

Inheritance of yield and agronomic traits in a maize (*Zeamays* L.) population at two levels of inbreeding.

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Abstract:

Hybrids resulting from diallel crosses of ten random lines at the second (S_2) and fifth (S_5) generations of inbreeding in the TZSR-W population of maize (*Zea mays* L.) were studied. Eight of the lines were common to both generations. At both generations, general combining ability (gca) was more important than specific combining ability (sca) for most traits. For grain yield however, gca and sca were nearly equal. Therefore, recurrent selection methods that utilize both additive and non-additive gene actions should be used to improve the population.

Generally, lines with positive gca effects at the S_2 generation also had positive gca at the S_5 generation with line 013 being the best at both generations. However, the relative performance of crosses (sca) differed between the two generations. Appreciable inbreeding depression had occurred at the S_2 generation with little further depression at the S_5 generation. The preponderance and relative stability of gca effects, and the magnitude of inbreeding depression at the S_2 generation suggest that good inbred lines can be selected as from the S_2 generation.

However, the inconsistent ranking of hybrids for sca effects at both generations implies that the yielding ability of such selected lines must be specifically tested to identify the best hybrid combinations.

Correlation, stepwise multiple regression and path-coefficient analyses indicated that vigorous lines that mature early, with long rather than wide ears will be high-yielding in hybrid combinations. These analyses also showed that shelling percentage, emergence percentage and numbers of days to silking of $S_2 \times S_2$ hybrids positively influenced grain yield in the $S_5 \times S_5$ hybrids. Therefore, these traits could be used as indirect selection criteria for high-yielding hybrids.

Keywords: Hybrids/ plants/ inbreeding/ gene/ population

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