B.Sc. (Hons) Agriculture – 2025 Syllabus

First Year – Second Semester

S. No	Course No	Course Title	Credit Hours
1	AEX 103	Personality Development	2(1+1)
2	ENS 101	Environmental Studies and disaster Management	3 (2+1)
3	SAC 102	Soil Fertility Management	3 (2+1)
4	AEN 101	Fundamentals of Entomology	3 (2+1)
5	AMP 101	Livestock and Poultry Management	3 (2+1)
6	PAT 101	Fundamentals of Plant Pathology	3 (2+1)
7	AGR 102	Fundamentals of Agronomy	3 (2+1)
8	SEC 3	Skill Enhancement course -III	2(0+2)
9	SEC 4	Skill Enhancement course – IV	2(0+2)
10	NSS 101 NCC 101	National Service Scheme I / National Cadet Corps I	1 (0+1)#
11	PED 101	Physical Education, First Aid, Yoga Practice and Meditation (Yoga Practice and Meditation offered in II semester)	2 (0+2)**
		Total	**24(13+11)**

***Non- Gradial but compulsory courses**

 # NSS & NCC: Registered in I Semester and Evaluated in II Semester

****PED: Registered in I Semester and Evaluated in IV Semester**

Class Duration:

Practical: 2 hours

Theory: 1 hour

AEX 103 Personality Development (1+1)

Unit I: Personality & Determinants of personality

Personality Definition, Nature of personality, theories of personality and its types. The humanistic approach - Maslow's self-actualization theory, shaping of personality, Determinants of personality, Myers-Briggs Typology Indicator, Locus of control and performance, Type A and Type B Behaviours, personality and Organizational Behaviour.

Unit II: Individual behavior, Perception and Attribution

Foundations of individual behavior and factors influencing individual behavior, Models of individual behavior, Perception and attributes and factors affecting perception, Attribution theory and case studies on Perception and Attribution.

Unit III: Learning & organizational behavior

Learning: Meaning and definition, theories and principles of learning, Learning and organizational behavior, Learning and training, learning feedback. Attitude and values.

Unit IV: Intelligence & its measurements

Intelligence- types of Intelligence, theories of intelligence, measurements of intelligence, factors influencing intelligence, intelligence and Organizational behavior, emotional intelligence.

Unit V: Motivation, Teamwork and group dynamics

Motivation- theories and principles, Teamwork and group dynamics.

Practical

MBTI personality analysis, Learning Styles and Strategies, Motivational needs, Firo-B, Interpersonal Communication, Teamwork and team building, Group Dynamics, Win-win game, Conflict Management, Leadership styles, Case studies on Personality and Organizational Behavior.

Lectures Schedule

1. Personality- Meaning, Definition, Nature of personality, theories of personality - Biological personality, Psychoanalytic, Humanistic, Trait perspective and Behaviourist theories. Personality types – Sheldon, Galen, Pavlov –Extrovert, Introvert and Ambivert.
2. The humanistic approach - Maslow's self-actualization theory. Shaping of personality - stages of shaping - Freud, Erikson, and Piaget's theories.
3. Determinants of personality - Myers-Briggs Typology Indicator -Locus of control and performance, Type A and Type B Behaviours
4. Personality and organizational behavior: Personality-Importance of inherited and acquired characteristics. Organizational behaviour-Meaning and definition. Personality traits in organizational behaviour -OCEAN- (Openness to experience, conscientiousness, extroversion, agreeableness and neuroticism)
5. Foundations of individual behavior – Motivation, Ability, Role perception, Situational factors (MARS) and factors influencing individual behavior -personal factors, environmental factors and organisational factors.
6. Models of individual behavior – Rational and Emotional Model, Behaviouristic and Humanisitic Model, Economic and Self-Actualizing Model and Theory X and Theory Y.
7. Perception – meaning, definition, stages and attributes of perception, Perceptual process, factors affecting perception.
8. Fritz HeiderAttribution theory, Jones & Davis Correspondent Inference Theory and case studies on Perception and Attribution
9. **Midsemester Examination**
10. Learning- Meaning and definition, theories (Classical and Operant Conditioning Theory) and principles of learning –Learning and Organizational Behaviour - Behaviorism, Cognitivism, Connectivism, Constructivism, and Humanism.
11. Learning and training – meaning, definition, Learning vs training. Learning feedback (Focus on learning,Be timely: Be constructive: Encourage action, Provide further help, Focus on learning goals, Provide prompt feedback)
12. Attitude and values - meaning, definition, importance– types of values - Attitude Vs Values

13. Intelligence- meaning, definition, types of Intelligence - Abstract, Concrete and Social Intelligence, theories of intelligence (Spearman's Two factor Theory of Intelligence, Thurstone's Theory of Intelligence and Gardner's Theory of Multiple Intelligences)
14. Measurement of intelligence - BinetTest,Wechsler Scales. Factors influencing intelligence.
15. Intelligence and Organizational behavior - Key aspects of intelligence in organization, emotional intelligence –Pillars of emotional intelligence (self-awareness, self-regulation, motivation, empathy and social skills)
16. Motivation theories - Maslow's needs hierarchy, Alderfer's ERG theory, McClelland's achievement motivation and Herzberg's two-factor theory and principles of motivation.
17. Teamwork and Group dynamics – Meaning, Definition, team building, and group dynamics – Meaning, Definition and key elements of group dynamics (roles, norms, relationships, and communication).

Practical Schedule

1. Exercise on MBTI personality analysis
2. Assessing the Learning Styles through Barsch and Kolb Inventories
3. Exercise on applying Learning Strategies
4. Assessing the Motivational needs in an Organization
5. Exercise on assessing motivation using online tools
6. Assessing individual's interpersonal needs- Firo-B (Fundamental Interpersonal Relations Orientation-Behavior)
7. Exercise on Effective Interpersonal Communication in an organization
8. Exercise on Teamwork
9. Exercise on Team building
10. Exercise on Group Dynamics
11. Exercise on Win-win game
12. Exercise on Conflict Management
13. Assessing the Leadership styles and its significance in Organization
14. Assessing the Emotional Intelligence
15. Case studies on Personality and its influence in Organization
16. Case studies on Organizational Behavior
17. **Final Practical Examination**

Learning Outcomes:

- Understand the concept, theories and determinants of personality and their role in shaping behavior.
- Recognize factors influencing individual behavior, perception and attribution in personal and organizational settings.
- Apply principles of learning, attitude and values for personal growth and professional development.
- Understand different types and theories of intelligence with focus on emotional intelligence in workplace situations.
- Gain knowledge of motivation theories and apply them for self-development and improving performance.
- Develop teamwork, interpersonal skills, and group dynamics for effective collaboration and leadership.

Text Books:

1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
2. Stephen P. Robbins and Timothy A. Judge(2014), Organizational Behavior 16th Edition: Prentice Hall.

Reference:

1. Andrews, Sudhir. 1988. How to Succeed at Interviews. 21st (rep.) New Delhi. Tata McGraw-Hill.
2. Heller, Robert. 2002. Effective Leadership. Essential Manager series. Dk Publishing.
3. Hindle, Tim. 2003. Reducing Stress. Essential Manager series. Dk Publishing.
4. Kumar, Pravesh. 2005. All about Self- Motivation. New Delhi. Goodwill Publishing House Lucas, Stephen. 2001. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill.
5. Mile, D.J. 2004. Power of Positive Thinking. Delhi. Rohan Book Company.
6. Shaffer, D. R. 2009. Social and Personality Development (6th Edition). Belmont, CA: Wadswor
7. Smith, B. 2004. Body Language. Delhi: Rohan Book Company.

Web Resources:

- https://www.bharathuniv.ac.in/colleges1/downloads/courseware_ece/notes/BSS201%20-%20PERSONALITY.pdf
- https://courses.lumenlearning.com/waymaker-psychology/chapter/measures-of-intelligence/
- https://study.com/academy/lesson/methods-of-measuring-intelligence-interpreting-an-iq-scores-score-range.html
- https://www.scribd.com/document/623426712/Chapter-3-Attitude-and-Motivation
- https://opentext.wsu.edu/psych105/chapter/10-5-learning-approaches-to-personality

ENS 101 Environmental Studies and Disaster Management (2+1)

Theory

UNIT I: Introduction to Environment - Environmental studies - Definition, scope and importance - Multidisciplinary nature of environmental studies - Segments of Environment - Spheres of Earth - Lithosphere - Hydrosphere - Atmosphere - Different layers of atmosphere

Natural Resources: Classification - Forest resources, Water resources, Mineral resources, Food resources. Energy resources. Land resources. Soil resources.

UNIT II: Ecosystems - Concept of an ecosystem - Structure and function of an ecosystem - Energy flow in the ecosystem., Types of ecosystem, Biodiversity **and its conservation:** Introduction, definition, types. Biogeographical classification of India. Importance and Value of biodiversity. Biodiversity hot spots. Threats and Conservation of biodiversity.

UNIT III: Environmental Pollution: Definition, cause, effects and control measures of: a. Air pollution. b. Water pollution. c. Soil pollution. d. Marine pollution. e. Noise pollution. f. Thermal pollution g. light pollution Solid **Waste Management:** Classification of solid wastes and management methods, Composting, Incineration, Pyrolysis, Biogas production, Causes, effects and control measures of urban and industrial wastes.

UNIT IV: Social issues and the Environment: Urban problems related to energy. Water conservation, rain water harvesting, watershed management. **Environmental ethics:** Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act, EIA , Environmental Auditing, International conventions. **Human Population and the Environment:** Environment and human health: Human Rights, Value Education. Women and Child Welfare. Role of Information Technology in Environment and human health.

UNIT V: Disaster management - Disaster definition - Types - Natural Disasters - Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves. Man Made Disasters - Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, road accidents, rail accidents, air accidents, sea accidents. International and National strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community-based organizations and media in disaster management. Central, state, district and local administration in disaster control; Armed forces in disaster response; Police and other organizations in disaster management.

Practical

Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain. Energy: Biogas production from organic wastes. Visit to wind mill / hydro power / solar power generation units. Biodiversity assessment in farming system. Floral and faunal diversity assessment in polluted and un polluted system. Visit to local polluted site-Urban/Rural/Industrial/Agricultural to study of common plants, insects and birds. Environmental sampling and preservation. Water quality analysis: pH, EC and TDS & mitigation measures. Estimation of Acidity, Alkalinity. Estimation of water hardness. Estimation of DO and BOD in water samples. Estimation of COD in water samples. Enumeration of E. coli in water sample. Assessment of Suspended Particulate Matter (SPM). Study of simple ecosystem – Visit to pond/river/hills. Visit to areas affected by natural disaster

Lecture Schedule

1. Introduction to Environment - Environmental studies - Definition, scope and importance - Multidisciplinary nature of environmental studies
2. Segments of Environment - Spheres of Earth - Lithosphere - Hydrosphere
3. Atmosphere - Different layers of atmosphere
4. Natural Resources: Classification - Forest resources, Water resources, Mineral resources, Food resources
5. Energy resources – Classification - Renewable and Non- Renewable, Land resources, Soil resources.
6. Ecosystems – Ecology – Types of Ecology - Concept of an ecosystem - Structure and function of an ecosystem

7. Dynamics of Ecosystem – Energy , Primary and secondary production, Energy flow in the ecosystem, Food chain, Food web
8. Trophic level, Ecological pyramids, Biogeochemical cycles, Succession and its types, Types of ecosystem – Aquatic and Terrestrial Ecosystem
9. **Midsemester Examination**
10. Biodiversity and its conservation: Introduction, definition, types. Bio-geographical classification of India.
11. Importance and Value of biodiversity. Biodiversity hot spots. Threats and Conservation of biodiversity – *In-situ* and *Ex-situ*.
12. Pollution and Pollutants: Definition, Air pollution, Criteria air pollutants: Cause, effects and control measures
13. Cause, effects and control measures : Water pollution, Marine pollution, Thermal pollution
14. Cause, effects and control measures : Soil pollution ,Noise pollution, light pollution
15. Solid Waste Management: Classification of solid wastes and management methods, Incineration, Pyrolysis, Biogas production,
16. Causes, effects and control measures of urban and industrial wastes - Composting
17. Mid-Semester Examination
18. Social issues and the Environment: Urban problems related to energy. Water conservation, rain water harvesting, watershed management.
19. Environmental ethics: Issues and possible solutions, climate change, global warming,
20. Acid rain, ozone layer depletion, nuclear accidents and holocaust.
21. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act,
22. EIA and Environmental Auditing
23. International conventions
24. Human Population and the Environment: Environment and human health: Human Rights, Value Education. Women and Child Welfare.
25. Role of Information Technology in Environment and human health.
26. Disaster management - Disaster definition - Types - Natural Disasters - Floods, Cyclone,
27. Earthquakes, landslides, Avalanches, volcanic eruptions
28. Drought, Heat and cold waves

29. Man Made Disasters - Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire,
30. Road accidents, rail accidents, air accidents, sea accidents.
31. International and National strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements;
32. Role of NGOs, community-based organizations and media in disaster management.
33. Central, state, district and local administration in disaster control
34. Armed forces in disaster response; Police and other organizations in disaster management.

Practical Schedule

1. Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain.
2. Energy: Biogas production from organic wastes
3. Visit to wind mill / hydro power / solar power generation units.
4. Biodiversity assessment
5. Floral and faunal diversity assessment in polluted and unpolluted system.
6. Visit to local polluted site-Urban/Rural/Industrial/Agricultural to study of common plants, insects and birds
7. Environmental sampling and preservation
8. Water quality analysis: pH, EC and TDS and mitigation measures
9. Estimation of Acidity, Alkalinity in water samples
10. Estimation of water hardness in water samples
11. Estimation of DO and BOD in water samples
12. Estimation of COD in water samples
13. Enumeration of *E. coli* in water sample
14. Assessment of Suspended Particulate Matter (SPM)
15. Study of simple ecosystem – Visit to pond/river/hills
16. Visit to areas affected by natural disaster / PCB lab / Fire service
17. **Final Practical Examination**

Learning Outcomes

- An interdisciplinary field that examines the relationship between human activity and the natural environment, while also providing strategies for mitigating, responding to,

and recovering from natural and man-made disasters.

- Key topics include natural resources, ecosystems, pollution, and public health aspects of disasters, with the goal of fostering sustainable development and creating environmentally literate citizens

Text Books

1. De. A.K. 2010.Environmental chemistry. Published by New Age International Publishers, New Delhi.ISBN:13–978 81 224 2617 5. pp 384
2. Dhar Chakrabarti. P.G. 2011.Disaster Management - India's risk management policy Frameworks and Key Challenges. Published by Centre for Social Markets (India), Bangalore.36 pp.

Reference

1. Sharma, P.D. 2009, Ecology and Environment, Rastogi Publications, Meerut, India
2. Tyler Miller and Scot Spoolman. 2009. Living in the Environment (Concepts, Connections, and Solutions). Brooks/cole, Cengage Learning Publication, Belmont, USA.
3. Erach Barucha, Text book for Environmental Studies. University Grants Commission, New Delhi

SAC 102 Soil Fertility Management (2+1)

Theory

Unit I: Soil Fertility and Plant Nutrients

History of soil fertility and plant nutrition. Criteria of nutrient essentiality. Role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of macro, secondary and micronutrients.

Unit II: Soil Fertility Evaluation

Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of Nutrients. Soil and plant analysis, rapid plant tissue tests, Indicator plants.

Unit III: Fertilizers & Fertilizer Recommendation approaches

Introduction and importance of fertilizers and manures. Fertilizer Recommendation approaches -STCR / RTNM / IPNS-Integrated nutrient management. Chemical fertilizers: classification, composition and properties of major, secondary & micronutrients fertilizers.

Unit IV: Fertilizers & Manures

Complex fertilizers, Customized fertilizers, Nano fertilizers, Soil amendments Preparation and properties of major manures (FYM, compost, vermicompost, green manuring, oilcakes). Fertilizer Storage, Fertilizer Control Order.

Unit V: Nutrient use efficiency & Carbon Storage

Methods of fertilizer recommendation to crops- Fertilisaton for rainfed and irrigated crops- Nutrient use efficiency (NUE). Factors influencing NUE. Carbon sequestration and Carbon Trading

Practical

Introduction of analytical instruments and their principles, calibration and applications of colorimetry, spectroscopy (UV-Vis Spectrophotometer Atomic Absorption Spectrophotometer) and flame photometry; Estimation of soil organic carbon and alkaline hydrolysable N in soils; Estimation of soil extractable P in soils; Estimation of exchangeable K in soils; Estimation of exchangeable Ca and Mg in soils; Estimation of soil extractable S in soils; Estimation of DTPA extractable Zn, Cu, Fe, Mn in soils. Estimation of Hot water soluble boron soils. Estimation of N in plants; Estimation of P in plants; Estimation of K in plants; Estimation of S in plants; Fertilizer calculations: Soil test based fertilizer prescription-STCR and M & B

Theory Schedule

1. History of soil fertility, productivity plant nutrition and criteria of nutrient essentiality.
2. Functions, deficiency and toxicity symptoms of N, P and K.
3. Functions, deficiency and toxicity symptoms of Secondary, Micronutrient and beneficial elements
4. Mechanisms of nutrient transport to plants
5. Factors affecting nutrient availability to plants
6. Chemistry of Major nutrients: Sources, forms, mobility, transformation, fixation, losses and availability
7. Chemistry of Secondary nutrients and Micronutrients: Sources, forms, mobility, transformation, fixation, losses and availability
8. Soil fertility evaluation: concepts - Liebig's Law, Mitscherlich's law and Bray's nutrient mobility concept. Approaches - Deficiency symptoms, tissue analysis, biological tests and chemical tests.
9. **Midsemester Examination**
10. Techniques/ methods of soil fertility evaluation: Crop logging, critical level, DRIS, Isotopic nutrient availability techniques.
11. Soil testing- soil and plant analysis, rapid plant tissue tests, Indicator plants.
12. Fertilizer recommendation approaches- M & B,STCR,STCR-IPNS,RTNM
13. Integrated nutrient management-definition, concepts, importance; PME & LTFE.
14. Organic manures-Importance, Definition, classification, properties and sources
15. Preparation and properties : bulky and concentrated manures - composting techniques- Aerobic and anaerobic (Bangalore & Coimbatore method)
16. Preparation and properties of manures: Enriched FYM, vermicompost, green manuring, oilcakes.
17. Fertilizers- Definition, classification of major, secondary and micronutrients fertilizers.
18. Mid semester Examination
19. N fertilizers : Properties and reactions in soil - Urea, ammonium sulphate, ammonium nitrate, CAN, properties
20. P fertilizers- Properties and reactions in soil- Rock phosphate, bone meal, basic slag, single super phosphate, diammonium phosphate, triple super phosphate.
21. K fertilizers: Properties and reactions in soil - MOP and SOP

22. Secondary nutrients and micronutrient fertilizers: Properties and reactions in soil
23. Complex fertilizers- definition, manufacture of ammonium phosphate, nitro phosphate and N,P,K complexes.
24. Mixed fertilizers-definition, preparation and compatibility.
25. Customized/designer fertilizers, water soluble, liquid fertilizers
26. Nano fertilizers : Importance, classification, properties and reactions in soil
27. Soil amendments : Importance, classification, properties and reactions in soil
28. Fertilizer Storage and Fertilizer Control Order
29. Methods of fertilizer recommendation to crops- Soil and foliar application.
30. Fertigation - Definition - Types of fertigation and scheduling
31. Fertilisaton for rainfed and irrigated crops- Seed coating, pelletization, seedling dipping - Nutriseed pack
32. Nutrient use efficiency - N fertilizers -Significance and enhancement techniques - Slow-release, inhibitors, coated fertilisers
33. Nutrient use efficiency - P, K and micronutrients fertilisers- Significance and enhancement techniques – enriched, customised, fortified, coated fertilisers
34. Factors influencing nutrient use efficiency (NUE) , Carbon sequestration and Carbon Trading

