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Response of boron-enriched in vitro micropropagated sugarcane seedlings to aluminum and chromium toxicity

Leônidas P. Passos, **Leticia S. Suzuki-D'Oliveira**¹, Paola R. C. Reis, Luciana F. Caetano, Daniele P. da Silva, Daniel P. Lizardo, Alessandra B. R. de Azevedo, Carolina S. Fonseca
- Embrapa Dairy Cattle - Rua Eugenio do Nascimento 610, Juiz de Fora 36038-330, Brazil

¹Corresponding author: leticia.suzuki@embrapa.br

A study was carried out to verify the effects of boron-enriched medium on the performance and response to toxic Al^{3+} and Cr(III) of sugarcane (*Saccharum officinarum* L.) seedlings. In vitro cultured sugarcane plantlets were transferred to in situ conditions and exposed to the following pre-treatments: ½ strength Clark's nutrient solution (1), or ½ strength Clark's nutrient solution with boron concentration increased four times (2). After 30 days, the seedlings were transferred to new ½ strength Clark's nutrient solution with one of the following treatments: C: Control, pH 5.7, I: no addition of P and Fe, pH 4.0, AL: I + Al^{3+} (6.0 mg L⁻¹), or CR: I + Cr(III) (5.0 mg L⁻¹). Following a continuous 30-day-growth period (solutions were replaced every four days), plants were harvested and evaluated. The data showed that AL and CR, regardless of boron enrichment, caused significant detrimental effects on seedling growth. Root length was depressed by (2) in all treatments, as compared to (1). However, C+2 and I+2 induced higher root and leaf dry weight, and (2) also favored root ramification. Leaf fresh weight and transpiration rates were increased by C+2. It is concluded that boron-enrichment, despite not mitigating the toxic effects of Al^{3+} or Cr(III), resulted advantageous for obtaining higher root branching and leaf fresh weight. Hence, such nutritional enhancement, despite the lack of effects in the attenuation of toxic conditions, is still likely to improve the rapidity of mass production of in vitro micropropagated sugarcane seedlings.

Key words: aluminum, boron, chromium, plant nutrition, sugarcane, toxicity

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