

MAXIMUM AND MINIMUM WINTER TEMPERATURES OF WHEAT IN THE BINS

DATE	Plain Metal Bin		Perforated Metal Bin		Single Wall Wood Bin		Double Wall Wood Bin	
	High	Low	High	Low	High	Low	High	Low
First Season								
October 17, 1938	78°F.	54°F.	65°F.	51°F.	67°F.	51°F.	67°F.	53°F.
November 22, 1938	58	18	44	15	49	12	55	36
December 19, 1938	43	21	28	21	36	23	32	23
January 17, 1939	29	5	18	4	26	8	23	10
February 14, 1939 ¹	20	0	11	-5	11	-2	12	4
March 14, 1939	21	9	18	3	18	6	18	4
Second Season								
October 3, 1940	78	65	78	63	80	68	78	66
November 16, 1940	68	29	45	24	57	24	54	26
December								
January								
February 24, 1941	27	11	25	9	24	12	22	7

¹Lowest temperature during season.

would have an additional cooling effect on all of the bins in the 1938-39 season.

Conclusions:

1. During October and November the rate of decrease in average wheat temperature was approximately 15 degrees per month. In the following two months, January and December, the

decrease was at the rate of 10 degrees per month.

2. The lowest temperatures were recorded in February.
3. In the first season's records the temperature in the bins started to rise in March.
4. The temperatures in all of the bins were higher in 1940-41 than in 1938-39 during February which was the coldest month for the wheat in the bin.

Testing Corn Variety and Hybrid Performance in North Dakota

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THE popularity of corn hybrids in corn belt states is dependent upon their performance with respect to superior root development which causes plants to stand upright, resistance to disease, good plant type which makes harvesting easier, uniformity in maturity which facilitates timely harvesting, higher quality of grain indicated by adequate maturity and freedom from disease, and higher yield of grain or silage.

The individual grower, however, faces the task of choosing a hybrid or variety which can be expected to produce well on his farm. His interest is mainly with the performance of a specific corn hybrid or variety that is suitable to his conditions. So the most frequent questions in choosing a particular variety or hybrid are: Will it get ripe on my farm? Will it yield higher? Will it be easier to handle at harvest?

Adaptability and Performance Field Trials in Eastern North Dakota ¹

Testing of corn hybrids and open-pollinated varieties for adaptation and yield in eastern North Dakota was initiated by the Agronomy Department in cooperation with the Extension Service, seed dealers and farmer cooperators in 1938. These tests were continued on a more extensive scale in 1939 and 1940. The detailed results of these trials have been published each year in hybrid corn field trial reports. The summary from 1938 to 1940 for yield of grain and fodder and moisture percent is reported in Table 1. The moisture percent in ears at harvest has been found to be a reliable measure of relative maturity. Comparisons of new hybrids tested only in 1940 are reported later.

The results for the **southeastern area** were obtained from trials in Sargent county in 1938-'39 and Richland county in 1940. The light soil and climatic conditions in this area are favorable for the production of later maturing corn than in areas further north and west. Because the temperatures during the growing season for the duration of the trials were comparatively higher than normal, late maturing varieties and hybrids developed and matured more rapidly than usual and yielded more than earlier strains. In this area varieties and hybrids included in the **semi-late** group such as Minn. 13 (late Mund's strain), Kingscrot A, Minhybrid 401, and others of equal maturity prove to be adapted for the production of mature corn. Other hybrids tested in 1940 that matured and were in the higher yielding group were as follows: TruKrost 170, New 95-Day and Jacques 90-day. Entries in the **late-maturing** group may also mature when the climatic and soil conditions are favorable as has been the case the last three years.

