

**SRI SATYA SAI UNIVERSITY OF TECHNOLOGY & MEDICAL SCIENCE
SEHORE (MP) 2016-17**

**B.Sc. (Ag.) DEGREE PROGRAMME
IInd Year
IIIrd Semester Credit**

AG-301 -Crop Physiology	2
AG-302 -Insect Morphology and Systematics	3
AG-303 -Agricultural Finance and Cooperation	3
AG-304 -Farm Power and Machinery	2
AG-305 -Production Technology of Vegetables and Flowers	3
AG-306 -Livestock Production and Management	3
AG-307 -Organic Farming	2
AG-308 -Practical Crop Production – I (Kharif crops)	2
TOTAL = 20	

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SUBJECT CODE-AG 301
Crop Physiology 2(1+1)

UNIT-1 Crop physiology and its importance in Agriculture, Seed Physiology, Seed structures of important crops viz., gram, maize, castor, wheat, soybean etc, Process of seed formation, Concept of physiological and harvestable maturity with significance, morphological, physiological and biochemical Changes accompanying, seed development, physiological and harvestable maturity, Seed viability and vigour, factors affecting Seed viability and vigour.

UNIT-2. Growth and development: Definitions, phases of growth, factors affecting growth, Determinate and indeterminate growth. Monocarpic and Polycarpic species, Measurement of growth. Growth analysis - Growth characteristics, definitions and Mathematical formulae, Application of growth analysis with merits and demerits, Cell water relations: Properties and physiological Functions of water in plants,

UNIT-3. Transpiration and stomatal regulation : Driving force for transpiration, various kinds with significance, mechanism involved, Antitranspirants, bleeding and guttation, water use efficiency (WUE) in C₃, C₄ and CAM plants. Factors affecting WUE, Stomatal structure and function, mechanism of opening and closing of stomata with supporting theories
Photosynthesis : Raw material for photosynthesis, The pigment system, structure of chloroplast, photo-phosphorylation, light and dark reactions, C₃, C₄ and CAM pathway

UNIT-4. Respiration : Definitions, kinds. Growth and maintenance respiration, alternate respiration, salt respiration, wound respiration, Glycolysis, kreb's cycle, electron transport system, Pentose phosphate pathway, Glyoxylate cycle and Fermentation. Factors affecting respiration. Photoperiodism : Introduction, classification of plants, importance of light and dark periods, light quality and photoperiodism,

UNIT-5. Plant growth regulators: Occurrence, biosynthesis, physiological role and mode of action of auxins, gibberellins, cytokinins, ethylene, abscisic acid and other novel growth regulators with their commercial use in agriculture. Senescence and abscission: Definition, classification, theories of mechanism and control of senescence, physiological and biochemical changes with significance. Post harvest physiology ,a) Seed dormancy - Definition, types, advantages and disadvantages, causes and remedial measures for breaking seed dormancy.

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Practical

1. Study of colloidal system and preparation of various solutions.
 2. Study of mineral deficiency symptoms in plants.
 3. Measurement of water status of plant parts by using various techniques.
 4. Measurement of water potential by various methods.
 5. Measurement of absorption spectrum of chloroplastic pigments and fluorescence.
 6. Determination of leaf area and dry matter production by using various techniques.
- Analysis of growth parameters.
7. Determination of stomatal frequency and index in various crops.
 8. Measurement of respiration by using various methods.
 9. Determination of transpiration rate by various methods.
 10. Study of leaf anatomy of C₃ and C₄ plants.
 11. Exercise to break seed dormancy by using various techniques.
 12. Tests on seed germination, viability and vigour.
 13. Study of stomatal regulation by using ethylene.
 14. Yield analysis in various crops.

References

1. Plant Physiology - R.M. Devlin and F.S. Witham (1986)
2. Text Book of Plant Physiology - C.P. Malik and A.K. Shrivastava
3. Introductory Plant Physiology - G. Ray Noggle and George, T. Fritz (1994)
4. Crop Physiology - U.S. Gupta
5. Plant Physiology - Frank, B. Salisbury & Cleon W. Ross (1995)
6. Test Book of Plant Physiology - S. Mukherjee and A.K. Ghosh
7. Practical Plant Physiology - O.P. Sharma
8. Plant Physiology - C.P. Malik
9. Plant Physiology - S.C. Dutta
10. Plant Physiology - H.S. Shrivastava
11. Plant Physiology - R.G.S. Bid Well (1979)
12. An introduction to crop physiology - Milthorpe, F.L. and Moorley, J.

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**SUBJECT CODE-AG 302
Insect Morphology and Systematic 3(2+1)**

UNIT-1 History of Entomology in India and factors of insect abundance, Classification of Phylum Arthropoda up to classes. Characters of Phylum Arthropoda and their classes, Relationship Of class Insecta with other classes, Structure of insect body Segmentation, Head, thorax and abdomen, Structure and functions Of insect cuticle and its moulting, Structure and modifications of antennae of insects, Structure and modification of mouth parts of insects, Structure and modifications of legs of insects.