Practical Schedule

1. Introduction of analytical instruments and their principles, calibration and applications (Colorimetry, UV-Vis Spectrophotometer)
2. Introduction of analytical instruments and their principles, calibration and applications of Spectroscopy - Atomic Absorption Spectrophotometer
3. Introduction of analytical instruments and their principles, calibration and applications of flame photometry-Flame photometer
4. Estimation of soil organic carbon
5. Estimation of alkaline hydrolysable N in soil
6. Estimation of soil extractable P in soil (Bray and Olsen methods)
7. Estimation of exchangeable K and soil extractable S in soils
8. Estimation of exchangeable Ca and Mg and in soil
9. Estimation of DTPA extractable Zn, Cu, Fe,Mn in soil
10. Estimation of Hot water soluble boron in soil
11. Preparation and digestion of Plant

12. Estimation of Nitrogen in plants
13. Estimation of Phosphorus and Potassium in plants
14. Estimation of Sulphur in plants
15. Estimation of Micronutrients in plant
16. Fertilizer calculations : Soil test based fertilizer prescription-STCR and M&B
17. **Final Practical Examination**

Learning Outcomes

Provides a comprehensive knowledge of soil fertility on plant nutrition, fertilizers, and nutrient management

Text books

1. Soil Fertility and Nutrient Management (2017)– By S. S. Singh, Kalyani Publishers
2. Introductory Soil Science (2022) – By Dilip Kumar Das, Kalyani Publishers

References

1. Soil Fertility and Fertilizers (2016) – By Samual L. Tisdale, Werner L. Nelson and
2. James D. Beaton, Macmillan Publishing Company, New York
3. The Nature and Properties of Soils (1998) By Harry O. Buckman and Nyle C.Brady

Web Resources

- www. fspublishers. org/ijab/past-issues/IJAB Vol_5_No_3/47. pdf
- www. springerlink. com/index/IQ11256h8t325054. pdf
- www. ipni. net/ppiweb/bcrops. nsf/$webindex/. . . /Better_Crops_2009-4 J_. pdf
- onlinelibrary. wiley. com/doi/10. 1002/9780470431771 . index/pdf
- agtr. ilri. cgiar. org/agtrweb/Documents/Library/docs/. ,. /Module4. htm
- www. uoa. edu. er/academics/graduate/. . . /courses. html -
- www. fao. org/wairdocs/ilri/x5546e/x5546e08. htm
- www. fao. org/wairdocs/ilri/x5546e/x5546e08. htm
- www. uoa. edu. er/academics/graduate/. . . /courses. html -
- www. ncpahindia. com/articles/article17. pdf-Similar
- www. energy. ca. gov/process/agriculture/ag_pubs/fertigation. pdf -
- www. soilandhealth. org/. . . /010117attrasoilmanual/010117attra. html

AEN 101 Fundamentals of Entomology (2+1)

Theory

Unit I: History of Entomology, Insect Morphology

History of Entomology in India; Causes for dominance of Insecta in Animal kingdom; Classification of phylum Arthropoda upto classes; Relationship of class Insecta with other classes of Arthropods; Morphology: Structure and functions of insect cuticle and moulting, Body segmentation, Structure of head, thorax and abdomen, Structure and modifications of insect antennae, mouth parts, legs, wings and wing coupling apparatus, male and female genital organs; Metamorphosis and diapause in insects; Types of larvae and pupae

Unit II : Insect Anatomy & Physiology

Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretory (Endocrine & Exocrine) and reproductive system; Types of reproduction; Major sensory organs; Tropism and communication.

Unit III: Insect Systematics

Insect Taxonomy –importance, binomial nomenclature, Definitions of Biotype, Sub-species, Species, Genus, Family and Order; Classification of class Insecta upto Orders; Orders and families of agricultural important insects like Apterygota, Odonata, Dictyoptera, Orthoptera, Hemiptera, Isoptera, Thysanoptera, Siphonaptera, Siphunculata, Mallophaga, Lepidoptera, Coleoptera, Diptera, Hymenoptera, and Neuroptera.

Unit IV: Insect Ecology, Principles and components of pest management I

Insect Ecology - balance of life in nature – reproductive potential and environmental resistance**;** Categories of pests; Population dynamics- Effect of abiotic factors and biotic factors - Interspecific and intraspecific relationship; pest outbreak – factors governing pest outbreak; pest monitoring, surveillance - sampling techniques - Roving and fixed plot survey, Pest forecasting – objectives, digital tools for monitoring; Economic Threshold Level & Economic Injury Level; Integrated Pest Management –concept, scope and limitations, Cultural, physical, mechanical, ecological engineering methods and host plant resistance in pest management; Legal methods –pest introductions – quarantine – phytosanitary certificate; Biological control - Parasitoids, predators, microbial agents and biopesticides in pest management

Unit V: Principles and components of pest management II

Semiochemicals in pest management; Sterile insect technique; insect growth regulators; antifeedants and repellents; Botanicals; Biotechnology in pest management; Chemical control - Classification of insecticides, Mode of action, Ideal qualities of an insecticide, Pesticide compatibility, safe handling; Pesticide poisoning – antidotes; impact of pesticides on agroecosystems; Insecticides Act 1968 – insecticide residues and waiting periods, insecticide resistance management

Practical content

Methods of collection and preservation of insects including immature stages; External features of Grasshopper/cockroach; Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus; Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper/cockroach); Study of characters of orders Apterygota, Odonata, Dictyoptera, Orthoptera, Hemiptera, Isoptera, Thysanoptera, Siphonaptera, Siphunculata, Mallophaga, Diptera, Hymenoptera, Neuroptera, Coleoptera and Lepidoptera and their families of agricultural importance; IPM Components: mechanical, physical and behavioural approaches in pest management; predators, parasitoids, their mass culture; entomopathogens and their mass production; Insecticides and their formulations; Pesticide application techniques including drone spraying; Preparation of spray fluids.

Theory Schedule

1. History of Entomology in India; Position of insects in the animal kingdom; Relationship of class Insecta with other classes of Arthropods; Factors responsible for dominance
2. Insect body wall - its structure and function; cuticular appendages; Moulting process in insects
3. Structure of insect head, thorax and abdomen and their appendages
4. Types of metamorphosis and variations in immature stages of insects
5. Structure of sense organs - photoreceptors, chemoreceptors & mechanoreceptors; Tropism and Biocommunication in insects
6. Anatomy and physiology of digestive system of insects
7. Anatomy and physiology of excretory systems of insects
8. Anatomy and physiology of respiratory system of insects
9. Anatomy and physiology of circulatory system of insects

10. Anatomy and physiology of reproductive system and Types of reproduction in insects
11. Anatomy and physiology of nervous system of insects, axonic and synaptic impulse transmissions in insects
12. Exocrine and endocrine glands and their function in insect physiology
13. Systematics - principles and procedures of classification and binomial nomenclature of insects, biotypes, sub species, species, Genus, Family and Order
14. Distinguishing characters of insect orders- Apterygota, Odonata - Anisoptera & Zygoptera, Dictyoptera - Blattodea & Mantodea, Isoptera
15. Distinguishing characters of insect orders- Orthoptera - Ensifera (Tettigonidae, Gryllidae and Gryllotalpidae); Caelifera (Acrididae), Thysanoptera (Thripidae), Siphonaptera, Siphunculata and Mallophaga
16. Distinguishing characters of insect orders — Hemiptera — Homoptera (Delphacidae, Cercopidae, Cicadidae, Cicadellidae, Psyllidae, Aleyrodidae, Aphididae, Kerridae, Pseudococcidae, Coccidae and Diaspididae)
17. **Mid semester examination**
18. Distinguishing characters of insect orders — Hemiptera - Heteroptera (Cimicidae, Tingidae, Reduviidae, Miridae, Lygaeidae, Pyrrhocoridae, Coreidae, Pentatomidae, Lophopidae, Alydidae, Podopidae, Gerridae, Belastomatidae, Nepidae)
19. Distinguishing characters of insect orders Diptera- Nematocera (Psychodidae, Culicidae and Cecidomyiidae), Brachycera (Tabanidae, Asilidae), Cyclorrapha (Syrphidae, Drosophilidae, Muscidae, Calliphoridae, Tachinidae, Hippoboscidae, Agromyzidae and Tephritidae)
20. Distinguishing characters of insect orders Hymenoptera - Symphyta (Tenthredinidae) Apocrita (Ichneumonidae, Braconidae, Evaniidae, Agaonidae, Chalcididae, Encyrtidae, Eulophidae, Trichogrammatidae, Bethylidae, Formicidae, Vespidae, Sphecidae, Megachilidae, Xylocopidae and Apidae); Neuroptera - (Mantispidae, Chrysopidae, Myrmeleontidae and Ascalaphidae).
21. Distinguishing characters of insect orders Coleoptera - Adephaga (Carabidae, Cicindellidae, Dytiscidae) Polyphaga (Hydrophilidae, Staphylinidae, Scarabaeidae, Dynastidae, Melolonthidae, Cetonidae, Buprestidae, Elateridae, Lampyridae, Dermestidae, Anobiidae, Bostrychidae, Coccinellidae, Tenebrionidae, Meloidae, Cerambycidae, Bruchidae, Chrysomelidae, Apionidae and Curculionidae)
22. Distinguishing characters of insect orders Lepidoptera - Butterfly families (Nymphalidae, Lycaenidae, Pieridae, Papilionidae and Hesperiidae), Moth families

(Psychidae, Gelechiidae, Cochlidiidae, Pyralidae, Crambidae, Pterophoridae, Geometridae, Bombycidae, Saturniidae, Sphingidae, Arctiidae, Lymantriidae, Noctuidae)

23. Insect ecology – definition – balance of life in nature – reproductive potential and environmental resistance - Population dynamics – role of biotic and abiotic factors – competition – Interspecific and intraspecific relationship
24. Pests, categories of pest; Causes for outbreak of pests and losses by pests; Pest monitoring – pest surveillance - sampling techniques - Roving and fixed plot survey, Pest forecasting – objectives, digital tools for monitoring, General Equilibrium Position, Economic Threshold Level and Economic Injury Level
25. Integrated Pest Management –Concept, scope and limitations; Components of pest management - Cultural methods; Ecological Engineering in pest management; Physical methods- use of heat, moisture, light, electromagnetic energy and sound energy; Mechanical methods- mechanical destruction and exclusion
26. Host plant resistance- types and mechanisms of resistance and role of host plant resistance in pest management; Legal methods- pest introductions – quarantine – phytosanitary certificate
27. Biological control- predators & parasitoids - role in pest management; classical biological control
28. Microbial control- viruses, bacteria, fungi, protozoa and nematodes infesting insects; biopesticides and their role in pest management
29. Semiochemicals – Interspecific – allomone, kairomone, synomone and apneumone – Intraspecific – pheromone, sex pheromone, alarm and trail marking pheromone-use in IPM; Sterile male insect release methods of pest management- methods of sterilization
30. Insect growth regulators- Moult inhibitors – Juvenile Hormone mimics – mode of action; Insect antifeedants and repellents;
31. Botanicals; Biotechnological approaches in pest management–bio safety of transgenic plants
32. Chemical control - toxicity parameters, Classification of insecticides, Ideal qualities of an insecticide, Pesticide compatibility, safe handling
33. Mode of action of organophosphates, carbamates, synthetic pyrethroids, neonicotinoids, diamides, avermectins and new molecules
34. Pesticide poisoning – antidotes; impact of pesticides on agroecosystems; Insecticides Act 1968 – insecticide residues and waiting periods, insecticide resistance management

Practical Schedule

1. Observations on external features of grasshopper / blister beetle/ Cokroach;
2. Methods of insect collection, preservation, display and storage
3. Types of insect head and its appendages- Types of Mouth parts and antenna
4. Structure of thorax and their appendages —modifications in insect legs and wings, wing coupling
5. Structure of abdomen and their appendages; male and female genital organs; types of immature stages of insects
6. Study of digestive systems in insects (grasshopper/ cockroach)
7. Observing the characters of Apterygota, Exopterygota – Odonata- Anisoptera & Zygoptera, Dictyoptera - Blattodea & Mantodea, Isoptera, Orthoptera (Ensifera - Tettigonidae, Gryllidae and Gryllotalpidae; Caelifera - Acrididae), Thysanoptera, Siphonaptera, Siphunculata, Mallophaga
8. Observing the characters of Exopterygota — Hemiptera — Homoptera (Delphacidae, Cercopidae, Cicadidae, Cicadellidae, Psyllidae, Aleyrodidae, Aphididae, Kerridae, Pseudococcidae, Coccidae and Diaspididae), Heteroptera (Cimicidae, Tingidae, Reduviidae, Miridae, Lygaeidae, Pyrrhocoridae, Coreidae, Pentatomidae, Gerridae, Belastomatidae, Nepidae)
9. Observing the characters of orders Diptera- Nematocera (Psychodidae, Culicidae and Cecidomyiidae), Brachycera (Tabanidae, Asilidae), Cyclorrapha (Syrphidae, Drosophilidae, Muscidae, Calliphoridae, Tachinidae, Hippoboscidae, Agromyzidae and Tephritidae)
10. Observing the characters of Hymenoptera & Neuroptera -Symphyta (Tenthredinidae) Apocrita (Ichneumonidae, Braconidae, Evaniidae, Agaonidae, Chalcididae, Encyrtidae, Eulophidae, Trichogrammatidae, Bethylidae, Formicidae, Vespidae, Sphecidae, Megachilidae, Xylocopidae and Apidae) Neuroptera (Mantispidae, Chrysopidae, Myrmeleontidae and Ascalaphidae)
11. Observing the characters of Coleoptera - Adephaga (Carabidae, Cicindellidae, Dytiscidae) Polyphaga (Hydrophilidae, Staphylinidae, Scarabaeidae, Dynastidae, Melolonthidae, Cetonidae, Buprestidae, Elateridae, Lampyridae, Dermestidae, Anobiidae, Bostrychidae, Coccinellidae, Tenebrionidae, Meloidae, Cerambycidae, Bruchidae, Chrysomelidae, Apionidae and Curculionidae)

12. Observing the characters of Lepidoptera - Butterfly families (Nymphalidae, Lycaenidae, Pieridae, Papilionidae and Hesperiidae), Moth families (Psychidae, Gelechiidae, Cochlidiidae, Pyralidae, Crambidae, Pterophoridae, Geometridae, Bombycidae, Saturniidae, Sphingidae, Arctiidae, Lymantriidae, Noctuidae)
13. Mechanical, physical and behavioral approaches in pest management
14. Identification and mass culturing of different types of predators and parasitoids
15. Mass production of entomopathogens; Field application of biopesticides
16. Pesticide formulations; Preparation of spray fluids; Pesticide application techniques including drone spraying
17. **Final Practical examination**

Assignment

1. Collection and submission of 50 insects
2. Preparation and submission of one riker mount

Text books

1. Richards O.W. and R.G. Davies. 1977. *Imm's General Text Book of Entomology*. Vol.I and II. Chapman and Hall Publication, London. 1354p. {ISBN 0412 15220 7}
2. Borror, D.J., D.M. Delong and C.A. Triple Horn. 1976. *An introduction to the study of insects* (IV Edition). Holt McDougal, New York. 864p. {ISBN 978-0030884061}
3. Chapman, R.F. 1998. The Insects: Structure and Function. Fourth Edition. Cambridge University Press. 770p. {ISBN 0 521 78732 7}
4. Snodgrass, R.E. 1994. *Principles of Insect Morphology.* CBS publishers and distributors, New Delhi. 667p
5. David, B.V. and V.V. Ramamurthy. 2011. *Elements of Economic Entomology*, Namrutha Publications, Chennai, 386 p. {ISBN: 978-81-921477-0-3}

Reference

1. Nayar. K.K., T.N. Ananthakrishnan and B.V. David 1976. *General and Applied Entomology.* Tata Mc-Graw Hill publishing Company Ltd, New Delhi
2. Srivastava, P. D. and R. P. Singh. 1997. *An Introduction to Entomology*. Concept Publishing Company, New Delhi
3. . Pedigo, L.P. and M.E.Rice.1996. *Entomology and Pest Management.* Prentice-Hall of Idia Pvt Ltd, New Delhi. 812p. {ISBN-978-8120338869}
4. David, B.V. and V.V. Ramamurthy. 2011. *Elements of Economic Entomology*,

Namrutha Publications, Chennai, 386 p. {ISBN: 978-81-921477-0-3}

5. Dhaliwal, G.S. and R.Arora. 2001. *Integrated Pest Management – Concepts and approaches*. Kalyani publishers, New Delhi. 427p. {ISBN: 81-7663-904-4}
6. Eugene.P. Odum & Gray W. Barrett Fundamentals of Ecology

Web Resources

- http://www.itis.usda.gov/it is/
- www.zin.ru/animalia
- https://courses.cit.cornell.edu/ent201/content/*anatomy*2.pdf
- www.*insects*explained.com/03*external*.htm
- www.earthlife.net/*insects*/anatomy.html
- www.*insect*identification.org/*orders_insect*.asp
- http://www.ncipm.org.in/recent-publications.html

AMP 101 Livestock and poultry Management (2+1)

Theory

Unit I: Importance of Livestock & Poultry, Census, Terminologies and Production Systems

Significance of Livestock and Poultry in Indian Economy - Contribution to national income - Employment and livelihood support-Nutritional security – milk, meat, eggs-Role in agriculture – draught power, manure, by-products-Livestock and Poultry Census-Frequency and importance-Trends in major species population-3. Livestock Development Programmes-Government of India: Rashtriya Gokul Mission, NADCP, NLM, AHIDF, Fodder Mission etc.-Tamil Nadu Government: TN-UHTP, Aavin schemes, TN-IAMWARM, Special livestock breeding programmes. --Common Terminologies-Livestock & poultry terminology (cow, heifer, gilt, stag, chick, pullet, hen, etc.) -Systems of Livestock Production-Extensive--Semi-Intensive-Intensive-Integrated Farming System (IFS)

Unit II: Cattle Breeds, Breeding, Reproduction & Housing

Important Cattle Breeds -White and Black cattle-Classification: Indigenous & Exotic--Breed characteristics-Breeding Methods-Pure breeding-Crossbreeding-Upgrading-Selection for economic traits (milk yield, growth rate, fertility)-Reproductive Management-Estrus cycle–signs, stages-Culling – criteria and importance-Artificial Insemination (AI) – advantages-Introduction to Embryo Transfer Technology (ETT)--Housing Management-Housing principles, site selection-Space requirement for calf & adult stock-Systems: loose housing, conventional barn, tail-to-tail, head-to-head arrangements-Types of housing

Unit III: Feeding, Nutrition & Management of Cattle

Feeding and Management – Digestion --Ruminants vs non-ruminants-Rumen functions, -microbial action Nutrition Concepts-Definition of nutrition-Ration, balanced ration, desirable characteristics-Total Mixed Ration (TMR)-Proximate Principles of Feed-Moisture, crude protein, crude fat, crude fibre, NFE, ash-Nutrients & Their Functions--Feed Ingredients-Common feed and fodder ingredients for livestock & poultry- Ration Formulation-Composition of concentrate mixture for young and adult stock-Age-wise feed and fodder requirements-Importance of green fodder- Milking & Clean Milk Production-Milking methods: hand, machine-Factors affecting milk composition-Clean milk production practices-Common Diseases of Cattle-Classification-Symptoms-Prevention and control measures

Unit IV: Sheep and Goat Production

Breeds - Classification of sheep and goat breeds - Breed characteristics- Economic Traits - Systems of Rearing – Extensive- Semi-intensive-Intensive- Housing & Management-Housing systems-Floor space requirement-Care and management of:Young stock-Adult stock- Nutrition Feed and fodders for small ruminants – Flushing-. Common Diseases-Symptoms, prevention, and control

