



Diploma in Agriculture

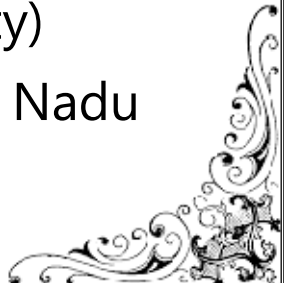

Syllabus

*With effect from
2021-22*

School of Agriculture and Animal
Sciences

The Gandhigram Rural Institute
(Deemed to be University)

Gandhigram – 624302 Tamil Nadu



SCHOOL OF AGRICULTURE AND ANIMAL SCIENCES
DIPLOMA IN AGRICULTURE

INTRODUCTION

This School was offering a two year Certificate course in Agricultural Science from 1956 under the auspices of National Council for Rural Higher Education, Ministry of Education, Govt. of India, New Delhi till 1980. After the introduction of 10+2 pattern of education in Tamil Nadu in 1980, it was felt necessary to restructure the Certificate course in Agricultural Sciences with the object of giving higher training and admitting students with higher general educational qualification. Hence, the syllabus content of Certificate course was so modified to make it as Diploma course in Agriculture and the course was started in the academic year 1980-1981 and continues. The syllabus has been revised once in three years to accommodate the recent developments in the agriculture field.

DETAILS OF THE COURSE

Name of the course	:	Diploma in Agriculture
Duration of the course	:	2 years (4 semesters)
No. of students to be admitted during the year 2021-22	:	30
Eligibility	:	A Pass in H.Sc. examination with Biology / Botany in Academic stream or in vocational stream with Biology and Agriculture Practices.
Admission Procedure	:	Academic Stream 95% / Vocational Stream 5 % <i> Community Reservation as per GRI Rules.</i>

OBJECTIVES

1. Impart skills on different agricultural and allied subjects
2. To create confidence among students to undertake farming on their own.
3. To assist them get employment in Government, Non Governmental and Private Organizations.

SYLLABUS PATTERN

The syllabus pattern is furnished in Annexure. The syllabus for individual subjects has been prepared semester wise. Choice Based Credit System (CBCS) is followed.

ASSESSMENT

Each theory-cum-practical course will have a maximum score of 150 with 100 for theory and 50 for practicals, the ratio between CFA and ESE for theory being 40:60 and practicals being 50:50.

EXPERIENTIAL LEARNING THROUGH FIELD EXPOSURE

The students would have to undergo experiential learning by placing them with farmers of Krishi Vigyan Kendra for individual crops for that season. The students will be attached to the farmers of Front Line Demonstration schemes of various crops. For getting exposure to cereals, millets, vegetables, fruits and flowers, progressive farmers of KVK will adopt them for practical field exposure, apart from attending the regular practical farm activities in the Faculty's Farm, Orchard and Dairy. They should keep and update the records for their crop and animal based activities

SCHOOL OF AGRICULTURE AND ANIMAL SCIENCES

**Diploma in Agriculture Programme
Scheme of Examinations**

Code No	Subject	Credit			Total Marks	Scheme			
		T	P	Total		Theory		Practical	
					CFA	ESE	CFA	ESE	
	I Semester								
21AGR0101	Soil and Nutrient Management	3		3	100	40	60		
21AGR0102	Soil and Nutrient Management - practical		1	1	50			25	25
21AGR0103	Principles of Agronomy	3		3	100	40	60		
21AGR0104	Principles of Agronomy - practical		1	1	50			25	25
21AGR0105	Agricultural Meteorology and Land Use Systems	3		3	100	40	60		
21AGR0106	Agricultural Meteorology and Land Use Systems - practical		1	1	50			25	25
21AGR0107	Irrigation Agronomy	3		3	100	40	60		
21AGR0108	Irrigation Agronomy - practical		1	1	50			25	25
21AGR0109	Dairy Cattle Production	3		3	100	40	60		
21AGR0110	Dairy Cattle Production - practical		1	1	50			25	25
21AGR0111	Rural Development	3		3	100	40	60		
21AGR0112	Rural Development - practical		1	1	50			25	25
	Total	18	6	24	900				
	II Semester								
21AGR0201	Agronomy of Field Crops - I	3		3	100	40	60		
21AGR0202	Agronomy of Field Crops – I - practical		1	1	50			25	25
21AGR0203	Fundamentals of Plant Protection	3		3	100	40	60		
21AGR0204	Fundamentals of Plant Protection - practical		1	1	50			25	25
21AGR0205	Introduction to Horticulture and Fruit Production	3		3	100	40	60		
21AGR0206	Introduction to Horticulture and Fruit Production - practical		1	1	50			25	25
21AGR0207	Environmental Science and Organic Farming	3		3	100	40	60		
21AGR0208	Environmental Science and Organic Farming - practical		1	1	50			25	25
21AGR0209	Dairy Technology	3		3	100	40	60		
21AGR0210	Dairy Technology - practical		1	1	50			25	25
21AGR0211	Principles of Plant Breeding and Seed Science Technology	3		3	100	40	60		
21AGR0212	Principles of Plant Breeding and Seed Science Technology - practical		1	1	50			25	25
	Total	18	6	24	900				
	III Semester								
21AGR0301	Agronomy of Field Crops – II	3		3	100	40	60		
21AGR0302	Agronomy of Field Crops – II - practical		1	1	50			25	25
21AGR0303	Crop Disease Management	3		3	100	40	60		
21AGR0304	Crop Disease Management - practical		1	1	50			25	25
21AGR0305	Vegetable Production	3		3	100	40	60		
21AGR0306	Vegetable Production - practical		1	1	50			25	25
21AGR0307	Farm Power and Machinery	3		3	100	40	60		

21AGR0308	Farm Power and Machinery - practical		1	1	50			25	25
21AGR0309	Introduction to Agricultural Extension	3		3	100	40	60		
21AGR0310	Introduction to Agricultural Extension - practical		1	1	50			25	25
21AGR0311	Agricultural Economics	3		3	100	40	60		
21AGR0312	Agricultural Economics - practical		1	1	50			25	25
21AGR0313	Village Placement Programme*	0	4	4	100				
	Total	18	6	24	900				
	IV Semester								
21AGR0401	Farm Management	3		3	100	40	60		
21AGR0402	Farm Management - practical		1	1	50			25	25
21AGR0403	Crop Pests and their Management	3		3	100	40	60		
21AGR0404	Crop Pests and their Management - practical		1	1	50			25	25
21AGR0405	Floriculture and Plantation Crops	3		3	100	40	60		
21AGR0406	Floriculture and Plantation Crops - practical		1	1	50			25	25
21AGR0407	Bio inoculants in Agriculture	3		3	100	40	60		
21AGR0408	Bio- inoculants in Agriculture - practical		1	1	50			25	25
21AGR0409	Livestock and Chicken Production	3		3	100	40	60		
21AGR0410	Livestock and Chicken Production - practical		1	1	50			25	25
21AGR0411	Extension communication for Transfer of technology	3		3	100	40	60		
21AGR0412	Extension communication for Transfer of technology - practical		1	1	50			25	25
	Total	18	6	24	900				

Note:* V.P.P. marks will not be considered for the calculation of GPA & CGPA.

I SEMESTER

21 AGRD 0101 SOIL AND NUTRIENT MANAGEMENT (3+1)

OBJECTIVES

- To develop knowledge about elements of soil and its management
- To inculcate about the soil nutrient resources viz., manures, fertilizers and biofertilizers
- To develop hope to meet the farming community with strong knowledge in nutrient management

LEARNING OUTCOME

The students can understand about the basics of soils and their influencing parameters with relevant to soil fertility, fertilizers and manures and they can develop confidence about the Nutrient Management and fertilizer recommendation

THEORY

- UNIT I** **Soil:** Definition – Composition of soil – Types of soils found in India and Tamil Nadu- Physical properties of soil – Texture – Structure, colour, particle density, Bulk density, Pore space, Consistency, Soil air and Soil water Soil temperature – Significance of physical properties in plant growth – Chemical properties of soil. Soil colloids pH, EC.
- UNIT II** **Soil-Fertility:** Definition and importance–Soil fertility and productivity – Organic matter–Influence on fertility- Problem soils – Physical constraints and their management, Soil reaction- Acid, Saline, Sodic and Saline sodic soils – their reclamation, management and suitable crops- Soil erosion - types and control measures.
- UNIT III** **Nutrient management:** Essential plant nutrients and their sources – Foliar diagnosis deficiencies and toxicity symptoms – corrective measures – Time and methods of fertilizer application – Precautions in applying fertilizers – Methods to improve fertilizer use efficiency – Integrated nutrient management (INM).
- UNIT IV** **Manures:** Definition – Classification – Bulky Organic Manures (BOM) and Concentrated Organic Manures (COM) – Preparation of different types of compost including industrial waste, coir waste, press mud – Vermicompost –enriched FYM etc – Green manures (GM)and Green Leaf Manures(GLM) – their Benefits and significance . Bio - fertilizers and their types – Application of Bio - Fertilizers
- UNIT V** **Fertilizers:** Fertilizers–classification – Straight, mixed and complex fertilizers–Nutrient content in fertilizers nitrogenous fertilizers, phosphatic fertilizers and Potassic fertilizers–slow release N fertilizers – Nitrification inhibitors – types of mixed fertilizers- Micronutrient mixtures-nano-fertilizers.

PRACTICAL SCHEDULE

1. Methods of collection and processing of soil samples

2. Estimation of pH and EC in soils
3. Analysis of available N
4. Analysis of Organic carbon
5. Analysis of available P
6. Analysis of available K
7. Determination of soil moisture by oven dry method.
8. Analysis of soil test results, Interpretation and Fertilizers recommendation.
9. Foliar diagnosis and its corrective measures
10. Identification of manures, fertilizers and bio-fertilizer
11. Preparation of different types of compost
12. Method of application of composted coir pith, vermicompost and FYM.
13. Preparation of slow release fertilizers (Neem coated, Tar and Lac coated urea)
14. Calculation of fertilizers through straight, complex and mixed fertilizers for some field crops
15. Study of soil amendments, fertigation and foliar fertilizers application.
16. Final practical Examination

REFERENCES

Text books

1. Buckman, H.O. and N.C. Brady. 1990. Nature and properties of soil, The McMillan Co, New York, Indian Publishers – Eurasia Publishing House (P) Ltd., Ram Nagar, New Delhi.
2. Das, P.C. 1993. Manures and Fertilizers, Kalyani Publishers, New Delhi
3. Sahai, V.N. 2001. *Fundamentals of Soil*, Kalyani Publishers, Ludhiana.
4. Tisdale, S.L., W.I. Nelson and J.D. Beaton. 1990. Soil Fertility and Fertilizers, The McMillan Company, New York.
5. White H 1989. Introduction to the Principles and Practices of Soil Science, Oxford Publishers, London.
6. Dilip Kumar Das. 2015. *Introductory Soil Science*. Kalyani Publishers, Ludhiana, India.
7. Biswas, T.D. and Mukherjee, S.K. Text book of Soil Science. Second edition. McGraw –Hill publications. Europe.
8. Arun Kumar Saha and Anuradha Saha. 2012. Textbook of Soil Physics. Kalyani Publishers, Ludhiana, India.

E-Resources

1. www.agritech.tnau.ac.in
2. www.icar.org.in
3. www.agrimoon.com

I SEMESTER

21 AGRD 0103 PRINCIPLES OF AGRONOMY (3+1)

OBJECTIVES

- To know about the principles and practices of crop production and management.

LEARNING OUTCOME

- Scope and importance of Agriculture in Indian economy
- To know about basic knowledge of crop adaption distribution, classification and economic importance of various crops.
- Basic knowledge about tillage objectives and modern concepts of tillage.
- To know about the cropping and farming system problems
- To know about characteristics of weed – weed dissemination and IWM.

THEORY

UNIT I **Introduction:** Agriculture – Definition scope of Agriculture in India and Tamil Nadu – Importance of Agriculture in Indian economy – Branches of Agriculture – History and Development of scientific Agriculture in World and India – Agronomy – Definition – Art, Science and Business of Crop Production - Relationship with other disciplines- role of an Agronomist.

