POSTER SUMMARY

GENOTYPE BY REGION INTERACTIONS OF RELEASED SUGARCANE VARIETIES IN THE SOUTH AFRICAN SUGAR INDUSTRY

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Abstract

Sugarcane (*Saccharum officinarum)* yields in South Africa are largely affected by genotype by environment interactions (GEI). The objective of this study was to investigate the nature of genotype x region interactions among selected sugarcane genotypes based on regional evaluation trials to inform future testing strategies. Eleven sugarcane hybrids were evaluated across five regions of the industry, including the Midlands (M), Hinterland (H), South Coast (S), North Coast (N) and Irrigated North (I). Sugarcane genotypes were tested using a randomised complete block design with four replications in each trial, and harvested over three to five crops. Data were collected for cane yield (TCANE), estimated recoverable crystal content (ERC), and ERC yield (TERC). Data were analysed using combined analysis of variance, additive main effects and multiplicative interaction (AMMI) and genotype plus genotype by environment (GGE) bi-plot analyses. Significant (P<0.001) effects of genotypes, locations, crop year and their interactions were found for all three traits. Genotype x location contributed more to variation than genotype x crop. The AMMI bi-plot revealed differential genotype interactions with regions, and showed that the M and H regions discriminated genotypes similarly. Results from AMMI were in agreement with GGE bi-plot in terms of site discriminating ability, genotype mean performance and stability. The GGE bi-plot identified two mega-environments (MGE) for the industry, with MGE1 comprising the M and H regions and MGE2 comprising the S, N and I regions. This preliminary study is the first to have identified two broad regional groupings in the industry, and this may have implications on breeding strategies.

Keywords: additive main effect and multiplicative interaction, genotype by environment interaction, GGE biplot analysis, adaptability, stability, mega-environment