Unit V: Poultry Production – Breeds, Management, Nutrition & Diseases

Breeds & Strains -Classification of poultry breeds-Commercial strains of broilers and layers-. Housing Systems-Brooding-Deep litter system-Cage system- Care & Management-Chicks, growers, layers, broilers- Poultry Nutrition-Nutrient requirements for:Chick-Grower-Layer-Broiler- Incubation and Hatching of Eggs-Natural and artificial incubation-Factors affecting hatchability- Common Diseases-Control and prevention

Practical

Study of external parts of Livestock - Identification of livestock and poultry-Tattooing-ear tags-wing and leg bands-Common restraining methods-Disbudding (or) Dehorning-Different methods of castration-Dentition-Study of type design of animal and poultry houses-Selection of dairy cow and work bullock-Determination of specific gravity, fat percentage and total solids of milk- Milking methods, clean milk production- Identification of feeds and fodder-Computation of rations for livestock. Formulation of concentrate mixtures. Economics Dairy, Goat and Swine farming - Study of external parts of Fowl - Preparation of Brooder House - Brooder management-Identification of layer and non layer- Debeaking, delousing and deworming of poultry-Vaccination schedule for broiler and layer-Dressing of broiler chicken - Economics of Broiler and Layer Farming - Hatchery layout and design Demonstration of incubator and setter- Visit to a modern Dairy and commercial layer and broiler farms

Lecture schedule

1. Significance of livestock and poultry in Indian economy-livestock and poultry census.
2. Different livestock development programmes of Government of India and Tamil Nadu
3. Various systems of livestock production – extensive, semi – intensive, intensive and Integrated farming system.
4. Breeds of dairy cattle (Indian and exotic) - Sahiwal, Gir, Red Sindhi, Jersey and Holstein Friesian- Crossbreds and breeds of buffalo
5. Breeding-cross breeding-upgrading-economic traits of cattle-culling importance and methods
6. Estrous cycle – signs of estrous - artificial insemination-merits and demerits-Principles and outline of embryo transfer
7. Housing management-farm site selection and floor space requirement for calves, heifer, milch animal and work bullocks
8. Systems of housing-single row system-double row system- head to head and tail to tail-merits and demerits - Type design of house
9. Care and management of new born calf and heifers
10. Care and management of pregnant animal and lactating animals and Care and management of dry cows and work bullock
11. Nutrition-definition-ration-balanced ration-desirable characteristics of a ration. Total mixed ration.
12. Model composition of concentrate mixture of young and adult stock-age wise feed and fodder requirement-Importance of green fodder
13. Milking methods-clean milk production-factors affecting milk yield and composition

14. Diseases-classification-viral, bacterial and metabolic-general control and preventive measures
15. Viral diseases-foot and mouth disease, bacterial diseases, anthrax, hemorrhagic septicemia- black quarter
16. Metabolic- tympanites, acidosis, ketosis and milk fever
17. **Mid semester Examination**
18. Sheep and goat farming-classification of breeds of Indian and exotic origin – economic traits
19. Systems of rearing-housing management - type design- floor diagram-space requirement for adult and young stock
20. Care and management of ram, ewe and lamb-nutrition- feeds and fodder for small ruminants
21. Care and management of buck, doe and kid- nutrition- flushing.
22. Common ailments of sheep and goat-sheep pox-foot and mouth-blue tongue- PPR-enterotoxaemia-Ecto and endo parasites.
23. Swine husbandry –Common breeds of exotic origin-Large White Yorkshire, Landrace and Duroc - economic traits- housing of Swine
24. Care and management of sow, boar and piglets-nutrition- creep feeding
25. Disease prevention and control of swine diseases –hog cholera, foot and mouth, ecto and endo parasites
26. Classification of breeds - commercial strains of layer and broiler.
27. Care and management of Chicks-brooder management
28. Systems of housing- deep litter and cage system- floor space requirement-common litter material-litter management-merits and demerits
29. Care and management of Grower and Layers- vaccination schedule
30. Care and management of broilers-vaccination schedule
31. Incubation and hatching of eggs
32. Nutrition-feed formulation-composition of chick, grower, layer broiler- starter and Finisher mashes-Feed Conversion Ratio /dozen egg or kg of meat production
33. Classification of disease –viral – bacterial - protozoan- causative organisms, symptoms and prevention – viral diseases- Ranikhet – IBD-avian flu -
34. Bacterial disease-E.coli-coryza-salmonellosis-protozoan–coccidiosis-casuative organism, symptoms and preventive measures. Management of dead birds and manure

Practical Schedule

1. Study of External parts of livestock
2. Identification methods of livestock and poultry
3. Common restraining methods of livestock
4. Disbudding, Dehorning, castration and Dentition in cattle, sheep and goat
5. Study of type and design of livestock and poultry houses
6. Selection and judging of dairy cattle and work bullock
7. Estimation of specific gravity, fat percentage, total solids and solid not fat

8. Demonstration of cream separation
9. Identification of feed &fodder
10. Computation of rations for livestock. Formulation of concentrate mixtures
11. Economics of Dairy cattle, sheep goat and swine farming
12. Study of external parts of fowl Preparation of brooder house and chicks management & Identification of layer and non layer in poultry
13. Debeaking, delousing, deworming of poultry Vaccination schedule for broiler and layer
14. Economics of layer and broiler farming Demonstration of dressing of broiler
15. Hatchery layout and design. Demonstration of incubator and setter
16. Visit to a modern dairy and commercial layer and broiler farms
17. **Final Practical Examination**

Learning outcomes

- the ability to identify and manage different breeds, understand and implement proper housing, feeding, and reproduction strategies, and recognize and prevent common diseases.
- Students will also gain practical skills in daily farm operations, record keeping, and the economic and health aspects of animal husbandry

Text books

1. A Textbook of Animal Husbandry by G. C Banerjee
2. A text Book of Livestock Production management in Tropic by D. N. Verma

Reference

1. Handbook of Livestock & Poultry Production and Management: A comprehensive guide covering national economy, breeds, housing, and disease management.
2. A Text Book of Livestock Production And Poultry Management: Another foundational textbook for understanding the fundamentals of the field.
3. Poultry Science And Practice: A Textbook by N. Ghosh: A textbook that covers the scientific aspects of poultry science.
4. Storey's Guide to Raising Chickens by Gail Damerow: A popular and comprehensive guide for raising backyard chickens.
5. Commercial Chicken Meat and Egg Production: A book on modern commercial production methods.

Web Resources

- http://www.agritech.tnau.ac.in/animal_husbandry/animhus_index.html
- https://raubikaner.org/wp-content/themes/theme2/PDF/LPM-211.pdf
- https://agrimoon.com/wp-content/uploads/Livestock-Poultry-Management.pdf

PAT 101 Fundamentals of Plant Pathology (2 + 1)

Theory

Unit I: Plant Pathogenic organisms

Plant Pathology : definition, history – Pathogens : fungi, bacteria, virus, viroid, phytoplasma, Fastidious vascular bacteria, spiroplasma , algae and phanerogamic parasites – Koch's postulates - Types of parasitism - General characters of fungi - Pathogenesis- Role of enzymes and toxins in plant disease development – survival and spread of plant pathogens .

Unit II: Fungal taxonomy based on Kirk *et al.*, (2008)

Classification of **Kingdom – Protozoa** - important taxonomic characters and Symptoms and life cycle of *Plasmodiophora brassicae* - Classification of **Kingdom –Chromista**- General characters - Classification of Oomycetes .Symptoms and life cycle of *Pythium, Phytophthora* , *Perenospora, Plasmopara* and *Albugo* -Classification of **Kingdom– Chytridiomycota** and **Zygomycota** - important characters, symptoms and life cycles of *Rhizopus* -Classification of **Kingdom– Ascomycota**- important characters. Symptoms and life cycles of *Taphrina*, *Aspergillus*, *Penicillium*, Capnodium, *Erysiphe, Leveillula, Phyllactinia, Venturia Helminthosporium, Alternaria, Cercospora, Pyricularia , Curvularia, claviceps, Ustiloginoidea, Fusarium, Verticillium, Colletotrichum, Pestalotia, Macrophomina,* and *Botryodiplodia.* Classification of **Kingdom - Basidiomycota-** Symptoms and life cycles of *Puccinia ,Uromyces, Hemileia, Ustilago, Sporisoriuum*, *Urocystis ,* and *Tilletia* .Important taxonomic characters of *Ganoderma Agaricus, Pleurotus* and *Calocybe*. Symptoms and important characters of *Athelium,Rhizoctonia* and *Exobasidium*

Unit III: Bacteria, Candidatus phytoplasma, virus, viroid and algal parasites

Classification, general characteristics and symptoms of bacterial diseases, mode of entry and spread - General characteristics and symptoms of viral, viroid and phytoplasma diseases - General characters of algal parasite *Cephaleuros* and Phanerogamic parasites and non parasitic diseases

Unit IV: Epidemiology and plant disease management -

Epidemiology of crop diseases - role of weather factors in disease development. Survival and spread of plant pathogens - Disease surveillance and forecasting. Principles of Crop disease management – Prophylaxis : Exclusion, Eradication and direct protection and immunization : Cross protection and host plant resistance. Fungicides – classification – characteristics of an

ideal fungicide – group of fungicides – Non systemic and systemic. Formulations – methods of application of fungicides. Precautions and safety measures in handling of fungicides. Special methods of application

Unit V: Biological control and biotechnological approaches

Biological control of crop diseases and their scope – biocontrol agents – Fungi, bacteria, – use of plant products, anti-viral principles and biotechnological approaches in plant disease management. Integrated plant disease management

Practical

General characters of fungi – mycelium – spores – asexual, sexual, and vegetative spores-sexual and asexual fruiting body in fungi.Study of symptoms, host parasite relationship and systematic position of pathogens causing the following diseases. Study of important taxonomic characters and symptoms produced by *Plasmodiophora*, *PythiumPhytophthora*,*Plasmopara* ,*Peronospora, Albugo*, *Rhizopus, Taphrina, Capnodium,Cercospora,* (*Mycospaerella*), *Botryodiplodia* (*Botryosphaeria*), *Curvularia*, *Drechslera* (*Helminthosporium)*, *Alternaria, Venturia, Erysiphe*, *Leveillula,Phyllactinia*, *Uncinula*, *Fusarium* (*Gibberella ,Nectria*), *Verticillium ,Colletotrichum (Glomerella) Pestalotia (Pestalosphaeria), Macrophomina*, *Puccinia*, *Uromyces* , *Hemileia, Ustilago, Sporisorium, Urocystis , Tilletia, Exobasidium, Sclerotium, Rhizoctonia* (*Thanatephorus*) and *Ganoderma.* Taxonomic characters of *Agaricus*, *Pleurotus* and *Calocybe.* Symptoms of bacterial , phytoplasmal , viral and algal diseases, phanerogamic parasites and non-parasitic diseases.Diagnosis of Plant Pathogens. Various groups of fungicides and antibiotics - Preparation of Bordeaux mixture and Bordeaux paste – Preparation of fungicidal spray solution – Delivery of fungicides, Production of immunized seedlings in citrus – Biological control agents and their mass production – *Trichoderma,* and *Pseudomonas* - Methods of application of biocontrol agents – Preparation of botanicals – leaf extracts, oil emulsions and anti- viral principles

Theory Schedule

1. Definition of Plant Pathology – History of Plant Pathology
2. Causes of plant diseases – biotic , mesobiotic and abiotic causes– classification of plant diseases

3. General characters of fungi – thallus- asexual, sexual spores and vegetative resting structures – Asexual and sexual fruiting bodies.
4. Pathogenesis- Pre-penetration, Penetration and post penetration phases
5. Role of enzymes and toxins in plant disease development
6. Survival and spread of plant pathogens
7. Classification of Kingdom – *Protozoa* - important taxonomic characters and symptoms and life cycle of *Plasmodiophora brassicae*
8. Classification of Kingdom –*Chromista*- General characters - Symptoms and life cycle of *Pythium* and *Phytophthora*
9. Symptoms and life cycle of *Sclerospora*, *Plasmopara, and Albugo*
10. Classification of Phylum *Chytridiomycota* and *Zygomycota* - important characters, symptoms and life cycles of *Synchytrium* and *Rhizopus*
11. Classification of Phylum– *Ascomycota*- important characters
12. Symptoms and life cycles of *Taphrina*, *Aspergillus*, *Erysiphe, Leveillula* and *Phyllactinia*
13. Symptoms and important characters of *Capnodium*, *Helminthosporium, Alternaria, Cercospora,* and *Venturia,*
14. Symptoms and taxonomic characters of *Claviceps,Ustiologinoidea, Fusarium,Colletotrichum, Pestalotia, Macrophomina,* and *Botryodiplodia*
15. Classification of *Basidiomycota*- important characters-symptoms and life cycles of *Puccinia, Uromyces, Hemileia*
16. symptoms and life cycles of *Ustilago ,Sporisorium, Urocystis and Tilletia*
17. **Mid semester examination**
18. Symptoms and important characters of *Athelium, Thanatephorus* and *Exobasidium* and taxonomic characters of *Ganoderma, Agaricus, Pleurotus*, and *Calocybe*
19. Plant pathogenic bacteria- classification- general characters – symptoms *viz*., leaf spot, streak, blight, canker, scab, wilt, crown gall, ring rot, and soft rot.
20. General characters - Common symptoms of virus and viroid diseases – Chlorosis, mosaic, leaf curl, stripe, vein clearing, vein banding, crinkle, enation, necrosis, dwarfing, rossette, bunchy top, bract mosaic and twisting, cadang cadang of coconut and potato spindle tuber
21. General characters and symptoms of phytoplasma diseases – phyllody and little leaf, and algal parasite – *Cephaleuros and* Phanerogamic parasites – *Cuscuta, Orobanche*, *Loranthus* and *Striga*
22. Diagnosis of Plant Pathogens – ooze test, chemo-diagnosis, serodiagnosis (ELISA) and molecular diagnosis (PCR)

23. Epidemiology of crop diseases – role of climate change and weather factors on disease development- disease triangle and Disease tetrahedran
24. Disease surveillance, assessment and forecasting
25. Principles of disease management -exclusion – plant quarantine- domestic and international and embargo – Exotic diseases, phyto-sanitary certificate
26. Eradication – physical, chemical and cultural methods.
27. Protection – Fungicides- definition- classification of fungicides -characteristics of an ideal fungicide and precautions while handling fungicides
28. Groups of fungicides – copper fungicide and sulphur fungicide, heterocyclic nitrogen compound, quinones, and miscellaneous fungicides.
29. Systemic fungicides, New generation fungicides and Antibiotics
30. Methods of application of fungicides –basic and special methods and application equipment
31. Immunization – Cross protection -Types of resistance, vertical and horizontal resistance, mechanism of resistance - structural and chemical
32. Biological control – definition - mechanism of action – mass production of *Trichoderma asperellum* , *Pseudomonas fluorescens* & *Bacillus subtilis* - methods of application - plant products – antiviral principles – preparation – methods of application
33. Tissue culture and biotechnological approaches of crop disease management and tissue culture.
34. Integrated management strategies for plant diseases for seed , soil, air and vector borne diseases

Practical Schedule

1. General characters of fungi – Types of mycelium, asexual, sexual and vegetative spores – types of sexual and asexual fruiting bodies.
2. Study of symptoms, fungal characters and host parasite relationships of *Plasmodiophora brassicae* (club root), *Pythium* (damping off), *Phytophthora* (late blight)
3. Study of symptoms, fungal characters and host parasite relationships of *Sclerospora Plasmopara, Albugo* and *Rhizopus* (Jack fruit rot)
4. Study of symptoms, fungal characters and host parasite relationships of *Taphrina* (leaf curl), *Capnodium* (sooty mould), *Aspergillus, Penicillium, Venturia,* and *Botryodiplodia*
5. Study of symptoms, fungal characters and host parasite relationships of *Helminthosporium, Cercospora* (Leaf spot), *Alternaria* ((Leaf blight), and *Colletotrichum* (Anthracnose)

6. Study of symptoms, fungal characters and host parasite relationships of *Erysiphe, Leveillula* and *Phyllactinia* (powdery mildew)
7. Study of symptoms, fungal characters and host parasite relationships of *Fusarium*, *Claviceps*, *Ustiloginoidea* and *Macrophomina*
8. Study of symptoms, fungal characters and host parasite relationships of *Puccinia, Uromyces,* and *Hemileia* ,
9. Study of symptoms, fungal characters and host parasite relationships *Ustilago, Thanatephorus, Exobasidium, Ganoderma, Athelium, Agaricus, Pleurotus and Calocybe*
10. Symptoms of bacterial– leaf spot, blight, canker, scab, crown gall, wilt and soft rot and phytoplasma (little leaf, phyllody and spike), algal diseases – *Cephaleuros* and phanerogamic parasites
11. Viral diseases - Chlorosis, mosaic, vein clearing, vein banding, leaf crinkle and leaf curl, Enation, necrosis, dwarfing, rosette, bunchy top and bract mosaic
12. Field visit to expose the students for disease symptoms and assessment of plant diseases
13. Study of various groups of fungicides and Preparation of Bordeaux mixture and Bordeaux paste. Preparation of fungicidal spray solution.
14. Methods of application of fungicides – seed treatment, dry, wet – foliar spraying and soil drenching, root feeding, corm injection,trunk injection, capsule application, acid delinting, pairing and prolinage and post-harvest treatment.
15. Cross protection – Demonstration of production of immunized seedling against citrus tristeza and Preparation of leaf extracts, oil emulsion of neem and other botanicals and antiviral principles
16. Biocontrol agents – Mass production of *Trichoderma viride and Bacillus subtilis* and Meristem tip culture for virus free plantlets production
17. **Final Practical examination**

Note: Students should submit 50 well-preserved diseased specimens.

Learning Outcomes:

The students will gain knowledge on plant pathogenic microorganisms especially about the life cycle by which they can able to understand about management practices.

Text books

1. Agrios, G.N. Plant Pathology (2008). 5th Edition Academic Press, New York
2. Nene, Y.L. and Thapliyal, P. N. (1998). Fungicides in plant disease control. Oxford and IBH Publishing Co. Ltd., New Delhi.
3. Prakasam, V., T. Raguchander, and K. Prabakar, (1998). Plant Disease Management, A.E. Publication, Coimbatore.
4. Vidyasekaran, P. (1993). Principles of Plant Pathology, CBS Publishers and Distributors, New Delhi.
5. Alice, D. and Jeyalakshmi (2014). Plant Pathology, AE Publications, Coimbatore.

References

1. Agrios, G.N. (2005). Plant Pathology – (5th Edition). Academic Press, New York.
2. Richard N. Strange. (2003). Introduction of Plant Pathology - John Wiley & Sons Ltd, London
3. Dale Walters (2009).Disease control in crops. Blackwell Publishing Ltd, UK

Web Resources:

- https://agri-bsc.kkwagh.edu.in/uploads/department_course/PATH-_121_FUNDAMENTALS_OF_PLANT_PATHOLOGY.pdf
- https://agrimoon.com/wp-content/uploads/Fundamental-of-Plant-Pathology.pdf.pdf
- https://agritech.tnau.ac.in/pdf/Plant%20Pathology_%20Concepts%20and%20Laboratory%20Exercises_240401_114653.pdf

AGR 102 Fundamentals of Agronomy (2+1)

Theory

Unit I: Agronomy, Agroclimatic zones and Crops

Agriculture: Definition - importance and scope - branches of agriculture; Agronomy: Definition - art, science, business - meaning and scope of Agronomy - relationship of Agronomy with other disciplines of agricultural science; Agro-climatic zones of India and Tamil Nadu; Field crops and classification; Ecology and ecosystem.

