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COMBINING ABILITY AMONG ELITE INBRED LINES OF TROPICAL MAIZE

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RESUMO

Diallel crosses are genetic designs widely used to obtain information in maize breeding programs. Through diallel analysis is possible to estimate the general combining ability (GCA) and specific combining (SCA) among parents, which are associated with additive and non-additive genetic effects, respectively. Moreover, diallel analysis allows the selection of genotypes for the development of new hybrids and breeding populations. Therefore, our objective study was to estimate the combining ability among elite inbred lines of tropical maize. Fifteen elite maize inbred lines were crossed based on a complete diallel scheme. The 105 hybrids and five checks were evaluated across four environments of Minas Gerais in an alpha-lattice design with three replications. We measured days to silking (DTS), ear height (EH, cm), number of kernel rows (NKR), total number of kernels per ear (NKE), one thousand-kernel weight (TKW, g) and grain yield (GY, kg ha⁻¹). Combined diallel analysis across environments was performed and based on the variance components estimates, the narrow-sense heritability (h^2), broad-sense heritability (H^2), the additive (σ^2_a) and dominance (σ^2_d) components of the genetic variance, the proportion of variance among single-cross hybrids due to GCA ($\sigma^2_{sch/GCA}$) and correlation between BLUP values and SCA ($r_{BLUP/SCA}$) were estimated. We found significant differences ($p < 0.05$) for GCA and SCA for all traits across environments. The GCA x environment interactions were significant, while the SCA x environment interactions were not significant for all traits. The overall mean of experimental hybrids were 68 days, 133 cm, 15 kernel rows, 549 kernels per ear, 322.3 g and 9,521 kg ha⁻¹ for DTS, EH, NKR, NKE, TKW and GY, respectively. The additive genetic effects, related to GCA, were preponderant over dominance genetic effects for DTS, EH, NKR and TKW. For these traits the h^2 ranged from 0.53 (NKR and TKW) to 0.63 (EH), the H^2 from 0.74 (NKR) to 0.91 (DTS), the $\sigma^2_{sch/GCA}$ from 0.76 (DTS) to 0.88 (EH) and $r_{BLUP/SCA}$ from 0.45 (EH) to 0.57 (DTS). Therefore, for DTS, EH, NKR and TKW it is possible to apply an intrapopulation recurrent selection program to increase favorable alleles in a population. On the other hand, for NKE and GY, the dominance genetic effects, related to SCA, were preponderant over additive genetic effects. For NKE the estimates of h^2 , H^2 , $\sigma^2_{sch/GCA}$ and $r_{BLUP/SCA}$ were 0.20, 0.80, 0.40 and 0.84, respectively, while for GY the estimates were 0.08, 0.72, 0.21 and 0.94, respectively. Thus, for NKE and GY the hybridization

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and reciprocal recurrent selection would enhance genetic gains and hybrid performance, since these methods explore heterosis among parents. We concluded that the inbred lines VML131, VML083, VML157, VML062 and VML016 could be promising parents to develop new hybrids and breeding populations of tropical maize targeting tropical environments.

PALAVRAS-CHAVE: Zea mays L, Diallel crosses, Genetic effects

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