

ARS Main: Descriptive-Previous Questions - Agricultural Bio-Technology (2008)

Previous Question Papers

1. What is "Gene Revolution"? How it differs from "green revolution"? Why the application of biotechnology is considered important for improving crop yield and quality?
2. What are the principles of Sanger's di-deoxynucleotide sequencing technique? Briefly describe about automation of DNA sequencing technology using primers labeled with fluorescent dyes.
3. What are genomic and cDNA libraries? Name the vectors, which have been used for making each of these libraries.
4. How many different forms of DNA are present under different physiological conditions? Differentiate among them.
5. Write the basic principle involved in marker-assisted selection for a major-gene controlled and QTL-controlled trait selection.
6. What is in vitro amplification of DNA? List out the steps involved. How this process has been exploited in crop improvement?
7. What is sub-cellular/organelle location and function of any five of the following enzymes? RuBisCO, ATP synthase, PEP carboxylase, nitrate reductase, glutamine synthetase, nitrogenase, and 2-P glycolate phosphatase.
8. Explain the use of microbes for the production of ethanol, antibiotics, enzymes, methane and single cell protein giving suitable examples.

9. Explain, why : (a) DNA had thymine not uracil as one of its base, (b) TAGs are ideal energy storage molecules while, organisms need to store energy in the form of glycogen and, (c) irreversible inhibitors do not follow MM equation

10. What are shot-gun and hierarchical methods of DNA sequencing? Which of these methods has been used by IRGSP for rice genome sequencing?

11. Differentiate between protein engineering and genetic engineering? What do you know about (a) gene fusion and, (b) hybrid enzymes?

12. How the replication of leading and lagging strands differs from each other? Why the replication of lagging strand lags behind that of the leading strand?

13. What are ureides? Why does plant prefer to transport N via amides and not ureides? Under what conditions, ureide transporters are converted to amide transporters and why?

14. How do Cyanobacteria perform the two incompatible processes of photosynthesis and nitrogen fixation? Explain.

15. What do you understand by metabolic engineering in plants? Briefly describe the progress made towards metabolic engineering for Vitamin A and iron in plants.

16. What are the major biosafety and IPR issues involved in the development and release of the transgenic crops? Describe.

17. How are C4 plants superior to C3 plants with respect to photosynthesis? What strategies have been used towards engineering C4 pathway in C3 crops?

18. What are di-haploid lines (DHLs)? How DHLs have been used for linkage mapping of genes and QTLs of various traits? List out the merits of using DHLs as against other mapping populations.

19. Describe briefly the process of chloroplast transformation. Give its advantages over nuclear transformation.

20. What is TILLING? How it is accomplished? List out its major applications.

21. Describe the various steps involved in production of monoclonal antibody against an antigen?

22. What is LOD? Write the threshold LOD for the detection of major gene/QTLs for a target trait. What will be the output of QTL mapping software and give their interpretations?

23. What approaches are used for detecting the number of copies of transgene in a transgenic plant? How will you genetically stabilize a transgenic line?

24. What do you know about biosensor, ELISA, phytoremediation and nanobiotechnology? List out their merits.

25. How the gene organization and post-transcriptional processing events differ in prokaryotes and eukaryotes? Give it in a tabulated form.