definition, importance, division and classification of horticultural crops. Importance of horticulture in India and Kerala.
2. Sexual and Asexual methods of Plant propagation
3- Importance and scope of fruit cultivation, classification of fruit crops
4- 6- Production technology of fruit crops – mango, banana, papaya, pineapple, guava, sapota
7. Importance of floriculture, classification of ornamental plants
8. Importance of vegetable cultivation for nutritional security, classification of vegetables
9- 11 Production technology of tomato, chilli, brinjal, snake gourd and bitter gourd cucumber and pumpkin, cowpea, okra and amaranthus
12- Plantation crops- importance and classification
13-14Production technology of coconut, cashew and cocoa, rubber
15 Spices, importance and classification
16-17 Production technology of black pepper small cardamom, ginger and turmeric
18 Production technology of Medicinal and Aromatic Plants

Practical

Propagation- budding, layering, grafting; Rooting of cuttings; Propagation of various horticultural crops-Visit to commercial nurseries

Practical schedule

1-3- Seed Propagation; vegetative propagation- budding, grafting, layering; rooting of cuttings
4- Identification and familiarization with fruit crops
5- Propagation of fruit crops- Banana and Pineapple
6- Layering
7- Visit to orchard
8- Identification and familiarization of ornamental crops
9- Identification and familiarization of vegetables
10- Visit to vegetable seed production unit
11- Identification and familiarization of plantation crops and spices
12- Visit to coconut seedling production unit
13-15- Propagation of Black Pepper, Ginger and Turmeric
16- Identification and familiarization of medicinal and aromatic plants
17- Propagation of medicinal and aromatic plants
18- Visit to a commercial nursery

Suggested reading

1. Bhattacharjee,S.K.(ed). 2006. Advances in Ornamental Horticulture Vol. I to VI. Pointer Publishers, Jaipur
2. Bose, T.K. and Mitra,S.K. 1985. Fruits of India – Tropical and Subtropical. Nayaprakash publications, Culcutta.
3. Bose, T.K., Parthasarathy,V.A. and Chattopadhyay, P.K. 2006. Plantation Crops Vol 1 & 2. Nayaudyog Publication, Kolkata, India.
4. Farooqi, A. A. and Sreeramu, B.S. 2004. Cultivation of medicinal and aromatic crops. Universities press (India) Pvt. Ltd., Hyderabad, 647p
5. Gopalakrishnan, T. R. 2007. Vegetable Crops. New India Publishing Agency, New Delhi.
6. Hartmann, HT. and Kester, D.E.1986. Plant propagation - Principles and practices. Prentice Hall, New Delhi.
7. Hazra, P. and Som, M. G. 1999. Technology for vegetable Production and Improvement. Naya Prokash, Calcutta

IFM 504 - Livestock and poultry Management (1+1)

Theory

Role of livestock in the national economy. Important Indian and exotic breeds cattle, buffalo, sheep, goat, swine and poultry. Housing principles, space requirements for different species of livestock and poultry. Management of calves, growing heifers and milch animals. Management of small ruminants, swine rearing. Poultry rearing, Reproduction in farm animals and poultry.

Classification of feedstuffs, Feed ingredients for ration for livestock and poultry. Feeding of livestock and poultry. Introduction of livestock and poultry diseases. Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.

Lecture schedule Theory

1 Introduction Role of Livestock in Indian Agriculture Livestock census
2. Livestock development agencies and Programmes in Kerala
3. Definition of Breed – Classification of indigenous and exotic cattle Breed characteristics of Sindhi, Kangayam, Kankrej, Jersey, Holstein Friesian, Brown Swiss, Murrah and Surti.
4. Systems of mating – importance of cross breeding. Female reproductive system
5. Oestrous cycle signs of heat, Time of A.I. Artificial insemination merits and demerits –
6. Care &management of pregnant cow Gestation period in different species
7. Care and management of new born calf, Milk definition, Composition of milk
8. Factors affecting milk yield and composition, Clean milk production
9. Preservation of milk – Pasteurization and other methods.
10. Nutrition–definition, Ration Balanced ration Requirement and importance of green fodder
11. Importance of health care & signs of health in cattle
12-14 Common. Diseases of cattle and poultry, Basic principles in controlling infectious and contagious diseases and control.
15. Goat farming, breeds indigenous and exotic, Goats Housing and feeding
16. Swine husbandry – common breeds
17. Poultry Definition, Introduction of systems of poultry rearing, Brooding and rearing of chicks
18. Rearing of growers and layers, Broiler rearing, Common diseases symptoms and Vaccination schedule for poultry.

Practical

External body part of cattle, goat, swine and poultry. Handling and restraining of livestock. Identification methods of farm animals. Daily routine farm operations and farm records. Planning and layout of housing for different types of livestock. Computation of rations for livestock. Formulation of concentrate mixtures. Clean milk production, milking methods. Hatchery operations, vaccination. Economics of livestock production.

Practical schedule

1- Body parts of cow
2- Identification of animals
3- Instruments used in Animal Husbandry practices
4- Ageing of cattle
5- Housing of Cattle
6- Milking of animals
7- Physical examination of milk and Determination of Specific gravity
8- Determination of Fat percentage, Total solids, Solid Not Fat
9- Legal standards of milk, Determination of adulterants in milk
10- Common cattle feeds and their classification
11- Feeding and calculation of feed for Dairy cattle
12- 13. Body parts and Handling of birds
14. Classification of Poultry
15. Housing and management of poultry, visit to poultry farm, culling of unproductive birds Demonstration of vaccination and deworming
16. Broiler, poultry farming
17. Cost benefit analysis
18. Practical Examination