Unit II: Tillage, Crop stand establishment, Crop growth and development

Tillage and tilth: Definition, objectives, types. Seeds and sowing: Definition of crop, variety and seed - methods of sowing - broadcasting, drilling, dibbling, transplanting; Factors affecting crop stand establishment: seed quality, proper tillage, seed rate, time and depth of sowing; Crop density and geometry - its effect on growth and yield; Growth and development of crops: Definition and meaning - stages of crop growth; Factors affecting growth and development - climatic - edaphic - biotic - physiographic and socio economic factors

Unit III: Crop Nutrition

Definition, classification of essential nutrients, criteria of essentiality - role of macro and micro nutrients; Nutrient absorption, active and passive absorption of nutrients, forms of plant nutrients absorbed by plants; Manures and fertilizers, nutrient use efficiency; Sources of nutrients: Inorganic (fertilizers), organic (manures) and bio-fertilizers - major classification and application methods; Integrated Nutrient Management (INM) - meaning, components and advantages of INM; Green manure and green leaf manures - definition, role in crop production - importance, advantages and limitations of green manuring

Unit IV: Water and weed management

Role of water in agriculture - water resources of the World, India and Tamil Nadu; Soil moisture constants: gravitational water, capillary water, hygroscopic water. Irrigation definition and methods of irrigation; Modern techniques of irrigation - drip and sprinkler Irrigation; Weeds: Definition, harmful and beneficial effects and major classification of weeds - crop weed competition; Weed control methods - cultural, physical, chemical and biological method; Integrated weed management; Allelopathy - meaning, types and importance in crop production

Unit V: Cropping system, sustainable agriculture and dry farming concepts

Cropping system: Classification of cropping systems; Factors affecting cropping pattern and cropping system in India; Sustainable agriculture - definition, objectives and importance – IFS; Natural resources conservation practices; Organic farming; Dry farming: Principles - classification - importance in Indian agriculture.

Practical

A visit to Instructional farm and identification of crops; Identification of seeds, manures, fertilizers, herbicides; Identification and study of different tillage, intercultural tools and implements; Practice of land configuration and nursery - ploughing/ puddling and

application of manures and fertilizers; Practicing different methods of seed treatments and sowing; Working out seed rate and plant population and fertilizer requirement of major field crops; Study and practice of inter cultural operations; Visit to compost production unit; Observing different irrigation methods; Identification of weeds; Study of growth and yield contributing characters and yield estimation of major field crops.

Lecture Schedule

1. Agriculture: Definition - importance and scope of agriculture in India - branches of agriculture
2. Agronomy: Definition - meaning and scope - Agronomy art, science and business of crop production - relationship of Agronomy with other disciplines of agricultural science
3. Agro - climatic zones of India and Tamil Nadu
4. Major agricultural seasons and rainfall pattern of India and Tamil Nadu
5. Agronomic classification of field crops
6. Ecology and ecosystem: Concept and types
7. Tillage and tilth: Definition - objectives and types of tillage - advantages and disadvantages
8. Modern concepts of tillage - merits and demerits
9. Seeds and sowing: Definition of crop, variety, and seed - methods of sowing - broadcasting, drilling, dibbling, transplanting
10. Factors affecting crop stand establishment: seed quality, proper tillage, seed rate, time and depth of sowing
11. Crop density and geometry - its effect on growth and yield – gap filling and thinning
12. Growth and development of crops: Definition - stages of crop growth
13. Factors affecting crop growth and development - climatic factors
14. Factors affecting growth and development: edaphic - biotic - physiographic and socio economic factors
15. Crop nutrition: Definition - classification of essential nutrients - criteria of essentiality – role of macro and micro nutrients
16. Nutrient absorption: Active and passive absorption of nutrients - forms of plant nutrients absorbed by plants
17. **Mid Semester Examination**

18. Sources of nutrients: Inorganic, organic and bio-fertilizers - classification - nutrient use efficiency
19. Integrated Nutrient Management (INM): Meaning, components and advantages of INM
20. Role of organic manures in crop production - time and methods of nutrient application
21. Green manure and green leaf manure: Definition - role in crop production -importance – advantages and limitations of green manuring
22. Role of water in agriculture - water resources of the World, India and Tamil Nadu
23. Soil moisture constants - gravitational water, capillary water, hygroscopic water – Water movement in soil
24. Irrigation: Definition - time and methods
25. Modern techniques of irrigation - drip and sprinkler irrigation
26. Weeds: Definition, harmful and beneficial effects - major classification of weeds - crop weed competition
27. Weed control methods: cultural, physical, chemical and biological methods - Integrated weed management
28. Allelopathy: Definition, types and importance in crop production
29. Cropping system: Cropping pattern, crop rotation - definition - classification of cropping system
30. Factors affecting cropping pattern and cropping system in India
31. Sustainable agriculture: Definition - objectives and importance – integrated farming system
32. Natural resources conservation practices for sustainable agriculture
33. Organic farming: Principles, practices and its importance
34. Dry farming: Concepts and principles - its importance in Indian agriculture

Practical Schedule

1. Visit to wetland farm and identification of crops
2. Visit to garden land, dry land farm and identification of crops
3. Identification of seeds, manures, fertilizers and herbicides
4. Identification and study of primary, secondary tillage and intercultural tools and implements

5. Practicing different methods of land configuration and nursery
6. Practice of ploughing/puddling and application of manures and fertilizers
7. Working out seed rate requirement of major field crops
8. Working out plant population of major field crops
9. Working out fertilizer requirement of major field crops
10. Practicing different methods of seed treatments and sowing
11. Study and practice of inter cultural operations
12. Visit to compost production unit
13. Observing and practicing different irrigation methods
14. Identification of weeds - wetland, garden land and dryland
15. Study of growth parameters of major field crops
16. Study of yield parameters and yield estimation of major field crops
17. Practical Examination

Learning Outcomes

- Students will gain the basic and fundamental knowledge of agronomy and exposed to various field crops and their intercultural operations

Text books

1. Thavaprakash N and Velayudham K.V. 2022. Fundamentals of Agronomy and Agricultural Heritage. Madras Agricultural Students Union Publishers, Tamil Nadu Agricultural University, Tamil Nadu.
2. Reddy Yellamanda T and Shankar Reddy GH. 2022. Principles of Agronomy. Kalyani Publishers, Ludhiana.

Reference

1. Reddy, S.R. 2022. Principles of Crop Production, Kalyani Publisher, Ludhiana.
2. Somasundaram.E and Mohamed Amanullah. 2018. Agronomy principles and practices. New India Publishing agency, New Delhi.
3. Handbook of Agriculture. 2015. Indian Council of Agricultural Research, New Delhi.

Web Resources

- www.icar.org.in
- http://icar.res.in

- www.eagri.org
- www.agrimoon.com
- www.agritech.tnau.ac.in

NSS 101 National Service Scheme -I (0+1)

Syllabus

Unit I: Youth leadership

Importance and role of youth leadership-Meaning, types and traits of leadership, qualities of good leaders-Life competencies, Definition and importance of live competencies, problem-solving and decision making interpersonal communication

Unit II: Youth development

Youth development programs-Development of youth programs and policy at the national level, state level and voluntary sector-Youth-focused and youth-led organizations

Unit III: Health, hygiene and sanitation

Health, hygiene and sanitation-Definition, needs and scope of health education-Role of food, nutrition, safe drinking water, water borne diseases and sanitation for health-Swachh Bharat Abhiyan activities

Unit IV: National health programms

National health programms and reproductive health-Youth health, lifestyle-HIV AIDS and first aid-Healthy lifestyles, HIV AIDS, drugs and substance abuse

Unit V: Home nursing and first aid

Home nursing and first aid.-Youth and yoga. History, philosophy, concept, myths and misconceptions about yoga-Yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method

Practical Schedule

1. Importance and role of youth leadership
2. Meaning, types and traits of leadership, qualities of good leaders;
3. Life competencies, Definition and importance of live competencies
4. Problem-solving and decision making interpersonal communication.
5. Youth development programs
6. Development of youth programs and policy at the national level, state level and voluntary sector
7. Youth-focused and youth-led organizations
8. Health, hygiene and sanitation. Definition, needs and scope of health education
9. Role of food, nutrition, safe drinking water, waterbornediseases and sanitation for health
10. Clean India Mission(Swachh Bharat Abhiyan)activities
11. National health programms and reproductive health

12. Youth health, lifestyle, HIV AIDS and first aid
13. Healthy lifestyles, HIV AIDS, drugs and substance abuse
14. Home nursing and first aid
15. Youth and yoga-History, philosophy, concept, myths and misconceptions about yoga
16. Yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method.
17. **Final Practical Examination**

Learning Outcomes

- The primary learning outcomes of theNational Service Scheme (NSS)are the development ofsocial and civic responsibility,a deeper understanding of the community, improved leadership and teamwork skills, enhanced problem-solving and communication abilities, and a greatercapacity to developpractical solutions to community issues

References

- **https://nss.gov.in/**

NCC 101 National Cadet Corps (NCC) – I (0+1)

Practical

Drill and introductory to arms - Weapon Training - Map Reading, Field Craft, and Battle Craft Essentials- Field Defences, Watermanship and Terrain Management- Small-Unit Tactics and Tactical Communications in NCC Training

Unit 1: Drill and introductory to arms

Arms Drill – Attention, stand at ease, stand easy, getting on parade, dismissing, and falling out. Ground/take up arms, examine arms. Shoulder from the order and vice-versa, present from the order and vice-versa. Saluting at the shoulder at the halt and on the march. Short/long trail from the order and vice-versa. Guard mounting, guard of honor, Platoon/Coy Drill.

Unit 2: Weapon Training

Characteristics of rifle (.22/.303/SLR), ammunition, fire power, stripping, assembling, care, cleaning, and sight setting. Loading, cocking, and unloading. The lying position and holding. Trigger control and firing a shot. Range Procedure and safety precautions. Aiming and alteration of sight. Theory of groups and snap shooting. Firing at moving targets. Miniature range firing. Characteristics of Carbine and LMG.

Unit 3: Map Reading, Field Craft, and Battle Craft Essentials

Introduction to map, scales, and conventional signs. Topographical forms and technical terms. The grid system. Relief, contours, and gradients. Cardinal points and finding north. Types of bearings and use of service protractor. Prismatic compass and its use. Setting a map, finding north and own position. Map to ground and ground to map. Knots and lashings, Camouflage and concealment, Explosives and IEDs.

Unit 4: Field Defences, Watermanship and Terrain Management

Field defences, obstacles, mines and mine laying. Bridging, watermanship. Field water supplies, tracks and their construction. Judging distance. Description of ground and indication of landmarks. Recognition and description of target. Observation and concealment.

Unit 5: Small-Unit Tactics and Tactical Communications in NCC Training

Field signals. Section formations. Fire control orders. Fire and movement. Movement with/without arms. Section battle drill. Types of communication, media, latest trends and developments.

Practical Schedule

1. Arms Drill – Attention, stand at ease, stand easy, getting on parade, dismissing, and falling out.
2. Ground/take up arms, examine arms. Shoulder from the order and vice-versa, present from the order and vice-versa.
3. Saluting at the shoulder at the halt and on the march. Short/long trail from the order and vice-versa.
4. Guard mounting, guard of honor, Platoon/Coy Drill.
5. Characteristics of rifle (.22/.303/SLR), ammunition, fire power, stripping, assembling, care, cleaning, and sight setting.
6. Loading, cocking, and unloading. The lying position and holding.
7. Trigger control and firing a shot. Range Procedure and safety precautions.
8. Aiming and alteration of sight. Theory of groups and snap shooting. Firing at moving targets. Miniature range firing.
9. Characteristics of Carbine and LMG.
10. Introduction to map, scales, and conventional signs. Topographical forms and technical terms.
11. The grid system. Relief, contours, and gradients. Cardinal points and finding north. Types of bearings and use of service protractor.
12. Prismatic compass and its use. Setting a map, finding north and own position. Map to ground and ground to map. Knots and lashings, Camouflage and concealment, Explosives and IEDs.
13. Field defenses, obstacles, mines and mine laying. Bridging, watermanship. Field water supplies, tracks and their construction.
14. Judging distance. Description of ground and indication of landmarks. Recognition and description of target. Observation and concealment.
15. Field signals. Section formations. Fire control orders. Fire and movement. Movement with/without arms. Section battle drill.
16. Types of communication, media, latest trends and developments.
17. **Final Practical Examination**

Learning Outcomes

- Develop discipline, drill skills, and knowledge of NCC organization.

- Enhance leadership, personality, and sense of national integration.
- Apply social service, health, and environmental awareness in community.

Text books

1. Handbook of NCC Cadets for 'A', 'B' and 'C' Certificate Examinations,
2. Cadet's Handbook (Army Wing),

Reference

1. Gupta, R. K. (2020). *Handbook of NCC Cadets for 'A', 'B' and 'C' Certificate Examinations*. Ramesh Publishing House. ISBN: 978-9387918573.

2. St. Joseph's College of Engineering and Technology. (2022). *Cadet's Handbook (Common Subjects for All Wings)*. SJBIT Publication.

Web Resources

- https://en.wikipedia.org/wiki/National_Cadet_Corps_(India)
- https://indiancc.mygov.in/
- https://mybharat.gov.in/Gov/Department/national-cadet-corps

PED 101 Physical Education, First Aid, Yoga Practice and Meditation (0+2)

Syllabus

Asanas – Suryanamskar – Pranayama – Meditation. Asanas – Pranayama. Asanas – Mudras. Role of Yoga in Sports.

Practical Schedule

Class 1 to 4	:	Asanas: Definition and Importance, Padmasan, Gaumukhasan, Hadrasan, Vajrajasan, Shashankasan, Halasan, Sarpasan, Ardhdhanurasan
Class 5 to 8	:	Asanas: Pashchimotasan, Ushtrasan, Tadasan, Padhastasan, Ardhchandrasan, Bhujangasan, Utanpadasan, Sawasan
Class 9 to 12	:	Suryanamskar Pranayama (Definition and Importance)
Class 13 to 16	:	Meditation (Demonstration)
Class 17 to 20	:	Pranayama: Shitali, Shitkari, Bhastrika, Bhramari, Omkar, Suryabhedan, Chandranbhedan, AnulomVilom
Class 21 to 24	:	Yogic Kriyas (Kapalbhati), Tratak, Jalneti and Tribandh
Class 25 to 28	:	Asanas: Sarvangasan, Parvatasan, Patangasan, Shishupalanasan - left leg-right leg, Pavanmuktasan.
Class 29 to 32	:	Mudras: (Definition and Importance) Gyanmudra, Dhyanmudra, Vayumudra, Akashmudra, Pruthvimudra, Shunyamudra, Suryamudra, Varumudra, Pranmudra, Apanmudra, Vyanmudra, Uddanmudra
Class 33 & 34	:	Role of yoga in sports and Teaching of Asanas - Demonstration, practice, correction and practice

Learning Outcome:

By the end of the course students will be able to:

- Develops flexibility, strength, and balance through regular practice of asanas.
- Enhances concentration, attention, and memory.
- Reduces stress, anxiety, and mental fatigue through relaxation techniques and meditation.
- Helps students connect with their inner self and understand the mind–body–spirit relationship.

References:

1. Satyananda, S. 1996. *Asana, pranayama, mudra and bandha.* Yoga Publications Trust. Pages 543.

2. Vishnudevananda, S. 1960. *The complete illustrated book of yoga.* Bell Publishing / Julian Press. Pages 359.
3. Smith, M. J. N. 2019. *An illustrated guide to asanas and pranayama.* Krishnamacharya Yoga Mandiram. Pages 205.
4. Nagarathana, R., & Nagendra, H. R. 2018. *Yoga – breathing practices: Asana and pranayama, mudras, bandhas and kriya, meditation.* Swami Vivekananda Yoga Prakashana. Pages 134.

Skill Enhancement Courses (SEC) for First & Second Semester

S.No	Course Code	Course Title	Credit Hours	Remarks
I	**SEC I & II**	**List of Courses**		
1	AEN 121	Bee Keeping	2 (0+2)	• Students can select any one course based on their interest or the course will be allotted based on the +2 Aggregate marks • Minimum number of students required to offer a course will be 20 and maximum number per course will be 40 students
2	AEN 122	Commercial Sericulture	2 (0+2)	
3	AGR 121	Organic inputs preparation techniques	2 (0+2)	
4	SAC 121	Soil, Plant and Water Testing	2 (0+2)	
5	FSN 121	Bakery Technology	2 (0+2)	
6	FSN 122	Processing and Value-addition of Fruits and Vegetable Products	2 (0+2)	
7	HOR 121	Nursery Production in Horticulture Crops	2 (0+2)	
8	HOR 122	Orchard Floor Management	2 (0+2)	
9	HOR 123	Landscape Gardening	2 (0+2)	
10	ARM 121	Entrepreneurial Skills for Agribusiness	2 (0+2)	
11	GPB 121	General morphology and Pollination techniques in Agricultural crops	2 (0+2)	
12	SST 121	Seed production technology	2 (0+2)	
13	AMP 121	Broiler Production	2 (0+2)	
14	PAT 121	Commercial Mushroom Production	2 (0+2)	

AEN 121 Bee Keeping (0+2)

Practical

UNIT I: Bee species, castes and social life

Honeybee species, castes and biology; morphology and structural adaptations; behaviour; communication; colony organization; pollen and nectar pasturage crops; role of honey bees in crop pollination

UNIT II: Bee Keeping equipment's and apiary establishment

Bee hives and bee keeping appliances; comb foundation mill; visit to bee keeping equipment manufacturing unit; site selection and establishment of a Apiary; hive inspection and maintenance of hive records; Meliponiculture; hiving Indian bee and stingless bee feral colony

UNIT III: Apiary maintenance

Dividing and uniting of honey bee colonies; artificial feeding of nectar and pollen; seasonal management; management of swarming, absconding and laying workers; pests and diseases of honey bees and their management; protecting bees from pesticides, migratory bee keeping,

UNIT IV: Bee products

Honey extraction, processing, purity testing and value addition, mass queen rearing, collection of pollen, bee venom and other bee products and their uses.

UNIT V: Bankable project

Visit to Honey FPOs; Preparation of bee keeping projects for bank funding and its economics

Practical Schedule

1. Identification of Honey Bee Species, Bee castes and Biology
2. Honey bee morphology and structural adaptations
3. Bee Behaviour
4. Bee communication – dance and pheromones
5. Colony Organization in Honey Bees
6. Pollen and nectar pasturage crops in bee keeping
7. Preparation of floral calendar
8. Role of Honey Bees in Crop Pollination
9. Bee Hives and bee keeping appliances
10. Production Protocol of Comb Foundation Sheet in Comb Foundation Mill
11. Visit to bee keeping equipment manufacturing unit
12. Site selection and establishment of a Apiary

13. Hive inspection and maintenance of hive records
14. Hiving Indian bee feral colony
15. Meliponiculture
16. Hiving Stingless bee feral colony
17. **Mid semester Examination**
18. Artificial feeding of nectar and pollen during dearth period
19. Dividing and Uniting of honey bee colonies
20. Seasonal Management of Honey Bees
21. Management of swarming, absconding and laying workers
22. Insect pests of honeybees and their management
23. Non-Insect pests of honeybees and their management
24. Identification of diseases of honeybees and their management
25. Bee poisoning and management
26. Migratory bee keeping and visit to migratory bee keeping site
27. Honey extraction and processing
28. Purity testing and value addition of honey
29. Bee pollen, bee venom (Apitherapy) – collection and uses
30. Other bee products- Bee wax, propolis and royal jelly – collection and uses
31. Mass queen rearing techniques
32. Visit to Honey FPOs
33. Preparation of bee keeping projects for bank funding and its economics
34. **Final Practical Examination**

Learning outcomes

- Students would acquire knowledge and skills in handling honeybees in a apiary.
- Students would be motivated to take apiculture as an entrepreneurial venture

Text books

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 & Pollination. KalyaniPublishers, Ludhiana. 394 p.
3. Ted Hooper, 1991. Guide to Bees and Honey (Thrid Edition), BASprintersltd. OverWallop, Hampshire271 p.

