

Question Bank: Plant Tissue Culture (Theory and practice)
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A question bank for the subject of Plant Tissue Culture, covering both theoretical and practical aspects.

Theoretical Questions

Basic Concepts

1. What is plant tissue culture and what are its main types?
2. Explain the concept of totipotency in plant cells.
3. Describe the historical development of plant tissue culture techniques.
4. What are the essential components of a plant tissue culture medium?
5. How does the choice of explant affect the success of tissue culture?

Culture Media and Conditions

6. Discuss the role of plant growth regulators in tissue culture.
7. Explain the significance of macronutrients and micronutrients in the culture medium.
8. What is the importance of the carbon source in tissue culture media?
9. How do environmental factors like light, temperature, and pH affect tissue culture?

Techniques and Methods

10. Describe the process of micropropagation and its stages.
11. What is somatic embryogenesis and how is it different from organogenesis?
12. Explain the procedure for anther and pollen culture.
13. What are the steps involved in protoplast isolation and fusion?

Applications

14. Discuss the applications of tissue culture in plant breeding.
15. How is tissue culture used in genetic engineering and transformation of plants?
16. Explain the role of tissue culture in conservation of endangered plant species.
17. Describe the use of tissue culture in the production of secondary metabolites.

Challenges and Solutions

18. What are the common contaminants in plant tissue culture and how can they be controlled?
19. Discuss the problems associated with somaclonal variation.
20. How can vitrification be prevented in plant tissue cultures?

Practical Questions

Laboratory Practices

21. What are the steps for sterilizing explants before culture initiation?
22. Describe the procedure for preparing a sterile culture medium.
23. How do you maintain aseptic conditions during tissue culture experiments?

Experimentation

24. Outline the protocol for initiating and maintaining callus cultures.
25. Describe the method for subculturing plant tissues.
26. How do you assess the viability and growth of cultured tissues?
27. Explain the procedure for cryopreservation of plant tissues.

Analysis and Troubleshooting

28. How do you identify and manage microbial contamination in cultures?

29. What techniques can be used to verify genetic stability in regenerated plants?
30. Discuss methods for optimizing tissue culture protocols for a specific plant species.

Case Studies and Problem Solving

31. Provide a step-by-step protocol for the micropropagation of a selected ornamental plant.
32. Analyze a case study where tissue culture was used to recover a virus-free plant.
33. Design an experiment to test the effect of different concentrations of auxins and cytokinins on shoot regeneration.

Advanced Techniques

34. Explain the process and applications of somatic hybridization.
35. Discuss the method of Agrobacterium-mediated transformation in plant tissue culture.
36. What is synthetic seed technology and how is it produced?