

## 9. The Iowa State Corn Yield Test<sup>1</sup>

**S**EED CORN obtained from different Iowa farmers and planted in local county yield test comparisons had shown significant yield differences, some of which appeared not to be in any way related to stand, maturity, or variety characteristics.

In 1918 and again in 1919, some 40 farmers in the central part of Iowa, from east to west, who had been entering samples of their Reid Yellow Dent corn in the annual Iowa State Corn Show, were invited to supply Iowa State College samples of their seed, to be planted in yield comparison plots at Ames. These tests showed that different strains of the same variety, all developed in the same area in the state, might vary greatly in productivity and in other agronomic characters when grown side by side under uniform conditions.

With this background information, in addition to that from the county yield test reports previously referred to, the Iowa Corn and Small Grain Growers Association decided in 1919 that it would sponsor a state-wide Corn Yield Test, as well as the State Corn Show, which it had been sponsoring for some 20 years.

---

<sup>1</sup> Professor H. D. Hughes, author of this chapter, was Head of the Farm Crops Section of the Iowa Station from 1910 until 1948. The Iowa State Corn Yield Test was initiated under his leadership.

## THE OBJECTIVE

The object was "To locate the strains and varieties of corn which will produce the larger yields of dry shelled corn per acre in the different sections and districts of the state." The Farm Crops Section of the Experiment Station cooperated with the farmer's Association from the time the state test was first inaugurated in 1920. Beginning in 1922, this cooperation was also shared by the "Office of Cereal Crops and Disease," USDA.

## PLAN OF THE IOWA STATE TESTS

The general plan of procedure of the Iowa State Corn Yield Test has varied but little from year to year. The state was divided into four sections: Northern, North Central, South Central, and Southern. Each section was divided into a Western, Central, and Eastern District, making 12 districts in all. A test field was located in each district.

During the period 1920-24, inclusive, each entry was compared in each of the three districts of a section. Beginning in 1924, a strain might be compared in only one or in several districts.

Corn growers and breeders were invited to enter their strains of corn, to be planted under uniform conditions in comparison with other strains and varieties. One of the early Corn Shows is illustrated in Figure 9.1. During the first six years each entrant was limited to not more than three entries of different strains in any one section. This limit was removed in 1926, to be imposed again in a somewhat different manner a number of years later. Each entrant indicated the districts or sections in which his strains were to be entered and compared.

An entry fee of \$10 per section was required for Iowa residents and \$40 for nonresidents during the years 1920-24, inclusive. Beginning in 1925, the entry fee was \$3.00 per district for residents of Iowa and \$10 for nonresidents. These fees were estimated to cover about one-half



Fig. 9.1. Iowa State Corn Yield Tests — January, 1924. Exhibit of baskets of field-run corn and a few selected ears from each sample entered in the 1923 tests. The heights of the boards indicate the relative yields of the different entries.

the cost of making the tests, the other half coming from State and Federal funds. At the time of making entries each sample was given a number, which was the only means of identification from that time until after all performance records had been calculated and tabulated.

Studies in field plot technique had indicated that 250 hills, distributed in ten 25-hill plots randomized throughout the test field to overcome variations in productivity of the soil, would insure satisfactorily accurate comparisons. The number of plots planted to each entry in each test field was five in 1920, 1921, and 1922, and 10 replications generally planted in each field in later years. Section yields, therefore, were the average of 30 plots, with 10 in each of three parts of the section.

In some cases, three-row plots were used and in others four-row plots, with only the central row, or rows, harvested for the yield determinations. Yields were all calculated to the same stand in the field and to a uniform moisture content of shelled corn, except that for the first four years the yields were reported on an ear-corn basis.

In the earlier years of the program, as an encouragement to corn growers and breeders to enter their strains of corn in the yield test, the names of only those whose corn strains ranked above the average in yield were published. The purpose was to find the high-yielding strains or varieties, not to humiliate those who had less productive strains. It was not until 1935 — 16 years after the state testing program was begun — that the names of all entrants were reported, together with the performance record of their strains.

In the very early years of the yield testing program, entrants sent in their seed samples at the time of making entries. After a few years, however, entrants were required to state the amount of seed of each entry and the location of at least one-half of this amount. Representatives of the Association then took samples of seed from these stocks, in this way ensuring that the seed planted in the yield test was truly representative of the seed of these strains being sold to farmers over the state.

