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1. The effects of semi-sterility on yield components of corn.

The effect of reduced seed set on yield components was studied using three-way crosses and backcross families segregating for reciprocal translocations. The yields of normal and semi-sterile plants of near identical genotypes were compared in two experiments.

The first experiment compared the yields of normal and semi-sterile plants of 9 three-way crosses and backcross families planted at 12,000 plants per acre, while the second experiment compared the yields of normal and semi-sterile segregates of three families planted at three different planting rates.

Data were taken and treated statistically on yield per ear, number of second ears, yield per plant, ear length, weight per 100 kernels, row number, and moisture in grain.

Significant differences were found between the normal and semi-sterile segregates in all comparisons except moisture in grain and row number. Semi-sterile segregates heterozygous for the translocation displayed a mean fertility of 50.74 percent.

The first chart shows the mean values for all comparisons in the first experiment.

	Ear length	Wt/100 K (Grams)	Ears/Plt.	% of Normals Yield/Ear	% of Normals Yield/Plt.
Semi-steriles	7.84*	36.97**	1.21**	69.54	73.30
Normals	7.66	28.66	1.04		

* Significant at .05
** Significant at .01

Although only fifty percent of the kernels developed on the semi-sterile segregates, increases in kernel size and ear length made it possible for them to yield 70 percent as much per ear as the fully fertile ears. The increase in number of second ears on the semi-sterile segregates resulted in a per plant yield of 73 percent of the yield of the normals.

The following chart shows the yields of the semi-steriles, expressed as percent of normal sibs, in the second experiment.

Semi-sterile segregates of:	Plants per Acre 8000	12000	16000
N6 BC_1	82.81	110.80	101.94
WF9 BC_1	54.83	82.39	79.61

Compensation for reduced seed set by the semi-steriles was again manifested by increased kernel size, increased ear length, and greater number of second ears. Unexpectedly, the N6 semi-sterile segregates were particularly able to compensate and yield as well, or even better at the higher rates, than the normal segregates.

The sugar content of certain normal and semi-sterile stalks was also determined 60 days after pollination. The mean of sugar analyses of stalk juices, as well as lodging data, are presented below:

	% Sucrose	% Stalk Breakage	% Root Lodging
Semi-steriles	13.49	14.33	38.77
Normals	9.11	53.70	22.23

The limited number of kernels on the semi-sterile plants apparently resulted in a build-up of sugars in the sporophyte. Although increased seed size was displayed on all semi-sterile ears, a fifty percent sterile ear would require kernels twice as large as those on a fully fertile ear before it would store an equal amount of nutrients.

Apparently physiological or morphological barriers exist which prevent kernels on semi-sterile plants from becoming twice as large as those on siblings of similar genotypes. However, some yield compensation on semi-steriles was made in the form of limited increase in kernel size, the formation of second ears, and, to a smaller extent, a slight increase in ear length.

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