

Course Name: Agriculture and Sustainable Livelihood

Course Credits: 2 (1+1)

Subject Core/Elective: Elective

Semester Batch: II

1. Faculty Information

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2. Course Overview

Course website:

3. Course Syllabus

Theory

Entrepreneurial opportunities in agriculture and successful case studies in India and abroad, Site selection, rainfall analysis, irrigation scheduling and crop planning. Cost of cultivation and choice of crops. Concepts of mushroom cultivation, bee keeping, sericulture, vermi-composting, ornamental gardening, landscaping, precision farming under constrained environment (dryland), mixed farming unit, location based crop specific soil and tissue test based nutrient prescription, biofertilizer production technology, biogas production, nursery development, commercial seed production, compost preparation, post-harvest food handling and product diversification, marketing, role of self- help groups, IoT applications in agriculture for crop production and marketing.

Practical

Crop planning. Culturing, mother spawn and bed spawn production, cultivation of mushroom, visit to commercial mushroom cultivation unit. Culturing of different biofertilizers, visit to commercial biofertilizer unit. Commercial bee keeping and management. Marketing and economics of honeybee products, visit to commercial Indian bee farm. Hands on experience on recycling techniques and composting. Visit to commercial vermicompost production unit, planning and execution of precision farming techniques, IoT applications in agriculture, precision agriculture, familiarising mixed farming unit and economics, biogas production concepts, generation of biogas and spent slurry, design consideration, calculation of benefit cost ratio of the seed production of agricultural and horticultural crops. Field visit to explore the seed processing and seed market, Visit to successful agro-based entrepreneurship/ industrial unit, visit to local markets and state department of agricultural marketing, visit to successful Self-Help Groups (SHGs). Practical on design and execution of landscape units and gardens, practical on propagation and familiarising of plant propagating structures. Visit to botanical garden and commercial nursery, visit to food processing industry.

TEXTBOOK(S)

REFERENCE(S)

Mushroom Cultivation

Kapoor, J.N. (2018). Mushroom Cultivation, Indian Council of Agricultural Research, New Delhi, Pages 180.

Tripathi, D.P. (2017). Mushroom Cultivation Oxford & IBH Publishing Company Pvt. Pages 355.

Biofertilizers

M. K. Rai (2008). Handbook of Microbial Biofertilizers, CRC Press, 610 Pages.

NIIR Board (2012). The Complete Technology Book on Biofertilizer and Organic Farming (2nd Revised Edition), NIIR project consultancy services, 620 Pages.

Forum for Nuclear Cooperation in Asia (2006). Biofertilizer Manual. Japan Atomic Industrial Forum (JAIF), 138 Pages.

Commercial Bee Keeping

1. Abrol. D.P. 2011. Beekeeping – A comprehensive guide to bees and beekeeping. Scientific Publishers, Jodhpur, 896 pages.
2. Atwal, A.S. 2013. Mellifera Bee Keeping and Pollination. Kalyani Publishers, Ludhiana. 394 p.
3. http://agritech.tnau.ac.in/farm_enterprises/fe_apiculture_home.html
4. <http://agdev.anr.udel.edu/maarec/>
5. <http://www.aragriculture.org/insects/beekeeping.htm>
6. <http://tiwanabeefarm.com/>
7. <http://beekeeping.com/>

Composting

1. Misra, R. V., R. N. Roy, H. Hiraoka. 2003. On-Farm composting methods. Land and water discussion paper. Food and Agriculture Organization. ISSN: 1729-0554.
2. L. J. Chanu, S. Hazarika, B.U. Choudhury, T., Balusamy A., P.Moirangthem, A. Yumnam and P. K. Sinha. 2018. A Guide to vermicomposting Ramesh -production process and socio economic aspects. Extension Bulletin No. 81 ICAR Research Complex for NEH Region, Umiam-793 103, Meghalaya.
3. https://agritech.tnau.ac.in/ta/org_farm/orgfarm_composting.html
4. <https://www.agrifarming.in/vermicompost>

Precision farming

1. Brahma Singh, Balraj Singh, NavedSabir and MurtazaHasan, 2014.Advances in Protected Cultivation.New India Publishing Agency, New Delhi.
2. Donell Hunt, 2013.Farm Power and Machinery Management.10th edition.MedTec Publishers, New Delhi.
3. Jana, B. L., 2008. Precision Farming.AgroTech Publishing Academy.

4. Kali CharanSahu, 2008. Text Book of Remote Sensing and Geographical Information Systems. Atlantic Publishers and Distributors Pvt Ltd.
5. K. RadhaManohar and C. Ignathinathane. 2015. Greenhouse Technology and Management. 2nd edition. B. S. Publications.

