

## 8. The Woodford County, Illinois, Corn Yield Test

**K**RUG CORN came to be the most commonly grown strain of open-pollinated corn in an area from 50 to 100 miles wide, reaching across the Corn Belt from Ohio to Nebraska, during the ten years just preceding the general introduction of hybrid corn. It also became a valuable source of inbreds for the production of commercial hybrids.

It happened in this way. I began work in Woodford County, Illinois, as farm adviser (county agricultural agent in most states) January 1, 1916. The Clinton County, Iowa, Corn Yield Test as described in the preceding chapter had just been completed.

The agricultural leaders in Woodford County, which is in the edge of the great grain-farming area of east central Illinois, knowing of the work in Clinton County asked that a similar project be undertaken in their county. World War I was on and the project was not undertaken until the close of the war. The Armistice on November 11, 1918, left the way open to proceed.

### THE PLAN OF THE WOODFORD COUNTY CORN YIELD TEST

The Woodford County Corn Yield Test was based almost entirely on the observations and results of the County Farm demonstrations in Iowa and the Clinton

County Corn Yield Test. The more important ideas on which the plans were based follow:

1. The belief that in every Corn Belt county there was some farmer who had developed a strain of corn which was better for that county than the strains that most farmers were growing, or that they could bring in from outside the county.
2. A field test for yield and quality continued over several years was the only way of finding superior strains.
3. The field testing of seed *from a large number of farmers*, each of whom had selected his seed for several years according to his idea of what was best.
4. Acceptance for the test of seed from all farmers who submitted samples. (Failure to do this in Clinton County, Iowa, may have caused us to miss a superior strain.)
5. Continued planting during all three years of the test of all samples submitted in order to test all samples under varying conditions.
6. Each farmer submitting seed to bring in a relatively large number of ears in order to insure that the sample was representative of the strain.
7. Each ear of each sample to be ear tested for germination and disease under carefully controlled and uniform conditions so as to eliminate insofar as possible differences in yield and quality due to differences in germination and disease.
8. The director of the project to avoid any selection of ears or kernels of any sample submitted for the test based on his idea of desirable type.
9. The elimination as much as possible of accidental differences in yield due to environmental differences.
10. A comparison in the fourth year of a few of the high-yielding strains by farmers of Woodford and surrounding counties, with plantings beside their own seed.

11. Definite plans for the commercial production and distribution of the strain or strains finally selected as most superior.

### DESCRIPTION OF THE WOODFORD COUNTY CORN YIELD TEST

During January, 1919, 118 men each brought to local meetings 100 ears of his seed corn. All but three or four samples had been grown in the county by the owner for five or more years.

Each sample was examined with the help of the owner and the 20 ears which appeared to be in the poorest condition for seed were discarded. An earnest attempt was made not to meddle with the type as selected by the owner.

Ten representative ears were then selected from the 80 and numbered with the owner's number. The 10-ear samples were kept to use in exhibits showing the results of the tests.

Three rows of kernels were shelled from each of the remaining 70 ears, to represent the farmer's strain in planted yield comparisons, and placed in envelopes. The owner of the corn then took the 70 ears home with him.

A careful germination test of 10 grains from each envelope was made, and the corn from ears which did not have perfect germination or which showed badly shrunken kernels or were apparently diseased, was discarded. The kernels from the ears which showed perfect germination, apparent freedom from disease, and good kernel development were then mixed to provide the sample for field planting. As an average, about 50 ears of each man's seed qualified for the test.

Each of the 118 samples was planted in four places, twice in each of two widely separated fields. The corn was planted by hand so as to get the same stand. In 1919 three kernels were planted in each hill. The plots were four rows wide and 15 hills long. Test samples were

separated by plots planted with one lot of seed, so that each test sample was planted between two plots of the same kind of corn, these to serve as check plots.

As the corn from each plot was harvested in the latter part of October the ears were divided into two grades, one of sound corn and one of nubbins, moldy, and smutted ears. The corn in each grade was weighed separately.