UNIT-2Wing venation, modifications and wing coupling apparatus of insects, Structure of male and female external genitalia of insects, Types of sensory organs and their functions in insects.

UNIT-3Structure and functions of digestive system in insects, Structure and functions of circulatory system in insects, Structure and functions of excretory system in insects, Structure and functions of Respiratory system in insects, Structure and functions of Nervous system in insects, Structure and functions of reproductive system (male and female) of insects.

UNIT-4Types of reproductions in insects, Types of endocrine glands in insects, Metamorphosis and their types and diapauses in insects, Types of larvae and pupae.

UNIT-5.Classification of class insecta upto orders

Order-orthoptera – Acrididae, Dictyoptera – Mantodea
Odonata – Libellulidae, Isoptera – Termitidae, Neuroptera – Chrysopidae,
Thysanoptera – Thripidae, Hemiptera – Pentatomidae Coreidae, Pyrrhocoridae,
Lygacidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Aleurodidae,
Pseudococcidae, Lepidoptera – Noctuidae, Sphingidae
, Pyralidae, Gelechiidae and Arctidae, Coleoptera – Coccinellidae
, Chrysomelidae, Cerambycidae, Curculionidae,
Bruchidae and Scharabidae, Order Hymenoptera – Tenthredinidae, Apidae,
Trichogrammatidae, Ichneumonidae,
Braconidae Diptera – Cecidomyiidae Trypetidae, Tephritidae
, Agromyziidae

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Practical

1. Distinguishing characteristics of insects, External features of cockroach, sutures, sclerites of head capsule and types of head
2. Structure of antennae and its modifications
3. Biting and chewing type of mouthparts of cockroach
4. Sucking type of mouth parts of Mosquito and bug
5. Structure of typical wing and its modifications
6. Structure of typical leg and its modifications
7. Dissection of cockroach to study internal organs – Salivary glands, Alimentary canal and Nervous system (central
8. Study of main types of larvae and pupae
9. Distinguishing characters, collection and preservation of the following orders– Isoptera, Orthoptera, Thysanoptera ,Hemiptera, Coleoptera, Diptera, Lepidoptera and Hymenoptera

References

1. Imms general text book of Entomology – Richards, O.W. and Davies, E.C.
2. Text Book of Entomology – Pruthi, H.S.
3. Agricultural Entomology for Indian – Khanna, S.S. Students
4. General and Applied Entomology – Nayar, K.K., Ananthakrishnan, T.N. and David,
5. The Insect Structure and function – Chapman, R.F.
6. d`f`k dhV foKku – Mathur and Upadhyaya
7. The science of Entomology – Romoser, W.S. (1981), II & III edition Macmillan Publishing Company, New York

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**SUBJECT CODE-AG 303
Agricultural Finance and Cooperation 3(3+0)**

UNIT-1 Agricultural Finance – nature and scope Time value of money, Compounding and discounting, Agricultural Credit: meaning, definition, needs, Classification of credit, Repayment plans of credit

UNIT-2 History of financing agriculture in India, Commercial banks, nationalization of commercial banks, Lead bank scheme, Regional Rural Banks, Scale of finance, Higher financing agencies– RBI, NABARD and AFC, Asian Development Bank, World Bank

UNIT-3. Insurance and Credit Guarantee Corporation of India, Assessment of crop losses, Determination of compensation, Crop insurance, advantages and limitations in application,

UNIT-4 Agricultural Cooperation – Philosophy and Principles, History of Cooperative movement – Pre independence and post Independence periods, cooperation in different plan periods,

UNIT-5 Reorganization of cooperative credit structure in Andhra Pradesh and single window system, Successful cooperative System in Gujarat, Maharashtra, Punjab etc.

References

1. An Introduction to Agricultural Finance – U.K. Pandey, Himalayan Publication Ltd., New Delhi
2. Agricultural Finance - Theory and Practical – J.P. Singh
3. Agricultural Finance - Theory and Practical – Kahlon and Tyagi
4. Agricultural Finance and Management – S. Subba Reddy

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SUBJECT CODE-AG 304
Farm Power and Machinery 2(1+1)

UNIT-1. Sources of Farm Power in India, Engine brief, classification of IC, Engines, Difference between 2 stroke and 4 stroke cycle engines, Difference between diesel and petrol engines, I.C. engine components and system's components of an IC. Engine, Working of two stroke petrol engines, working of four stroke cycle petrol engines and diesel engines.

