

Crop Science Reviewer Based On TOS

Topic: Plant Growth and Development | Published By Agriculture Review

Practice Questions (1 - 11)

1. Which of the following refers to the quantitative and irreversible increase in size, weight, or volume of a plant or its parts?

- a. Development
- b. Growth
- c. Differentiation
- d. Morphogenesis

2. Development in crop plants is best described as the:

- a. Increase in fresh weight due to water absorption
- b. Qualitative changes in form and function leading to maturity
- c. Elongation of internodes during the vegetative stage
- d. Irreversible increase in dry matter content

3. In the sigmoid growth curve of a crop, which phase represents the period where the growth rate is at its maximum?

- a. Lag phase
- b. Logarithmic or exponential phase
- c. Linear phase
- d. Senescence phase

4. The transition of a plant from the vegetative phase to the reproductive phase is visually marked by:

- a. Rapid leaf expansion
- b. Root hair elongation
- c. Floral initiation and emergence
- d. Seed maturation

5. Harvest Index (HI) is a critical parameter in crop yield. How is it calculated?

- a. Economic yield divided by biological yield
- b. Biological yield divided by economic yield
- c. Grain yield divided by total root mass
- d. Total biomass multiplied by grain weight

6. Which physiological process is considered the primary source of dry matter accumulation in crop plants?

- a. Respiration
- b. Photosynthesis
- c. Transpiration
- d. Photorespiration

7. What is the primary CO₂ acceptor in the mesophyll cells of C₄ plants?

- a. Ribulose-1,5-bisphosphate (RuBP)
- b. Phosphoenolpyruvate (PEP)
- c. Oxaloacetate (OAA)
- d. Malic acid

8. Which crop is an example of a C₄ plant, characterized by high photosynthetic efficiency under high temperature and light intensity?

- a. Rice
- b. Wheat
- c. Soybean
- d. Sugarcane

9. The specialized leaf anatomy found in C₄ plants, characterized by prominent bundle sheath cells, is known as:

- a. Kranz anatomy
- b. Aerenchyma tissue
- c. Casparian strip
- d. Spongy mesophyll

Practice Questions (12 - 22)

12. The first stable product of the Calvin-Benson cycle (C3 pathway) is:

- a. Oxaloacetic acid (OAA)
- b. 3-Phosphoglycerate (3-PGA)
- c. Glyceraldehyde 3-phosphate (G3P)
- d. Ribulose-1,5-bisphosphate

13. What is the primary function of cellular respiration in crop plants?

- a. To produce oxygen for the environment
- b. To convert light energy into chemical energy
- c. To release energy stored in carbon compounds for plant metabolism
- d. To assimilate atmospheric nitrogen

14. Where does the Krebs cycle (Citric Acid Cycle) take place within the plant cell?

- a. Cytosol
- b. Chloroplast stroma
- c. Mitochondrial matrix
- d. Thylakoid membrane

15. The loss of water in the form of vapor from the aerial parts of the plant is called:

- a. Guttation
- b. Transpiration
- c. Evaporation
- d. Exudation

16. Guttation is the exudation of liquid water from leaves. Through which specialized structures does this occur?

- a. Stomata
- b. Lenticels
- c. Hydathodes
- d. Trichomes

17. Which plant hormone is primarily synthesized in the shoot apex and is responsible for apical dominance?

- a. Gibberellin
- b. Cytokinin
- c. Auxin
- d. Ethylene

18. Which hormone promotes cell division and is abundantly found in actively dividing tissues such as root apices and developing fruits?

- a. Auxin
- b. Absciscic acid (ABA)
- c. Ethylene
- d. Cytokinin

19. During severe drought stress, which phytohormone rapidly accumulates in leaves to induce stomatal closure?

- a. Indole-3-acetic acid (IAA)
- b. Gibberellic acid (GA3)
- c. Absciscic acid (ABA)
- d. Zeatin

20. Which gaseous plant hormone is known for promoting fruit ripening and abscission of leaves and flowers?

- a. Methane
- b. Ethylene
- c. Carbon dioxide
- d. Nitric oxide

21. In the malting industry and seed germination, which hormone stimulates the aleurone layer to produce alpha-amylase to break down endosperm starch?

- a. Cytokinin
- b. Gibberellin

Practice Questions (23 - 33)

23. A crop that requires a night length longer than a critical minimum duration to initiate flowering is classified as a:

- a. Day-neutral plant
- b. Long-day plant
- c. Short-day plant
- d. Intermediate-day plant

24. Phytochrome is a photoreceptor pigment in plants that mainly absorbs:

- a. Blue and UV light
- b. Red and far-red light
- c. Green and yellow light
- d. Infrared light

25. The artificial induction of flowering in plants by exposure to prolonged cold temperatures is known as:

- a. Scarification
- b. Stratification
- c. Vernalization
- d. Acclimation

26. Which of the following refers to the directional growth response of a plant toward a light source?

- a. Geotropism
- b. Thigmotropism
- c. Phototropism
- d. Heliotropism

27. The physiological process of aging in plants, leading eventually to the death of tissues or the whole plant, is called:

- a. Necrosis
- b. Abscission
- c. Senescence
- d. Dormancy

28. In root gravitropism, specialized amyloplasts that settle to the bottom of columella cells to sense gravity are called:

- a. Chloroplasts
- b. Statoliths
- c. Chromoplasts
- d. Elaioplasts

29. What is the accepted mechanism for the translocation of sugars in the phloem?

- a. Cohesion-Tension Theory
- b. Root Pressure Theory
- c. Pressure-Flow (Mass Flow) Hypothesis
- d. Capillary Action

30. According to the Cohesion-Tension theory of xylem transport, what is the primary driving force for the upward movement of water?

