

**Genetic Variability and Predicted Responses
to Four Types of Progeny Selection in a
Nigeria Maize (Zeamays L.) population.**

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Abstract:

Genetic variability and predicted responses to full-sib (FS), half-sib (HS), Si and S₁ testcross (TCH) selection methods were studied in the open-pollinating maize variety, TZSR-Y-1. Evaluation of progress after one cycle of selection was also done. Grain yield and seven agronomic traits were investigated.

Mean grain yield ranged from 3.4 to 9.2 t/ha for FS, 2.9 to 7.5 t/ha for HS, 1.75 to 8.0 t/ha for S₁ and 3.2 to 8.8 t/ha for TCH. Genetic variances (σ^2) were largest for S₁ families but there were no consistent trends for σ^2 among the other progeny types. Additive genetic variance constituted the major portion of the total genetic variance for grain yield and the agronomic traits. Heritability estimates were moderate to high for nearly all agronomic traits of the four progeny types.

Generally, only the correlations of yield with ear number per plot and ear length had coefficients appreciably larger than 0.50; these two traits were therefore the primary determinants of grain yield.

Largest predicted direct gain per season of selection for grain yield was obtained for S₁ families followed by TCH and FS which differed little. HS selection gave the smallest predicted gain. Predicted correlated responses in grain yield assuming selection was done for agronomic traits were generally smaller than predicted direct responses to selection for grain yield.

After one cycle of selection, yield improvements of the derived populations relative to the source population were -2.5% for S₁, 8.8% for HS, 13.5% for FS, and 14.6% for TCH selection methods. On the basis of operational efficiency and predicted versus realized gains from selection, FS family selection would be more effective than the other selection methods studied for improving the maize variety TZSR-Y-1.

Keywords: Genetic variability/ Progeny/ Agronomic traits

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