Área: Fisiologia vegetal

LEAF-LEVEL CARBON ISOTOPE DISCRIMINATION AND ITS RELATIONSHIP WITH YIELD COMPONENTS AS A PROXY FOR COTTON PHENOTYPING.

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Carbon isotope discrimination(Δ) is negatively correlated with transpiration efficiency, and low (Δ) is being used for indirect selection of high crop yield in rainfed environments for many plant species.Our objectiveswere to investigate whether (Δ) could distinguish cotton lines in Brazilian savanna and to assess its relationship with yield components when submitted to diferente environments; so thatcotton breeders could use Δ values as a criterion for plant selection to obtain plants with higher efficiency for gas exchange and/or water use, without the need for many years of laborious and expensive field testing. For this purpose, experiments were conducted in two sites termed Santa Helena de Goiás (SHGO), GO at 563 m altitude and Montividiu (MONT), GO at 940 m altitude which represent contrasting environments of the Brazilian savanna with respect to altitude, temperature, rain accumulation and rain distribution. Eighteen cotton breeding lines were sown during the second crop season in a randomized complete block design with four replications for both locations. The plot size was 4 rows by 5 m, with a row spacing of 0.45 m and plant density of 9 plants m-1. After first flower emission just 72 and 137 mm of rainfall accumulated until cutout for SHGO and MONT, respectively.The Δ analysis was performed on first youngest fully expanded leaf, using a leaf bulk sampled of five plants randomly chosen per plot; being sampled at 95 days after sowing (at the boll development phase), with the two sites sampled at 23 days and 16 days after the occurrence of the last rainfall in SHGO and MONT, respectively. Subsequently, the leaves were oven-dried and ground to a fine powder for analysis of carbon isotope composition (δ 13C) and subsequently Δ determination. At maturity, seed cotton yield (SCY), lint yield (LY), fiber percentage (Fiber %) and boll weight (Boll) were measured. In both locations, Δ was able to discriminate Cotton genotypes ($P < 0.0001$ and 0.0157 for SHGO and MONT, respectively). There was a significant positive correlation between Δ and seed cotton yield only in the SHGO site where the water déficit were more severe. However, in this site Δ had a significant negative correlation with fiber percentage. MT 04-1540 genotype that showed low Δ in the two locations also showed higher values for lint yield at least in the MONT site. Additionally, this genotype yetshowed a similar performance to those better genotypes evaluated in SHGO. In this site, the negative correlations found between Δ and fiber percentage strongly suggest an integrative effect of gas exchange on Δ and its association with yield components. Therefore, our results indicate that Δ can be used as a proxy for plant selection aiming to increase gas exchange and/or water use efficiency saving cost and time-consuming in expensive field testing.