Suggested Readings

1. Banerjee, G.C. 1998. The Text Book of Animal Husbandry. Oxford and IBH Publishing, Calcutta

2. Gopalakrishnan, C.A. and Lal, D.M.M., 1992. Livestock and Poultry Enterprises for Rural Development. Vikas Publishing House Private Limited,Ghaziabad, U.P.,
3. ICAR. 2001. A Hand Book of Animal Husbandry. Indian Poultry Industry Year Book 1998. A25 Priyadarshini Vihar, DELHI.
4. Maynard, C. and Loosli, S. 1989. Animal Nutrition. Tata Mc Graw Hill Publishing Company Limited, New delhi.
5. Sastry, N.S.R., Thomas, C.K. and Singh, R.A. 1982. Farm Animal Management and Poultry Production. Vikas Publishing House Private Limited, Ghaziabad, Uttar Pradesh. 8. Sukumar De. 1980. Outlines of Dairy Technology. Oxford University Press, Delhi.
6. Watter, H.P. and Robert, H.G. 2001. Livestock Production. Green World Publications, Indira Nagar, Lucknow

IFM 505 - Manures, fertilizers, soil fertility management (2+1)

Theory

Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management. Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano fertilizers Soil amendments, Fertilizer Storage, Fertilizer Control Order. History of soil fertility and plant nutrition. criteria of essentiality. role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

Lecture schedule Theory

1. Importance and scope of organic farming-Types of organic manures- sources
2. Preparation techniques of different types of manures-role in soil fertility management
3. Chemical fertilizers – classification-Nitrogenous fertilizers
4. Nitrogenous fertilizers , Suitability of different nitrogenous fertilizers for different soils and crops
5. Phosphatic fertilizers –property and use of single super phosphate, triple super phosphate and bone meal
6. Phosphatic fertilizers Behavior of phosphatic fertilizers in different soil types and comparative fertilizer value of various phosphatic fertilizers
7. Principles of manufacture of potassic fertilizers, physical and chemical properties in relation to their use in various soils Quiz
8. Straight vs complex fertilizers. Unit value and evaluation of fertilizers.
9. Materials supplying secondary nutrients and micro nutrients and chelating compounds.
10. Fertilizer control order
11. Soil acidity – liming materials and its reaction in acidic soils. Saline and alkali soils
12. Soil as a source and storehouse of nutrients-soil fertility vs productivity and factors.
13. Soil fertility studies. -Essential and beneficial elements in plant nutrition
14. Role, deficiency and toxicity symptoms of essential plant nutrients,

15. Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants.
16. Metabolic functions of elements in plants
17. Soil fertility – different approaches for soil fertility evaluation-chemical /biological/tracer
18. Chemical methods –Soil testing -Critical level of nutrients in soils- Colwell approach
19. Tracer techniques and EUF for soil fertility evaluation – Fertilizer tagging techniques
20. Soil test based fertilizer recommendation to crops (STCR)
21. Chemical methods –plant analysis – DRIS -Critical levels in plants - Rapid tissue tests – Indicator plants - Leaf colour chart - SPAD meter 30
22. Biological methods
23. Remote sensing for crop N status- precision farming- GIS applications in agriculture
24. Nutrient use efficiency (NUE) – Concepts–factors influencing NUE in respect of N, P,K, S, Fe and Zn fertilizers.
25. Chemistry of soil nitrogen- phosphorus /potash/secondary and miro nutrients- interactions in soils.
26. Nutrient cycles in soils – Nitrogen cycle – atmospheric N, plant and animal organic N, ammonification, nitrification and denitrification
27. Nitrogen fixation, non symbiotic and symbiotic-Role of blue green and azolla Nitrogen fixation – Major reactions involved in n fixation
28. Phosphorus transformation in soil- p cycle – organic and inorganic forms of P – rock phosphate sediments, release of P in soil.
29. Dynamics of Potassium in soil-forms- reactions in soils
30. Sulphur cycle – organically bound sulphur, oxidation under aerobic conditions, role of chemotrophic bacteria.
31. Chemical and biochemical implications of different nutrient cycles in soil fertility
32. Sources, method, and scheduling of nutrient for different soils and crops grown under rainfed and irrigated condition
33. Integrated nutrient management- IPNS- concepts- approaches- practical utility
34. Nutrient balance sheet- -indicator plants
35. Nutrient management planning
36. STCR based fertilizer recommendation

Practical

Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry. Estimation of soil organic carbon, Estimation of alkaline hydrolysable N in soils. Estimation of soil extractable P in soils. Estimation of exchangeable K; Ca and Mg in soils . Estimation of soil extractable S in soils.. Estimation of DTPA extractable Zn in soils. Estimation of N in plants. Estimation of P in plants. Estimation of K in plants. Estimation of S in plan

Practical schedule

1-3	Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry.
4-7	Estimation of soil organic carbon, Estimation of alkaline hydrolysable N in soils. Estimation of soil extractable P in soils.
8 -10	Estimation of exchangeable K; Ca and Mg in soils .
11-12	Estimation of soil extractable S in soils. Estimation of DTPA extractable Zn in soils.
13-18	Estimation of N in plants. Estimation of P in plants. Estimation of K in plants. Estimation of S in plan

Suggested Readings

1. Burges, A, and Raw, F. 1967. Soil Biology. Acad.Press, New York
2. Donahu, L. R., Miller, W. R. and Shickuluna, 1977. Soils. Prentice Hall of India Pvt. Ltd., New Delhi
3. Fundamentals of Soil Science. Published by Indian Society of Soil Science, IARI New Delhi, 2002
4. Gupta, P.K. (1999) Hand book of Soil, Fertilizer and Manure. Agro Botanica, Bikaner
5. Gupta,A.K. (2007) Methods in Environmental Analysis of Water , Soil and Air. 2nd Edn. Published by Agrobios (India) Jodpur
6. Mengel, K.J. and Kirkby, A. 1978. Principles of Plant Nutrition. International Potash Institute, Switzerland
7. Nyle.C. Brady 1995. The Nature and Properties of Soils. 10th Edn. Printice Hall India pvt. Ltd. New Delhi
8. Raymond W Miller and Roy L. Donahue. 1992. Soils and Introduction to Soils and Plant Growth. 6th edn. Printice Hall India pvt. Ltd. New Delhi
9. Robert .M. Devlin and Francis H. Witham 1986. Plant Physiology. 4th Edn. CBS Publishers and Distributors New Delhi.
10. Singh,S.S.2011.Soil Fertility and Nutrient Management.3rd Edn. Kalyani Publishers.New Delhi
11. Tisdale,S.L., Nelson,W.L.,Beaton, J.D. and Havlin,J.L. 1995. Soil Fertility and Fertilisers. 5th Edn. Macmillan publishing company, USA.