Reference

1. Roger A. Morse, 1994. The new complete guide to beekeeping. *The* CountrymanPress*,* Woodstock*,* Vermont. 207p.
2. Thomas D.Seeley.1995.The Wisdom of the Hive, Harvard University Press, Cambridge, 295p.
3. வா.ரா.சாமிநாதன், ச.சௌமியா, ஓ.ஹென்றி பிரான்சிஸ். 2025. லாபம் தரும் தேனீ வளர்ப்பு- வங்கிகடனுதவி மற்றும் அரசு மானிய திட்டங்கள் பதிப்பகம்: நியூ செஞ்சுரி புக்ஹவுஸ் , சென்னை 246 ப. (தமிழ்)

Web Resources

- http://agritech.tnau.ac.in/farm_enterprises/fe_apiculture_home.html
- http://agdev.anr.udel.edu/maarec/
- http://www.aragriculture.org/insects/beekeeping.htm
- https://scientificbeekeeping.com
- http://beekeeping.com/; http://www.apimondia.com/en

AEN 122 Commercial Sericulture (0+2)

Practical

Unit I: Mulberry Cultivation

Mulberry varieties - Host plants of non-mulberry silkworms - Preparation of land, planting material and planting of mulberry -Pruning, harvesting, and storage of mulberry - Mulberry pests and diseases

Unit II: Silkworm Biology

Identification of cocoons of important breeds - External morphology of life stages: egg, larva, pupa, and moth of *Bombyx mori* L. - Study of silk glands and digestive system of *Bombyx mori* L.

Unit III: Disinfection and Grainage

Disinfectants: rearing bed and general disinfectants - Grainage techniques - Study of rearing house plan and equipment for shoot feeding and shelf rearing

Unit IV: Rearing Techniques

Methods of incubation of silkworm eggs and brushing - Identification of silkworms: settling for moult, at moult, and out of moult - Feeding, bed cleaning, and spacing - Identification and picking of ripe silkworms - Mounting and types of mountages

Unit V: Post-Cocoon Operations

Cocoon harvesting and grading - Pests and diseases of mulberry silkworm - Single cocoon reeling - Study of reeling equipment

Practical schedule

1. Identification of mulberry varieties – V1, G4, MR2, S36 and G2
2. Identification of host plants of Eri silkworm – Castor, Papaya and Jatropha
3. Identification of host plants of Tasar and muga silkworms – *Terminalia* spp., Som and Soalu
4. Mulberry garden - Preparation of land, planting material and
5. Planting and planting methods
6. Mulberry – Pruning methods, harvesting and storage of leaf and shoots
7. Identification of insect pests of mulberry, damage symptoms and management
8. Identification of diseases of mulberry, causal organism, damage symptoms and management
9. Identification of cocoons of important silkworm breeds
10. External morphology of life stages egg, larva, pupa and moth of *Bombyx mori* L

11. Study of silk glands of *Bombyx mori* L
12. Study of digestive system of mulberry silkworm
13. Disinfectants - Rearing bed and general disinfectants – Ideal characters of disinfectants
14. Preparation of disinfection solution and disinfection of rearing house and appliances
15. Grainage techniques – Card egg production
16. Preparation of loose eggs of hybrid silkworm
17. **Midsemester Examination**
18. Study of silkworm rearing house – Plan, structure and cost estimates for shoot feeding and shelf rearing
19. Study of silkworm rearing equipments for shoot feeding and shelf rearing
20. Methods of incubation of silkworm eggs
21. Brushing of silkworm larvae – Card eggs and loose eggs – Incubation frame
22. Identification of silkworm settling for moult, at moult and out of moult
23. Feeding of silkworm larvae, bed cleaning and bed space maintenance
24. Identification and picking of ripe silkworms
25. Mounting techniques and types of mountages
26. Cocoon harvesting, sorting and grading
27. Identification of pests of mulberry silkworm, damage symptoms and management
28. Identification of diseases of mulberry silkworm and management
29. Single cocoon reeling – Epprovette / Single cocoon reeler
30. Study of reeling equipments – Charkha, Multiend reeling machine and Automatic Reeling unit
31. Visit to Chawki Rearing Centre (CRC) to study the chawki rearing techniques and record maintenance
32. Visit to progressive farmers field - Mulberry garden and silkworm rearing unit
33. Visit to silk reeling unit
34. **Practical Examination**

Text books

1. Dandin, S.B. and Giridhar, 2010, Handbook of Sericulture Technologies. CSB, Bengaluru, P.427.
2. Ganga, G. and Sulochana Chetty, J., 1991, An Introduction to Sericulture. Oxford and IBH, New Delhi, P. 176.
3. Govindan, R., Narayanaswamy, T.K. and Devaiah, M.C., 1998, Principles of Silkworm

4. Pathology. Seri Scientific Publishers, P. 420.
5. Rangaswami, G., Narasimhanna, M.N., Kasivishwanathan, K., Sastry, C.S. and Jolly, M.S., 1979, Mulberry cultivation. FAO Manual, Vol. I, FAO, Rome, pp. 99-129.
6. Krishnaswami, S., Narasimhanna, M.N., Suryanarayan, S.K. and Kumararaj, S., 1979, Silkworm Rearing. FAO Manual, Vol. II, FAO, Rome, pp. 99-129.

Reference

1. Krishnaswami, S., Madhava Rao, N.R., Suryanarayan, S.K. and Sundaramurthy, T.S., 1972, Silk Reeling, FAO Manual, Vol. III, FAO, Rome, pp. 112.
2. Narayanaswamy, K.C. and Devaiah, M.C., 1998, Silkworm Uzi Fly. Zen Publishers, Bengaluru, P 232.
3. Nataraju, B., Sathyaprasad, K., Manjunath, D. and Aswani Kumar, C., 2005, Silkworm Crop Protection. Central Silk Board, Bengaluru, pp.1 – 324.
4. Mahadevappa, V. G. Haliyal, D.G. Shankar and Ravindra Bhandiwad, Mulberry silk reeling technology. Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi. 2000.

Web resources

- www.csb.gov.in/
- www.tnau.ac.in/
- www.csrtimys.res.in/

AGR 121 Organic Inputs Preparation Techniques (0+2)

Practical

UNIT I: Organic Nutrient Sources and Composting

Quantification of cow dung and cow urine recovery per animal; nutrient composition analysis; Assessment of storage methods; Collection, segregation, shredding, and quantification of farm wastes for compost preparation; pre-digestion and preparing bio-compost and vermicompost; FCO standards; Enriched organic manure/compost preparation; Compost maturity of FAO standards.

UNIT II: Green Manures and Organic Formulations

Quantification of biomass for different green manures and green leaf manures; multivarietal seed technique; Preparing liquid formulations of Panchagavya, fermented extracts from various sources and Effective Microorganisms (EM).

UNIT III: Biofertilizers and Bioinoculants

Mass multiplication and use of PPFM and liquid bioinoculants; Mass multiplication and use of bioinoculants for crop application; Mass production of Arbuscular Mycorrhizal Fungi (AMF); Biodiversity assessment techniques

UNIT IV: Weed and Pest Management in Organic Farming

Integrated organic weed and pest management; Experiencing mulching techniques in weed management; Preparation and application of herbal leaf and fermented extracts in pest and disease management; Monitoring of insect pests through traps and lures; Biodiversity assessment techniques

UNIT V: Organic Certification and Post-Harvest Management

Organic certification procedures – importance, scope, and documentation; Post-harvest management, value addition, and supply chain management in organics; Role of FPOs.

Practical Schedule

1. Quantification of cow dung and cow urine recovery per animal
2. Quality and nutrient composition analysis of cow urine and cow dung
3. Assessment of storage methods with temperature, nutrient, and microbial load in manure pits.

4. Collection, segregation, shredding and quantification of farm wastes
5. Pre-digestion of various farm wastes for composts preparation
6. Preparing bio-compost from farm wastes and quality increase to match FCO standards
7. Preparing vermicompost
8. Assessing the quality of various composts
9. Enriched organic manure/compost preparation
10. Harvest and assessment of compost maturity indices against FAO standards.
11. Quantification of biomass for different green manures and green leaf manures
12. Nutrients composition analysis of green manures and green leaf manures
13. Multi-varietal seed technique (Navadhanya) for soil quality improvement
14. Preparing the liquid formulations of *Panchagavya*, and effective microorganisms
15. Preparing the fish and egg fermented extracts
16. Mass multiplication and use of biofertilizers, Liquid bioinoculants and PPFM
17. **Mid Semester Examination**
18. Mass production of Arbuscular Mycorrhizal Fungi
19. *Insitu* (Field) soil health assessment techniques
20. Exposure visit to organic farming farmer's field
21. Integrated organic weed management techniques
22. Experiencing mulching techniques in weed management
23. Integrated organic pest management
24. Preparation and application of herbal leaf extracts in insect management
25. Preparation and application of herbal /fermented extracts in disease management
26. Monitoring of insect pests through traps and lures
27. Importance and establishment of pest repellent cafeteria
28. Biodiversity assessment techniques
29. Organic certification procedures
30. Post-harvest management and value addition of organic produces
31. Supply chain management in organic agriculture
32. Role of FPOs in organic agriculture, Opportunities for entrepreneurship development
33. Exposure visit to TNOCD unit/FPOs / Organic inputs producing industries
34. **Final Practical Examination**

Learning Outcomes

- Students learn to quantify organic nutrient resources, manage composting systems, assess quality, and standardize products for marketability.
- Ability to produce and utilize traditional and scientific organic formulations for enhancing soil fertility and crop performance.
- Students acquire microbial culture handling, multiplication, and field application techniques for different biofertilizers.
- Hands-on knowledge of eco-friendly weed suppression, botanical pest control, and pest monitoring for organic crop protection.
- Students gain awareness of certification processes, market standards, value addition, and entrepreneurship opportunities in organics.

Textbooks

1. M. Suganthy B. Renuka Rani N R Sharma. 2023. Natural Farming for Sustainable Agriculture. E-book published by Hyderabad: National Institute of Agricultural Extension Management (MANAGE). ISBN: 978-81-19663-10-1
2. S.S. Walia, Tamanpreet Kaur & N Ravisankar. 2025. Principles and Practices of Natural Farming. Scientific Publishers. ISBN9789363461079. https://www.scientificpubonline.com/bookdetail/principles-practices-natural-farming/9789363461079/0
3. Palaniappan, S. P. (2018). Organic farming: Theory and practice. Scientific Publishers. ISBN: 978-8172335380. https://www.scientificpubonline.com/bookdetail/organic-farming-theory-practice/9788172335380/0
4. Suganthy, M., P. Janaki, R. Krishnan, P. Balasubramaniam, S. Lakshmi, S. Susikaran, P. Kumaresan. 2025. Organic Farming. Directorate of Open and Distance Learning, TNAU, Coimbatore. TNAU Offset Press, 56p, ISBN. 978-93-93563-41-5.
5. M. Suganthy, P. Janaki, E. Parameswari, R. Krishnan, M. Ramasubramanian, P. S. Kavitha, and M. K. Kalarani. 2023. "Natural Farming: present status and Future prospectus. Published by Darshan Printers, 6A, Pudhukinar Street, P.N. Pudur, Coimbatore. ISBN. 978-93-92032-93-6. P. 487.
6. Kavitha, P.S, M. Suganthy, E. Parameswari, M. Ramasubramanian, P. Janaki, M. Kavino, R. Krishnan and M. K. Kalarani. 2024.Futuristic strategies and options for profitable organic farming. Dharshan Printers, Coimbatore, 463p. ISBN: 978-93-92032-76-9.

Reference

1. Reddy, T. R. (2019). *Soil fertility and nutrient management*. New Age International. ISBN: 978-1032429298.
2. Subba Rao, N. S. (2019). *Biofertilizers in agriculture and forestry* (3rd ed.). Oxford & IBH Publishing. ISBN: 978-8120407916.
3. Jaiswal, P. K., & Gaur, R. K. (2020). *Organic farming and sustainable agriculture*. Agrobios. ISBN: 978-9388892117.
4. Malik, R. K. (2018). *Composting and organic fertilizers*. Scientific Publishers. ISBN: 978-9381095140.
5. Ramesh, C. (2021). *Handbook of organic farming and certification*. New India Publishing Agency. ISBN: 978-9388892124.
6. Singh, R., & Saini, M. S. (2017). *Integrated pest management in organic farming*. Agrobios. ISBN: 978-9383415331.
7. Sharma, S. K. (2018). *A handbook of organic farming*. Agro-Bios. ISBN: 978-8177540994.
8. Kristiansen, P. (2020). *Organic farming: Science and practice*. Acram Publishers. ISBN: 978-9388892124.
9. Food and Agriculture Organization**. (2022).** *FAO organic standards & guidelines*. FAO.

Web Resources

- https://www.fao.org/organicag/oa-faq/oa-certification/en/
- https://www.amazon.com/Organic-Farming-Science-Practice-Kristiansen/dp/938889212X
- https://agrobiosdigitals.com/ebookchapters.php?bx===AUVZ0cWtGZXJFbaNVTWJVU&ChapterView=1
- https://www.researchgate.net/publication/387819808_Integrated_Insect_Pest_Management_in_Organic_Farming
- https://www.biblio.com/book/organic-farming-farming-systems-sustainable-agriculture/d/1614935503?srsltid=AfmBOorlC4QeHU6d7Iab0D424eHSgum9gkpz8copVd3Lh5LaevbCiQ0Y
- https://www.abebooks.com/9789381095140/Composting-Organic-Fertilizers-Malik-R-9381095146/plp
- https://www.satishserial.com/book/9789388892117/organic-farming-and-farming-systems-for-sustainable-agriculture
- https://archive.org/details/biofertilizersin0000subb
- https://www.walmart.com/ip/Soil-Fertility-and-Nutrient-Management-Principles-and-Practices-Hardcover-9781032429298/1118374774

SAC 121 Soil, Plant and Water Testing (0+2)

Practical

Unit I: Collection of soil sample

Collection of representative soil sample- processing and storage. Determination of soil density - bulk density (wax coating method) and particle density (cylinder method), Determination of Soil moisture content. Determination of soil colour. Determination of soil texture by feel method and Bouyoucos Hydrometer method. Determination of Hydraulic conductivity.

Unit II: Preparation and standardization of laboratory reagents

Preparation and standardization of laboratory reagents: acidimetry, alkalimetry. Preparation of indicators and buffers. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Estimation of soil organic Carbon. Determination of lime requirement of acid soil. Determination of gypsum requirement of sodic soil. Estimation of soil available Macronutrients (N, P and K), secondary nutrients (Ca, Mg and S) and Micronutrients.

Unit III: Plant analysis

Plant analysis: collection of plant samples and processing. Digestion of plant sample - preparation of diacid and triacid mixture. Estimation of total nutrients in plant samples: nitrogen, phosphorus, potassium, calcium and magnesium, sulphur and micronutrients.

Unit IV: Irrigation water

Irrigation water: collection of different types of irrigation water samples. Irrigation water analysis: estimation of pH and EC, TSS and hardness of irrigation water. Estimation of cations: calcium, magnesium, sodium and potassium. Estimation of anions in irrigation water: carbonate and bicarbonates, chlorides sulphate and boron. Estimation of Micronutrients (Mn, Fe, Zn and Cu). Classification of irrigation waters as per USSL and other systems. Computation of salts (RSC and SAR), Water quality indices and appraisal.

Unit V: Interpretation

Interpretation of soil, plant and water test results with crop response; Soil Test based recommendations, DISSIFER, VDK, Preparation of soil health cards. Scope of establishing soil testing and water testing laboratories. Accreditation and quality control measures. Entrepreneurship opportunities in soil, plant and water testing advisory services in agriculture. Visit to soil testing laboratory (STL).

Practical schedule

1. Collection of representative soil, plant and water samples- processing and storage
2. Determination of soil density and interpretation
3. Determination of Soil moisture, colour and their interpretation & soil texture by feel method and Bouyoucos Hydrometer method
4. Determination of Hydraulic conductivity and ratings
5. Preparation and standardization of laboratory reagents: acidimetry, alkalimetry
6. Preparation of indicators and buffers. Determination of soil pH and electrical conductivity and interpretation
7. Determination of cation exchange capacity of soil and interpretation
8. Estimation of organic carbon content of soil and ratings
9. Determination of lime requirement of acid soil & gypsum requirement of sodic soil - interpretation and reclamation
10. Estimation of soil available Nitrogen
11. Estimation of soil available Phosphorus (Bray and Olsen' P) and Potassium
12. Estimation of Exchangeable Ca and Mg and soil available S
13. Estimation of DTPA Extractable Micronutrients
14. Digestion of plant sample - preparation of diacid and triacid mixture: Estimation of total nutrients in plant samples: Nitrogen
15. Estimation of total nutrients in plant samples :Phosphorus and Potassium
16. Estimation of total nutrients in plant samples: Calcium and magnesium
17. **Mid Semester Examination**
18. Estimation of total nutrients in plant samples: Sulphur and micronutrients.
19. Rapid tissue tests for plant nutrient analysis
20. Irrigation water analysis- estimation of pH and EC, TSS, hardness and rating
21. Irrigation water analysis: estimation of cations (Calcium and Magnesium) and rating
22. Irrigation water analysis: estimation of cations (Sodium and Potassium) and rating
23. Irrigation water analysis: estimation of anions (Carbonate and bicarbonates) and rating
24. Irrigation water analysis: estimation of anions (Chlorides) and rating
25. Irrigation water analysis: estimation of anions (Sulphate) and rating
26. Irrigation water analysis: estimation of Micronutrients (Mn, Fe, Zn, Cu & B) and rating
27. Classification of irrigation waters as per USSL and other systems.

28. Computation of salts, Water quality indices and appraisal
29. Analytical advisory services : Soil test based recommendations, DISSIFER & VDK
30. Preparation of soil health cards and recommendations
31. Establishing Startups - soil and water testing - Accreditation and quality control measures
32. Entrepreneurship opportunities in soil testing advisory services-
33. Visit to Soil testing laboratory
34. Practical Examination

Learning outcomes

Provides skill based module on soil, plant and water testing in agriculture. Develop skills to sustainably manage soil and water resources to enhance agricultural productivity and environmental sustainability. Provides competency to establish startup and operate Soil, Plant and Water Testing Laboratory

Textbooks

1. BaruahJ.C and D.K.Patgiri. 1996. Physics and Chemistry of Soils, New Age International Publications
2. Garison Sposito, 2008. The Chemistry of Soils. Oxford University Press, USA
3. Black, C.A. 1965. Agronomy Monograph. Methods of Soil Analysis. Part 1. Physical and Mineralogical properties including Statistics of Measurement and Sampling. Wiley, New York.

References

1. Hessee, P.R. 1971. A Text book of Soil Chemical Analysis. John Murray (Publishers) Ltd. London
2. Jackson, ML. 1973. Soil Chemical Analysis. Prentice Hall Pvt.Ltd
3. Thiyageshwari, S., M.V. Sriramachandrasekharan and D. Selvi., 2015. Fundamentals of Soil Inventory, Problem Soils and Irrigation water. Jaya Publishing House, New Delhi (ISBN: 978-9384337-438).

