

Antioxidant Metabolism of Coffee Cell Suspension Cultures in Response to Cadmium

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SUMMARY

The antioxidant responses of *Coffea arabica* cell suspension cultures to Cd were investigated. Cd accumulated very rapidly in the cells and this accumulation was directly correlated CdCl₂ concentration in the medium. At 0.05 mM CdCl₂, growth was stimulated, but it was reduced at 0.5 mM CdCl₂. Cells became brown with Cd and an increase in lipid peroxidation was observed at 0.5 mM CdCl₂. Catalase (CAT), glutathione reductase (GR) and superoxide dismutase (SOD) activities increased with Cd. Ascorbate peroxidase (APX) in the cells was higher at 0.05 mM CdCl₂, but could not be detected at 0.5 mM CdCl₂ after 24h of growth, whilst guaiacol peroxidase (GOPX) did not show a clear response to Cd treatment. Activity staining in non-denaturing PAGE one CAT isoenzyme, nine SOD isoenzymes and four GR isoenzymes. The SOD isoenzymes were differently affected by Cd treatment and one GR isoenzyme specifically responded to Cd. The results suggest that the higher concentrations of CdCl₂ may lead to oxidative stress. The main response appears to be via the induction of SOD and CAT activities for the removal of active oxygen species (AOS), and by the induction of GR to ensure the availability of reduced glutathione for the synthesis of Cd-binding peptides, which may also be related to the inhibition of APX activity probably due to glutathione and ascorbate depletion.