

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF PLANT INDUSTRY

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COMPARISON OF

WINTER WHEAT VARIETIES GROWN IN COOPERATIVE

PLOT AND NURSERY EXPERIMENTS IN THE

HARD RED WINTER WHEAT REGION

IN 1939

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Lincoln, Nebraska
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IN 1939

by

K. S. Quisenberry, Agronomist,^{1/} Wheat Investigations, Division of Cereal

Crops and Diseases

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EXPERIMENTS IN 1939

The cooperative winter wheat program has been in operation for nine years. During this time no radical alteration of plans has occurred, although each year shifts are made in the lists of varieties tested in plot and nursery experiments. The cooperating stations have changed slightly from time to time owing to reorganization of State and Federal work.

Since the last report a number of personnel changes have occurred. Dr. John H. Parker, who had been at Manhattan for more than 20 years, resigned. His whole-hearted cooperation, enthusiasm, and sound advice will be missed. Mr. L. P. Reitz, formerly a cooperator at Bozeman, Mont., succeeded Dr. Parker. Clyde H. Jamison replaced Ernest Mader at Goodwell and Orlie Smith succeeded Sam Litzenberger at Moccasin. The cooperative work in the Texas Panhandle was moved from Amarillo, about 13 miles west, to a new experiment station near Bushland. David A. Reid was put in charge of the breeding work and will be permanently located at the station.

The Regional Hard Red Winter Wheat Quality Laboratory at Manhattan became better established and has reported some interesting data on the quality of the various varieties of wheat. The laboratory is finding it possible to evaluate a limited number of individual samples from the various stations. The data on quality are issued in a separate report.

This report is a summary of the 1939 data from all cooperating stations as well as a summary of yield data for the 9-year period ending in 1939. The cooperating agencies, stations, and personnel concerned in these experiments are as follows:

COOPERATING AGENCIES, STATIONS, AND PERSONNEL
(The asterisk (*) indicates Government field stations)

BUREAU OF PLANT INDUSTRY:

Division of Cereal Crops and Diseases

Wheat Investigations
Hard Red Winter Wheat
Smut
Leaf Rust
Milling and Baking

M. A. McCall
S. C. Salmon
K. S. Quisenberry
H. A. Rodenhiser
C. O. Johnston
C. C. Fifield, M. A. Barmore,
M. E. McCluggage, K. F. Finney

TEXAS AGRICULTURAL EXPERIMENT STATION:

Agronomy (Corn and Small Grains)

College Station Agricultural Exp. Station
Denton Substation No. 6
Chillicothe Substation No. 12
Bushland

P. C. Mangelsdorf
E. S. McFadden
I. M. Atkins
J. R. Quinby, I. M. Atkins
David A. Reid

OKLAHOMA AGRICULTURAL EXPERIMENT STATION:

Field Crops and Soils

*Lawton U.S. Dry Land Field Station^{1/}
Stillwater A. & M. College
*Woodward Southern Great Plains Field Sta.^{1/}
Goodwell Panhandle Agr. Exp. Sta.

H. J. Harper
W. M. Osborn
C. B. Cross
V. C. Hubbard
Ernest Mader and Clyde H. Jamison

KANSAS AGRICULTURAL EXPERIMENT STATION:

Agronomy

Manhattan Kansas State College

Hays Ft. Hays Branch Exp. Sta.
Colby Colby Branch Station

R. I. Throckmorton
H. H. Laude, L. P. Reitz, E. G. Heyne
A. F. Swanson
E. H. Coles

COLORADO AGRICULTURAL EXPERIMENT STATION:

Agronomy

*Akron U.S. Dry Land Field Sta.^{1/}
Fort Collins State Agricultural College
Hesperus Ft. Lewis Substation

Alvin Kezer
J. J. Curtis
D. W. Robertson
D. W. Koonce

NEBRASKA AGRICULTURAL EXPERIMENT STATION:

Agronomy (Experimental)

Lincoln Agricultural Exp. Station
North Platte North Platte Substation
Alliance Box Butte Experiment Farm
Valentine Valentine Substation

T. A. Kiesselbach
K. S. Quisenberry
O. J. Webster, L. L. Zook
George Schmid
E. M. Brouse

WYOMING AGRICULTURAL EXPERIMENT STATION:

*Sheridan U. S. Dry Land Field Sta. ^{1/}

R. S. Towle

MINNESOTA AGRICULTURAL EXPERIMENT STATION:

Agronomy and Plant Genetics

St. Paul University Farm
Waseca Southeast Exp. Sta.
Grand Rapids

H. K. Hayes
E. R. Ausemus
R. E. Hodgson
E. R. Ausemus

NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION:

Agronomy

Dickinson Dickinson Substation

T. E. Stoa
R. W. Smith

MONTANA AGRICULTURAL EXPERIMENT STATION:

Agronomy

Bozeman Montana Exp. Sta.
Moccasin Judith Basin Branch Sta.
Havre Northern Mont. Branch Sta.

A. H. Post
R. H. Bamberg
R. H. Bamberg, Orlie Smith
J. J. Sturm

^{1/} Cooperation with Division of Dry Land Agriculture, Bureau of Plant Industry, as well as with the State experiment stations.

ACCESSION NUMBERS ASSIGNED

In the past some difficulty has been encountered in keeping all cooperators informed as to the assignment of accession or C. I. numbers to wheats entered in uniform tests. In one or two cases two numbers have been assigned to the same wheat and corrections were found necessary. In order to keep the cooperators better informed the following is a record of numbers assigned in 1939 to wheats of interest in the area.

In 1934, C. I. 8888 was assigned to Minard x Minhardi, Minnesota No. 2313, N.S.N. 11-20-11. Later, the same wheat was assigned C. I. 11656, but when the duplication was discovered the first number was considered as correct. C.I. 11656 was then assigned to Oro x Tenmarq, Kans. No. 2730, Kansas selection No. 342018, which had previously been assigned C. I. 11674. The strain will continue to carry C. I. 11674, and C. I. 11656 is blank.

Marquillo x Oro, Kansas selection No. 382963, Pedigree No. 790-1, was assigned C. I. 11851 and 11956. The first number will be considered as correct. Quivira x F₁ (Fulhard-Oro), Kansas selection No. 354150, was assigned C. I. 11954 and 11969. The first one will be used for this strain. Part of this confusion was caused by receiving wheats first under a selection number and later under a State number.

Accession Numbers Assigned in 1939

<u>C. I. No.</u>	<u>Name</u>	<u>State No.</u>
11956	Kawvale x Tenmarq	Denton No. 35-34-117
11969	Hope x Cheyenne	Nebr. sel. No. 363339
11972	Cheyenne x Tenmarq	Kans. No. 2748
11973	Cheyenne x Tenmarq	Kans. No. 2751
11974	Kanred-Hard Federation x Tenmarq	Denton No. 37-34-54
11975	Kanred x Hope-Hard Federation	Akron No. 533
11976	Kanred x Hope	Akron No. 850

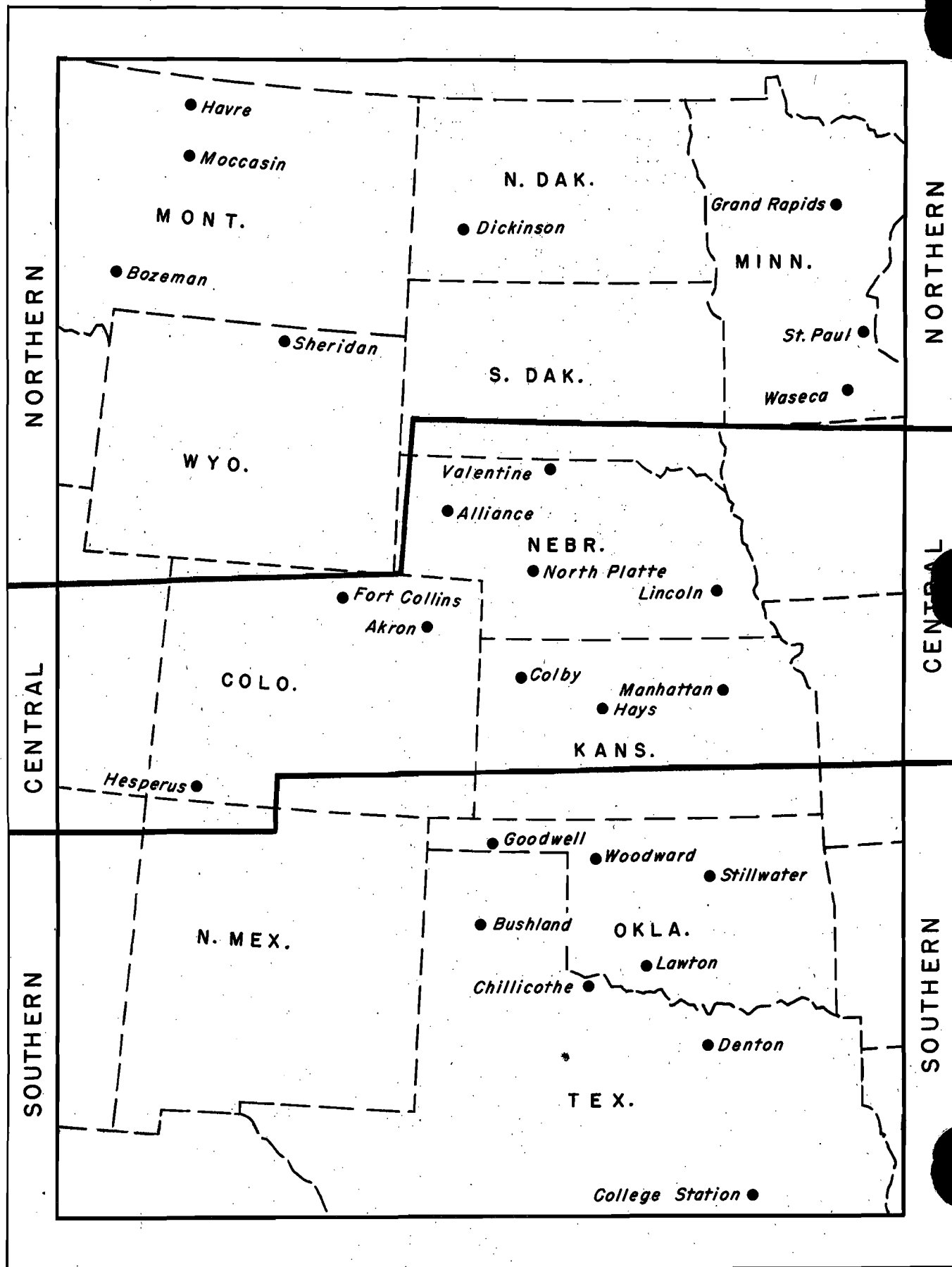
<u>C. I. No.</u>	<u>Name</u>	<u>State No.</u>
11977	(Kanred-Webster x Kanred) x (Hard Federation-Marquis x Marquis)	Akron No. 874
11978	Marquillo x Oro	Kans. sel. No. 383475
11979	Marquillo x Oro	Kans. sel. No. 383483
11980	Marquillo x Oro	Kans. sel. No. 383487
11981	Hussar x Kanred	Nebr. sel. No. 105
11982	Tenmarq x Minturki	Nebr. sel. No. 23762
11983	Turkey 1069 x Cheyenne	Nebr. sel. No. 3256-13-8
11984	Turkey selection	Nebr. sel. No. 4CS-21
11985	Turkey selection	Nebr. sel. No. 4F-358
11986	Hope x Turkey 1069	Nebr. sel. No. 363442
11987	Hope x Turkey 1069	North Platte No. 143
11988	Hope x Turkey 1069	Nebr. sel. No. 363338
11989	Hussar x Kanred	Nebr. sel. No. 31B-96
11990	Turkey 1069 x Quivira	Nebr. sel. No. 372707
11991	Turkey 1069 x Cheyenne	Nebr. sel. No. 372722

UNIFORM VARIETIES IN PLOTS

Because of the wide variation in environment encountered in the region from Texas to Montana, it has not seemed advisable to seed the same varieties at all stations. The region has been divided into three districts, as shown by the map on the following page, and the varieties grown uniformly at the cooperating experiment stations are somewhat different in each of the three districts. The varieties considered as uniform for each district in 1939 are as follows:

Southern		Central		Northern	
<u>Variety</u>	<u>C.I. No.</u> ^{1/}	<u>Variety</u>	<u>C.I. No.</u> ^{1/}	<u>Variety</u>	<u>C.I. No.</u> ^{1/}
<u>Hard Red:</u>		<u>Hard Red:</u>		<u>Hard Red:</u>	
Kharkof	1442	Kharkof	1442	Kharkof	1442
Tenmarq	6936	Tenmarq	6936	Minturki	6155
Blackhull	6251	Blackhull	6251	Yogo	8033
Quivira	8886	Oro	8220	Karmont	6700
Early Blackhull	8856	Cheyenne	8885	Minturki x	
Chiefkan	11754	Chiefkan	11754	Marquis	11502
Oro x Tenmarq	11673	Oro x Tenmarq	11673	Minard x Minhardi	8888
Kawvale x Tenmarq	11669	Kawvale x Tenmarq	11669	Nebred	10094
		Nebred	10094		
<u>Soft Red:</u>					
Denton	8265				
Kawvale	8180				

^{1/} C. I. refers to accession number of the Division of Cereal Crops and Diseases.



The lists include the most widely grown commercial varieties of the region (considering Kharkof as representing the Turkey type) and some of the more promising new varieties and strains.

At all of the experiment stations, varieties of local interest, in addition to those in the uniform list, were grown. The data for all varieties reported as grown in replicated plots at each station are included in this report.

PLOT DATA

In the fall of 1938 plots were seeded at 23 cooperating stations. At Lawton, difficulty was encountered in obtaining stands of all varieties and in some cases replanting was necessary. Because a complete set of yields were not obtained no data are reported. At Manhattan, a severe hailstorm occurred before harvest and the yields are reported but not used in the averages. The crop at Valentine and Colby was a complete failure. Yield and other agronomic data for varieties grown at each of 20 stations are given in table 1. The generalized standard errors for most of the stations are given and are summarized in table 2.

To save space, data are given only for those characters that showed a contrasting reaction and that may have had an influence on yield. For each station the varieties are listed in order of yield for 1939, and, where possible, average yields are given for various periods. Where varieties have been grown for varying periods a percentage of Kharkof (C. I. 1442) is shown so that comparisons may be made more easily. For the most part the data need little explanation.

Fall conditions were rather variable over the area. At a number of stations the fall was so dry that good seedbeds could not be prepared. This caused late seeding or late germination if the seeding was done in dry soil. In some cases stands were inclined to be spotted, and root development was poor, except on fallow. In a number of areas it was reported that stock pasturing on winter wheat pulled many of the plants. Late in the fall rains were received at most stations and this put the plants in fair shape for the winter. At Akron and Dickinson complete emergence did not occur until spring.

The winter, especially the early part, was open and mild. At some stations all frost came out of the ground during January. The coldest weather occurred during February, but in most cases the ground was covered with snow at the time of the lowest temperatures. At no station was winter-killing especially severe.

Throughout most of the southern part of the area the spring was very dry and plants showed effects of this drought. Late in April there were periods of high, dry winds that caused considerable deterioration of the crop. In the northern district spring conditions were more favorable.

By the middle of May the drought became more serious and in many areas fields began to show a spotted condition. In general, the crop was extremely spotted within the fields, from field to field, and from station to station. If local rains were received some fairly good wheat was produced, but where these rains did not come the crop was very poor or a complete failure. The heat and drought hastened harvest in the southern part of the district. At Manhattan, a good crop was developing only to be ruined by a severe hailstorm on June 7.

Stem rust was reported from Denton, Texas, on April 19 which was very early, but the infection did not spread owing to unfavorable conditions. Leaf rust was present but was much less severe than in 1938. Considerable loose smut was observed in Kansas and Oklahoma, especially on Clarkan and Chiefkan.

At the stations in the northern district the crop was better than farther south. At several of these stations really good crops were produced.

In general, the season was not so interesting as in 1938. The conditions were so spotted that comparisons between stations were very difficult to make, and in some cases varietal behavior was rather unusual. About the only observations taken were the routine notes on maturity, height, test weight, and yield. The reaction of varieties to heat and drought was studied in a few cases.

At Denton, considerable leaf rust developed on susceptible varieties, but Denton, Kawvale, and a number of Mediterranean selections showed considerable resistance. Very little stem rust was recorded, Fulcaster having only 20 percent. Test weights were all less than 60 pounds per bushel except for Chiefkan. Oro x Tenmarq (C. I. 11673) had the highest yield per acre followed by Denton x Kanred (selection 4-33-28), and Chiefkan. Clarkan was the highest yielding soft wheat and it yielded four bushels per acre less than the leading variety. Kawvale had an unusually low yield. For the long-time average (1931-39), Quivira, Tenmarq, and Kawvale have the highest average yields. During the last two years Oro x Tenmarq (C. I. 11673), Kawvale x Tenmarq (C. I. 11669), and Chiefkan have averaged the highest. As yet no soft wheat is being grown in plots at Denton that equals the hard wheat varieties in yield.

Data were reported for the second year from Chillicothe. No great differences were noted among the varieties for yield or other characters. Blackhull, Kawvale x Tenmarq (C. I. 11669), Quivira, and Tenmarq were at the top of the list with Denton and Kharkof at the bottom. Chiefkan was fairly well down the list, as were Cheyenne and Kawvale. For the 2-year period Blackhull, Tenmarq, Kawvale x Tenmarq (C. I. 11669), Quivira, and Chiefkan produced the highest yields and Kawvale and Early Blackhull the lowest.

As mentioned before, the Amarillo work was moved to Bushland where plots were grown both on dry land and under irrigation. The data are shown in separate tables, but the dry-land figures are used in the averages. For the long-time averages the previous yields from Amarillo are used. On dry land straw was short, test weights low, and yields ranged from 18 down to 9 bushels per acre. Early Blackhull and Blackhull had the highest yields, while Tenmarq, Cheyenne, and two Turkey strains had the lowest yields. For a 5-year period Blackhull, Kharkof, Kanred, and Tenmarq rank the highest. For the 2-year period (1938-39) Blackhull, Chiefkan, and Early Blackhull have given the best average yields. During this same period Turkey (Vaughn), Tenmarq, and Turkey gave the lowest yields.

For the irrigated plots at Bushland the yields were only slightly higher than for the dry land. Maturity was later, straw slightly taller, and test weights about the same. Blackhull, Kharkof, and Early Blackhull gave the highest yields, Chiefkan slightly lower, and Denton and Kawvale were at the bottom of the list. The relation between the two sets of yields is fairly good but not so close as might be expected.

At Stillwater, test weights were all less than 60 pounds per bushel, although the yields were rather good. A selection of Kanred x Hard Federation (III-30-38) had the highest yield, being slightly higher than Kawvale x Tenmarq (C. I. 11669), Oro x Tenmarq (C. I. 11673), Quivira, and Chiefkan. A number of varieties of soft wheat yielded less than the varieties mentioned, and toward the bottom of the list appear a number of Turkey selections, Turkey, and Kanred. Denton, Sibley No. 62, Sibley No. 81, Quivira, and Cheyenne have had the highest yields over a 9-year period (1931-39). For the last two years Kanred x Hard Federation (III-30-38), Quivira, and Kawvale have given the best yields.

Yields at Woodward were very good, all varieties averaging more than 34 bushels per acre. Cheyenne, Kawvale x Tenmarq (C. I. 11669), Chiefkan, and Oro ranked highest. Two of these varieties are late and two are early, so no relation between time of maturity and yield can be mentioned. Quivira, Blackhull, Tenmarq, Denton, and Kawvale yielded in the order listed. For a longer period (8 years) Tenmarq, Quivira, Kharkof, and Cheyenne have had the best average yields. For the last two years Kawvale x Tenmarq (C. I. 11669) and Chiefkan have ranked the highest.

Goodwell reported data for the first time since 1935. Quivira, Oro x Tenmarq (C. I. 11673), and Blackhull had the highest yields. Chiefkan, Nebred, and Cheyenne ranked rather low. For five crop years Kharkof has the best average yield, Blackhull, Kanred, Cheyenne, and Tenmarq ranking in the order named. At this station only Oro x Tenmarq (C. I. 11673) has a percentage of Kharkof greater than 100 and the

variety has been grown for one year only. For a 3-year average Nebred has equalled Kharkof in yield. Based on the averages for longer periods the very early varieties have not done so well at this station.

A very complete set of data was obtained at Manhattan, but because of hail damage it is felt that the yields should not be averaged with other data. The hail damage, as expressed by broken culms, shows Early Blackhull x Tenmarq (Kans. No. 2739) to have escaped with little injury. Cheyenne and Nebred had 53 and 62 percent of broken straw, respectively, while Tenmarq suffered the most with 95 percent of straw broken. The percentage of hail shattered kernels showed little difference among varieties, although Kawvale and Kawvale x Tenmarq (C. I. 11951) had the greatest losses. Leaf rust percentages ranged from 5 percent on resistant varieties to 85 percent for Cheyenne. Yield records for 8 years excluding 1939 are available. For this period Quivira and Cheyenne have the best records. For a 7-year period Kanred x Marquis (C. I. 11589) has a high record. A number of new hybrids grown for short periods have very good yield records and may have considerable promise.

At Hays, the growth on cropped land was so poor that only one replication was harvested, while both replications were harvested on fallow. Straw was very short, test weights per bushel were good, but yields were low, ranging from 15.7 to 10.4 bushels per acre. Chiefkan, Tenmarq, and Early Blackhull had the highest yields, while Kanred and Cheyenne were at the bottom of the list. For an 8-year average, Tenmarq, Early Blackhull, and Blackhull have the highest yields, while for the last two years Kawvale x Tenmarq (C. I. 11669) and Chiefkan rank the highest. Chiefkan has been grown for four years and during that time has yielded about 27 percent more than Kharkof. Early varieties are still ahead at this station.

Winter-killing was recorded at Akron but it would seem that it was not caused by low temperature. For example, Yogo, Minturki, and Kharkof had survival percentages lower than Chiefkan, Early Blackhull, and Tenmarq. From other experiments it is known that drought probably causes as much killing at Akron as does low temperatures. Yields were very low, with three Akron selections, Chiefkan, and Nebred at the top of the list. Such varieties as Yogo, Alton, and Minturki gave very poor yields. For a 9-year period Blackhull, Early Blackhull, and Tenmarq have outyielded such varieties as Cheyenne, Kanred, and Kharkof. The experiment has gone long enough to give some weight to these data. For the last two years Kawvale x Tenmarq (C. I. 11669), Nebred, and Akron No. 7 have given the best yields. Akron No. 7, a stiff-strawed strain developed at Akron has been tested for six years and has averaged 28.8 percent higher than Kharkof.

The only data obtained at Lincoln were for maturity, height, stand, test weight, and yield. Clarkan and Chiefkan had the lowest number of culms per acre, while the Turkey types had the greatest number. Straw was so short that considerable difficulty was encountered in harvesting with a binder. There was a spread of only 5.4 bushels between the highest and the lowest yielding variety. Oro x Tenmarq (C. I. 11672), Clarkan, Cheyenne, and Kawvale x Tenmarq (C. I. 11669) all yielded about the same. Chiefkan, Nebraska No. 60, Blackhull, Tenmarq, Nebred, and Iobred yielded in the order listed. For a 9-year period Cheyenne, Kawvale, Tenmarq, and Nebred have given the highest average yields. For shorter periods some of the newer strains rank at the top.

The crop at North Platte was rather good when compared with the crop at other stations. Test weights were somewhat reduced due to lack of moisture and a fairly heavy straw growth. Cheyenne yielded the highest at this station, followed by Cheyenne selection, Nebraska No. 60, and Oro. Blackhull, Chiefkan, and Tenmarq had rather low yields. For an 8-year period Cheyenne, Nebraska No. 60, and Local Turkey have the highest average yields. It is interesting to note that very few of the varieties have percentages of Kharkof greater than 100, the highest being Cheyenne selection with 110.2 percent for a 3-year period.

The crop at Alliance was very short, owing to drought. There was no winter-killing so the winter hardy varieties had no advantage. Turkey selection (C. I. 10016), Tenmarq, and Yogo gave the highest yields. For the average of five crop years Turkey selection (C. I. 10016), Cheyenne, Nebraska No. 60, and Oro have given the highest yields. Several new varieties, tested for only two years, have averaged well above Kharkof.

At St. Paul, Minn., eight varieties of winter wheat were grown in plot tests. No variety was equal to Minhardi in winter hardiness. Lodging was recorded for Minturki x Marquis (C. I. 11502) and Minard. Leaf rust was fairly heavy on all varieties except Minard x Minhardi (C. I. 8888). The highest yields were recorded for Minturki x Marquis (C. I. 11502) and Minturki x Marquis (Minn. 2552). For the 3-year period (1937-39), the highest-yielding varieties were Minard x Minhardi (C. I. 8888), Minturki x Marquis (C. I. 11502), and Minturki. During this same period Minard had the lowest average yield.