Web Resources

- ftp:/ftp.fao.org/agl/agll/docs/fpnb19.pdf
- http://www.agric.gov.mt/soil-and-irrigation-water-lab
- www.soiltesting.okstate.edu/
- www.texasplantandsoillab.com/
- www.ulm.edu/spal/
- soilhealth.cals.cornell.edu/extension/.../managing_constraints.pdf
- cnal.cals.cornell.edu/
- http://agritech.tnau.ac.in/agriculture/agri_reosurcemgt_soil_soilcontraints.html
- http://edis.ifas.ufl.edu/topicjertilization

FSN 121 Bakery Technology (0+2)

Practical

Introducing tools and equipments used in bakery unit. Quality evaluation of ingredients - Methods and Types of bakery products – Yeast based products (Bread and Bun), Cake, Cookies, Puffs, Rusk Doughnut and Therapeutic bakery foods. Icing and Cake Decorations - Quality evaluation of bakery products. Commercial and Cost of production of bakery products – Layout and Establishment of Bakery Unit.

UNIT I: Fundamentals of Bakery Ingredients and Equipment

Identification of bakery tools and equipment. Introduction to Bakery Ingredients - flour, sugar, leavening agent, shortening agent, egg, water, colouring and flavouring agents, improvers, and preservatives. Quality Evaluation of Flour - gluten content, water absorption capacity, moisture, and ash content.

UNIT II: Bread and Bun Technology

Different methods of bread preparation: straight dough,sponge–dough. Different types of bread preparation: white bread, wheat bread, milk bread, sweet bread, fruit bread, milletbread, multi-grain bread,and garlic bread. Methods of bun preparation - Straight dough and Sponge dough method, Types of bun preparation –Bun, cream bun, masala bun and stollen.Processing technology of coconut bun and butter bun.

UNIT III: Cake and Icing Technology

Different methods of cake preparation - the Cream method and the all-in-one method. Types of cake preparation – Sponge cake, tea cake, angel cake, plum cake, eggless cake and cupcake. Icing- Butter Icing and Royal icing. Cake decoration- Fondants and fudge. Preparation of fresh cream cake and frosting.

UNIT IV: Cookies, Pastries, and other Bakery Products

Different methods of cookies preparation- drop and sheet method. Types of cookies- Maida cookies, wheat cookies, millet cookies, composite flour cookies, coconut cookies, peanut cookies, salt cookies and chilly cookies. Method of preparation of pastry – Puff, Flaky pastry. Preparation of Naan kattai, vanilla buttons,puffs – vegetable, egg and mushroom puff; Khari – Sweet and Spices; Sweet Doughnut, Chocolate Doughnut; and Rusk – Milk and Millet Rusk.

UNIT V: Quality Evaluation, Therapeutic Bakery, and Commercial Production

Quality evaluation of bakery products. Therapeutic bakery production- High fibre foods. Commercial and Cost of Production of Cakes, Bread, and Cookies. Layout and establishment of the bakery unit.

Practical Schedule

1. Identification and utilization of bakery tools and equipments
2. Quality evaluation of flour for bakery products
3. Different method of bread preparation- Straight dough and Sponge dough method
4. Types of bread preparation- White bread and Wheat bread
5. Types of bread preparation- Millet and Garlic bread
6. Different methods of bun preparation- Straight dough and Sponge dough method
7. Preparation of different types of bun- Maida bun and Cream bun
8. Preparation of different types of bun- Masala bun and Stolen
9. Different methods of cake preparation- Cream method and all in one method
10. Types of cake preparation – Sponge cake and Tea cake
11. Types of cake preparation – Angel cake and Plum cake
12. Types of cake preparation – Eggless cake and Cup cake
13. Icing- Butter Icing and Royal icing
14. Cake decoration- Fondants and fudge
15. Preparation of fresh cream cake and frosting
16. Different methods of cookies preparation- Drop method and Sheet method
17. **Mid Semester Examination**
18. Types of cookies- Maida and Wheat cookies
19. Types of cookies- Millet and Composite flour cookies
20. Types of cookies- Coconut cookies and Peanut cookies
21. Types of cookies- Salt cookies and Chilly cookies
22. Method of preparation of pastry – Puff and Flaky pastry
23. Preparation of Naan kattai and vanilla buttons
24. Preparation of puffs –Vegetable, Egg and Mushroom puff
25. Preparation of Khari – Sweet and Spices
26. Preparation of Sweet Doughnut and Chocolate Doughnut
27. Preparation of Rusk – Milk and Millet Rusk
28. Quality evaluation of bakery products

29. Therapeutic bakery production- High fiber foods
30. Commercial and Cost of production of Cakes
31. Commercial and Cost of production of Bread
32. Commercial and Cost of production of Cookies
33. Layout and establishment of bakery unit
34. **Final Practical Examination**

Learning Outcomes

- Enable students to understand the fundamental **concepts and principles involved in the preparation of bakery products.**
- Impart **practical skills and techniques in the art of baking technology.**
- Develop competence in the **quality assessment and evaluation of bakery products.**
- Provide hands-on experience in **icing techniques and cake decoration skills.**
- Familiarize students with the processes involved in the **commercial production and cost management of bakery products.**

Textbooks

1. Kamaliya, M.K. and Kamaliya, K.B. 2001. Baking: Science and Industries, Vol.1 and 2. Publisher: M.K.Kamaliya, 42, AshrutiBunglows, Jitodia Road, Anand -388001.
2. Mathuravalli, S. M. D. 2021. Textbook of Bakery and Confectionary. Narendra Publishing House, New Delhi.
3. Srilakshmi, B. 2018. Food Science. New Age International (P) Ltd. Publishers. New Delhi
4. Dubey, S.C.1992. Basic Baking Science and Craft. Published by G.N. Dangi, G.D. Enterprises, B -13, 1st floor, Bombay - 400002.
5. Potter, N. 2005. Food Science, CBS Publishers and Distributors, New Delhi.
6. Manay N.S and Shadaksharaswamy, M. (2001). Foods Facts and Principles. Wiley Eastern Ltd. New Delhi, Bangalore, Bombay, Calcutta, Hyderabad.

Reference

1. Kingslee, J. J. 2006. A Professional Text to Bakery and Confectionery. New Age International, New Delhi.
2. Minife, B.W. 1989. Chocolate, Cocoa, and Confectionary – Science and Technology, 3rd edn. Chapman and Hall, Inc., New York, USA.
3. Lakshmi Jagarlamudi. 2023. Bakery and Confectionery Products: Processing, Quality Assessment, Packaging and Storage Techniques. aylor & Francis Ltd. (CRC Press), UK.
4. Amit Kumar Gupta. 2021. Textbook of Bakery & Confectionery. Daya Publishing House. New Delhi

Web resources

- www.foodnetbase.com
- www.researchchandmarkets.com
- www.indiamart.com
- www.foodindustryindis.com

FSN 122 Processing and Value-addition of Fruits and Vegetable Products (0+2)

Practical

Unit I: Post-Harvest Processing of Horticultural Crops

Packaging technology – prepackaging by vents - waxing, vacuum packaging technology - for export by air, road and sea for fruits and vegetables. Packaging machinery and operational skill – Ripening methods – Quality assessment of packed crops for marketability.

Unit II: Processing and Value addition using Sugar and Salt

Processing using sugar - principles and processing of jam, jelly, marmalade, fruit bar, preserves and candies. Unfermented and fermented products - fruit juices, RTS, nectar, cordial, squash, syrup, carbonated beverage, wine, cider and vinegar. Processing using salt - principle – brining. Preservation of horticultural products.

Unit III: Processing of Dehydrated and Canned Products

Drying and Dehydration of fruits – mango, guava, sapota, pineapple and amla, Drying and Dehydration of vegetables – moringa, greens, bhendi, cucurbits, brinjal, gourds and other regional vegetables. Osmotic dehydration of fruits – *tutifruity*, *murraba*, glazed candy and crystalline candy. Canning of fruits – orange and pineapple, canning of vegetables – carrot and beans - Quality assessment of Products – moisture and acidity.

Unit IV: Processing of Pickles, Sauces, and Condiments

Processing and evaluation of different types of pickles – vinegar, salt & spices with and without oil. Production of tomato paste, puree, sauce, and ketchup, including red and green chilli sauce.

Unit V: Waste Utilization and Commercial Production

Utilization of fruit and vegetable waste – mango peel waste for convenience foods, apple and jack fruit for pectin production – commercial Production of jam, squash and dehydrated products.

Practical Schedule

1. Selection and sorting of raw material for Processing and preservation
2. Pre-Packing operations of fruits and vegetables – Vented Polybags and cartoons
3. Waxing, and Vacuum Packing of fruits and vegetables
4. Ripening Techniques – chemical and Natural Methods

5. Processing of Fruit Jam (Mango or Mixed Fruit)
6. Processing of Jelly- guava / apple
7. Processing of orange marmalade
8. Processing of Fruit Preserve / Candy (Amla or Pineapple)
9. Processing of Fruit Bar / Leather (Guava or Mango Pulp)
10. Processing of Unfermented Beverages –RTS and nectar
11. Processing of squash as per FSSAI specification
12. Processing of lime cordial
13. Processing of Unfermented Beverages - synthetic Syrup
14. Processing of Carbonated Fruit Beverage
15. Processing of Vinegar or Cider (Fermented Product)
16. Processing of Dehydrated Fruit Slices (Mango / Guava / Amla / Sapota / Pineapple)
17. **Mid-Semester Examination**
18. Processing of Dehydrated Vegetables (Moringa Leaves / Bhendi / Cucurbits / Brinjal / Gourds)
19. Osmotic Dehydration – Processing of Tutti Frutti / Glazed Candy
20. Processing of Crystalline Fruit Candy (Amla or Pineapple)
21. Canning of Fruits – Pineapple or Orange Segments
22. Canning of Vegetables – Carrot and Beans
23. Quality Assessment – Moisture, Acidity, and Sensory Evaluation
24. Processing of Brined Vegetables and Mango Pickle (with and without Oil)
25. Processing of Lime or Mixed Vegetable Pickle (Salt-Spice Pickle)
26. Processing of Tomato Puree and Paste
27. Processing of Tomato Sauce and Ketchup
28. Processing of Chilli Sauce (Red/Green)

29. Preparation of Mango Peel-Based Value-Added Product (Candy or Flour Mix)

30. Extraction of Pectin from Apple Pomace / Jackfruit Waste

31. Commercial production of Jam – single and mixed fruit

32. Commercial production of dehydrated fruits – Tuti fruiti and raisin

33. Commercial production of Squash and RTS

34. Final Practical Examination

Learning Outcomes

- Demonstrate skills in processing and preservation of fruits and vegetables.
- Apply techniques for value addition and waste utilization of horticultural produce.
- Operate and handle basic processing and packaging equipment.
- Assess product quality using sensory and physico-chemical parameters.
- Understand entrepreneurial and small-scale commercial production opportunities.

Textbooks

1. Giridharilal, Sidappa. G.S. and Tandon, G.L.1979. Preservation of Fruits and Vegetables. ICAR. New Delhi.
2. Sudheer, K.P. and V.Indira. 2007. Post-Harvest Technology of Horticultural Crops. New India Publishing Agency, Pitampura, New Delhi-110088.

Reference

1. Verma, L.R. and V.K. Joshi. 2000. Post-Harvest Technology of Fruits and Vegetables. Vol. 1 and 2. Indus Publishing Company. New Delhi.

Web Resources

- www.foodnetbase.com
- www.cfs.purdue.edu/class

HOR 121 Nursery Production in Horticulture Crops (0+2)

Practical

UNIT I: Introduction to Nursery

Layout of model nursery, Tools and equipment-identification and application-Containers for propagation and their practical usage-Practices in preparation of media for propagation of fruit plants, flowering annuals and perennials, foliage and indoor ornamentals and orchids, Potting, de potting and repotting

UNIT II: Sexual / Seed Propagation

Different methods of breaking seed dormancy stratification, scarification and use of plant growth regulators- Seed propagation- Extraction and storage of healthy seeds, seed bed preparation-Identification and raising of rootstocks for different fruit plants

UNIT III: Understanding Nursery Components

Types of nursery beds, soil solarization- raising hybrid vegetable seedlings in Protrays, Protection of nursery plants against adverse climatic conditions- Protected structures, shade net houses and Mist chamber- Mother plant block or scion block establishment- Calculation of growth regulators concentration for propagation- Preparation and application of growth regulators for cuttings and layering,

UNIT IV: Sexual / Vegetative propagation

Hands on training in preparation of stem, root, leaf and leaf bud cuttings and rooting, Different types of layering methods- Hands on training in simple layering and air layering-Rootstocks for commercial horticultural crops and raising of the rootstocks - different types of grafting methods - Hands on training in epicotyl grafting, soft wood grafting, inarching /approach grafting in fruit crops-Hands on training in shield budding and patch budding, Micro propagation- Commercial tissue culture laboratory- Visit to commercial tissue culture laboratory,

UNIT V: Nursery management practices

Weed control, irrigation, nutrition, removal of sprouts etc. Diagnosis and control of important diseases and pests in the nursery- lifting and packing of nursery plants, marketing of products in commercial nursery - Nursery registration act -Obtaining accreditation for a commercial nursery - Plant quarantine, quality standards for export and import of seeds and nursery plants produced - Project preparation for the establishment of commercial nursery.

Practical schedule

1. Layout of model nursery -Horticultural nurseries, types and economical importance and Various components of nursery
2. Tools and equipment-identification and Practices in usage and maintenance
3. Different types of media -Qualities of an ideal propagation media - Practices in preparation of media for propagation of horticultural crops
4. Containers for propagation and their practical usage
5. Practices in Potting, de potting and repotting
6. Different methods of breaking seed dormancy stratification, scarification and use of plant growth regulators and seed propagation of horticultural crops
7. Types of nursery beds – hands on training for preparation of raised beds and seed sowing
8. Hands on training raising hybrid vegetable seedlings in Protrays
9. Protected structures for propagation and
10. Hands on training for establishment of mother plant block or scion block establishment
11. Hands on training in preparation of different types of stem cuttings in horticultural crops *viz*., fruits and ornamental crops
12. Calculation of growth regulators concentration for propagation
13. Preparation and application of growth regulators for cuttings and layering
14. Hands on training in preparation of different types of layering in horticultural crops *viz*., fruits and ornamental crops
15. Hardening of rooted cuttings and layers in horticultural crops
16. Hands on training for raising the rootstocks in fruits and vegetable crops
17. **Mid semester Examination**
18. Different types of grafting methods - Hands on training in epicotyl grafting, soft wood grafting, inarching /approach grafting in fruit crops
19. Hands on training in grafting in vegetable crops
20. Hands on training in In situ grafting and top working in fruit crops
21. Hands on training in shield budding and patch budding in fruits and ornamental crops
22. Hands on training in propagation of foliage ornamental plants
23. Hands on training in propagation of flowering ornamental plants
24. Hands on training in propagation of Orchids Anthuriums, important flowering climbers, important ornamental trees

25. Hands on training in collection and preparation of explants, surface sterilization of explants, inoculation of explants and in sub culturing
26. Hands on training in micro propagation of banana
27. Hardening of seedling in nursery
28. Nursery management practices- i.e. weed, irrigation management nutrition and removal of rootstock sprouts
29. Diagnosis and control of important diseases and pests in the nursery
30. Lifting, labelling and packing of nursery plants
31. Nursery registration act, plant quarantine, quality standards for export and import of seeds and nursery plants
32. Visit to accredited nurseries and commercial tissue culture laboratory
33. Project preparation for the establishment of commercial nursery
34. **Final practical examination**

Learning outcomes

- Students will develop entrepreneurial skills in the propagation of horticultural crops.
- They will gain hands-on training in various propagation methods and nursery management practices.
- Students will acquire knowledge of techniques and economic aspects involved in establishing a commercial nursery

Text books

1. Kumar N. 2023.Introduction to Horticulture, Medtech Science Press; 9th edition, New Delhi- 110002
2. Kumar M., C. Kavitha and L. Pugalendhi. 2022.Plant Propagation and Nursery Management in Fruit Crops, Jeya Publishing house, New Delhi Sharma R.R., and Hare Krishna. 2007.Text book of plant propagation and nursery management, CBS Publishers and Distributors Private Limited - first edition
3. Hudson T. Harmann, Dale E. Kester, Fred T. Davies, Jr. and Robert L. Geneve. Plant Propagation –Principles and Practices (7th Edition). PHI Learning Private Limited, New Delhi – 110001
4. T. K. Bose, S. K. Mitra, M. K. Sadhu, P. Das and D. Sanyal, Propagation of Tropical & Subtropical Horticultural crops, Volume 1 (3 rd Revised edition). Naya Udyog, 206, Bidhan Sarani, Kolkata -700006.

Reference

1. Guy W. Adriance and Feed R. Brison, Propagation of Horticultural Plants, Axis Books (India).
2. Mukherjee, S. K. and Manjumdar, P. K. 1973. Propagation of fruit crops. ICAR, New Delhi.
3. Chandha, K. L. (ICAR) 2002, 2001. Hand book of Horticulture. ICAR, New Delhi.
4. Sadhu, M.K.1989. Plant Propagation. Wiley Eastern Ltd., 4835/24, Ansari Road, Daryaganj, New Delhi 110 002.
5. Krishnan P.R., Kalia R.K., Tewari J.C. and Roy M.M. 2014. Plant Nursery Management and Plant Nursery Management: Principles and Practices, Central Arid Zone Research Institute, Jodhpur,

Web Resources

- https://agritech.tnau.ac.in/horticulture/horti_nursery%20techniques.html
- https://iht.edu.in/basics-of-nursery-production/
- https://k8449r.weebly.com/uploads/3/0/7/3/30731055/horticulture_plant_nursery1-signed.pdf
- https://msmedichennai.gov.in/GARMS_Admin/basictools/images/ProjectProfiles/FruitNursery.pdf

HOR 122 Orchard Floor Management - (0+2)

PRACTICALS

Unit I: Understanding the Components of Orchard

Types of orchards - Assessment, Designing and Layout of different systems of orchards and Fruit Nutrition Garden. Components – non-plant components of orchard.

Unit II: Soil Management and Cropping Pattern

Soil management practices: clean cultivation, sod culture, sod mulch, intercropping, cover cropping and mixed cropping.

Unit III: Irrigation System, Weed and Water Management

Use of mulch materials: organic and inorganic, moisture conservation and weed control, drainage systems. Layout of various irrigation systems, surface irrigation: Flood system, basin system, modified basin system, furrow method, sub-surface irrigation systems:

Unit IV: Micro Irrigation, Nutrient Management and Plant Protection

Layout of drip irrigation and its components, overhead irrigation: sprinkler system, Soluble fertilizers and fertigation techniques, Different methods of application of manure and fertilizers, use of organic manures, Biofertilizers, Green manuring and bio-agents. IPM, IDM practices.

Unit V: Canopy Management and Mechanization

Canopy management, crop regulation and rejuvenation techniques in fruit crops. Off season bearing techniques, Farm mechanization techniques. Calendar of operations and budget preparation. Visit to orchards of Progressive fruit growers.

