

Title: Introduction to Applications of Plant Biotechnology

Eligibility: Bachelor's degree in any Faculty

Objectives: To create understanding of **Plant growth promoting organisms, food processing, Micropropagation and commercial Cultivation**

To create **General Awareness** of **Environment**

To create manpower related to this

Course Structure: The course is equivalent to 4 credits. The course can be run in any of the four semesters.

Syllabus:

1. Plant growth promoting bacteria and fungi (1 credit)

Theory 5L of 1h duration

1. Introduction to bacteria and fungi that are beneficial to plant growth and health
2. Mycorrhizal fungi, Trichoderma – their role in nutrient acquisition and biocontrol
3. Plant growth promoting rhizobacteria – their role in nutrient acquisition, plant growth regulator secretion, plant protection
4. Isolation of beneficial organisms, identification, mass production and bioassays
5. Selection of carriers for application to plant roots

Practicals: (10 h)

1. Isolation of AM fungal spores from soil and development of soil-based inocula 3h
2. Isolation of plant growth promoting bacteria from rhizosphere 2h
3. Identification, preparation of pure cultures and inocula using carriers 3h
4. Assays on plant growth promoting activity 2h

2. Post harvest technology and food processing (1 credit)

Theory -5 lectures of 1h duration each

1. Post harvest handling of agricultural crops to reduce losses -Optimum harvest factors
2. Reduction of losses in handling, packaging, transportation and storage
3. Use of thermal processing, low temperature, drying, chemical and biological preservation techniques to extend shelf-life.
4. Fruits and vegetables processing – primary, secondary and tertiary processing
5. Food grain processing – Milling, oil extraction

Practicals – 10 h

1. Post harvest handling of grain, fruits and vegetables – Case studies 3h
2. Processing of vegetables and fruits – Case studies 3h
3. Value addition –Fruit pulps, juices, jams etc.- Case studies 4h

3. Micropropagation Course

(1 Credit)

Theory -5 lectures of 1h duration each

1. Introduction to theory of plant tissue culture behind propagation
2. Laboratory setup, media, surface sterilization of explants maintenance of aseptic conditions
3. Handling plants through 5 stages of micropropagation.
4. Scaling up and cost-related aspects during commercialization
5. Export potential and related assays for quality control

Practicals – 10 h

1. Preparations for experiments (Glassware and media)
2. Gerbera/Dianthus/Gladiolus/Carnation micropropagation
3. Banana/sugarcane micropropagation
4. Hardening and transfer to green house.

4. Commercial Cultivation and processing of Medicinal and Aromatic Plants (1 Credit)

Theory- 6 L of 1 h duration each

1. **Raising of plants:** Cultural practices for nursery raising, transplantation, hoeing, weeding, irrigation, fertigation, plant protection etc. 2
2. **Harvesting and Post-harvest Management:** Harvesting at optimum stage, drying, garbling, grading, packing and storage. 2
3. **Primary Processing and Value Addition:** Chemical extraction processes, distillation of essential oils, preparation of powders, tinctures, extractives etc. 2

Practicals- 3P of total 9h duration

- Nursery Techniques and raising of any one commercially important plant 3
- Distillation of essential oils from any one commercially important plant 2
- Value addition-preparation of different herbal products like kalpa, oils, herbal biscuits, etc 4

Methodology: Lectures supplemented with case studies that may include visits.

Assessment: Final assessment by written and group discussion. Skill based assessment will be as per the case study.