UNIT II **Crop adaptation and distribution:** Classification of crops – Their economic importance – Major crops of India and Tamil Nadu – Adaptation and distribution – Factors affecting crop production – Internal or Genetic factors, external or environmental factors - Agricultural seasons of India and Tamil Nadu.

UNIT III **Tillage:** Principles and practices of agricultural operations – Tillage and Tilt – Characteristics of good tilt, objectives of tillage – Types of tillage, primary and secondary tillage and Intercultural operations. Implements and tools in Agriculture - Preparatory cultivation, after cultivation gap filling and thinning - Modern concepts of tillage – Seed and sowing – seed treatment Nursery and Transplanting. Harvesting, threshing drying and storage

UNIT IV **Cropping systems and Farming systems:** Systems of farming- Wet land, Garden land and dry Land Farming systems- Factors affecting choice of crop and varieties – Types of cropping systems – Mono cropping, multiple cropping, inter cropping, sequential cropping – Multi species and multi tier cropping – Crop rotation – Definition and advantages –Integrated Farming System (IFS) – Definition & types- Organic farming and precision farming- Definition and concepts

UNIT V Weed Management: Definition-classification of weeds - Characteristics of weeds –Dissemination of weeds – Harmful and beneficial effects of weeds - critical period of crop–weed competition - Principles of weed management - Methods of weed management – Cultural (mechanical, cropping and competition), chemical and biological methods – Chemical weed control - Classification of herbicides – Formulations – Mode of action - Time and methods of application – control of invasive weeds- Integrated weed management (IWM).

PRACTICAL SCHEDULE

1. Identification of crops in wet land system of farming
2. Identification of garden system of farming
3. Identification of dry land system of farming
4. Identification of tillage implements and acquiring skill in tillage operation
5. Identification of seeds of various field crops
6. Practicing Nursery bed preparation for low land and upland crops.
7. Practicing different methods of sowing and other cultivation practices in field crops
8. Practicing harvesting and processing of important crops
9. Practicing of different cropping systems and farming systems
10. Calculating the growth and the yield components of major crops.
11. Identification of weeds in wet, garden land and Arid and Semi Arid land areas.
12. Acquiring skill in mechanical and cultural methods of weed control, use of tools and implements
13. Practicing the methods of application of herbicide for different field crops and perennial and invasive weeds.
14. Practicing the methods of application of herbicide for different perennial and invasive weeds.
15. Practicing the methods of application of herbicide for the control of water weeds
16. Final Practical Examination

REFERENCES

Text books

1. Gupta, O.P. 1998. Weed management principles and practices, Agro botanical Publishers. Bikaner.
2. Hosmani, M.M. 1995. Integrated weed management in field crops, Hosmani Publishers, Dharward.
3. Rao, V.S. 1983. Principles of weed science. Oxford and IBH, New Delhi.
4. Sankaran, S. V.T.Subbiah Mudaliar. 1997. Principles of Agronomy, The Bangalore Printing and Publication Company Pvt. Ltd., Bangalore.
5. Yeilamanda Reddy and G.H. Sankara Reddi,1998. Principles of Agronomy, Kalyani Publishers, Ludhiana.

I SEMESTER

21 AGRD 0105 AGRICULTURAL METEOROLOGY AND LAND USE SYSTEMS (3+1)

OBJECTIVES

- To make the students understand the Principles of Agricultural Meteorology
- To improve knowledge and skills in Dry land Agriculture and Wasteland management

LEARNING OUTCOME

- Creation of basic knowledge on role of agricultural meteorology in crop production
- Scope and practical utility of agricultural meteorology in crop production
- Basic knowledge of alternate land use systems especially dry farming
- Scope and practical utility in studying dry land agriculture involving soil and water conservation efforts, integrated nutrient management, alternate land use systems especially agro forestry and watershed management in dry lands
- Creation of basic knowledge on forestry and wastelands and their practical utility in agriculture especially in dry lands

THEORY

UNIT I Introduction: Meteorology – Agricultural meteorology – Branches – their scope in Crop production – atmosphere – composition - climate and weather – weather elements and their importance – monsoons of India Rainfall and its distribution in India and Tamil Nadu – Agro climatic zones of India and Tamil Nadu – Agro ecological zones.

UNIT II Weather Forecasting: Weather forecasting – Types of weather forecasting – synoptic chart, weather calendar – Climatic change and weather modification – types – Artificial rain making – automatic weather station – Remote sensing and its role in agriculture.

UNIT III Principles of Dry Farming: Significance of dry farming in Indian Agriculture Indices of Aridity – Distribution of dry farming regions – Major dry land crops and cropping systems in India and Tamil Nadu – Drought – Types and effect on crop production

UNIT IV Dry Farming Practices: Integrated Dry land Development Technology and its components – Soil moisture conservation methods – Principles and practices – pre-monsoon sowing – Mid season corrections – Soil fertility management in dry farming – Alternative land use system in dry farming areas – Watershed Management – water shed – definition and importance

Unit V Forestry and Wasteland Development : Forests and forestry – Forest in India and Tamil Nadu – Distribution – Status – Importance – their uses and conservation – classification – Wastelands – Definition- extent – ecological status – causes – types – classification – tree species suitable for waste lands, saline and water logged areas.

PRACTICAL SCHEDULE

1. Visit and study of Agro meteorological observatory
- 2-3. Site selection for Agro met observatory-Drawing layout sketch of the observatory
- 4-5. Measurement of weather parameters – Acquiring skill and use of Meteorological Instruments- Thermometers
- 6-7. Acquiring skill and use of Meteorological Instruments- Anemometer, rain gauge and open pan evaporimeter
8. Pre-monsoon dry seeding for dry land crops.
9. Preparation of contingency crop planning for various aberrant weather situations
10. Study of dry farming tools and implements
11. Study of agro forestry options in Tamil Nadu
12. Study of tree species suitable for Agro Forestry and Wastelands.
- 13-14. Seed collection and seed treatment for tree species.
15. Nursery Management of tree species and planting.
16. Final practical Examination

REFERENCES

Text books

1. Gopalsamy, N. 1994. Agricultural Meteorology, Rawat Publications, Jaipur.
2. Griffiths, J.F. 1994. Hand Book of Agricultural Meteorology, Oxford University Press.
3. Nair, P.K.R. 2008. An Introduction to Agro forestry. Springer (India) Private Ltd., New Delhi.
4. Singh, R.P. 1996. Sustainable Development Dry land Agriculture in India, Scientific Publishers, Jodhpur.
5. Dhopte, A.M. 2009. Agro technology for Dry land farming.

I SEMESTER

21AGR0107 IRRIGATION AGRONOMY (3+1)

OBJECTIVES

- The students will be familiarized with the irrigation and crop water requirement concepts
- The students will be taught with the drainage and problems in the usage of water sources

LEARNING OUTCOME

- The students are well known with the handling of crops with better water requirement and irrigation resources

THEORY

- UNIT I Importance of Irrigation:** Definition- - Water resources of India and Tamil Nadu- Need for irrigation- Sources of Irrigation- Natural streams and rivers, surface resources, underground resources- History and development of Irrigation in India and Tamil Nadu- Irrigation systems of India and Tamil Nadu- Ground water- Aquifer- Well irrigation- Classification –open and bore well - Merits and demerits of tube wells-Role of water in plant growth
- UNIT II Irrigation and Crop Water requirement:** Irrigation Requirement - Net Irrigation requirement (NIR) and Gross Irrigation requirement (GIR) – Evapo transpiration- Evaporation, Transpiration, Potential Evapo Transpiration (PET)- Crop Co-efficient – Effective rainfall- Factors affecting crop water requirement- Consumptive Use(Cu)-Methods of estimation of Crop water Requirement- Critical stages for irrigation- Water requirement of crop
- UNIT III Scheduling and methods of Irrigation:** When, how and how much to irrigate- different approaches- Methods of irrigation- Surface, sub-surface , sprinkler and drip irrigation- surge irrigation-Micro irrigation – layout, suitability, , merits and scope-Fertigation-Water use efficiency(WUE)-Methods to improve WUE- Conjunctive use of surface and ground water- Water management for major field crops of Tamil Nadu
- UNIT IV Water Shed Management and water harvesting structures;--** Definition, Principles, objectives and benefits; Water shed development methods, Water harvesting structure- Temporary gully control structures – Brush dam, Rock dam; Permanent gully control structures – Drop spillway, Chute spillway, Drop inlet spillway; Percolation pond, Farm pond and Sunken Pond Sand Storage dam – its merits and demerits.
- Unit V Drainage and problems in water use:** Drainage- Definition- Effects of water logging, Benefits of Drainage- Classification of Drainage- Quality of irrigation water- Agronomic practices for use of poor quality water (Saline, effluent and sewage water).

PRACTICAL SCHEDULE

1. Estimation of soil moisture by gravimetric method and Tensiometer
2. Estimation of Soil moisture by Resistance blocks and Neutron probe and other improved devices
3. Measurement of irrigation water with flumes and weirs
4. Calculation of irrigation water based on source, waterflow, soil moisture status and depth of irrigation
5. Land leveling and land shaping- beds and channels- Ridges and furrows
6. Land leveling and land shaping for border strips – Broad Bed and furrow method of irrigation
7. Operation and maintenance of drip and sprinkler irrigation systems
8. Estimation of crop water requirement by direct and indirect methods
9. Scheduling of irrigation based on indicator plants , soil-sand mini plot technique
10. Scheduling of irrigation based on depletion of available soil moisture and IW/CPE ratio
11. Calculations on Irrigation efficiency parameters
12. Assessment of irrigation water quality parameters
13. Observation of irrigation structures in wetlands and irrigated drylands
14. Visit to Water management and training Institutes
15. Final practical Examination

REFERENCES

Text books

1. Michael , A.M. 1997. Irrigation- Theory and Practice. Vikas Publishers
2. Sankarareddy, G.H. and T. Yellamananda Reddy, 1997. Efficient use of Irrigation Water. Kalyani Publishers.

I SEMESTER

21AGRD0109 DAIRY CATTLE PRODUCTION (3+1)

OBJECTIVES

- The General objective of this course is to establish basic knowledge of how to manage and operate dairy farm.
- This course is designed to impart basic technical knowledge and skills required for entry level positions or to successfully run a dairy farm enterprise by developing competencies concerning the selection and breeding of dairy cattle, management of animals of different physiological status, feeding, housing and health care.
- To provide hands-on experiences with handling and restraining of cattle, milking and other dairy husbandry practices.

LEARNING OUTCOME

Unit I: Instruction in lessons in Unit I should result in students achieving the following objectives

1. Describe the size and contribution of dairying to Indian economy and rural livelihood
2. Describe the various breeds of dairy cattle, giving their origin and breed characteristics and milk production capacity.
3. Identify the anatomical parts of the dairy animal
4. Identify various breeds of cattle and buffalo by viewing photographs or live animals.
5. Name the parts of dairy cattle and describe economically important traits.
6. Describe the characteristics of a good dairy cow
7. Select desirable breeding and production animals.
8. Differentiate desirable from undesirable traits

Unit II: Instruction in lessons in Unit II should result in students achieving the following objectives

1. Describe the male and female reproductive organs.
2. Identify the signs of heat and right time for insemination.
3. Able to identify suitable method of breeding for improving the productivity of herd
4. Able to determine the breeding efficiency of cows and bulls
5. Acquire knowledge skills in semen collection, evaluation, dilution and insemination

Unit III: Instruction in lessons in Unit III should result in students achieving the following objectives

1. Ability to handle and restrain animals safely.
2. Acquired skill in putting nose ring, castration, dehorning, tattooing, branding, tattooing and dentition and ageing of cattle.
3. Ability to prepare plans for housing of dairy cows.