The average yields are lower than normally expected in the **east-central area** (Cass county) because of severe drouth in 1938 and 1939. The drouth damage was greatest for later maturing varieties and hybrids. The 1940 season was favor-

able for corn production. The varieties included in the **semi-early** group are adapted to this area. Minhybrid 402 has produced the highest average yield of mature corn while Minhybrid 401 in the **semi-late** group ranks second. The average yields of Falconer and early strains of open-pollinated Rainbow and Mercer are comparatively higher than expected because they escaped much of the drouth damage in 1938 and 1939. Other semi-early hybrids tested in 1940 producing good yields were: Kingscrot 125, Jacques Proven 80-day, New 85-day and TruKrost Wis. 279. In 1940 the ten highest yielding entries were hybrids. Because of a very favorable growing season in 1940, semi-late strains such as Minhybrid 401, Kingscrot A, Pioneer Cross No. 3 and Iowearth 88 yielded high but they were immature at the time of first killing frost.

The average yields for the **north-eastern area** are the results of two years' trials at Park River, Walsh county, and in 1940 at Gilby, Grand Forks county. The growing season in 1938 was favorable, in 1939 it was poor, while in 1940 it was very good. The 1940 trial also was located on more fertile soil and therefore yields were considerably higher than normally expected in this area. The corn varieties and hybrids adapted to this area are mainly in **early** and **semi-early** groups. The Rainbow variety averaged highest in both grain and fodder yields. All other varieties in the early group have yielded on the average more than those in the semi-early group. Minhybrid 402 yielded higher than the open-pollinated varieties in the semi-early group. Other promising commercially sold semi-early hybrids tested in 1940 were: Pioneer Cross No. 1, TruKrost Wis. 279, Kingscrot 125, TruKrost 100, New 83-Day, and Falconer hybrid.

The fodder yields have been highest for the later maturing varieties and hybrids in the southeastern and east-central areas. In the north-eastern area, however, early flint varieties as a group have averaged highest in yields of fodder.

¹Results of Field Trials are published in Agronomy Mimeographed Circular 72. 1941.

Table 1. THREE-YEAR AVERAGE YIELD AND MOISTURE PERCENT OF EARS AT HARVEST IN THREE CORN GROWING AREAS IN EASTERN NORTH DAKOTA, 1938-1940^a.

Variety ¹ or hybrid	Yield of shelled corn—bushels ²			Yield of fodder tons ²			Moisture in ears at harvest—percent		
	South-east.	East-central	North-east.	South-east.	East-central	North-east.	South-east.	East-central	North-east.
Early									
Dakota White O.P. ....	....	....	34.9	....	....	2.47	....	....	34.5
Falconer O.P. ....	....	25.6	32.9	....	1.88	2.38	....	30.2	38.6
Northwestern O.P. ....	....	....	34.4	....	....	2.62	....	....	40.7
Rainbow O.P. ....	....	27.1	35.9	....	2.13	2.75	....	34.5	42.0
Semi-early									
Minn. 13 (early) O.P. 43.4	24.4	25.1	2.49	1.83	1.94	28.7	35.3	39.8	....
TruKrost 100. ....	....	24.7	....	1.81	....	....	34.5	....	....
Minhybrid 402.	55.7	28.4	31.8	2.68	2.12	2.52	30.1	38.6	45.3
Mercer Flint O.P.	44.5	26.1	....	2.67	1.96	....	38.9	36.8	....
Rustler dent O.P.	49.6	....	....	2.80	....	....	30.1	....	....
Kingscrost E 2-8. ....	....	24.2	28.9	....	1.73	2.18	....	40.5	46.4
Semi-late									
Minhybrid 401.	60.8	28.1	....	3.41	2.14	....	32.0	42.0	....
Kingscrost A2-3.	61.6	23.1	....	3.43	1.96	....	32.9	42.5	....
Minn. 13 (late) O.P.	62.3	....	....	3.70	....	....	34.0	....	....
Late									
Kingscrost D4.	65.4	....	....	3.81	....	....	39.4	....	....
National 95.	59.8	....	....	3.92	....	....	36.1	....	....
DeKalb 201.	66.3	....	....	4.09	....	....	40.5	....	....

