

Biofertilizers

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution Of The Course			Eligibility Criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Biofertilizers	2	0	0	2	Class XII	NIL

Learning objectives:

To help the students understand:

- the concept of biofertilizers and develop the skills for handling microbial inoculants.
- the growth and multiplication conditions of useful microbes and their role in mineral cycling and nutrition to plants.
- various methods of decomposition of biodegradable waste and their conversion to compost.

Learning outcomes:

After completion of this course, the learners will be able to:

- describe the different methods of composting.
- assess quality of compost and its role in soil nutrition.
- apply methods of bio-control
- develop a composting unit for production of biofertilizers (generate employment)

Syllabus

Practical: 60 hours

1. Introduction to rhizobial symbiosis - Study of *Rhizobium* and its isolation from root nodules of leguminous plants by Gram staining method. 4 hours
2. Study of different bio-composting methods (microbes and earthworm). 8 hours
3. Compost quality assessment and its role in soil nutrition - Test for pH, NO_3^- , SO_4^{2-} , Cl^- and organic matter of different composts. 8 hours

4. Introduction to Arbuscular mycorrhiza - Study of arbuscular mycorrhizal fungi from plant roots by staining methods. 4 hours
5. Isolation of arbuscular mycorrhizal spores from rhizosphere soil. 4 hours
6. Study structure of *Anabaena* and *Azolla* structure - Isolation of *Anabaena* from *Azolla* leaf. 4 hours
7. Study various biocontrol methods and their application Pheromone trap, *Trichoderma*, *Pseudomonas*, Neem etc. 4 hours
8. Projects on any one of the following topics: *Rhizobium* technology, AMF technology, Organic farming, Bio composting, Vermicomposting, *Azolla* culture etc. The design of the project should be such that it includes a continuous work of at least 6 weeks and a dissertation submission/ presentation/ CE - continuous evaluation. 24 hours

Essential Readings:

1. Kumaresan, V. (2005). *Biotechnology*. New Delhi, Delhi: Saras Publication.
2. Sathe, T.V. (2004). *Vermiculture and Organic Farming*. New Delhi, Delhi: Daya publishers.
3. Subha Rao, N.S. (2000). *Soil Microbiology*. New Delhi, Delhi: Oxford & IBH Publishers.
4. Khosla, R. (2017). *Biofertilizers and Biocontrol Agents for Organic Farming* Kojo Press.

Suggestive Readings:

1. Azotobacter - Isolation and characterization -- <https://youtu.be/1Z1VhgJ2h6U>
2. Rhizobium -- Identification and characterization - <https://youtu.be/jELlo-pMvc4>.
3. 3-Days Online Workshop On Arbuscular Mycorrhizal Fungi_ Biodiversity, Taxonomy and Propagation 19-2 (2022-01-20 at 02_27 GMT-8) – <https://youtu.be/LKzK4luSRc4>
4. Vayas, S.C, Vayas, S., Modi, H.A. (1998). *Bio-fertilizers and organic Farming*. Nadiad, Gujarat: Akta Prakashan.

Examination scheme and mode:

Evaluation scheme and mode will be as per the guidelines notified by the University of Delhi.