There was considerable winter-killing at Waseca, Nebred and Yogo having the lowest survivals. Very little stem rust developed but all varieties had high leaf-rust readings. Kharkof, Minhardi x Marquis (C. I. 11657), and Nebred had the highest yields. For a 7-year period Minard x Minhardi (C. I. 8888) and Yogo rank the highest and Kharkof the lowest for yield. For the last three years Minhardi x Marquis (C. I. 11657), Nebred, and Minard x Minhardi (C. I. 8888) have given the highest averages. All varieties have outyielded Kharkof for the years tested.

At Grand Rapids, some lodging was noted, Minturki x Marquis (C. I. 11502) having the highest percentage. Stem rust was present, Minturki and Minhardi x Marquis (C. I. 11657) showing the least infection. Leaf-rust readings were all rather high. Test weights were all above 60 pounds per bushel. Minturki, Yogo, and Minhardi x Marquis (C. I. 11657) had the highest yields. These same wheats have the best averages for a 2-year period (1938-39).

Considerable spring germination occurred at Dickinson and stands were rather variable. Both leaf and stem rust infections were recorded with little difference between the reactions of the various varieties. Minturki x Marquis (C. I. 11502), Minard x Minhardi (C. I. 8888), Minturki, and Nebred had the best yields. For a 5-year period Yogo, Minturki, and Turkey (C. I. 1571) have given the best average yields.

Winter survivals were about the same for all varieties grown at Sheridan. Cheyenne, Nebraska No. 60, Nebred, and Kanred had the highest yields, while Karmont and Yogo had the lowest. For a 9-year period, Nebred, Kanred, and Montana No. 36 have given the best average yields. For the last three years Cheyenne, Nebraska No. 60, and Kanred have yielded the highest.

At Bozeman, wide differences were noted in the amount of lodging of the different varieties. Minard x Minhardi (C. I. 8888), Nebred, Cheyenne, and Eureka x Minhardi had the least lodging, while Montana No. 36 and Karmont had the most. Test weights were all above 60 pounds per bushel and yields ranged from 50 to 69.3 bushels per acre. Cheyenne, Nebred, Minturki, and Yogo had the highest yields. Yogo and Kharkof have given the highest average yields over a 9-year period. For the last three years (1937-39) Cheyenne and Nebred have the highest average yields. Tested for a 6-year period, Cheyenne has a percentage of Kharkof of 111.0, which is higher than any other variety tested for as long a time. The smut susceptibility of the variety reduces its value for this station.

No winter-killing occurred at Moccasin and sufficient moisture was available to produce a very good crop. All but one of the 16 varieties yielded more than 30 bushels per acre. Cheyenne, Newturk, and Yogo, of the named varieties, had the best yields. Two hybrid strains produced at Moccasin had very good yields. At this station Nebred gave a relatively poor yield and had shorter straw than any other variety. For eight crop years, Yogo has the highest average yield, followed by Eureka x Minhardi (C. I. 8036) and Kanred x Minassa (C. I. 8045). As yet no hybrid strain has been found that consistently outyields Yogo.

At Havre, there was very little difference in the winter survival of the various varieties. The heading dates extended over a 5-day period but all varieties were ripe the same day. The number of straws per acre showed considerable variation, Nebred having the lowest number and Minturki x Marquis (C. I. 11502) the highest. Test weights were all slightly below 60 pounds per bushel. Kanred, Montana No. 36, Newtürk, and Nebred had the highest yields. In fact the seven highest-yielding strains are named varieties. All hybrid strains were toward the bottom of the list. For a 7-year period, Yogo has the best average yield, followed by Karmont, Kanred, and Montana No. 36. Among the unnamed hybrids Minhardi x Minturki (C. I. 8034) has the best record as expressed in percentage of Kharkof.

Table 1. - Agronomic and other data for winter wheat varieties grown in replicated plots in cooperative experiments at 20 experiment stations in the hard red winter wheat area in 1939, and average yields for 1931-39

Denton, Texas

(Four 1/44-acre plots)

Variety	C. I. No.	Date		Hgt. (In.)	Rust		Test weight per bu. (Lbs.)	Av. acre yield (Bu.)	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed	Ripe		Leaf (Pct.)	Stem (Pct.)			Av. 1931-39 (Bu.)	Rank	Av. 1938-39 (Bu.)	Rank		
Oro x Tenmarq	11673	Apr. 30	May 31	35	10	2	58.5	30.9	-----	-	30.0	1	2	174.4
Denton x Kanred (T.S. 4-33-28)	-----	May 6	June 4	37	18	13	58.0	29.4	-----	-	25.8	6	2	150.0
Chiefkan	11754	May 4	June 3	36	30	10	60.0	28.9	-----	-	27.1	3	2	157.6
Kawvale x Tenmarq	11953	May 5	June 3	35	3	3	58.0	27.9	-----	-	27.0	4	2	157.0
Martin x Tenmarq ³	11805	May 4	June 4	36	18	8	57.0	27.6	-----	-	25.5	7	2	148.3
Kawvale x Tenmarq	11669	May 2	June 1	33	3	2	58.5	27.0	-----	-	27.9	2	2	162.2
Clarkan	8858	May 6	June 4	39	30	15	59.5	26.9	-----	-	25.2	8	6	122.7
Mediterranean (Campbell)	-----	May 4	June 3	36	25	13	59.0	26.9	-----	-	24.3	10	3	132.1
Quivira	8886	Apr. 30	May 31	34	32	1	58.0	26.7	32.1	1	24.6	9	9	133.2
Tenmarq	6936	May 4	June 4	35	33	8	57.5	26.5	31.1	2	24.2	11	9	129.0
Martin x Tenmarq ³	11823	May 4	June 4	36	15	10	57.5	26.3	-----	-	-----	-	1	115.4
Denton	8265	May 5	June 4	36	T	18	58.0	25.1	27.4	5	22.5	12	9	113.7
Early Blackhull	8856	Apr. 24	May 26	32	43	0	59.5	24.1	-----	-	26.2	5	7	119.8
Kanred	5146	May 6	June 4	34	55	3	57.5	23.7	28.4	4	21.1	16	9	117.8
Mediterranean selection	10086	May 3	May 31	35	6	9	58.0	23.5	25.3	8	21.7	15	9	105.0
Fulcaster	6471	May 4	June 3	36	50	20	57.0	23.5	25.6	7	21.1	16	9	106.2
Blackhull	6251	May 4	June 4	34	50	3	58.0	23.4	26.9	6	21.8	14	9	111.6
Kharkof	1442	May 9	June 6	31	60	10	57.0	22.8	24.1	9	17.2	20	9	100.0
Kawvale	8180	May 5	June 4	33	T	1	57.0	22.7	28.7	3	22.1	13	9	119.1
Mediterranean selection	11525	May 2	June 1	36	T	9	59.5	22.7	-----	-	20.5	19	8	108.3
Do	11526	May 1	May 31	34	6	1	58.5	21.8	-----	-	21.0	18	7	112.1

Standard error of a difference, 1.69 bu.; standard error of a mean, 1.20 bu., or 4.69 percent.

Table 1. - (Continued)

Chillicothe, Texas
(Four Plots)

Variety	C. I. No.	Date		Hgt.	Test weight per bu.	Av. acre yield	Yield		Percentage of Kharkof (1938- 39 av.)
		Headed	Ripe				1938-39	Rank	
		(June)	(In.)	(Lbs.)	(Bu.)	(Bu.)			
Blackhull	6251	May 8	6	31	61	34.0	27.3	1	115.7
Kawvale x Tenmarq	11669	May 7	6	25	61	34.0	27.2	2	115.3
Quivira	8886	May 7	4	28	62	33.6	26.4	4	111.9
Tenmarq	6936	May 8	7	30	60	33.4	27.2	2	115.3
Early Blackhull	8856	Apr. 25	2	30	61	33.2	21.3	16	90.3
Oro x Tenmarq	11673	May 7	6	26	60	32.5	24.6	10	104.2
Martin x Tenmarq ³	11805	May 9	8	32	58	32.4	25.7	6	108.9
Mediterranean sel.	11587	May 8	7	34	59	31.5	24.7	9	104.7
Kanred	5146	May 9	8	32	61	31.0	24.9	8	105.5
Turkey (Vaughn)	-----	May 9	7	34	61	30.6	24.4	11	103.4
Cheyenne	8885	May 9	7	27	60	30.6	25.0	7	105.9
Chiefkan	11754	May 7	6	30	60	30.1	26.4	4	111.9
Kawvale	8180	May 9	7	29	59	30.0	22.6	15	95.8
Turkey	1558	May 9	8	33	61	29.9	23.6	13	100.0
Denton	8265	May 9	7	37	59	29.5	23.7	12	100.4
Kharkof	1442	May 11	10	31	60	28.8	23.6	13	100.0

Standard error of a difference, 1.40 bu.; standard error of a mean 0.99 bu., or 3.14 percent.

Bushland, Texas
(Irrigated)
(Four plots)

Variety	C. I. No.	Date		Height	Test weight per bu.	Av. acre yield
		Headed	Ripe			
		(May)	(June)	(In.)	(Lbs.)	(Bu.)
Blackhull	6251	19	20	33	54.0	18.3
Kharkof	1442	24	27	30	53.9	18.1
Early Blackhull	8856	6	14	33	53.6	17.6
Quivira	8886	17	18	32	52.4	17.4
Kawvale x Tenmarq	11669	18	21	32	49.1	17.3
Oro x Tenmarq	11673	18	24	32	50.3	17.2
Tenmarq	6936	22	24	32	51.0	17.0
Chiefkan	11754	20	24	36	53.9	16.8
Martin x Tenmarq ³	11823	22	24	30	47.9	16.8
Do	11805	21	25	32	47.9	16.4
Kanred	5146	26	28	30	55.1	16.1
Cheyenne	8885	24	26	28	55.6	15.7
Turkey	1558	27	30	29	55.5	15.6
Turkey (Vaughn)	-----	25	26	28	55.1	15.5
Denton	8265	22	25	32	50.0	14.8
Kawvale	8180	22	22	30	47.6	12.6

Standard error of a difference, 0.96 bu.; standard error of a mean, 0.68 bu., or 4.14 percent.

Table 1. - (Continued)

Bushland, Texas

(Dry Land)

(Four plots)

Variety	C. I. No.	Date		Height	Test weight per bu.	Av. acre yield	Yield				No. years grown	Percentage of Kharkof for same year
		Headed	Ripe				Av. 1931, 1934 1937-39	Rank	Av. 1938-39	Rank		
		(May)	(June)	(In.)	(Lbs.)	(Bu.)	(Bu.)			(Bu.)		
Early Blackhull	8856	10	14	28	55.9	18.2	---	--	19.7	3	4	95.0
Blackhull	6251	17	18	27	53.9	16.5	17.1	1	19.9	1	5	100.6
Kawvale x Tenmarq	11669	18	19	26	50.6	15.5	---	--	18.8	6	2	96.4
Chieftan	11754	18	20	30	55.3	13.6	---	--	19.8	2	3	105.2
Oro x Tenmarq	11673	18	20	26	50.5	13.3	---	--	18.8	6	2	96.4
Denton	8265	22	21	26	50.3	13.3	16.2	6	19.3	5	5	95.3
Quivira	8886	18	17	25	52.6	13.3	16.4	3	17.6	10	5	96.5
Kawvale	8180	21	18	25	48.6	12.3	15.8	7	18.8	6	5	92.9
Martin x Tenmarq ³	11805	20	20	27	45.6	11.9	---	--	---	--	1	102.6
Kanred	5146	25	25	25	50.9	11.7	16.4	3	18.0	9	5	96.5
Kharkof	1442	23	24	24	50.9	11.6	17.0	2	19.5	4	5	100.0
Martin x Tenmarq ³	11823	22	20	26	45.1	11.4	---	--	---	--	1	98.3
Tenmarq	6936	22	20	26	49.0	10.7	16.4	3	17.0	13	5	96.5
Cheyenne	8885	22	21	22	52.8	10.6	---	--	17.6	10	4	93.9
Turkey	1558	26	28	26	50.8	10.1	---	--	16.5	14	4	91.6
Turkey (Vaughn)	-----	24	23	24	50.9	9.6	---	--	17.4	12	4	91.6

Standard error of a difference, 1.32 bu.; standard error of a mean, 0.93 bu., or 7.32 percent.

Table 1. - (Continued)

Stillwater, Oklahoma
(Four 1/38-acre plots)

Variety	C. I. No.	Test weight per bu. (Lbs.)	Av. acre yield (Bu.)	Yield				No. of years grown	Percentage of Kharkof for same years
				Av. 1931-39 (Bu.)	Rank	Av. 1938-39 (Bu.)	Rank		
Kanred x Hard Federa- tion (III-30-38)	-----	57.8	44.4	-----	-	37.6	1	4	108.6
Kawvale x Tenmarq	11669	57.4	44.2	-----	-	-----	-	1	134.8
Oro x Tenmarq	11673	56.9	42.8	-----	-	-----	-	1	130.5
Quivira	8886	57.0	42.6	29.4	4	37.4	2	9	102.4
Chiefkan	11754	59.6	39.8	-----	-	30.6	9	3	106.3
Cheyenne	8885	58.0	39.4	29.4	4	31.4	7	9	102.4
Blackhull	6251	58.4	38.7	-----	-	26.0	21	8	99.7
Sibley No. 62	11523	57.3	36.7	29.7	2	31.2	8	9	103.5
Penquite selection	11745	57.9	36.3	-----	-	28.6	11	5	100.4
Denton	8265	57.7	36.3	30.1	1	31.8	5	9	104.9
Clarkan	8858	59.0	35.9	-----	-	31.7	6	5	108.2
Kawvale	8180	57.1	35.6	29.1	6	33.8	3	9	101.4
Fulcaster	6471	57.7	35.4	-----	-	28.6	11	8	94.1
Harvest Queen	6199	58.4	34.9	25.7	12	26.8	20	9	89.5
Turkey selection (I-27-84)	-----	56.1	34.9	-----	-	28.6	11	4	96.0
Kanhull	11877	58.9	33.8	-----	-	28.2	17	2	98.6
Tenmarq	6936	56.6	33.8	29.0	7	29.4	10	9	101.0
Early Blackhull	8856	57.8	33.5	25.7	12	23.3	24	9	89.5
Sibley No. 81	10084	59.2	33.2	29.5	3	32.8	4	9	102.8
Turkey selection (I-27-94)	-----	57.6	33.2	-----	-	28.0	18	2	97.9
Eagle Chief	8868	57.3	33.1	29.0	7	28.4	16	9	101.0
Kharkof	1442	56.8	32.8	28.7	9	28.6	11	9	100.0
Turkey selection (I-27-85)	-----	57.1	32.8	-----	-	27.8	19	2	97.2
Turkey	1558	57.4	32.4	27.7	11	23.4	23	9	96.5
Turkey selection (I-27-87)	-----	57.2	32.0	-----	-	25.9	22	2	90.6
Kanred	5146	57.2	31.4	28.1	10	28.5	15	9	97.9

Standard error of a difference, 2.15 bu.; standard error of a mean, 1.52 or 4.20 percent.

Table 1. - (Continued)

Woodward, Oklahoma
(Four 1/47-acre plots)

Variety	C. I. No.	Date		Height (In.)	Test weight per bu. (Lbs.)	Av. acre yield (Bu.)	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed	Ripe				Av. 1931-34, and 1936-39		Av. 1938- 1939			
							Rank	Rank	Rank	Rank		
Cheyenne	8885	May	10 June	10 32	61	42.9	28.0	4	39.3	8	8	99.6
Kawvale x Tenmarq	11669	May	7 June	5 36	57	42.1	---	---	49.2	1	2	129.8
Chiefkan	11754	May	7 June	9 38	60	41.4	---	---	42.3	2	3	118.4
Oro	8220	May	10 June	10 34	60	40.4	26.1	9	38.0	12	8	92.9
Kanred	5146	May	10 June	10 34	60	39.8	26.9	6	38.1	11	8	95.7
Kharkof	1442	May	13 June	10 34	59	39.5	28.1	3	37.9	13	8	100.0
Danne selection H-59-C	-----	May	9 June	9 30	61	39.5	---	---	40.0	6	2	105.5
Quivira	8886	May	7 May	31 38	58	38.7	28.4	1	41.5	3	8	101.1
Turkey (Local) Wd. 1008	-----	May	11 June	10 34	59	38.6	27.2	5	36.4	15	8	96.8
Sibley No. 62	11523	May	11 June	7 34	59	38.6	---	---	36.9	14	5	96.6
Blackhull	6251	May	8 June	7 36	60	38.4	26.3	8	33.5	17	8	93.6
Early Blackhull	8856	Apr.	29 May	30 39	61	38.2	25.1	10	32.7	18	8	89.3
Oro x Tenmarq	11673	May	7 June	5 36	58	37.5	---	---	40.7	5	2	107.4
Blackhull x Oro	11961	May	9 June	9 33	61	37.0	---	---	---	---	1	93.7
Tenmarq	6936	May	8 June	7 36	57	36.4	28.4	1	38.9	10	8	101.1
Tenmarq x Nebraska No. 28	11847	May	7 June	7 36	60	36.4	---	---	41.1	4	2	108.4
Denton	8265	May	9 June	9 37	59	35.6	23.5	11	34.4	16	8	83.6
Turkey selection	10016	May	8 June	7 32	57	35.3	---	---	39.1	9	5	98.0
Kawvale	8180	May	9 June	7 35	56	34.1	26.9	6	39.7	7	8	95.7

Standard error of a difference, 1.73 bu.; standard error of a mean, 1.22 bu., or 3.17 percent.

Table 1. - (Continued)

Goodwell, Oklahoma

(Three 1/40-acre plots)

Variety	C. I. No.	Date		Height	Test weight per bu.	Av. acre yield	Yield		No. of years grown	Percentage of Kharkof for same years	
		Headed	Ripe				Av. 1931-32, 1934- 35, and 1939	Rank			
		(June)	(In.)	(Lbs.)	(Bu.)	(Bu.)					
Quivira	8886	May	3	17	24	53.0	16.4	21.4	7	5	80.8
Oro x Tenmarq	11673	May	5	17	22	53.9	16.2	-----	--	1	104.5
Blackhull	6251	May	8	17	24	55.2	15.6	25.0	2	5	94.3
Kharkof	1442	May	12	17	22	56.2	15.5	26.5	1	5	100.0
Denton	8265	May	14	17	25	54.3	15.5	20.4	8	5	77.0
Early Blackhull	8856	Apr.	30	10	26	50.2	15.4	18.2	10	5	68.7
Tenmarq	6936	May	7	17	23	54.7	14.5	23.0	5	5	86.8
Kawvale x Tenmarq	11669	May	4	17	20	49.3	14.5	-----	--	1	93.5
Turkey (Goodwell 102)	-----	May	12	17	21	54.6	13.7	21.5	6	5	81.1
Kanred	5146	May	12	17	21	56.6	13.6	24.8	3	5	93.6
Sibley No. 62	11523	May	14	17	20	56.8	13.4	-----	--	2	71.5
Chiefkan	11754	May	9	17	26	57.6	13.4	-----	--	1	86.5
Nebred	10094	May	11	17	18	55.0	11.5	-----	--	3	100.0
Cheyenne	8885	May	15	17	18	56.4	10.8	23.9	4	5	90.2
Penquite selection	11745	May	10	17	23	54.3	9.8	-----	--	2	68.0
Sibley No. 81	10084	May	13	17	21	54.7	9.6	19.2	9	5	72.5

Standard error of a difference, 3.48 bu.; standard error of a mean, 2.46 bu., or 17.93 percent.

Table 1. - (Continued)

Hays, Kansas

(Three 1/50-acre plots; two on fallow, one on cropped land; seeded Sept. 26, 1938; emerged Oct. 1, 1938)

Variety	C. I. No.	Date		Height (In.)	No. of tillers (per 100 ft. row)	Test weight per bu. (Lbs.)	Av. acre yield (Bu.)	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed	Ripe					Av. 1931-34, and 1936-39	Rank	Av. 1938-39	Rank		
		(May)	(June)					(Bu.)		(Bu.)			
Chiefkan	11754	16	16	26	2820	61	15.7	-----	-	23.3	2	4	126.9
Tenmarq	6936	17	16	24	3010	59	15.4	24.4	1	21.9	5	8	120.2
Early Blackhull	8856	8	10	23	2375	61	15.0	23.7	2	18.5	6	8	116.7
Kanred x Marquis	11589	18	15	24	3120	59	14.9	-----	-	22.6	3	4	120.8
Kawvale x Tenmarq	11669	16	15	23	3460	57	14.8	-----	-	28.4	1	2	164.2
Oro x Tenmarq	11673	16	14	23	2875	58	14.7	-----	-	22.2	4	3	116.3
Kawvale x Tenmarq	11750	17	15	23	3170	56	14.6	-----	-	-----	-	1	116.8
Oro x Tenmarq	11672	16	14	23	2665	60	12.9	-----	-	-----	-	2	102.6
Nebred	10094	21	15	21	3455	60	12.8	-----	-	17.5	8	4	105.7
Kharkof	1442	23	18	21	3300	60	12.5	20.3	7	17.3	10	8	100.0
Blackhull	6251	17	16	24	3070	61	12.0	23.4	3	17.8	7	8	115.3
Oro	8220	23	18	21	3460	61	11.9	21.4	5	16.4	13	8	105.4
Early Blackhull													
Hybrid H.C. 366	11846	18	16	23	-----	59	11.9	-----	-	-----	-	1	95.2
Turkey	1558	23	18	22	3255	60	11.7	20.8	6	16.6	12	8	102.5
Kanred	5146	23	17	21	3375	60	11.5	-----	-	17.5	8	7	109.3
"Weaver" Kanred	-----	23	18	21	3365	61	11.0	-----	-	-----	-	1	88.0
Cheyenne	8885	21	18	20	3885	61	10.4	23.0	4	16.9	11	8	113.3

Standard error of a difference, 1.57 bu.; standard error of a mean, 1.11 bu., or 8.44 percent.

Table 1. - (Continued)

Manhattan, Kansas

(Three 1/40-acre plots)

Variety	C. I. No.	Date		No. culms at maturity (1,000)	Hgt. (In.)	Hail damage		Leaf rust (Pct.)	Test weight per bu. (Lbs.)	Av. acre yield (Bu.)	No. of years grown	Percentage of Kharkof for same years 1/
		Headed	Ripe			Broken culms (Pct.)	Shattered grain (Pct.)					
		(May)	(June)			(Pct.)	(Pct.)					
Quivira	8886	14	15	2085	43	72	15	5	58.2	19.6	8	112.1
Cheyenne	8885	20	21	2584	41	53	13	85	56.6	19.5	8	111.2
Kharkof	1442	20	21	2509	42	73	8	80	56.1	19.4	8	100.0
P-1066-1 x Prelude	11590	14	14	1920	43	68	12	5	57.8	19.3	6	112.9
Nebred	10094	19	20	2671	41	62	12	85	57.6	19.3	5	116.8
Oro x Tenmarq (Kans. 2738)	-----	17	19	2324	42	93	12	17	57.7	18.8	1	-----
Early Blackhull x Tenmarq	11952	13	10	1823	42	6	17	47	58.4	18.7	1	-----
Kawvale x Tenmarq	11950	16	19	2326	42	88	13	12	55.4	18.5	2	188.2
Kanred	5146	19	20	2430	42	80	8	60	55.5	18.4	8	103.3
Kawvale x Tenmarq	11669	16	19	2342	40	70	15	8	57.0	18.2	3	168.2
Turkey (Farm)	1558	20	21	2594	44	72	8	80	55.2	18.1	2	105.9
Oro	8220	20	21	2580	44	77	10	75	56.2	18.1	8	103.3
Kawvale x Tenmarq	11750	17	19	2503	41	81	15	8	55.2	17.9	3	157.6
Early Blackhull	8856	10	9	1822	42	84	12	45	58.8	17.8	8	105.5
Oro x Tenmarq	11673	16	16	2104	41	83	15	12	56.5	17.3	3	149.6
Tenmarq	6936	18	20	2144	42	95	8	25	56.3	17.3	8	109.1
Blackhull	6251	18	20	2429	45	82	10	75	57.4	17.1	8	107.9
Oro x Tenmarq	11672	16	16	2154	41	75	18	7	56.9	16.9	3	141.5
Turkey	1558	20	20	2621	44	77	8	82	55.3	16.8	8	104.2
Kanred x Marquis	11589	17	19	2501	42	70	17	8	57.8	16.5	7	112.2
Chiefkan	11754	17	20	2187	46	82	10	60	57.7	16.3	3	137.7
Oro x Tenmarq (Kans. 2736)	-----	17	19	2294	41	83	15	10	56.6	15.5	2	131.9
Fulcaster	6471	19	20	2274	47	82	17	73	56.3	14.5	8	106.1
Kawvale	8180	19	20	2311	44	80	20	12	54.7	13.6	8	115.5
Clarkan	8858	19	20	1991	48	83	12	60	56.5	13.3	8	110.9
Kawvale x Tenmarq	11951	16	19	2142	42	82	22	5	55.4	12.8	2	225.2
Harvest Queen	6199	19	21	1811	49	83	12	80	54.6	12.7	9	90.0

1/ Excluding 1939.

