Effect of isolated and combined drought and root-chilling stresses on gas exchange in two sugarcane genotypes

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The aim of this work was to investigate the effects of drought and root-chilling isolated or combined in the gas exchange of two sugarcane genotypes in initial growth phase considered drought-tolerant (IACSP 94-2094) or susceptible (IACSP 97-7065), in response to drought and/or chilling stress. The experiment was carried out under greenhouse and the control treatment was conducted with the plant's root at 25 °C and adequate irrigation (25 H+). In the drought treatment, the plants root system was maintained at 25 °C, but with suspension of watering (25 H-), while the chill treatment, the root system was maintained at 15 °C with irrigation (15 H+). Finally, the two stresses were combined by imposing the root chilling treatment together with water deficit (15 H-). IACSP 94-2094 maintained a higher CO_2 assimilation (A_{CO2}) for a longer period in the 25 H- treatment. The stomatal conductance (g_s), however, decreased similarly for both genotypes. The 15 H+ treatment caused a decrease in g_s only for IACSP 94-2094 and no significant changes in the A_{CO2} were observed. For the 15 H- treatment, the IACSP 97-7065 did not present any decrease in A_{CO2} and $g_{s,}$ while IACSP 94-2094 did. After rehydration, IACSP 94-2094 recovered the gas exchange parameters in the 25 H- treatment, while IACSP 97-7065 did not recover g_s. In 15 H- none of the genotypes exhibited recover. It is concluded that IACSP 94-2094 is more tolerant to isolated drought when compared to IACSP 97-7065, due to the maintenance of A_{CO2} for a longer stress period and the full recover after rehydration. However, when combined with root-chilling, the drought effects are intensified and none genotypes show tolerance characteristics. The root-chilling isolated was not enough to cause major changes in the gas exchange.

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