Water Dynamics in Plant Production, 2nd Edition

Questions and Discussion Points

Chapter 10 – Radiation and Dry Matter Production

Section 10.1

1. Please explain the term 'photosynthetically active radiation' (PAR).
2. Explain CO_2 exchange rate (CER). It is the result of which physiological processes?
3. Sketch out the light response curves for a C_3 and a C_4 crop. Where is the light compensation point? Are there differences in light saturation between the crops?
4. Is the efficiency of radiation use greater for net CO_2 fixation at a lower or a higher radiation level?
5. What is photorespiration of C_3 plants? Why does it not exist in C_4 plants?

Section 10.2

1. Radiation interception of a crop stand increases with leaf area index (LAI). What causes the difference in interception when comparing soybean and maize (Fig. 10.2)?
2. Discuss the effect of leaf inclination on radiation use for CO_2 fixation, when radiation changes from a low to a high level.
3. Discuss the effect of leaf inclination on soil evaporation, weed control and transpiration.
4. Show the connection between LAI and net assimilation rate (NAR). Why then does crop growth rate (CGR) increase, when with increasing LAI the NAR declines?
5. When conditions for water and nutrient uptake are not growth limiting, a crop usually experiences a linear phase of dry matter increase per unit of time (Fig. 10.4). Please explain the connections that give rise to the linear phase.
6. What is 'radiation use efficiency'?