Prediction of maize hybrid performance using similarity in state and similarity by descent information

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 ABSTRACT. We evaluated the efficiency of the best linear unbiased predictor (BLUP) and the influence of the use of similarity in state (SIS) and similarity by descent (SBD) in the prediction of untested maize hybrids. Nine inbred lines of maize were crossed using a randomized complete diallel method. These materials were genotyped with 48 microsatellite markers (SSR) associated with the QTL regions for grain yield. Estimates of four coefficients of SIS and four coefficients of SBD were used to construct the additive genetic and dominance matrices, which were later used in combination with the BLUP for predicting genotypic values and specific combining ability (SCA) in unanalyzed hybrids under simulated unbalance. The values of correlations between the genotypic values predicted and the means observed, depending on the degree of unbalance, ranged from 0.48 to 0.99 for SIS and 0.40 to 0.99 using information from SBD. The results obtained for the SCA ranged from 0.26 to 0.98 using the SIS and 0.001 to 0.990 using the SBD information. It was also observed that the predictions using SBD showed less biased than SIS predictions demonstrating that the predictions obtained by these coefficients (SBD) were closer to the observed value, but were less efficient in the ranking of genotypes.

Although the SIS showed a bias due to overestimation of relatedness, this type of coefficient may be used where low values are detected in the SBD in the group of parents because of its greater efficiency in ranking the candidates hybrids.

Key words: BLUP; Maize breeding; Untested hybrids; Mixed models