Table 1. - (Continued)

Akron, Colorado

(Four plots, 2 on fallow (1/46-acre), 2 on cornland (1/41-acre); seeded Sept. 9; emerged Sept. 19, 1938)

Variety	C. I. No.	Winter survival	Date		Hgt.	Test weight per bu.	Av. acre yield	Yield				No. of years grown	Percentage of Kharkof for same years
			Headed	Ripe				Av. 1931-39	Rank	Av. 1938-39	Rank		
		(Pct.)			(In.)	(Lbs.)	(Bu.)	(Bu.)		(Bu.)			
Kanred-Hard Federation x													
Minhardi-Minturki (Akron 130)	11970	90	May 25	July 1	23	57.0	10.0	-----	-	16.8	4	2	121.7
Chiefkan	11754	85	May 27	June 30	22	59.0	9.8	-----	-	14.3	16	2	103.6
Akron No. 7	11660	93	May 29	July 1	22	54.5	9.6	-----	-	17.3	3	6	128.8
Minturki x Marquis (Akron 85)	-----	90	May 28	July 1	21	56.5	9.2	-----	-	-----	-	1	141.5
Nebred	10094	95	May 29	July 1	22	56.3	9.2	-----	-	17.4	2	4	120.0
Tenmarq	6936	84	May 28	July 1	24	56.0	9.0	14.0	3	15.2	13	9	117.6
Early Blackhull	8856	90	May 20	June 27	20	60.0	8.9	14.2	2	16.3	7	9	119.3
Turkey selection	10098	95	May 27	June 30	21	58.0	8.9	-----	-	15.7	9	6	118.2
Blackhull	6251	81	May 26	June 30	23	60.0	8.8	14.3	1	15.7	9	9	120.2
Turkey selection	10016	95	May 27	June 30	21	57.3	8.7	-----	-	14.8	14	8	120.3
Oro x Tenmarq	11673	82	May 27	July 1	21	57.5	8.5	-----	-	16.5	6	2	119.6
Cheyenne	8885	89	May 30	July 3	22	56.3	8.5	13.4	4	15.5	11	9	112.6
Kanred x Marquis (Akron 44)	-----	95	May 28	July 1	21	55.5	8.4	-----	-	16.0	8	2	115.9
Kanred	5146	89	May 30	July 2	23	55.3	8.2	13.3	5	14.4	15	9	111.8
Oro	8220	92	May 31	July 3	23	53.5	7.9	13.0	6	14.2	17	9	109.2
Kharkof	1583	92	May 31	July 3	23	55.0	7.9	12.4	7	15.4	12	9	104.2
Kawvale x Tenmarq	11669	80	May 26	June 29	19	57.0	6.7	-----	-	18.6	1	2	134.8
Kharkof	1442	77	May 31	July 3	22	54.8	6.6	11.9	8	13.8	18	9	100.0
Minturki	6155	79	June 1	July 5	21	53.5	6.0	10.7	9	13.7	19	9	89.9
Alton	1438	89	June 1	July 4	21	53.3	5.5	10.2	10	11.5	21	9	85.7
Yogo	8033	70	June 4	July 5	20	54.5	5.4	-----	-	13.1	20	7	100.0

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Standard error of a difference, 1.16 bu.; standard error of a mean, 0.82 bu., or 10.09 percent.

Table 1. - (Continued)

Lincoln, Nebraska

(Five 1/40-acre plots; seeded Sept. 22-23; emerged Sept. 27-28, 1938)

Variety	C. I. No.	Date		Height	No. culms per acre	Test weight per bu.	Av. acre yield	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed	Ripe					Av. 1931-39	Rank	Av. 1938-39	Rank		
		(May)	(June)	(In.)	(1,000)	(Lbs.)	(Bu.)	(Bu.)		(Bu.)			
Oro x Tenmarq	11672	20	19	22	2166	57.9	22.8	-----	-	-----	-	1	109.1
Clarkan	8858	23	20	28	1755	59.0	22.8	-----	-	19.7	4	5	105.3
Cheyenne	8885	23	20	21	2502	59.6	22.7	29.4	1	18.2	13	9	108.1
Kawvale x Tenmarq	11669	20	17	20	2464	57.1	22.7	-----	-	21.7	1	4	107.7
Turkey selection	11577	23	19	21	2464	58.0	22.7	-----	-	18.5	9	5	101.4
Kanred x Blackhull	11844	21	20	22	2464	56.5	22.4	-----	-	18.5	9	2	99.5
Tenmarq x Kawvale (Sel. No. 23866)	-----	20	17	21	2390	57.4	22.2	-----	-	-----	-	1	106.2
Chieftan	11754	22	20	23	1979	59.3	21.9	-----	-	21.5	2	2	115.6
Turkey (Seward Co.)	-----	23	20	21	2688	57.1	21.9	27.6	6	18.7	7	9	101.5
Turkey x Minturki	11580	21	19	22	2166	56.5	21.9	-----	-	19.3	5	3	97.8
Kawvale x Tenmarq	11750	20	17	20	2278	55.3	21.6	-----	-	-----	-	1	103.3
Tenmarq x Kawvale (Sel. No. 23908)	-----	20	17	21	2240	56.2	21.3	-----	-	-----	-	1	101.9
Turkey (S. Dak. 144)	3689	23	20	20	2539	58.2	21.2	28.4	3	18.4	12	9	104.4
Cheyenne selection	11666	23	19	21	2464	58.3	21.2	-----	-	19.1	6	4	101.0
Oro x Tenmarq	11673	20	19	22	2054	57.7	21.1	-----	-	20.0	3	2	107.5
Nebraska No. 60	6250	24	22	22	2278	57.4	20.9	25.8	15	16.9	23	9	94.9
Kharkof	1442	25	22	21	2054	57.2	20.9	27.2	8	18.6	8	9	100.0
Turkey (Nebr. No. 312)	-----	23	22	21	2315	57.0	20.8	26.3	11	17.7	17	9	96.7
Blackhull selection	11737	21	19	20	2278	59.3	20.3	-----	-	17.4	20	3	96.1
Blackhull	6251	22	19	22	2240	58.3	20.1	27.3	7	17.9	15	9	100.4
Turkey (Nebr. 1)	-----	24	22	22	2128	57.1	20.0	26.3	11	16.4	25	9	96.7
Tenmarq	6936	22	19	21	2128	58.1	20.0	28.2	4	17.9	15	9	103.7
Oro	8220	24	24	23	2203	58.3	19.8	26.3	11	15.8	26	9	96.7
Turkey (Sonderregger)	-----	23	20	22	2763	57.9	19.8	-----	-	17.5	19	2	94.1
Kanred	5146	24	20	21	2352	57.0	19.7	27.2	8	18.0	14	9	100.0
Turkey selection	10015	22	20	21	2502	57.9	19.3	25.9	14	17.6	18	9	95.2
Nebred	10094	23	20	20	2502	57.8	19.3	28.1	5	18.5	9	9	103.3
Minturki x Blackhull	11815	23	20	23	2128	58.1	19.0	-----	-	17.0	22	2	91.4
Kawvale	8180	23	20	22	2166	53.9	17.5	28.6	2	17.1	21	9	105.1
Iobred	6934	25	20	22	2016	58.3	17.4	-----	-	-----	-	2	90.8
Turkey selection	10016	21	17	19	2539	57.7	17.4	26.5	10	16.8	24	9	97.4

Standard error of a difference 1.37 bu.; standard error of a mean 0.97 bu., or 4.68 percent.

Table 1. - (Continued)

North Platte, Nebraska

(Four 1/40-acre plots; seeded Sept. 19, 1938, 2 on fallow, 2 on cornland)

Variety	C. I. No.	Date		Height	Test weight per bu.	Av. acre yield	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed	Ripe				Av. 1931-36, and 1938-39	Rank	Av. 1938-39	Rank		
		(May)	(June)	(In.)	(Lbs.)	(Bu.)	(Bu.)		(Bu.)			
Cheyenne	8885	28	27	28	58.0	28.7	25.6	1	22.6	1	8	106.7
Cheyenne selection	11666	27	25	26	57.5	27.9	-----	-	21.4	2	3	110.2
Nebraska No. 60	6250	29	28	30	58.0	27.0	24.3	2	21.2	3	8	101.3
Oro	8220	28	27	29	57.5	26.5	23.8	6	20.0	5	8	99.2
Beloglina x Hussar	11513	26	27	27	57.0	26.3	-----	-	19.3	9	2	100.0
Nebred	10094	27	26	29	57.5	26.0	-----	-	19.9	6	6	103.4
Kawvale x Tenmarq	11750	23	23	27	57.5	25.2	-----	-	-----	-	1	103.7
Kharkof	1442	28	28	30	56.5	24.3	24.0	5	19.3	9	8	100.0
Turkey selection	10016	25	24	28	57.0	24.2	24.1	4	18.8	11	8	100.4
Oro x Tenmarq	11673	22	23	28	58.0	24.2	-----	-	19.6	7	2	101.6
Kanred	5146	28	27	29	55.5	23.9	22.9	10	18.2	12	8	95.4
Turkey (Local)	-----	26	26	30	55.0	23.5	24.2	3	17.9	13	8	100.8
Oro x Tenmarq	11672	22	23	28	57.5	23.2	-----	-	-----	-	1	95.5
Beloglina selection	8884	28	27	29	56.0	23.0	23.5	9	17.4	15	8	97.9
Blackbull	6251	27	24	28	57.0	22.4	23.6	8	17.8	14	8	98.3
Chiefkan	11754	25	23	30	58.5	22.1	-----	-	19.5	8	2	101.0
Kawvale x Tenmarq	11669	23	23	26	57.5	21.9	-----	-	20.4	4	2	105.7
"Alton"	1438	30	28	32	55.0	21.9	-----	-	15.2	18	2	78.8
Beloglina x Hussar	11664	29	28	31	57.5	21.8	-----	-	15.6	17	4	93.0
Tenmarq	6936	27	24	29	55.5	21.1	23.8	6	16.9	16	8	99.2

Standard error of a difference, 1.97³⁷ bu.; standard error of a mean, 0.76⁷⁷ bu., or 3.01⁹⁹ percent.

Table 1. - (Continued)

Alliance, Nebraska

(Three 1/20-acre plots; seeded Sept. 15, 1938)

Variety	C. I. No.	Date		Height (In.)	Test weight per bu. (Lbs.)	Av. acre yield (Bu.)	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed	Ripe				Av. 1931-33, and 1938-39	Rank	Av. 1938-39	Rank		
		(July)					(Bu.)		(Bu.)			
Turkey selection	10016	May 28	6	21	59.5	9.7	15.0	1	16.0	2	5	116.3
Tenmarq	6936	May 30	8	23	56.0	9.6	13.7	5	15.0	6	5	106.2
Yogo	8033	June 10	9	22	57.5	9.5	-----	--	14.1	10	2	110.2
Cheyenne	8885	June 1	8	20	58.5	9.3	14.9	2	16.3	1	5	115.5
Oro	8220	June 6	9	20	58.5	8.8	14.1	4	14.1	10	5	109.3
Nebred	10094	June 5	8	19	58.0	8.6	-----	--	14.6	9	3	108.9
Oro x Tenmarq	11673	May 28	5	22	59.3	8.3	-----	--	15.2	3	2	118.8
Chiefkan	11754	June 4	7	22	58.5	8.3	-----	--	15.1	5	2	118.0
Cheyenne selection	11666	June 4	8	20	57.5	8.1	-----	--	15.2	3	2	118.8
Nebraska No. 60	6250	June 8	9	21	57.0	7.5	14.7	3	14.8	8	5	114.0
Blackhull	6251	June 3	6	19	57.5	7.2	13.3	6	13.6	12	5	103.1
Kawvale x Tenmarq	11669	May 29	6	25	56.5	6.9	-----	--	14.9	7	2	116.4
Kharkof	1442	June 7	8	22	57.8	6.3	12.9	8	12.8	13	5	100.0
Turkey selection	10015	June 5	8	21	58.5	4.2	13.2	7	11.9	14	5	102.3

Standard error of a difference, 1.40 bu.; standard error of a mean, 0.99 bu., or 12.33 percent.

Table 1. - (Continued)

Waseca, Minnesota
(Three 1/40-acre plots)

Variety	C. I. No.	Winter sur- vival	Date		Hgt. (In.)	Rust		Test weight per bu.	Av. acre yield	Yield				No. of years grown	Percentage of Kharkof for same years
			Headed	Ripe		Stem	Leaf			Av. 1931-33, 1935, and 1937-39	Rank	Av. 1937-39	Rank		
		(Pct.)	(June)	(July)		(Pct.)	(Pct.)	(Lbs.)	(Bu.)	(Bu.)		(Bu.)			
Kharkof	1442	80	6	11	33	20	60	60.0	43.8	32.5	4	26.3	9	7	100.0
Minhardi x Marquis	11657	70	7	11	37	5	60	59.2	41.9	-----	--	32.4	1	5	113.2
Nebred	10094	63	5	8	32	15	90	60.4	40.4	-----	--	31.0	2	3	117.9
Minard x Minhardi	8888	75	7	11	37	10	70	60.3	40.3	34.3	1	30.6	3	7	105.5
Minturki x Marquis	11501	93	7	12	39	15	50	59.4	40.1	-----	--	29.3	5	5	108.4
Do	11502	72	5	10	37	5	70	59.3	38.8	-----	--	29.1	6	5	104.9
Minturki x Marquis (Minn. 2552)	-----	87	7	11	37	--	60	59.4	37.1	-----	--	29.6	4	3	112.5
Minturki	6155	83	8	12	39	5	70	58.2	36.8	33.5	3	28.8	7	7	103.1
Yogo	8033	68	8	12	38	5	50	59.2	36.8	33.9	2	28.2	8	7	104.3

Standard error of a difference, 2.52 bu.; standard error of a mean, 1.78 bu., or 4.50 percent.

St. Paul, Minnesota
(Three 1/40-acre plots)

Variety	C. I. No.	Winter sur- vival	Date		Hgt. (In.)	Lodging		Rust		Grain tex- ture	Test weight per bu.	Av. acre yield	Yield	
			Headed	Ripe		Pct.	Degree	Stem	Leaf				Av. 1937-39	Rank
		(Pct.)	(June)	(July)				(Pct.)	(Pct.)	(Pct.)	(Lbs.)	(Bu.)		
Minturki x Marquis	11502	83	6	12	36	100	8	7	53	72	56.3	49.7	32.2	2
Minturki x Marquis (Minn. 2552)	-----	83	6	14	36	0	0	3	47	78	57.3	48.4	29.9	6
Minhardi x Marquis	11657	80	6	13	37	0	0	5	33	72	56.8	48.1	30.8	4
Minturki	6155	82	6	14	36	0	0	T	32	68	56.3	45.8	31.3	3
Minard x Minhardi	8888	82	7	14	35	0	0	2	25	78	58.0	45.2	33.0	1
Minhardi	5149	92	7	14	36	0	0	25	60	60	56.5	45.0	27.5	7
Minturki x Marquis	11501	83	7	14	38	0	0	8	50	78	57.3	44.5	30.0	5
Minard	6690	85	8	15	40	33	5	17	60	75	56.5	43.8	24.1	8

Standard error of a difference, 1.98 bu.; standard error of a mean, 1.40 bu., or 3.02 percent.

Table 1. - (Continued)

Grand Rapids, Minnesota
(Three 1/40-acre plots)

Variety	C. I. No.	Date		Height (In.)	Lodging		Rust		Grain tex- ture	Test weight per bu.	Av. acre yield	Yield	
		Headed	Ripe		Pct.	Degree	Stem	Leaf				Av. 1938-39	Rank
		(June)	(July)		(Pct.)	(Pct.)	(Pct.)	(Pct.)				(Bu.)	(Bu.)
Minturki	6155	22	20	42	2	40	18R	85	70	60.7	34.1	24.5	1
Yogo	8033	24	21	42	0	0	20SR	75	65	60.9	31.7	23.7	3
Minhardi x Marquis	11657	24	21	44	T	30	20R	85	72	61.2	31.7	24.3	2
Minturki x Marquis (Minn. 2552)	-----	24	21	42	0	20	35SR	85	70	61.4	31.5	22.9	4
Minturki x Marquis	11501	25	24	43	2	20	33SR	73	70	61.3	30.5	20.4	5
Minard x Minhardi	8888	24	21	41	0	0	35R	85	80	62.6	29.7	20.4	5
Minturki x Marquis	11502	24	20	43	7	65	30R	85	73	61.1	26.4	19.9	7

Standard error of a difference, 1.61 bu.; standard error of a mean, 1.14 bu., or 3.70 percent.

Dickinson, North Dakota

(Two 1/40-acre plots; seeded Sept. 16, 1938; emerged (thinly) Oct. 26, 1938)

Variety	C. I. No.	Spring stand	Date		Hgt.	Rust		Test weight per bu.	Av. acre yield	Yield		No. of years grown	Percentage of Kharkof for same years
			Headed	Ripe		Leaf	Stem			Av. 1932-33, 1935- 36, and 1939	Rank		
(M per acre)		(June)	(July)	(In.)	(Pct.)	(Pct.)	(Lbs.)	(Bu.)	(Bu.)				
Minturki x Marquis	11502	396	20	27	40	20	8	58.5	18.9	---	1	132.2	
Minard x Minhardi	8888	396	22	27	38	20	8	58.4	17.8	---	2	123.3	
Minturki	6155	430	24	28	44	25	8	54.0	16.2	9.4	5	114.6	
Nebred	10094	446	21	27	35	20	5	57.5	16.2	---	1	113.3	
Yogo	8033	338	24	27	41	30	8	55.5	15.6	9.7	5	118.3	
Kharkof	1442	374	22	27	39	20	8	55.5	14.3	8.2	1	100.0	
Turkey	1571	348	22	27	39	20	10	55.0	14.0	9.2	5	112.2	
Beloglina	1543	360	22	27	37	25	15	56.0	12.0	8.7	5	106.1	
Karmont	6700	368	22	27	39	20	10	55.0	11.7	7.7	5	93.9	
Nebraska No. 60	6250	294	22	27	38	25	12	56.0	11.2	8.4	5	102.4	

Standard error of a difference, 0.74 bu.; standard error of a mean, 0.52 bu., or 3.53 percent.

Table 1. - (Continued)

Sheridan, Wyoming

(Three 1/55-acre plots; seeded Oct. 6, 1938)

Variety	C. I. No.	Winter sur- vival	Date		Height	Test weight per bu.	Av. acre yield	Yield				No. of years grown	Percentage of Kharkof for same years
			Headed	Ripe				Av. 1931-39	Rank	Av. 1937-39	Rank		
		(Pct.)	(June)	(July)	(In.)	(Lbs.)	(Bu.)	(Bu.)		(Bu.)			
Cheyenne	8885	90	21	28	43	60.0	52.3	—	—	38.0	1	5	118.6
Nebraska No. 60	6250	87	22	29	41	59.0	46.8	27.5	1	37.0	2	9	107.0
Nebred	10094	82	19	28	38	59.3	44.9	—	—	34.4	4	3	101.5
Kanred	5146	87	23	27	43	59.0	44.3	27.5	1	34.8	3	9	107.0
Turkey selection	10016	85	16	28	40	58.7	43.7	—	—	33.3	7	6	100.0
Kharkof	1442	85	22	28	40	58.0	41.6	25.7	5	33.9	5	9	100.0
Minturki	6155	85	23	29	42	57.7	40.0	23.7	7	32.0	10	9	92.2
Montana No. 36	5549	83	23	29	40	58.7	39.4	27.2	3	33.4	6	9	105.8
Minard x Minhardi	8888	83	23	30	40	58.3	38.2	—	—	32.5	9	4	96.3
Minturki x Marquis	11502	83	21	30	42	59.0	37.9	—	—	30.9	11	4	92.6
Karmont	6700	83	23	29	40	57.0	37.3	25.3	6	30.6	12	9	98.4
Yogo	8033	83	23	30	42	55.7	36.4	26.5	4	33.2	8	9	103.1

Standard error of a difference, 2.98 bu.; standard error of a mean, 2.11 bu., or 5.04 percent.

Table 1. - (Continued)

Bozeman, Montana

(Three 1/56-acre plots; seeded Sept. 10, 1938; emerged Sept. 19, 1938)

Variety	C. I. No.	Date		Lodging	Height	Test weight per bu.	Av. acre yield	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed	Ripe					Av. 1931, and 1933-39	Rank	Av. 1937-39	Rank		
Cheyenne	8885	27	5	32	54	62.4	69.3	—	—	74.5	1	6	111.0
Nebred	10094	23	3	28	48	62.6	62.8	—	—	70.3	2	3	111.1
Minturki	6155	28	8	48	56	62.5	61.3	64.5	3	65.2	5	9	97.0
Yogo	8033	28	7	73	59	62.4	60.9	69.6	1	66.8	4	9	104.7
Karmont	6700	29	7	80	51	62.4	60.0	—	—	—	—	7	98.1
Kharkof	1442	28	7	77	55	62.6	59.1	66.5	2	63.3	8	9	100.0
Minard x Minhardi	8888	27	7	18	52	63.4	58.5	—	—	67.2	3	4	103.8
Newturk	6935	27	7	68	51	61.9	57.9	61.5	5	63.5	7	9	92.5
Eureka x Minhardi	8036	27	5	32	54	62.6	56.0	—	—	61.1	9	5	95.1
Yogo selection 2	—	28	4	78	56	61.8	56.0	—	—	63.9	6	5	101.7
Montana No. 36	5549	27	4	80	52	62.3	52.3	63.3	4	60.4	10	9	95.2
Minturki x Marquis	11502	26	6	50	56	62.8	50.4	—	—	59.3	11	4	89.6

Standard error of a difference, 4.01 bu.; standard error of a mean, 2.84 bu., or 4.83 percent.

Table 1. - (Continued)

Moccasin, Montana

(Four 1/50-acre plots; seeded Sept. 13, 1938)

Variety	C. I. No.	Date		Hgt.	Bunt	Test weight per bu.	Av. acre yield	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed	Ripe					Av. 1931-35, and 1937-39	Rank	Av. 1937-39	Rank		
				(In.)	(Pct.)	(Lbs.)	(Bu.)	(Bu.)		(Bu.)			
Cheyenne	8885	June 24	July 30	41	47	61.1	37.6	—	—	24.8	4	5	101.4
Newturk	6935	June 24	July 29	44	35	60.5	36.7	18.6	4	24.9	3	8	102.8
Yogo	8033	June 30	July 30	46	25	59.7	35.9	19.9	1	25.4	1	8	109.9
Turkey x Kanred	11725	June 30	July 30	46	50	58.7	35.3	—	—	25.4	1	3	107.2
Kanred x Minessa	8045	June 29	Aug. 1	43	22	58.9	34.9	19.1	3	24.6	5	8	105.5
Turkey	1558	June 27	July 31	42	62	60.2	34.7	18.1	6	23.8	7	8	100.0
Minturki	6155	June 29	July 31	44	30	58.9	34.6	17.8	8	23.4	11	8	98.3
Minturki x Beloglina-Buffum	11661	June 29	July 31	46	25	59.0	33.8	—	—	23.6	9	3	99.6
Karmont	6700	June 28	July 30	43	60	60.1	33.7	18.4	5	24.4	6	8	101.7
Kharkof	1442	June 27	July 30	44	55	60.1	33.7	18.1	6	23.7	8	8	100.0
Kanred x Minhardi	11726	June 30	July 31	44	65	60.5	33.7	—	—	23.5	10	3	99.2
Minard x Minhardi	8888	June 30	July 31	44	55	60.5	32.6	—	—	22.8	13	7	99.0
Nebred	10094	June 27	July 30	38	20	60.6	31.9	—	—	21.8	14	3	92.0
Eureka x Minhardi	8036	June 27	July 30	43	52	59.7	31.9	19.5	2	23.1	12	8	107.7
Minessa x Beloglina-Buffum													
B.H. 23-2	—	July 4	Aug. 1	44	50	58.5	30.5	—	—	21.5	15	3	90.7
Minturki x Marquis	11502	June 27	July 31	45	21	59.4	29.1	—	—	—	—	1	86.4

Standard error of a difference, 1.44 bu.; standard error of a mean, 1.02 bu., or 3.02 percent.