IFM 506 - Organic farming for sustainable agriculture (2+0)

Theory

Concepts and principles of organic farming: History and evolution of organic farming in the world and India. Scenario of organic farming in India and world, global market for organic products, IFOAM's Guiding principles of organic farming, conversion to organic agriculture, advantages and limitations.

Definitions and types of organic farming: Definitions of organic farming, types of organic farming such as natural farming, zero chemical natural farming, bio dynamic farming, biological farming, compost farming, Natueco culture, integrated farming, homa farming, permaculture etc, traditional farming systems in India and evolving indigenous knowledge systems

Conventional vs Organic farming: Philosophy of two farming systems, fundamental differences, productivity issues, management protocols, food quality, nutritional differences and impact of conventional practices on soil fertility, natural resources, environment and overall social perception. Myths and realities about organic farming in addressing nutritional security and food safety need vis-à-vis national food security.

Advocacy, Ethics, health and social issues in organic farming: Advocacy for organic farming with sustainability, resource conservation and food safety issues. Advocacy through overall farm productivity under diversified cropping systems. Spirituality values and ethics in organic

farming. Socio economic importance of organic farming: concept measurements and issues. Need for ethical practices and values across the organic agriculture value chain including trading and reaching to consumers.

Organic farming techniques for climate change issues threatening sustainability- potential of organic farming practices in addressing sustainability and climate change. Resource conservation through organic farming, Carbon sequestration through organic farming techniques -tools and techniques in organic farming -resource utilization and management techniques - Organic certification process - NPOP Certification- PGS Certification - Protocols adopted .

Lecture schedule Theory

1 -3 Concepts and principles of organic farming: History and evolution of organic farming in the world and India.
4-7 Scenario of organic farming in India and world, global market for organic products, IFOAM's Guiding principles of organic farming,
8-9 conversion to organic agriculture, advantages, and limitations.
10-16 Definitions and types of organic farming: Definitions of organic farming, types of organic farming such as natural farming, zero chemical natural farming, bio dynamic farming, biological farming, compost farming, Natueco culture, integrated farming, homa farming, permaculture etc., traditional farming systems in India and evolving indigenous knowledge systems
17-18 Conventional vs Organic farming: Philosophy of two farming systems, fundamental differences, productivity issues, management protocols, food quality, nutritional differences, and impact of conventional practices on soil fertility, natural resources, environment, and overall social perception.
20-22 Myths and realities about organic farming in addressing nutritional security and food safety need vis-à-vis national food security.
23- 26 Advocacy, Ethics, health, and social issues in organic farming: Advocacy for organic farming with sustainability, resource conservation and food safety issues. Advocacy through overall farm productivity under diversified cropping systems.
27- 29 Spirituality values and ethics in organic farming. Socio economic importance of organic farming: concept measurements and issues. Need for ethical practices and values across the organic agriculture value chain including trading and reaching to consumers.
30-32 Organic farming techniques for climate change issues threatening sustainability- potential of organic farming practices in addressing sustainability and climate change. Resource conservation through organic farming,
33-36 Carbon sequestration through organic farming techniques -tools and techniques in organic farming -resource utilization and management techniques - Organic certification process - NPOP Certification- PGS Certification - Protocols adopted.

Suggested Readings

1. Gaur AC. 1982. A Manual of Rural Composting, FAO/UNDP Regional Project Document, FAO.
2. Joshi M. 2016. New Vistas of Organic Farming. Scientific Publishers
3. Lampin N. 1990. Organic Farming. Press Books, lpswitch, UK.
4. Palaniappan SP and Anandurai K. 1999. Organic Farming – Theory and Practice. Scientific Publ.
5. Rao BV Venkata. 1995. Small Farmer Focused Integrated Rural Development: Socio-economic Environment and Legal Perspective: Publ.3, Parisaraprajna Parishtana, Bangalore.

6. Reddy MV. (Ed.). 1995. Soil Organisms and Litter Decomposition in the Tropics. Oxford & IBH.
7. Sharma A. 2002. Hand Book of Organic Farming. Agrobios.
8. Singh SP. (Ed.). 1994. Technology for Production of Natural Enemies. PDBC, Bangalore.
9. Subba Rao NS. 2002. Soil Microbiology. Oxford & IBH.
10. Trivedi RN. 1993. A Text Book of Environmental Sciences, Anmol Publ.
11. Veeresh GK, Shivashankar K and Suiglachar MA. 1997. Organic Farming and Sustainable Agriculture. Association for Promotion of Organic Farming, Bangalore.
12. WHO. 1990. Public Health Impact of Pesticides Used in Agriculture. WHO.
13. Woolmer PL and Swift MJ. 1994. The Biological Management of Tropical Soil Fertility. TSBF & Wiley

7. IFM 507 - Principles of integrated pest and disease management (2+1)

Theory

Introduction, definition, concept and tools of disease management, components of integrated disease management- their limitations and implications, Development of IDM- basic principles, biological, chemical and cultural disease management,IDM in important crops- rice, wheat, cotton, sugarcane, vegetable crops, fruit, plantation and spice crops.

