Water Dynamics in Plant Production, 2nd Edition

Multiple Choice Questions

Chapter 5 – Water Storage and Movement in Soil

1. The concept of 'unavailable water' is important to distinguish between water that can be used by plants and that which cannot. Unavailable water is defined as:
(a) water that is draining out of the rooting zone
(b) water that roots can't extract because the osmotic potential is too negative
(c) water held in the soil at potentials less (more negative) than -15,000 cm water
(d) all of the above

2. The term 'field capacity' (the water content after allowing a saturated soil to drain for 2 days) is widely used in understanding soil–plant water relations. However, the term is often criticized because:
(a) its use is too limited to allow laboratory and field results to be compared
(b) it only deals with water held by adsorptive or capillary forces
(c) it only deals with water held against gravity
(d) the term is a convention but drainage still continues, albeit slowly, and the water content is therefore not fixed
(e) values vary too much between clayey and sandy soils

3. Solar radiation is:
(a) long wave
(b) short wave
(c) a mixture of long and short wave
(d) none of the above

4. Total radiation is:
(a) another name for solar radiation
(b) solar radiation minus global radiation
(c) solar radiation minus radiation that is adsorbed or reflected as it passes through the atmosphere
(d) all of the above

5. Infiltration is the process by which water enters the soil.
(i) Under what rainfall conditions will the actual infiltration lead to surface runoff?
- **(a)** rainfall rate exceeds actual infiltration rate
- **(b)** rainfall rate exceeds the saturated conductivity of the soil
- **(c)** rainfall rate exceeds the infiltrability
- **(d)** all of the above

(ii) What name is given to the maximum intake rate of water into the soil under prolonged heavy rainfall?
- **(a)** ponded infiltration rate
- **(b)** infiltrability
- **(c)** intrinsic infiltration
- **(d)** all of the above

(iii) Which of the following are true? (There may be more than one correct answer.)
(a) The maximum water intake rate of a soil depends on its texture.
(b) The maximum water intake rate of a soil depends on its structure.
(c) The maximum water intake rate of a soil depends on its initial water content.
(d) The maximum water intake rate of a soil depends solely on the rainfall rate.

6. Soil evaporation is one component of the soil water balance. Which of the following are true?
(a) Soil evaporation is only important in humid environments.
(b) Actual evaporation at a site will not typically exceed the potential evaporation rate.
(c) The colour of a soil has no influence on the potential evaporation rate.
(d) All of the above.
(e) None of the above.

7. When the Penman equation is to be used to determine potential evaporation, which of the following weather variables are not required in the calculation?
(a) air temperature
(b) relative humidity
(c) wind run
(d) total radiation
(e) net radiation

8. In the first stage of soil evaporation, the daily evaporative water flux is constant because:
(a) The soil is so wet that minor changes in rate cannot be measured.
(b) The increase in hydraulic gradient balance the decrease in hydraulic conductivity.
(c) The hydraulic conductivity remains constant.
(d) All of the above.
(e) None of the above.

9. Tensiometers are commonly used in determining the potential of water in soils. Which of the following statements are true? (There may be more than one correct answer.)
(a) Tensiometers cannot be used in the measurement of water use by crops.
(b) Tensiometers cannot be used to determine the location of a shallow water table.
(c) Tensiometers can be used to measure the matric potential.
(d) Tensiometers have been developed to determine matric potentials less (more negative) than -800 cm water.

10. Which of the following statements about ‘preferential flow’ in soil are true?
(a) It results in some portions of the soil being bypassed during flow events.
(b) It is prevalent in soils with a pore distribution with many large and small pores but fewer intermediate pores.
(c) It can occur in soils with large earthworm channels.
(d) All of the above.
(e) None of the above.