Caesium uptake by roots of *Medicago* plants

Lea Wiesel [1,2], Martin Broadley [2] and Philip White [1]
[1] Scottish Crop Research Institute, Invergowrie, Dundee DD2 5DA
[2] University of Nottingham, Sutton Bonington Campus, Loughborough, LE12 5RD

Summary

- Medicago plants were grown with 1.65 and 20 mM potassium
- Caesium inhibits growth of low potassium and high potassium plants
- Low potassium plants are more sensitive to caesium
- Caesium competes with potassium for uptake

Introduction

- Potassium (K) is an essential element for plant growth and development
- Caesium (Cs) is chemically similar to K, but Cs is toxic to plants
- Because of the chemical similarity between Cs and K, root uptake mechanisms cannot differentiate between these elements easily (White & Broadley 2000)

Materials & Methods

An *in vitro* system was used to grow *Medicago truncatula* (Figure 1). The plants were grown on MSR medium (Declerck *et al.* 2003) containing either 1.65 mM K (low K) or 20 mM K (high K). Various concentrations of CsCl were added to these media. After 6 weeks the plants were harvested, oven dried and acid digested in a microwave. Concentrations of elements were measured using ICP-MS (PerkinElmerSCIEX, Massachusetts, USA).

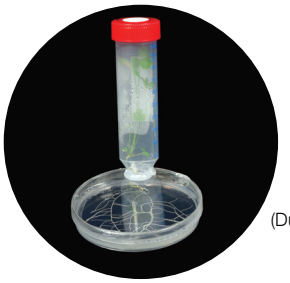


Figure 1: *In vitro* system to grow *Medicago truncatula* (Dupré de Boulois *et al.* 2006).

Results

Figure 2: Potassium concentrations

Plants grown on low K and high K media differ in tissue K concentrations.
Mean K concentrations [mg/g DW] ± SE (n>3).

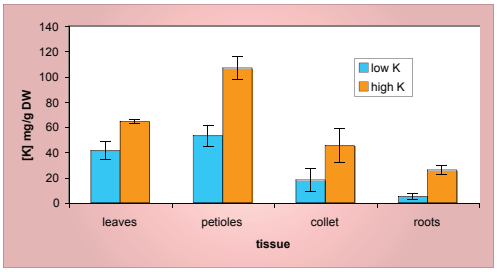
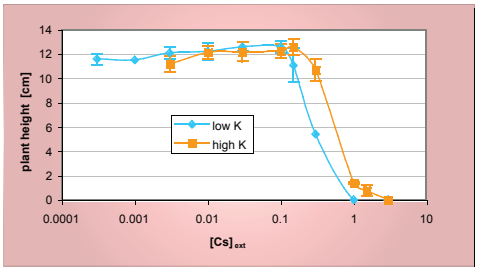


Figure 3: Caesium toxicity



Caesium reduces plant growth on low and high K media. Low K plants are inhibited more than high K plants at lower external Cs concentrations.
Plant height [cm] ± SE (n>3).

Figure 4: Caesium uptake

Plants take up Cs. Low K plants accumulate more Cs than high K plants at the same external Cs concentration.
Shoot Cs concentrations [µg/g DW] ± SE (n>3).

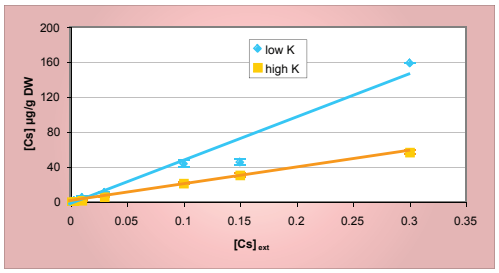
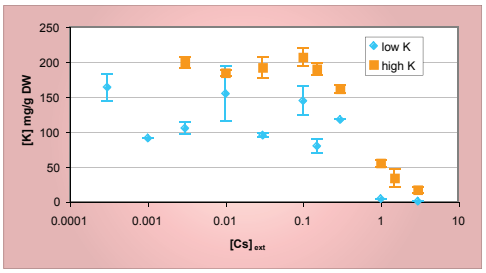


Figure 5: Competition for uptake



Caesium competes with K for uptake. High K plants have higher K concentrations in their tissues when grown at the same external Cs concentration than low K plants.
Shoot K concentrations [mg/g DW] ± SE (n>3).

References
Declerck S *et al.*, 2003. *Environmental Microbiology* 5, 510-516
Dupré de Boulois H et al., 2006. *Environmental Microbiology* 8, 1926-1934
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