^a Southeastern—1938-39, Milnor, Sargent Co.; 1940, Barney, Richland county. East central—1938-39, Amentia; 1940, Arthur, Cass County.

North-eastern—1938-39, Park River, Walsh county; 1940, Gilby, Grand Forks county.

¹ O.P.—open-pollinated varieties, others are hybrids.

² Shelled corn at uniform 12 percent and fodder 20 percent of moisture.

Adaptation and Yield Trials at Experiment Stations

The performance of early and semi-early commercially sold hybrids and adapted open-pollinated varieties has been compared at Fargo and substations for the last 2 or 3 years. The average performance of standard varieties at Dickinson

was reported by Smith in the Bimonthly, Vol. 3, No. 1, 1940, and for Fargo and other areas in the Bimonthly, Vol. 1, No. 4, 1939. The 1939 and 1940 average yields of grain and fodder are summarized in Table 2. Several other open-pollinated varieties and hybrids tested are not reported here because of insufficient data or lack of space.

Table 2. TWO-YEAR AVERAGE YIELD OF CORN VARIETIES AND HYBRIDS AT FARGO AND AT SUBSTATIONS FOR 1939-1940¹

Varieties ²	Yield of corn—bushels					Yield of fodder—tons				
	Fargo	Edgeley	Dickinson	Langdon	Williston	Fargo	Edgeley	Dickinson	Langdon	Williston
Early										
Nodakhybrid 14.	36.4	....	23.1	20.4	27.9	2.37	....	1.73	1.49	1.62
Dakota White O.P. ....	....	....	24.2	23.4	27.2	....	....	1.90	1.64	1.89
Falconer O.P.	34.1	12.3	25.7	23.9	27.0	2.53	1.28	2.25	1.70	1.86
Northwestern O.P.	31.7	10.4	23.2	20.4	24.5	2.52	1.42	1.97	1.80	1.86
Rainbow O.P. ....	....	....	24.6	24.6	....	....	....	2.16	2.43	....
Semi-late										
Minn. 13 (early) O.P. 28.6	14.4	18.4	19.0	19.5	2.07	1.67	1.84	1.04	1.44	....
Minhybrid 402.	39.4	13.8	17.6	18.7	25.5	2.62	1.67	2.19	1.71	2.09
Rustler O.P.	33.1	12.2	20.8 ^p	....	....	2.21	1.42	1.88	....	....
Kingscrost E5-8.	34.5	....	19.2	18.2	19.0	2.20	....	2.10	1.65	1.84
Mercer	32.2	11.8	....	....	....	2.32	1.51	....	....	....
Wis. Hybrid 279.	40.2	....	....	....	....	2.65	....	....	....	....
Late										
Minhybrid 401.	40.0	11.7	....	....	....	2.81	1.73	....	....	....
Kingscrost A.	37.5	14.4	....	....	....	2.60	1.80	....	....	....
Minn. 13 (late) O.P.	34.3	8.8	....	....	....	2.70	1.60	....	....	....
Wis. Hybrid 355.	37.8	....	....	....	....	2.51	....	....	....	....
Wis. Hybrid 340.	35.4	....	....	....	....	2.69	....	....	....	....

¹ Results from substations are through the courtesy of Edgeley, Dickinson, Langdon and Williston substations.

² Varieties are arranged in relative order of earliness.

^p Payne strain of white dent used.

The growing season in 1940 was favorable for corn production, especially at Langdon and Dickinson substations and the yields of some of these hybrids were very good. Yields at Edgeley are lowest because of unfavorable growing seasons. The average yields for the last 2 years, however, do not justify recommending extensive hybrid corn growing in the northern and western part of the State. Early maturing open-pollinated varieties on the average yielded more grain than the hybrids at the Dickinson, Williston and Langdon substations. When compared with adapted early open-pollinated varieties, Minhybrid 402, Kingscrosst E, Wisconsin hybrid 279, Kingscrosst 125 and TruKrost 100, some of which were tested only for one year, were taller, bore ears higher on the plant and were more resistant to lodging than either Falconer or Northwestern. For the production of mature corn in northern and western areas, the growers must rely upon the adapted open-pollinated varieties until more data on the hybrid performance is available, or when new hybrids are produced that will meet the needs of these areas.

