

## Comparison of cadmium-induced oxidative stress in *Brassica juncea* in soil and hydroponic cultures

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### Abstract

**Aims** The objective of this study was to investigate the response of *Brassica juncea* in the presence of Cd, in hydroponic and soil experiments, and to conclude about common and divergent trends in both cultures.

**Methods** We studied the effect of Cd on growth, oxidative damage and antioxidant responses in roots and shoots of *B. juncea* grown in soil and hydroponic cultures, using typical time-scales for each one. Major ROS-scavenging enzymes such as catalase, ascorbate peroxidase and guaiacol peroxidase were evaluated, as well as lipid peroxidation.

**Results** Small Cd concentrations in the plant led to enhanced plant growth, while large Cd concentrations

impaired growth. The increase in lipid peroxidation observed in the presence of Cd was always greater in shoots than in roots. The physiological response to enhanced levels of reactive oxygen species in the presence of Cd included an increase in guaiacol peroxidase, ascorbate peroxidase and catalase activities, but those enzymes were not always enhanced in a similar manner in both cultures.

**Conclusions** The main factors responsible for the differences between the experiments in soil and nutrient solution, were the different Cd content in the plant tissues and the different time-scale of the experiments.

**Keywords** Antioxidant enzymes · Lipid peroxidation · Oxidative stress · *Brassica juncea* · Cadmium