Table 1. - (Continued)

Havre, Montana

(Three 1/50-acre plots; sown on fallow, Sept. 29, 1938)

Variety	C. I. No.	Winter sur- vival	Date		Hgt. (In.)	Straw per acre (Lbs.)	Test weight per bu. (Lbs.)	Av. acre yield (Bu.)	Yield				No. of years grown	Percentage of Kharkof for same years
			Headed	Ripe					Av. 1931-35, and 1938-39	Rank	Av. 1938-39	Rank		
			(Pct.)	(June)	(July)				(Bu.)		(Bu.)			
Kanred	5146	95	8	24	34	3483	57.4	29.7	12.3	3	25.3	1	7	112.8
Montana No. 36	5549	95	8	24	36	3833	57.2	28.9	12.2	4	23.9	4	7	111.9
Newturk	6935	93	8	24	34	3567	57.2	28.9	11.9	6	23.8	5	7	109.2
Nebred	10094	95	7	24	33	3417	58.4	28.1	—	—	19.9	12	2	85.8
Karmont	6700	90	9	24	35	3900	56.7	27.8	12.4	2	24.6	2	7	113.8
Kharkof	1442	95	9	24	35	3867	57.0	27.2	10.9	10	23.2	6	7	100.0
Yogo	8033	93	13	24	38	3967	56.1	26.7	13.0	1	24.1	3	7	119.3
Minard x Minhardi	8889	93	8	24	36	3783	57.4	25.3	11.0	9	21.1	10	7	100.9
Minhardi x Minturki	8034	92	11	24	39	3850	57.2	24.7	11.6	7	22.9	7	7	106.4
Minard x Minhardi	8888	92	9	24	35	3817	57.0	24.7	—	—	21.7	9	5	98.5
Minturki	6155	93	9	24	38	3833	56.1	24.5	12.0	5	22.7	8	7	110.1
Minturki x Marquis	11502	93	7	24	36	4083	57.4	22.5	—	—	19.1	14	2	82.3
Minhardi x Minturki	8215	92	9	24	38	3933	56.3	21.7	10.6	11	19.2	13	7	97.2
Turkey x Minessa	8028	93	12	24	38	4017	55.9	20.8	11.4	8	21.0	11	7	104.6

Standard error of a difference, 1.79 bu.; standard error of a mean, 1.52 bu., or 4.09 percent.

STANDARD ERRORS

Standard errors have been calculated for yields where possible. The accuracy of these errors may be open to question since the plots were not randomized at most of the stations. Random arrangements were used at the Texas and Minnesota stations. Statisticians do not agree as to whether or not a generalized error obtained from non-randomized plots is of any use. From the agronomic standpoint it is felt that the statistic is of use, although it is realized that the value may not be entirely correct. Just how far wrong it may be is not known.

The analysis of variance was used for the 1939 yield data at each station. Total variance was obtained and from this was subtracted the variance due to varieties and due to replications, the remainder considered as due to error. To obtain the standard error of the mean, the square root of the mean square due to error, or the standard deviation, was divided by the square root of the number of replications for each variety. The standard error of a difference was obtained by multiplying the standard error of a mean by $\sqrt{2}$.

The standard error of an average of averages was determined by the formula -

$$S. E. = \pm \frac{1}{N} \sqrt{a^2 + b^2 + c^2 + \dots n^2}$$

where a, b, and c, ---n are the separate standard errors and N = the number of separate averages. The standard error in bushels may be expressed in percent by dividing the standard error by the mean yield and multiplying by 100. The summary of these standard errors is shown in table 2, together with the number of plots and average yields at each station.

Table 2. - Number of plots, average yield, and standard errors of the mean and difference for plot tests at each cooperating station, 1939

Station	No. of plots	Average yield of varieties	Standard error of a difference	Standard error of a mean in	
				Bushels	Percent
		(Bu.)	(Bu.)		
Texas:					
Denton	4	25.64	1.69	1.20	4.69
Chillicothe	4	31.57	1.40	0.99	3.14
Amarillo (dry)	4	12.71	1.32	0.93	7.32
(irrigated)	4	16.44	0.96	0.68	4.14
Oklahoma:					
Woodward	4	38.44	1.73	1.22	3.17
Goodwell	3	13.72	3.48	2.46	17.93
Stillwater	4	36.15	2.15	1.52	4.20
Kansas:					
Hays	3	13.15	1.57	1.11	8.44
Colorado:					
Akron	4	8.13	1.16	0.82	10.09
Nebraska:					
Lincoln	5	20.73	1.37	0.97	4.68
North Platte	5 1/2	25.24 ^{24.30}	1.07.37	0.76.97	3.01.99
Alliance	3	8.03	1.40	0.99	12.33
Minnesota:					
Waseca	3	39.56	2.52	1.78	4.50
St. Paul	3	46.31	1.98	1.40	3.02
Grand Rapids	3	30.80	1.61	1.14	3.70
North Dakota:					
Dickinson	2	14.75	0.74	0.52	3.53
Wyoming:					
Sheridan	3	41.89	2.98	2.11	5.04
Montana:					
Bozeman	3	58.72	4.01	2.84	4.83
Moccasin	4	33.82	1.44	1.02	3.02
Havre	3	31.00	1.79	1.52	4.09

SUMMARY OF YIELDS

The yields of the uniform, as well as other, varieties grown in cooperative experiments have been summarized for the different districts and States. Where possible, average yields are also shown for the complete period over which the test has been continued.

Districts

Summaries of the yield data for the uniform varieties grown in 1939 and the 1931-39 averages, where available, are presented in tables 3 to 8.

In the southern district in 1939, yields were reported from six stations. Ten varieties were grown uniformly at these stations, except that Kawvale was not included at Goodwell. The data are shown in table 3 where the varieties are listed in order of average yield. Kawvale x Tenmarq (C. I. 11669), Oro x Tenmarq (C. I. 11673), Quivira, and Chiefkan had the highest average yields. These strains are among the earliest of the varieties listed. Chiefkan and Blackhull again had averages nearly equal with Early Blackhull ranking just below them. The average yield of Early Blackhull is a little higher than has been the case in the past. Tenmarq ranked seventh which is lower than usual for this variety. At the bottom of the list appear Denton and Kharkof. The average yield for Kawvale is not comparable with the other varieties since it was not grown at Goodwell. An inspection of the data will show that this variety did not yield well in comparison with the other strains.

For the period 1931-39, averages are shown for six varieties (table 4). The varieties are listed in order of the weighted average yield based on the results of 51 station-year tests. The order of the varieties has not changed since 1938, Tenmarq and Quivira being at the top and Kawvale and Denton at the bottom. Quivira will be dropped from the list since it has been decided not to release the variety. In future reports, averages for shorter periods may be used in order to compare some of the newer varieties.

For the central district data were reported from five stations in 1939 (table 5). Cheyenne had the highest average yield, followed closely by Chiefkan and Oro x Tenmarq (C. I. 11673). The high rank of Cheyenne can be explained in part by the fact that of the five stations reporting three are in Nebraska, and the year 1939 was very favorable to the variety. Nebred ranked fourth and Tenmarq sixth. Kharkof and Blackhull gave the lowest average yields, although it is doubtful if any of the differences are significant. In table 6 the yields for six varieties grown at five stations are averaged. In this case Cheyenne and Tenmarq rank highest and Oro and Kharkof the lowest. Oro has not given an outstanding yield performance in the district and for that reason is being dropped from plot tests.

The yields obtained in the northern district in 1939 are presented in table 7. Data are presented from eight stations but the yields from St. Paul and Grand Rapids are not averaged because so few varieties were grown. Because of absence of winter-killing the less hardy varieties made a good showing. Nebred and Kharkof had the highest averages for the five stations, Minturki ranked fourth, Yogo fifth, and Minturki x Marquis (C. I. 11502) last. Relative yields as expressed in percentage of Kharkof showed the varieties to rank in the same order. In table 8 the data for the last three years are presented. The shorter period is used in order to compare the yields of some of the newer varieties. Owing to the fact that all varieties were not grown at the same stations a percentage of Minturki is shown and the varieties are ranked in the order of that figure. Nebred and Yogo rank highest with Kharkof and Minturki x Marquis (C. I. 11502) the lowest.

Table 3. - Summary of average yields of the uniform winter wheat varieties grown in plot tests at 6 stations in the southern district, 1939

Variety	C. I. No.	Average yield in bushels per acre at:						Average
		Denton	Amarillo	Chilllicothe	Stillwater	Woodward	Goodwell	
Kawvale x Tenmarq	11669	27.0	15.5	34.0	44.2	42.1	14.5	29.6—
Oro x Tenmarq	11673	30.9	13.3	32.5	42.8	37.5	16.2	28.9 —
Quivira	8886	26.7	13.3	33.6	42.6	38.7	16.4	28.6
Chiefkan	11754	28.9	13.6	30.1	39.8	41.4	13.4	27.9 —
Blackhull	6251	23.4	16.5	34.0	38.7	38.4	15.6	27.8
Early Blackhull	8856	24.1	18.2	33.2	33.5	38.2	15.4	27.1
Tenmarq	6936	26.5	10.7	33.4	33.8	36.4	14.5	25.9
Denton	8265	25.1	13.3	29.5	36.3	35.6	15.5	25.9
Kharkof	1442	22.8	11.6	28.8	32.8	39.5	15.5	25.2
Kawvale	8180	22.7	12.3	30.0	35.6	34.1	----	26.9 <u>1/</u>
Standard error of a mean (bu.)		1.20	0.93	0.99	1.52	1.22	2.46	0.60
Standard error of a mean (pct.)		4.69	7.32	3.14	4.20	3.17	17.93	3.48

1/ Excluding Goodwell.

Table 4. - Summary of average yields of 6 uniform winter wheat varieties grown in plot tests at 9 stations in the southern district for a part or all of the period, 1931-39

Variety	C.I. No.	Average yield in bushels per acre at:									Weighted average
		Denton	Bushland (Amarillo)	Chillicothe	Lawton	Stillwater	Carrier	Helena	Woodward	Goodwell	
No. of years grown		9	5	2	7	9	3	3	8	5	
Tenmarq	6936	31.1	16.4	27.2	23.6	29.0	27.8	19.2	28.4	23.0	26.0
Quivira	8886	32.1	16.4	26.4	24.1	29.4	22.5	20.3	28.4	21.4	25.9
Blackhull	6251	26.9	17.1	27.3	23.1	28.6 ^{1/2}	26.9	28.9 ^{1/2}	26.3	25.0	25.6
Kharkof	1442	24.1	17.0	23.6	23.4	28.7	27.3	17.4	28.1	26.5 ^{1/2}	24.8
Kawvale	8180	28.7	15.8	22.6	24.3	29.1	25.5	16.0	26.9	21.0 ^{1/2}	24.7
Denton	8265	27.4	16.2	23.7	22.2	30.1	25.0	17.7	23.5	20.4	23.9

1/ Grown 1 year less than shown for station.

Table 5. - Summary of average yields of 9 winter wheat varieties grown in uniform plot tests at 5 stations in the central district, 1939

Variety	C. I. No.	Av. yield in bushels per acre at:					Average
		Hays	Akron	Lincoln	North Platte	Alliance	
Cheyenne	8885	10.4	8.5	22.7	28.7	9.3	15.9
Chiefkan	11754	15.7	9.8	21.9	22.1	8.3	15.6
Oro x Tenmarq	11673	14.7	8.5	21.1	24.2	8.3	15.4
Nebred	10094	12.8	9.2	19.3	26.0	8.6	15.2
Oro	8220	11.9	7.9	19.8	26.5	8.8	15.0
Tenmarq	6936	15.4	9.0	20.0	21.1	9.6	15.0
Kawvale x Tenmarq	11669	14.8	6.7	22.7	21.9	6.9	14.6
Kharkof	1442	12.5	6.6	20.9	24.3	6.3	14.1
Blackhull	6251	12.0	8.8	20.1	22.4	7.2	14.1
Standard error of a mean (bu.)		1.11	0.82	0.97	0.76	0.99	0.42
Standard error of a mean (pct.)		8.44	10.09	4.68	3.01	12.33	3.77

Table 6. - Summary of average yields of uniform varieties of winter wheat grown in plot tests at 5 stations in the central district during all or part of the period, 1931-39

Variety	C. I. No.	Av. yield in bushels per acre at:					Weighted average
		Hays	Akron	Lincoln	North Platte	Alliance	
No. of years grown		4	4	9	6	3	
Cheyenne	8885	22.3	17.3	29.4	26.1	19.3	24.5
Tenmarq	6936	25.8	17.6	28.2	23.9	19.9	24.3
Nebred	10094	22.4	18.6	28.1	24.6	17.1	23.7
Blackhull	6251	23.3	16.9	27.3	23.8	18.0	23.2
Oro	8220	21.2	16.0	26.3	23.8	18.2	22.4
Kharkof	1442	21.2	15.5	27.2	23.8	15.7	22.4

Table 7. - Summary of average yields of 7 varieties of winter wheat grown in uniform plot tests at 8 stations in the northern district, 1939

Variety	C. I. No.	Average yield in bushels per acre at:									Percentage of Kharkof for same stations
		St. Paul	Waseca	Grand Rapids	Sheridan	Dick- inson	Bozeman	Moccasin	Havre	Average 1/	
Nebred	10094	----	40.4	----	44.9	16.2	62.8	31.9	28.1	37.4	100.5
Kharkof	1442	----	43.8	----	41.6	14.3	62.6	33.7	27.2	37.2	100.0
Minard x Minhardi	8888	45.2	40.3	29.7	38.2	17.8	67.2	32.6	24.7	37.0	98.9
Minturki	6155	45.8	36.8	34.1	40.0	16.2	61.3	34.6	24.5	36.7	95.7
Yogo	8033	----	36.8	31.7	36.4	15.6	60.9	35.9	26.7	34.9	95.2
Karmont	6700	----	----	----	37.3	11.7	60.0	33.7	27.8	----	95.0
Minturki x Marquis	11502	49.7	38.8	26.4	37.9	18.9	50.4	29.1	22.5	34.2	88.4
Standard error of a mean (bu.)		1.40	1.78	1.14	2.11	0.52	2.84	1.02	1.52	0.59	
Standard error of a mean (pct.)		3.02	4.50	3.70	5.04	3.53	4.83	3.02	4.09	1.43	

1/ Excluding St. Paul and Grand Rapids.

Table 8. - Summary of average yields of 7 uniform winter wheat varieties grown in plot test at 8 stations in the northern district during all or part of the period, 1937-1939

Variety	C. I. No.	Average yield in bushels per acre at:								Weighted average	Percentage of Minturki for years grown
		St. Paul	Waseca	Grand Rapids	Sheridan	Dickinson	Bozeman	Moccasin	Havre		
No. of years grown		3	3	2	3	2	3	3	2		
Nebred	10094	—	31.0	—	34.4	—	70.3	21.8	19.9	36.6	103.7
Yogo	8033	—	28.2	23.7	33.2	7.9	66.8	25.4	24.1	31.8	102.3
Minard x Minhardi	8888	33.0	30.6	20.4	32.5	9.0	67.2	22.8	21.7	31.5	101.3
Minturki	6155	31.3	28.8	24.5	32.0	8.5	65.2	23.4	22.7	31.1	100.0
Karmont	6700	—	—	—	30.6	5.9	—	24.4	24.6	22.6	98.7
Kharkof	1442	—	26.3	—	33.9	7.3	63.3	23.7	23.2	31.4	98.4
Minturki x Marquis	11502	32.2	29.1	19.9	30.9	—	59.3	—	19.1	33.3	94.1

States

In several of the States there were two or more cooperating stations from which data were received in 1939. At some of these stations only the uniform varieties were grown, while at others additional varieties were included. It has been the practice to summarize the data by States by averaging the yields from all stations within a State. In 1939, only one station reported yields in Colorado, Kansas, and Wyoming so no summaries are shown for these States.

In Texas, 14 varieties were grown at Bushland and Chillicothe and the yields and averages are shown in table 9. Early Blackhull, Blackhull, and Kawvale x Tenmarq (C. I. 11669) had the highest average yields. At the three stations (including Denton) Oro x Tenmarq (C. I. 11673), Kawvale x Tenmarq (C. I. 11669), and Early Blackhull had the highest average yields. In both cases Chiefkan ranked fairly well down the list. For a long-time average, including 16 station-years, Quivira, Tenmarq, and Kanred are the three highest yielding varieties at these three Texas stations.

Fourteen varieties were grown at two stations (Stillwater and Goodwell) in 1939 (table 10). At these stations Quivira, Oro x Tenmarq (C. I. 11673), and Kawvale x Tenmarq (C. I. 11669) ranked highest. Blackhull, Chiefkan, Cheyenne, and Tenmarq ranked somewhat lower in yield. For a 3-station average, which includes Woodward, Kawvale x Tenmarq (C. I. 11669), Quivira, and Oro x Tenmarq (C. I. 11673) yielded in the order mentioned. Based on 28 station-year results in Oklahoma, Kharkof, Cheyenne, Quivira, and Tenmarq are the highest in average yield. For the same set of comparisons Early Blackhull has the lowest average yield.

In Nebraska, 15 varieties were grown at both Lincoln and North Platte. These yields have been averaged and are shown in table 11 where the varieties are arranged in the order of this 2-station average. It will be seen that the later varieties are at the top of the list and some of the earlier ones at the bottom. The 3-station average includes the yields from Alliance, and the order of yield was changed very little. For a 22 station-year average extending from 1931 to 1939, Cheyenne, Tenmarq, and Turkey selection (C. I. 10016) had the highest average yields and Oro and Nebraska No. 60 the lowest. During the years 1936-39 the varieties may be compared in eight tests. In this comparison Kawvale x Tenmarq (C. I. 11669), Cheyenne, and Cheyenne selection had the highest average yields while Tenmarq and Blackhull were the lowest.

In Minnesota, six varieties were grown at three stations in 1939. These data are averaged and presented in table 12. Minhardi x Marquis (C. I. 11657) and Minturki x Marquis (Minn. 2552) both averaged higher than did Minturki. During the last three years (1937-39), eight comparisons can be made and in this case Minhardi x Marquis (C. I. 11657) has the highest average yield with Minard x Minhardi second, and Minturki third. Minturki x Marquis (C. I. 11501) has the lowest average yield for the same period.

Ten varieties were grown at Bozeman and Moccasin, Montana, and the averages for these varieties are shown in table 13. Cheyenne, Yogo, and Minturki had the highest average yields. Including Havre it is possible to compare eight varieties, of these Yogo, Newturk, Nebred, and Karmont having the highest averages, and Minturki x Marquis (C. I. 11502) the lowest.

Table 9. - Average yield in bushels per acre of winter wheat varieties grown in plot tests in Texas in 1939, and weighted averages for 1931-39

Variety	C. I. No.	Average yield in bushels				
		1939 2 stations	1939 3 stations	Rank	1931-39 16 station -years	Rank
Early Blackhull	8856	25.7	25.2	3	----	-
Blackhull	6251	25.3	24.6	4	23.9	4
Kawvale x Tenmarq	11669	24.8	25.5	2	----	-
Quivira	8886	23.5	24.5	5	26.5	1
Oro x Tenmarq	11673	22.9	25.6	1	----	-
Martin x Tenmarq	11805	22.2	24.0	7	----	-
Tenmarq	6936	22.1	23.5	8	26.0	2
Chiefkan	11754	21.9	24.2	6	----	-
Kanred	5146	21.4	22.1	10	24.2	3
Denton	8265	21.4	22.6	9	23.4	6
Kawvale	8180	21.2	21.7	11	23.9	4
Cheyenne	8885	20.6	----	-	----	-
Kharkof	1442	20.2	21.1	12	21.8	7
Turkey	1558	20.0	----	-	----	-

Table 10. - Average yield in bushels per acre of winter wheat varieties grown in plot tests in Oklahoma in 1939, and weighted averages for 1931-39

Variety	C. I. No.	Average yield in bushels				
		1939 2 stations	1939 3 stations	Rank	1931-39 28 station -years	Rank
Quivira	8886	29.5	32.6	2	27.2	2
Oro x Tenmarq	11673	29.5	32.2	3	----	-
Kawvale x Tenmarq	11669	29.4	33.6	1	----	-
Blackhulll	6251	27.2	30.9	6	----	-
Chiefkan	11754	26.6	31.5	4	----	-
Denton	8265	25.9	29.2	9	25.3	6
Sibley No. 62	11523	25.1	29.6	7	----	-
Cheyenne	8885	25.1	31.1	5	27.2	2
Early Blackhull	8856	24.5	29.0	10	23.8	7
Kharkof	1442	24.2	29.3	8	27.4	1
Tenmarq	6936	24.2	28.3	11	27.1	4
Penquite selection	11745	23.1	----	-	----	-
Kanred	5146	22.5	28.3	11	26.7	5
Sibley No. 81	10084	21.4	----	-	----	-

Table 11. -- Average yield in bushels per acre of winter wheat varieties grown in plot tests in Nebraska in 1939, and weighted averages for 1931-39 and 1936-39

Variety	C. I. No.	Average yield in bushels						
		1939 2 stations	1939 3 stations	Rank	1931-39 22 station -years	Rank	1936-39 8 station -years	Rank
Cheyenne	8885	25.7	20.2	1	24.7	1	20.0	2
Cheyenne selection	11666	24.6	19.1	2	---	--	19.7	3
Nebraska No. 60	6250	24.0	18.5	3	22.7	6	18.9	5
Kawvale x Tenmarq	11750	23.4	---	--	---	--	---	--
Oro	8220	23.2	18.4	4	22.6	7	18.1	8
Oro x Tenmarq	11672	23.0	---	--	---	--	---	--
Nebred	10094	22.7	18.0	5	---	--	19.1	4
Oro x Tenmarq	11673	22.7	17.9	6	---	--	---	--
Kharkof	1442	22.6	17.2	8	22.8	4	18.5	6
Kawvale x Tenmarq	11669	22.3	17.2	8	---	--	20.1	1
Chiefkan	11754	22.0	17.4	7	---	--	---	--
Kanred	5146	21.8	---	--	---	--	---	--
Blackhull	6251	21.3	16.6	12	22.8	4	17.6	10
Turkey selection	10016	20.8	17.1	10	23.0	3	18.2	7
Tenmarq	6936	20.6	16.9	11	23.3	2	18.0	9

Table 12. - Average yield in bushels per acre of winter wheat varieties grown in plot tests in Minnesota in 1939, and weighted averages for 1937-39

Variety	C. I. No.	Average yield in bushels		Rank
		1939 3 stations	1937-39 8 station -years	
Minharid x Marquis	11657	40.6	29.8	1
Minturki x Marquis (Minn. 2552)	-----	39.0	28.0	4
Minturki	6155	38.9	28.7	3
Minard x Minhardi	8888	38.4	28.9	2
Minturki x Marquis	11501	38.4	27.3	6
Do	11502	38.3	28.0	4

Table 13. - Average yield in bushels per acre of winter wheat varieties grown in plot tests in Montana in 1939, and weighted averages for the period 1931-39

Variety	C. I. No.	Average yield in bushels				
		1939 2 stations	1939 3 stations	Rank	1931-39 23 station-years	Rank
Cheyenne	8885	53.5	-----	-	-----	-
Yogo	8033	48.4	41.2	1	35.1	1
Minturki	6155	48.0	40.1	5	32.3	3
Nebred	10094	47.4	40.9	3	-----	-
Newturk	6935	47.3	41.2	1	31.5	4
Karmont	6700	46.9	40.5	4	-----	-
Kharkof	1442	46.4	40.0	6	32.7	2
Minard x Minhardi	8888	45.6	38.6	7	-----	-
Eureka x Minhardi	8036	44.0	-----	-	-----	-
Minturki x Marquis	11502	39.8	34.0	8	-----	-

SUMMARY OF AGRONOMIC DATA

The agronomic data other than yield have been summarized for each district in tables 14 to 16. In each case the data are averaged for as many varieties and from as many stations as possible. The number of stations entering the average is shown at the top of each column. The amount of data summarized this year is smaller than usual since so few differential characters could be studied.

The data for the southern district are presented in table 14. Average dates of heading varied from April 30 for Early Blackhull to May 14 for Kharkof, a spread of 15 days. Oro x Tenmarq (C. I. 11673), Quivira, and Kawvale x Tenmarq (C. I. 11669) were about a week later in heading than was Early Blackhull. Tenmarq averaged one day later than Blackhull. Date of ripening shows the same general order of maturity, only the spread is not as great. Average heights do not vary a great deal. Kawvale x Tenmarq (C. I. 11669) was the shortest and Denton and Chiefkan the tallest variety. As is invariably the case the three varieties Chiefkan, Blackhull, and Early Blackhull had the highest test weights per bushel. Kawvale, Kawvale x Tenmarq (C. I. 11669), and Tenmarq averaged about two pounds per bushel lower than the Blackhulls.

The central district data are averaged for nine varieties and are presented in table 15. The two hybrid strains, Oro x Tenmarq (C. I. 11673) and Kawvale x Tenmarq (C. I. 11669), were two days earlier than Chiefkan, Blackhull, and Tenmarq. Oro and Kharkof were the latest, Cheyenne and Nebred being slightly earlier. Ripening dates show the same relationship. Cheyenne and Nebred were the shortest, while Chiefkan and Tenmarq were the tallest. Chiefkan, Blackhull, and

Cheyenne had the highest averages for test weight per bushel, while Tenmarq and Kawvale x Tenmarq (C. I. 11669) had the lowest averages.

