

STUDY OF THE RECIPROCAL EFFECTS ON THE PERFORMANCE OF
DOUBLE-CROSS HYBRIDS UNDER TWO NITROGEN LEVELS IN MAIZE

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ABSTRACT

The main objective of this investigation was to determine the importance of genotype X nitrogen fertilizer interactions and reciprocal effects in evaluating corn populations for use in breeding programs. Eight parental single crosses, 28 F₁'s and their reciprocals were evaluated in two adjacent experiments under two nitrogen fertilizer levels (60 Kg N/faddan - low level and 120 Kg N/faddan - high level). Data were recorded on grain yield/plant, number of kernels/row, number of rows/ear, 100 kernels weight, ear height, silking and tasseling dates. Mean squares of nitrogen level was significant for all traits; except for 100 kernels weight and ear height. Increasing nitrogen level increased the mean values of all traits. Significant genotypes mean squares were detected for all traits except for ear height. Except for no. of rows/ear and 100 kernel weight, there were genotype by nitrogen level interactions. Only under the low nitrogen level there were detectable significant differences among genotypes and their reciprocals for grain yield per plant. Data of mean performance and heterosis % for grain yield/plant showed wide differences of reciprocal effects in certain crosses in each nitrogen level and in combined analysis. Most heterotic effect values were higher under the high nitrogen level. The highest amount of heterotic effects (more than 15 %) were obtained from the some studied double crosses based on the combined analysis. Combined data of GCA mean squares showed significant differences for all traits except for number of row/ear, 100 kernels weight and ear height and they were higher under the high nitrogen level in most cases. GCA played the major role in the inheritance of most traits and exhibited a greater degree of interactions with nitrogen level than SCA. The parental single crosses 4, 5 and 8 had the highest GCA effects for yield/plant and some of its components. Data revealed significant differences for specific combining ability (SCA) for grain yield/plant, number of kernels/row and number of rows/ear. In most cases, unstable trend of SCA effect was observed from one nitrogen level to another. For grain yield/plant, ten out of twenty eight double crosses exhibited significant desirable and positive SCA effects. Significant differences of reciprocal mean squares were detected for grain yield and number of kernel/row. About six (11 % of F₁'s) of the resulted double crosses had significant reciprocal effects