

Water Dynamics in Plant Production, 2nd Edition

Multiple Choice Questions

Chapter 12 – Influence of Nutrient Supply on Water Use and Establishment of Yield

1. When fertilizer nitrogen (N) is applied to a soil that has either a plentiful or a meagre water supply, which of these factors are likely to result in differences in dry matter production between crops grown on the two soils? (There may be more than one correct answer.)
 - (a) soil organic matter
 - (b) mineralization of soil organic N
 - (c) rate of transport of N through the soil to the root surface
 - (d) the requirement for N in the shoots
2. Relative to conditions where water supply is not limiting to growth, which of the following statements are true when water supply limits growth?
 - (a) Plant response to N is greatly reduced at all levels of application.
 - (b) Farmers can reduce fertilizer input to a greater extent without adversely affecting yield.
 - (c) A similar amount of N will be taken from the soil plus fertilizer, irrespective of water supply, when the yield is linearly related to N uptake.
 - (d) All of the above.
 - (e) None of the above.
3. Which of the following statements are true? In semi-arid conditions:
 - (a) Total water use is not greatly affected by the application of N fertilizer.
 - (b) Harvest index is improved when crop water use is reduced.
 - (c) Under an adequate water supply, unproductive water use is greater in crops receiving fertilizer N than in those that don't.
 - (d) All of the above.
 - (e) None of the above.
4. Assume that potassium (K) and nitrogen (N) are in abundant supply in the soil but phosphorus (P) supply is limited. Based on the law of the optimum, how would you expect plants to make use of P compared to when N is also in somewhat limited supply?
 - (a) the same use
 - (b) poorer use
 - (c) better use
5. In crops well supplied with water, an optimum fertilizer application substantially increases above-ground dry matter and economic yield but has a much smaller impact on crop water use. Which of the following factors can contribute to the increased water use efficiency implied by the results?
 - (a) Increased leaf area index (LAI), number of green leaves, leaf area duration and darker green leaf colour allow greater radiation interception and absorption.
 - (b) Increased photosynthesis leads to a faster crop growth rate and greater biomass production.
 - (c) Faster growth rates lead to taller plants and greater surface roughness.
 - (d) Reduced heating of the air within the plant canopy results in less of the transpiration that is caused by advective energy acting through the *clothesline effect*.
 - (e) All of the above.
 - (f) None of the above.