In 1920 each of the same 118 men who had had seed in the 1919 test brought in another sample of 80 ears of the same kind of corn as that furnished in 1919. In most cases the 1920 bushel was selected from the plot where the remnants of the selected ears of the 1919 sample had been planted. Two additional samples were included in 1920, making a total of 120 lots.

In 1921, 117 samples were brought in by the same men who had had seed in the test during the first two years. All three of the men whose seed was not entered the third year had quit farming or had moved away.

The test was conducted in almost the same way in 1920 and 1921 as in 1919. In 1920 and 1921 the seed was planted with four kernels per hill and the corn thinned to two stalks per hill in the first and third rows and to three stalks in the second and fourth rows of each plot. The thinning was done when the stalks were about a foot tall. It was thought that the thick planting thinned to a uniform stand would give a yield determined more nearly by the inherent ability of the seed to produce, and less influenced by any diseased or accidental condition that would have lowered the vitality or vigor of the seed. Final exhibit of the Woodford County tests is shown in Figure 8.1.

## RESULTS OF THE THREE-YEAR TEST

The seed furnished by George Krug produced an adjusted three-year average yield of 78.1 bushels per acre of dry shelled corn. This was 1.8 bushels more than the next highest yielding sample, 6.6 bushels more than the



Fig. 8.1. Final exhibit of the Woodford County Corn Yield Test. The six high-yielding samples are on the left-hand table with others arranged in order of yields down the left-hand row of tables and back to the six low-yielding samples on the right-hand table in the foreground.

average, and 17.1 bushels more than the lowest yielding sample.

A brief summary of Krug and other samples is shown in Table 8.1.

Table 8.1. A Brief Three-year Summary of Krug and Other Samples

Item	Bushels Per Acre	Percent Moisture	Percent Good Corn	Percent Shelled Corn
The George Krug sample	78.1	20.3	89.7	86.3
Average of 120 samples	71.5	21.4	89.7	85.7
The lowest yielding sample	61.0	23.6	86.1	85.3
Average of 12 high-yielding	75.5	20.7	89.7	86.1
Average of 12 low-yielding	67.4	21.9	86.1	85.5
12 with least moisture	72.2	19.1	89.5	85.8
12 with most moisture	69.9	23.6	88.7	85.4
12 with most shelled corn	72.6	21.1	89.6	86.8
12 with least shelled corn	69.8	21.5	89.8	84.8

*The Krug corn was more consistently high yielding in the 12 field trials, four per year for three years, than any other sample. When the 120 samples were divided into 10 groups according to yield, the Krug sample was in the high decile group eight of the 12 times and once in each of the second, third, fourth, and sixth decile groups. A sample of the high-yielding Krug corn is shown in Figure 8.2.*

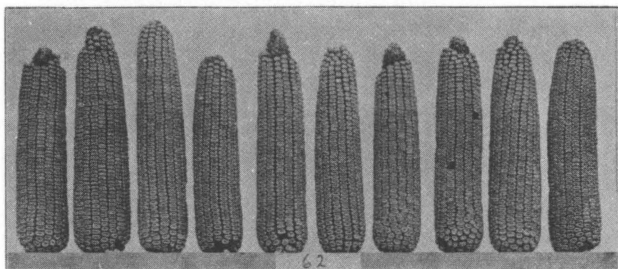


Fig. 8.2. Typical ears of Krug corn as selected by George Krug.

## COUNTY-WIDE TEST IN 1922

Eleven of the 12 samples producing the highest yields during the three years of 1919, 1920, and 1921 were planted in comparative tests on one farm in each township of Woodford County in 1922. The samples were planted with corn planters. Every alternate two rows were planted with the farmer's seed, used as check plots when the yields were calculated.

Two of the most popular strains of seed sold by commercial seedsmen, whose seed production farms were in adjoining counties, were included in the trials in 1922. One strain was carefully ear tested and sold as "disease-free" seed. The other was a consistent winner in the newly established Illinois Utility Corn Show. Also, a composite sample of seed obtained at early planting time from the planter boxes of 45 farmers in Woodford County was included in the field trials.

