

Sugarcane phenotyping to tolerance of water deficit through carbon isotope discrimination

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Stable isotopes have proved to be a valuable tool for selecting genotypes of plants adapted to drought stress with productive capacity. However, little is known about the usefulness of this technique in C₄ plants such as sugarcane. Therefore, this study aimed at investigating the relationship between ¹³CΔ and dry matter accumulation in three sugarcane genotypes grown in two contrasting water regimes (dryland and irrigated) in order to identify tolerant genotypes to drought stress. The experiment was carried out at APTA Jaú-SP, located at the geographic coordinates: latitude 22°17 'S and longitude 48°34 ' W. The experimental design was a randomized block design with four replications. The treatments consisted of three genotypes of sugarcane: RB867515, RB855536, SP80-3280, with and without irrigation. At the end of the plant cycle (365 days after cutting the ratoon), samples of leaves (leaf + 1) were taken for determination of isotope discrimination (Δ¹³C) by mass spectrometry. Shoot (SHDM) and stalks (STDM) dry matter of the sugarcane were also evaluated. The joint analysis of the three genotypes showed a significant negative linear relationship (p< 0.005) of SHDM and STDM and Δ¹³C (SHDM = 165.5-24.10*Δ¹³C, R² = 0.55; STDM = 106.9 - 15.70*Δ¹³C, R² = 0.47). Relating STDM and Δ¹³C allowed to set apart RB867515 RB855536 as more tolerant and SP80-3280 as more sensitive to water deficit. Therefore, carbon isotope discrimination proved to be an additional tool for selecting tolerant sugarcane genotypes to water deficiency.

Supported by "FAPESP (Proc. 08/56147-1)"

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