History and origin, definition and evolution of various related terminologies. Economic threshold concept, Principles and methods of IPM. Tools of pest management and their integration- legislative, quarantine regulations, cultural, physical and mechanical methods; semiochemicals, biotechnological and bio-rational approaches in IPM. IPM in major crops – Rice, Wheat, Spices, Cotton, Sugarcane, vegetables, fruits, plantation crops etc. Genetic engineering and new technologies- their progress and limitations in IPM programmes. Application of IPM to farmers' real time situation. Case Studies of successful IPM Programmes.

Lecture schedule Theory

1- Introduction to Plant Pathology
2- Definition, Concept of disease management
3- Integrated disease management – components
4- IDM – limitations and implications
5- Basic principles of disease management- Biological, cultural and chemical methods
6- Biological control methods
7- Cultural management practices
8- Chemical methods - Fungicides classification, Newer fungicides
9- IDM in important crops
10- IDM in rice
11- IDM in wheat
12- IDM in Cotton
13- IDM in Sugarcane
14- 15 IDM in Vegetable crops
16- IDM in major fruit crops
17- IDM in major Plantation crops
18- IDM in major Spice crops

19- History and origin, definition and evolution of various related terminologies
20- Economic threshold concept, Principles and methods of IPM
21- Tools of pest management and their integration- legislative, quarantine regulations, cultural, physical and mechanical methods
22- Semiochemicals, biotechnological and bio-rational approaches in IPM
23- IPM in major crops – Rice
24- IPM in Wheat
25- IPM in major Spice crops
26- IPM in Cotton
27- IPM in Sugarcane
28- IPM in Vegetables
29- 30 IPM in major fruit crops
31- IPM in major Plantation crops
32- 33 Genetic engineering and new technologies- their progress and limitations in IPM programme
34- 36Application of IPM to farmers' real time situation. Case Studies of successful IPM Programmes

Practical

Application of physical, biological and cultural methods, Use of chemical and bio control agents and integration in IDM,Study of symptoms, etiology and integrated disease management practices of crops like rice,vegetables, banana, mango, pineapple, coconut, arecanut, black pepper, ginger, nutmeg andrubber etc.

Crop loss assessment- direct losses, indirect losses, potential losses, avoidable losses, unavoidable losses, Computation of EIL and ETL; IPM in major crops – Rice, vegetables, banana, coconut, arecanut, spices etc. Acquaintance with useful insects – predators, parasitoids, productive insect.

Practical schedule

1- Application of physical, biological and cultural methods,
2- Use of chemical and bio control agents and integration in IDM
3- Study of symptoms, etiology and integrated disease management practices of crops - Rice
4- Study of symptoms, etiology and integrated disease management practices of crops - Vegetables
5- Study of symptoms, etiology and integrated disease management practices of crops – Banana
6- Study of symptoms, etiology and integrated disease management practices of crops – Coconut
7- Study of symptoms, etiology and integrated disease management practices of crops – Arecanut
8- Study of symptoms, etiology and integrated disease management practices of crops – Black pepper
9- Study of symptoms, etiology and integrated disease management practices of crops - Nutmeg

10- Study of symptoms, etiology and integrated disease management practices of crops - Ginger
11- Study of symptoms, etiology and integrated disease management practices of crops - Rubber
12- Crop loss assessment- direct losses, indirect losses, potential losses, avoidable losses, unavoidable losses, Computation of EIL and ETL;
13- IPM in major crops – Rice
14- IPM in major crops – Vegetables
15- IPM in major crops – Banana
16- IPM in major crops – Spices
17- IPM in major crops – Coconut and Arecanut
18- Acquaintance with useful insects – predators, parasitoids, productive insect

Suggested Readings

1. Agrios, G.N. 2005. Plant Pathology .Academy Press. New York.
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3. Dhaliwal, G. S. and Arora, R. 2001. Integrated Pest Management- concepts and approaches, 369 p.
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5. Gour, T. B. and Sridevi, D. 2012. Chemistry, toxicity and mode of action of insecticides. Kalyani publishers, Bangalore, 316 p.
6. Gupta, G.P. 2004. Text Book of Plant Diseases. Discovery Publishing House. New Delhi
7. Gupta, V. K. and Sharma, R.C. 2011.Integrated Disease Management and Plant Health.Scientific Publishers
8. Maloy,O.C. 1993.Plant Disease control. Principles and Practice. John Wiley and Sons.Inc, New York
9. Mehrotra, R.S. 1980. Plant Pathology .Tata Mc. Graw Till Publ.Co., , New Delhi.
10. Metcalf, R. L. and Luckman, W. H. 1994. Introduction to Insect Pest Management. John Wiley and sons, New York, 605 p.
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14. Singh. R.S. 2002. Introduction to Principles of Plant Pathology. Oxford and IBH Publishing, New Delhi.

IFM 508 - Cropping Systems and Sustainable Agriculture (1+0)

Theory

Cropping systems: definition and its importance; physical resources, soil and water management in cropping systems

Concept of sustainability in cropping systems and farming systems, scope and objectives; production potential under monoculture cropping, multiple cropping, alley cropping, sequential cropping and intercropping, assessment of yield advantage in intercropping systems. Evaluation of farming systems, cropping system and sustainability

Above and below ground interactions and allelopathic effects; competition relations; multi-storied cropping and yield stability in intercropping, role of non-monetary inputs and low cost technologies

Conservation of Agriculture, pillars, methods, significance, advantages and disadvantages

Artificial Intelligence- Concept and application.

Lecture schedule Theory

1- Cropping systems: definition and its importance;

2-4 physical resources, soil and water management in cropping systems

5 - Concept of sustainability in cropping systems and farming systems, scope, and objectives;

6-7 production potential under monoculture cropping, multiple cropping, alley cropping, sequential cropping and intercropping,

8-10 assessment of yield advantage in intercropping systems. Evaluation of farming systems, cropping system and sustainability

11-13 Above and below ground interactions and allelopathic effects; competition relations; multi-storied cropping and yield stability in intercropping,

14 role of non-monetary inputs and low cost technologies

15-16 Conservation of Agriculture, pillars, methods, significance, advantages, and disadvantages

17-18 Artificial Intelligence- Concept and application.

