IN THE Mexican Agricultural Program of The Rockefeller Foundation, S₁ lines of corn have been used extensively for the production of commercial double and three-way crosses. Two of the most important hybrids presently in production are combinations of S₁ lines which yield from 25 to 40% more than the open-pollinated varieties in their maturity classes. Although many hybrids developed from lines selfed four to five generations have been tested against these original combinations of S₁ lines, none has been found superior to the S₁ combinations in yield. For this reason, the use of S₁ lines for the production of commercial crosses has been advocated for those countries where new programs of corn improvement are being developed.

The use of S₁ lines for commercial crosses has been criticized to some extent by other investigators. Their arguments are: (1) that, because S₁ lines retain about 50% of the heterozygosity of their open-pollinated varieties, they are so variable and so vigorous that contaminants cannot be eliminated effectively in increase plots; and (2) that S₁ lines retain so much genetic variability that selection, whether natural or artificial, would be important in causing changes in the genetic constitution of the line.

The present study was designed to determine whether or not any of the 28 important lines in the high altitude breeding program had changed through three successive generations of selfings.

MATERIALS AND METHODS

Seed from the original first generation selfed ear of each of 28 lines was planted in 1950 and crossed with an unrelated tester. At the same time, third generation sibbed seed of each of these lines was planted and crossed with the same tester as its original counterpart. Each of these sibbed stocks had been increased through three generations, as follows:

For each generation 60 seeds were planted of each line in 2 adjacent rows. In the first row, 10 ear shoots were bagged before the appearance of silks and pollinated by a mixture of pollen from 10 plants in the second row. Although pollinators were told to pick plants at random, a certain amount of visual selection obviously took place, with a total of approximately 60 plants to choose from. At harvest, seed from the 10 plants was composited.

The 28 pairs of crosses were tested for yield in 1951 at the breeding station at Chapingo, Mexico, using a randomized block design in which the 28 pairs were planted together in paired plots and the paired plots distributed at random in each of 8 replications. During the season, data were taken on important agronomic characters and yield. The yield data were corrected for differences in stand and moisture, and were subjected to a standard analysis of variance. Also, the eight comparisons of the two seed stocks for each line were analyzed separately with the "t" test, both considering and ignoring the paired relationship.