The Krug corn was again the consistent high-yielding sample in this county-wide test. It outyielded the average of the other 10 high-yielding Woodford County samples by 2.7 bushels per acre. It had outyielded the same 10 samples during the preceding three years by 2.8 bushels.

The Krug corn outyielded the widely advertized and very good "disease-free" corn by 0.6 bushels and the prize-winning "utility corn" by 1.6 bushels. It was consistently high yielding on each of three different types of soil on which the tests were planted.

The Krug corn outyielded the composite sample of seed from 45 planter boxes by 5.1 bushels per acre. It had outyielded the average of the other 119 farmers' samples during the three years by 5.8 bushels. It outyielded the average of the farmers' seed on the ten farms on which the tests were made in 1922 by 2.8 bushels per acre.

## FOUR-YEAR SUMMARY

The performance of the Krug corn compared with other seed during the four years 1919 to 1922 is shown in Table 8.2.

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Table 8.2. Results of the Woodford County Corn Yield Test  
Averages of Four Years of 1919 to 1922, Inclusive

Grower of Seed	Bushels per Acre		Percent Moisture	Percent Good Corn	Percent Shelled Corn
	All Corn	Good Corn			
George Krug	75.8	68.5	21.5	90.5	86.1
William Shuck	73.7	66.4	22.3	90.1	86.8
Edwin R. Schertz	73.5	67.1	20.7	91.3	87.1
J. D. Smith	73.5	66.9	22.3	91.0	86.6
Herman Lampe	73.4	66.1	20.1	90.0	85.4
E. D. McChesney	73.3	66.5	21.7	90.7	85.6
C. H. Kamm	73.3	67.0	23.0	91.4	86.5
John Martin	72.7	65.7	22.3	90.4	86.4
Yordy Brothers	72.3	65.7	23.3	90.0	85.9
Peter R. Schertz	72.2	65.4	22.0	90.6	86.0
L. J. Wadsworth	71.7	65.0	21.6	90.7	85.6
Average of 120 samples*	69.5	62.9	22.9	90.5	85.6
<u>Tests on 10 fields in 1922</u>					
Krug corn	68.8	64.1	25.3	93.1	85.7
Disease-free corn	68.2	62.8	29.4	92.1	84.7
Utility prize corn	67.2	62.2	27.7	92.6	85.8
45 farmers' seed	63.7	56.2	27.6	93.0	85.5

\*The composite sample of seed from 45 men used in 1922 was averaged in with the 120 lots used during 1919, 1920, and 1921.

### COMMERCIAL DISTRIBUTION OF HIGH-YIELDING STRAINS

A farmers' cooperative seed company, the Woodford County Agricultural Association, later named the Woodford County Seed Company, was organized in 1919. One object in organizing the company was to provide a means of commercial production and distribution of the high-yielding seed corn as soon as such was found.

From about 10 to 100 bushels of seed was selected in 1921 by each of the 15 men whose seed had produced the highest yields during the first two years of the 3-year test. Among the 15 samples were 11 of the 12 that



produced the highest three-year average yields. This seed was purchased and distributed by the seed company.

### RAPID INTRODUCTION OF KRUG CORN

Favorable publicity was given to the Woodford County Corn Yield Test. This, combined with publicity telling of the rapid distribution of the Studeman corn in Clinton County, Iowa, following the similar program in that county, led to many requests for Krug seed.

*Wallaces' Farmer* said editorially in the issue of January 12, 1923: "Over in Woodford County in central Illinois, they seem to have discovered an extraordinarily productive strain of corn.... Everything considered, it now has behind it the best verified yield record of any corn grown in the central part of the corn belt."

The Krug corn immediately won such favor in an area 50 to 100 miles wide across the south central part of the Corn Belt from Ohio to Nebraska that many old, established seed companies obtained foundation seed from the Woodford County Agricultural Association and produced large quantities of seed for sale in their areas.

