

Stress Biology and Genomics (MMBB0517)

Short Questions

1. Which of the following is a strategy to manipulate drought tolerance in plants?
 - a) Increasing light intensity
 - b) Reducing nutrient availability
 - c) Enhancing osmotic adjustment
 - d) Increasing water logging

2. What are osmoprotectants in relation to drought tolerance?
 - a) Proteins that protect against osmotic stress
 - b) Molecules that regulate hormone synthesis
 - c) Enzymes that degrade reactive oxygen species
 - d) Substances that help maintain cellular water balance

3. Which of the following is a hormone involved in ABA signaling during drought stress?
 - a) Gibberellin (GA)
 - b) Cytokinin (CK)
 - c) Abscisic acid (ABA)
 - d) Ethylene (ET)

4. How do plants adapt to water logging stress?
 - a) By increasing light intensity
 - b) By reducing oxygen availability
 - c) By synthesizing osmoprotectants
 - d) By enhancing nutrient uptake

5. What is the primary mechanism of tolerance to flooding in plants?
 - a) Increased synthesis of abscisic acid
 - b) Enhanced production of osmoprotectants
 - c) Activation of hormone signaling pathways
 - d) Increased water uptake through the roots

6. How do plants improve submergence tolerance?
 - a) By reducing light intensity
 - b) By increasing oxygen availability
 - c) By synthesizing antioxidants
 - d) By regulating hormonal metabolism

7. Which pathway is involved in ion homeostasis during salinity stress?
 - a) SOS pathway
 - b) ABA signaling pathway
 - c) Ethylene signaling pathway
 - d) Gibberellin signaling pathway

8. What are the strategies to improve salinity tolerance in plants?
 - a) Reducing water availability
 - b) Enhancing nutrient uptake
 - c) Activating SOS pathways

- d) Increasing temperature
9. How does water logging stress affect plant growth and metabolism?
- a) It enhances nutrient availability
 - b) It reduces oxygen availability
 - c) It promotes root development
 - d) It increases photosynthetic activity
10. What are the physiological and biochemical changes associated with high temperature tolerance in plants?
- a) Reduced water uptake
 - b) Enhanced osmotic adjustment
 - c) Decreased production of antioxidants
 - d) Increased synthesis of proline
11. Which of the following is a role of cell membranes in signal perception in plants?
- a) Energy production
 - b) Nutrient absorption
 - c) Environmental sensing
 - d) DNA replication
12. What are the ways of signal transduction in cells?
- a) Hormone synthesis
 - b) Protein degradation
 - c) Signal perception and response
 - d) Cell division and growth
13. Which of the following is an abiotic stress affecting plant productivity?
- a) Biotic pathogens
 - b) Insect infestation
 - c) Drought stress
 - d) Fungal infections
14. How does drought stress affect plant growth and development?
- a) Increases water uptake
 - b) Promotes root growth
 - c) Reduces photosynthesis
 - d) Enhances nutrient absorption
15. What are the components of drought resistance in plants?
- a) Increased leaf size
 - b) Enhanced root development
 - c) Elevated chlorophyll content
 - d) Improved seed germination
16. Which of the following is a physiological basis of tolerance mechanisms to drought stress?
- a) Increased antioxidant activity
 - b) Reduced hormone synthesis
 - c) Enhanced membrane permeability

