Water Dynamics in Plant Production, 2nd Edition

Multiple Choice Questions

Chapter 11 – Water Use and Dry Matter Production

1. Briggs and Shantz reported a linear relationship between the cumulative transpiration and the accumulation of dry matter in wheat. Such a relationship could be expected because:
(a) photosynthesis depends on the availability of hydrogen from water
(b) drought reduces crop yields
(c) stomates control the exchange of water and carbon dioxide
(d) both transpiration and carbon dioxide assimilation are strongly dependent on intercepted radiation

2. Which of the following statements is true?
(a) The regression coefficient between accumulated organic matter production and transpiration is known as the transpiration ratio.
(b) The regression coefficient between accumulated above-ground dry matter production and cumulative transpiration is known as the transpiration efficiency.
(c) Estimation of transpiration efficiency depends on preventing soil evaporation.
(d) Key to the success in determining transpiration efficiency is the determination of root dry matter content.

3. When the water used by a crop cannot be separated into transpiration and evaporation, the relation between total water use (ET) and above-ground dry matter is identified as *water use efficiency*. By plotting above-ground dry matter production against cumulative ET, it is possible to estimate: (There may be more than one correct answer.)
(a) total dry matter production (including roots)
(b) soil evaporation during the early growth of the crop
(c) soil evaporation during the later growth of the crop
(d) none of the above

4. Bierhuizen and Slatyer showed that transpiration depends on the saturated vapour pressure deficit of the air. They expressed the relationship between above-ground dry matter production, P, and the cumulative transpiration as:

$$P = k \cdot {}^{T}/_{\Delta e}$$

The use of this equation to determine the factor k allows:
(a) transpiration efficiency to be determined independent of the humidity of the region
(b) transpiration efficiency to be compared with radiation use efficiency in any region
(c) investigation of how transpiration efficiency varies with saturated vapour pressure deficit
(d) all of the above

5. Crop dry matter production depends *solely* on:
(a) water available in the soil
(b) net radiation
(c) evaporative demand of the air
(d) a combination of soil and climate factors that influences transpiration water use