For the northern district the data are summarized in table 16. Winter survivals were reported from three stations and the averaged do not show a very wide range. For date of heading, Nebred and Minturki x Marquis (C. I. 11502) were the earliest and Yogo the latest. There were differences of only one day for the average ripening dates. For height Nebred averaged four inches shorter than any other variety and seven inches shorter than Yogo and Minturki which had the tallest straw. Stem rust was reported from two stations, Kharkof and Nebred having the highest averages. Kharkof had the most leaf rust and Yogo the least. There was a relatively narrow spread between the average test weights with Nebred, Minard x Minhardi (C. I. 8888) and Minturki x Marquis (C. I. 11502) having the highest averages and Minturki and Yogo the lowest.

Table 14. - Summary of agronomic data other than yield for winter wheat varieties grown at the cooperating stations in the southern district in 1939

Variety	C. I. No.	Average			Test weight per bushel
		Date		Height	
		Headed	Ripe		
No. of stations		5	5	5	6
		(June)	(June)	(In.)	(Lbs.)
Kharkof	1442	May 14	13	28.4	56.6
Tenmarq	6936	May 10	11	30.0	55.9
Blackhull	6251	May 9	10	30.4	57.7
Quivira	8886	May 7	7	29.8	56.8
Early Blackhull	8856	Apr. 30	4	31.0	57.6
Chiefkan	11754	May 9	11	32.0	58.8
Oro x Tenmarq	11673	May 7	9	29.0	56.5
Kawvale x Tenmarq	11669	May 8	10	28.0	55.7
Denton	8265	May 12	12	32.2	56.3
Kawvale	8180	May 11 ¹ / ₂	9 ¹ / ₂	30.5 ¹ / ₂	55.6 ¹ / ₂

1/ Excluding Goodwell, Okla.

Table 15. - Summary of agronomic data other than yield for winter wheat varieties grown at the cooperating stations in the central district in 1939

Variety	C. I. No.	Average			
		Date		Height	Test weight per bushel
		Headed	Ripe		
No. of stations		5	5	5	5
		(May)	(June)	(In.)	(Lbs.)
Kharkof	1442	29	28	23.2	57.4
Tenmarq	6936	25	26	24.2	57.0
Blackhull	6251	25	25	23.2	58.8
Oro	8220	29	28	23.2	58.0
Cheyenne	8885	27	27	22.2	58.8
Chiefkan	11754	25	25	24.6	59.4
Oro x Tenmarq	11673	23	24	23.2	58.2
Kawvale x Tenmarq	11669	23	24	22.6	57.2
Nebred	10094	27	26	22.2	58.0

Table 16. - Summary of agronomic data other than yield for winter wheat varieties grown at the cooperating stations in the northern district in 1939

Variety	C. I. No.	Average						Test weight per bu.
		Winter survival	Date		Hgt.	Rust		
			Headed	Ripe		Stem	Leaf	
No. of stations		3	4	5	6	2	2	5
		(Pct.)	(June)	(July)	(In.)	(Pct.)	(Pct.)	(Lbs.)
Kharkof	1442	87	22	29	41.0	14	40	58.6
Minturki	6155	87	22	30	43.8	7	48	57.8
Yogo	8033	81	24	30	44.0	7	40	57.9
Karmont	6700	87 ^{1/}	22	30	41.6 ^{1/}	--	--	58.2
Minturki x Marquis	11502	83	20	30	42.7	7	45	59.4
Minard x Minhardi	8888	83	22	30	41.0	9	45	59.5
Nebred	10094	80	19	29	37.3	10	55	59.7

^{1/} Excluding Waseca.

SUMMARY OF PLOT DATA

The 1939 crop was not subjected to as many hazards as was the case in 1938. At most stations the data reported were confined to dates of maturity, height, test weight per bushel, and yield.

Stem rust was reported in Texas rather early but failed to spread because of unfavorable climatic and plant conditions. Some leaf rust was reported but the amount was much less than in 1938.

In the southern district Kawvale x Tenmarq (C. I. 11669) made a very good yield record. This wheat is early but is inclined to shatter and there is some question as to its milling and baking characteristics. Oro x Tenmarq (C. I. 11673) ranked second in the district.

In the central district yields were low, with Cheyenne ranking first and Chiefkan second. Cheyenne gave a good yield at nearly all stations tested, just the reverse of the past years.

Results from the northern district are somewhat different than in previous years in that Nebred and Kharkof outyielded such varieties as Yogo, Minturki, and some of the newer hybrids.

Chiefkan was fairly high in yield in most cases but not so high as in 1938. It did continue to give grain of high test weight.

Nebred did not yield as well as expected in the central but was unusually high in the northern district. The variety seems to be sensitive to heat and drought in the early spring, and at heading time.

In the central part of the area early wheats continue to give high yields, the result being that selection is going more and more to such types and away from the later, more hardy wheats. This is a most interesting, although slightly disturbing trend.

UNIFORM YIELD NURSERY

In the fall of 1938 the uniform yield nursery was seeded at the same 13 stations in the central and southern districts as in 1937. The nursery at Amarillo, was moved to the new station at Bushland, Texas. The nursery consisted of 30 varieties and strains, each seeded in three rod-row plots. The number of plots of each variety at a station varied from three to five. In table 17 the varieties making up the 1939 nursery, together with State and C. I. numbers, are shown.

A comparison of the 1939 list with that of 1938 will show a number of changes in the nursery. Seven strains which seemed to be lacking in agronomic value and which were not needed for ecological studies were replaced by newer selections. As soon as a strain is shown to be lacking in some important character it is omitted from the nursery, although it still may be continued at individual stations. The strains having the best performance in the nursery are advanced to plot trials. An attempt is also made to avoid too many duplications between plot and nursery tests.

Table 17. -- Varieties of winter wheat grown in the uniform yield nursery, 1939

Variety	C. I. No.	State No.
Kharkof	1442	-----
Blackhull	6251	-----
Early Blackhull	8856	-----
Nebred	10094	Nebr. No. 1063
Sibley No. 62	11523	Oklahoma
Kanred x Marquis	11589	Kans. No. 2690
Kanred x Hope-Hard Federation	11843	Akron No. 537
Minturki x Blackhull	11671	Nebr. No. 1089
Early Blackhull Hybrid	11846	Hays Cereal No. 366
Tenmarq x Nebraska No. 28	11847	Woodward No. 1094
Oro x Tenmarq	11672	Kans. No. 2728
Oro x Tenmarq	11673	Kans. No. 2729
Cheyenne selection	11666	Nebr. No. 1087
Kanred x Blackhull	11844	Nebr. No. 1098
Kanred x Marquis	11746	Akron sel. No. 46
Turkey x Marquis	11747	Akron sel. No. 49
Turkey selection	11577	Nebr. No. 1081
Oro x Fulhard	11579	Nebr. No. 1083
Minturki x Blackhull	11815	Nebr. No. 1099
Kawvale x Tenmarq	11669	Nebr. No. 1086
Kawvale x Tenmarq	11750	Kans. No. 2727
Blackhull selection	11737	Nebr. No. 1093
Tenmarq x Minturki	11580	Nebr. No. 1094
Kawvale x Tenmarq	11950	Kans. No. 2726
Kawvale x Tenmarq	11951	Kans. No. 2735
Early Blackhull x Tenmarq	11952	Kans. No. 2739
Martin x Tenmarq ³	11805	Denton No. 50-33-63
Kawvale x Tenmarq	11953	Denton No. 35-34-96
Kanred-Hard Federation x		
Minhardi-Minturki	11970	Akron No. 130
Ft. Collins selection	11971	Ft. Collins 1143

DATA OBTAINED

In table 18 are presented the data from the 13 nurseries. The 30 varieties were grown in all of these nurseries except at Stillwater, Okla., where two strains were discarded. For each station the varieties are listed in order of the 1939 yields. The average yields and ranks for the 4-year period (1936-39) and the 2-year period (1938-39) are given wherever possible. A percentage of Kharkof (C. I. 1442) is also shown for each variety so that comparisons may be made between varieties grown for varying lengths of time. Data other than yield are given when the character concerned seemed to be related to yield or when the data showed differences believed to be of interest.

At Denton, there was a fairly heavy epidemic of leaf rust, but very little stem rust developed. Hybrid strains with either Kawvale or Tenmarq, or both, as parents gave the highest yields. It would seem that the leaf rust resistance of these wheats was partly responsible for the higher yields at this station. As usual, the Turkey type wheats gave the lowest yields, and in some cases yielded less than half as much as the early strains. For the 2-year period (1938-39) Kawvale x Tenmarq (C. I. 11750) and Oro x Tenmarq (C. I. 11672) show the highest yields. These strains have been high in yield for the three years they have been grown. For a 4-year period (1936-39), Kawvale x Tenmarq (C. I. 11669), Early Blackhull, and Kanred x Marquis (C. I. 11589) ranked highest.

Several of the more susceptible varieties showed leaf rust infection at Chillicothe, although in no case was the infection heavy. Test weights were good and yields ranged between 18 and 37 bushels

per acre. At the top of the list for 1939 yield are Nebred, Early Blackhull, and Blackhull. There seemed to be little relation between earliness and yield in 1939. Yields have been reported from Chillicothe for two years and during this time Nebred, Blackhull, and Tenmarq x Nebraska No. 28 had the highest averages. The results for the two years are none too consistent, but after a few years some idea will be obtained as to the type of variety best adapted to this station.

Straw was fairly short, and test weights were all below 59 pounds per bushel at Bushland. Yields ranged from 13 to 22 bushels per acre. There seems to be a tendency for the early wheats to give the higher yields although there were exceptions. Based on a 3-year average, two years at Amarillo and one year at Bushland, Kawvale x Tenmarq (C. I. 11669), Blackhull selection (C. I. 11737), and Blackhull had the best records for yield.

At Stillwater, data were obtained for date of heading, height, test weight, and yield. All varieties headed within four days, Early Blackhull x Tenmarq (C. I. 11952) and Early Blackhull being the earliest. Growth was fairly good although heat and drought tended to reduce the test weights of the later varieties. The highest yields were produced by Early Blackhull x Tenmarq (C. I. 11952), Kawvale x Tenmarq (C. I. 11950), and Early Blackhull. Nine strains outyielded Blackhull, while Nebred and Kharkof were well down the list. For the period 1936-39, Blackhull, Kawvale x Tenmarq (C. I. 11669), and Sibley No. 62 have given the highest average yields. For the last two years the varieties that had the highest average yields were Oro x Tenmarq (C. I. 11672), Oro x Tenmarq (C. I. 11673), and Kawvale x Tenmarq (C. I. 11669).

At Woodward, Early Blackhull and Early Blackhull x Tenmarq were four days earlier than any other variety and seven days earlier than Kharkof. Two Kawvale x Tenmarq selections (C. I. 11950 and 11953) and Early Blackhull x Tenmarq had the highest yields. These wheats were being grown in the nursery for the first time in 1939. Based on an average for the last two years Kawvale x Tenmarq (C. I. 11669 and 11750) and Tenmarq x Minturki (C. I. 11580) have ranked the highest. Seventeen wheats average higher than Blackhull for this same period. For a 4-year period Kawvale x Tenmarq (C. I. 11669), Kanred x Marquis (C. I. 11588), and Oro x Fulhard (C. I. 11579) have given the best yields, although all were down slightly in 1939.

The data from Manhattan are presented but the yields are not used in any averages. A hailstorm on June 7 caused considerable damage both as broken straw and shattered kernels. From the estimates of damage it appears that the later varieties were injured the least, as might be expected. Strains having Kawvale as one parent seemed to show the higher percents of shattered grain. Leaf rust readings ranged from 5 percent for Kawvale x Tenmarq (C. I. 11953) to 90 percent for Blackhull. To show the past performance at this station an average yield for 1937-38 is presented, as well as a percentage of Kharkof, excluding 1939. For the 2-year period Oro x Tenmarq (C. I. 11672), Kawvale x Tenmarq (C. I. 11750), and Oro x Tenmarq (C. I. 11673) gave the highest average yields, while for a 7-year period Nebred has the largest percentage of Kharkof.

At Hays, straw was short and yields ranged from 20 down to 8.9 bushels per acre. Again the early wheats ranked at the top of the list. Two Kawvale x Tenmarq selections (C. I. 11951 and 11950), Early Blackhull, and two Oro x Tenmarq strains (C. I. 11672 and 11673) gave the highest yields. Several strains grown for the first time gave yields double that of Kharkof. All of the later varieties were well down the list. For the last two years Kawvale x Tenmarq (C. I. 11669 and 11750) and Tenmarq x Nebraska No. 28 gave the best yield records. For a 4-year average the highest-yielding strains were Kawvale x Tenmarq (C. I. 11669), Kanred x Marquis (C. I. 11589), Kanred x Marquis (C. I. 11746), and Blackhull. Some of these strains yielded rather poorly in 1939.

The nursery at Akron was below average, the yields ranging from 12.5 to approximately 6 bushels per acre. Grain quality was poor, the test weights ranging from 52 to 57 pounds per bushel. There seemed to be no close relation between time of maturity and yield. Several early hybrid strains appear at the top of the list, but Cheyenne selection and Kanred x Blackhull, both slightly later, were well up in yield. Most of the wheats in the nursery outyielded Kharkof. For the last two years the two Kawvale x Tenmarq strains (C. I. 11750 and 11669) rank highest, followed by Tenmarq x Minturki (C. I. 11580) and Cheyenne selection. At this station during recent years the early wheats have been at a distinct advantage due to absence of winter-killing and lack of moisture. For the last four years Kawvale x Tenmarq (C. I. 11669), Kanred x Marquis (C. I. 11589), and Cheyenne selection have had the highest average yields.

The crop at Fort Collins was as good as usual with considerable lodging present. The strains having the strongest straw were Fort Collins selection, Kawvale x Tenmarq (C. I. 11951, 11950, and 11750), and Kanred x Marquis (C. I. 11589). The weaker-strawed strains were Nebred, Blackhull selection, Cheyenne selection, and Sibley No. 62. Kanred x Blackhull (C. I. 11844), Kawvale x Tenmarq (C. I. 11950), and Fort Collins selection gave the highest yields. Kharkof, Nebred, and Blackhull yielded considerably less than the leading varieties. Considering the yields for the years grown as expressed in percentage of Kharkof only 15 of the varieties have a percentage greater than 100. This is different than at a number of the stations where new strains have outyielded Kharkof by such wide margins.

At Hesperus, Colo., yields were rather variable, ranging from 60.5 for Oro x Tenmarq (C. I. 11673) to 27.2 bushels for Early Blackhull. Fort Collins selection, Oro x Fulhard (C. I. 11579), and Kanred x Blackhull all gave good yields. For the 2-year period during which a nursery has been grown at this station, Oro x Tenmarq (C. I. 11673), Kanred x Blackhull (C. I. 11844), Turkey selection (C. I. 11577), and Oro x Fulhard (C. I. 11579) have the best averages. Early Blackhull has made a very poor showing during this same period.

Some winter-killing was recorded at Lincoln but in no case was it serious and it seems to have had little influence on yield. The usual notes on maturity and height were recorded but no rust was present. The nursery was grown on fallow, which probably accounts for the fairly high yields, in spite of dry weather. Test weights and plumpness figures showed considerable variation in grain quality, indicating that there was not sufficient moisture to finish the crop.

At the top of the list will be noted an unbroken series of early strains, 15 strains yielding more than Nebred. At the bottom of the list will be found the later varieties, which undoubtedly suffered from heat and drought. For the last two years Kawvale x Tenmarq (C. I. 11669), Oro x Tenmarq (C. I. 11672), Oro x Tenmarq (C. I. 11673), and Kawvale x Tenmarq (C. I. 11750) have the highest average yields and all of these are early varieties. For this same period Nebred ranks ninth. For the 4-year average the earlier varieties have the best yield records.

Some winter-killing was recorded at North Platte, although no variety survived less than 87 percent. Plant heights varied from 28 to 34 inches. The test weights of some varieties were above 60 pounds per bushel while others dropped considerably lower. There was a tendency for early varieties to yield the most, with a number of Tenmarq hybrids at the top of the list. Twelve strains yielded more than Nebred and Blackhull was next to the bottom. Based on an average of four years Kawvale x Tenmarq (C. I. 11669), Kanred x Marquis (C. I. 11589), Early Blackhull, and Turkey selection (C. I. 11577) ranked highest for yield. For the last two years Kawvale x Tenmarq (C. I. 11669), Oro x Tenmarq (C. I. 11672), and Early Blackhull had the highest average yields. For many years there has been a feeling that varieties of this type are too winter-tender for North Platte, but these data indicate that in the absence of winter-killing an early variety is at an advantage, especially when moisture becomes deficient prior to harvest.

The Alliance nursery was grown on land that had been fallowed for four years, thus accounting for the relatively high yields. Some varieties showed winter-killing but in no case was it serious. All varieties headed within a period of seven days and the ripening period was shortened to three days by the hot, dry weather. Test weights were all above 60 pounds per bushel. Six early hybrid strains produced yields above Nebred, although it is doubtful if the differences are significant. Blackhull and Kharkof were well down in the list. Of the varieties grown for five years Nebred had the best average yield. For the last two years Cheyenne selection (C. I. 11666), Blackhull selection (C. I. 11737), and Kawvale x Tenmarq (C. I. 11750) had the highest yields. For this same 2-year period Nebred ranked eighth and Blackhull sixteenth. It must be remembered that no crop was harvested at Alliance between 1934 and 1938.

STANDARD ERRORS

Standard errors were calculated for each station as outlined on page 36 of this report. In table 19 will be found the number of plots, average yields, and standard errors for the uniform nursery grown at each of the twelve stations. No errors were calculated for Manhattan because the yields are not being used.

Table 18. - Agronomic and other data for the uniform winter-wheat varieties grown in replicated nursery plots in cooperative experiments at 13 stations in the winter-wheat area, 1939, and average yields for 1936-39

Denton, Texas

(Four plots)

Variety	C. I. No.	Date		Hgt. (In.)	Rust		Av. acre yield (Bu.)	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed	Ripe		Leaf (Pct.)	Stem (Pct.)		Av. 1936-39 (Bu.)	Rank	Av. 1938-39 (Bu.)	Rank		
Kawvale x Tenmarq	11951	May	6 June	3	37	18	5	37.0	---	---	---	1	191.7
Oro x Tenmarq	11672	May	7 June	4	36	18	2	33.5	---	---	---	3	204.3
Kawvale x Tenmarq	11750	May	6 June	3	37	14	1	33.4	---	---	---	3	215.2
Do	11950	May	7 June	3	37	13	5	33.3	---	---	---	1	172.5
Early Blackhull x Tenmarq	11952	Apr.	28 May	31	37	49	3	32.1	---	---	---	1	166.3
Martin x Tenmarq ³	11805	May	9 June	7	36	28	5	31.4	---	---	---	1	162.7
Kawvale x Tenmarq	11669	May	6 June	3	36	23	2	30.7	34.8	33.3	3	4	161.3
Early Blackhull	8856	Apr.	27 May	30	38	56	T	30.5	33.0	32.1	5	7	152.9
Kanred x Marquis	11589	May	6 June	4	36	23	4	29.9	32.3	30.7	7	5	157.7
Kawvale x Tenmarq	11953	May	9 June	4	34	13	T	28.9	---	---	---	1	149.7
Tenmarq x Nebraska No. 28	11847	May	8 June	3	37	40	3	28.6	---	32.0	6	2	213.3
Oro x Tenmarq	11673	May	6 June	4	35	15	3	27.4	---	32.8	4	3	201.8
Blackhull	6251	May	9 June	3	36	70	2	26.7	25.6	20.4	15	7	115.2
Kanred x Blackhull	11844	May	7 June	6	37	63	6	26.7	---	24.6	10	2	164.0
Tenmarq x Minturki	11580	May	8 June	5	36	49	6	26.6	---	29.5	8	3	182.3
Early Blackhull Hybrid	11846	May	7 June	6	38	51	4	25.8	---	26.5	9	2	176.7
Kanred x Marquis	11746	May	10 June	7	36	43	4	25.4	26.2	21.9	13	4	121.3
Minturki x Blackhull	11671	May	10 June	6	38	55	5	25.0	27.0	21.9	13	4	125.0
Kanred-Hard Federation x Minhardi-Minturki	11970	May	6 June	3	39	53	8	23.7	---	---	---	1	122.8
Blackhull selection	11737	May	10 June	6	36	75	3	23.6	---	20.2	16	3	142.1
Minturki x Blackhull	11815	May	9 June	7	38	64	4	23.6	---	22.7	12	2	151.3
Sibley No. 62	11523	May	12 June	7	34	71	5	22.0	25.1	19.0	17	5	127.4
Kanred x Hope-Hard Federation	11843	May	4 June	3	31	49	T	21.5	---	23.4	11	2	156.0
Oro x Fulhard	11579	May	10 June	6	34	66	4	19.8	23.1	15.9	18	4	106.9
Kharkof	1442	May	13 June	10	35	74	5	19.3	21.6	15.0	21	7	100.0
Turkey x Marquis	11747	May	9 June	7	36	74	6	18.9	23.7	15.6	19	4	109.7
Fort Collins selection	11971	May	7 June	5	31	74	T	18.1	---	---	---	1	93.8
Nebred	10094	May	11 June	6	33	79	3	17.8	23.1	15.1	20	7	98.0
Cheyenne selection	11666	May	11 June	7	31	85	5	15.9	22.1	13.1	22	4	102.3
Turkey selection	11577	May	10 June	8	31	78	5	15.8	21.0	11.4	23	4	97.2

Standard error of a difference, 2.42 bu.; standard error of a mean, 1.71 bu., or 6.63 percent.

Table 18, - (Continued)

Chillicothe, Texas

(Four plots)

Variety	C. I. No.	Date		Hgt.	Leaf rust	Test wt. per bu.	Av. acre yield	Yield		No. of years grown	Percentage of Kharkof for same years
		Headed	Ripe					Av. yield	Rank		
		(June)	(In.)	(Pct.)	(Lbs.)	(Bu.)	(Bu.)				
Nebred	10094	May	5 6	29	25	60	36.9	27.6	1	2	140.8
Early Blackhull	8856	Apr. 27	2 2	30	15	61	31.7	23.1	8	2	117.9
Blackhull	6251	May	5 6	31	10	59	30.5	24.9	2	2	127.0
Minturki x Blackhull	11815	May	9 7	36	0	59	28.9	22.4	12	2	114.3
Sibley No. 62	11523	May	9 8	34	0	60	28.8	22.8	9	2	116.3
Kawvale x Tenmarq	11953	May	5 6	29	0	58	28.6	-----	-----	1	124.3
Kanred x Marquis	11589	May	5 6	31	0	60	28.0	22.8	9	2	116.3
Oro x Tenmarq	11672	May	9 7	26	0	61	28.0	22.4	12	2	114.3
Kawvale x Tenmarq	11669	May	5 6	25	0	60	27.9	23.7	6	2	120.9
Oro x Tenmarq	11673	May	5 6	26	0	59	27.7	23.9	5	2	121.9
Tenmarq x Nebraska No. 28	11847	May	9 7	28	0	60	27.7	24.9	2	2	127.0
Martin x Tenmarq ³	11805	May	5 6	30	0	59	27.6	-----	-----	1	120.0
Blackhull selection	11737	May	9 7	28	0	60	27.5	23.6	7	2	120.4
Kawvale x Tenmarq	11750	May	5 6	27	0	59	26.6	21.7	15	2	110.7
Kanred x Hope-Hard Federation	11843	May	3 5	30	10	60	26.4	22.0	14	2	112.2
Kanred x Marquis	11746	May	9 7	28	0	60	26.3	22.6	11	2	115.3
Kanred x Blackhull	11844	May	3 5	29	0	60	26.3	24.4	4	2	124.5
Oro x Fulhard	11579	May	5 6	31	25	61	26.1	21.3	20	2	108.7
Kanred-Hard Federation x Minhardi-Minturki	11970	May	2 4	31	0	60	25.7	-----	-----	1	111.7
Turkey selection	11577	May	9 9	32	35	58	25.5	21.4	19	2	109.2
Cheyenne selection	11666	May	9 7	25	0	61	25.1	21.6	16	2	110.2
Minturki x Blackhull	11671	May	9 7	31	0	59	24.7	21.5	17	2	109.7
Turkey x Marquis	11747	May	9 7	29	10	60	24.6	21.5	17	2	109.7
Kawvale x Tenmarq	11951	May	5 6	27	0	60	24.0	-----	-----	1	104.3
Tenmarq x Minturki	11580	May	5 6	27	0	60	23.6	21.3	20	2	108.7
Kharkof	1442	May	9 10	31	0	61	23.0	19.6	22	2	100.0
Early Blackhull x Tenmarq	11952	May	1 2	29	0	62	21.1	-----	-----	1	91.7
Fort Collins selection	11971	May	5 6	29	10	58	20.9	-----	-----	1	90.9
Kawvale x Tenmarq	11950	May	5 6	28	0	59	20.2	-----	-----	1	87.8
Early Blackhull Hybrid	11846	May	3 4	28	0	61	18.4	17.8	23	2	90.8

Standard error of a difference, 4.23 bu.; standard error of a mean, 2.99 bu.,
or 11.38 percent.