Unit IV: Instruction in lessons in Unit IV should result in students achieving the following objectives

1. Able to classify feeds according to their nutritive values

2. Acquire knowledge in feeding value of locally available feed
3. Able to list key nutrients for animals
4. Able to outline how carbohydrates, lipids and proteins can be classified
5. Able to describe the functions of minerals and vitamins in the nutrition of animals, and list the sources as well as the clinical signs associated with deficiency symptoms of these nutrients.
6. Describe the functions of the parts of the digestive systems of cow
7. Acquire knowledge in the use of urea as protein supplement

Unit V: Instruction in lessons in Unit V should result in students achieving the following objectives

1. Able to take care of sick animals
2. Able to identify healthy and sick animals
3. Able describe the basic physical examination of animals for health assessment
4. Able to list and describe the common diseases of cattle
5. Able to diagnose and treat mastitis, FMD, LSD, anthrax, black quarters and Hemorrhagic Septicemia
6. Able to diagnose Tuberculosis, Johne's disease, Brucellosis and Rabies
7. Able to diagnose and treat Bloat, Carbohydrate engorgement, Diarrhoea and Indigestion
8. Able to control common Endoparasites and Ectoparasites

THEORY

- UNIT I** **Cattle breeds and selection:** Introduction – Role of dairying in Indian agriculture and economy - Meaning of commonly used terms - Origin and domestication of livestock - Dairy cattle census – Milk production and availability – Description of parts of dairy cow - Cattle breeds – Indigenous breeds – Red Sindhi, Sahiwal, Gir, Kangayam, Pulikulam – Exotic breeds – Holstein Friesian, Jersey, Brown Swiss. Breeds of buffalo – Murrah – Surti – Nili - Ravi – Toda. Selection of dairy cattle – objectives – dairy characters – selection of individual cows - Choice of breeds.
- UNIT II** **Cattle breeding:** Reproductive system of bull and cow – Oestrous cycle - Signs of heat – Concept of breeding – Inbreeding – Out breeding - breeding efficiency – Artificial insemination – Semen collection – Evaluation – Freezing technique – Insemination – Advantage and disadvantages of frozen semen
- UNIT III** **Zootechny and Housing:** Handling and restraining of dairy cow – Casting – Putting nose ring and string – Dehorning – Castration – Dentition and ageing – Identification of dairy cow – Tattooing – Branding – Selection of site for the farm buildings — Planning and designing - construction details – Foundation – Wall, floor, roof, manger, drain etc. – Types of animal housing – Conventional barn – Loose housing – calving pen – calf pen – quarantine and isolation shed.
- UNIT IV** **Feeds and Feeding:** Classification of feeds – Roughage – Concentrate – Grains – Mill by products – Molasses – Oil cakes – Nutrients - water, protein, carbohydrates, fats, vitamins and minerals in animal nutrition – Digestive system of ruminants – Digestion of carbohydrates, protein and fats – Nutrient requirements for maintenance and milk production – Urea feeding – Urea treatment of paddy straw. Feeding of pregnant and lactating cows Challenge feeding – complete feeding.

UNIT V ABC of Veterinary medicine: Elementary principles of treatment and care of sick animals – Signs of health and ill health – Temperature – Respiration – Pulse – Mastitis - Common ailments – Bloat – Carbohydrate engorgement – Diarrhoea – Indigestion – Wounds. Common contagious diseases – Foot and Mouth disease – Lumpy Skin Disease - Anthrax – Black quarter – Tuberculosis – Johne’s disease – Brucellosis – Rabies, Hemorrhagic Septicemia – Endoparasites – Ectoparasites.

PRACTICAL SCHEDULE

1. Familiarizing with of body parts of dairy cow
2. Identification of breeds of cattle and buffaloes
3. Estimation of body weight by body measurements
4. Demonstration of semen collection, evaluation and insemination
5. Restraining of dairy cattle
6. Disbudding of calves
7. Castration of male calves
8. Dentition and ageing
9. Recording of temperature, pulse and respiration
10. Identification of feeds and fodder
11. Preparation of plans for animal housing
12. Calculations of nutrient requirements for maintenance and milk production
13. Preparation of projects for obtaining bank loan

REFERENCES

Text Books

1. ICAR, 2014. Hand book of Animal Husbandry, 4th Ed. ICAR Publication, Pusa, New Delhi.
2. Banerjee, G.C., 2018. Text book of Animal Husbandry 8th Ed. Oxford and IBH Publishing Company Ltd., New Delhi.
3. Jagdish Prasad, 2016. Principles and practices of Dairy Farm Management, 8th Ed. Kalyani Publishers, Ludhiana.
4. Sastry, N.S.R., C.K. Thomas and R.A. Singh, 2019. Livestock Production Management, 4th Ed. Kalyani Publishers, New Delhi.
5. Ranjhan, S.K., and N.N. Pathak, 2003. Text book on buffalo production, 4 Ed. Vikas Publishing House Pvt. Ltd., New Delhi

I SEMESTER

21AGR0111 RURAL DEVELOPMENT (3+1)

OBJECTIVES

- To teach the students about the basics and importance of rural development.
- To understand the rural development attempts over various decades
- To expose the students to various agricultural and rural development programmes of centre and state
- To impart knowledge about rural development institutions and their role and importance

LEARNING OUTCOME

- Studying the concepts of rural development
- Learning about the community development programme and the machinery of its implementation
- Learning about the Origin, objectives and functions of various agricultural development programmes
- Studying about the Origin, objectives and functions of various rural development programmes
- Learning about the different rural development institutions and SHGs

THEORY

UNIT I Introduction: Rural Development- meaning, objectives, and its importance in the development of Indian economy - Socio-economic conditions of and causes for poverty conditions in villages. Rural and Urban societies - differences and relationships. Rural Development Attempts in Pre-independent Era: Shantiniketan, Gurgaon Experiment, Etawah Pilot Project, Marthandam Project, Gandhian Constructive Programme, Firka Development Scheme of Madras State and Nilokheri Experiment.

UNIT II CDP and Panchayati Raj: Community Development Programme- meaning, principles, objectives, history and administration. Community Development and National Extension Service. Panchayati Raj- evolution, earlier efforts and setup in 1957-59. New Panchayati Raj- 73rd Constitutional amendment- Tamil Nadu Panchayati Raj Act- constitution, structure and functions of Panchayat bodies at three tiers in Tamil Nadu.

UNIT III Origin, objectives and functions of IADP, IAAP, HYVP, NPDP, ICDP, NATP, Technology mission on Oilseeds, Pulses and Maize. National Horticulture Board and its schemes, NWDPR, IAMWARM and NHM and NFSM. Govt. of India schemes- E-NAM, NMSA, PMFBY, PKVY, PKSY, Soil Health card, Kisan Call Centre. Origin, objectives and functions of Training and Visit System and TNADP. TOT by ICAR- KVK, FLDs, OFTs, ATIC, ATMA, Agri Clinics and Agri Business Centres. Kisan Credit Card Scheme, National Agricultural Insurance Scheme.

UNIT IV Rural Development Programmes: Origin, objectives and functions of IRDP, SGSY, National Social Assistance Programme- NOAPS, NMBS, NFBS, Annapurna Scheme, PMGSY, MGNREGS, DAY-NRLM, DDU-GKY, PMAY-G, SAGY, Shyama Prasad Mukherjee National RURBAN, DPAP, DDP, IWMP and Hariyali.

UNIT V Rural Social Organizations: Origin, objectives and functions of DRDA, NABARD, CAPART. TAWDEVA - Self Help Groups- history, formation and functioning. TNCDW and its role in SHGs - Role of NGOs in the development of SHGs- role in linking SHGs to formal credit system- linkage models.

PRACTICAL SCHEDULE

1. Study of tools of data collection.
2. Preparation of schedules to collect the village basic data.
3. Preparation of schedules to collect the socio-economic status.
4. Visit to nearby villages to collect village basic data.
5. Micro level survey to assess the Socio-economic status of people in nearby villages.
6. Study of attitude of villagers towards Agricultural Development programmes
7. Visit to a nearby Village Panchayat office and attending Gram Sabha Meeting.
8. Visit to nearby Village to attend the Gram Sabha Meeting
9. Visit to Panchayat Union to learn its administrative setup, functions and programmes.
10. Visit and study of organizational structure, functions and programmes of DRDA.
11. Visit to KVK at GRI to learn its activities and programmes.
12. Interaction with SHG' members about their activities and experience.
13. Visit to an NGO and learning its activities and role in rural development.
14. Visit to Farmers training centre.
15. Visit to JDA office – Dindigul
16. Final practical Examination

REFERENCES

Text books

1. Dahama, O.P. and O.P. Bhatnagar. (1996). Education and Communication for Development, Oxford & IBH Publishing Co., Ltd., New Delhi.
2. Ray, G.L.(1991). Extension Communication and Management. Naya Prakash, Calcutta.
3. Reddy, A.A. (1980) Extension Education. Shree Laxmi Press, Bapatla

4. Tripathi, N.K. (2000). Rural Sociology and Psychology in Extension Education.
5. Sundaramari, M. (2006). Agriculture and Dairying- A Rural Development Perspective, NCBH, Chennai.

II SEMESTER

21 AGRD 0201 AGRONOMY OF FIELD CROPS-I (3+1)

OBJECTIVES

- To know the concept and classification of field crops and cropping systems
- To know the production technology of Cereal crops (Rice, Wheat, Maize, Sorghum and other Millets), Pulses (Red gram, Black gram, Green gram and others) and Green / Green leaf manure and Cover crops (Daincha, Manila Agathi, Sun hemp and others)

LEARNING OUTCOME

- Knowing the concept and classification of field crops their importance and their distribution / Improved production technology of Rice, wheat, maize, major and minor millets, Major and Minor pulses , Green and Green leaf manure and Cover Crops and their incorporation

THEORY

UNIT I Cereals I: Rice

UNIT II Cereals II: Wheat and Maize

UNIT III Millets:

A. **Major millets:** Sorghum, Pearl millet (Cumbu), Finger millet (Ragi).

B. **Minor millets:** Foxtail millet (Tenai), Little millet (Samai), Kodo millet (Varagu), Common millet (Pani Varagu), Barnyard millet (Kudirai Vali).

UNIT IV Pulses:

A. **Major:** Pigeon pea (Red gram), Black gram, Green gram, Bengal gram (Chickpea), Cowpea,

B. **Minor:** Soybean, Horse gram, Field bean

UNIT V Green manure, Green leaf manure and Cover crops:

A. Green manures – Daincha, Manila Agathi, Sunhemp,

B. Green leaf manure - Gliricidia, Pungam and Neem.

C. Cover crops – Pillipesara, Kolingi, Kalapogonium, Mucana (Punaicali)

PRACTICAL SCHEDULE

1. Practicing different types of rice nursery, SRI Technique in Rice.
2. Acquiring skill in nursery preparation for sorghum, cumbu and ragi
3. Practicing main field preparation, sowing and manuring of important cereals and millets.
4. Practicing main field preparation, sowing of pulses under pure and inter cropping system.
5. Seed treatment practices in cereals and pulses
6. Assessing and estimation of plant population for important field crops.
7. Foliar application of nutrients.
8. Yield attributes and yield estimation in rice and maize

9. Yield attributes and yield estimation in sorghum.
10. Yield attributes and yield estimation in Ragi and other millets
11. Yield attributes and yield estimation in pulses
12. Yield estimation in green manure crops.
13. Working out cost of cultivation for Rice and Maize
14. Working out cost of cultivation for Millets
15. Working out cost of cultivation for Pulses
16. Final Practical Examination

REFERENCES

Text books

1. Balasubramanian, R and B.Gururajan. 2009. Crop Production, Kalyani Publishers, Ludhiana
2. Chatterjee, B.N. and S. Maiti. 1993. Cropping system – Theory and Practice, Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.
3. Chiddha Singh. 1997. Modern Techniques of raising field crops, Oxford and OBH Publishing Company Pvt. Ltd., New Delhi.
4. Singh, S.S. 1997. Crop Management under irrigation and rain fed conditions, Kalyani Publishers, New Delhi.
5. TNAU. 2006. Crop production Guide, TNAU and Directorate of Agriculture, Chennai.

