

**A
PROPOSAL
For
Certificate Course
in
Biofertilizer Production
Course code: CCBFP22
(w.e.f. session 2022-2023)**



**Department of Biotechnology
DAYANAND COLLEGE, HISAR**

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Introduction: The use of synthetic chemical fertilizers during past few decades for increasing the agricultural yield. It has badly affected soil fertility, the water retention capacity and micronutrients content in the soil. Hence, the concept of biofertilizers is being promoted all over the world. The biofertilizers nothing but beneficial microbes that enhances availability of plant nutrients to host plant and protect plants from pathogen. Application of biofertilizers is being advocated by the environment for sustainable agriculture. Quality biofertilizers are, however, only available in a few number of locations and in restricted quantities. Besides, there is a need to popularize the biofertilizer use among the farmers. In spite of the efforts, well trained skilled manpower to start-up small biofertilizer production units are not much available in the country. In this regard, we have proposed to start this skill development certificate course.

Aim: To demonstrate the low-cost media preparation and impart training of ecofriendly agricultural inputs in biofertilizer production.

Objectives: -

- To promote organic farming in the region through technical capacity building of all stake holders.
- To facilitate the students to understand basics of biofertilizers.
- To impart training to develop skill both handling, cultivation and propagation of quality microbial inoculants.
- To make students ready for industry as entrepreneurs.
- To improve the professional competencies and upgrade the knowledge and develop technical skills of biofertilizer production.

Structure of Course:

- Paper I: Theory Paper
- Paper II: Practical

Course Duration:

- Theory: 30 Contact hours
- Practical: 06 Contact hours

Qualification Required: - XII Science

Organizing Department: Biotechnology Department
Faculty: Biotechnology Department Faculty/ Teachers

Syllabus

Course code: CCBFP22 (T)

Nomenclature: Biofertilizer Production (Theory)

Maximum marks: 60

Time: 3 Hours

Course outcome:

- Understand the role of microorganism in improving the fertility of soil and also in control the pest and other pathogens.
- Will know the techniques involved in mass production, quality control and application of Bioinoculants in organic farming.
- Students will have an opportunity to work in research laboratory, biofertilizer industry and can also be a bio-entrepreneurs.
- Ability to distinguish the types of biofertilizers and methods of application in field.

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/ short answer type question covering the entire syllabus. In addition to that eight more question will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question no. 1. All questions will carry equal marks.

Unit 1

Introduction: History and concept of Bio fertilizers, status, scope, types and importance of Bio fertilizers, Classification of Bio fertilizers, Biological Nitrogen fixation.

Unit II

Media: Formulation & their various types, sterilization techniques, Nutrients required for growth of bacteria, chemoautotrophy, photo autotrophy, Microbial growth.

Unit III

Structure and characteristic features of Bacterial Bio fertilizers- Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium and Frankia; Cyanobacterial biofertilizers- Anabaena, Nostoc, and fungal biofertilizers- AM mycorrhiza and ectomycorrhiza.

Unit IV

Production technology: Strain selection, fermentation, equipment, mass production of carrier based and liquid biofertilizers. FCO specifications and quality control of bio fertilizers.

Recommended Books: -

1. Dubey, R.C., 2005 A Text book of Biotechnology S. Chand & Co, New Delhi.
2. Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
3. John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay -Publication, New Delhi.
4. Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.
5. Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New _Delhi.
6. Vayas, S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic _Farming Akta Prakashan, Nadiad

Course code: CCBFP22 (P)
Nomenclature: Biofertilizer Production (Practical)

Total: 40
Experiment: 20
Practical Work Book: 10
Viva Voce: 10
Time: 3 hours

List of Practicals

- Acquaintance with microscope and other lab equipments.
- Washing & Sterilization Techniques of glassware.
- Preparation of stock solutions and nutrient media.
- Methods of isolation and purification of microbial cultures.
- Isolation of Rhizobium from legume root nodule
- Isolation of Azotobacter from soil.
- Isolation of Azospirillum from roots.
- Isolation of BGA
- Gram staining of bacteria
- Isolation of Mycorrhiza

Assessment by Exam: At the end of course, examination will be conducted in offline mode (Pen and Paper Mode).

Scheme of Examination: There will be a written theory examination of 60 marks and practical examination will carry 40 marks.

Award of Certificate: After successful completion of the course certificate indicating grade will be awarded to the students.

Grading of Certificate:

- 90% & above: 'A+' grade
- 70% & above but less than 90%: "A" grade
- 60% & above but less than 70%: "B" grade
- 50% & above but less than 60%: "C" grade
- 35% & above but less than 50%: "D" grade

The course content and syllabus of the Certificate Course in Biofertilizer Production - CCBFP22 is developed and designed by following teachers: -

- Dr. Vivek Srivastava
- Dr. Kanchan
- Dr. Ritu Saharan
- Dr. Mamta Sharma

Dr. Vivek Srivastava
HOD

Principal