Practical Schedule

1. Study of different types of orchards.
2. Assessment, data gathering and analysis of new site for the establishment of Fruit orchard.
3. Planning and designing for orchard establishment
4. Components of Orchard
5. Steps to be followed for the establishment of orchard.
6. Practices on management of physical practices of the soil.
7. Problem soil management practices
8. Study of sod culture and sod mulch
9. Study of Inter cropping in orchard with examples
10. Study of cover cropping in orchard with examples
11. Study of mixed cropping techniques with examples
12. Study of organic and inorganic mulches
13. Study of drainage systems in orchard management
14. Studies on moisture conservation practices in orchard.
15. Study of weed management practices in orchard.
16. Study of different training systems in orchard.
17. **Mid-semester examination**
18. Study of wind breaks in orchards with examples
19. Study of different irrigation systems in orchards surface: flood system, basin, modified basin, furrow method etc.,
20. Designing and layout of drip irrigation systems

21. Different method of application of manures and fertilizers and calculation of fertilizer doses.
22. Study of soluble fertilizers and fertigation techniques.
23. Uses of different organic manures biofertilizers, green manuring and bioagents.
24. Integrated pest management
25. Integrated Disease management
26. Canopy management practices followed in orchard.
27. Rejuvenation of old orchards and top working techniques
28. Studies on crop regulation practices in orchard
29. Studies on non-plant components – civil works, fence line and machinery
30. Off-Season production techniques – bahar – pruning techniques – growth regulators etc.
31. Farm mechanization techniques – Power systems – tools and implements.
32. Scheduling the calendar of operations and budget preparation.
33. Visit to Fruit orchards of progressing fruit growers
34. **Final Practical Examination**

Learning outcome s

- Students will understand the principles and importance of orchard floor management for sustainable fruit production.
- They will understand different methods of weed control, soil management, and mulching practices in orchards.
- They will understand appropriate irrigation, nutrient management, and soil conservation practices to maintain orchard productivity
- Students will acquire knowledge of techniques of planning, implementing, and monitoring orchard floor management practices to enhance yield and fruit quality

Text books

1. Kumar N. 2023.Introduction to Horticulture, Medtech Science Press; 9th edition, New Delhi- 110002
2. Chattopadhyay T.K., 2012.A Textbook on Pomology (Fundamentals, Vol-I), Kalyani Publishers, New Delhi
3. Chadha, K.L. 2001. Handbook of Horticulture, ICAR, New Delhi.
4. Christopher, E.P. 2001. Introductory Horticulture, Biotech Books, New Delhi.

Reference

1. Jitendra Singh. 2011. Basic Horticulture. Kalyani Publishers, New Delhi
2. Singh, N.P. 2005. Basic concepts of fruit science. International Book Distributing Co., Lucknow.
3. Surendra Prasad and U. Kumar. 1999. Principles of horticulture, Agro – botanica, Bikaner, India.
4. Adams, C.R. and M. P. Early. 2004. Principles of horticulture. Butterworth Heinemam, Oxford University Press.
5. Bansil. P.C. 2008. Horticulture in India. CBS Publishers and Distributors, New Delhi.

Web Resources:

- https://agritech.tnau.ac.in/horticulture/horti_orchard%20management.html
- https://www.slideshare.net/slideshow/orchard-floor-management/252983711

HOR 123 Landscape Gardening (0+2)

UNIT I: Basics of Gardening and Plant Propagation

Identification and use of garden tools and equipment - Identification, description and propagation of ornamental trees - Identification, description and propagation of ornamental shrubs - Identification, description and propagation of flowering annuals, climbers, creepers, and bulbous ornamentals - Identification, description and propagation of indoor plants, foliage plants and water plants - Identification and description of palms, ferns, cycads, ornamental grasses, cacti, succulents, and ground covers

UNIT II: Principles and Elements of Landscape Gardening

Understanding the principles of landscape gardening -Studying the features of formal gardens- Studying the features of informal gardens- Description and designing of plant components in a garden – edges, hedges, flower beds, flower borders, arboretum, palmatum, topiary- Description and designing of non-plant garden structures – arches, bowers, pergolas, roads, walks, paths, bridges, fountains, and statues- Landscape drafting tools – dimensioning, graphic symbols, and notations

UNIT III: Landscape Design and Site Planning

Site analysis, planning and designing of a home garden - Site analysis and landscape designing of gardens for public places and places of worship - Landscape planning for roads and roundabouts - Visit to public parks to study different features and styles of gardening

UNIT IV: Lawns, Special Gardens, and Indoor Gardening

Identification of lawn grasses - Establishment of lawns - Maintenance of lawns - Designing and layout of special gardens – rockery, water garden - Designing and layout of special gardens – sunken garden, roof garden - Designing and layout of special gardens – vertical garden - Indoor gardening – designing and layout of terrarium/bottle garden, dish garden - Visit to community parks, ornamental plant nurseries, and golf courses

UNIT V: Advanced Practices, Art Forms, and Professional Applications

Therapeutic gardens – studying the concept and types; practising activities in therapeutic gardening - Bonsai – studying the concept, principles, styles, selection of plants, containers, and tools - Practising the art of bonsai making and maintenance - Understanding the features of software used for landscape designing - CAD in landscaping – guest lecture - Practising

flower arrangement and bouquet making - Value addition – practising dry flower making and value addition with floral waste - Project preparation and working out cost estimate for designing and laying out different types of gardens

Practical Schedule

1. Identification and use of garden tools and equipment
2. Identification, description and propagation of ornamental trees
3. Identification, description and propagation of ornamental shrubs
4. Identification, description and propagation of flowering annuals, climbers and creepers, bulbous ornamentals
5. Identification, description and propagation of indoor plants, foliage plants and water plants
6. Identification and description of palms, ferns, cycads, ornamental grasses, cacti and succulents, ground covers
7. Understanding the principles of landscape gardening
8. Studying the features of formal gardens
9. Studying the features of informal gardens
10. Description and designing of plant components in a garden – edges, hedges, flower beds, flower borders, arboretum, palmatum, topiary
11. Description and designing of non-plant garden structures - arches, bowers, pergolas, roads, walks, paths, bridges, fountains and statues
12. Landscape drafting tools: dimensioning, graphic symbols and notations
13. Site analysis, planning and designing of a home garden
14. Site analysis and landscape designing of gardens for public places and places of worship
15. Landscape planning for roads and roundabouts
16. Visit to public parks to study different features and styles of gardening
17. **Mid semester Practical exam**
18. Identification of lawn grasses
19. Establishment of lawns
20. Maintenance of lawns
21. Designing and layout of special gardens - rockery, water garden
22. Designing and layout of special gardens - sunken garden, roof garden
23. Designing and layout of special gardens - vertical garden
24. Indoor gardening: designing and layout of terrarium / bottle garden, dish garden

25. Visit to community parks, ornamental plant nurseries and golf courses
26. Therapeutic gardens: studying the concept and types; practising activities in therapeutic gardening
27. Bonsai - studying the concept, principles, styles, selection of plants, containers and tools
28. Practising the art of bonsai making and maintenance
29. Understanding the features of software used for landscape designing
30. CAD in landscaping - guest lecture
31. Practising flower arrangement and bouquet making
32. Value addition - Practising dry flower making and value addition with floral waste
33. Project preparation and working out cost estimate for designing and laying out of different types of gardens
34. **Final Practical Examination**

Learning Outcome

- Landscape gardening learning outcomes include the ability to design and plan gardens, understand both softscape (plants) and hardscape (structures) elements, manage soil and irrigation, and maintain existing gardens. Students should also be able to identify and treat plant diseases, prepare cost estimates, and understand legal aspects of landscape design

Text Books

1. Di-Sabato-Aust, T. (1998). *The well-tended perennial garden: planting & pruning techniques.* Portland: Timber Press.
2. Howells, J. (1996). *The rose and the clematis as good companions.* Woodbridge: Garden Art Press. (ISBN 1-870673-19-0)
3. Harper, P.J. (2000). *Time-tested plants: thirty years in a four-season garden.* Portland: Timber Press.
4. Mabey, Richard. *Flora Britannica.* (1992). Cornell University.[1]
5. *Platt, Karen (2003). Black Magic and Purple Passion: Complete Guide to Dark Plants. Karen Platt. ISBN 978-0-9528810-9-4.*

Reference

1. Damrosch, B. (2008). *The Garden Primer.* (2nd ed). New York: Workman. (ISBN 0-7611-2275-3)[2]

2. Dirr, M.A. (1997). *Dirr's hardy trees and shrubs: an illustrated encyclopedia*. Portland: Timber Press. (ISBN 0-88192-404-0)
3. Dirr, M.A. (1998). *Manual of woody landscape plants: their identification, ornamental characteristics, culture, propagation and uses.* Champaign, IL: Stipes. (ISBN 0-87563-800-7)
4. Dirr, M.A. (2002). *Dirr's Trees and Shrubs for Warm Climates: An Illustrated Encyclopedia* (ISBN 088192525X)

Web Resources

- https://agritech.tnau.ac.in/horticulture/horti_landscaping.html
- https://celkau.in/Agrienterprises/enerprise/30.Landscape%20Gardening/1.%20Landscape%20Gardening.pdf

ARM 121 Entrepreneurial Skills for Agribusiness (0+2)

Practical

Unit 1: Entrepreneurial and Management skills

Assessment of Entrepreneurial Skills -Exercise on Leadership skills -Time management skills -Team building Exercises -Exercise on Decision Making Skills-Exercise on Business Communication Skills-Creativity and Innovation -Innovation challenges, Ideathon, Hackathon, Boot camp, Demo Day

Unit 2: Agribusiness Opportunities

Area, production, productivity, export/import of Major agricultural commodities - Mapping of major agricultural commodities – Identification of commodity/product- Identification of Agribusiness Opportunities - Hands on exercise - Market selection -Hands on exercise - Buyer identification – Segmentation and Platforms - Consumer preference for major agricultural products – Framing Interview Schedule -Quality certification - FSSAI & NPOP, AGMARK – Certification checklist

Unit 3: Business Plan

Business plan – Components, types - Hands on exercise - Drafting and preparation of Business plan -Hands on exercise - Business Model canvas-Hands on exercise - Bankable project preparation- Hands on exercise - Bankable project preparation- II

Unit 4: Business Incubation and Product Promotion

Visit to incubation centre - Start-up ecosystem – Mapping key players and their interactions

Hands on exercise - Registration of a sole proprietorship firm and private limited company Source of finance - Seed money, Angel investment Source of Finance - Schemes / Funds for Startups-Pitching for Funds - Guidelines and opportunities Hands on exercise - Branding, designing the Logo and Trade mark Hands on exercise - Product promotion - Hands on exercise - Digital marketing

Unit 5: Networking and mentoring

Networking with EDII-TN for Innovation Voucher Programme (IVP) - Start-up India, FAME-TN and District Industries Centre (DIC) - Mentoring session with successful start-ups - Networking events with successful start-ups- Hands on business simulation games – Entrepreneurship

Practical Schedule

1. Assessment of Entrepreneurial Skills
2. Exercise on Leadership skills
3. Time management skills
4. Team building Exercises

5. Exercise on Decision Making Skills
6. Exercise on Business Communication Skills
7. Creativity and Innovation -Innovation challenges, Ideathon, Hackathon, Boot camp, Demo Day
8. Area, production, productivity, export/import of Major agricultural commodities
9. Mapping of major agricultural commodities – Identification of commodity/product
10. Identification of Agribusiness Opportunities
11. Hands on exercise - Market selection
12. Hands on exercise - Buyer identification – Segmentation and Platforms
13. Consumer preference for major agricultural products – Framing Interview Schedule
14. Quality certification - FSSAI & NPOP, AGMARK – Certification checklist
15. Business plan – Components, types
16. Hands on exercise - Drafting and preparation of Business plan, Hands on exercise - Business Model canvas
17. **Mid Semester Examination**
18. Hands on exercise - Bankable project preparation- I
19. Hands on exercise - Bankable project preparation- II
20. Visit to incubation centre
21. Start-up ecosystem – Mapping key players and their interactions
22. Hands on exercise - Registration of a sole proprietorship firm and private limited company
23. Source of finance - Seed money, Angel investment
24. Source of Finance - Schemes / Funds for Start ups
25. Pitching for Funds - Guidelines and opportunities
26. Hands on exercise - Branding, designing the Logo and Trade mark
27. Hands on exercise - Product promotion
28. Hands on exercise - Digital marketing
29. Networking with EDII-TN for Innovation Voucher Programme (IVP)
30. Start-up India, FAME-TN and District Industries Centre (DIC)
31. Mentoring session with successful start-ups
32. Networking events with successful start-ups
33. Hands on business simulation games - Entrepreneurship
34. **Final practical examination**

Text books

1. Innovation and Entrepreneurship: Practice and Principles by Peter F Drucker
2. Zero to one: Notes on Start-ups, or How to Build the Future by Peter Thiel

Reference

1. The Innovator's Solution: Creating and Sustaining Successful Growth by Clayton M Christensen
2. The Lean Start-up: How Today's Entrepreneurs use continuous Innovation to create radically successful business by Eric Ries

Web Resources

- https://www.icar.org.in/en/node/3489
- https://agribsc.kkwagh.edu.in/uploads/department_course/Entrepreneurship_Development_and_Communication_Skills.pdf

GPB 121 General Morphology and Pollination Techniques in Agricultural Crops (0+2)

Unit I: General morphological description of plants

Kinds of root, stem, leaf and inflorescence; Structure of flower, calyx, corolla, aestivation, androecium, gynoecium, placentation, types of fruits.

Unit II: Modes of reproduction and pollination in plants

Sexual and Asexual reproduction- Apomixis – Modes of Pollination - mechanisms enforcing self and cross pollination in crops - working out extent of natural out crossing

Unit III - Botanical description selfing, crossing techniques and hybrid seed production in cereals

Key botanical features. Observation on floral biology – anthesis and pollination – selfing – crossing techniques, varietal development, nucleus, breeder seed and hybrid seed production in rice, maize

Unit IV: Botanical description selfing, crossing techniques and hybrid seed production in millets and pulses

Key botanical features. Observation on floral biology – anthesis and pollination – selfing – crossing techniques, varietal development, nucleus, breeder seed and hybrid seed production in pearl millet and redgram

Unit V: Botanical description selfing, crossing techniques and hybrid seed production in in oilseed and Cotton

Key botanical features. Observation on floral biology – anthesis and pollination – selfing – varietal development, nucleus, breeder seed and hybrid seed production sunflower and cotton

Practical Schedule

1. General morphology of root, stem and leaf and its types
2. General morphology of inflorescence, flower, fruits and its types
3. Modes of reproduction in plants - Sexual and Asexual - Apomixis
4. Mode of pollination in self- and cross-pollinated crops - Mechanisms enforcing self and cross pollination in crops - working out extent of natural out crossing Key botanical features. Observation on floral biology – anthesis and pollination – selfing – crossing techniques, varietal development, nucleus, breeder seed and hybrid seed production

5. Rice
6. Rice
7. Rice
8. Rice
9. Rice
10. Rice
11. Maize
12. Maize
13. Maize
14. Maize
15. Maize
16. Maize
17. **Mid Semester Examination**
18. Pearl millet
19. Pearl millet
20. Pearl millet
21. Pearl millet
22. Redgram
23. Redgram
24. Redgram
25. Redgram
26. Sunflower
27. Sunflower
28. Sunflower
29. Sunflower
30. Cotton
31. Cotton
32. Cotton
33. Cotton
34. **Final Practical Examination**

Learning Outcomes

Most agricultural crops require pollination (through insects or wind) for successful production. Weather events or asynchrony in flowering between a crop and its polliniser can cause pollination failure, and insect-pollinated crops are additionally vulnerable to declines in insect pollination services.

Text books

1. Daniel Sundararaj, D. and G. Thulasidas, 1993. Botany of field crops. MacMillan India Ltd., New Delhi.
2. Sambamurthy, V.S. and N.S. Subramanian, 1989. Text Book of Economic Botany, Wiley Eastern, New Delhi
3. Purse glow, 1988. Tropical Crops - Monocotyledons. The English Language book Society and Longman Co., Singapore
4. Albert F. Hill and O.P. Sharma, 1996. Economic Botany. Tata McGraw - Hill Publishing Co. Ltd., New Delhi.

Reference

1. John Joel, A., C. Vanniarajan, T.S. Raveendran, and A. Gopalan 2006. Fundamentals of Crop Botany, Directorate of ODL, Tamil Nadu Agricultural University, Coimbatore – 641 003.
2. Chopra, V.L. 1990. Plant Breeding. Theory and Practice. Oxford and IBH Publishing Co., New Delhi.
3. D.N.Bharadwaj.2012. Breeding Field Crops. Agrobios (India), Jodhpur – 342002

Web Resources

- https://agritech.tnau.ac.in/crop_improvement/crop_imprv_pollmode.html
- https://www.rvskvv.net/images/II-Year-II-Sem_Principles_Plant-Breeding_YNAU_20.04.2020.pdf
- https://annamalaiuniversity.ac.in/studport/download/agri/gen/resources/GPB%20225%20Principles%20and%20Methods%20of%20Plant%20Breeding-Record%20Material-T.%20Sabesan.pdf

SST 121 Seed Production Technology 2 (0+2)

Practical

Unit I: Introduction and identification of seeds

Importance of quality seed and characteristics; Identification of seeds; Study of external and internal seed structures of important agricultural and horticultural crops; Study on floral biology and pollination behaviour of agricultural and horticultural crops.

Unit II: Principles and practices of seed production

Maintenance of genetic purity - procedures for seed certification - isolation distance - identification of contaminants and practicing roguing; Visit to seed production field - study on field inspection and counting procedures; Genetic tools employed in hybrid seed production of different crops; Hybrid rice - planting design - staggering, synchronization, GA application and supplementary pollination techniques, identification of pollen shedders; Hybrid maize - types of hybrids - planting design - staggering, synchronization, physiological maturity - detasseling - identification of shedding tassel, cob drying, cob sorting, shelling and identification of mechanical damage; Pearl millet - practicing jerking, identification of designated diseases; Pulses - foliar application for enhancing seed set, tendril clipping, pre harvest sanitation spray; Groundnut - arresting flower drop, pod verification, decortication, seed recovery; Sunflower - planting design, block method, supplementary pollination, identification of pollen shedders; Castor - reproductive biology, identification of bloom types, pistillate mechanism, sex expression, foliar application; Cotton - planting design, block method, emasculation, dusting, kapas sorting, ginning and delinting; Hybrid seed production techniques in solanaceous vegetables and bhendi - seed production in cucurbits; Assessment of physiological maturity indices in different crops.

Unit III: Post harvest handling and seed storage

Practicing seed extraction and drying methods in various crops; Practicing seed cleaning, grading and upgrading techniques in various crops; specific gravity separation in paddy and bhendi; Visit to seed processing unit; Study on packaging container, seed storage godowns and maintenance. Assessment of seed dormancy and breaking methods; Seed quality enhancement techniques - seed priming, coating and pelleting.

Unit IV: Seed testing

Seed sampling: mixing, dividing and equipments; Physical purity analysis of seeds; Estimation of seed moisture content; Conducting seed germination test and seedling evaluation;

Determination of seed viability; Quick viability test - seed and seedling vigour tests; Assessment of genetic purity - Grow out test; Visit to study on farmers participatory seed production - seed hubs and community seed bank. Visit to seed industry.

Unit V: Seed production planning

Seed production planning - calculation of area requirement for different classes of seeds and working out economics of seed production.

Practical schedule

1. Importance of quality seed and characteristics - Identification of seeds
2. Study of external and internal seed structures of important agricultural and horticultural crops
3. Study on floral biology and pollination behaviour of agricultural and horticultural crops
4. Maintenance of genetic purity - procedures for seed certification - isolation distance - identification of contaminants and practicing roguing
5. Visit to seed production field - study on field inspection and counting procedures
6. Genetic tools employed in hybrid seed production of different crops
7. Hybrid rice - planting design - staggering, synchronization, GA application and supplementary pollination techniques, identification of pollen shedders
8. Hybrid maize - types of hybrids - planting design - staggering, synchronization, physiological maturity - detasseling - identification of shedding tassel, cob drying, cob sorting, shelling and identification of mechanical damage
9. Pearl millet - practicing jerking, identification of designated diseases
10. Pulses - foliar application for enhancing seed set, tendril clipping, pre harvest sanitation spray
11. Groundnut - arresting flower drop, pod verification, decortication, seed recovery
12. Sunflower - planting design, block method, supplementary pollination, identification of pollen shedders
13. Castor - reproductive biology, identification of bloom types, pistillate mechanism, sex expression, foliar application
14. Cotton - planting design, block method, emasculation, dusting, kapas sorting, ginning and delinting
15. Hybrid seed production techniques in solanaceous vegetables and bhendi

16 Seed production techniques in cucurbits

17 Mid semester examination

18 Assessment of physiological maturity indices in different crops - practicing seed extraction and drying methods in various crops

19 Practicing seed cleaning, grading and upgrading techniques - specific gravity separation in paddy and bhendi

20 Visit to seed processing unit

21 Study on packaging container and seed storage godown and maintenance

22 Assessment of seed dormancy and breaking methods

23 Seed quality enhancement treatments - seed priming, coating and pelleting

24 Seed sampling: mixing, dividing and equipments

25 Physical purity analysis of seeds

26 Estimation of seed moisture content

27 Conducting seed germination test and seedling evaluation

28 Determination of seed viability - Quick viability test

29 Seed and seedling vigour tests

30 Assessment of genetic purity - Grow out test

31 Visit to seed production fields - study on farmers participatory seed production, seed hubs and community seed bank

32 Visit to seed industry

33 Seed production planning - calculation of area requirement for different classes of seeds and working out economics of seed production

34 Final practical examination

Learning Outcomes

- Students to be knowledgeable in the principles of quality seed production and hybrid seed production, seed quality testing for important cereals, pulses, oilseeds, fodder crops and vegetables.
- Students develop skills on technical know-how to become successful seed grower.