Comparison of Hybrid Maturity and Yield in 1940

The 1940 tests made it possible to compare the average performance of new hybrids tested in several areas in eastern North Dakota. Judging from the moisture content in ears at harvest, Wisconsin 279, Kingscrosst 125, Minhybrid 402, and TruKrost 100 are comparable in maturity to Haney or Thorpe strains of Minn. 13 variety. Kingscrosst 125 on the average contained the least amount of moisture and appeared to be earliest. All these above mentioned hybrids yielded significantly higher than the early strains of Minn. 13. The greatest increase in yield, however, was realized in the southeastern and east central areas where growing conditions were favorable. Wisconsin 279 on the average yielded highest, followed by Kingscrosst 125 and Minhybrid 402. The average yield of Minhybrid 402 was somewhat reduced because of low yields in some trials. Other high yielding early varieties tested in three northern trials in 1940 were Rainbow flint and Pioneer Cross

No. 1. The yields and moisture percent in ears at harvest are reported in Table 3.

The yield and the moisture content of a number of semi-late and late hybrids tested in 1940 in several areas are reported in Table 4. In maturity, as measured by the amount of moisture in ears, all the hybrids reported are comparable to the late (Mund) strain of Minn. 13 except Kingscrosst D4 and Iowealth W6 which are later. Kingscrosst D4 was the highest yielding while Iowealth W6 was the lowest. All these semi-late and late hybrids yielded more shelled corn than the late strain of Minn. 13 in the southeastern area. In the northeastern area, represented by Gilby and Park River, Iowealth 88 yielded highest, followed by Pioneer Cross No. 3, Kingscrosst D4 and Kingscrosst A. At the time of harvest all of the hybrids in the semi-late group were immature in the northern area and therefore are not recommended for the production of mature corn in this area.

Early NDAC Experimental Hybrids

Corn improvement work has been in progress at the North Dakota Agricultural Experiment Station and a large number of hybrids have been made and tested. A number of selected new experimental dent hybrids have also been tested at substations and other parts of the State. The comparative yields of new hybrids, and three check varieties, are presented as a progress report in Table 5. Since facilities for testing were limited only a few hybrids could be tested in some of these places.

The N.D.A.C. experimental dent hybrids were earlier than Minhybrid 402 or Thorpe strain of Minnesota 13. When compared with Falconer they were equally as early but were more resistant to smut and rust, were taller and the ears were higher on the plant. These hybrids were handled with greater convenience and less waste at harvest than the Falconer variety.

In all areas the new N.D.A.C. hybrids were higher yielding than the early strain of open-pollinated Minn. 13 variety. At Fargo, Edgeley, Mandan, Dickinson and Langdon they yielded either higher than or equal to Minhybrid 402. When

Table 3. COMPARISON OF EARLY TO SEMI-EARLY COMMERCIAL CORN HYBRIDS WITH STANDARD OPEN-POLLINATED VARIETIES BY AREAS IN 1940