Biogas production

1. Rathore N. S., Kurchania A. K., Panwar N. L. 2007. Renewable Energy, Theory and Practice, Himanshu Publications.
2. Khandelwal, K.C. & S. S. Mahdi. 1990. Biogas Technology- A Practical Handbook.

Commercial seed production

- Seed inoculation, Coating and Precision Pelleting. Science, Technology and Practical applications. Gerald M. Bennett. 2016. CRC Press.
- Seed Potato technology. P.C. Struik and S.G. Wiersema. 2012. Wageningen Academic Publishers. DOI: 10.3921/978-90-8686-759-2. ISBN: 978-90-74134-65-1.
- Seed conditioning. Volume Two Technology. Bill (B.R.) Gregg and Gary L. Billups. 2010. CRC Press and Science Publishers. ISBN 978-1-57808-608-5 (Volume 2).
- Principles of Seed Science and Technology 4th Edition. 2001. Lawrence O. Copeland and Miller B. McDonald. ISBN 978-1-4613-5644-8. DOI 10.1007/978-1-4615-1619-4.
- Principles of Seed Science and Technology 3rd Edition. 1999. ISBN 978-1-4613-5719-3. DOI 10.1007/978-1-4615-1783-2.
- Seed Technology. R.L. Agarwal. 1996. Oxford & IBH Publishing Company Pvt. Limited.

Agricultural extension

a. Entrepreneurship Development

- Anil Kumar, S., Poornima, S.C., Mini, K., Abraham and Jayashree, K. 2003. Entrepreneurship Development, New Age International Publishers, New Delhi.
- Sagar Mondal and Ray, G.L. 2009.- Text Book of Entrepreneurship and Rural Development. Kalyani publishers, Ludhiana.

b. Market led Extension

- NIAM. 2013. Reading manual- Training programme on market led extension system.
- Satheesh Babu, K. Kaleel, F.M.H. and Jayasree Krishnankutty. 2007. Market-Led Extension Dimensions and Tools Hardcover. Agrotech Publishing Academy, ISBN-13 : 978-8183210621.

c. Self Help Group (SHGs)

- Sivaraj, P. 2016. Women Empowerment through Self Help Groups in Tamil Nadu. Lambert Academic Publishing. Germany. ISBN: 978-3-330-00676-8.
- Viswanathan Maithili. 1994. Women in Agriculture and Rural Development, Printwell, Jaipur.

Horticulture

1. Introductory Ornamental Horticulture – J.S. Arora
2. A text book of Food processing – Dr Jaishree S. Mehta

3. Plant Propagation: Principles and Practices - Hudson Hartmann
4. Plant Propagation and Nursery Management - Ranjan Kumar Tarai
5. Post-harvest management and processing of fruits and vegetables – N.S. Rathore et al.

Course Plan

T= Theory of 1-hour duration

P= Practical of 2.5-hours duration

Lecture hrs		Topics	Keyword	Objective	CO	PO/PSO
1-2	1 T 1 P	Agronomy	Site selection, rainfall analysis, Irrigation scheduling, crop planning	To familiarise the choice of crops and feasibility of cultivation	CO1	
3	1 P	Agronomy	Crop management and cost of cultivation choice of crops			
4-8	2 T 3 P	Plant Pathology	Mushroom Production Commercial Cultivation, Edible Mushroom, Oyster mushroom, Milky mushroom, Medicinal mushrooms. Culturing, mother spawn and bed spawn production, Cultivation of oyster mushroom. Visit to commercial mushroom cultivation unit	Brief overview and production strategy about the mushroom cultivation	CO2	
9-10	1 T 1 P	Plant Pathology	Biofertilizer production technology and their role in enhancing crop production. Visit to commercial biofertilizer unit at Coimbatore/ Pollachi	Brief overview and production strategy about the microbial biofertilizers	CO2	
11-16	3 T 3P	Agricultural Entomology	Commercial Bee Keeping, Honey bee species, castes, social biology, communication in honey bees. Beehives, beekeeping equipment specification and uses. Hive inspection, maintenance of hive and management in nectar flow season,	Brief Overview of Hiving feral Indian bee colony, site selection for apiary, visit to migratory bee keeping sites, visit to commercial Indian bee farm	CO2	

