

Bio-Fertilizers

Course Objectives

- To understand the methods of isolation, propagation, and application of different bacterial, fungal and algal biofertilizers.
- To learn the characteristics of strains of importance for use as biofertilizers and the methods of their cultivation, processing and application.
- To inculcate the knowledge for understanding the concept and procedure of organic farming for sustainable agroecosystem.
- To learn the processing and recycling methods of biodegradable organic wastes of diverse origin and their integration with biofertilizers.
- To learn the techniques and application of composting, vermin-composting and reuse of complex organic matters and method of their agricultural application.

Course Outcomes:

After the completion of the course the students are expected to have

- Knowledge of biofertilizers belonging to different microbial groups and their association with crop plants.
- Skill on isolation, culture, mass propagation and harvesting, processing, storage and marketing of various types of biofertilizers.
- Detailed understanding on the techniques and benefits of organic farming following green manuring and organic manure application.
- Knowledge on the nutritional advantage of the application of biofertilizers and the field doses of various biofertilizers for nitrogen and phosphorus nutrition.
- Skill to properly compost the organic wastes of various complexity and use of the compost on crop field for enhanced yield.

Unit I: LO: Awareness about the microbial groups, preparation and types of biofertilizers

General account about the microbes used as biofertilizer– Rhizobium – isolation, identification, mass multiplication, carrier-based inoculants, Actinorrhizal symbiosis. *Azospirillum*: isolation and mass multiplication, *Azotobacter*: classification, characteristics – crop response to Azotobacter inoculums, maintenance and mass multiplication.

Unit II:

LO: Knowledge on isolation, culture, harvesting, processing, storage and marketing of biofertilizers

Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation, factors affecting growth, blue green algae and *Azolla* in rice cultivation.

Unit III: LO: Understanding the nutritional advantage of various biofertilizers

Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants.

Text Books:

- ✓ *Mahendra Rai, (2006). Hand book of Microbial Bio-fertilizers. CRC Press.*

ReferenceBooks:

- ✓ *Dubey, R.C., 2005 A Text book of Biotechnology S. Chand & Co, New Delhi.*
- ✓ *Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.*
- ✓ *John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication, New Delhi.*
- ✓ *Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.*
- ✓ *Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New -Delhi.*
- ✓ *Vayas, S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic. Farming Akta Prakashan, Nadiad*
- Pravin Chandra Dwivedi. (2008). Biofertilizers. Pointer Publishers.*