- a. Root pressure
- b. Active transport of ions
- c. Transpirational pull
- d. Osmotic pressure in the soil

31. Which environmental factor usually has the most immediate and profound effect on crop transpiration rates?

- a. Soil nutrient concentration
- b. Atmospheric relative humidity
- c. Soil pH
- d. Atmospheric carbon dioxide concentration

32. Photosynthetically Active Radiation (PAR) utilizes the portion of the electromagnetic spectrum falling roughly between:

- a. 200 to 400 nm
- b. 400 to 700 nm

Practice Questions (34 - 44)

34. What type of seed germination occurs when the cotyledons are pushed above ground by the elongation of the hypocotyl? E.g., in mungbean.

- a. Hypogeal germination
- b. Epigeal germination
- c. Cryptogeal germination
- d. Viviparous germination

35. The failure of a viable seed to germinate even under favorable environmental conditions is termed:

- a. Quiescence
- b. Dormancy
- c. Senescence
- d. Recalcitrance

36. Which mechanical or chemical treatment is used to break physical seed dormancy caused by a hard or impermeable seed coat?

- a. Stratification
- b. Vernalization
- c. Scarification
- d. Emasculation

37. Leaf Area Index (LAI) is an important indicator of canopy photosynthetic potential. An LAI of 4 means:

- a. There are 4 leaves per plant
- b. There is 4 square meters of leaf area per square meter of ground area
- c. The plant canopy intercepts 4 percent of sunlight
- d. The crop will yield 4 tons per hectare

38. Climacteric fruits undergo a sudden burst in cellular respiration and ethylene production during ripening. Which of the following is a climacteric fruit?

- a. Citrus
- b. Pineapple
- c. Banana
- d. Strawberry

39. The development of a fruit without prior fertilization, resulting in a seedless fruit, is called:

- a. Apomixis
- b. Parthenocarpy
- c. Polyembryony
- d. Vivipary

40. The point at which the rate of photosynthesis equals the rate of respiration, resulting in zero net CO₂ exchange, is known as the:

- a. Saturation point
- b. Cardinal point
- c. Light compensation point
- d. Yield threshold

41. Water potential drives the movement of water in the Soil-Plant-Atmosphere Continuum. Water always moves from an area of:

- a. Lower water potential to higher water potential
- b. Higher (less negative) water potential to lower (more negative) water potential
- c. High solute concentration to low solute concentration
- d. Low hydrostatic pressure to high hydrostatic pressure

42. Which metabolic pathway involves the splitting of a 6-carbon glucose molecule into two 3-carbon pyruvate molecules?

- a. Calvin cycle
- b. Electron transport chain
- c. Krebs cycle
- d. Glycolysis

43. Under anaerobic conditions in plant roots (e.g., waterlogging), pyruvate is primarily converted to

Practice Questions (45 - 50)

45. When a plant cell is placed in a hypertonic solution, water exits the cell causing the protoplast to shrink away from the cell wall. This phenomenon is called:

- a. Turgor pressure
- b. Imbibition
- c. Plasmolysis
- d. Cytokinesis

46. In the symplastic pathway of water transport across the root cortex, water moves through the:

- a. Cell walls and intercellular spaces
- b. Plasmodesmata connecting the cytoplasm of adjacent cells
- c. Xylem vessels exclusively
- d. Casparian strips

47. The Casparian strip is a suberized band in the root that blocks apoplastic flow of water. In which root tissue is it located?

- a. Epidermis
- b. Pericycle
- c. Endodermis
- d. Cortex

48. Which of the following is considered an active 'sink' in a mature, fruiting tomato plant?

- a. Fully expanded mature leaves
- b. Senescing cotyledons
- c. Developing fruits
- d. Dying roots

49. Abscission of plant parts is primarily regulated by the balance and interaction between which two hormones?

- a. Auxin and Ethylene
- b. Gibberellin and Cytokinin
- c. Absciscic acid and Gibberellin
- d. Auxin and Cytokinin

50. In terms of cardinal temperatures for crop growth, the 'optimum temperature' is defined as:

- a. The highest temperature at which survival is possible
- b. The temperature at which physiological processes and growth rate are at a maximum
- c. The minimum temperature required for seed germination
- d. The temperature where respiration exceeds photosynthesis

Detailed Answer Key (1 - 50)

Q1: b	Q2: b	Q3: b	Q4: c	Q5: a
Q6: b	Q7: b	Q8: d	Q9: a	Q10: c
Q11: c	Q12: b	Q13: c	Q14: c	Q15: b
Q16: c	Q17: c	Q18: d	Q19: c	Q20: b
Q21: b	Q22: c	Q23: c	Q24: b	Q25: c
Q26: c	Q27: c	Q28: b	Q29: c	Q30: c
Q31: b	Q32: b	Q33: c	Q34: b	Q35: b
Q36: c	Q37: b	Q38: c	Q39: b	Q40: c
Q41: b	Q42: d	Q43: a	Q44: b	Q45: c