

Comparative effects of low night temperature and water stress on sugarcane photosynthesis

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The aim of this study was to investigate the photosynthetic mechanisms affected by low night temperature and water stress applied simultaneously or separately. Sugarcane IACSP 94-2094 plants with around 4-months old were planted in 10 L pots and subjected to four treatments in a growth chamber: well-hydrated and night temperature (T_N) of 20 °C (Control); water-stressed and T_N of 20 °C (WD); well-hydrated and T_N of 12 °C (LT); and water-stressed and T_N of 12 °C (WD+LT). Some photosynthetic traits derived from the response curve of photosynthesis to varying intercellular CO_2 concentration were evaluated. Four days after exposing plants to stressful treatments, a significant reduction was found in photosynthetic capacity measured under CO_2 saturation and carboxylation efficiency; however, such negative effect was less pronounced in plants subjected to LT. Non-significant changes were noticed in relation to stomatal limitation of photosynthesis after four days of treatment, varying around 25%. Partial recovery of photosynthesis was observed in WD, LT and WD+LT plants after one day of rehydration and return to 20 °C of night temperature. Full recovery of photosynthesis was noticed only in plants subjected to LT treatment after four days. As conclusion, our data reveal that the photosynthesis of IACSP 94-2094 genotype is more sensitive to drought stress than to low temperature when both stresses are applied rapidly.

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