Table 18. - (Continued)

Bushland, Texas

(Three plots)

Variety	C. I. No.	Date		Height (In.)	Kernel plump- ness (Pct.)	Test weight per bu. (Lbs.)	Av. acre yield (Bu.)	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed (May)	Ripe (June)					Av. 1937-39 (Bu.)	Rank	Av. 1938-39 (Bu.)	Rank		
Early Blackhull	8856	6	10	23	80	57.3	22.4	15.1	12	21.0	6	3	107.9
Blackhull selection	11737	18	16	22	83	58.2	22.4	18.0	2	22.8	1	3	128.6
Early Blackhull x Tenmarq	11952	7	11	22	81	55.7	22.1	-----	-	-----	-	1	156.7
Kawvale x Tenmarq	11669	17	15	23	68	53.5	21.4	18.2	1	22.7	2	3	130.0
Do	11950	17	17	23	70	52.2	19.3	-----	-	-----	-	1	136.9
Kanred-Hard Federation x Minhardi-Minturki	11970	14	13	23	80	54.3	19.1	-----	-	-----	-	1	135.5
Tenmarq x Nebraska No. 28	11847	18	18	24	71	54.5	18.8	-----	-	18.0	17	2	105.3
Oro x Tenmarq	11672	16	15	23	73	53.0	18.5	16.6	6	22.1	4	3	118.6
Blackhull	6251	17	16	23	80	55.8	18.0	17.5	3	21.1	5	3	125.0
Kanred x Blackhull	11844	19	17	21	77	53.5	18.0	-----	-	18.6	15	2	108.8
Fort Collins selection	11971	18	18	21	70	53.1	18.0	-----	-	-----	-	1	127.7
Cheyenne	11666	20	17	20	78	54.7	17.9	15.5	9	19.7	9	3	110.7
Oro x Tenmarq	11673	17	16	21	76	53.2	17.9	16.5	8	19.6	12	3	117.9
Tenmarq x Minturki	11580	19	17	22	73	53.7	17.8	16.6	6	20.1	8	3	118.6
Martin x Tenmarq ³	11805	18	16	23	70	49.8	17.8	-----	-	-----	-	1	126.2
Kawvale x Tenmarq	11951	16	15	21	76	54.5	17.8	-----	-	-----	-	1	126.2
Nebred	10094	20	18	21	73	54.5	17.6	14.8	13	19.7	9	3	105.7
Kanred x Marquis	11589	18	16	22	75	53.5	17.4	15.3	11	19.6	12	3	109.3
Kawvale x Tenmarq	11750	19	17	24	67	50.7	17.3	15.4	10	19.1	14	3	110.0
Sibley No. 62	11523	19	18	22	77	54.3	16.8	16.9	5	20.5	7	3	120.7
Early Blackhull Hybrid	11846	17	15	23	77	52.7	16.6	-----	-	18.2	13	2	106.4
Kawvale x Tenmarq	11953	19	17	19	71	51.8	16.5	-----	-	-----	-	1	117.0
Kanred x Hope-Hard Federation	11843	16	15	22	67	51.8	16.2	-----	-	17.0	21	2	99.4
Turkey selection	11577	20	18	21	69	53.2	15.6	14.6	14	19.7	9	3	104.3
Minturki x Blackhull	11915	20	17	23	72	54.5	15.3	-----	-	16.2	23	2	94.7
Do	11671	20	17	24	72	55.8	15.0	14.1	15	17.8	18	3	100.7
Oro x Fulhard	11579	20	18	21	78	54.8	14.7	17.4	4	22.2	3	3	124.3
Turkey x Marquis	11747	19	16	19	80	54.0	14.7	13.6	18	16.9	22	3	97.1
Kharkof	1442	19	19	20	80	53.0	14.1	14.0	16	17.1	20	3	100.0
Kanred x Marquis	11746	19	18	21	74	55.5	13.1	13.7	17	17.5	19	3	97.9

Standard error of a difference, 2.50 bu.; standard error of a mean, 1.77 bu., or 10.06 percent.

Table 18. - (Continued)

Stillwater, Oklahoma

(Four plots)

Variety	C. I. No.	Date headed	Height	Test weight per bu.	Av. acre yield	Yield				No. of years grown	Percentage of Kharkof for same years
						Av. 1936-39	Rank	Av. 1938-39	Rank		
		(May)	(In.)	(Lbs.)	(Bu.)	(Bu.)		(Bu.)			
Early Blackhull x Tenmarq	11952	4	34	62.5	38.3	—	—	—	—	1	145.6
Kawvale x Tenmarq	11950	6	32	57.6	36.9	—	—	—	—	1	140.3
Early Blackhull	8856	4	34	62.1	35.8	27.8	4	28.5	5	8	100.0
Kawvale x Tenmarq	11951	6	32	59.6	35.4	—	—	—	—	1	134.6
Oro x Tenmarq	11672	5	32	57.2	33.7	—	—	32.8	1	3	131.3
Kanred-Hard Federation x Minhardi-Minturki	11970	6	35	58.9	33.4	—	—	—	—	1	127.0
Oro x Tenmarq	11673	5	32	57.2	32.9	—	—	31.6	2	3	126.6
Blackhull selection	11737	5	36	60.7	32.7	—	—	24.2	12	3	108.2
Kawvale x Tenmarq	11953	6	34	56.5	32.2	—	—	—	—	1	122.4
Blackhull	6251	6	36	60.3	31.9	29.1	1	24.4	10	8	103.9
Kanred x Marquis	11589	6	33	58.8	30.5	26.5	5	24.0	15	6	109.3
Kawvale x Tenmarq	11750	7	32	56.4	30.2	—	—	29.1	4	3	120.7
Tenmarq x Nebraska No. 28	11847	7	35	59.5	29.8	—	—	28.0	6	2	128.4
Kanred x Marquis	11746	7	35	57.8	28.7	26.4	6	25.7	8	4	102.3
Minturki x Blackhull	11815	7	37	57.8	28.7	—	—	25.2	9	2	115.6
Kawvale x Tenmarq	11669	5	31	58.7	28.4	28.7	2	29.5	3	5	117.3
Fort Collins selection	11971	5	33	55.5	28.2	—	—	—	—	1	107.2
Minturki x Blackhull	11671	7	34	58.0	27.8	24.8	10	20.9	18	4	96.1
Nebred	10094	6	33	58.3	26.6	25.5	8	20.1	21	8	102.1
Kharkof	1442	7	36	59.0	26.3	25.8	7	21.8	16	8	100.0
Oro x Fulhard	11579	6	33	58.9	26.3	24.9	9	21.0	17	5	94.5
Early Blackhull Hybrid	11846	5	34	57.5	26.3	—	—	26.2	7	2	120.2
Kanred x Blackhull	11844	7	33	57.8	26.0	—	—	24.1	14	2	110.6
Martin x Tenmarq	11805	6	35	56.1	25.7	—	—	—	—	1	97.7
Turkey x Marquis	11747	5	32	57.8	24.9	24.2	11	20.7	19	4	93.8
Sibley No. 62	11523	5	34	57.0	24.8	28.1	3	24.3	11	6	112.1
Tenmarq x Minturki	11580	6	34	57.0	23.3	—	—	24.2	12	3	110.2
Kanred x Hope-Hard Federation	11843	6	30	54.4	21.8	—	—	20.2	20	2	92.7

Standard error of a difference, 3.08 bu.; standard error of a mean, 2.18 bu., or 7.38 percent.

Table 18. - (Continued)

Woodward, Oklahoma

(Four plots)

Variety	C. I. No.	Date		Height (In.)	Test weight per bu. (Lbs.)	Av. acre yield (Bu.)	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed	Ripe				Av. 1936-39 (Bu.)	Rank	Av. 1938-39 (Bu.)	Rank		
		(June)										
Kawvale x Tenmarq	11950	May	5 7	31	58	34.5	----	-	----	-	1	104.9
Do	11953	May	9 7	31	57	34.3	----	-	----	-	1	104.3
Early Blackhull x Tenmarq	11952	May	2 3	33	62	33.9	----	-	----	-	1	103.0
Kanred-Hard Federation x Minhardi-Minturki	11970	May	5 7	35	59	33.8	----	-	----	-	1	102.7
Sibley No. 62	11523	May	9 8	33	59	33.3	24.6	6	33.0	8	6	103.5
Fort Collins selection	11971	May	6 7	32	57	33.0	----	-	----	-	1	100.3
Kharkof	1442	May	11 10	34	60	32.9	22.6	10	29.2	17	8	100.0
Nebred	10094	May	11 8	32	59	31.6	24.9	4	32.7	10	8	104.1
Early Blackhull	8856	Apr.	28 3	34	62	31.4	23.0	9	28.2	20	8	95.9
Kawvale x Tenmarq	11951	May	5 7	33	59	31.0	----	-	----	-	1	94.2
Do	11750	May	6 7	29	58	30.8	----	-	39.6	2	3	139.4
Do	11669	May	6 7	31	60	30.5	30.6	1	40.6	1	5	136.2
Oro x Tenmarq	11673	May	5 7	32	60	30.2	----	-	33.0	8	3	117.7
Kanred x Marquis	11589	May	5 7	32	59	29.9	25.8	2	34.4	4	6	115.8
Oro x Fulhard	11579	May	9 8	31	60	29.8	25.2	3	30.4	14	5	115.0
Blackhull	6251	May	8 8	33	60	29.7	22.5	11	28.8	18	8	99.1
Tenmarq x Minturki	11580	May	9 7	32	59	29.6	----	-	38.9	3	3	135.8
Early Blackhull Hybrid	11846	May	6 7	33	60	29.3	----	-	32.5	11	2	111.3
Blackhull selection	11727	May	8 7	33	61	28.8	----	-	28.0	21	3	110.6
Tenmarq x Nebraska No. 28	11847	May	6 7	33	61	28.7	----	-	34.0	6	2	116.4
Kanred x Hope-Hard Federation	11843	May	5 7	31	59	28.7	----	-	27.4	22	2	93.8
Cheyenne selection	11666	May	12 10	30	60	28.0	24.8	5	32.5	11	4	109.7
Oro x Tenmarq	11672	May	5 7	32	60	27.6	----	-	34.3	5	3	119.5
Turkey selection	11577	May	11 8	31	58	27.3	24.0	7	29.5	16	5	106.3
Kanred x Blackhull	11844	May	9 7	31	58	27.1	----	-	33.4	7	2	114.4
Turkey x Marquis ³	11747	May	9 7	30	59	26.8	23.3	8	31.0	13	4	103.1
Martin x Tenmarq ³	11805	May	11 8	32	57	26.8	----	-	----	-	1	81.5
Minturki x Blackhull	11815	May	11 10	35	60	25.2	----	-	28.4	19	2	97.3
Do	11671	May	11 9	34	58	25.1	20.9	13	24.9	23	4	92.5
Kanred x Marquis	11746	May	10 9	32	59	24.3	21.9	12	30.1	15	4	96.9

Standard error of a difference, 1.95 bu.; standard error of a mean, 1.38 bu., or 4.63 percent.

Table 18. - (Continued)

Manhattan, Kansas

(Three plots; seeded Sept. 24-26, 1938; emerged Oct. 29-Nov. 18, 1938)

Variety	C. I. No.	Date		Hgt. (In.)	Hail damage		Leaf rust (Pct.)	Test weight per bu. (Lbs.)	Av. acre yield (Bu.)	Yield		No. of years grown	Percentage of Kharkof for same years 1/
		Headed (May)	Ripe (June)		Broken straw (Pct.)	Shattered grain (Pct.)				Av. 1937-38 (Bu.)	Rank		
Nebred	10094	23	20	33	10	5	65	58.5	17.6	29.5	9	7	131.9
Sibley No. 62	11523	25	21	33	12	4	85	57.0	17.1	26.4	13	5	117.2
Blackhull	6251	21	19	36	14	5	90	58.5	16.9	26.2	14	7	115.2
Kharkof	1442	25	21	34	10	5	80	57.5	16.6	24.6	16	7	100.0
Kawvale x Tenmarq	11750	22	17	34	17	12	15	56.0	16.5	35.6	2	2	144.7
Blackhull selection	11737	23	18	34	18	10	75	60.0	16.1	28.8	10	2	117.1
Early Blackhull x Tenmarq	11952	17	13	34	17	15	53	60.5	16.0	-----	---	---	-----
Kanred-Hard Federation x Minhardi-Minturki	11970	22	19	37	13	5	70	56.5	15.8	-----	---	0	-----
Cheyenne selection	11666	24	20	32	9	5	80	58.0	15.7	30.1	7	3	120.5
Kawvale x Tenmarq	11950	21	18	34	17	12	10	56.5	15.3	-----	---	0	-----
Kanred x Blackhull	11844	22	20	35	13	6	60	57.5	14.5	-----	---	1	83.0
Oro x Tenmarq	11673	21	18	33	22	6	10	57.0	14.1	34.7	3	2	141.1
Kanred x Hope-Hard Federation	11843	22	18	32	15	5	60	55.0	14.1	-----	---	1	48.0
Turkey selection	11577	23	20	32	11	9	75	56.5	13.8	29.7	8	4	118.9
Oro x Tenmarq	11672	21	17	35	22	6	15	58.0	13.1	36.6	1	2	148.8
Early Blackhull	8856	17	14	34	20	12	52	60.0	12.9	28.5	11	7	115.9
Oro x Fulhard	11579	23	20	34	12	8	65	58.0	12.8	24.6	16	4	111.7
Kanred x Marquis	11589	21	17	35	20	15	20	59.5	12.6	34.0	4	5	124.2
Tenmarq x Nebraska No. 28	11847	22	19	35	23	8	50	59.0	12.5	-----	---	1	145.5
Martin x Tenmarq ³	11805	23	19	34	40	9	60	55.0	12.3	-----	---	0	-----
Minturki x Marquis	11971	24	20	33	12	9	65	55.0	12.1	-----	---	0	-----
Kawvale x Tenmarq	11669	24	21	34	13	9	65	57.0	11.8	34.0	4	4	137.0
Tenmarq x Minturki	11580	22	19	33	18	7	45	57.0	11.5	32.7	6	2	132.9
Turkey x Marquis	11747	23	21	34	38	5	25	57.0	11.1	21.9	18	3	89.4
Kawvale x Tenmarq	11951	22	18	34	18	15	10	57.0	10.9	-----	---	0	-----
Do	11953	24	17	33	13	25	5	57.0	10.8	-----	---	0	-----
Kanred x Marquis	11746	25	22	34	17	4	20	58.0	10.6	27.2	12	3	111.7
Early Blackhull Hybrid	11846	23	19	34	40	10	55	56.0	10.1	-----	---	1	104.0
Minturki x Blackhull	11815	23	21	36	17	5	70	59.0	9.7	-----	---	1	71.0
Do	11671	25	21	35	22	5	60	57.0	9.5	25.9	15	3	108.7

1/ Excluding 1939.

Station no 13.5

Table 18. - (Continued)

Hays, Kansas

(Three plots)

Variety	C. I. No.	Date		Height	Av. acre yield	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed (May)	Ripe (June)			Av. 1936-39 (Bu.)	Rank	Av. 1938-39 (Bu.)	Rank		
Kawvale x Tenmarq	11951	17	13	21	19.8	-----	-	-----	-	1	222.5
Do	11950	17	13	18	19.0	-----	-	-----	-	1	213.5
Early Blackhull	8856	9	10	19	18.3	20.9	13	13.6	23	7	108.7
Oro x Tenmarq	11672	17	13	21	17.9	-----	-	20.1	4	3	118.3
Do	11673	17	15	21	17.8	-----	-	20.0	5	3	115.4
Early Blackhull Hybrid	11846	18	16	22	17.6	-----	-	18.4	9	2	118.7
Early Blackhull x Tenmarq	11952	16	12	20	17.6	-----	-	-----	-	1	197.8
Tenmarq x Nebraska No. 28	11847	18	15	22	17.5	-----	-	21.2	3	2	136.8
Kanred x Marquis	11589	18	13	21	16.6	26.4	2	19.9	6	5	128.6
Blackhull selection	11737	17	15	19	16.3	-----	-	17.9	11	3	104.8
Kanred-Hard Federation x Minhardi-Minturki	11970	17	13	24	16.3	-----	-	-----	-	1	183.1
Ft. Collins selection	11971	18	15	22	16.2	-----	-	-----	-	1	182.0
Kanred x Blackhull	11844	17	15	18	15.9	-----	-	15.8	18	2	101.9
Kawvale x Tenmarq	11669	17	13	21	15.5	28.2	1	23.4	2	4	124.8
Kanred x Hope-Hard Federation	11843	15	13	22	15.3	-----	-	14.6	22	2	94.2
Turkey x Marquis	11747	17	15	20	14.9	21.3	12	15.5	19	4	94.2
Tenmarq x Minturki	11580	17	16	19	14.4	-----	-	18.2	10	3	107.2
Minturki x Blackhull	11671	18	17	20	14.3	23.7	8	17.1	13	4	104.9
Kawvale x Tenmarq	11953	18	15	19	14.1	-----	-	-----	-	1	158.4
Blackhull	6251	19	16	20	13.9	24.6	4	17.8	12	7	117.4
Oro x Fulhard	11579	18	16	20	13.7	23.2	10	14.7	21	4	102.7
Martin x Tenmarq ³	11805	19	16	20	13.3	-----	-	-----	-	1	149.4
Nebred	10094	18	17	17	13.2	23.9	7	16.8	15	7	108.7
Kawvale x Tenmarq	11750	17	13	18	13.1	-----	-	25.5	1	3	133.2
Cheyenne selection	11666	18	15	18	13.0	24.6	4	16.8	15	4	108.8
Turkey selection	11577	18	16	20	12.7	23.6	9	16.6	17	4	104.4
Minturki x Blackhull	11815	18	18	19	12.5	-----	-	18.5	8	2	119.4
Kanred x Marquis	11746	18	16	20	12.2	24.9	3	19.7	7	4	110.2
Sibley No. 62	11523	19	19	16	9.9	24.3	6	17.0	14	5	124.1
Kharkof	1442	20	19	19	8.9	22.6	11	15.5	19	7	100.0

Standard error of a difference, 2.86 bu.; standard error of a mean, 2.02 bu., or 13.41 percent.

Table 18. - (Continued)

Akron, Colorado

(5 plots; seeded Sept. 15, 1938; emerged Sept. 27, 1938)

Variety	C. I. No.	Date		Height	Test weight per bu.	Av. acre yield	Yield				No. of years grown	Percentage of Kharkof for same years
		Headed	Ripe				Av. 1936-39	Rank	Av. 1938-39	Rank		
		(July)	(In.)	(Lbs.)	(Bu.)	(Bu.)	(Bu.)					
Early Blackhull x Tenmarq	11952	May 26	4	22	57.0	12.5	---	-	---	-	1	201.6
Kawvale x Tenmarq	11750	May 28	4	23	52.5	12.4	---	-	21.9	1	3	141.9
Cheyenne selection	11666	May 31	5	20	54.5	12.1	22.2	3	18.7	4	4	123.3
Kawvale x Tenmarq	11953	May 31	4	21	54.5	12.1	---	-	---	-	1	195.2
Kawvale x Tenmarq	11669	May 29	4	21	54.0	11.8	23.3	1	19.9	2	4	129.4
Kanred x Blackhull	11844	May 28	7	21	56.0	11.8	---	-	15.9	12	2	112.0
Early Blackhull	8856	May 28	4	22	56.0	11.7	22.1	4	17.5	7	6	120.0
Turkey x Marquis	11747	May 30	6	21	54.0	11.6	18.1	10	14.7	20	4	100.6
Blackhull	6251	May 31	6	22	56.0	11.2	20.7	7	16.0	11	6	122.1
Kawvale x Tenmarq	11950	May 26	2	24	52.0	10.9	---	-	---	-	1	175.8
Nebred	10094	May 31	8	19	55.0	10.6	21.1	6	16.8	10	6	121.4
Kawvale x Tenmarq	11951	May 28	7	22	54.5	10.6	---	-	---	-	1	171.0
Tenmarq x Minturki	11580	May 31	8	20	54.5	10.5	---	-	18.9	3	3	121.3
Oro x Fulhard	11579	May 30	8	20	55.0	9.6	21.2	5	17.8	6	4	117.8
Martin x Tenmarq ³	11805	June 1	8	21	55.0	9.5	---	-	---	-	1	153.2
Tenmarq x Nebraska No. 28	11847	May 30	7	22	54.0	9.4	---	-	15.6	16	2	109.9
Fort Collins selection	11971	June 1	6	21	56.5	9.4	---	-	---	-	1	151.6
Oro x Tenmarq	11673	May 31	8	21	55.0	9.3	---	-	18.2	5	3	125.2
Blackhull selection	11737	June 1	9	21	55.0	9.0	---	-	15.9	12	3	112.3
Turkey selection	11577	May 31	8	20	52.5	8.6	19.0	9	15.8	14	4	105.6
Minturki x Blackhull	11671	May 31	7	23	54.0	8.6	18.1	10	14.6	21	4	100.6
Sibley No. 62	11523	June 1	8	19	55.5	8.5	19.9	8	15.6	16	5	105.7
Oro x Tenmarq	11672	June 1	8	22	55.0	8.3	---	-	17.0	9	3	121.3
Kanred-Hard Federation x Minhardi-Minturki	11970	May 30	6	24	56.0	8.3	---	-	---	-	1	133.9
Kanred x Marquis	11589	June 1	8	21	54.5	7.7	22.9	2	17.5	7	5	131.0
Minturki x Blackhull	11815	May 31	8	23	55.5	7.6	---	-	15.0	18	2	105.6
Early Blackhull Hybrid	11846	May 30	8	22	54.5	7.6	---	-	15.7	15	2	110.6
Kharkof	1442	June 1	9	20	55.0	6.2	18.0	12	14.2	22	6	100.0
Kanred x Hope-Hard Federation	11843	May 31	7	19	55.0	6.2	---	-	14.8	19	2	104.2
Kanred x Marquis	11746	May 31	11	19	54.5	5.9	17.5	13	11.6	23	4	97.2

Standard error of a difference, 1.46 bu.; standard error of a mean, 1.03 bu., or 10.62 percent.

Table 18. - (Continued)

Fort Collins, Colorado

(Five plots; seeded Sept. 17, 1938; emerged Sept. 23, 1938)

Variety	C. I. No.	Date		Hgt. (In.)	Lodging (Pct.)	Av. acre yield (Bu.)	Yield				No. of years grown	Percentage of Kharkof for same yrs.
		Headed (May)	Ripe (July)				Av. 1936-39 (Bu.)	Rank	Av. 1938-39 (Bu.)	Rank		
Kanred x Blackhull	11844	28	11	44	45	66.5	-----	-	62.3	2	2	107.0
Kawvale x Tenmarq	11950	27	10	44	20	64.4	-----	-	-----	-	1	108.6
Fort Collins selection	11971	30	11	46	15	63.1	-----	-	-----	-	1	106.4
Early Blackhull Hybrid	11846	29	13	44	44	62.1	-----	-	62.6	1	2	107.6
Minturki x Blackhull	11671	30	12	46	36	61.4	58.2	4	60.2	5	4	101.9
Early Blackhull x Tenmarq	11952	25	9	44	43	60.6	-----	-	-----	-	1	102.2
Oro x Tenmarq	11672	27	12	43	44	60.2	-----	-	58.0	10	3	94.6
Kanred-Hard Federation x Minhardi-Minturki	11970	25	11	47	36	60.0	-----	-	-----	-	1	101.2
Kharkof	1442	31	14	42	53	59.3	57.1	8	58.2	9	7	100.0
Kawvale x Tenmarq	11669	27	10	41	39	59.1	61.8	2	60.7	4	5	108.2
Kanred x Marquis	11589	27	12	43	20	58.7	62.0	1	60.8	3	6	111.8
Minturki x Blackhull	11815	30	13	47	67	58.2	-----	-	60.0	6	2	103.1
Cheyenne selection	11666	30	13	44	76	57.8	58.0	5	58.5	8	4	101.6
Turkey selection	11577	30	14	46	64	57.4	59.9	3	59.0	7	5	108.6
Martin x Tenmarq ³	11805	30	13	44	36	57.3	-----	-	-----	-	1	96.6
Kawvale x Tenmarq	11750	27	10	45	15	55.2	-----	-	52.4	18	3	95.6
Tenmarq x Minturki	11580	29	12	44	45	54.7	-----	-	56.5	12	3	98.4
Sibley No. 62	11523	29	12	45	69	53.7	57.2	7	54.1	14	6	101.3
Oro x Tenmarq	11673	27	11	44	43	53.2	-----	-	54.4	13	3	94.9
Blackhull selection	11737	29	12	46	84	51.3	-----	-	50.3	23	3	91.6
Turkey x Marquis	11747	29	14	44	54	51.2	57.1	8	53.1	17	4	100.0
Kawvale x Tenmarq	11951	26	10	44	4	51.2	-----	-	-----	-	1	86.3
Early Blackhull	8856	22	9	45	52	51.2	51.9	13	57.4	11	7	93.1
Kanred x Marquis	11746	30	14	45	41	51.2	54.7	11	54.1	14	4	95.8
Nebred	10094	30	14	42	75	51.0	57.5	6	51.7	20	7	104.3
Kawvale x Tenmarq	11953	30	11	42	27	49.3	-----	-	-----	-	1	83.1
Blackhull	6251	28	12	45	60	48.2	54.8	10	54.1	14	7	97.4
Tenmarq x Nebraska No. 28	11847	28	12	46	25	47.5	-----	-	51.5	21	2	88.5
Oro x Fulhard	11579	30	13	43	33	47.4	54.0	12	50.4	22	5	97.1
Kanred x Hope-Hard Federation	11843	26	12	42	45	46.8	-----	-	51.8	19	2	89.0

Standard error of a difference, 6.12 bu.; standard error of a mean, 4.33 bu., or 7.50 percent.

