Department of Botany III Semester
Open Elective Theory
OET. 3.1: BIOFERTILIZERS AND BIOPESTICIDES

52 Hours

Unit-I

Biofertilizers – Definition, Classification, Advantages and Constraints of Biofertilisers. Role of biofertilizers in Modern agriculture. A general account of Biofertilizer organisms - Cyanobacteria (BGA), Bacteria and Mycorrhizae, Phosphorus and Phosphate solubilizating micro-organisms, Role of genetic engineering in the preparation of biofertilizers.

Unit-II

Cyanobacteria (BGA) as biofertilizers - A general account of cyanobacterial organisms- *Anabaena, Cylindrospermum, Gloeocapsa, Lyngbya, Nostoc, Plectonema* and *Tolypothrix*. Symbiotic association of Cyanobacteria. Field application of Cyanobacterial inoculants.

Bacterial biofertilizers - A general account of bacterial biofertilizer organisms- *Azospirillum, Azotobacter, Frankia, Phosphobacteria* and *Rhizobium,* Mass production of *Azospirillum*, *Azotobacter* and Phosphobacteria. Azolla as biofertilizer.

Unit-III

Mycorrhizae as biofertilizers - A general account of Ecto, Endo and Arbuscular mycorrhizae (AM). Methods of collection, wet sieving and decanting method and inoculum production. Culturing of mycorrhizae in Modified Melin - Norkrans (MMN) agar medium, Isolation and method of inoculation of Arbuscular mycorrhizae (AM).

Unit- IV

Biopesticides - Definition. Types (Bioinsecticides and biofungicides); advantages over chemical pesticides. Fungal and Bacterial Biopesticides – *Trichoderma*, *Bacillus Thuringiensis* Bioinsecticides – Neem, Virus, bacteria and fungi as Bioinsecticides. Biocontrol of diseases in plants. Role of Mycorrhizae in disease control. Role of plants, Fungi and bacteria as biocontrol agents. Cross protection.

References

1. Dubey, R. C. (2008): A Textbook of Biotechnology. S. Chand & Co., New Delhi.
2. Newton, W. E. *et al*. (1977): Recent Developments in Nitrogen Fixation. Academic Press, New York.
3. Schwintzer, C. R. and Tjepkema, J. D. (1990): The Biology of *Frankia* and *Actinorhizal* Plants. Academic Press Inc., San Die go, USA.
4. Stewart, W. D. P. and Gallon, J. R. (1980): Nitrogen Fixation. Academic Press, New York.

5. Subba Rao, N. S. (1982): Advances in Agricultural Microbiology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Subba Rao, N. S. (2002): Soil Microbiology. 4th ed. Soil Microorganisms and Plant Growth. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
7. Subba Rao, N. S. and Dommergues, Y. R. (1998): Microbial Interactions in Agriculture and Forestry. Vol. I, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
8. Verma, A. (1999): Mycorrhiza. Springer Verlag, Berlin.
9. Wallanda, T. *et al.* (1997). Mycorrhizae. Backley's Publishers, The Netherlands.
10. Ilan chet (Ed.). Innovative Approaches to plant disease Control. Wiley Inter Science Publication, Ihon Wiley and Sons New York (1987)
11. Agrios, G. N. Plant Pathology, Fourth Edition 1997, Academic Press, U S A.

Open Elective Practical

OEP. 3.1: BIOFERTILIZERS AND BIOPESTICIDES

Unit-I

1. Isolation and Mass cultivation of Cyanobacteria (BGA)- *Anabaena, Cylindrospermum, Gloeocapsa, Lyngbya, Nostoc, Plectonema* and *Tolypothrix.*
2. Mass cultivation of *Azolla*
3. Isolation of Nitrogen fixing bacteria - *Azobacter* and *Azospirullum*
4. Demonstration and isolation of Root nodules (*Rhizobium*)

Unit-II

5. Isolation and identification of fungal and insect biocontrol agents
6. Isolation and culturing of *Aspergillus, Trichoderma* and *Bacillus* sps.
7. Experiments on Fungal and bacterial Antagonism
8. Trap crops in Gulbarga Region