SELECTION AND EVALUATION OF SOME SUGARCANE CLONES *VIA* BEST LINEAR UNBIASED PREDICTOR

By

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APPROVAL SHEET

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ABSTRACT

The present study was implemented in two stages, the first stage was conducted to estimate the predicted genotypic value of genotype. Best Linear Unbiased Prediction (BLUP) method was used to select elite sugarcane clones. A total of 420 sugarcane seedlings (clones) of 13 bi-parental crosses and 3 selfed populations were evaluated in an Augmented block design along with three check cultivars, viz. G84-47, Ph8013 and GT54-9 at the breeding nursery of Sugar Crops Research Institute, Giza Governorate during 2013/2014 growing season. Based on BLUBs analysis, the best 90 sugarcane clones for stalk weight were selected (22% selection intensity) and advanced for evaluation in the next stage (clonal stage). The second stage was conducted at Mattana Agricultural Research Station, Luxor Governorate, Egypt during 2015 and 2016 seasons to evaluate the 90 selected clones for yield and quality traits and to estimate the genetic parameters of most important agronomic traits. The experimental design was a randomized complete block with two replications. Analysis of variance for the first stage revealed highly significant differences among the evaluated genotypes (clones) for all studied traits. High estimates of broad-sense heritability (H %) were obtained for all studied traits, varying between 81.11% for stalk diameter and 97.54% for stalk number/stool. Genotypic coefficient of variation (GCV %) estimates for all studied traits were greater than 10% and reached 31.25% for stalk weight and 55.40% for stalks number/stool, which indicated the presence of genetic variability and potential selection for these traits. Based on BLUP analysis, clones with high genotypic effects and high genotypic values varied from one trait to another. For the second stage, high genotypic coefficient of variation were observed for cane diameter cm (32.37%) followed by sugar yield (32.02%) and no. of stalks/fed (27.50%). Maximum expected genetic advance as percentage of mean was recorded for cane yield (41.72, 52.31 and 61.48%) under 20, 10 and 5% selection intensity, respectively. Most evaluated traits had high heritability estimates with high genetic advance values, especially under 5% selection intensity, indicating the high probability of selecting individuals with better performance in the next stages. Also all selected clones using 20% selection intensity for stalk weight had positive and high genotypic effects, except five clones which had negative effects. Moreover the predicted genotypic value was approximately similar to the actual mean indicating that BLUP is an important strategy for identifying clones with high genotypic values and increases the probability of selecting potential clones. The results showed that three sugar cane clones, viz. G2014/357, G2014/312 and G2014/349 were the best clones and significantly exceeded others and the check variety for cane yield and sugar yield.

Key words: *Saccharum spp*., seedling stage, , selection, blup, genotypic values, genotypic effects, genetic advance, heritability.

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