The greatest impetus to the widespread distribution of Krug corn came in 1926, when entries in the Iowa Corn Yield Test were made by the Woodford County Agricultural Association, and by S. E. Unzicker, and by Lester Pfister of Woodford County. All three samples of Krug corn did well in the Iowa test and the Pfister sample was declared the top-yielding corn in the open pollinated class for the state.

The Krug corn also was the winner in many local yield tests in different states. Quotations from some reports follow:

The report of "A County Corn Improvement Program, 1923 to 1930" by the Jasper County, Iowa, Farm Bureau stated:

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For the past seven years (1924 to 1930, inclusive) five or more stations have operated in different sections of the county. An average of 50 or 60 different varieties or strains have been tested each year. . . . The results of the eight years testing has demonstrated the Krug corn to be the highest yielding variety of the open pollinated strains, with the Wilson a close second.

A four-year summary of tests conducted by the Henry County, Illinois, Farm Bureau during the years of 1922 to 1925 reads:

<u>Variety</u>	<u>1922</u>	<u>1923</u>	<u>1924</u>	<u>1925</u>	<u>Average 4 years</u>
Krug	79.7	61.3	68.8	95.9	76.4
Hulting	79.7	53.0	63.0	94.2	72.5
Ward	79.6	53.3	58.0	96.4	71.8
Funk	76.7	54.2	63.7	92.4	71.7
Washburn	78.4	56.2	61.0	87.3	70.7
Golden King	76.3	53.6	61.7	90.7	70.6

Krug corn was used by the winner of a state-wide contest in Nebraska in 1933. W. W. Motz, the winner, grew 100.7 bushels per acre on the required 10 acres on his farm in Madison County.

A state-wide survey in Iowa by the Iowa State College showed more Krug corn was being grown in Iowa in 1928 than any other one strain. This was only five years after the first general distribution in 1923! This shows the effectiveness of the Iowa Corn Yield Test in getting rapid distribution of strains of seed corn found by means of that program.

The Iowa Corn Yield Test has had such an important place in the finding and distribution of superior strains of open pollinated and hybrid corn that Chapter 9 is devoted to its history and accomplishments.

Distribution of Krug corn in north central Illinois was rapid. Several times as much of it was grown as of any other one strain. This statement is based on corn-growing practice records kept by cooperators in the Farm Bureau Farm Management Service. A brief summary is given in Table 8.3.<sup>1</sup>

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<sup>1</sup>See Ill. Exp. Sta. Bul. 444, "Farm Practices and Their Effects on Farm Earnings," by M. L. Mosher and H. C. M. Case, Aug. 1938.

Table 8.3. Summary of Krug Corn Compared to Other Varieties in North Central Illinois

Kind of Seed	Number of Fields	Percent of Fields	Yield Per Acre
Krug	2,923	48.1	52.4
Other good strains <sup>a</sup>	721	11.9	51.6
All other kinds <sup>b</sup>	2,437	40.0	49.0

<sup>a</sup>Other good strains included six or more of the most popular strains being sold in the area.

<sup>b</sup>All other kinds were mostly yellow strains developed from Reid's Yellow Dent and Leaming, with some white strains of Boone County White and Silvermine.

### REASONS FOR THE RAPID DISTRIBUTION OF KRUG CORN

The Woodford County Agricultural Association had prepared in advance to produce and sell the high-yielding seed as soon as it was found. A contract was made with George Krug to buy from him all of the seed that he would select annually from his crop. He was very particular and such purchases were limited to only a few hundred bushels each year.

Krug was paid what he considered a satisfactory price. His seed was carefully stored, prepared for planting, and put out to good corn growers under contract. It was the corn grown under contract from the seed grown and selected by George Krug that was sold to farmers. George Krug was paid a royalty of a few cents a bushel for all such commercial seed that was sold.

Another source of Krug corn available soon after its discovery was that grown by Lester Pfister. Pfister had been growing a white variety of corn on his mother's 80-acre farm and selling some seed before the Woodford County Corn Yield Test was started in 1919. He had done some careful selection by the old-time, ear-to-row method and his painstaking work and careful records had attracted my attention. His sample, Number 73, was the second highest yielding of the white samples in the test.