II SEMESTER

21AGR0203 FUNDAMENTALS OF PLANT PROTECTION (3+1)

OBJECTIVES

- To facilitate the students to learn and understand basic principles of Agricultural Entomology and Plant Pathology

LEARNING OUTCOME

- Studying the brief history of Indian Agricultural Entomology
- Studying the methods of pest control
- Studying the brief history of plant pathology
- Studying the plant diseases and symptoms
- Studying the plant protection chemicals

THEORY

UNIT I **Brief history of Indian Agricultural Entomology:** Systematic position of class Insecta in animal classification – Reasons for the dominance of class Insecta – Types of damages caused by insects to plants – Causes for Insect Pest outbreak.

UNIT II **Methods of Pest Control:** Principles of Insect Pest control– Natural/Applied/Cultural/Physical/ Mechanical/Legal/ Biological and Chemical methods - Integrated Pest Management (IPM) and ETL level – Resurgence of insects with reference to insecticides application – pheromones, its uses in insect pest control.

UNIT III **Brief history of Plant Pathology:** Elementary classification of fungi – Basic knowledge on disease causing Fungal, Bacterial, Viral, MLO's, Nematode and Algal agents. Infectious and Non infectious agents of plant diseases – Flowering parasites like Cuscuta, Striga, Loranthus and Orbanchy.

UNIT IV **Study of plant diseases and symptoms** – Mode of spread of plant diseases – Brief study of sulphur, copper, systemic groups of fungicides - Importance of seedtreatment with fungicides – Basic biological agents for disease control.

UNIT V **Study of Plant Protection Chemicals:** Different pesticide formulations and their nutrients – Preparation of spray fluid – Compatibility of pesticides, Physical/Chemical and Phytotoxic – Storage and handling of plant protection chemicals and appliances.

PRACTICAL SCHEDULE

1. Study of external structures of an insect.
2. Study of types of damage caused by insects on crops.
3. Study of Pesticide formulations.
4. Methods of pesticide application.
5. Study of Storage and handling of plant protection chemicals and appliances
6. Preparation of Bordeaux mixture.
7. Symptoms of plant diseases in crop plants.
8. Simple calculation on Pesticide requirements.
9. Study of seed treatment
10. Study of biological agents for disease control
11. Observation of disease fields.
12. Collection of plants damaged by insect pests
13. Collection of plants diseases
14. Visit to Agricultural Research Stations
15. Visit to Farmers Field
16. Final practical Examination

REFERENCES

Text books

1. David, B.V. and T. Kumarasamy. 1995. Elements of Economic Entomology, Popular Book Depot, Chennai.
2. Govindasamy, C.V. and M. N. Alagianagalingam. 1990. Plant Pathology, Popular Book Depot, Chennai.
3. Panwar, V.P.S. 2000. Agricultural Insect Pests of Crops and their control. Kalyani Publishers, New Delhi.
4. Singh, R.S. 2000. Introduction to Principles of Plant Pathology, Oxford & IBH Publishing Company, New Delhi.
5. Srivastava, H.N. 1996. Plant Pathology, Pradeep Publications, Jalandhar.

II SEMESTER

21AGRD0205 INTRODUCTION TO HORTICULTURE AND FRUIT PRODUCTION

(3+1)

OBJECTIVES

- To learn about importance, climatic zones, establishment of orchard, Systems of cropping, and propagation techniques of horticultural crops.
- To learn about production technology of tropical, subtropical, arid, humid and temperate fruit crops.

LEARNINGOUTCOME

- Studying the importance of horticulture and layout of orchard.
- Studying the Systems of cropping, training and pruning, harvest, Postharvest management
- Studying the vegetative Propagation techniques and tissue culture
- Studying the Production Technology of tropical fruit crops, subtropical, arid, humid and temperate fruit crops.

THEORY

UNIT I Fundamentals of Horticulture: Definition – Importance in Indian economy and nutrition – Climatic zones and Horticulture zones of India – Establishment of orchard – Selection of site, preliminary operations – Planning and layout – Planting systems and methods of planting.

UNIT II Orchard Management: Orchard soil management – Systems of cropping, training and pruning and Canopy management– Harvest, Post harvest management.

UNIT III Propagation techniques: Definition – Advantages and limitations - Stem cuttings – Simple layering, compound layering, serpentine layering, and Air layering – Inarching and Epicotyl grafting – Shield and Patch budding, T-budding and Tissue Culture.

UNIT IV Cultivation of Major Tropical Fruits: Cultivation of Mango, Banana, Citrus and Grape vine.

UNIT V Cultivation of Other Fruits: Cultivation of Guava, Sapota, Papaya, Ber, Pomegranate, Custard Apple, Indian goose berry- Temperate Fruits.

PRACTICAL SCHEDULE

1. Acquiring knowledge about the college orchard and identifying of fruit plants
2. Acquiring knowledge about the tools and implements
3. Practicing nursery methods for horticultural crops
4. Pest and disease management in nursery.
5. Practicing Preparation of pits, planting and after care of horticultural crops
6. Practicing Manuring and fertilizer application methods
7. Practicing Irrigation and irrigation methods
8. Practicing training methods
9. Practicing Pruning methods
10. Special pruning techniques in horticultural crops.
11. Acquiring knowledge about the Simple layering and air layering
12. Acquiring knowledge about the Inarching and epicotyl grafting
13. Practicing Harvesting of fruits and preparing for the market
14. Visit to major orchard and fruit farms
15. Visit to micro propagation unit.
16. Final practical examination.

REFERENCES

Textbooks

1. Kumar, N. 1997. Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
2. Hartmann, H.T. and D.E. Kester. 1975. Plant propagation, Englewood cliffs, New Jersey, Prentice Hall.
3. Bose, T.K. 1986. Fruits of India–Tropical and subtropical, Nayaprakash, Calcutta.
4. Shanmugavelu, K.S.1989.Viticulture in India. Agro Botanical Publishers.
5. Singh,K.K.1987, Mango- A Hand Book, ICAR Publications, New Delhi

II SEMESTER

21AGR0207 ENVIRONMENTAL SCIENCE AND ORGANIC FARMING (3+1)

OBJECTIVES

- To teach the students about the ecology, ecosystem concepts and environmental pollution.
- To impart knowledge on organic farming and certification procedures.

LEARNING OUTCOME

- The students can understand about ecology, environment, ecosystem concept and can practice and identify different methods of Indigenous Knowledge and collection of IK.

THEORY

UNIT I Introduction: Ecology –Ecosystems – forest, grassland and aquatic ecosystems - water cycle, carbon, oxygen, nitrogen, sulphur and phosphorous cycles - Environment - Components – Natural Resources - Soil, water, mineral, forest, wildlife resources – Components and Types of Ecosystems.

UNIT II Agricultural Pollution and Management: Adverse effect of Modern Agriculture on soil and water resources - Impact of high technology agriculture on crop production – Soil pollution – water pollution – Acid Rain – Ozone layer depletion – Green House Effect – Global Warming and Climate Change.

UNIT III Introduction to Organic Farming: Need, Concepts, Definition and Components – Essential characteristics – Key principles – Different methods of eco-friendly Agriculture –Indigenous Technical knowledge in organic Agriculture- Need, Forms and Types of ITK, Indigenous Vs Western (External) Knowledge -Participatory Technology Development

UNIT IV Organic Agriculture Management methods: Organic nutrient sources - Non chemical weed management- methods of pest and disease management in organic Agriculture

UNIT V Organic Certification : Organic certification – Types and Agencies in India - NPOP guidelines- Crop production standards- Quality considerations- Certification process- Marketing and export potential of organic products

PRACTICAL SCHEDULE

1. Study of forest ecosystem
2. Study of pond ecosystem
3. Study of biodiversity in the farm
4. Visit to residue testing laboratory
5. Observe and document the do nothing farming practices in the farmers field
6. Preparation of cow horn manure.
7. Preparation of Organic nutrient solution.
8. Preparation of Bio pesticides formulations.
9. Zero Budget Farming components
10. Identification and collection of plants used as pest repellants
11. Study on crop rotation and mixed cropping techniques.
12. Identification of sources for collection of IKs
13. Practicing different methods of collecting IKs
14. Documentation of IKs on Field crops.
15. Field Visits to Organic farmer's field.
16. Final practical Examination

REFERENCES

Text books

1. Dhaliwal, G.S. and D.S. Kler. (2000). Agricultural Ecology, Himalaya Publishing Company, Mumbai.
2. IIRR (1996), Recording and using Indigenous Knowledge: A Manual International Institute of Rural Reconstruction, Silang, Cavite, Philippines.
3. Palaniappan. S.P. and K. Annadurai.(1999). Organic Farming Theory and Practice. Scientific Publishers (India), Jodhpur.
4. Sharma, Arun K. (2002). A Hand Book of Organic Farming Agrobios (India), Jodhpur.
5. Sundaramari, M. (2003). Indigenous Agricultural Practices for Sustainable Farming, Agrobios (India), Jodhpur.

II SEMESTER

21AGR0209 DAIRY TECHNOLOGY (3+1)

OBJECTIVES

- To enlighten the students about the processing and marketing of milk.
- To gain an understanding of manufacturing methods and production of dairy products.

LEARNING OUTCOME

- Students will learn about the properties of milk
- Students will learn about the clean milk production
- Students will learn about the Milk processing and market
- Students will learn about the production techniques of fermented milk products.
- Students will learn about the production techniques of fat rich and dried milk products.

THEORY

UNIT I Properties of Milk: Milk - definition – Composition- Secretion of milk in the udder –Nutritive value of milk – Properties of milk – colostrums - Definition – composition-importance factors affecting the milk yield and composition.

UNIT II Clean Milk Production: Sources of microbes in milk – Clean milk Production – Bacteriological standard for raw milk – MBRT Test – Detergents and Sanitizers – common adulterants and preservatives in milk.

UNIT III Milk Processing and Market: Collection, Transportation of milk, milk reception, clarification, chilling, homogenization, pasteurization, sterilization, UHT processing, packaging; Market milk – standardized – Toned – Double toned – flavoured milk

UNIT IV Milk Products – I :Fermentation – Definition – Starter culture – Method of manufacture of yoghurt, dahi, buttermilk, acidophilus milk and cheese-therapeutic benefits of fermented milk products.

UNIT V Milk Products - II: Method of manufacture and uses of cream, ice cream, butter, ghee, khoa concentrated milk, dried milk, paneer and channa.

PRACTICAL SCHEDULE

1. Sampling of milk
2. Determination of specific gravity of milk
3. Analysis of fat in milk
4. Analysis of lactose in milk
5. Analysis of protein milk
6. Estimation of TS and SNF content of milk
7. Determination of acidity in milk
8. Determination of MBRT in milk
9. Detection of adulterants in milk
10. Deduction of preservatives and neutralizers
11. Estimation of ash in milk
12. Preparation of khoa
13. Preparation of peda
14. Preparation of flavoured milk
15. Preparation of paneer
16. Final practical Examination

REFERENCES

Text books

1. Anantha Krishnan, C.P., (1991), Technology of milk processing, Sri Lakshmi Publications, Chennai -10.
2. Banerjee G.C (1993) Text Book of Animal Husbandry, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Aneja. R. P, B.N Mathur, R.C Chandra and A.K. Banerjee (2002). Technology of Indian Milk Products, Dairy India year book 2007
4. Eeckless C.H, W.B Combs and H. Mery (1955), Milk and Milk Products, Tata Mc Graw Hill Publishing Co. Pvt. Ltd., New Delhi.
5. Sukumar De (1980) Outlines of Dairy Technology, Oxford University Press, New Delhi.

II SEMESTER

21AGRD0211 PRINCIPLES OF PLANT BREEDING AND SEED SCIENCE TECHNOLOGY (3+1)

OBJECTIVES

This course aimed at understanding to impart theoretical knowledge and practical skills about plant breeding objectives, modes of reproduction and genetic consequences, breeding methods for crop improvement and seed physiology, seed certification, seed testing and seed storage.

LEARNING OUTCOME

The students will understand about breeding objectives, breeding methods for crop improvement, tissue culture techniques, seed physiology, seed testing and seed storage.