Variety or hybrid ¹	Yield of shelled corn — bushels per acre							Moisture of ears at harvest — percent						
	Barney	Daven- port	Fargo	Arthur	Gilby	Park River	Average	Barney	Daven- port	Fargo	Arthur	Gilby	Park River	Average
Wis. Hybrid 279.....	53.6	54.9	49.3	50.4 ²	54.5	38.1	50.1	32.1	21.4	43.7	42.7	45.9	50.4	39.4
Kingscrost 125.....	49.7	47.0	49.1	53.9	51.8	39.1	48.4	28.2	24.0	39.7	39.7	41.1	45.5	36.4
Minhybrid 402.....	47.4 ²	50.7 ²	44.5	47.9 ⁴	54.8 ³	32.4 ³	46.3	33.7	23.1	45.0	44.3	45.5	51.4	40.5
TruKrost 100.....	38.4	46.4 ²	45.6	46.2 ²	43.6 ²	38.9 ²	43.2	30.2	21.1	40.8	41.7	43.7	47.3	37.5
Minn. 13 (early) O.P....	37.3	46.0 ²	32.7	39.4	46.4 ²	34.8 ²	39.4	33.3	22.7	43.6	41.0	44.2	47.0	33.6
Rustler O.P.....	46.2	44.1	39.2	....	....	....	....	32.9	27.5	46.7	....	....	....	....
Kingscrost E8.....	....	....	....	43.9	45.3	38.5	....	....	....	....	....	47.0	43.9	....
Falconer O.P.....	....	....	43.3	46.2	45.1	33.0	....	....	....	....	....	47.0	43.9	49.6
Rainbow flint O.P.....	....	....	....	45.2	55.7	33.4	....	....	....	39.6	....	40.7	43.8	46.9
Pioneer Cross No. 1....	....	....	....	48.5	56.1	34.5	....	....	....	....	....	44.7	42.7	50.0
Falconer hybrid.....	....	....	....	39.1	50.3	33.1	....	....	....	....	....	38.7	45.7	47.8
	....	....	....	....	....	....	....	....	....	....	....	38.3	42.9	40.8

Table 4. COMPARISON OF SEMI-LATE AND LATE CORN HYBRIDS WITH A LATE OPEN-POLLINATED VARIETY BY AREAS IN 1940

Variety or hybrid ¹	Yield of shelled corn — bushels per acre							Moisture of ears at harvest — percent						
	Fair- mount	Barney	Daven- port	Fargo	Arthur	Gilby	Park River	Fair- mount	Barney	Daven- port	Fargo	Arthur	Gilby	Park River
Kingscrost D4.....	63.7	61.6	53.3	44.0	49.0	54.1	36.2	30.6	41.5	36.4	52.0	52.0	52.1	59.2
Kingscrost A.....	58.1	58.1	49.2	43.9	47.8	55.9	37.5	28.5	36.5	29.8	52.2	48.7	46.8	54.3
Minhybrid 401.....	59.4	52.1 ²	49.6	49.3	50.8	....	....	28.4	35.8	28.7	47.3	48.0	....	....
Minn. 13 (late) O.P....	57.9	52.2	49.4	40.4	47.1	....	....	31.0	38.7	34.1	51.3	47.7	....	....
Wis. hybrid 355.....	55.7	53.3 ²	51.5	44.6	....	....	....	30.0	39.1	29.6	47.9	....	....	....
Trukrost 170.....	62.3 ²	56.9 ²	50.7 ²	....	....	....	....	30.7	39.8	32.3	....	....	....	....
Kingscrost 108.....	61.0	52.4	52.6	....	....	....	....	31.3	40.4	31.0	....	....	....	....
Wis. Hybrid 340.....	....	47.6	53.3	44.7	50.6	....	....	....	40.4	31.3	51.6	48.7	....	....
Pioneer Cross No. 3....	....	....	....	....	51.9	58.0	37.4	....	....	....	....	48.0	49.3	54.4
Iowealth 88.....	....	51.6	....	....	50.5	60.9	36.2	....	....	....	....	47.7	50.3	55.0
Iowealth W6.....	....	58.2	....	....	46.8	15.7*	35.5	....	36.4	....	....	....	50.1	57.3
	....	....	....	....	....	....	....	....	43.0	....	....	....	....	57.0

¹ O.P. — open-pollinated variety.

2, 3, 4 = average of 2, 3, or 4 entries of the same variety in the yield test.

* Damaged by severe wind storm.

