5

Potassium

Potassium (K) is one of the three major **essential plant nutrients** along with nitrogen (N) and phosphorus (P). Agronomic crops contain about the same amount of potassium as nitrogen, and both are required in greater amounts than phosphorus. The amount of potassium taken up by crop and pasture species can vary widely. For example, a 2 t/ha wheat crop will contain approximately 7 kg K/ha in the grain, while up to 215 kg K/ha can be removed in the cane, tops and trash of a typical sugar cane crop. The amount of potassium removed in many harvested products is shown in **Appendix 1.**

Potassium plays many roles in the plant

Potassium is absorbed by plant roots as the positively charged ion K^+. Unlike nitrogen and phosphorus, potassium does not form organic compounds in the plant, and is highly mobile within plant tissues. This allows for the involvement of potassium in many biological processes, including:

- photosynthesis. When potassium is deficient, photosynthesis declines, and the plant's respiration increases. These two effects of potassium deficiency, reduced photosynthesis and increased respiration, lower the plant's carbohydrate supply (see **Figure 5.1**, which shows the close correlation between K concentration in maize leaves and their rate of carbon dioxide assimilation)
- protein synthesis
- the breakdown of carbohydrates, a process which provides energy for plant growth
- controlling ionic balance within plant cells and therefore plant turgidity. This includes the cells that control the opening and closing of plant leaf pores called stomata

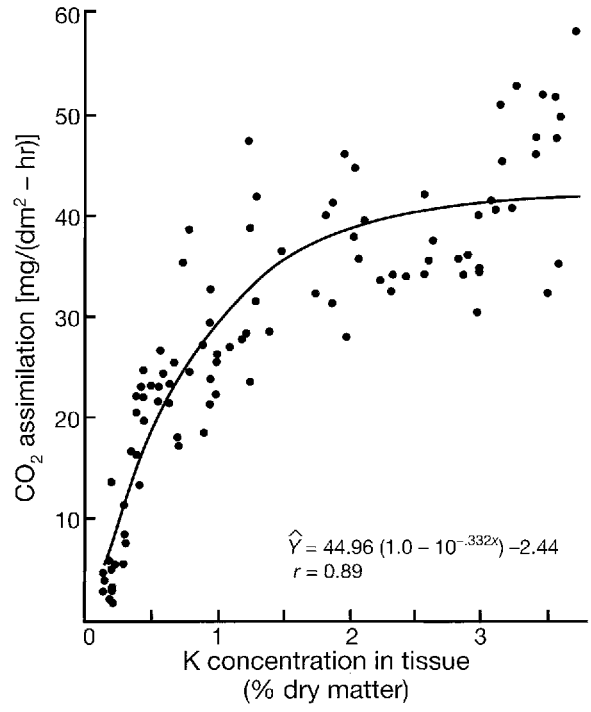

Figure 5.1 The relationship between carbon dioxide assimilation and the K concentration of maize leaves (from *Smid AE and Peaslee DE (1976) Growth and carbon dioxide assimilation by corn as related to potassium nutrition and simulated canopy shading.* Agronomy Journal ***68**: 904–908).*

- the translocation of metal ions such as iron (Fe)
- the ability of plants to resist pest and disease damage. In Western Australia, application of potassium fertilizer has reduced the impact of spot type net blotch and powdery mildew on barley (see **Figure 5.2**)
- in fruit initiation