THEORY

- UNIT I Introduction to plant breeding:** History of plant breeding, pollination mechanisms - Methods of plant breeding – Introduction – Selection – Mass selection, pureline selection – Hybridization and selection Mechanisms promoting self pollination and Cross pollination in crops.
- UNIT II Heterosis breeding:** Male sterile systems – Development of hybrids single cross, double cross and polycross – Synthetic sand composites.
- UNIT III Other breeding methods:** Mutation breeding, Tissue culture – Meristem, Anther, ovary, Embryo culture – variety release committee and steps involved in release of crop varieties and hybrids.
- UNIT IV Seed science and technology -** Fertilization – embryo genesis and seed formation – development and maturation – seed structure and composition – seed quality characteristics - difference between seed and grain- selection, Seed Farm Management – Seed Certification and standards –classes of seed.
- UNIT V Seed germination and seed testing:** Types – Requirements – Factors affecting germination – Seed dormancy – Seed and seedling vigour – Seed storage –Seed storability – Seed sampling – Seed purity analysis – seed viability and seed health.

PRACTICAL SCHEDULE

1. Breeders Kit & its components
2. Pollination and reproduction in plants – alternation of generation and life cycle
3. Selfing and crossing techniques in different crops
4. Emasculation and kinds of emasculation and pollination techniques
5. Fertility & Sterility in A,B,R & TGMS lines and their maintenance
6. Identification of seed and its structure
7. Assessing the physiological and harvestable maturity in different crops
8. Sampling – mixing and dividing – equipments – methods
9. Purity analysis – reporting results
10. Seed germination tests
11. Seed dormancy breaking treatments
12. Seedling evaluation – tetrazolium test and evaluation.
13. Seed farm visit and Seed Certification agency
14. Final practical Examination

REFERENCES

Text books

1. Agarwal. R. L. 2004. Seed Technology, IVth Edition, Oxford and IBH Publishers Company, New Delhi.
2. Chaudhary. R.C. 1990. Introduction to Plant Breeding, Oxford and IBH Publishers Company, New Delhi.
3. Ramamoorthy, K. and K. Sivasubramaniam. 2006. Seed Technology, Ready Reckoner, Agrobios Publishers, Jodhpur, Rajasthan
4. Singh B.D. 2005. Plant breeding – Principles and Methods, Kalyani Publishers, New Delhi.
5. Sivasubramaniam. K. and S.K Yadav. 2007. A Dictionary of Seed Technological Terms, Kalyani Publishers, Ludhiana
6. Bhojwani and Dantu, 2013. Plant tissue culture: An introductory text, Springer, New Delhi.

E-Resources

1. https://ecourses.icar.gov.in/e-Learningdownload3_new.aspx?Degree_Id=01
2. <https://agrimoon.com/>

III SEMESTER

21AGRD 0301 AGRONOMY OF FIELD CROPS-II (3+1)

OBJECTIVES

- To know the concept and classification of field crops and cropping systems
- To know the production technology of oilseeds, sugar crops, Fibre crops, Tobacco and fodder crops.

LEARNING OUTCOME

The student will gain knowledge on the cultivation of oilseeds sugar crops, Fibre crops, Tobacco and fodder crops.

THEORY

Agronomy of the field crops with reference to economic importance, origin, soil and climatic requirement area, production and productivity in India and Tamil Nadu – systems of cultivation, crop management – season, varieties, seed rate, seed treatment, sowing, spacing, Integrated nutrient and weed management – irrigation – after cultivation – harvest- by product utilization. Latest developments in oilseeds sugar crops, Fibre crops, Tobacco and fodder crops.

UNIT I Oil seeds I: Groundnut, Gingelly and Sunflower

UNIT II Oil seeds II: Rapeseed and Mustard, Safflower and Castor.

UNIT III Sugar crops: Sugarcane, Sugar beet and Sweet sorghum

UNIT IV Fibre crops and narcotics:

- a) Major Fibre crops : Cotton, Jute
- b) Minor Fibre crops : Silk cotton, Agave,
- c) Narcotics : Tobacco.

UNIT V Forage crops

- a) Forage cereals - Sorghum, Maize and cumbu
- b) Forage grasses - Guinea grass, Bajra Napier, Kolukkattai grass and Deenanath grass.
- c) Forage legumes - Lucerne, Cow Pea, Stylo, Siratro and Desmanthus.
- d) Forage trees - Subabul (saundal), Sesbania (Agathi) and Gliricidia.
- e) Less Known - Erythrina (Mulmurugai), Thespesia (Poovarasu)

PRACTICAL SCHEDULE

1. Study of field management in groundnut and other oil seeds
2. Cultivation techniques of sugarcane
3. Cultivation techniques of sweet sorghum
4. Study of sowing and manuring of oilseeds
5. Study of sowing and manuring of sugarcane
6. Study of sowing and manuring of cotton
7. Tobacco nursery management
8. Growth and Yield estimation in oil seeds
9. Growth and Yield estimation in sugarcane.
10. Growth and Yield estimation in fibre crops
11. Cost of cultivation in oil seeds.
12. Cost of cultivation in sugarcane.
13. Cost of cultivation in cotton.
14. Cost of cultivation in forage crops.
15. Visit to CTRI, Veda sandur
16. Final practical Examination.

REFERENCES

Text books

1. Chiddha Singh. 1997. Modern techniques of raising field crops. Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.
2. Gopalachari, N.C. 1984. Tobacco, ICAR, New Delhi.
3. Thakur, C. 1981. Scientific crop production. Vol. II. Metropolitan Book Company Pvt. Ltd., New Delhi.
4. Yadava, R.L. 1993. Agronomy of sugarcane – Principles and Practices, International book distribution Company, Lucknow.
5. Gururajan, B.R. Balasubramanian and V. Swaminathan, 2008. Recent strategies on crop production.

III SEMESTER

21 AGRD 0303 CROP DISEASE MANAGEMENT (3+1)

OBJECTIVE

- To facilitate the students to learn and understand about the micro organisms.

LEARNING OUTCOME

- Studying the Diseases of Cereals and Pulses
- Studying the Disease of Oilseeds and Cash Crops
- Studying the Diseases of Vegetable Crops
- Studying the Diseases of Fruit Crops
- Studying the Diseases of Plantation and Flower Crops

THEORY

Study of major and common diseases (including nutritional disorders), symptoms, mode of spread and management practices of following crops.

UNIT I Disease of Cereals and Pulses: Rice, Wheat, Cholan, Maize, Cumbu, Green gram, Black gram, and Bengal gram.

UNIT II Disease of Oilseeds and Cash Crops: Coconut, Groundnut, Castor, Gingelly, Sunflower, Cotton, Sugarcane.

UNIT III Disease of Vegetable Crops: Brinjal, Bhendi, Chillies, Potato, Tomato, Cucurbits, Crucifers and Tapioca.

UNIT IV Disease of Fruit Crops: Citrus, Mango, Banana, Grapes, Apple

UNIT V Disease of Plantation and Flower Crops: Coffee, Tea, Cardamom, Pepper, Rose, Crossandra and Jasmine

PRACTICAL SCHEDULE

1. Study of cereal crops diseases symptoms
2. Study of pulses crops diseases symptoms
3. Study of Cotton crop diseases symptoms
4. Study of Sugarcane crop diseases symptoms
5. Study of Vegetable crops diseases symptoms(Brinjal, Bhendi and Tomato)

6. Study of Vegetable crops diseases symptoms (Chillies, Potato and Tapioca)
7. Study of Vegetable crops diseases symptoms(Cucurbits and Crucifers)
8. Study of Fruit crops diseases symptoms (Citrus, Mango and Banana)
9. Study of Fruit crops diseases symptoms (Grapes and Apple)
10. Collection and Preservation of diseased specimens.
11. Study of Micro nutrient deficiencies and their rectifications.
12. Study of seed treatment
- 13-15. Field Visits.
16. Final practical Examination

REFERENCES

Text books

1. Govindasamy, C.V. and M.N. Alagianagalingam. 1990. Plant Pathology, Popular Book Depot, Chennai.
2. Mehrotra, R.S. 1988. Plant Pathology, Tata McGraw Hill Publishing Company Ltd., New Delhi.
3. Prakasam, V., V.Valluva Paraidhasan and R.Jeyarajan. 1993. Hand book on Field Crop Diseases, AE Publication, Coimbatore.
4. Rangasamy, G. 1994. Diseases of Crop Plants in India, Prentice Hall of India Pvt. Ltd., New Delhi.
5. Singh, R.S. 1989. Diseases of Vegetable Crops, Oxford & IBH Publishing and Company, New Delhi.

III SEMESTER

21AGR0305 VEGETABLE PRODUCTION (3+1)

OBJECTIVES

- To learn about Importance, classification and types of vegetable gardens.
- To learn about Production Technology of greens, salads, crucifers, cucurbitaceous, bulb, root, tuber, solanaceous, malvaceous and leguminous vegetables.

LEARNING OUTCOME

- Studying the importance, classification, types and maturity index of vegetables.
- Studying the Production technology of Drumstick, Curry leaf, Amaranthus and Coccinea
- Studying the Production technology of Cabbage, Cauliflower, Chow-chow, Pumpkin, Water melon, Snake gourd, Bitter gourd and Ribbed gourd.
- Studying the Production technology of Onion, Garlic, Carrot, Radish, Beetroot, Potato, Tapioca and Sweet Potato.
- Studying the Production technology of Brinjal, Tomato, Chillies, Bhendi, Garden bean, Cluster bean, Peas and French beans.

THEORY

- UNIT I Introduction:** Importance – Classification and types of vegetable gardens – Cultural aspects of vegetables- Handling and maturity index.
- UNIT II Perennial vegetables, greens and salad crops:** Cultivation of Drumstick, Curry leaf, Amaranthus and Coccinea
- UNIT III Cole crops and cucurbits:** Cultivation of Cabbage, Cauliflower, Chow-chow, Pumpkin, Water melon, Snake gourd, Bitter gourd, Ridged gourd, bottle gourd and Ribbed gourd.
- UNIT IV Bulb, root and tuber vegetables:** Cultivation of Onion, Garlic, Carrot, Radish, Beetroot, Potato, Tapioca and Sweet Potato.
- UNIT V Solanaceous vegetables, peas and beans:** Cultivation of Brinjal, Tomato, Chillies, Bhendi, Garden bean, Cluster bean, Peas and French beans.

PRACTICAL SCHEDULE

1. Identifying of different vegetable varieties
- 2-3. Practicing preparation of nursery beds, seeds and sowing
4. Acquiring knowledge about propagation through specialized vegetative structures. 5-6. Practicing Field preparation for vegetables
7. Practicing transplanting of vegetables
8. Practicing manuring and fertilizer application methods
9. Acquiring knowledge about plant protection measures
10. Practicing harvesting and grading of vegetables
11. Practicing in packing and marketing of vegetables
12. Conducting kitchen garden campaigns
13. Preparing cost of cultivation for important vegetables
14. Visit to vegetable gardens
15. Protected cultivation.
16. Final practical Examination

REFERENCES

Text books

1. Bose, T.K., M. G. Som and J. Kabir. 1993. Vegetable crops, Nayaprakash, Calcutta.
2. Choudhary, B. 1987, Vegetables, NBT, New Delhi.
3. Shanmugavelu, K.G. 1989. Production technology of vegetable crops, Oxford India Publications, New Delhi.
4. Singh, S.P. 1989. Production technology of vegetable crops, Universal Publication Centre, Karnal.
5. Veeraragavathatham, D, M. Jawaharlal and Seemandhini Ramadas. 1991. A guide on vegetable culture, AE Publication, Coimbatore.