Suggested Readings

1. Panda SC. 2017. Cropping Systems and Sustainable Agriculture. Agrobios (India)
2. Panda SC. 2018. Cropping and Farming Systems. Agrobios.
3. Palaniappan SP and Sivaraman K. 1996. Cropping Systems in the Tropics; Principles and Management. New Age.
4. Panda SC. 2003. Cropping and Farming Systems. Agrobios.
5. Reddy SR. 2000. Principles of Crop Production. Kalyani.
6. Sankaran S and Mudaliar TVS. 1997. Principles of Agronomy. The Bangalore Printing & Publ. Co.
7. Singh SS. 2006. Principles and Practices of Agronomy. Kalyani.
8. Tisdale SL, Nelson WL, Beaton JD and Havlin JL. 1997. Soil Fertility and Fertilizers. Prentice Hall.

8. IFM 509 - Integrated Livestock Farming Systems (2+1)

Theory

Classification of livestock-based farming systems. Principles, Scope, drivers, and trade-offs in integrated livestock farming systems. Sustainability of integrated livestock farming systems and their economic importance.

Integration of various components of farming systems. Livestock-fish, arable farming, plantation crops and different livestock enterprises (cattle, buffalo, sheep, goat, pig, rabbit, poultry, beekeeping, silkworm, etc.) along with the bio-gas plant, FYM, vermicompost, solar and wind energy utilization
New approach for changing farming systems in the light of global warming, carbon sequestration and mitigation of GHGs (reducing carbon and water footprints)
Project formulation and evaluation of various integrated livestock enterprises

Lecture schedule Theory

1- Classification of livestock-based farming systems.
2-5 Principles, Scope, drivers, and trade-offs in integrated livestock farming systems.
6-10 Sustainability of integrated livestock farming systems and their economic importance.
11-20 Integration of various components of farming systems. Livestock-fish, arable farming, plantation crops and different livestock enterprises (cattle, buffalo, sheep, goat, pig, rabbit, poultry, beekeeping, silkworm, etc.)
21-27 bio-gas plant, FYM, vermicompost, solar and wind energy utilization
28-33 New approach for changing farming systems in the light of global warming, carbon sequestration and mitigation of GHGs (reducing carbon and water footprints)
34-36 Project formulation and evaluation of various integrated livestock enterprises

Practical
Visit modern integrated livestock farming units.

Practical schedule

1- Visit to an organized cattle farm
2- Visit to an organized goat farm
3- Visit to an organized pig farm
4- Visit to an organized rabbit farm
5- Visit to an organized farm
6- Practical of waste management in livestock farm
7- Value added products from livestock wastes
8- Biogas production
9- Visit to integrated livestock farmer fields

Suggested Readings

1. Ghosh B. 2007. Integrating Crops and Livestock, 1st ed. Gene-Tech Books.
2. Little DC and Edwards P. 2003. Integrated Livestock-fish Farming Systems. FAO.
3. Mukherjee TK, Moi PS, Panandam JM and Yang YS. (Eds.) 1992. Integrated Livestock Fish Production Systems. FAO/ IPT Workshop on Integrated Livestock-Fish Production Systems, University of Malaya, Kuala Lumpur.
4. Raman KV and Balaguru T. (Eds.). 1992. Farming Systems Research in India: Strategies for Implementation. NAARM, Hyderabad
5. Rana SS. 2015. Recent Advances in Integrated Farming Systems. CSK HPKV, Palampur. Rangasamy A and Annadurai K. 2002. Farming System in the Tropics. Kalyani Publishers.
6. Renard C. (Ed.). 1997. Crop Residues in Sustainable Mixed Crop/ Livestock Farming Systems. CABI.
7. Speirs M and Opsen O. 1992. Indigenous Integrated Farming System in the Sahel. World Bank.

8. Sunil Kumar and DR Palsaniya DR and Kiran Kumar T. 2017. Farming systems: Issues and Strategies. Satish Serial Publishing, New Delhi.

IFM 510- Basics of Aquaculture (1+1)

Theory

Introduction to Aquaculture, Definition and scope of aquaculture, Historical development and importance of aquaculture, Types of aquaculture systems: extensive, semi-intensive, intensive, Aquatic Organisms in Aquaculture, Overview of commonly cultured species (fish, shellfish, crustaceans),Life cycles and biology of key aquaculture species, Aquaculture Systems and Facilities, Pond aquaculture: types, design, and management, Cage and pen culture: principles and practices, Tank and raceway systems: design and operation, Recirculating aquaculture systems (RAS),Water Quality Management, Importance of water quality in aquaculture, Monitoring and management of water parameters (temperature, dissolved oxygen, pH, ammonia, nitrite, nitrate),Water treatment techniques, Nutrition in Aquaculture, Nutritional requirements of aquatic species, Formulation and preparation of aqua feed, Feeding strategies and practices, Health and Disease Management, Common diseases in aquaculture, Disease prevention and control measures, Biosecurity in aquaculture, Aquaculture Economics and Marketing, Economic aspects of aquaculture, Cost analysis and budgeting, Market analysis and marketing strategies, Environmental and Sustainability Issues, Environmental impact of aquaculture, Sustainable aquaculture practices, Certification and eco-labelling, Emerging Trends in Aquaculture, Advances in aquaculture technology, Aquaponics and integrated multi-trophic aquaculture, Future prospects and challenges in aquaculture

