

Core Course – V : BIOFERTILIZERS AND MUSHROOM TECHNOLOGY

Unit-I: BIOFERTILIZER

Biofertilizers - Introduction, scope. A general account of Biofertilizers organisms - Cyanobacteria (BGA), Bacteria and Mycorrhizae - Cyanobacteria (BGA) as biofertilizers - *Anabaena*, *Cylindrospermum*, *Gloeocapsa*, *Lyngbya*, *Nostoc*, *Plectonema* and *Tolypothrix*. Algalization, *Azolla* - *Anabaena* as biofertilizers. Isolation of cyanobacteria. Formation of Fogg's medium - Mass cultivation of *Azolla* - Cyanobacterial biofertilizers - Symbiotic association of Cyanobacteria - Field application of Cyanobacterial inoculants.

Unit-II: BIOFERTILIZER

Bacterial biofertilizers - Introduction, scope. A general account of bacterial biofertilizers organisms. *Azospirillum*, *Azotobacter*, *Frankia*, *Phosphobacteria* and *Rhizobium*. Isolation - *Azotobacter* - Ashby's mannitol agar, *Azospirillum* - Semisolid medium (Bulow and Dobereiner, 1975). *Rhizolium* - Yeast Extract Mannitol Agar medium - Culture characteristics. Mass production of *Azospirillum*, *Azotobacter* and *Phosphobacteria*. Mechanism of nitrogen fixation (free-living and symbiotic) - Biochemistry and molecular basis of nitrogen fixation - Phosphate solubilization and mobilization.

Unit-III: BIOFERTILIZER

Mycorrhizal fungi as biofertilizers - Introduction, scope. A general account of Ecto, Endo and Arbuscular mycorrhizae (AM). Methods of collection, wet sieving and decanting method and inoculum production. Culture of mycorrhizae in Modified Melin - Norkrans (MMN) agar medium - Cultural characteristics of Ecto mycorrhizal fungi. Techniques of Ectomycorrhizal inoculum, Endo mycorrhizae of orchids. Isolation and method of inoculation of Arbuscular mycorrhizae (AM), Legume - AM interactions - National and Regional Biofertilizers Production and Development Centres.

Unit-IV: MUSHROOM TECHNOLOGY

Mushroom Technology - Introduction, History and Scope - Edible and Poisonous Mushrooms. Vegetative characters - Formation and development of Basidiocarp, structure of basidiocarp - *Agaricus*. Importance and nutritive value of edible mushrooms. Food preparation- soup, cutlet, vegetable curry, samosa, omlette and pickle. Mushroom research centres in India.

Unit-V: MUSHROOM TECHNOLOGY

Cultivation of button mushroom (*Agaricus bisporus*), milky mushroom (*Calocybe indica*), oyster mushroom (*Pleurotus sajorajju*) and paddy straw mushroom (*Volvariella volvcea*). Isolation and culture of spores, culture media preparation. Production of mother spawn, multiplication of spawn - Inoculation Technique - Cultivation technology - Substrates, composting technology, bed, polythene bag preparation, spawning - casing - Cropping - Mushroom production - Harvest - Storage methods and marketing.

References

Biofertilizers

- Dubey, R. C. (2008). A Textbook of Biotechnology. S. Chand & Co., New Delhi.
- Newton, W. E. *et al.* (1977). Recent Developments in Nitrogen Fixation. Academic Press, New York.
- Schwintzer, C. R. and Tjepkema, J. D. (1990). The Biology of *Frankia* and *Actinorhizal* Plants. Academic Press Inc., San Diego, USA.
- Stewart, W. D. P. and Gallon, J. R. (1980). Nitrogen Fixation. Academic Press, New York.
- Subba Rao, N. S. (1982). Advances in Agricultural Microbiology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- Subba Rao, N. S. (2002). Soil Microbiology. 4th ed. Soil Microorganisms and Plant Growth. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- 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.
- Verma, A. (1999). Mycorrhiza. Springer Verlag, Berlin.
- Wallanda, T. *et al.* (1997). Mycorrhizae. Backley's Publishers, The Netherlands.

Mushroom Technology

- Alice, D., Muthusamy and Yesuraja, M. (1999). Mushroom Culture. Agricultural College, Research Institute Publications, Madurai.
- Marimuthu, T. *et al.* (1991). Oster Mushroom. Department of Plant Pathology. Tamil Nadu Agricultural University, Coimbatore.
- Nita Bhal. (2000). Handbook on Mushrooms. 2nd ed. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- Pathak, V. N. and Yadav, N. (1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
- Tewari Pankaj Kapoor, S. C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi.
- Tripathi, D. P. (2005). Mushroom Cultivation. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Note: No Practical for this paper.