III SEMESTER

21 AGRD 0307 FARM POWER AND MACHINERY (3+1)

OBJECTIVES

- To identify suitable implements for tillage, sowing, weeding and plant protection operations for different crop and soil conditions
- To understand the operation and maintenance of oil engine and electric motor pump sets

LEARNING OUTCOME

- The students can learn in selection of suitable farm power source, farm implements based on field conditions and crop conditions
- The students can get practical knowledge in handling of farm machineries and maintenance of oil engine and electric motor pump sets

THEORY

- UNIT I Farm power:** Farm power sources – Man, animal, mechanical and electrical - advantages and limitations of different source of farm power, Tractors and power tillers – its major functions; Renewable sources of energy – bio gas, wind and solar energy – Application and limitation, tapping and limitations in Agriculture.
- UNIT II Farm Machinery:** Tillage –Classification - Primary tillage implements – Country plough, mould board plough, disc plough, chisel plough, secondary tillage implements – Harrows, cultivators, weeders, basin lister, puddler, green manure trampler; Different sowing methods – its merits and demerits – sowing machinery – broadcasting device, seed planter, seed cum fertilizer drill, direct paddy seeder, paddy transplanter. Harvesting machinery – Sickles –Reapers - Calculation of draft, field capacity and power required for the farm implements.
- UNIT III Pumping Machinery:** Oil engine coupled with centrifugal pump set – study of the parts, working principles and repair and maintenance of oil engine ; Electric motor – types of AC three phase induction motor – monoblock, motor coupled with centrifugal pump set – study of parts, working principles, repair and maintenance of electric motor.
- UNIT IV Plant protection machinery:** Sprayers and dusters – Bucket type sprayer - Knapsack sprayer – Rocker arm sprayer – Engine powered sprayer – study of parts and its working principles; Power duster – Rotary hand duster – study of parts and

its working principles; Repairs and maintenance of sprayers and dusters.

UNIT V Post harvesting machinery: Multi crop thresher, Seed cleaner cum grader, paddy drier, groundnut decorticator, sunflower thresher, maize sheller, mini dhal mill, vegetable seed drier – study of parts, working principles and capacity of the machinery.

PRACTICAL SCHEDULE

1. Study and identification of different parts of solar drier, solar cooker, solar water heater, windmill and bio gas plant
2. Identification of different parts of tractor, power tiller
3. Study the operation of different primary tillage implements
4. Study the operation of different secondary tillage implements
5. Study the operation of bullock drawn planters and seed drills
6. Assessment of machinery power and cost of operation
7. Study the operation of different parts of hand operated sprayers and duster & power operated sprayers and dusters
8. Study the operation of different parts and types of electric motors and pumps
9. Study of post harvesting machineries - Paddy thresher cum winnower, paddy drier and seed cleaner cum grader
- 10-13. Study of post harvesting machineries – Groundnut decorticator, maize Sheller and Dhal mill
14. Field visit to College of Agriculture Engineering, TNAU, Coimbatore
15. Field visit to SRFMTTI, Govt of India, Ananthapur.
16. Final practical Examination

REFERENCES

Text books

1. Anonymous. 1997. Directory of Rural Technologies. Vol. I, Council for advancement of rural technology, New Delhi.
2. Ghose, R.K. and S. Swain. 1990 Practical Agrl. Engg., Nayaprakash Publishing Ltd., Calcutta
3. Michael, A.M. and T.P. Ojha. 1987. Principles of Agricultural Engineering. Vol. I, Jain Brothers, New Delhi
4. Nakra, C.P. 2006, Farm Machineries and Equipment.
5. Shippen, J.M. and J. G. Turner. 1996. Basic farm machinery, Pergamon Press, Oxford.

III SEMESTER

21AGR0309 INTRODUCTION TO AGRICULTURAL EXTENSION (3+1)

OBJECTIVES

- To teach the students about the basics of extension education
- To impart various dimensions of extension education
- To train the students as better extension workers.

LEARNING OUTCOME

- Studying the basics of extension education
- Studying the rural sociology and its application to extension education
- Learning about the communication and its process and models
- Learning about the diffusion and adoption of innovations
- Studying the programme planning and evaluation in extension education

THEORY

UNIT I Introduction: Education-meaning and types. Differences between formal and extension education. Extension Education–Meaning, Concepts, Characteristics, Terminology in extension. Extension Education–Scope, Importance, Principles, Philosophy and Objectives. Agricultural Extension Education - Meaning, nature - Process. Qualities of a good Extension worker. History and development of extension service and extension systems. Concept of extension Pluralism.

UNIT II Rural Sociology: Meaning and importance. Significance of Rural Sociology in Agricultural Extension. Rural society- characteristics. Social structure- meaning and importance. Rural social institutions. Social control- meaning, types and agents. Motivation- meaning and types, motivating the rural people for agricultural development. Leaders- meaning, types, selection, training and use of local leaders in rural areas. Social change- meaning, types and causes.

UNIT III Communication and Training: Communication – definition, types, forms, characteristics, scope, importance and models of communication process. Elements of communication and their description. Problems and barriers in communication. Teaching-learning situation and Steps in extension teaching. Training- meaning- types of training and differences between education and training. FTC, KVK, ATMA – Objectives and salient features.

UNIT IV Diffusion and adoption of Innovations: Innovations- Diffusion, Adoption and their Perceived Attributes. Adoption Process- demerits. ID Process of adoption. Innovativeness- Adopter categories and their characteristics. Consequences of

adoption of innovation. Adoption stages and information sources. Factors affecting adoption of innovations. Agri-clinics and Agri business centres. Farmer Field Schools. Privatization of Extension, Market led Extension.

UNIT V Programme Planning and PRA: Needs- characteristics and assessment. Programme planning – meaning, principles, purposes, characteristics, limitations and steps in programme planning process. Enlisting peoples’ participation. Evaluation in extension– meaning, objectives, types, importance, degrees, uses, steps and methods. Role and scope of PRA and RRA in assessment of local needs and problems. PRA- meaning, scope and principles. Menu of PRA methods, and steps to conduct. Participatory Technology Development - meaning, principles and approaches.

PRACTICAL SCHEDULE

1. Terminology in Extension methodologies
2. Study of socio-psychological background of rural people by interacting with them.
3. Simulated exercises on communication and distortion in communication
4. Study of diffusion and adoption pattern of a selected innovation in a village
5. Study of information sources of innovations to the farmers.
6. Identification of local and farm leaders and learning about their roles.
7. Visit to the Office of the Joint Director of Agriculture
8. Study of records to be maintained by base level extension workers
9. Visit to the Farmers Training Centre
10. Visit to ATMA and study its functions
11. Visit to an Agricultural Clinic
12. Visit to KVK at GRI and study its functions.
13. Practicing PRA and RRA methods to identify the rural problems
14. Interaction with self help groups about their activities and functions.
15. Visit to nearby village to understand the problems encountered by the farmers
16. Final practical Examination

REFERENCES

Text books

1. Annamalai, R. 1993. Extension Education and Programme Planning. Palaniappa Printers,
2. Chaubey, B.K. *et.al.* 1999. Extension Education. Aman Publishing House, Meerut.
3. Dahama, O.P and O.P. Bhatnagar. 1996. Education and Communication for

- Development, OxfordIBH Publishing Co., Ltd., New Delhi. Pvt. Ltd., New Delhi.
4. Ganesan, R., Mohammad Iqbal, I. and Anandaraja, N. (2003). Reaching the Unreached- Basics of Extension Education. Associated Publishing Company, New Delhi.
 5. Narayanasamy, N. 2009. Participatory Rural Appraisal- Principles, Methods and Application. Sage Publications India Pvt. Ltd. New Delhi.
 6. Ray, G.L. (2006). Extension Communication and Management Naya Prakashan, Kolkata.
 7. Reddy, A. A. (2005). Extension Education. Sri Lakshmi Press. Bapatla
 8. Rishipal. 2011. *Training and Development Methods*, S. Chand and Co. Ltd., New Delhi.
 9. Rogers, E.M. (2003). Diffusion of Innovations. The Free Press, New York.
 10. Sandhu, A.S. 1996. *Agricultural Communication: Process and Methods*, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.
 11. Sandhu, A.S. 1996. *Extension Programme Planning*, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.
 12. Singh, A.K. 2012. *Agricultural Extension*, Agrobios, New Delhi.
 13. Supe, S.V. 1997. *An Introduction to Extension Education*, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

III SEMESTER

21 AGRD 0311 AGRICULTURAL ECONOMICS (3+1)

OBJECTIVES

- The students will impart knowledge on concepts of Economics and familiarize with economic laws.
- The Students will be taught with marketing concepts and Role of Finance in Agriculture.
- The students will be familiarized with the Gandhian Approach to Economics.

LEARNING OUTCOME

- The students have learnt with the production, Financial and Marketing concepts of Economics.

THEORY

UNIT I

Meaning and concepts of Economics – Definition of economics. Definition of Agricultural Economics. Division of economics – Consumption; Classification of goods, characteristics and classification of wants, law of diminishing marginal utility.

UNIT II

Production Economics: Production: process, creation of utility, factors of production, input output relationship. Laws of returns: Law of variable proportions and law of returns to scale. Cost: concepts Causes of low productivity and remedial measures:– Land reforms, consolidation of holdings, organization of cooperative framings-Agricultural labour: causes of the poor economic condition of farm labour, suggestion for the improvements of the condition of agricultural labour and Government measures.

UNIT III

Market: Importance of marketing, significance of agriculture marketing– Classification of markets – Services of different market functionaries present systems of agricultural marketing in India and development measure Marketing institution: Regulated markets, cooperative marketing, Direct Retail Market, Corporate Retail Market.

UNIT IV

Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Rural indebtedness, causes of indebtedness and relief measures - Role of agricultural credit, classification of agricultural credit, factors responsible for successful agricultural credit. Agencies supplying agricultural credit- Institutionalized and Non Institutionalized source of and Micro Credit.

UNIT V Gandhian approach to economics: Means of production, Swadeshi and Bread labour–Village economy–Village Industries and Appropriate Technology – J.C Kumarappa concept of economy, Economics of permanence. Constructive programmes of Gandhiji.

PRACTICALSCHEDULE

1. Socio economic survey
2. Micro level study of Farm Labour household
3. Visit to Farmer's market
4. Visit to Regulated market
5. Visit to Corporate Retail Market
6. Visit to RUDSET
7. Study of Cooperative banks
8. Study of commercial banks and loaning pattern
9. Visit to Gandhigram KVIC Trust
10. Visit to Constructive Programme of Gandhi Museum.
11. Visit to Village Industries.
12. Preparation of Farm Layout.
13. Visit to NABARD
14. Interaction with Self Help groups and their Activities.
15. Visit to Lead Bank.
16. Final Practical Examination.

REFERENCES

Textbooks

1. S.S. Acharya and N.L Agarwal, 2004 Agricultural Marketing in India, Fourth Edition, Oxford & IBH Publishing Co. Pvt. Ltd.,
2. S. Subba Reddy and P. Raghuram, 1996, Agricultural Finance and Management, Oxford & IBH Publishing Co. Pvt. Ltd.
3. H. Evandrummond and John W. Goodwin, 2004 Agricultural Economics, IInd Edition, Pearson Education Publishers.
4. Ruddar Datt and K.P.M Sundharam, 2001 Indian Economy, Forty Third Revised Edition, S. Chand and Company Ltd.
5. M.K.Gandhi,1990,Village Industries, Navajivan Publishing House, Ahemedabad

IV SEMESTER

21 AGRD 0401 FARM MANAGEMENT (3+1)

OBJECTIVES

- To improve knowledge and skills about the farm management and decision making and problems solving the successful farm to get maximum profits

LEARNING OUTCOME

- Basic Knowledge about farm management in maximizing the profits.
- Scope and practical utility in study of farm selection, farm layout and importance of fencing
- To study the labour problems, how to improve the labour efficiency, crop calendar and calendar of operation.
- Basic knowledge about preparation of farm planning and farm budgeting
- To Study about basic knowledge on storage, Marketable produce and concept of warehouse.

THEORY

UNIT I Introduction: Farm Management - Definition and importance – Farming System – Definition, classification - Cropping system – Definition – difference between farming system and cropping system – Systems of farming and types of farming – Advantages and disadvantages – mechanized farming and its possibilities in India – Integrated farming systems (IFS) – definition - types of IFS, Suitable for different situations.

UNIT II Selection and layout of Farm: Factors to be considered in selection and layout of a farm – Physical, climatic, economic and social factors –Ideal farm layout – Fencing – need and types, merits and demerits.