			dearth period. Marketing, Economics of honeybee products, commercial Indian bee farm visit to Honey processing unit			
17-18	1 T 1 P	Agronomy	Composting, Stages of composting, methods of composting, factors affect composting process. Hands on experience on recycling techniques – composting.	To have a general understanding, methods of composting and its uses	CO3	
19-20	1 T 1 P	Agronomy	Vermicomposting, Worm types, procedure of vermicomposting, vermiculture, vermi wash production and uses. Exposure visit to commercial vermicompost production unit	To study the importance of vermicomposting and its production technology.	CO3	
21-24	2 T 2 P	Soil Science	Soil Health and soil nutrition for better crop production	Importance of Soil testing and nutrient management for crop production	CO3	
25-28	2 T 2 P	Agronomy – Mixed farming	Mixed farming units, To know about the biogas concepts and generation and biogas spent slurry. Advantages and disadvantages of biogas spent slurry	To know about mixed farming concepts, familiarising components such as biogas unit.	CO3	
29-33	2 T 3 P	Genetics and Plant Breeding – Commercial seed production	Commercial seed production vs Crop production, Variety and hybrid, DUS, Scope and importance, Seed market, Seed policy.	Bird eye view of seed production and seed market	CO4	
			Crop varieties maintenance, Seed quality and health, Seed vs grain, Seed multiplication and seed processing, Seed	Bird eye view of maintaining standards in seed production		

			classes and certification			
			Seed production techniques in food grains, oil seeds, pulses, cash crops and horticultural crops	Describing the seed production techniques in agricultural and horticultural crops		
			Calculation of benefit cost ratio of the seed production in agricultural and horticultural crops	Practical knowledge of calculating the Economics of seed production		
			Field visit to explore the seed processing and seed market.	Connects students to the real world of commercial seed production		
			Scientists from National institute will deliver the seed production techniques and successful stories.	Bringing in the experiences and insights of current scenario of commercial seed production		
34-39	3 T 3 P	Agricultural Extension – Entrepreneurial opportunities in agriculture and successful case studies in India and abroad, agro-based industries	Entrepreneurship – concepts, characteristics, approaches, Nature and Importance for Sustainable Livelihood, SWOC analysis, success case in India and Abroad. Visit to meet Successful Entrepreneurship.	To impart and familiarize with the concept, overview of entrepreneurship and knowledge on the basics of entrepreneurial skills. Gain needed information from achievers.	CO5	
		Agricultural Extension – Market led Extension, Role of self-help groups	Market led extension, farmer led extension: Meaning, definition, challenges and importance in agricultural extension. Visit to State department of Agricultural marketing Visit to successful Self-Help Groups (SHGs)	To understand the concepts, approaches and importance of Market led extension and SHGs To get first-hand information and exposure		
40-49	4 T 5 P	Horticulture	Ornamental gardening, Landscaping,	To know the Basic Principles, History and Styles of gardening, To learn the Components, Landscape gardening, Lay out and execution of garden design	CO6	

				Practical on design and execution of landscape garden		
			Nursery development	To know the Principles and Practices of plant propagation, Propagating structures, Management, Hardening of plants Practical on propagation and plant propagating structures Visit to botanical garden and commercial nursery		
			Post-harvest food handling and product diversification	To understand the Principles and applications of Post-harvest management of fresh produce and food Visit to food processing industry	CO7	
50-53	2 T 2 P	Agri - Informatics	IoT applications in agriculture for crop production and marketing	To understand the application-oriented aspects of IoT.	CO8	

Total number of Theory classes: 24

Total number of Practical classes: 28

4.1: Detailed Lecture plan (not mandatory to include for all lecture topics. Any 1 or 2 may be shared as a sample)

Lecture	Sub Topic	Learning Objectives	Videos duration	Reading materials	Assessments
Lecture Topic (Contributed by Dr. Parthasarathy)	Commercial Mushroom Production Technology	To train the cultivation skills, which allow them to establish a mushroom cultivation enterprise, or to cultivate mushrooms in a form of extra-earnings.	30 mins	It will be provided	Internal examination, assignments and viva voce
	Biofertilizer Production Technology	To learn about isolation, characterization, culturing and mass production techniques of	10 mins	It will be provided	

		different biofertilizers for crop improvement and soil enrichment			
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Lecture	Sub Topic	Learning Objectives	Videos duration	Reading materials	Assessments
Lecture Topic (Contributed by Dr. J. Aravind)	Commercial Bee Keeping	To train the students skills, entrepreneurs in beekeeping by enriching them with knowledge on honeybee species, apiary management, production of honey, beeswax and other by products to meet the national and international standards.	20 mins	It will be provided	Internal Examination, Assignments and viva voce
	Commercial Bee Keeping	To learn about Knowledge and skill on various aspects of beekeeping namely, honey bee species, social biology and communication, beehives, beekeeping equipment's, site selection for apiary, migratory beekeeping, honey extraction, processing, purity testing and value addition, general and seasonal management protecting bees from pesticides, mass queen rearing, collection of other bee products, marketing and economics will be imparted	10 mins	It will be provided	

