

**FACULTY OF AGRICULTURE****DEPARTMENT OF MICROBIOLOGY****GMICVAC01 Microbial Inoculant Production Technology****Learning Objective**

To study the basic principles and application methodologies of different microbial inoculants in order to improve the soil fertility and productivity.

**Unit I**

Concepts of microbial inoculants Biofertilizers – Definition - types, importance of biofertilizers in agriculture – Rhizobium - characters and classification – Rhizobium - legume symbiosis - nodule formation - Factors affecting nodulation and nitrogen fixation.

**Unit II**

Nitrogen fixing biofertilizer Characteristics and classification of Azospirillum, Azotobacter, Gluconacetobacter.- Actinorhizal plants (Frankia) and Algal biofertilizers - Blue green algae – Azolla.

**Unit III**

Phosphate solubilizing/mobilizing biofertilizer Problems of phosphorus uptake - fixation of phosphorus - microbial transformation of phosphorus- Phosphate solubilizing microorganisms, K, Zn and silicate solubilizing microorganisms – factors affecting phosphate solubilization– AM fungi – characteristics and types of mycorrhizae - Plant Growth Promoting Rhizobacteria (PGPR) – Pseudomonas.

**Unit IV**

Formulations of biofertilizer Different formulations of biofertilizers – Types and characters - carrier – beads – pellets and liquid formulation – preservatives and additives-shelf life of different formulations-quality control of different formulations - BIS.

**Unit V**

Production technology Mass Production technology of bacterial biofertilizers, Azolla , Algal biofertilizers and AM fungi – problem and constrains in production- method of application – Marketing and monitoring field performance-Economics of microbial inoculants.

**References Books:**

1. Bhattacharyya.,P and Tandon HLS.2002.Dictionary of Biofertilizers and Organic Fertilizers. Fertilizer Development and Consultation Organization, New Delhi. 1 – 165.
2. Gianinazzi, Hannes Schüepp, J.M. Barea, K. Haselwandter.2012.
  - a. Mycorrhizal Technology in Agriculture: From Genes to Bioproducts. Birkhäuser publisher
3. Hyma. 2017. Biofertilizers: Commercial production Technology and qualitycontrol. Random publishers. New Delhi.
4. Motsore, M. R., P. Bhattacharayya and Beena Srivastava, 2001. Biofertilizer Technology,Marketing and usage – A source Book – cum – glossary – FDCCO, New Delhi, P. 584
5. Umesh Chandra Mishra.2015. Facts for Liquid Biofertiliser. Partridge Publishing, Singapore. S.G.Borkar.2015. Microbes as Bio- fertilizers and their Production Technology .Wood head publisher. New Delhi.