UNIT III Farm labour and Management: Definition of labour -Criteria for selection of labour –Types of labour –Factors affecting labour efficiency - methods for improving labour efficiency – Wages - Systems of payment of wages – Cropping scheme – Forecast and execution, Crop Calendar and Calendar of Operations

UNIT IV Farm planning and budgeting: Assessment of resources – Planning for land use – Livestock use and marketing – Factors affecting farm profits – Objects of farm budget –Balance sheet – Farm accounts and types records and registers, records Need, maintenance depreciation – types and methods of calculation –

condemnation – disposal of unserviceable materials.

UNIT V Storage and marketing of farm products: Importance of storage – factors affecting storage of food grains – methods of storage - rat and moisture proof storage godowns – warehouse concepts – Marketing of farm products –Quality Management – Supply Chain Management -Consumer preference-Rural godowns – Concept and implementation strategies.

PRACTICAL SCHEDULE

1. Preparing cropping scheme for wet land areas
2. Preparing cropping scheme for garden land areas
3. Preparing cropping scheme for dry land areas
4. Preparation of crop calendar
5. Preparation of calendar of operations
6. Working out input requirement and cost for unit area of important wet land crops
7. Working out input requirement and cost for unit area of important garden and dry land crops
8. Integrated farming systems model for wet land areas
9. Integrated farming systems model for garden land areas
10. Integrated farming systems model for dry land areas
11. Visit to farm section and dairy section of our faculty
12. Visit to a Government farm
13. Practicing on important records in farm and their maintenance
14. Working out a balance sheet for a farm
15. Visit to warehouse and observing the storage pattern
16. Final practical Examination

REFERENCES

Text books

1. Indian Social Institute. 1996. Agricultural labour, Indian Social Institute, Issue No.501, New Delhi.
2. Johl, S. S. and T.R. Kapur, 1992, Fundamentals of Farm Business management, Kalyani publishers, Lundhiana.
3. Kahlon, A.S. and Karam Singh. 1980. Economic of farm management in India – Theory and Practice. Allied Publishers Pvt. Ltd., Chennai.
4. Karuppusamy, S.S. and S. Kulandaisamy. 1986. Pannai Nirvagam, Gandhigram Rural Institute - Deemed University, Gandhigram
5. Morachan, Y.B. 1986. Crop production and management. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

IV SEMESTER

21AGR00403 CROP PESTS AND THEIR MANAGEMENT (3+1)

OBJECTIVES

- To impart detailed knowledge on damage symptoms, life stages and management practices of key insect and non – insect pests on major crops

LEARNING OUTCOME

- Studying the Pests of Cereals, Pulses and Cash crops
- Studying the Pests of Oilseeds and Plantation Crops
- Studying the Pests of Fruit Crops
- Studying the Pests of Vegetable and Flower Crops
- Studying the Pests of Stored Products

THEORY

Damage symptoms, life cycle and management practices of insect and non insect pests of the following crops.

UNIT I Cereals, Pulses and Cash crops: Rice, Chola, Cumbu, Red gram, Black gram, Green gram, Bengal gram, Cotton and Sugarcane.

UNIT II Oilseeds and Plantation Crops: Castor, Groundnut, Coconut, Sesamum, Sunflower, Coffee, Tea, Cardamom.

UNIT III Fruit Crops: Mango, Banana, Citrus, Pomegranate, Sapota, Guava, Grapes, papaya.

UNIT IV Vegetable and Flower Crops: Tomato, Brinjal, Bhendi, crucifers, cucurbits, moringa, Potato, Rose and Jasmine.

UNIT V Stored Products: Pests of stored materials and their management. Rodents and their management

PRACTICAL SCHEDULE

1. Identification and damage of insects, their damages on crop plants.
2. Study of Rice pests (sucking pests).
3. Study of Rice pests (borers and defoliators).
4. Study of cereals and millets pests
5. Study of Pulses pests.
6. Study of oil seeds pests (Coconut and Groundnut)

7. Study of oil seeds pests(Castor, Sesamum and Sunflower)
8. Study of Sugarcane pests.
9. Study of Cotton pests(sucking pests)
10. Study of Cotton pests (bollworms, borers and defoliators)
11. Study of Vegetable pests. (Brinjal, Bhendi andTomato)
12. Study of Vegetable pests(Crucifers, Cucurbits and Potato)
13. Study of Fruit pests.(Mango, Banana and Citrus)
14. Study of Fruit pests(Pomegranate, Sapota, Guava, Papaya and Grapes)
15. Field visits and visit to warehouse to study the methods of grain storage and pestControl
16. Final practical Examination

REFERENCES

Text books

1. Ayyar, T.V.R. 1963. *Hand Book of Economic Entomology for South India* – Govt. Press, Madras, 516p.
2. David, B.V. and V.V. Ramamurthy. 2010. *Elements of Economic Entomology (Revised Edition)*. Namrutha Publications, Chennai.
3. Regupathy, A., Palanisamy, S., Chandramohan, N. and Gunathilagaraj, K. 1987. *A Guide on Crop Pests*. Sooriya desktop publishers, Coimbatore, 290 p.
4. Atwal, A.S. 1991. *Agricultural Pests of India and South – East Asia*. Kalyani Publishers, New Delhi, 529 p

IV SEMESTER

21 AGRD 0405 FLORICULTURE AND PLANTATION CROPS (3+1)

OBJECTIVES

- To learn about importance, history, styles and types of garden and garden components.
- To learn about production technology of commercial flower crops, spices and plantation crops

LEARNING OUT COME

- Studying importance, History and development of gardening Hindu style, Moghul garden, Japanese garden, British garden.
- Studying the Arboretum ,Lawn , Shrubs ,Climbers and Creepers, Flowering annuals, Hedges, Edges, Rock garden and water garden
- Studying the Production technology of Jasmine, Rose, Tuberose, Chrysanthemum, Marigold and Crossandra.
- Studying the Production technology of Cardamom, Pepper, Turmeric, Ginger, Nutmeg and Clove
- Studying the Production technology of Coffee, Tea, Rubber, Cashew nut and Areca nut.

THEORY

- UNIT I** **Ornamental gardening:** Introduction, importance – History and development of gardening – Hindu style – Moghul garden – Japanese garden – British garden.
- UNIT II** **Garden Components** Arboretum – Lawn – Shrubs – Climbers and Creepers – Flowering annuals – Hedges – Edges – Rock garden and water garden.
- UNIT III** **Commercial Floriculture:** Cultivation of Jasmine, Rose, Tuberose, Chrysanthemum, Marigold and Crossandra.
- UNIT IV** **Spices:** Cultivation of Cardamom, Pepper, Turmeric, Ginger, Nutmeg and Clove.
- UNIT V** **Plantation Crops:** Cultivation of Coffee, Tea, Rubber, Coconut, Cashewnut and Arecanut

PRACTICAL SCHEDULE

1. Practicing of planning and layout for home and public gardens
- 2-3. Identifying of ornamental trees and shrubs
4. Identification of climbers and creepers, edges & hedges and other ornamental species
5. Practicing cultivation of chrysanthemum
6. Practicing cultivation of marigold
7. Practicing cultivation of Jasmine flowers, Rose
8. Practicing cultivation of tuberose and crossandra

9. Special horticultural practices in flower crops.
10. Preparing cost of cultivation for major flower crops
11. Practicing display of ornamental plants
12. Identifying of spices and plantation crops
13. Processing of turmeric
14. Visit to plantation – Research station
15. Visit to Botanical garden & parks.
16. Final practical Examination

REFERENCES

Text books

1. Bose, T.K. 1990. Fruits of India Tropical and Subtropical, Nayaprakash, Calcutta.
2. Crop Production Guide. 1999. TNAU & Department of Agriculture Publication.
3. Kumar, N. 1993. Spices, plantation crops, medicinal and aromatic plants, Rajalakshmi Publications, Nagercoil.
4. Pappaiyah, C.M. Commercial flowers. TNAU.
5. Randhava, G.S. 1973. Ornamental Horticulture in India, Today and Tomorrow's Printers and Publishers, New Delhi.

IV SEMESTER
21AGRD0407 BIO- INOCULANTS IN AGRICULTURE (3+1)

OBJECTIVES

- To teach about the importance of bio-inoculants in Agriculture
- To familiarize students with the microbes used as bio fertilizers for various crop plants
- To give hands on training on the production of bio fertilizers

LEARNING OUTCOME

- The students will be able to isolate various microbes used in microbial inoculants in Agriculture and know the process of mass multiplication of bio- inoculants.
- The students will be able to demonstrate the methods of application of biofertilizers.
- The students will be able to apply quality control procedures to check the quality of biofertilizers

THEORY

UNIT I Introduction: General introduction of the microbes used as bioinoculants for crop plants and their advantages. History of Bioinoculants, types of bioinoculants – Bacterial, Fungal, Algal and Actinorhizal- Nitrogen fixation – Biological nitrogen fixation- symbiotic and non symbiotic nitrogen fixation- Scope and Importance of Biofertilizers- Uses of Biofertilizers-

UNIT II Bacterial Nitrogen Fixation; Bacterial nitrogen fixers - Types - Nodule formation and Nitrogen fixation – Benefits in Agriculture- Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertilizers

UNIT III Fungal & Cyanobacterial Bioinoculants
Mycorrhizae- types of mycorrhizae- Benefits - Phosphorus mobilizers – Phosphorus solubilizers – Mechanism of Phosphorus mobilization and solubilization - Mass inoculum production of AM fungi - Cyanobacterial Biofertilizers – Types and characteristics - Association with Azolla - Isolation, characterization, mass multiplication - Benefits and role in rice cultivation - Field application

UNIT IV .Other Biofertilizers
Importance and uses of silicate, potassium and zinc solubilizers – microorganisms involved, plant growth promoting Rhizobacteria, composting bioinoculants

UNIT V Quality control of Biofertilizers. Selection and application for seeds, seedlings, tubers, sets etc. Properties of good quality biofertilizer formulation- Biofertilizers -Storage, shelf life, quality control, FCO specifications, Recommendation and dosage for various crops- Factors influencing the efficacy of biofertilizers.

PRACTICAL SCHEDULE

1. Isolation and identification of *Rhizobium* from root nodules
2. Inoculum production of bacterial biofertilizers
3. Preparation of carrier based formulation
4. Preparation of liquid formulation
5. Requirements for a biofertilizer production unit
6. Isolation of AM fungi -Wet sieving method
7. Isolation of AM fungi - sucrose gradient method
8. Mass production of AM inoculants
9. Percent colonization of roots by AM fungi
10. Isolation of blue green algae from soil and water samples
11. Small scale cultivation of Azolla
12. Plant growth promoting Rhizobacteria
13. Compost accelerators
14. Evaluation of growth and quality criteria of Biofertilizers
15. Visit to biofertilizers production unit

REFERENCES

Text Books

1. Subba Rao, N.S. 1999. *Biofertilizers in Agriculture and Agroforestry*. Oxford and IBH, New Delhi.
2. Subba Rao, N. S. 2000. *Soil Microbiology*. Oxford and IBH, New Delhi.
3. Alexander, M. 1985. *Introduction to Soil Microbiology*, John Willey and Sons a. Inc. N. Y. and London
4. Rangaswami, G. and D. J. Bagyaraj, 1999. *Agricultural Microbiology*, Asia a. Publishing House, New Delhi.
5. Wicklow, D.T. and B.E. Soderstrom. 1997, *Environmental and Microbial Relationships*. Springer ISBN.
6. Kannaiyan, S. (2003). *Biotechnology of Biofertilizers*, CHIPS, Texas.
7. Mahendra K. Rai (2005). *Hand book of Microbial Biofertilizers*, The Haworth Press, Inc. New York.

IV SEMESTER

21AGR0409 LIVESTOCK AND CHICKEN PRODUCTION (3+1)

OBJECTIVES

- The General objective of this course is to establish basic knowledge of how to manage and operate sheep, goat, pig, rabbit and poultry farms.
- This course is designed to impart basic technical knowledge and skills required to successfully run livestock and chicken farm enterprise by developing competencies concerning the selection and breeding of livestock, management of animals of different physiological status, feeding, housing and health care.
- To impart scientific knowledge and skills required to run broiler and layer chicken farm successfully.

