SELECTION CRITERIA FOR CLONAL EVALUATION OF SUGARCANE

(SACCHARUM HYBRID SPP)

By

ARUNA WIJESURIYA

Thesis

Submitted in partial fulfilment of the requirements

for the degree of

MASTER OF PHILOSOPHY

in the

POSTGRADUATE INSTITUTE OF AGRICULTURE

of the

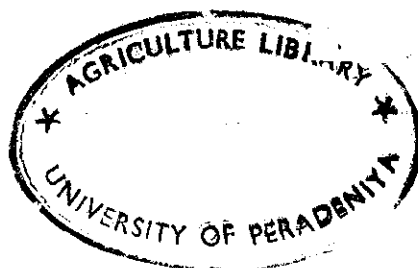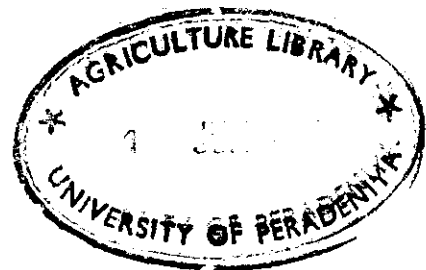UNIVERSITY OF PERADENIYA

SRI LANKA

July 1997.

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ABSTRACT

A knowledge of genetic architecture of the relationships between the components of yield is of great importance in devising selection criteria for sugarcane. In early selection stages, the direct selection for yield has proved to be ineffective. In the present study, an experiment was conducted at the Sugarcane Research Institute of Sri Lanka, using 9 biparental families, their parents and two standard varieties to estimate heritabilities, genetic and phenotypic correlations and expected direct and correlated responses to selection of 12 yield and quality components in sugarcane. The information collected on genetic parameters were used to construct selection indices to be employed in initial and intermediate stages of the clonal selection programmes. A simple ranking method was suggested in the determination of phenotypic merit of the clones under evaluation.

Information collected on genetic parameters suggested that additive genetic variance is more important for most of the characteristics. Dominance variance is also found to be important in the genetic determination of characteristics except pol and purity. High heritability values were associated with sugar yield components such as; brix (total soluble solids in juice), pol (sucrose % in juice), purity [(pol/brix)/100] and POCS (pure obtainable cane sugar) and lower heritability values were associated with clump weight, millable stalks per clump and tillers per clump. Moderate heritability estimates were recorded for stalk length, stalk diameter, rind hardness and fibre % fresh weight. For a number of characteristics, a marked difference was observed between narrow sense

heritabilities estimated through variance components and parent off-spring regression. Most of the sugar yield components were significantly and positively related with clump weight on phenotypic level and negatively related genetically. Negative relationships were observed for brix *versus* purity and for millable stalks per clump *versus* cane diameter.

Indirect selection *via* selection of pol and purity proved to be effective in improving POCS, while selection on stalk length leads to selection of clones with high cane yield. Brix and stalk diameter were also positively correlated with sugar and cane yields. Rind hardness was positively correlated with fibre % fresh weight and therefore can be used as a proxy variable for fibre.

Clonal selection through the proposed selection indices suggested that selection has to be performed at the initial stages with high intensities to avoid the elimination of better progenies. The use of indices in the selection of proven parents and cross combinations are illustrated and the practical aspects of index selection are discussed in detail.