Text Books

1. Agarwal, P.K. and M. Dadlani, 1987. Seed Science and Technology, South Asia Publishers, New Delhi.
2. Agarwal, R.L., 1996. Seed Technology, Oxford and IPH Publicity Company, New Delhi.

3. Bale, M.S., 2013. Seed Certification Handbook, Vardhman Books and Periodicals.

References

1. Joshi, A.K. and Singh, P.D., 2003. Seed Science and Technology, Kalyani Publishers, Ludhiana.
2. Kulkarni, G.N., 2002. Principles of Seed Technology, Kalyani Publishers, Ludhiana.
3. Nema, N.P., 1986. Principles of Seed Certification and Seed Testing, Allied Publishers Private Limited. New Delhi.
4. Singh. P.D. 2018. Principles and Methods of Plant Breeding. Kalyani Publishers, Ludhiana.

Web Resources

- www//efaidnbmnnnibpcajpcglclefindmkaj/https://www.rvskvv.net/images/I I-Year-II- Sem_Seed-Technology_ANGRAU_20.04.2020.pdf
- https://pmc.ncbi.nlm.nih.gov/articles/PMC4233836/
- https://sites.google.com/a/uasd.in/ecourse/seed-science-technology

AMP 121 Broiler Production (0+2)

Practical

Unit I: Introduction

Poultry Industry in India - Current status of broiler industry – Scope of broiler production in India - Introduction to Broilers – Commercial strains of broilers

Unit II: Housing Management

Housing management – Location and layout of commercial broiler farm – Preparation of poultry house - Equipments used in broiler farm - Different system of Management - Deep litter system, Cage system of management, Raised housing - Litter management - Preparation of brooder house – Brooder Management – Broiler breeder - Chick management – Grower management – Layer management - Summer management of broiler -Winter management of broiler – Lighting management – Common procedures followed in broiler farm.

Unit III: Feeding Management

Water – Requirement, quality analysis and its maintenance - Feeding Management of broilers – Types of feed – Feed ingredients – Quality assessment of feed ingredients and feed – Additive and supplementation of additives - Storage of feed-Feeding Methods – Nutrient requirement of different stages of broilers – Various standards for broilers -Feed formulation – Least cost formulation –Preparation of compound feed –Components in feed mill –Feed mill operations

Unit IV: Flock Health Management

Common disease of broilers – Control and Prevention - Medication and Vaccination in broilers – Different vaccination methods – Cold chain for vaccine – Vaccination schedule for broilers - Postmortem inspection –Waste management - Disposal of dead birds and Manure management - Biosecurity measures.

Unit V: Hatchery Management, Processing and Marketing

Hatchery Management – Hatchery layout and design – Hatcher and Setter – Collection and handling of egg – Setting and hatching of eggs and chicks quality assessment - Processing of broilers - Slaughtering of broilers and cut up parts of broilers - Record maintenance- Marketing Channels in broilers - Export of poultry meat - Integration method of broilers marketing– Economics of broiler farming and Project preparation for broiler farm unit for bank loan–Role of NECC and BCC in marketing of poultry and its products - Visit to commercial broiler farm feed plant, hatchery unit and processing plant.

Practical Schedule

1. Current status of broiler industry – Scope of broiler production in India - Commercial strains of broilers
2. Location and layout of commercial broiler farm
3. Preparation of poultry house
4. Equipments used in broiler farm

5. Different system of Management - Deep litter system, Cage system of management, Raised housing – Video on broiler management.
6. Litter management
7. Preparation of brooder house – Brooder Management,
8. Broiler breeder - Grower management and layer management
9. Summer and winter management of broiler
10. Lighting management – Common procedures followed in broiler
11. Water – Requirement, quality analysis and its maintenance
12. Types of feed – Feed ingredients
13. Feeding Management of broilers
14. Quality assessment of feed ingredients and feed - Additive and supplementation of additives
15. Storage of feed-Feeding Methods
16. Nutrient requirement of different stages of broilers – Various standards for broilers
17. Feed formulation – Least cost formulation
18. Preparation of compound feed
19. Components in feed mill – Feed mill operations
20. Common bacterial disease of broilers – Control and Prevention
21. Common viral disease of broilers – Control and Prevention
22. Common metabolic and fungal disease of broilers – Control and Prevention
23. Common deficiency disease of broilers – Control and Prevention
24. Medication and Vaccination in broilers and layers – Different vaccination methods – Cold chain for vaccine – Vaccination schedule for broilers
25. Postmortem inspection - Disposal of waste -dead birds and manure
26. Biosecurity measures.
27. Hatchery Management – Hatchery layout and design – Hatcher and Setter –
28. Collection and handling of egg – Setting and hatching of eggs and chicks quality assessment
29. Processing of broilers - Slaughtering of broilers and cut up parts of broilers – Video on modern slaughtering of broilers.
30. Record maintenance- Marketing Channels in broilers - Export of poultry meat
31. Integration method of broilers marketing
32. Economics of broiler farming and Project preparation for broiler and layer farm unit for bank loan
33. Role of NECC and BCC in marketing of poultry and its products & Visit to commercial broiler farm, feed plant, hatchery unit and processing plant
34. **Final Practical Examination**

Learning Outcomes

- Understanding and applying knowledge in areas such as broiler anatomy, housing and environment, nutrition and feeding, health management (including biosecurity, disease prevention, and vaccination), and farm management practices.
- Students should be able to perform routine tasks, analyze performance, and make informed decisions regarding marketing and profitability

Text Books

1. *Poultry Science* by Colin G. Scanes and Karen D. Christensen. This comprehensive text is widely used at the university level and covers global and commercial production of meat chickens (broilers), genetics, diseases, housing, and processing.
2. *Textbook on Commercial Poultry Production and Hatchery Management* by M. Murugan. This is a detailed publication, particularly useful for commercial operations and academic settings, covering all aspects of production and hatchery management.
3. *Commercial Broiler Chicken Production*. This title is offered by multiple publishers (e.g., IBDC, The Bookish Owl) and focuses on the specific practices of large-scale broiler meat production.

References

1. *Poultry Science and Practice: A Textbook* by N. Ghosh. A general textbook on poultry science that includes essential information on broiler production.
2. *Modern Livestock and Poultry Production* by James R. Gillespie and Frank B. Flanders. A broad textbook that covers current practices in livestock and poultry production, including dedicated sections on broilers

Web Resources

- http://www.agritech.tnau.ac.in/expert_system/poultry/Broiler%20Management.htmlhttps://pmc.ncbi.nlm.nih.gov/articles/PMC4233836/
- https://sites.google.com/a/uasd.in/ecourse/seed-science-technology

PAT 121 Commercial Mushroom Production (0+2)

Practical

Unit I: Mushroom current status, media and tissue culture

Mushroom - Introduction, importance-present production and trade, scope for export, markets for mushroom and mushroom products Different types of media - Tissue isolation- Equipment's required for culture media and spawn preparation

Unit II: Oyster mushroom – spawn production, cultivation, biotic and abiotic disorders

Oyster mushroom - mother spawn and bed preparation - Oyster mushroom cultivation - cropping house requirements - pest and diseases and abiotic disorder - Visit to oyster mushroom farm

Unit III: Milky mushroom – spawn production, cultivation, biotic and abiotic disorders

Milky mushroom - mother and bed spawn preparation - milky mushroom cultivation - cropping house requirements-bed preparation and casing - pest, disease and abiotic disorders - Visit to Milky mushroom farm

Unit IV: Button mushroom – spawn production, cultivation, biotic and abiotic disorders

Button mushroom cultivation - visit to button mushroom unit-compost preparation-cropping house requirements- pest, disease and abiotic disorders

Unit V: Value addition and Project preparation

Recipe and value added products from oyster, milky and button mushroom - Mushroom as a component in Integrated Farming System - Project preparation on oyster, milky and button – mushroom production and economics

Practical schedule

1. Importance of mushroom - Status of edible and medicinal mushroom industry in India
2. General characters of mushrooms - edible and poisonous mushrooms
3. Morphological characters of edible mushroom - *Pleurotus* , *Agaricus, Volvariella* and *Calocybe*
4. Varieties of edible mushrooms and their special features
5. Equipments for spawn and mushroom production and their handling
6. Preparation of culture media for isolation of mushroom fungi
7. Isolation and pure culture techniques of mushroom fungi

8. Preservation and maintenance of pure culture of mushroom fungi
9. Oyster mushroom - mother spawn preparation
10. Oyster mushroom- bed spawn preparation
11. Spawn contaminants and their management
12. Cropping house for oyster mushroom cultivation
13. Substrate preparation for oyster mushroom cultivation
14. Bed preparation, maintenance, harvest and storage of oyster mushroom
15. Pest and disease of oyster mushroom- Identification and their management
16. Visit to commercial oyster mushroom unit
17. **Mid semester examination**
18. Mother spawn and bed spawn preparation for milky mushroom
19. Cropping house for milky mushroom cultivation
20. Substrate preparation for milky mushroom cultivation
21. Bed preparation for milky mushroom cultivation
22. Preparation of casing soil and its application for milky mushroom cultivation
23. Bed maintenance, harvest, grading, packing and storage of milky mushroom
24. Pest and diseases of milky mushroom - Identification and their management
25. Abiotic disorders of oyster and milky mushrooms
26. Compost preparation and its quality for button mushroom cultivation
27. Cropping room, bed preparation and cropping technology for button mushroom
28. Harvesting, grading, packing and storage of button mushroom
29. Identification of pest, diseases and abiotic disorders of button mushroom and their management
30. Recipes and value-added products from edible mushrooms
31. Visit to commercial milky and button mushroom units
32. Visit to uzhavar sandai and retail shops and studying the marketing strategy for edible mushroom
33. Project preparation on oyster, milky and button mushroom production and cost economics
34. **Final Practical examination**

Learning Outcomes

The students will learn the mushroom production technologies in such a way that they can start their own enterprise.

Text Books

1. A.S.Krishanmoorthy.,T.Marimuthu. and S.Nakkeeran.2005. Mushroom Biotechnology, Vijay Books, Sivakasi,India,Publ: ODL, TNAU, Coimbtaore
2. G. Thirubhuvanamala, K. Angappan, M. Karthikeyan, P. Mahalakshmi, P. Geetha and M. Shanthi. 2024. Handbook of Oyster, Milky, Paddy straw mushroom Cultivation. Department of Plant Pathology, Coimbatore.

Reference

1. Gogoi, Robin, Y. Rathaiah, and Tasvina Rahman Borah.2019.Mushroom cultivation technology. Scientific Publishers, Jodhpur.
2. Manjith Singh, Bhuvneshvijay,Shwetkamal and G..Wakchaure. 2011.Mushrooms-Cultivation, Marketing, and Consumption, Directorate of Mushroom Research, Solan.

Web Resources

- https://nhb.gov.in/pdf/Cultivation.pdf
- https://tnagriculture.in/dashboard/CPG/12_Mushroom_Cultivation.pdf
- https://smallfarms.cornell.edu/projects/mushrooms/methods-of-commercial-mushroom-cultivation-in-the-northeastern-united-states/4-four-methods-of-commercial-cultivation/

AMP 101 Livestock and Poultry Management (2+1)
Syllabus and Lecture Schedule

Theory

Unit I: Introduction to Livestock Management

Significance of Livestock and Poultry in Indian Economy – Livestock and Poultry census – Different livestock development programs of Government of India and Tamil Nadu- Various systems of livestock production-extensive – semi intensive - intensive- mixed- Integrated and specialized farms.

Unit II: Dairy Cattle Management

Important White and Black cattle breeds – Classification and Breed Characteristics of indigenous and exotic White and Black cattle breeds– Breeding - Cross breeding- Upgrading - Economic traits of cattle –Culling - Estrus Cycle – Artificial Insemination – Introduction to Embryo transfer – Housing – Space requirement calf and adult stock – System and types of housing - Care and Management of calf, heifer, pregnant, lactating, dry and working animals – Digestion in ruminants and non ruminants- Nutrition – Ration – Balanced Ration - Characteristics of ration and classification of feed and fodder –Total Mixed Ration –Proximate principles of feed - Nutrients and their functions - Feed ingredients ration for livestock and poultry - Composition of concentrate mixture of young and adult stock-age wise feed and fodder requirement-Importance of green fodder- Milking methods - Clean milk production – Factors affecting milk yield and composition – Disease classification - Common diseases of cattle – symptoms - preventing and control measures.

Unit III: Sheep and Goat Management

Breeds - Sheep and goat classification - Economic traits - System of rearing - Housing Management – Floor space requirement - Care and Management of young and adult stock – Nutrition – Feed and fodders of Small ruminants – Flushing - Common diseases – prevention and control.

Unit IV: Management of Swine

Classification of breeds – Economic traits - Housing - Nutrition – creep feeding - Care and Management of Adult and Young Stock - Common disease- prevention and control.

Unit V: Poultry Management

Classification of breeds - Commercial Strains of broilers and layers – Housing – brooding – deep litter and cage system – care and Management of broilers and layers -Nutrition of Chick, grower, Layer and broiler – Incubation and Hatching of Eggs - Common Diseases - Control and prevention.

Lecture schedule

1. Significance of livestock and poultry in Indian economy-livestock and poultry census. Different livestock development programmes of Government of India and Tamil Nadu - www.indiastat.com,

   Livestock census 2019, Dairying in Tamil Nadu 2019 by NDDB

2. Various systems of livestock production-extensive – semi intensive, intensive- mixed-integrated and specialized farms.

3. Definition of breed-classification of indigenous white and black cattle-breed characteristics of Tamil Nadu cattle breeds and Indian breeds -Sindhi, Gir and Sahiwal.

4. Breed-characteristics of exotic cattle -Jersey and Holstein Friesian – Indian Buffaloes-Murrah, Surti and Toda.

5. Breeding-cross breeding-upgrading-economic traits of cattle-culling importance and methods

6. Estrous cycle – signs of estrous - artificial insemination-merits and demerits-Principles and outline of embryo transfer

7. Housing management-farm site selection and floor space requirement for calves, heifer, milch animal and work bullocks.

8. Systems of housing-single row system-double row system- head to head and tail to tail-merits and demerits - Type design of house.

9. Care and management of new born calf and heifers; pregnant animal and lactating animals and dry cows and work bullock

10. Digestion in ruminants and non ruminants.

11. Nutrition-definition-ration-balanced ration-desirable characteristics of a ration. Classification of feed stuffs-concentrate and roughage-comparison, Total Mixed Ration

12. Proximate principles of feed - Nutrients and their functions - Feed ingredients ration for livestock and poultry

13. Composition of concentrate mixture of young and adult stock-age wise feed and fodder requirement-Importance of green fodder

14. Milking methods-clean milk production-factors affecting milk yield and composition

15. Diseases-classification-viral, bacterial and metabolic-general control andpreventive measures.
16. Viral diseases-foot and mouth disease;Bacterial diseases - anthrax, hemorrhagic septicemia-black quarter; Metabolic- tympanites, acidosis, ketosis and milk fever

17. Mid semester examination

18. Sheep and goat farming-classification of breeds of Indian and exotic origin – economic traits.
19. Systems of rearing-housing management - type design- floor space requirement for adult and young stock.
20. Care and management of ram, ewe and lamb-nutrition- feeds and fodder for small ruminants.
21. Care and management of buck, doe and kid- nutrition- flushing.
22. Common ailments of sheep and goat-Sheep Pox, FMD, Blue Tongue, PPR, Enterotoxaemia, Ecto and endo parasites.
23. Swine husbandry –Common breeds of exotic origin-Large White Yorkshire, Landrace and Duroc - economic traits- housing of Swine.
24. Care and management of sow, boar and piglets – Nutrition- creep feeding.
25. Disease - prevention and control of swine diseases – Hog Cholera, Foot and Mouth Disease, Ecto and Endo parasites.
26. Classification of breeds - commercial strains of layer and broiler.
27. Care and management of Chicks-brooder management.
28. Systems of housing- deep litter and cage system- floor space requirement-common litter material-litter management-merits and demerits.
29. Care and management of Grower and Layers- vaccination schedule.
30. Care and management of broilers-vaccination schedule.
31. Incubation and hatching of eggs.
32. Nutrition-feed formulation-composition of chick, grower, layer feeds; broiler- starter and Finisher mashes-Feed Conversion Ratio /dozen egg or kg of meat production.
33. Classification of disease –viral – bacterial - protozoan- causative organisms, symptoms and prevention – viral diseases- Ranikhet – IBD-avian flu
34. Bacterial disease-E.coli-coryza-salmonellosis-protozoan–coccidiosis-casuative organism, symptoms and preventive measures. Management of dead birds and manure

Practical

Study of external parts of Livestock - Identification of livestock and poultry-Tattooing-ear tags-wing and leg bands-Common restraining methods-Disbudding (or) Dehorning-Different methods of castration-Dentition-Study of type design of animal and poultry houses-Selection of dairy cow and work bullock-Determination of specific gravity, fat percentage and total solids of milk-Milking methods, clean milk production - Identification of feeds and fodder- Computation of rations for livestock. Formulation of concentrate mixtures- Economics Dairy, Goat and Swine farming - Study of external parts of Fowl - Preparation of Brooder House - Brooder management-Identification of layer and non layer- Debeaking, delousing and deworming of poultry-Vaccination schedule for broiler and layer-Dressing of broiler chicken - Economics of Broiler and Layer Farming - Visit to a modern Dairy and commercial layer and broiler farms - Demonstration of incubator and setter.

Practical Schedule

1. Study of external parts of livestock
2. Identification of livestock and poultry
3. Common restraining methods of livestock
4. Disbudding, Dehorning, Castration and Dentition of livestock
5. Study of type design of animal and poultry houses
6. Selection of dairy cow and work bullock
7. Determination of specific gravity, fat %, total solids and solids not fat
8. Milking methods and clean milk production
9. Identification of feed &fodder
10. Computation of rations for livestock and formulation of concentrate mixtures
11. Economics of dairy, goat and swine Farming
12. Study of external parts of fowl. Preparation of brooder house and Identification of layer and non- layer
13. Debeaking, delousing, deworming of poultry Vaccination schedule for broiler and layer
14. Demonstration of dressing of broiler. Economics of layer and broiler farming
15. Visit to a modern dairy and commercial layer and broiler farms
16. Demonstration of incubator and setter
17. **Practical Examination**

Learning Outcome

- Understand the principles of Animal husbandry practices
- Gain basic knowledge on livestock and poultry management
- Exposing latest techniques on animal husbandry practices

Reference

- ICAR (2002) Hand of Animal Husbandry, ICAR, New Delhi.
- Livestock production – N.S.R. Shastri
- Livestock management – CA Gopalakrishnan

E- Reference

- http://www.elearnvet.net/
- http://agridr.in/expert_system/cattlebuffalo/Breeding%20management%20of%20cattle%20and%20b uffaloes-2.html