

# Water Dynamics in Plant Production, 2nd Edition

## Questions and Discussion Points

### Chapter 16 – Breeding for Yield and Water Use

#### Section 16.1

1. What kind of traits have been modified by plant breeding in modern cereal cultivars?
2. Please explain some of the principles, enabling modern cultivars to use water more efficiently for grain production than older cultivars.
3. Recreate the strategies in breeding modern cultivars for maximizing water use in grain production in water-limited environments. For that purpose recalculate the grain yield of old and modern wheat by applying Eqn 16.1.

#### Section 16.2

1. Please present some reasons why the earliness of crop plants can contribute to larger grain yields.
2. What is the basis of the discrimination by plants against  $^{13}\text{C}$ ?
3. Why is the discrimination less in  $\text{C}_4$  plants than in  $\text{C}_3$  plants?
4. Why is the discrimination linked to transpiration efficiency?
5. There are difficulties in making generalizations about the relation between discrimination and wheat yield. Can you present an explanation calling the relation into question?
6. As well as the expensive method for determining  $\Delta^{13}\text{C}$ , a much simpler surrogate method, a plant trait, has been employed. Please explain the principle of this simpler method.

#### Section 16.3

1. How do you assess the likelihood that molecular biology will improve crop yield under drought?