Lecture	Sub Topic	Learning Objectives	Videos duration	Reading materials	Assessments
Lecture Topic (Contributed by Dr. R. Sureshkumar)	Vermicomposting	To learn about knowledge and skill on vermicast, vermiculture and vermiwash production	20 min	It will be provided	Internal Examination, Assignments and viva voce

		and it uses in various crops.			
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Lecture	Sub Topic	Learning Objectives	Videos duration	Reading materials	Assessments
Precision farming Biogas production (Contributed by Dr. Janarthanan P)	Precision Agriculture – need and functional requirements.	To understand the technology of precision farming.	15 m	Online sources	Quiz, model and assignments
	Familiarization with equipment for precision agriculture including sowing and planting machines, power sprayers, land clearing machines, laser guided land levellers, straw-chopper, straw-balers, grain combines, etc.	To know the various system concepts in precision farming	30 m	Online sources	
	Introduction to sensors and application of sensors for data generation. Database management.	To know about the sensor-based management	30 m	Online sources	
	Application to PERT and CPM for machinery system management.	To know about the PERT and CPM	30 m	Online sources	
	Biogas: types of biogas plants, biogas generation	To know about the biogas concepts and generation	20 m	Online sources	
	Factors affecting biogas generation and usages	To know about the factor for generation	20 m	Online sources	
	Design consideration	To know about the design for biogas	30 m	Online sources	

	Advantages and disadvantages of biogas spent slurry	To know about the biogas spent slurry	20 m	Online sources	
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Lecture	Sub Topic	Learning Objectives	Videos duration	Reading materials	Assessments
Cost Benefit analysis (Dr. Dhivyapriya D)	Calculation of benefit cost ratio of the seed production in agricultural and horticultural crops	Practical knowledge of calculating the Economics of seed production	30 minutes	Journals/ Books	Internal examination, assignments and viva voce

Lecture	Sub Topic	Learning Objectives	Videos duration	Reading materials	Assessments
Lecture Topic (Contributed by Dr. Sivaraj P)	Entrepreneurship Development, agro-based industries	To impart and familiarize with the concept, overview of entrepreneurship and knowledge on the basics of entrepreneurial skills	45 min	It will be provided	Internal examination, assignments and viva voce
	Market led Extension and Self Help Groups (SHGs)	To understand the concepts, approaches and importance of Market led extension and SHGs	1 hr	It will be provided	

Lecture	Sub Topic	Learning Objectives	Videos duration	Reading materials	Assessments
Ornamental Gardening (Dr.S. Kumaresan)					Assignments
	History and Styles of Gardening	To know and learn the basic principles and different features of gardening	20 mins	Online and Reference books	

5.1 Evaluation and Grading

Internal		External	Total
Components	Weightage		
Examination	30	-	Internal = 100
Assignments	60		
		100%	

Viva	10			
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5.2 Agriculture and sustainable livelihood - Course Outcomes (CO)

CO1	:	To familiarise the choice of crops and feasibility of cultivation
CO2	:	Brief overview and production strategy about the mushroom cultivation, bio fertiliser and bee keeping
CO3	:	Brief overview on importance of soil health, nutrient management , composting and Mixed farming
CO4	:	Principles of commercial seed production
CO5	:	To impart and familiarize with the concept, overview of entrepreneurship, market led extension and Self Help Groups
CO6	:	Principles and familiarisation of gardening, nursery management, post-harvest handling
CO7	:	Familiarise post-harvest food handling
CO8	:	To understand the application-oriented aspects of IoT.

*Programme Outcomes (PO) (As given by NBA and ABET)

PO 1:

PO 2:

PO 3:

*E4Life PhD Programme Specific Outcome (PSO)

PSO1:

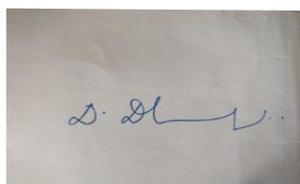
PSO2:

PSO3:

5.3 Course Mapping

PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO2
CO1								
CO2								
CO3								
CO4								
CO5								

**3-strong, 2-moderate, 1-weak



23.01.2021
Course Faculty: Dr. DHIVYAPRIYA D
Designation: Assistant Professor
Dept: Genetics and Plant Breeding



23.01.2021
Course Faculty: Dr. KUMARESAN S
Designation: Assistant Professor
Dept: Horticulture

Within the School of Agriculture, Dr. Sudheesh Manalil, School of Agriculture will coordinate and oversee the smooth conduct the programme.