MANGALORE UNIVERSITY

DEPARTMENT OF MICROBIOLOGY

M.Sc. MICROBIOLOGY

MBH- 551: Agricultural Microbiology

56h

Objectives:

After studying this course, the learners will be able to –

1. To study the importance of Microorganisms in Agriculture.
2. Agriculture crop improvement and protection by using Microorganisms.
3. To understand the recycling of nutrients through biogeochemical cycles.
4. To understand the agricultural waste management by using microorganisms.

Course Outcome:

CO1: Students are trained to establish agriculture industries for the production of biofertilizers and biopesticides.
CO2: Students understand agriculture crop diseases and control measures.
CO3: They are trained to develop a genetically modified agricultural crop.
CO4: Understanding in agricultural waste management and recycling.
CO5: Obtain knowledge about Current research and developments.

Unit I

Microbial diversity in Soil, Qualitative and quantitative analysis of Soil microflora. Rhizosphere and non-rhizosphere microorganisms and their importance. Soil- Types, Physical, chemical and Biological properties, Soil horizons and Microbial distribution. Microorganisms in nutrients recycling- Nitrogen, Sulphur, Phosphorus and Carbon cycles.

Unit II

Nitrogen fixation- Symbiotic and Non-Symbiotic Nitrogen fixation, Biochemistry of nitrogen fixation. Phosphate solubilization, VAM- Endomycorrhiza and Ectomycorrhiza, PGPR and role in agriculture, Cyanobacteria. Biofertilizers- Microbial inoculants, *Rhizobium, Azospirillum, Azotobacter.*

Unit III

Diseases of important crop plants-Bacterial, fungal and Viral diseases and its management, Biopesticides- *Bacillus thuringiensis*, *Bacillus papillae*, *Beauveria bassiana*, *Metarhiziumanisopliae*. Bio control agent - *Trichoderma.* Genetic engineering technology for crop improvement, Harvesting, transportation and storage of Agricultural products. Global Environmental Problems Ozone depletion, UV-B, greenhouse effect, acid rain, their

impact and biotechnological approaches for management. Global warming and climate change.

Unit IV

Bioremediation of Contaminated Soils, ISI Standards and Quality tests, Nursery Inoculants, Impact of Heavy Metals on Soil Microbial communities. Biodeterioration: Definition and concept, biodeterioration of woods. Biomagnification: concept and consequences, Biomagnifications of chlorinated hydrocarbons and pesticides. Biotransformations: metals and metalloids, mercury transformations, biotransformation of pesticides such as hexachlorobenzene. Biodegradation of plastics. Concept of phytoremediation and applications.

Note: Each unit is for 14h