

KVR GOVT. COLLEGE FOR WOMEN (AUTONOMOUS), KURNOOL

Re-Accredited by NAAC with Grade "B++"

(w. e. f. 2022-2023)

DEPARTMENT OF BIOTECHNOLOGY

THIRD YEAR – V SEMESTER SYLLABUS

PAPER VI – ORGANIC FARMING

Total Hours : 36 Hrs

Credits : 3

Course Objectives:

On successful completion of this course, the students will be able to :

1. Understand the soil profile and nutrients in soil
2. Appreciate the importance of organic manure and bio fertilizers
3. Produce Vermicompost, farmyard manure from bio waste
4. Acquire skill on isolation and maintenance of bio fertilizers

UNIT I - Soil: (7h)

Definition, soil formation, composition and characteristics. Types of soils. Distribution of soil groups in India. Acidic, Alkaline and heavy metal contaminated soil. Methods of reclamation. Effects of chemical dependant farming on yield and soil health.

UNIT II - Plant Nutrition (7h)

Macro and micro nutrients, functions of nutrients in plant growth and development. Nutrient uptake and utilization by plant. Types of fertilizers. Organic, inorganic and bio fertilizers. Chemical fertilizer. Advantages & disadvantages of their use. Importance of organic and bio fertilizers.

UNIT III - Organic Farming (8h)

Definition, concept, benefits. Integrated farming system (combination of organic and inorganic). Mixed farming system. Concept of different cropping systems in relation to organic farming, Inter cropping, crop rotation. Organic farming process. Organic fertilizers, crop nutrients and effective microorganisms in Organic farming.

UNIT IV - Organic compost (7h)

Definition, types of compost, farm yard compost, green leaf compost, animal husbandry, animal

housing, animal feeding, animal health, breeding goals.

Vermi compost: Introduction, vermi composting material, species of earthworms, small scale, large scale composting process. Vermi castings, harvesting, processing and drying. Nutrient content of vermi compost. Field application methods.

UNIT V - Biofertilizers

(7h)

Introduction, status and scope. Structure and characteristic features of bacterial bio fertilizers- *Azospirillum*, *Azotobacter*, *Bacillus*, *Pseudomonas*, *Rhizobium* and *Frankia*. Cyanobacterial biofertilizers- *Anabaena*, *Nostoc*, *Hapalosiphon* and fungal biofertilizers- AM mycorrhiza and ectomycorrhiza. Mechanism of nitrogen fixation and phosphorus solubilisation.

References:

1. Principles of Organic Farming- by E Somasundaram, D Udhaya Nandhini, M Meyyappan ;2021
2. Organic farming in India:: by Arpita Mukherjee; 2017
3. Biofertilizer and biocontrol agents for agriculture;; by AM Pirttilä · 2021
4. Trends in Organic Farming in India;; by S. S. Purohit, 2006
5. Biofertilizers for Sustainable Agriculture and Environment;; by Bhoopander Giri
Ram Prasad, Qiang-Sheng Wu, Ajit Varma; 2019

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III B.Sc – V SEMESTER

PRACTICAL SYLLABUS

Total Hours : 36 Hrs

Credits : 3

PAPER VI - ORGANIC FARMING

1. Collection of different soil samples
2. Qualitative estimation of nitrogen, phosphorus and potassium in soil samples
3. Collection of fruit, vegetable and other domestic waste
4. Preparation of compost beds and introducing earthworms
5. Collection of vermi castings
6. Sieving, drying and packing of vermi compost
7. Visit to animal shed and observing farm yard manure production
8. Preparation of media and isolation of bio fertilizers

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DEPARTMENT OF BIOTECHNOLOGY

THIRD YEAR – V SEMESTER SYLLABUS

PAPER VII – BIOFERTILIZERS AND BIOPESTICIDES PRODUCTION

Total Hours : 36 Hrs

Credits : 3

COURSE OBJECTIVES:

On successful completion of the practical course, student shall be able to

1. Understand the importance of bio fertilizers for sustainable agriculture.
2. Appreciate the role of VAM in P solubilisation
3. Define bio pesticide and its nature
4. Produce bio fertilizers and bio pesticides on large scale
5. Able to prepare inoculums for field application

UNIT I - Bio fertilizers

(8h)

Introduction, history, concept, scope of bio fertilizers in India. Classification, microorganisms used as bio fertilizers. Bacterial, fungal and algal bio fertilizers. Symbiotic and a symbiotic microorganisms. Mechanism of nodulation and nitrogen fixation.

UNIT II - Mycorrhizal bio fertilizers

(7h)

Importance, types, characteristic features of ecto and endo mycorrhiza. Mechanism of phosphorus solubilisation. Uptake of phosphates by the roots. Consortium based inoculums and significance.

UNIT III - Bio pesticides

(7h)

Definition, concept, history, scope and importance of bio pesticides. Classification - botanicals, bacterial, fungal and viral based bio pesticides. Mechanism of action of *Bacillus thuringiensis*

and *Trichoderma viridae* as bio control agents.

UNIT IV - Mass production techniques (7h)

Media, types, preparation. Methods of isolation, streak plate, spread plate and pour plate techniques, purification and identification of microorganisms used as bio fertilizers and bio pesticides. Mass production and packing techniques.

UNIT V - Field application methods (7h)

Preparation of carrier based inoculum. Sphagnum, peat, vermiculite as inoculums carriers. Dosage standardization. Seed treatment, foliar application, root dressing and soil application techniques. Storage and maintenance of inoculum.

References:

1. Biofertilizers: Commercial Production Technology and Quality Control, 2017 by Dr.P.Hyma
 2. Biofertilizers Technology, 2010, by S.Kaniyan, K.Kumar and K. Govinda rajan
 3. Biofertilizers for Sustainable Agriculture, 2017; by Arun K Sharma
 4. Advances In Plant Biopesticides 2021, by Dwijendra Singh, Springer India
 5. A Textbook of Integrated Pest Management, 2013 by Ram Singh & Vikas Jindal
- G.S.Dhaliwal

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Credits : 3

PAPER VII - BIOFERTILIZERS AND BIOPESTICIDES PRODUCTION

1. Preparation of Nutrient agar, YEMA, and PDA media
2. Isolation of *Rhizobium* from root nodules
3. Isolation of *Azotobacter* from soil samples
4. Isolation of *Trichoderma*
5. Gram staining of bacteria
6. VAM root staining
7. Raising of legume seedlings with *Rhizobium* treatment
8. Visit to commercial bio control units and Krishi seva Kendra