UNIT-2. I.C. engine terminologies, Numerical on engine terminologies, Fuel supply system of petrol engine, Fuel supply system of diesel engine, Cooling systems of diesel engine, Lubrication system of diesel engine, Air intake and exhaust system, Valve operating system, Tractors Definition, Classification and systems, Selection of a tractor, Operating cost of a tractor.

UNIT-3. Tillage, objectives of tillage, Tillage implements – Primary and secondary tillage tools and implements (Bullock Drawn and Tractor Drawn), Description of Indigenous plough, MB plough, Types of shares and M.B, Description of Disc Plough and other ploughs, Description of harrows (BD & TD), Description of Disc harrow.

UNIT-4. Description of intercultural operations implements (cultivators), Descriptions of Hand Hoes, Description of Seed and Seed cum fertilizer drills, Calibration of seed drill, Description of paddy transplanter, Description of sprayers.

UNIT-5. Description of harvesting equipments – Mowers, Description of harvesting equipments – Combines, Bullock drawn implements for land development.

Practical

1. Study of different components of an I.C. engine.
2. Study of working of 2 stroke petrol engine.
3. Study of working of 4 stroke diesel engine.
4. Study of working of 4 stroke petrol engine.
5. Study of working of a farm tractor.
6. Study of working of power tiller.
7. Learning of Tractor driving – Forward.
8. Learning of Tractor driving – Reverse.
9. Hitching of implements to a tractor.
10. Study of M.B. plough and its adjustments.
11. Study of Disc plough and its adjustments.
12. Study of Disc harrows and its adjustments.
13. Study of seed cum fertilizers and calibration of seed drill
14. Study of mowers and its adjustments.

References

1. Elements of Agricultural Engineering – Dr. Jagdishwar Shay
2. Principle of Agricultural Engineering Vol. I – T.P. Ojha, A.M. Michael
3. Elements of Agricultural Engineering – Dr. O.P. Singhal

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SUBJECT CODE-AG 305

Production Technology of Vegetables and Flowers 3(2+1)

UNIT-1 Importance and scope of olericulture, Types of vegetable gardens, Classifications of vegetable,

UNIT-2. Origin, area, production, varieties, package of practices for fruit vegetables, Tomato, brinjal, chilli, okra, Cucurbitaceous vegetables – cucumber, ridge gourd, ash gourd, snake gourd, bottle gourd, bitter gourd, watermelon, musk melon

UNIT-3. Cole crops – cauliflower, cabbage, knol-khol, Bulb crops – onion and garlic, Peas, Tuber crops – potato, sweet potato, colocasia, tapioca, yams, Root crops – carrot, radish, turnip, beet root, Leafy vegetable – palak, amaranthus

UNIT-4. Importance and planning of ornamental gardens, Types and styles of ornamental gardens, Different uses of trees, shrubs, climbers, palms, houseplants and seasonal flowers in gardens

UNIT-5. Package of practices for Rose, Marigold, Tuberose, Jasmine, Chrysanthemum, Package of practices (cultivation) of knol-khol, cluster bean, tapioca, yams,

Practical

1. Layout planning of kitchen garden
2. Identification of important vegetable seeds and plants
3. Raising of vegetable nurseries
4. Identification of ornamental plants – Trees, shrubs, climbers, seasonal, palm etc.
5. Development of garden features
6. Transplanting of seedlings
7. Layout planning of lawns and maintenance
8. Seed extraction of tomato and brinjal
9. Depotting, repotting and maintenance of house plants
10. Visit to different vegetable farms
11. Training and pruning of roses, pinching and disbudding of Chrysanthemum
12. Layout planning of gardens and garden design for public and private areas
13. Intercultural operations and seed production in vegetables
14. Harvesting indices of different vegetable crops, grading and packaging of vegetables
15. Prolonging the shelf life of cut flowers

References

1. Vegetable crops in India – T.K. Bose and M.G. Som
2. Production Technology – S.P. Singh of Vegetable crops
3. Production Technology – K.G. Shanmughavelu of Vegetable crops
4. Complete Gardening in India – K.S. Gopal Swamiyanger
5. Floriculture in India – G.S. Randhawa and A. Mukhopadhyay
6. Commercial Flowers – T.K. Bose

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**SUBJECT CODE-AG 306
Livestock Production and Management 3 (2+1)**

UNIT-1. Role of Livestock in National economy, Different Livestock Development Programmes of Govt. of India, Important Indian breeds of cattle, buffalo, sheep, goat and swine, Important exotic breeds of cattle, buffalo, sheep, goat and swine

UNIT-2 Measures and factors affecting fertility in Livestock, Mechanism of milk secretion, clean and hygienic milking of animals, Factors affecting milk yield and their composition, Selection and breeding of livestock for higher milk production, Selection and breeding of livestock for meat production.