- d) Decreased water uptake
17. What is the biochemical basis of tolerance mechanisms to drought stress?
- a) Enhanced osmotic adjustment
 - b) Decreased protein synthesis
 - c) Elevated ROS production
 - d) Reduced carbohydrate metabolism
18. Which of the following is a molecular basis of tolerance mechanisms to drought stress?
- a) Upregulation of stress-related genes
 - b) Suppression of photosynthetic genes
 - c) Inhibition of cell division
 - d) Activation of pathogenesis-related genes
19. What is biotic stress in plants?
- a) Environmental pollution
 - b) Soil erosion
 - c) Insect infestation
 - d) Water scarcity
20. What is the resistance mechanism against insect pests?
- a) Increased water availability
 - b) Enhanced nutrient uptake
 - c) Production of toxic compounds
 - d) Stimulation of cell division
21. Which of the following is a pathogen resistance mechanism in plants?
- a) Reduced hormone production
 - b) Increased pathogen growth
 - c) Activation of defense genes
 - d) Suppression of immune response
22. Which abiotic stress affects plant productivity by increasing soil salinity?
- a) Drought stress
 - b) Temperature stress
 - c) Water logging
 - d) Light stress
23. How does light stress affect plants?
- a) Enhances photosynthesis
 - b) Promotes growth and development
 - c) Triggers oxidative stress
 - d) Increases nutrient availability
24. What is nutrient stress in plants?
- a) Excessive fertilizer application
 - b) Lack of water availability
 - c) Insufficient nutrient supply
 - d) Soil contamination

25. Which of the following is an adaptation strategy for plants to cope with nutrient stress?
- Enhanced root development
 - Suppression of photosynthesis
 - Increased water logging
 - Inhibition of hormone synthesis
26. What is the primary focus of genomics in plant biology?
- Protein-protein interactions
 - Epigenetic modifications
 - Gene expression patterns
 - DNA sequences and genetic variation
27. Which of the following is an example of a functional genomics approach?
- Sequencing the entire genome of a plant species
 - Studying the expression patterns of all genes in a tissue
 - Transferring a specific gene into a model plant
 - Examining epigenetic modifications in a gene promoter region
28. How can the transfer of tolerance/resistant genes to model plants be validated?
- Analyzing gene expression patterns
 - Conducting field trials and observations
 - Performing genetic crosses
 - Using bioinformatics tools to predict gene function
29. What are transcriptomes in the context of plant biology?
- DNA sequences of all genes in a plant
 - Small RNA molecules involved in gene regulation
 - RNA molecules produced by a cell or organism
 - Epigenetic modifications of DNA sequences
30. What is the role of small RNAs in gene regulation?
- DNA replication
 - Protein synthesis
 - Transcriptional silencing or activation
 - Protein-protein interactions
31. Which of the following is an example of a defense-related gene in plants?
- Coat protein genes
 - Detoxification genes
 - R proteins
 - Transcription factors
32. What is the RNAi approach used for in plant biology?
- Gene expression analysis
 - Inhibition of pathogen genes
 - Gene transfer to model plants
 - Protein-protein interaction studies

33. What are Bt proteins used for in transgenic crops?
- Enhancing photosynthesis
 - Improving nutrient uptake
 - Detoxifying pollutants
 - Insect pest control
34. What is resistance management in transgenic crops?
- Selecting for resistance to transgene insertion
 - Developing strategies to prevent resistance evolution in pests
 - Enhancing resistance to abiotic stresses
 - Studying the ecological impact of transgenic crops
35. What is the ecological impact of field release of transgenic crops?
- Increased biodiversity
 - Reduced pesticide use
 - Enhanced soil fertility
 - Altered interactions with non-target organisms
36. How can bioinformatics approaches determine gene function in model plants under stress?
- By analyzing protein-protein interactions
 - Through gene expression analysis
 - By studying epigenetic modifications
 - Using computational tools to predict gene function
37. What is an epigenome in plant biology?
- DNA sequences of all genes in a plant
 - Small RNA molecules involved in gene regulation
 - Chemical modifications of DNA that affect gene expression
 - RNA molecules produced by a cell or organism
38. Which technique is commonly used for the functional validation of genes?
- Next-generation sequencing
 - Polymerase chain reaction (PCR)
 - Chromatin immunoprecipitation (ChIP)
 - Site-directed mutagenesis
39. What are R proteins in plants?
- Proteins involved in photosynthesis
 - Proteins involved in RNA processing
 - Proteins involved in defense against pathogens
 - Proteins involved in DNA replication
40. How can the validation of gene function be achieved in plants?
- Through in silico analysis
 - Using transgenic approaches
 - By observing phenotypic changes
 - Performing mutational analysis