

GOVERNMENT DEGREE COLLEGE, NANDIKOTKUR

DEPARTMENT OF BOTANY

Plant Tissue Culture

Unit 1: Basic Concepts of Plant Tissue Culture

Unit 1: Basic Concepts of Plant Tissue Culture

Short Questions:

1. Define plant tissue culture.
2. Explain the history and scope of plant tissue culture.
3. What is totipotency in plant tissue culture?
4. Differentiate between differentiation, dedifferentiation, and redifferentiation.
5. What are the different types of cultures in plant tissue culture?
6. Mention the infrastructure required for setting up a tissue culture laboratory.

Long Questions:

1. Discuss the significance of plant tissue culture in modern plant biotechnology.
 2. Explain the concept of totipotency and its role in plant tissue culture. Also, discuss the processes of differentiation, dedifferentiation, and redifferentiation.
 3. Describe the equipment and infrastructure required to establish a plant tissue culture laboratory.
-

Unit 2: Sterilization Techniques and Culture Media

Short Questions:

1. What are the different methods of sterilization in plant tissue culture?
2. Define aseptic conditions and explain their importance in tissue culture.
3. What is the role of UV sterilization in plant tissue culture?
4. What is ultrafiltration, and how is it used in sterilization?

5. List the inorganic and organic components commonly used in nutrient media.
6. What is the composition of Murashige and Skoog (MS) medium?

Long Questions:

1. Explain various sterilization techniques used in plant tissue culture, including fumigation, wet and dry sterilization, UV sterilization, and ultrafiltration.
 2. Discuss the composition of commonly used culture media and the role of inorganic chemicals, organic constituents, vitamins, and amino acids in plant tissue culture media.
 3. Describe the preparation and composition of Murashige and Skoog (MS) medium, highlighting its importance in plant tissue culture.
-

Unit 3: Callus Culture Technique

Short Questions:

1. What is an explant, and give examples of explants used in plant tissue culture?
2. How is surface sterilization of explants performed?
3. What is the importance of inoculation methods in callus culture?
4. Define callus culture and explain the various steps involved in callus culture.

Long Questions:

1. Discuss the different types of explants used in plant tissue culture and their methods of isolation and surface sterilization.
 2. Explain the process of callus culture, describing the different steps involved in the initiation and maintenance of callus cultures.
-

Unit 4: Micropropagation

Short Questions:

1. What is direct morphogenesis in micropropagation?
2. Explain indirect morphogenesis in micropropagation.
3. Define somatic embryogenesis and its significance in plant tissue culture.
4. What are synthetic seeds, and how are they produced?
5. What is the role of acclimatization and hardening in micropropagation?

Long Questions:

1. Discuss the process of micropropagation through direct and indirect morphogenesis, including organogenesis and somatic embryogenesis.
 2. Explain the process of acclimatization and hardening of plantlets. What are the key considerations and techniques involved?
 3. Describe the operation and management of a greenhouse for plantlet hardening and its importance in micropropagation.
-

Unit 5: Applications of Plant Tissue Culture

Short Questions:

1. What is germplasm conservation, and what are the methods used in it?
2. Define cryopreservation and discuss its applications and limitations in germplasm conservation.
3. Explain plant transformation techniques and their role in producing transgenic plants.
4. What are bioreactors, and how are they used in plant tissue culture for secondary metabolite production?
5. What is BT cotton, and how is gene transfer involved in its development?

Long Questions:

1. Explain the methods of germplasm conservation, with a focus on cryopreservation, its applications, and limitations.
2. Discuss plant transformation techniques, including gene transfer methods used in producing transgenic plants such as BT cotton.
3. Describe the production of secondary metabolites in plant tissue culture and the role of bioreactors in scaling up the process.