

A Ciência e os caminhos do desenvolvimento

Base population of recurrent selection in papaya: a tool for discovery and selection of superior genotypes

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The genetic variability in papaya (*Carica papaya* L.) populations can be explored through population breeding methods, such as recurrent selection - RS. The work aims were to study the agronomic profile of the combined selection index - CSI and direct selection - DS of genotypes from the UCP-C0 base population, in order to identify the genetic gains in the short and long term. The image-based-phenotyping were used to evaluate the 222 genotypes, for the traits plant height - PH, stem diameter - SD, number of marketable fruits - NMF, number of deformed fruits - NDF, nodes without fruits - NWF, fruit weight - FW, fruit yield - FY, fruit and pulp firmness - FF and PF, length and diameter of fruit - FL and FD, length and diameter of the ovarian cavity - LOC and DOC, pulp thickness - PT, percentage of pulp volume - %PV and soluble solids content - TSS. The combined and direct selection of the 30 genotypes was performed based on the permanent phenotypic value. For both selections, the maximum genetic gain was estimated using the individual repeatability, which provides the upper limit of heritability. The Venn diagram was used to compare the genotypes selected by CSI and DS. The analyzes were performed in the R and Selegen programs. Genetic gains estimated with the CSI were 10.9% for FY, 13.8% for NMF, 7.5% for FW, 6.5% for FF and 5.3% for PF and TSS. The estimated genetic gain with DS was 19.1% for FY, 11.4% for FF and 17.2% for TSS. The agronomic profile of the CSI and DS effect on the Venn diagram indicated that two genotypes (52 and 94) are common among the indexes for FY, TSS, FF and CSI and two genotypes (45 and 165) for FF and TSS were not selected in the CSI, but are sources of favorable alleles for DS. Although the gains from DS are two to three times higher, the CSI is more suitable for short-term selection, aiming at the development of per se lines. However, for long-term selection purposes such as SR, we must use the CSI and DS simultaneously, ensuring the presence of superior genotypes, which are sources of favorable alleles for specific traits, to be used in the recombination phase. The present work showed that if on the one hand RS is a long-term strategy, on the other hand, it offers opportunities for selection of superior genotypes in the UCP-C0.

Keywords: Plant Breeding, *Carica papaya* L., Fruit yield and quality.

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