Table 5. COMPARISON OF SOME N.D.A.C. EXPERIMENTAL DENT DOUBLE CROSS HYBRIDS WITH STANDARD VARIETIES AND HYBRIDS BY AREAS IN 1940

Location	Yield of corn — bushels per acre						Check varieties		
	N.D.A.C. experimental hybrids						Minn. 13 (early)	M.H. 402	Fal- coner
	M222	M254	M298	M301	M456	M467			
Fargo	44.8	48.4	45.2	44.1	47.3	46.7	32.7	44.5	43.3
Davenport	45.7	48.7	43.9	47.0	....	45.0	45.3	49.6	....
Arthur	41.5	46.6	45.5	....	45.6	....	39.4	47.9	46.2
Gilby	51.5	53.4	46.2	53.5	50.1	51.1	46.4	54.8	45.1
Edgeley .....	....	22.9	....	21.6	20.2	19.9	17.3	20.6	20.9
Mandan	38.6	....	37.3	43.7	33.4	36.0	....	30.9	36.8 ^a
Dickinson	32.7	....	....	30.5	34.7	31.0	....	29.2	37.8
Williston	25.4	....	....	22.9	....	31.1	22.0	39.5	27.6
Langdon	35.0	....	....	....	33.0	....	33.2	33.1	41.2

^a Northwestern open-pollinated variety used instead of Falconer.

compared with Falconer they yielded significantly higher at Fargo and Gilby while at Arthur, Williston, Edgeley, and Langdon they were equal to or lower than Falconer.

Suggestions

In the **southeastern area**, including Richland, Sargent and parts of Ransom, Dickey, Cass counties, and other favorable areas, the following varieties and hybrids are suggested. For heavy and cold soils—Minhybrid 402, Wisconsin 279, Kingscrosst A and Minhybrid 401. For lighter more fertile soils—Minhybrid 401, Kingscrosst A, Minnesota 13 (Mund strain), Kingscrosst D4, TruKrost 170, Wisconsin 355 and possibly other hybrids in the late maturing group.

In the **east-central area**, including Cass and parts of Traill, Steele, Ransom and Dickey counties, and also in very favorable areas in central and western North Dakota, the

following varieties appear adapted for production of mature corn—Minhybrid 402, Wisconsin 279, Kingscrosst 125, TruKrost 100, Haney strain of Minnesota 13, Rainbow flint and others of equal maturity.

For the **northeastern area** and most of western and northern areas, the early strains of Falconer, Northwestern, and a number of early flint varieties are preferable for the production of mature corn. Growers in more favorable areas with light and fertile soil may select some of the earlier hybrids such as Wisconsin 279, Minhybrid 402, Kingscrosst 125, TruKrost 100 and Kingscrosst E.

The suitability of hybrids to an area or to individual farms can best be determined by comparison with locally adapted varieties. Individual growers will find it desirable to choose hybrids or varieties of the same maturity requirements as the variety previously found adapted to his conditions.

Spring Wheat Varieties at the Mandan Station

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VARIETIES of spring wheat have been tested in varietal plots at the Northern Great Plains Field Station during the 25 years 1916-1940. Before 1930 most of the wheat varieties were susceptible to rust. It was after 1930, especially in the rust epidemics of 1935, 1937, 1938 and 1939, that the importance of growing rust resistant varieties came to be generally recognized.

Yield data on 22 wheat varieties grown on disked corn ground for 2 or more of the years 1930 to 1940,

inclusive, are presented in Table 1. Some varieties, grown only 1 or 2 years, or that appeared unpromising and have not been distributed commercially, are not included.

Thatcher is a good standard of comparison because it is the leading wheat variety now grown in this area. The average yield of Thatcher for 9 years, 1930 to 1940 with the 2 years of crop failure omitted, 1933 and 1936, was 16.2 bushels per acre. Omitting 1934, when the crop was hardly worth harvesting, the aver-