

Course 6B Organic Farming
(Skill enhancement course (Elective), 05 credits)
Maximum Marks Theory: 100 + practical: 50

I. Learning outcomes

Students after successful completion of the course will be able to

1. Understand the soil profile and nutrients in soil
2. Appreciate the importance of organic manure and biofertilizers
3. Produce vermicompost, farmyard manure from biowaste
4. Acquire skill on isolation and maintenance of biofertilizers

II. Syllabus: (Total 90 hrs. (including Teaching, Lab, Field Training and unit tests etc.))

UNIT -1-Soil: (10h)

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 dependent farming on yield and soil health.

UNIT-2 -Plant Nutrition (10h)

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 -3 -Organic Farming (10h)

Definition, concept, benefits of organic farming. 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- 4 -Organic compost (10h)

Definition, types of compost, farm yard compost, green leaf compost, compost from animal waste.

Vermi compost: Introduction, vermicomposting 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 –5-Biofertilizers (10h)

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.

III. Skill outcomes:

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

1. Estimate NPK levels in the soil
2. Demonstrate the collection and processing of raw material
3. Develop skill of vermicompost production
4. Learn the technique of establishing organic farms
5. Equip with the skill of preparation of microbial media

Course 7B: Bio fertilizers and Bio pesticides production

(Skill enhancement course (Elective), 05 credits)

Maximum Marks Theory: 100 + practical:50

I. Learning outcomes:

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 largescale
5. Able to prepare inoculums for field application

II. Syllabus: (Total 90 hrs (including Teaching, Lab, Field Training and unit tests etc.)

UNIT -1-Biofertilizers (10h)

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

UNIT – 2- Mycorrhizal biofertilizers (10h)

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-3 -Bio pesticides (10h)

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 -4 – Mass production techniques (10h)

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- 5 - Field application methods (10h)

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.

III. Skill outcomes:

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

1. Prepare bacterial and fungal media
2. Isolate and identify symbiotic and free living nitrogen fixing bacteria
3. Isolate fungal bio control agents from soil samples.
4. Develop skill for large scale production of microorganisms
5. Learn field application techniques of biofertilizers and biopesticides