Lecture schedule Theory

1- Aquaculture Systems and Facilities, Pond aquaculture: types, design, and management, Cage and pen culture: principles and practices.
2- Tank and raceway systems: design and operation
3- Recirculating aquaculture systems (RAS)
4- Water Quality Management, Importance of water quality in aquaculture
5- Monitoring and management of water parameters (temperature, dissolved oxygen, pH, ammonia, nitrite, nitrate)
6- Water treatment techniques, Nutrition in Aquaculture
7- Formulation and preparation of aqua feed, Feeding strategies and practices
8- Health and Disease Management, Common diseases in aquaculture, Disease prevention and control measures
9- Biosecurity in aquaculture
10- Aquaculture Economics and Marketing, Economic aspects of aquaculture, Cost analysis and budgeting, Market analysis and marketing strategies
11- Environmental and Sustainability Issues, Environmental impact of aquaculture, Sustainable aquaculture practices
12- Certification and eco-labelling
13- Emerging Trends in Aquaculture
14- Advances in aquaculture technology
15- Aquaponics and integrated multi-trophic aquaculture
16- Future prospects and challenges in aquaculture
17- Nutritional requirements of aquatic species
18- Sustainable aquaculture practices

Practical

Introduction to Aquaculture and Facility Tour, Aquatic Organisms in Aquaculture - Species Identification, Pond Aquaculture - Practical Pond Management, Cage and Pen Culture - Setting Up and Monitoring. Tank and Raceway Systems - Operation and Maintenance, Feeding Practices - Feed Preparation and Feeding Trials, Health, and Disease Management - Disease Diagnosis and Treatment, Aquaponics and Integrated Systems - Setup and Maintenance.

Practical schedule

1- Introduction to Aquaculture and Facility Tour
2- Aquatic Organisms in Aquaculture - Species Identification
3- Pond Aquaculture
4- Practical Pond Management
5- Cage and Pen Culture - Setting Up and Monitoring
6-7 Tank and Raceway Systems- Operation and Maintenance
8-9 Fish Feeding Practices
10-11 Feed Preparation and Feeding Trials
12-13 Health, and Disease Management
14-16 Disease Diagnosis and Treatment
17-18 Aquaponics and Integrated Systems - Setup and Maintenance

Suggested Readings

1 Agarwal SC. 2008. A Handbook of Fish Farming. 2nd Ed. Narendra Publ. House.
2 Bardach EJ, Rhyther JH and Mc Larney WO. 1972. Aquaculture the Farming and Husbandry of Freshwater and Marine Organisms. John Wiley and Sons.
3 Beveridge MCM and Mc Andrew BJ. 2000. Tilapias: Biology and Exploitations. Kluwer.
4 De Silva SS. (Ed.). 2001. Reservoir and Culture Based Fisheries: Biology and Management. ACAIR Proceedings.
5 FAO. 2007. Manual on Freshwater Prawn Farming.
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7 FAO Publ. Gilbert B. 1990. Aquaculture. Vol. II. Ellis Horwood.
8 Ghosh, P.K., 2010. Brackishwater Aquaculture. Agrobios (India)
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10 Midlen and Redding TA. 1998. Environmental Management for Aquaculture.Kluwer.
11 New MB. 2000. Freshwater Prawn Farming. CRC Publ.
12 Pillay TVR. 1990. Aquaculture: Principles and Practices. Fishing News Books, Cambrige University Press, Cambridge.
13 Venugopal S. 2005. Aquaculture. Pointer Publ.
14 Welcomme RL. 2001. Inland Fisheries: Ecology and Management. Fishing News Books

IFM 511- Weather and Climate Risk Management (2+0)

Theory

Risk characterization – definitions and classification of risks; characterization of weather and climate related risks in agriculture; water related risks; radiation/heat related risks; air and its movement related risks; biomass related risks; social and economic risk factors related to weather and climate.

Risks of droughts; monitoring, prediction and prevention of drought; drought proofing and management; modern tools including remote sensing and GIS in monitoring and combating droughts.
Risks in agricultural production, approaches, and tools to deal with risks, preparedness for weather and climate risks, strategies of dealing with risks- mitigating practices before occurrence; contingency planning and responses; disaster risk main streaming, challenges for developing coping strategies including transferring risks through insurance schemes.
Weather modification; hails suppression, dissipation of fog, modification of frost intensity and severe storms; shelter belts and wind breaks, mulches and anti- transpirants; protection of plants against climatic hazards; air and water pollution; meteorological conditions in artificial and controlled climates - green, plastic, glass, and animal houses, etc.
Preparedness approaches reducing emergency relief necessities; the role that insurances can play in risk spreading and transfer; application of methods that permit the incorporation of seasonal and long-term forecasts into the risk assessment models.

Lecture schedule Theory

1- Risk characterization – definitions and classification of risks;
2-5 characterization of weather and climate related risks in agriculture; water related risks; radiation/heat related risks; air and its movement related risks; biomass related risks;
6- social and economic risk factors related to weather and climate.
7-10 Risks of droughts; monitoring, prediction and prevention of drought; drought proofing and management; modern tools including remote sensing and GIS in monitoring and combating droughts.
11- 13 Risks in agricultural production, approaches, and tools to deal with risks,
14-17 preparedness for weather and climate risks, strategies of dealing with risks- mitigating practices before occurrence; contingency planning and responses;
18- 21 disaster risk main streaming, challenges for developing coping strategies including transferring risks through insurance schemes.

22- 25 Weather modification; hails suppression, dissipation of fog, modification of frost intensity and severe storms;
26-27 shelter belts and wind breaks, mulches and anti- transpirants;
28-29 protection of plants against climatic hazards; air and water pollution;
30-32 meteorological conditions in artificial and controlled climates - green, plastic, glass, and animal houses, etc.
33-34 Preparedness approaches reducing emergency relief necessities; the role that insurances can play in risk spreading and transfer;
35-36 application of methods that permit the incorporation of seasonal and long-term forecasts into the risk assessment models.