Table 18. - (Continued)

Hesperus, Colorado

(Three plots; seeded Oct. 4, 1938; emerged Oct. 13, 1938)

Variety	C. I. No.	Date ripe	Hgt. (In.)	Av. acre yield (Bu.)	Yield		No. of years grown	Percentage of Kharkof for same years
					Av. 1938-39 (Bu.)	Rank		
Oro x Tenmarq	11673	22	37	60.5	45.7	1	2	126.6
Fort Collins selection	11971	22	38	57.2	-----	---	1	144.1
Oro x Fulhard	11579	29	38	53.3	45.0	4	2	124.7
Kanred x Blackhull	11844	22	37	53.2	45.7	1	2	126.6
Kawvale x Tenmarq	11950	22	37	52.5	-----	---	1	132.2
Kanred-Hard Federation x Minhardi-Minturki	11970	22	39	50.9	-----	---	1	128.2
Oro x Tenmarq	11672	22	37	50.7	37.5	12	2	103.9
Cheyenne selection	11666	21	35	49.7	44.7	5	2	123.8
Kawvale x Tenmarq	11669	21	37	48.1	36.4	13	2	100.8
Early Blackhull x Tenmarq	11952	21	37	48.0	-----	---	1	120.9
Kawvale x Tenmarq	11953	23	35	46.6	-----	---	1	117.4
Blackhull selection	11737	23	36	46.5	38.9	11	2	107.8
Tenmarq x Minturki	11580	23	37	46.3	34.9	16	2	96.7
Tenmarq x Nebraska No. 28	11847	23	37	45.8	-----	---	1	115.4
Blackhull	6251	17	39	44.7	40.0	8	2	110.8
Kanred x Marquis	11746	24	38	44.4	40.0	8	2	110.8
Sibley No. 62	11523	22	37	44.1	39.0	10	2	108.0
Turkey selection	11577	22	36	43.9	45.6	3	2	126.3
Martin x Tenmarq ³	11805	23	36	41.3	-----	---	1	104.0
Turkey x Marquis	11747	23	37	39.8	41.1	7	2	113.9
Kharkof	1442	23	37	39.7	36.1	14	2	100.0
Early Blackhull Hybrid	11846	23	36	39.5	-----	---	1	99.5
Kanred x Marquis	11589	19	38	39.4	32.0	18	2	88.6
Minturki x Blackhull	11815	22	38	38.7	42.3	6	2	117.2
Kawvale x Tenmarq	11951	23	37	38.3	-----	---	1	96.5
Minturki x Blackhull	11671	21	36	38.2	34.7	17	2	96.1
Kawvale x Tenmarq	11750	21	36	37.5	30.4	20	2	84.2
Kanred x Hope-Hard Federation	11843	22	36	36.0	31.1	19	2	86.1
Nebred	10094	18	34	31.5	35.7	15	2	98.9
Early Blackhull	8856	14	36	27.2	25.0	21	2	69.3

Standard error of a difference, 6.99 bu.; standard error of a mean, 4.94 bu.,
or 11.11 percent.

Table 18. - (Continued)

Lincoln, Nebraska

(Five plots; seeded Sept. 23, 1938; emerged Sept. 28, 1938)

Variety	G. I. No.	Winter sur- vival	Date		Test weight per bu.	Plump- ness	Av. acre yield	Yield				No. of years grown	Percentage of Kharkof for same years	
			Headed	Ripe				Avg.	Rank	Avg.	Rank			
(Pct.)	(May)	(June)	(In.)	(Lbs.)	(Pct.)	(Bu.)	(Bu.)	(Bu.)						
Kawvale x Tenmarq	11950	100	20	17	28	58.5	75	35.0	-----	--	-----	--	1	137.8
Early Blackhull x Tenmarq	11952	98	18	16	27	62.0	90	34.1	-----	--	-----	--	1	134.3
Kawvale x Tenmarq	11951	100	20	17	29	58.0	85	34.0	-----	--	-----	--	1	133.9
Kanred-Hard Federation x Minhardi-Minturki	11970	93	20	19	31	58.0	90	32.8	-----	--	-----	--	1	129.1
Oro x Tenmarq	11672	100	19	17	29	60.0	90	32.4	-----	--	25.5	2	3	127.6
Early Blackhull	8856	91	17	17	28	61.0	80	32.1	22.1	4	21.1	10	8	125.4
Kawvale x Tenmarq	11669	100	19	16	28	60.0	85	31.7	23.3	1	26.2	1	5	137.8
Martin x Tenmarq ³	11805	100	22	18	30	56.0	75	31.5	-----	--	-----	--	1	124.0
Fort Collins selection	11971	92	22	18	29	57.0	80	30.2	-----	--	-----	--	1	118.9
Kanred x Marquis	11589	95	20	18	30	59.0	85	30.0	22.9	2	21.7	6	6	104.0
Oro x Tenmarq	11673	100	19	17	29	59.0	90	30.0	-----	--	25.5	2	3	129.4
Sibley No. 62	11523	100	22	20	29	58.0	80	29.9	19.9	8	21.8	5	6	93.4
Kanred x Blackhull	11844	100	20	18	29	58.5	85	29.9	-----	--	20.4	12	2	115.3
Tenmarq x Nebraska No. 28	11847	96	21	19	31	60.5	90	29.9	-----	--	21.6	7	2	122.0
Kawvale x Tenmarq	11953	100	22	17	27	54.0	70	29.9	-----	--	-----	--	1	117.7
Nebred	10094	100	22	18	28	57.0	75	29.7	21.1	6	21.5	9	8	120.4
Kawvale x Tenmarq	11750	100	21	17	28	58.0	85	29.7	-----	--	24.4	4	3	134.7
Blackhull	6251	100	22	20	30	58.0	80	29.1	20.7	7	19.6	13	8	122.9
Tenmarq x Minturki	11580	98	21	18	29	56.5	75	28.5	-----	--	21.6	7	3	113.5
Cheyenne selection	11666	100	22	18	28	58.0	80	28.1	22.2	3	20.9	11	4	106.7
Turkey selection	11577	100	22	19	28	57.5	80	28.0	19.0	9	19.1	15	5	99.5
Kanred x Hope-Hard Federation	11843	100	19	17	27	58.0	80	27.2	-----	--	18.3	17	2	103.4
Blackhull selection	11737	100	21	17	29	60.0	80	27.1	-----	--	17.0	21	3	106.5
Early Blackhull Hybrid	11846	100	20	18	29	57.5	90	27.1	-----	--	19.2	14	2	108.5
Oro x Fulhard	11579	100	21	19	27	60.0	95	26.2	21.2	5	17.5	20	5	94.9
Kanred x Marquis	11746	100	21	19	29	56.0	80	25.8	17.5	13	18.5	16	4	100.0
Kharkof	1442	100	23	20	29	57.0	75	25.4	18.0	12	17.7	19	8	100.0
Minturki x Blackhull	11815	95	22	19	31	60.0	85	25.1	-----	--	18.0	18	2	101.7
Do	11671	95	24	19	32	54.5	70	23.7	18.1	10	15.1	22	4	91.9
Turkey x Marquis	11747	100	21	19	28	55.5	75	20.3	18.1	10	14.5	23	4	89.5

Standard error of a mean, 2.45 bu.; standard error of a mean, 1.73 bu., or 5.94 percent.

Table 18. - (Continued)

North Platte, Nebraska

(Three plots on fallowed land)

Variety	C. I. No.	Winter sur- vival	Date		Hgt. (In.)	Test weight per bu. (Lbs.)	Av. acre yield (Bu.)	Yield				No. of years grown	Percentage of Kharkof for same years
			Headed	Ripe				Av. 1935-36, and 1938-39	Rank	Av. 1938-39	Rank		
		(Pct.)	(May)	(June)				(Bu.)		(Bu.)			
Early Blackhull x Tenmarq	11952	90	21	23	30	64.0	31.9	-----	-	-----	-	1	134.6
Kawvale x Tenmarq	11951	97	23	23	31	61.0	31.1	-----	-	-----	-	1	131.2
Do	11669	92	24	23	28	61.0	30.5	32.5	1	27.2	1	4	137.7
Do	11950	95	23	23	31	60.0	29.3	-----	-	-----	-	1	123.6
Fort Collins selection	11971	94	28	26	32	59.5	29.3	-----	-	-----	-	1	123.6
Oro x Tenmarq	11672	92	23	23	30	60.0	29.1	-----	-	25.2	2	2	137.0
Do	11673	90	22	23	29	60.0	28.9	-----	-	23.9	4	2	129.9
Blackhull selection	11737	94	24	24	32	58.5	27.5	-----	-	22.1	7	2	120.1
Kawvale x Tenmarq	11750	97	24	23	29	58.0	27.3	-----	-	23.5	5	2	127.7
Tenmarq x Minturki	11580	97	24	25	31	58.0	27.0	-----	-	22.6	6	2	122.8
Kawvale x Tenmarq	11953	97	28	24	27	57.0	26.9	-----	-	-----	-	1	113.5
Early Blackhull	8856	88	19	24	30	62.5	26.7	25.9	3	24.4	3	5	98.8
Nebred	10094	95	28	24	29	58.0	25.8	24.2	6	20.6	10	5	99.2
Cheyenne selection	11666	95	28	24	28	57.5	25.5	-----	-	21.0	9	3	115.1
Kanred x Hope-Hard Federation	11843	90	24	25	30	56.0	25.3	-----	-	19.0	17	2	103.3
Tenmarq x Nebraska No. 28	11847	88	24	26	32	60.0	24.9	-----	-	21.2	8	2	115.2
Kanred x Marquis	11589	93	24	24	32	59.0	24.8	27.3	2	20.5	11	4	115.7
Sibley No. 62	11523	95	26	24	30	56.5	24.7	24.3	7	18.0	20	4	103.0
Early Blackhull Hybrid	11846	90	24	25	33	57.0	24.7	-----	-	20.2	13	2	109.8
Kanred-Hard Federation x Minhardi-Minturki	11970	87	25	25	34	59.0	24.5	-----	-	-----	-	1	103.4
Turkey x Marquis	11747	94	25	24	30	58.5	24.2	-----	-	19.2	16	3	110.9
Kharkof	1442	93	29	26	30	57.0	23.7	23.6	8	18.4	19	5	100.0
Turkey selection	11577	93	25	24	30	57.0	23.7	25.9	3	19.7	15	4	109.7
Martin x Tenmarq ³	11805	92	27	26	30	55.0	23.7	-----	-	-----	-	1	100.0
Kanred x Blackhull	11844	97	24	26	30	59.5	23.3	-----	-	20.4	12	2	110.9
Oro x Fulhard	11579	95	25	26	30	61.0	23.2	25.5	5	19.9	14	4	108.1
Minturki x Blackhull	11815	92	25	26	32	58.0	22.9	-----	-	17.9	21	2	97.3
Do	11671	92	27	25	32	56.0	22.5	-----	-	17.6	22	3	103.1
Blackhull	6251	92	25	24	32	58.5	21.7	21.2	9	16.8	23	5	88.8
Kanred x Marquis	11746	95	25	26	31	57.0	21.4	-----	-	18.6	18	3	101.6

Standard error of a difference, 1.84 bu.; standard error of a mean, 1.30 bu., or 5.03 percent.

Table 18. - (Continued)

Alliance, Nebraska

(Three plots; seeded Sept. 14, 1938)

Variety	C. I. No.	Winter sur- vival (Pct.)	Date		Height (In.)	Test weight per bu. (Lbs.)	Av. acre yield (Bu.)	Yield		No. of years grown	Percentage of Kharkof for same years
			Headed (July)	Ripe (July)				Av. 1938-39 (Bu.)	Rank		
Early Blackhull x Tenmarq	11952	97	May 27	4	31	64.0	34.0	—	—	1	129.8
Kanred x Marquis	11589	93	May 29	4	29	62.5	33.7	30.8	4	3	125.4
Kawvale x Tenmarq	11750	97	May 28	4	29	62.0	33.4	30.9	3	2	114.0
Blackhull selection	11737	100	May 30	5	30	64.5	33.1	31.3	2	2	115.5
Oro x Tenmarq	11673	93	May 28	3	30	63.0	32.8	30.8	4	2	113.7
Fort Collins selection	11971	90	May 30	5	31	62.0	32.5	—	—	1	124.0
Nebred	10094	100	May 31	4	27	65.0	32.4	30.2	8	5	107.4
Tenmarq x Minturki	11580	100	May 27	4	30	63.0	31.7	30.3	7	2	111.8
Oro x Tenmarq	11672	93	May 27	3	31	64.0	31.7	30.7	6	2	113.3
Kawvale x Tenmarq	11950	100	May 27	4	30	63.0	31.6	—	—	1	120.6
Do	11669	95	May 28	3	27	62.5	31.0	29.7	10	2	109.6
Cheyenne selection	11666	100	May 31	5	26	64.0	30.9	32.2	1	2	118.8
Kawvale x Tenmarq	11951	100	May 28	4	31	63.0	30.6	—	—	1	116.8
Early Blackhull Hybrid	11846	98	May 29	3	30	64.0	30.2	29.8	9	2	110.0
Turkey selection	11577	100	May 31	4	28	63.0	29.7	82.5	11	2	105.2
Martin x Tenmarq ³	11805	100	May 30	5	29	61.0	29.4	—	—	1	112.2
Early Blackhull	8856	87	May 25	4	31	64.0	28.8	27.2	16	5	93.6
Kanred-Hard Federation x Minhardi-Minturki	11970	85	May 28	5	32	63.5	28.8	—	—	1	109.9
Turkey x Marquis	11747	100	May 30	4	27	63.0	28.2	26.6	21	2	98.2
Minturki x Blackhull	11671	100	May 31	5	30	64.0	27.9	28.4	13	2	104.8
Sibley No. 62	11523	100	May 30	5	34	63.0	27.2	28.5	11	3	108.6
Blackhull	6251	88	May 29	4	31	63.0	26.9	27.2	16	5	93.1
Kanred x Hope-Hard Federation	11843	97	May 28	4	28	62.0	26.8	26.3	22	2	97.0
Tenmarq x Nebraska No. 28	11847	100	May 30	3	29	64.5	26.8	28.0	14	2	103.3
Oro x Fulhard	11579	100	May 30	5	29	63.5	26.7	27.5	15	2	101.5
Minturki x Blackhull	11815	95	May 30	5	30	64.5	26.4	26.8	20	2	98.9
Kharkof	1442	100	June 2	6	28	62.5	26.2	27.1	18	5	100.0
Kanred x Blackhull	11844	100	May 28	4	27	63.0	26.0	27.0	19	2	99.6
Kawvale x Tenmarq	11953	98	May 30	4	28	62.0	25.3	—	—	1	96.6
Kanred x Marquis	11746	100	May 29	4	27	63.0	24.6	25.9	23	2	95.6

Standard error of a difference, 3.49 bu.; standard error of a mean, 2.47 bu., or 8.37 percent.

Table 19. - Number of plots, average yield, and standard errors of a difference and of the mean for the uniform yield nursery at each cooperating station in 1939.

Station	No. of plots	Average yield of varieties (Bu.)	Standard error of a difference (Bu.)	Standard error of a mean in	
				Bushels	Percent
Texas:					
Denton	4	25.78	2.42	1.71	6.63
Chillicothe	4	26.27	4.23	2.99	11.38
Bushland	3	17.60	2.50	1.77	10.06
Oklahoma:					
Stillwater	4	29.55	3.08	2.18	7.38
Woodward	4	29.78	1.95	1.38	4.63
Kansas:					
Hays	3	15.06	2.86	2.02	13.41
Colorado:					
Akron	5	9.7	1.46	1.03	10.62
Ft. Collins	5	55.71	6.12	4.33	7.50
Hesperus	3	44.45	6.99	4.94	11.11
Nebraska:					
Lincoln	5	29.13	2.45	1.73	5.94
North Platte	3	25.86	1.84	1.30	5.03
Alliance	3	29.51	3.49	2.47	8.37

SUMMARY OF NURSERY YIELDS

The yields of the 30 varieties of winter wheat grown at 12 stations are summarized in table 20. In this table the varieties are listed in the order of the 12-station average yield. These averages are of interest only insofar as they show the general adaptation of the variety. A more detailed study is possible, as the varieties also have been averaged and ranked by States.

Kawvale x Tenmarq (C. I. 11950) and Early Blackhull x Tenmarq (C. I. 11952) had the highest average yields for 1939. The performance of neither of these varieties was especially consistent, and both made rather poor yields in Texas. Early Blackhull x Tenmarq (C. I. 11952) ranked first in Oklahoma and in Nebraska. Both of these strains were in the nursery for the first time. It has been observed that Kawvale x Tenmarq (C. I. 11950) shatters rather easily, a characteristic of many Kawvale x Tenmarq hybrids. Oro x Tenmarq (C. I. 11672) and Oro x Tenmarq (C. I. 11673) ranked third and fourth with a 0.3 bushel difference in yield, these varieties ranking in the same order as in 1938. Kawvale x Tenmarq (C. I. 11669) ranked first in 1938 and was fifth in 1939. Early Blackhull ranked first in Texas, third in Oklahoma and at Hays, but was next to last in Colorado. Of the commercial varieties grown in the nursery as checks, Blackhull had the highest average yield, while 17 varieties and strains had higher average yields. Nebred ranked twentieth and Kharkof twenty-seventh.

Twenty-three varieties have been grown in the nursery for a two-year period, 1938 and 1939, at 12 stations. These data are presented in table 21, where the yields are averaged by States and the

varieties are listed in order of yield at all stations. Kawvale x Tenmarq (C. I. 11669) has the highest average yield and a consistently high rank at all places except in Colorado. The Oro x Tenmarq strains (C. I. 11672 and 11673) are tied for second place, while in fourth place is Kawvale x Tenmarq (C. I. 11750). As a matter of fact the first six strains were at the top of the list for the period 1937-38, and yielded in nearly the same order. Kanred x Blackhull (C. I. 11844) and Cheyenne selection had the highest average yields in Colorado. Fifteen varieties and strains yielded higher than Blackhull and Nebred and all but two higher than Kharkof. These yield data again emphasize the yielding ability of a group of wheats known to have very little winter hardiness, in fact there are no really hardy varieties in the nursery.

SUMMARY OF AGRONOMIC DATA

Data for characters other than yield are averaged and presented in table 22. Since all stations did not report the same data, the number of stations entering the averages is shown at the top of each column.

Three stations reported winter-killing, although at no place was it heavy. Kanred-Hard Federation x Minhardi-Minturki (C. I. 11970), Early Blackhull, Ft. Collins selection, and Blackhull were the most tender. Date-of-heading data show that Early Blackhull was five days earlier than any other strain. Early Blackhull x Tenmarq (C. I. 11952), and several Kawvale x Tenmarq strains fall into the

fairly early group, while Kharkof was the latest. It is felt that Early Blackhull is too early and there may be some question as to just where the breeding for earliness should stop. Ripening dates bring out the same differences, although the spread is not so great.

Average infections of leaf rust were high on many of the strains although the Oro x Tenmarq and Kawvale x Tenmarq selections had fairly low averages. Eight strains had averages under 15 percent, while the susceptible varieties had averages above 50 percent. This gives some indication of the progress being made in breeding for resistance to this disease.

Height measurements were reported from 12 stations and when averaged do not show any great differences between varieties.

Two sets of quality data were reported. Two stations reported kernel plumpness and eight stations reported test weights per bushel. The plumpness figures vary from 71 percent for Kawvale x Tenmarq (C. I. 11953) to 87 percent for Oro x Fulhard (C. I. 11579). Only two strains had average test weights above 60 pounds per bushel and these were Early Blackhull x Tenmarq (C. I. 11952) and Early Blackhull. Tenmarq x Nebraska No. 28 (C. I. 11847), Oro x Fulhard (C. I. 11579), and Blackhull selection, had averages above 59 pounds per bushel.

Table 20. -- Summary of average yields of the 30 winter wheat varieties grown as uniform yield nurseries at 12 stations in the hard winter-wheat region, 1939

