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Title page

Enzymatic antioxidants - relevant or not to protect the photosynthetic system against cadmium-induced stress in Massai grass supplied with sulfur?

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HIGHLIGHTS

- Massai grass maintains the majority of glutathione in the oxidized form (GSSG).
- Cd/S regimes not affect *CSD2*, *CSD3*, *MSD1*, *APX1*, *CAT1*, *CAT2*, *GR1* and *GR2* genes.
- Proper S supply increased GSH+GSSG and decreased lipid peroxidation in the roots.
- Proper S supply reduces Cd-induced stress on CO₂ assimilation rate and the instantaneous carboxylation efficiency of Rubisco.

ABSTRACT

Exposure to cadmium (Cd) can cause oxidative stress and injuries to the photosynthetic apparatus of plants. Otherwise, plant metabolism impaired by Cd toxicity can be aided by a proper sulfur (S) nutrition, since S is a component of antioxidants and photosynthetic systems. In this sense, our aim in this study was to evaluate the effect of S supply (0.1, 1.9 and 3.7 mmol L⁻¹) on the antioxidant and photosynthetic systems of Massai grass exposed to Cd (0.0, 0.1 and 0.5 mmol L⁻¹) as a prerequisite for studies of Cd phytoextraction. Plants supplied with 3.7 mmol L⁻¹ S showed the lowest growth and the highest Cd concentrations when exposed to 0.5 mmol L⁻¹ Cd. However, Massai grass grown without S deprivation showed the highest GSH+GSSG concentrations in all tissues and the lowest lipid peroxidation in stems and sheaths and roots. In general, the activities of SOD, CAT, APX, GPOX and GR did not increase in Massai grass exposed to Cd, even with proper S supply. Severe Cd exposure halted the photosynthetic system of Massai grass, although well-nourished plants

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