SYNOPSIS. Mean F₂ grain and fodder yields of single crosses were 73% and 78% of the F₁, respectively; for double crosses they were 85% and 87%. Advanced generation seed, in the absence of selection, reaches its minimum of productivity in the F₃ when produced by sibbing whereas by selfing it continues to reduce until complete homozygosity is reached. Application of Wright's prediction formula for F₃ hybrid performance is restricted to populations in which all component lines are equally represented.

IN THE literature, yield comparisons of F₁ and F₂ corn hybrids have been largely restricted to grain production (2-10). It is the chief purpose of this paper to show in addition the comparative performance with respect to yields of stover, fodder, and ensilage, and some other plant characters. The application of Wright's formula for the theoretical prediction of F₂ hybrid-corn performance is also discussed.

Current interest in advanced-generation performance concerns the possible development of multiple-hybrid combinations that may serve as desirable synthetic varieties, thereby dispensing with the need for annual F₁ hybrid seed production. In the early days of hybrid corn, F₂ yield information served to counteract the tendency of growers at that time to pick seed ears from their attractive first-generation commercial crop of 3-way and double-cross hybrids.

EXPERIMENTAL PROCEDURE

Comparative yields of inbred lines and hybrids at the Nebraska Agricultural Experiment Station plots, 10 hills in length, spaced 42 inches, with plant spacing at a double rate and the stand was managed in the seedling stage to 3 plants per hill, except in a plant-spacing test where the thinning was at the specified rates. Yields per acre were based on the 2 middle rows with shelled grain, stover, and fodder at 15% moisture content. Ensilage was calculated from the fodder by conversion to a 75% moisture basis. Randomization was restricted by having the relatively small inbreds randomized in a separate block within each replication of all entries.

The inbreds used throughout these studies for six or more generations and were essentially homozygous. The seed of F₁ hybrids was prepared by compositing ears which had been pollinated with a pollen mixture from as many plants of the other parent. F₃ and F₄ seed was composite sib-pollination, using 10 or more ear-shoots and a pollen mixture from as many other sib-plants, except where its production by selfing was under comparison, as specified.

RESULTS AND DISCUSSION

Effect of the Manner of Producing Advanced-Generation Seed

In experimental tests of this kind the seed is produced by controlled pollination. Since these results are to be applicable to farm conditions, it is important that the methods used in producing the seed be comparable with what occurs in field practice.

In the commercial field, hybrid seed is naturally advanced in its generation by open pollination which