### OPEN POLLINATED AND HYBRID STRAINS COMPARED

When the Iowa State Corn Yield Test was organized there were no commercially available hybrids. The first entry of a hybrid was in 1923. In 1924 there were four hybrid entries and in 1925 there were 10. Beginning in 1926 a separate class was provided for hybrid entries. The purpose in making this arrangement was to encourage entrants to continue with the testing of their open pollinated strains. This separation appeared to be necessary in view of the fact that the hybrids were consistently out-yielding even the best of the open pollinated varieties. In 1926 there were 133 and in 1927, 206 district hybrid entries, indicating something of the rapidity with which hybrid corn came into the picture. A few years later the open pollinated class was discontinued, as all the entries were hybrids.

### "EXTENSIVELY GROWN" HYBRIDS ENTERED BY THE ASSOCIATION

Many of the most extensively grown hybrids were not being entered in the State Corn Yield Test by their producers. This meant that there was no information available to seed corn buyers on the productivity of these hybrids, their maturity, or other characteristics. As a service to Iowa seed corn buyers, beginning in 1944 a survey was made each year to determine which of the hybrids commercially sold were being most extensively grown in the different areas in the state. Those found to be grown on the larger acreages were entered in the name of the Association, representative seed samples being obtained by the Association.

In 1944 the five hybrids reported to be grown on the larger acreages in each of the four sections were so entered in the State Corn Yield Test. In following years 10 of these "most extensively grown hybrids" were entered for each of the four sections of the state, making a total of 40.

In obtaining and testing these extensively grown hybrids in this way, the Iowa Corn Growers Association rendered a very important service to Iowa farmers. For the first time, purchasers of seed corn had readily available to them accurate, unbiased performance records on the hybrids being promoted by the larger hybrid seed corn producers, and which were being planted on a larger and larger percentage of the state corn acreage.

## REPORTING OF RESULTS

In the earlier years of the state test, the results were made available annually at the midwinter State Corn Show at Ames, in reports published and distributed by the Association, and especially in the agricultural press.

In 1929 the Iowa Station in its Bulletin 265, "High Yielding Strains and Varieties of Corn for Iowa," authored by H. D. Hughes, Joe L. Robinson, and A. A. Bryan, summed up the results of the first eight years: "Inasmuch as the average of accumulated tests is of special significance in a comparative study of varieties and strains, it is deemed advisable herewith to report certain results not previously available." In the more recent years, the results of the Iowa Corn Yield Test have been published annually by the Iowa Agricultural Experiment Station, the publication being made available at the time of the winter meeting of the Association (more recently known as the Iowa Crop Improvement Association).

In addition to reporting the strain yield comparisons, Bulletin 265 also reported on studies having to do with:

1. The rate of planting as related to yield in the different parts of Iowa
2. Effect of moving seed corn east and west within the state
3. Shelling percentage in relation to acre yield
4. Relation of moisture content at harvest to acre yield
5. Method of testing in relation to the accuracy of yield comparisons.

### A MEASURE OF THE IMMEDIATE EFFECT

The number of district entries in the first eight years of the State Yield Test was 3,229, with the same entry usually planted in more than one district and in more than one year. In 1928 several hundred Iowa farmers were asked to estimate the acreage planted to different strains and varieties of corn in their respective localities. Based on these reports — on the average acre yield in the different parts of the state as published by the Iowa Crop Reporting Service, and the increase in acre yield by these newly found strains as shown in the Corn Yield Test — it was calculated that:

The use of Krug corn in the districts where yield comparison data are available has resulted in an estimated increase in annual production of 445,918 bushels; Ioleaming, 228,822; Black yellow dent, 178,906; Golden King 104,426; Osterland yellow dent 109,844; and for other corn yield test strains somewhat smaller amounts — an annual increase in production of 1,255,513 bushels, with no increase in acreage or other material expense. This is not an estimate of what might result at some time in the future if a certain percent of the corn acreage of the state were to be planted with some of the varieties located through the Iowa Corn Yield Test, but by what actually has resulted within nine years after the yield test was inaugurated.

### IMPORTANT TO THE HYBRID BREEDING PROGRAM

The Iowa Corn Yield Test made a very important contribution to the hybrid seed breeding program, in that as the hybrid method of breeding got under way, these high-yielding, high-quality strains provided the foundation stocks from which many of the most valuable inbreds were isolated.

State corn yield test programs, similar to the pioneering procedure developed in Iowa, were established and have been continued through the years in practically all — if not all — of the Corn Belt states.