THE DECREASE IN YIELDING CAPACITY IN ADVANCED GENERATIONS OF HYBRID CORN

N. P. Neal

The exclusive use of first generation seed for the production of hybrid corn runs counter to the traditional practice of the farmer who is accustomed to saving his own supply. The generally superior performance of tested and adapted hybrids greatly enhances the temptation to take seed from the crop; and, in some cases at least, the rather attractive appearance of the advanced generations themselves tends to mask the decline in productivity which has occurred. As a basis for efficient practice, it is important, therefore, that a well-founded body of fact be established concerning the value of first generation hybrid seed as compared with that taken from later generations.

Wright (4) has pointed out that "a random-bred stock derived from \( n \) inbred families will have \( \frac{1}{n} \) th less superiority over its inbred ancestry than the first cross or a random-bred stock from which the inbred families might have been derived without selection." The main object of the present study was to determine whether, on the average, this generalization holds for corn and to ascertain if, in particular cases, the departures from it were large enough to be significant in practice.

Tests were made in 1933 and 1934 to determine the relative yielding capacities of the first and succeeding generations of hybrid strains. In the first season's trials, precautions were not taken to avoid competition effects between the F\(_1\) and F\(_2\) generations. The present report involves only the data obtained in 1934.

MATERIALS AND METHODS

The material used in the test consisted of 10 single, 4 three-way, and 10 double hybrids and their F\(_2\) generations, as well as the F\(_3\) generations of 8 of the single and 3 of the three-way hybrids. Reference to Table 1 shows the various hybrids comprising the same group of inbred lines. Lines 25 and 26 are closely related.

The F\(_2\) seed of certain of the single hybrids was taken from the bulked seed obtained from a series of crossing plats in which the single hybrids were the respective male parents. In these instances the seed used was obviously the result of random pollination. The F\(_3\) seed of some of the three-way and double hybrids, having been harvested from uncontaminated field crops of the respective hybrids, was likewise the product of random pollination. In all other cases the seed

---

1Contribution from the Departments of Genetics (paper No. 188), Agronomy, and Plant Pathology, Wisconsin Agricultural Experiment Station, Madison, Wis. Published with the approval of the Director of the Station. Received for publication May 31, 1935.

2Instructor. The writer desires to express his appreciation to Dr. R. A. Brink, of the Department of Genetics, for helpful suggestions in the preparation of the manuscript.

3Figures in parenthesis refer to "Literature Cited," p. 670.