UNIT-3. Feeding and management of calves, growing heifers and milch animals and other types of animals, Disease control measures, sanitation and care, Breeding, feeding and production records

UNIT-4 Breed characteristics of poultry, Methods of rearing of poultry, breeding of poultry, Feeding and Management of poultry, Structure and keeping quality of eggs, Incubation and hatching management, Vaccination schedules for prevention of poultry disease

UNIT-5. Marketing of eggs, Preservation of eggs, Economics of layer production, Cost of milk production, Economical unit of dairy, Economical unit of Goatery, Economical unit of Piggery.

Practical

1. Visit to Livestock farms
2. Study of external body parts of Livestock species
3. Identification methods for different livestock species
4. Handling and restraining of animals
5. Judging and culling of dairy animals
6. Feeding and ration formulation
7. Incubation and hatchery maintenance and their management
8. Housing of animals
9. Management of poultry
10. Economics of livestock production

References

1. Livestock Production Management – Dr. N.S.R. Shastry, Dr. R.A. Singh and Dr. Thomas
2. A Text Book of Animal Husbandry – Dr. G.C. Banerjee
3. Poultry Production – Dr. R.A. Singh and others
4. Animal Husbandry and Draining – Dr. Jagdish Prasad
5. Animal Husbandry – Dr. Harbansh Singh & Dr. Moor
6. Dairy India – 2007

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**SUBJECT CODE-AG 307
Organic Farming 2 (2+0)**

UNIT-1 Introduction of Organic Farming (OF)

- (a) Importance of requirement of foods and fodder in the nation.
- (b) OF in relevance to quality foods and fodder
- (c) Meaning of OF and its basic tools
- 2. Concept of OF and objectives of OF
- (b) OF in relevance to sustainable agriculture and farming systems

UNIT-2. Organic production requirements

- (a) What to do and what not to do in OF and conversion of land for organic agriculture
- (b) Organic soil with organic nutrition - organic matter and its role in plant nutrition
- (c) Organic sources of plant nutrition

UNIT-3 Biological intensive nutrient management

- (a) Organic manures-Farmyard manure (preparation, composition and availability)
- (b) Composts and composting-aerobic and anaerobic composting, microbial cultures for hastening composting, preparation of composts from rural and urban wastes, Phospho-composts, NADEP-composts
- (c) Vermicompost-role of earthworms in composting, method of Vermicomposting, vermiculture, vermi-wash, qualities of vermi-compost
- (d) Green manuring and its advantages, green manure crop (leguminous and non-leguminous), ideal green manuring crops
And type of green manuring

UNIT-4 Disease and pest management in OF - Integrated disease and pest management and key steps for biological control of diseases and pests

- (a) Use of bio-control agents (parasitoids and predators), and biopesticides (bacterial, fungal and viral pesticides)
- (b) Use of pheromone traps, trap crops, bird-perches, botanic, cultural practices and ITKs (indigenous technical knowledge).

UNIT-5 Weed management

- (a) Cultural and physical methods of weed control
- (b) Biological methods of weed control using natural enemies and Pathogens.

References

1. Organic Food Production in India - Bhattacharya, P. 2003, Agribios- Status, Strategy and Scope - (India), Jodhpur
2. Organic Farming-Theory and - Palanniappan, S.P. and Anandurai, Practices K 1999, Scientific Publisher, Jodhpur
3. Organic Farming - Lumpkin, N. 1990, Farming PressBooks, IPSWITCH, U.K.
4. Hand Book of Organic Farming - Sharma, A.K. 2001,

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SUBJECT CODE-AG 308

Practical Crop Production – I (Kharif crops) 2 (1+1)

Practice of raising 8-10 prevailing *Kharif* crops of the agro-climatic zones will be done by the student. One crop will be grown by a student or group of 2-4 students depending upon the strength of students in the class, on a minimum of 100 m² area. Following practices will be performed by the student(s) for raising the allotted crop to them separately, besides observing the practices performed by other students in their plots for raising the crops.

Practical

S.No. Exercise No. of classes

- 1 Crop planning for raising Kharif-crops 2
- 2 Field preparation and preparation of nursery beds for crop 1
- 3 Seed treatment, seed inoculation and sowing of crop 2
- 4 Fertilizer applications (basal, top dressing and foliar spray) in crop 2
- 5 Water management (irrigation & drainage) in crop 1
- 6 Weed management (cultural/mechanical/chemical) in crop 1
- 7 Management of insect pests and diseases in crop 1
- 8 Harvesting, drying, and tying bundles and transport to threshing Floor of crop.
- 9 Threshing, winnowing and drying of produce 1
- 10 Storage and marketing 1
- 11 Preparation of balance sheet including cost of cultivation and value of produce

2. S.No. Exercise No. of classes

- 12 Determination of net monetary returns per student or per group of Students and benefit cost ratio 1

Total 16

Note: Final report of raising the crop will be submitted by the student or group of Students for valuation.

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