George Krug, Woodford County, Illinois: The man who made Krug corn. Untold thousands of farm people have had more abundant lives because of Krug seed corn, or hybrids for which Krug corn provided one or more of the parent inbreds.

When harvest time came in 1919, Pfister was hired to help weigh and grade the corn as the hundreds of plots (about 1,200 per year) were harvested. His work was so satisfactory that that job was turned over to him. All of the field records for all three years are in Pfister's handwriting.<sup>2</sup>

Pfister obtained some of the Krug seed distributed in 1922 and began at once to grow and sell it. His experience in helping weigh and grade all samples in the test, his natural painstaking ability to select good seed, and his close study of the basis of selection that George Krug

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<sup>2</sup>The original field records in Lester Pfister's handwriting and all other original laboratory and office records are filed in the Holden Library of the Michigan State University Corn Foundation.

used enabled him to select a strain of Krug corn that was more true to the original Krug type than was selected by most others. His was the best of the Krug seed that won such favor in the Iowa Corn Yield Test.

Other seed corn producers were soon selling large quantities of Krug corn.

Thus the Krug corn, totally unknown even in Krug's own county as late as 1921, within 10 years came to be the most generally grown of any single strain of open pollinated corn in an area from 50 to 100 miles wide across the south central part of the Corn Belt from Ohio to Nebraska.

### DESCRIPTION OF KRUG CORN

The quality of Krug corn was good. It was a little earlier than most of the rougher, deeper grained corn then in common use, and graded well on the market. Its golden color and the lustrous, oily appearance of the shelled corn appealed to farmers. It had been developed by rigid selection from a mixed planting of Reid's Yellow Dent and Iowa Goldmine made about 1910.

Krug's most characteristic method of selecting seed was: first, to heft and twist each ear to see that it was heavy for its size and solid; and, second, to shell a few kernels from the butt of each ear to see that the kernels were fully developed down to the cob.

While there was a wide range in most characters, a majority of ears and kernels were medium in size, shape, and indentation. Before me now as I write is an ear of Krug corn which George Krug picked from his 1921 crop as the most typical ear that he could find. It is a medium-sized ear with medium depth of kernels, cylindrical in shape for about two-thirds of its length, then tapering gradually to the tip. It has 18 rows of kernels which are



Lester Pfister, who assisted with the Woodford County Corn Yield Test and later developed valuable inbreds from Krug Corn, was one of the first large-scale producers of hybrid seed.

distinctly medium rather than smooth or rough in indentation.<sup>3</sup>

#### KRUG CORN HAS BEEN AN IMPORTANT SOURCE OF INBREDS USED IN HYBRID CORN PRODUCTION

Lester Pfister, the young man who had assisted with the field records kept during the progress of the Woodford County Corn Yield Test, was among the first to develop inbreds from the Krug corn. As has been stated, he began selling open pollinated Krug corn in 1923.

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<sup>3</sup> This ear and one ear of each of the next eleven high-yielding samples are now in the Museum of the Michigan State University Corn Foundation, East Lansing, Michigan.

He began inbreeding Krug corn in 1925 with 388 ears. Within a few years he had reduced the number to four inbreds. His single-cross hybrid, Number 58, was the high yielder on the University plots at Urbana in 1934. During the next ten years the Pfister hybrids, all of which included one or more Krug inbreds and were sold by Pfister's own company or by the Pfister Associated Growers (who obtained seed stock from Pfister), were among the popular hybrids in general use.

Henry A. Wallace and William L. Brown in their book, *Corn and Its Early Fathers*, published in 1956 by Michigan State University Press, place Krug corn along with Reid's Yellow Dent, developed by James L. Reid of Illinois, and Lancaster Sure Crop, developed by Isaac Hershey of Pennsylvania, as a most valuable source of inbreds for hybrid seed corn production.