Suggested Readings

1. Anonymous 2003. Critical Issues in Weather Modification Research Board of Atmoshperic Science and Climate. National Research Council, USA.
2. Bishnoi OP. 2007. Principles of Agricultural Meteorology. Oxford Book Co.
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9. IFM 512 - Agroforestry Systems (1+0)

Theory

Agroforestry: objectives, importance, potentials and limitations for implementations. Land capability classification and land evaluation. Basis of classification of agroforestry systems and principles, indigenous vs. exotic. Structural and functional attributes of agroforestry systems, shifting cultivation, taungya system, multiple and mixed cropping, alley cropping, silvopastoral systems, shelter-belts and windbreaks, energy plantations and home gardens. Role of trees in soil productivity and conservation– micro-site enrichment- litter and fine root dynamics, Nitrogen fixation and nutrient pumping. Community forestry and social forestry, Definition and concepts, Major social forestry and agro forestry programmes in India. Agroforestry systems in India and Kerala

Lecture schedule Theory

1-2	Agroforestry: objectives, importance, potentials and limitations for implementations.
3-4	Land capability classification and land evaluation.
5-6	Basis of classification of agroforestry systems and principles, indigenous vs. exotic.
7-10	Structural and functional attributes of agroforestry systems, shifting cultivation, taungya system, multiple and mixed cropping, alley cropping, silvopastoral systems, shelter-belts and windbreaks, energy plantations and home gardens.
12-15	Role of trees in soil productivity and conservation– micro-site enrichment- litter and fine root dynamics, Nitrogen fixation and nutrient pumping.
16-18	Community forestry and social forestry, Definition and concepts, Major social forestry and agro forestry programmes in India. Agroforestry systems in India and Kerala

Suggested Readings

1. Dwivedi AP. 1992. Agroforestry- Principles and Practices. Oxford & IBH. Publising Co. Pvt. Ltd. New Delh,i 365p
2. Gupta, R.K. 1993. Multipurpose Trees for Agroforestry and Wasteland Utilization. Oxford and IBH, 562p
3. Indian Society of Agronomy. 1989. Agroforestry System in India. Research and Development, New Delhi.
4. Nair, P.K.R. 1993. An Introduction to Agroforestry. Kluwere Academic Publications, Dordrecht, The Netherlands, 499p
5. Narayan TR and Dabadghao PM. 1972. Forage Crop of India. ICAR, New Delhi.
6. Pathak, PS. and Roy M.M. 1994.Agroforestry Systems for Degraded Lands.Oxford& IBH Publishing, New Delhi
7. Puri, S and Panwar, P. (ed.). 2007. Agroforestry Systems and Practices. New India Publishing Agency, New Delhi, 643p

8. Sharma, Y.M.L.1959. Lessons in Forestry. ICAR, 183p
9. Singh, P., Pathak, P.S. and Roy, M.M.(ed.).1995. Agroforestry Systems for Sustainable Land use. Science Publishers Inc,282p
10. Subba Rao, N.S. 1999 .Biofertilizers in Agricultural and Agroforestry .Oxford & IBH New Delhi
11. Tejwani, K.G. 1994. Agroforestry in India, Oxford & IBH Pub., New Delhi.

IFM 513 - Postharvest Management of Horticultural Produce (1+1)

Theory

History, Importance and scope of Postharvest technology of horticultural produce. Nature and structure of horticultural produce. Pre and Postharvest losses and their causes. Climacteric and non-climacteric fruits. Regulation of ripening by use of chemicals and growth regulators. Control of sprouting, rooting and discoloration in vegetables. Maturity indices for harvest. Harvesting and harvesting tools. Curing Horticultural Sciences Post-Harvest Management in roots and tubers. Prepackage Operation: Precooling, washing, sorting, grading of horticultural perishables for local markets and export. Postharvest handling of spices, plantation crops, medicinal and aromatic plants. Equipment's for washing, sizing, grading. Pre and Postharvest treatments for extending storage life/ vase life. VHT, irradiation treatment, skin coating, degreening, etc. Pre-packaging, Packaging techniques for local market and export. Standards and specifications for fresh produce. Postharvest handling system for horticulture crops of regional importance. Principles of transport, modes of transportation, types of vehicles and transit requirements for different horticultural produce. Marketing: Factors influencing marketing of perishable crops, marketing systems and organizations.

Lecture schedule Theory

1- History, Importance, and scope of Postharvest technology of horticultural produce.
2- Nature and structure of horticultural produce. Pre and Postharvest losses and their causes.
3- Climacteric and non-climacteric fruits. Regulation of ripening by use of chemicals and growth regulators.
4- Control of sprouting, rooting and discoloration in vegetables.
5- Maturity indices for harvest. Harvesting and harvesting tools.
6- Curing Horticultural Sciences Post-Harvest Management in roots and tubers.
7-8 Prepackage Operation: Precooling, washing, sorting, grading of horticultural perishables for local markets and export.
9-10 Postharvest handling of spices, plantation crops, medicinal and aromatic plants.
11- Equipment's for washing, sizing, grading.
12- Pre and Postharvest treatments for extending storage life/ vase life.
13- VHT, irradiation treatment, skin coating, degreening, etc.
14- Pre-packaging, Packaging techniques for local market and export.
15- Standards and specifications for fresh produce.
16- Postharvest handling system for horticulture crops of regional importance.
17- Principles of transport, modes of transportation, types of vehicles and transit requirements for different horticultural produce.
18- Marketing: Factors influencing marketing of perishable crops, marketing systems and organizations.

Practical

• Study of maturity indices for harvest of fruits, vegetables, spices and plantation crops;
• Protective skin coating with wax emulsion
• Study of modern harvesting, sorting and grading equipments
• Study of effect of pre-cooling on shelf-life and quality of fresh fruits, vegetables and flowers
• Visit to packaging centers
• Visit to local markets, cooperative organizations, super markets dealing with marketing of Perishables.

Practical schedule

1-3 Study of maturity indices for harvest of fruits, vegetables, spices and plantation crops;
4-6 Protective skin coating with wax emulsion
7-9 Study of modern harvesting, sorting and grading equipments
10-12 Study of effect of pre-cooling on shelf-life and quality of fresh fruits, vegetables and flowers
13-15 Visit to packaging centres
16-18 Visit to local markets, cooperative organizations, super markets dealing with marketing of Perishables.