LEARNING OUTCOME

Unit I: Instruction in lessons in Unit I should result in students achieving the following objectives

1. Describe the size and contribution of sheep farming to Indian agriculture, economy and rural livelihood.
2. Know and identify different main breeds of sheep giving their origin and breed characteristics.
3. Develop a knowledge of the genetic diversity and versatility of sheep
4. Describe the characteristics of a good mutton sheep
5. Select desirable breeding and production animals.
6. Understand and explain the reproductive cycle of the ewe.
7. Describe the different sheep breeding systems.
8. Describe the principles of genetic improvement of mutton production.
9. Explain the basic concepts of sheep nutrition
10. Be able to list and describe the common diseases of sheep viz. sheep pox, blue tongue, PPR, anthrax, hemorrhagic septicemia, foot rot and pregnancy toxemia.

Unit II: Instruction in lessons in Unit II should result in students achieving the following objectives

1. Describe the size and contribution of goat farming to Indian agriculture, economy and rural livelihood.
2. Know and identify different main breeds of goat giving their origin and breed characteristics.
3. Develop a knowledge of the genetic diversity and versatility of goat
4. Be able to select desirable breeding and production animals.
5. Understand and explain the reproductive cycle of the doe.
6. Describe the different goat breeding systems.
7. Describe the principles of genetic improvement of goat milk and chevon production.
8. Gain insight into feeding habits of goat, the nutrient requirements for animals of different physiological status and feeding programs

9. Be able to diagnose and treat common complaints like acute carbohydrate engorgement, HCN poisoning, and diseases like tetanus and ecto and endo parasitic infestations.
10. Students will experience hands-on training in everyday management practices.

Unit III: Instruction in lessons in Unit III should result in students achieving the following objectives

1. Students will gain an insight into status of swine production in India
2. Students will gain knowledge about swine breeds, their classification, type and utility.
3. Students will gain knowledge in various swine production systems their advantages and disadvantages.
4. Able to select good breeding stocks of gilt and boar.
5. Gain skill in the management of piglets from birth to weaning
6. Gain knowledge in the management of pregnant sow.
7. Able to take care of farrowing sow.
8. Gain knowledge in general principles of swine feeding, nutritional requirements of different age groups and feeding of different categories of pigs in detail.
9. Gain knowledge in location and layout of piggery, space requirement, and construction details of pig sty.
10. Be able to list and describe the common diseases of pig viz. swine fever, swine pox, FMD, swine erysipelas and brucellosis.

Unit IV: Instruction in lessons in Unit IV should result in students achieving the following objectives

1. Able to identify common breeds of rabbit giving their origin and breed characteristics.
2. Able to describe the advantages and disadvantages of rabbit farming.
3. Understand and explain the reproductive cycle of the rabbit.
4. Know how to select a best breeding rabbit, and most suitable reproduction method.
5. Gain knowledge in pregnancy diagnosis, management of pregnant does, taking care at the time of kindling.
6. Able to determine the sex of young rabbit,
7. Gain skill handling of rabbit and fostering.
8. Able to design and construct rabbit hutches.
9. Gain knowledge in general principles of rabbit feeding, nutritional requirements of different age groups and feeding of different classes of rabbit.
10. Able to list and describe the common diseases of rabbit viz. coccidiosis, hemorrhagic septicemia, Ecto and endo parasites and pneumonia.

Unit V: Instruction in lessons in Unit V should result in students achieving the following objectives

1. Able to identify different types of chicken and describe common breeds of each type.
2. Describe the Purpose of Brooding, how to keep chicks in a brooder and types of Brooding Equipment
3. Acquire skill in the management of grower and layer chicken
4. Acquire knowledge in broiler chicken production

5. Acquire knowledge in essentials of good housing
6. Acquire knowledge in design and layout of poultry house
7. Acquire knowledge in different systems of poultry housing
8. Acquire knowledge in nutrients of the feeding stuff.
9. Acquire knowledge in nutrient requirement, feed ingredients and feed formulation.
10. Able to diagnose and control common viral, bacterial and protozoan diseases of chicken.
11. Gain knowledge and skill in vaccinating layers and broilers.
12. Acquire skill in Slaughtering of chicken

THEORY

- UNIT I** **Sheep:** Introduction – Zoological classification – Advantages of sheep farming – breeds classification – Indigenous breeds – Hissardale, chokla, Nali, Nellore, Mandya – Breeds of Tamil Nadu – Mecheri, Madras Red, Ramnad White, Trichy Black, Kilakarsal, Vembur – Exotic breeds – Merino, Rambouillet, Dorest - Suffolk – South Down – Breeding – Selection of breeding stocks - Reproduction in sheep – Breeding system – Breeding policy for improving mutton and wool production — Feeding – Nutrient requirements – Feed resources – Pasture management – Flushing – Feeding of pregnant and lactating ewes – Housing of sheep – Common diseases – Sheep pox – Blue tongue – PPR – Anthrax – Hemorrhagic septicemia – Foot root – Pregnancy toxemia.
- UNIT II** **Goat:** Introduction – Meaning of commonly used terms – Advantages of goat farming – Breeds – Indigenous breeds – Jamunapari – Tellicherry – Barbari – Exotic breeds – Saanen –Toggenberg – Nubian – Breeding – Selection of breeding animal – Reproduction - Mating systems – Feeding – Feeding habits of goat – Nutrient requirement – Stall fed system of goat rearing – Control of ecto and endo parasites – Common complaints – Carbohydrate engorgement – HCN poisoning – Tetanus.
- UNIT III** **Swine:** Advantages and disadvantages of pig farming – Utility – Breeds – Large White Yorkshire – Middle White Yorkshire – Landrace – Berkshire – Breeding – Selection of breeding stocks – Reproduction - symptoms of heat – Care of pregnant sows – Management at the time of farrowing – Weaning – Feeding – Creep feeding – Starter ration – Grower ration – Finisher ration – quantity to be feed – Housing of pigs - Common diseases – Swine fever – Swine pox – Foot and mouth disease – Swine erysipelas – Brucellosis.
- UNIT IV** **Rabbit:** Advantages and disadvantages of rabbit farming – Breeds – New Zealand White – Californian - Giant Blanc – Chinchilla Giganta – Dutch – Angora – Breeding – selection of breeding stocks – Reproduction – Mating – Pregnancy – Fostering – Care of young rabbits – Handling of rabbits – Feeding – Concentrate – Roughage – Coprophagy – Time of feeding – Housing – Objectives – Rabbit hutches – Common diseases – Coccidiosis – Hemorrhagica septicemia – Ecto and endo parasites – Pneumonia.
- UNIT V** **Poultry:** Advantages of poultry farming – Role of egg and chicken meat in human nutrition – Parts of a fowl – Classification of poultry – American – English – Asiatic – Mediterranean classes – Management – Chicks – Growers – Layers – Broilers – Housing – Location – Housing requirements – Construction details – Deep litter system – Cage system – Feeding – Nutrient requirement for different classes of chicken – Feed formulation – Common diseases – Ranikhet disease – Infectious bursal disease –

PRACTICAL SCHEDULE

1. Identification of breeds of sheep
2. Preparation of project for a sheep unit
3. Identification of breeds of goat
4. Preparation of project for a goat unit
5. Preparation of plans for housing of sheep and goats
6. Preparation of project for a piggery unit
7. Preparation of plans for housing of pigs
8. Visit to commercial sheep, goat, piggery, rabbitry and poultry farm
9. Debeaking and vaccination of poultry
10. Dressing of birds for table purpose
11. Preparation of project for a broiler chicken unit
12. Preparation of project for a layer chicken unit

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Text Books

1. ICAR, 2014. Hand book of Animal Husbandry, 4th Ed. ICAR Publication, Pusa, New Delhi.
2. Banerjee, G.C. 2018. Poultry, 8th edition, Oxford and IBH Publishing Company Ltd., New Delhi.
3. Sastry, N.S.R., C.K. Thomas and R.A. Singh. 2019. Livestock production management, Fourth edition, Kalyani Publishers, New Delhi.
4. Panda, B. and S.C. Mohapatra. 1989. Poultry Production. ICAR Publications, New Delhi.
5. Peacock, C.P.1996. Improving Goat Production in the Tropics: A Manual for Development Workers, Oxafam

IV SEMESTER

21AGRD0411 EXTENSION COMMUNICATION FOR TRANSFER OF TECHNOLOGY

(3+1)

OBJECTIVES

- To expose the students to various extension teaching methods and audio-visual aids
- To impart skill in the application of extension methods and audio-visual aids to specific situations and subjects
- To impart skill in the planning, preparation and use of various visual aids and modern gadgets.

LEARNING OUTCOME

- Studying the classification extension teaching methods and audio-visual aids
- Learning about the different extension methods belonging to individual and group contact
- Learning about the different mass contact methods
- Learning about various audio and visual aids

THEORY

UNIT I **Introduction:** Extension teaching methods - meaning, functions and classification according to form and use, functions and stages of ID process. Audio-visual aids- definition, purpose, merits and demerits.. Classification of audio-visual materials according to evolution, senses involved and contribution to learning. Planning, preparation, presentation and evaluation of audio-visual aids.

UNIT II **Individual and group contact methods:** Farm & Home visit, office call, telephone call, personal letter, e-mails, observation plots, result demonstration and agri -clinics. Method demonstration, General meetings- lecture, debate, symposium, panel, forum, buzz session, brainstorming, seminar and workshop. Group discussion and field trips.

UNIT III **Mass contact methods:** Farm journalism- scope and functions. Publications- leaflet and folder, extension journals, newspaper, extension bulletins, newsletter and circular letter. Radio, television, exhibition, campaign, farmers' fairs, Agrl. Film shows, extension talk, drama, puppet show and folk songs.

UNIT IV **Audio and Visual aids:** Audio aids-Radio, types of audio-recording, tape recorder, CDs, DVDs, and public address system. Visual aids-Literature,

symbolized- charts and graphs. Three dimensional- models, specimens and objects. Two-dimensional-non-projected- photographs, still pictures, chalk board, flash cards and flannel graph. Projected- slides, power point. Slide, Over Head and Opaque projectors.

UNIT V **Audio-visual aids:** Audio-visual- television, film shows, Movie projector. Video projectors- CRT, LCD and DLP. Drama, puppet show, folk dance and folk songs. Modern information technology- E- mail, Internet browsing, Information kiosks, Teleconferencing, Search engines, Directories, online journals, websites and computer networks. MS Power Point - Creating Presentations and Slides. Agri portals, VKC, Mobile phones, Expert systems, social media, Whats App and Mobile Applications. Factors to be considered in the selection and combination of extension methods and audio-visual aids. Influence of extension teaching methods.

PRACTICAL SCHEDULE

1. Practicing with lecture, debate and symposium methods.
2. Steps to be followed in the conduct of result and method demonstrations.
3. Organizing and conducting group discussions
4. Preparation of Poster.
5. Preparation of flash cards.
6. Preparation of still pictures.
7. Preparation of charts and graphs.
8. Writing for leaflet, folder and news articles.
9. Planning and preparation of news stories and success stories
10. Practicing with the use of different projectors.
11. Operation and handling of digital and video camera.
12. Participating in farmers' day celebrations.
13. Visit to Information kiosk and Kissan call centres
14. Preparation of power point presentations.
15. Internet browsing and E-mail communication- practice
16. Final practical Examination

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Text books

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2. Chaubey, B.K. *et.al.* 1999. Extension Education. Aman Publishing House.
3. Dahama, O.P. and O.P. Bhatnagar. 1996. Education and Communication for Development.
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7. Saxena, S. 2003. MS.OFFICE 2000 for every one. Vikas Publishing House, New Delhi.
8. Seetharaman, Netaji. R., *et.al.* 1990. A Manual on Audio-visual Aids.
9. Yella Reddy, N. (1998). Audio-Visual Aids for Teaching, Training and Extension. Haritha Publishing House, Hyderabad.