

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