Suggested Readings

1. Bhattacharjee SK and Dee LC. 2005. Postharvest technology of flowers and ornamental plants. Pointer publishers, Jaipur.
2. Chattopadhyay SK. 2007. Handling, transportation and storage of fruit and vegetables. GeneTech books, New Delhi.
3. FAO. 2007. Handing and Preservation of Fruits and Vegetables by Combined methods for Rural Areas-Technical Manual. FAO Agr.Ser.Bull., 149
4. Kader AA. 1992. Postharvest technology of horticultural crops. 2nd ed university of California.
5. Paliyath G, Murr DP, Handa AK and Lurie S. 2008. Postharvest Biology and Technology of Fruits, Vegetables and Flowers, Wiley-Blackwell, ISBN: 9780813804088.
6. Pruthi JS. 2001 (Reprint). Major spices of India crop management and Postharvest technology. ICAR, NewDelhi
7. Stawley J Kays. 1998. Postharvest physiology of perishable plant products. CBS publishers.
8. Sudheer KP, Indira V. 2007. Postharvest Technology of Horticultural Crops, Peter K.V. (Ed.), New India Publishing Agency, ISBN 9788189422431.
9. Sunil Pareek (Ed.) 2016. Postharvest Ripening Physiology of Crops, CRC Press, ISBN 9781498703802. Thompson AK. (Ed.) 2014. Fruit and Vegetables: Harvesting, Handling and Storage (Vol. 1 & 2) Blackwell Publishing Ltd, Oxford, UK. ISBN: 9781118654040.
10. Verma LR and Joshi VK. 2000. Postharvest Technology of Fruits and Vegetables: Handling, Processing, Fermentation and Waste Management. Indus Publishing Company, New Delhi, India. ISBN 8173871086.
11. Wills RBH and Golding J. 2016. Postharvest: an introduction to the physiology and handling of fruit and vegetables, CABI Publishing, ISBN 9781786391483.
12. Wills RBH and Golding J. 2017. Advances in Postharvest Fruit and Vegetable Technology, CRC Press, ISBN 9781138894051.

IFM 514 - Entrepreneurship Development and Management in Extension (1+1)

Theory

Entrepreneurship – Concept, characteristics. Agri –entrepreneurship – Concept, characteristics. Traits of entrepreneurs, Types of Entrepreneurs. Stages of establishing enterprise – Identification of sound enterprise, steps to be considered in setting up an enterprise. Project Management and Appraisal – Market, Technical, Financial, Social Appraisal of Projects.

Management – Meaning, concept. Principles of management, Planning – Concept, Importance. Decision making – Concept, Types of decisions. Organizing – Meaning of Organization, Concept, Principles, Organizational Structure, Span of Management, Departmentalization, Authority and responsibility, Delegation and decentralization, line and staff relations.

Coordination – Concept, Types. Staffing – Need and importance, Manpower planning, Recruitment, Selection, Placement and Orientation, Training and Development – Concept, Principles, Leadership – Concept, Approaches to leadership, Leadership styles. Organizational Communication, Supervision, Budgeting.

Micro enterprises – Profitable Agri enterprises in India – Agro Processing, KVIC industries. Micro financing – meaning, Sources of Finance, Banks, Small scale industries development organizations. Marketing for enterprises – Concept, planning for marketing, target marketing, Competition, market survey and strategies, Product sales and promotion.

Lecture schedule Theory

1 Entrepreneurship – Concept, characteristics. Agri –entrepreneurship – Concept, characteristics.
2 Traits of entrepreneurs, Types of Entrepreneurs.
3 Stages of establishing enterprise – Identification of sound enterprise, steps to be considered in setting up an enterprise.
4 Project Management and Appraisal – Market, Technical, Financial, Social Appraisal of Projects.
5 Management – Meaning, concept. Principles of management, Planning – Concept, Importance.
6 Decision making – Concept, Types of decisions
7 Organizing – Meaning of Organization, Concept, Principles of organizing
8 Organizational Structure, Span of Management, Departmentalization
9 Authority and responsibility, Delegation and decentralization, line and staff relations
10 Coordination – Concept, Types. Staffing – Need and importance, Manpower planning
11 Recruitment, Selection, Placement and Orientation, Training and Development – Concept, Principles
12 Leadership – Concept, Approaches to leadership, Leadership styles.
13 Organizational Communication, Supervision, Budgeting.
14 Micro enterprises
15 Profitable Agri enterprises in India – Agro Processing, KVIC industries
16 Micro financing – meaning, Sources of Finance, Banks, Small scale industries development organizations.
17 Marketing for enterprises – Concept, planning for marketing, target marketing, Competition, market survey and strategies
18 Product sales and promotion

Practical

Fields visits and visit to agri enterprises. Assessment of your entrepreneurial traits. Preparation of project proposal

Practical schedule

1. Assessment of your entrepreneurial traits
2. Entrepreneurial Problem Solving skill
3. Managerial skill of an entrepreneur

4-8 Visit to Entrepreneurship Development Institutions
9-12 Preparation of business plan
13-16 Project Proposal writing exercise
17-18 Preparation of project proposal

Suggested Readings

1. Akhodri, N.M.P. 1989. Trainers Manual on Developing entrepreneurial motivation. NIES Bud, NewDelhi.
2. Bhaskaran, S. 2014. Entrepreneurship Development and Management .Aman Publishing House, New Delhi
3. Blanchard, H.P.K. 1985. Management of organizational behavior Utilizing human resources. Prentice Hall, New Delhi
4. Chatterjee, S.S. 1988. Introduction to management, its principles and techniques. Gold Press, Calcutta.
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12. Rao, T.V. 1974. Development of an entrepreneur: A behavioral model IIM(Ahmadabad)