Variety	C. I. No.	Bushels per acre																				Average 12 stations	
		Texas					Oklahoma					Kansas		Nebraska				Colorado					
		Denton	Chilli- cothe	Bush- land	Av.	Rank	Still- water	Wood- ward	Av.	Rank	Days	Rank	Lin- coln	North Platte	Alliance	Av.	Rank	Akron	Fort Collins	Hes- perus	Av.		Rank
Kawvale x Tenmarq	11950	33.3	20.2	19.3	24.3	13	36.9	34.5	35.7	2	19.0	2	35.0	29.3	31.6	32.0	2	10.9	64.4	52.5	42.6	3	32.2
Early Blackhull x Tenmarq	11952	32.1	21.1	22.1	25.1	7	38.3	33.9	36.1	1	17.6	6	34.1	31.9	34.0	33.3	1	12.5	60.6	48.0	40.4	5	32.2
Oro x Tenmarq	11672	33.5	28.0	18.5	26.7	2	33.7	27.6	30.7	10	17.9	4	32.4	29.1	31.7	31.1	4	8.3	60.2	50.7	39.7	7	31.0
Do	11673	27.4	27.7	17.9	24.3	13	32.9	30.2	31.6	7	17.8	5	30.0	28.9	32.8	30.6	7	9.3	53.2	60.5	41.0	4	30.7
Kawvale x Tenmarq	11669	30.7	27.9	21.4	26.7	2	28.4	30.5	29.5	15	15.5	14	31.7	30.5	31.0	31.1	4	11.8	59.1	48.1	39.7	7	30.6
Do	11951	37.0	24.0	17.8	26.3	4	35.4	31.0	33.2	6	19.8	1	34.0	31.1	30.6	31.9	3	10.6	51.2	38.3	33.4	27	30.1
Kanred-Hard Federation x Minhardi-Minturki	11970	23.7	25.7	19.1	22.8	17	33.4	33.8	33.6	3	16.3	10	32.8	24.5	28.8	28.7	14	8.3	60.0	50.9	39.7	7	29.8
Fort Collins selection	11971	18.1	20.9	18.0	19.0	28	28.2	33.0	30.6	11	16.2	12	30.2	29.3	32.5	30.7	6	9.4	63.1	57.2	43.2	2	29.7
Kanred x Blackhull	11844	26.7	26.3	18.0	23.7	16	26.0	27.1	26.6	22	15.9	13	29.9	23.3	26.0	26.4	22	11.8	66.5	53.2	43.8	1	29.2
Early Blackhull	8856	30.5	31.7	22.4	28.2	1	35.8	31.4	33.6	3	18.3	3	32.1	26.7	28.8	29.2	11	11.7	51.2	27.2	30.0	29	29.0
Kanred x Marquis	11589	29.9	28.0	17.4	25.1	7	30.5	29.9	30.2	13	16.6	9	30.0	24.8	33.7	29.5	9	7.7	58.7	39.4	35.3	19	28.9
Kawvale x Tenmarq	11750	33.4	26.6	17.3	25.8	5	30.2	30.8	30.5	12	13.1	24	29.7	27.3	33.4	30.1	8	12.4	55.2	37.5	35.0	21	28.9
Blackhull selection	11737	23.6	27.5	22.4	24.5	12	32.7	28.8	30.8	8	16.3	10	27.1	27.5	33.1	29.2	11	9.0	51.3	46.5	35.6	17	28.8
Kawvale x Tenmarq	11953	28.9	28.6	16.5	24.7	11	32.2	34.3	33.3	5	14.1	19	29.9	26.9	25.3	27.4	17	12.1	49.3	46.6	36.0	15	28.7
Tenmarq x Nebraska No. 28	11847	28.6	27.7	18.8	25.0	10	29.8	28.7	29.3	16	17.5	8	29.9	24.9	26.8	27.2	20	9.4	47.5	45.8	34.2	24	28.0
Martin x Tenmarq	11805	31.4	27.6	17.8	25.6	6	25.7	26.8	26.3	26	13.3	22	31.5	23.7	29.4	28.2	15	9.5	57.3	41.3	36.0	15	27.9
Tenmarq x Minturki	11580	26.6	23.6	17.8	22.7	18	23.3	29.6	26.5	23	14.4	17	28.5	27.0	31.7	29.1	13	10.5	54.7	46.3	37.2	10	27.8
Blackhull	6251	26.7	30.5	18.0	25.1	7	31.9	29.7	30.8	8	13.9	20	29.1	21.7	26.9	25.9	24	11.2	48.2	44.7	34.7	23	27.7
Cheyenne selection	11666	15.9	25.1	17.9	19.6	26	—	28.0	—	—	13.0	25	28.1	25.5	30.9	28.2	15	12.1	57.8	49.7	39.9	6	27.6
Hebred	10094	17.8	36.9	17.6	24.1	15	26.6	31.6	29.1	17	13.2	23	29.7	25.8	32.4	29.3	10	10.6	51.0	31.5	31.0	28	27.1
Early Blackhull Hybrid	11846	25.8	18.4	16.6	20.3	24	26.3	29.3	27.8	20	17.6	6	27.1	24.7	30.2	27.3	18	7.6	62.1	39.5	36.4	13	27.1
Sibley No. 62	11523	22.0	28.8	16.8	22.5	20	24.8	33.3	29.1	17	9.9	29	29.9	24.7	27.2	27.3	18	8.5	53.7	44.1	35.4	18	27.0
Oro x Fulhard	11579	19.8	26.1	14.7	20.2	25	26.3	29.8	28.1	19	13.7	21	26.2	23.2	26.7	25.4	25	9.6	47.4	53.3	36.8	11	26.4
Turkey selection	11577	15.8	25.5	15.6	19.0	28	—	27.3	—	—	12.7	26	28.0	23.7	29.7	27.1	21	8.6	57.4	43.9	36.6	12	26.2
Minturki x Blackhull	11671	25.0	24.7	15.0	21.6	21	27.8	25.1	26.5	23	14.3	18	23.7	22.5	27.9	24.7	28	8.6	61.4	38.2	36.1	14	26.2
Do	11815	23.6	28.9	15.3	22.6	19	28.7	25.2	27.0	21	12.5	27	25.1	22.9	26.4	24.8	27	7.6	58.2	38.7	34.8	22	26.1
Kharkof	1442	19.3	23.0	14.1	18.8	30	26.3	32.9	29.6	14	8.9	30	25.4	23.7	26.2	25.1	26	6.2	59.3	39.7	35.1	20	25.4
Kanred x Marquis	11746	25.4	26.3	13.1	21.6	31	28.7	24.3	26.5	23	12.2	28	25.8	21.4	24.6	23.9	30	5.9	51.2	44.4	33.8	26	25.3
Turkey x Marquis	11747	18.9	24.6	14.7	19.4	27	24.9	26.8	25.9	27	14.9	16	20.3	24.2	28.2	24.2	29	11.6	51.2	39.8	34.2	24	25.0
Kanred x Hope-Hard Federation	11843	21.5	26.4	16.2	21.4	23	21.8	28.7	25.3	28	15.3	15	27.2	25.3	26.8	26.4	22	6.2	46.8	36.0	29.7	30	24.9
Standard error of a mean (Bu.)		1.71	2.99	1.77	1.29		2.18	1.38	1.29		2.02		1.73	1.30	2.47	1.09		1.03	4.33	4.94	2.22		0.75
Standard error of a mean (Pot.)		6.63	11.38	10.06	5.52		7.38	4.63	4.36		13.41		5.94	5.03	8.37	3.81		10.62	7.50	11.11	5.70		2.57

1/ Not grown at Stillwater.

Table 21. - Summary of average yields of 23 winter wheat varieties grown in uniform yield nurseries at 12 stations in the hard red winter-wheat region 1938-39

Variety	C. I. No.	Bushels per acre																					Average 12 stations
		Texas					Oklahoma				Kansas		Nebraska				Colorado						
		Denton	Bush-land	Chilli-cothe	Av.	Rank	Still-water	Wood-ward	Av.	Rank	Hays	Rank	Lincoln	North Platte	Alliance	Av.	Rank	Akron	Fort Collins	Hesperus	Av.	Rank	
Kawvale x Temmarq	11669	33.3	22.7	23.7	26.6	1	29.5	40.6	35.1	1	23.4	2	26.2	27.2	29.7	27.7	1	19.9	60.7	36.4	39.0	6	31.1
Oro x Temmarq	11672	34.7	22.1	22.4	26.4	2	32.8	34.3	33.6	3	20.1	4	25.5	25.2	30.7	27.1	2	17.0	58.0	37.5	37.5	8	30.0
Do	11673	32.8	19.6	23.9	25.4	3	31.6	33.0	32.3	4	20.0	5	25.5	23.9	30.8	26.7	3	18.2	54.4	45.7	39.4	4	30.0
Kawvale x Temmarq	11750	35.3	19.1	21.7	25.4	3	29.1	39.6	34.4	2	25.5	1	24.4	23.5	30.9	26.3	4	21.9	52.4	30.4	34.9	18	29.5
Temmarq x Minturki	11580	29.5	20.1	21.3	23.6	8	24.2	38.9	31.6	5	18.2	10	21.6	22.6	30.3	24.8	5	18.9	56.5	34.9	36.8	9	28.1
Kanred x Marquis	11589	30.7	19.6	22.8	24.4	7	24.0	34.4	29.2	8	19.9	6	21.7	20.5	30.8	24.3	7	17.5	60.8	32.0	36.8	9	27.9
Kanred x Blackhull	11844	24.6	18.6	24.4	22.5	9	24.1	33.4	28.8	9	15.8	18	20.4	20.4	27.0	22.6	14	15.9	62.3	45.7	41.3	1	27.7
Cheyenne selection	11666	13.1	19.7	21.6	18.1	20	---	32.5	---	---	16.8	15	20.9	21.0	32.2	24.7	6	18.7	58.5	44.7	40.6	2	27.2 1/2
Temmarq x Nebraska No. 25	11847	32.0	18.0	24.9	25.0	6	28.0	34.0	31.0	6	21.2	3	21.6	21.2	28.0	23.6	10	15.6	51.5	---	---	---	26.9 1/2
Early Blackhull	8856	32.1	21.0	23.1	25.4	3	28.5	28.2	28.4	11	13.6	23	21.1	24.4	27.2	24.2	8	17.5	57.4	25.0	33.3	20	26.6
Early Blackhull Hybrid	11846	26.5	18.2	17.8	20.8	12	26.2	32.5	29.4	7	18.4	9	19.2	20.2	29.8	23.1	12	15.7	62.6	---	---	---	26.1 1/2
Minturki x Blackhull	11815	22.7	16.2	22.4	20.4	17	25.2	28.4	26.8	13	18.5	8	18.0	17.9	26.8	20.9	21	15.9	60.0	42.3	39.1	5	26.1
Sibley No. 62	11523	19.0	20.5	22.8	20.8	12	24.3	33.0	28.7	10	17.0	14	21.8	18.0	28.5	22.8	13	15.6	54.1	39.0	36.2	14	26.1
Blackhull selection	11737	20.2	22.8	23.6	22.2	10	24.2	28.0	26.1	16	17.9	11	17.0	22.1	31.3	23.5	11	15.9	50.3	38.9	35.0	17	26.0
Turkey selection	11577	11.4	19.7	21.4	17.5	22	---	29.5	---	---	16.6	17	19.1	19.7	28.5	22.4	15	15.8	59.0	45.6	40.1	3	26.0 1/2
Blackhull	6251	20.4	21.1	24.9	22.1	11	24.4	28.8	26.6	14	17.8	13	19.6	16.8	27.2	21.2	17	16.0	54.1	40.0	36.7	11	25.9
Nebred	10094	15.1	19.7	27.6	20.8	12	20.1	32.7	26.4	15	16.8	15	21.5	20.6	30.2	24.1	9	16.8	51.7	35.7	34.7	19	25.7
Kanred x Marquis	11746	21.9	17.5	22.6	20.7	16	25.7	30.1	27.9	12	19.7	7	18.5	18.6	25.9	21.0	20	11.6	54.1	40.0	35.2	16	25.5
Oro x Fulhard	11579	15.9	22.2	21.3	19.8	19	21.0	30.4	25.7	18	14.7	21	17.5	19.9	27.5	21.6	16	17.8	50.4	45.0	37.7	7	25.3
Minturki x Blackhull	11671	21.9	17.8	21.5	20.4	17	20.9	24.9	22.9	21	17.1	13	15.1	17.6	28.4	20.4	22	14.6	60.2	34.7	36.5	12	24.6
Kharkof	1442	15.0	17.1	19.6	17.2	23	21.8	29.2	25.5	19	15.5	19	17.7	18.4	27.1	21.1	19	14.2	58.2	36.1	36.2	14	24.2
Turkey x Marquis	11747	15.6	16.9	21.5	18.0	21	20.7	31.0	25.9	17	15.5	19	14.5	19.2	26.6	20.1	23	14.7	53.1	41.1	36.3	13	24.2
Kanred x Hope-Hard Federation	11843	23.4	17.0	22.0	20.8	12	20.2	27.4	23.8	20	14.6	22	18.3	19.0	26.3	21.2	17	14.8	51.8	31.1	32.6	21	23.8

1/ Average includes only 11 stations.

Table 22. - Summary of agronomic data other than yield for
30 varieties of winter wheat grown as uniform yield nur-
series at 13 stations in the hard red winter wheat region
1939

Variety	C. I. No.	Winter sur- vival	Average					
			Date		Leaf rust	Hgt.	Kernel plump- ness	Test weight
			Headed	Ripe				
No. of stations		3	11	11	2	12	2	8
		(Pct.)	(May)	(June)	(Pct.)	(In.)	(Pct.)	(Lbs.)
Kharkof	1442	98	21	26	37	30.1	78	58.1
Blackhull	6251	93	18	23	40	31.5	80	58.9
Early Blackhull	8856	89	11	20	36	30.8	80	60.8
Nebred	10094	98	19	24	52	28.7	74	58.4
Sibley No. 62	11523	98	19	25	36	30.6	79	58.0
Kanred x Marquis	11589	94	17	23	12	30.7	80	58.5
Kanred x Hope-Hard Fed.	11843	96	16	23	30	29.0	74	57.0
Minturki x Blackhull	11671	96	20	24	28	31.7	71	57.5
Early Blackhull Hybrid	11846	96	17	23	26	31.0	84	58.3
Tenmarq x Nebraska No. 28	11847	95	18	24	20	31.3	81	59.5
Oro x Tenmarq	11672	95	17	23	9	30.2	82	58.8
Do	11673	94	17	23	8	29.8 ^{1/}	83	58.3 ^{1/}
Cheyenne selection	11666	98	19 ^{1/}	24	43	27.7 ^{1/}	79	58.7 ^{1/}
Kanred x Blackhull	11844	99	17	23	32	29.8	81	58.5
Kanred x Marquis	11746	98	19	25	22	30.1	77	58.0
Turkey x Marquis	11747	98	18	24	42	29.4 ^{1/}	78	57.8 ^{1/}
Turkey selection	11577	98	19 ^{1/}	24	57	29.4 ^{1/}	75	57.1 ^{1/}
Oro x Fulhard	11579	98	19	25	46	29.8	87	59.4
Minturki x Blackhull	11815	94	19	25	32	32.4	79	58.9
Kawvale x Tenmarq	11669	96	17	22	12	29.1	77	58.9
Do	11750	98	17	22	7	29.8	76	56.9
Blackhull selection	11737	98	18	24	38	30.7	82	59.9
Tenmarq x Minturki	11580	98	18	24	25	30.1	74	57.9
Kawvale x Tenmarq	11950	98	16	22	7	30.3	73	57.6
Do	11951	99	16	23	9	30.4	81	58.9
Early Blackhull x Tenmarq	11952	95	16	20	25	30.5	86	61.3
Martin x Tenmarq ³	11805	97	19	24	14	30.5	73	56.1
Kawvale x Tenmarq	11953	98	19	23	7	28.8	71	56.5
Kanred-Hard Federation x								
Minhardi-Minturki	11970	88	16	23	27	32.8	85	58.6
Ft. Collins selection	11971	92	18	24	42	30.4	75	57.5

^{1/} Excluding Stillwater, Okla.

DATA FROM THE DISEASE NURSERIESBUNT NURSERY

For convenience copies of the data from the uniform winter wheat bunt nursery are included in this report. The data are presented in table 23.

LOOSE SMUT

During the last two years I. M. Atkins, at Denton, Texas, has obtained some data on the reaction of wheat varieties to loose smut. These data have been made available to the cooperators and a copy of the report is included here. The data are presented in table 24.

UNIFORM WINTER WHEAT RUST NURSERIES

In tables 25 and 26 are presented the data on severity of leaf and stem rust infection on the 30 varieties of winter wheat grown in observation nurseries throughout the country in 1939. These preliminary data are included in this report through the kindness of Dr. H. B. Humphrey. At some future date a complete report of these nurseries will be issued and the rust percentages may not agree entirely with those presented here since the data shown included only figures for the severity of infection.

Differential data for leaf-rust infection were obtained for all varieties at 25 stations. The averages for these stations again demonstrated the lack of resistance among hard wheats. The most resistant hard winter wheats were Hope x Hussar (C. I. 11682), Hope x Mediterranean (C. I. 11763), Red Rock x Hope (C. I. 11821), Hard Federation x Kawvale (C. I. 11753), and Marquillo x Oro (C. I. 11851).

Stem-rust readings showing differential reaction were reported from 14 stations (table 26). The varieties of hard wheat showing the lowest average infection were Hope x Hussar (C. I. 11682), Hope x Mediterranean (C. I. 11763), Hope x Kawvale (C. I. 11822), and Marquillo x Oro (C. I. 11851).

UNITED STATES DEPARTMENT OF AGRICULTURE

Bureau of Plant Industry

SUMMARY OF THE GREAT PLAINS UNIFORM WINTER
WHEAT BUNT NURSERY, 1939

By H. A. Rodenhiser, pathologist, and K. S. Quisenberry, agronomist,
Wheat Investigations, Division of Cereal Crops and Diseases

The uniform winter-wheat bunt nursery for the Great Plains area was continued in 1939 in the same manner as in previous years. This report gives a summary of the data obtained in 1939, together with averages for the varieties grown during different periods from 1932 to 1939.

In the fall of 1938, 49 varieties and strains of winter wheat were sown in duplicate 8-foot rows at 10 stations in the Great Plains and at Bozeman, Mont., Kearneysville, W. Va., Arlington, Va., and Logan, Utah. The nursery included varieties that had shown resistance in previous years and interesting new strains supplied by several of the cooperating stations.

Inoculum for each station was obtained from the previous year's nursery at that station by selecting bunted heads from all infected varieties. For the Manhattan test the inoculum was a composite of races known to be present in Kansas. For the Kearneysville and Arlington tests the seed was inoculated with a composite made up of inoculum from all other nurseries.

Data from 10 nurseries are recorded in the accompanying table. Because of unfavorable environmental condition for bunt infection or subsequent plot growth, no significant data were obtained in nurseries planted at Akron, Colo., North Platte, Nebr., and Bozeman, Mont.

Data from the 10 additional nurseries are recorded in the table.

The varieties are listed in the order of average infection at the 10 stations. These averages ranged from 0.7 to 59.1 percent. The average infections of some standard varieties were as follows: Relief, 1.1; Hussar, 2.4; Nebred, 2.9; Minturki, 3.5; Yogo, 4.5; Redit, 5.4; and Oro, 10.0. The check varieties, Kharkof, Cheyenne, and Quivira, had average infections ranging from 41 to 57 percent and Chiefkan had an average of 59.1 percent. Three strains had averages lower than Relief and nine were better than Hussar. Four strains of Hope x Turkey 1069, in the nursery for the first time, showed less infection than the Turkey (C.I. 10016) parent. All but four of the hybrid strains in the test showed less infection than Oro.

At the bottom of the table are shown the average infections by stations. Ft. Collins had the heaviest infection, followed by Woodward, Kearneysville, and Denton. A study of the Woodward and Ft. Collins data gives some indication that different forms may be present at these stations. The Martin resistance seemed to be more effective at Woodward than at Ft. Collins.

At the right of the table some long-time averages are presented. For the period 1932-39, Turkey selection (C.I. 10016) has the lowest average. In these tests since 1936, Relief has the lowest average for the period of years. Hope x Hussar (C.I. 11834) and Kanred x Redit (C.I. 11840), each grown for two years, have records nearly as good as Relief. Of the commercial varieties in the test Nebred has the best record, although in 1939 this variety developed 14 percent infection at Ft. Collins.

January 18, 1940.

Table 23 - Summary of bunt infection on 49 varieties and strains of wheat grown in the Great Plains uniform winter-wheat bunt nursery at 10 stations in 1939, and average bunt infections for 1932-1939

Variety or cross	C. I. no.	Average percentage of bunt at:										Average 10 stations 1939	Weighted average		
		Denton, Tex.	Amarillo, Tex.	Stillwater, Okla.	Woodward, Okla.	Manhattan, Kans.	Fort Collins, Colo.	Lincoln, Nebr.	St. Paul, Minn.	Kearneysville, W. Va.	Arlington, Va.		1938 and 1939	1936 to 1939	1932 to 1939
Kanred x Redit	11840	0.2	0	1.0	0.5	1.1	3.4	0	0	0.5	0	0.7	0.8	---	---
Hope x Turkey 1069	11964	0.7	0	0	5.7	0	1.4	0	0	0	0	0.8	---	---	---
Hope x Hussar	11834	0.5	0	0.5	0	2.5	1.7	0	3.3	0	0	0.9	0.7	---	---
Relief	10082	0	0	0	1.0	8.8	1.0	0	0	0	0	1.1	0.6	1.0	---
Hope x Turkey selection	11958	1.4	0.4	0.5	4.2	1.7	3.0	0	0.9	0	0	1.2	---	---	---
Cheyenne selection	11666	0.2	0	0	1.2	0	12.5	0	0	0	0	1.4	1.1	2.0	---
Turkey selection	11962	1.5	0.9	0	2.5	0	8.9	0	0.4	1.0	0	1.5	---	---	---
Hope x Turkey 1069	11968	0.5	1.7	0.6	3.7	8.2	1.9	0	0.4	1.5	0	1.9	---	---	---
Fulhard x Oro	11732	1.0	0	0	0	0.6	19.0	0	0	0.5	0	2.1	2.2	2.2	---
Oro x Temmarq	11729	0.2	1.4	0.3	2.5	0	18.2	0	0	0	0	2.3	2.2	1.9	---
Hussar	4843	8.5	5.2	0	0.4	2.2	1.3	0	1.8	5.0	0	2.4	6.2	6.4	3.7
Oro x Temmarq	11674	2.5	0	0	0.8	0	18.5	0	1.8	0	0	2.4	2.7	3.1	---
Temmarq x Minturki	11833	0.7	1.7	0	7.5	3.1	7.7	3.7	0	1.0	0	2.5	2.2	---	---
Hope x Turkey 1069	11966	1.2	0	0	2.9	6.6	11.5	0	2.8	0	0	2.5	---	---	---
Do	11967	0.5	0	0	4.4	5.4	14.2	0	0.9	1.0	0	2.6	---	---	---
Turkey selection	10016	3.2	0	0	4.8	1.2	13.5	0	0.9	2.0	0.5	2.6	1.8	2.1	1.6
Do	11963	1.5	0.5	0	9.5	0.9	12.0	0	2.4	1.5	0	2.8	---	---	---
Nebred	10094	1.5	0	0	4.4	5.5	14.0	0	1.5	2.0	0.5	2.9	2.2	2.4	2.1
Kanred x Minturki	11839	2.0	1.1	1.5	1.7	0	21.8	0	1.1	0.5	0	3.0	2.2	---	---
Oro x Temmarq	11807	1.7	0	0	2.7	0	26.4	0	2.6	0	0	3.3	2.8	---	---
Turkey selection	11965	2.0	1.5	0.8	5.5	6.3	17.4	0	0.2	0	0	3.4	---	---	---
Minturki	6155	1.4	4.0	0	7.0	1.1	6.2	0.8	1.6	13.0	0	3.5	3.7	4.3	5.6
Turkey selection	11841	3.5	0.7	0.4	9.3	2.9	13.2	0	4.5	1.0	0	3.6	2.6	---	---
Martin x Temmarq	11823	0	0	0	0.4	6.4	11.5	0	4.3	17.0	1.5	4.1	2.9	---	---
Turkey 1069 x Temmarq	11842	1.9	0	0.7	12.7	1.1	22.0	0	2.1	2.0	0	4.3	---	---	---
Yogo	8033	6.0	0.8	0	17.8	0	13.7	1.6	2.8	2.0	0.5	4.5	3.7	3.6	2.7
Turkey selection	11848	1.7	0	0	5.2	0.3	35.3	0	1.3	2.5	0	4.6	3.2	---	---
Oro x Temmarq	11731	1.7	1.2	0	9.8	0.6	31.3	2.0	0.3	0.5	0	4.7	4.5	4.0	---
Do	11830	0.2	1.8	0	2.5	1.6	42.2	0	3.8	0	0	5.2	5.6	---	---
Redit	6703	1.8	4.0	3.3	7.7	3.3	15.5	1.8	1.8	12.0	3.0	5.4	9.3	5.9	5.1
Martin x Temmarq	11824	0	0	0	0.5	6.7	14.8	0	6.7	21.0	4.0	5.4	3.8	---	---
Oro x Temmarq	11673	3.4	1.9	0	9.2	0	38.5	0	2.2	0	0.5	5.6	5.8	5.0	---
Martin x Temmarq	11805	0	0	0	1.2	9.9	13.7	0	9.3	17.5	4.0	5.6	3.3	---	---
Blackhull x Oro	11961	1.7	1.7	8.4	5.5	3.0	33.8	0	1.5	1.5	0.5	5.8	---	---	---
Sherman x Kanred	11820	1.5	0	0	14.9	0.3	39.2	0	1.1	0.5	0	5.8	4.1	---	---
Oro x Temmarq	11728	1.0	0	0	2.7	0	54.2	0	6.1	1.0	0	6.8	5.5	5.0	---
Martin x Temmarq	11804	0	0	0	0.3	4.9	22.9	0	6.6	26.0	6.0	6.7	4.6	---	---
Marquillo x Oro	11955	7.9	2.4	0	19.2	0.9	49.7	0	0.3	1.0	0	8.1	---	---	---
Do	11851	12.8	2.1	0.4	18.9	0.7	46.2	1.7	2.0	0.5	0	8.5	---	---	---
Quivira x Fulhard - Oro	11954	5.1	1.5	0.9	16.3	1.7	56.7	5.1	3.6	1.8	0.3	9.3	---	---	---
Oro	8220	9.9	2.8	4.6	24.7	4.2	44.0	0.9	1.3	6.5	1.0	10.0	7.9	7.1	5.9
Marquillo x Oro	11957	17.8	0.5	0.2	17.5	0.7	64.3	7.6	0	1.5	0	11.0	---	---	---
Oro x Temmarq	11827	15.0	4.4	0	34.0	3.7	52.5	7.7	1.4	2.0	0	12.1	9.7	---	---
Hope x Kawvale	11959	26.7	5.0	27.4	27.0	7.2	27.7	7.0	6.7	32.5	0.5	16.8	---	---	---
Do	11960	38.5	21.3	21.3	34.5	14.6	35.5	5.6	6.2	12.0	0	19.0	---	---	---
Khartof	1442	60.4	43.2	50.9	62.5	28.8	72.5	33.3	29.3	26.5	6.5	41.4	39.2	40.2	43.5
Cheyenne	8885	56.7	47.3	36.4	65.2	30.8	76.2	51.6	21.0	61.5	16.5	46.3	41.9	44.1	43.2
Quivira	8886	75.7	57.7	51.6	82.5	31.8	89.8	55.9	21.2	87.5	15.5	56.9	53.3	51.9	46.2
Chieftan	11754	78.5	40.2	41.7	73.5	47.4	88.3	34.6	46.8	87.5	52.5	59.1	---	---	---
Average		9.4	5.3	5.2	13.2	5.5	27.4	4.5	4.4	9.3	2.3				

UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Plant Industry

REACTION OF WINTER WHEAT VARIETIES TO LOOSE SMUT INFECTION
AT TEXAS SUBSTATION NO. 6, DENTON, TEX., 1938 AND 1939

By I. M. Atkins, Associate Agronomist, Wheat Investigations,
Division of Cereal Crops and Diseases

In many years loose smut (Ustilago tritici) is present in fields of winter wheat in serious amounts in the vicinity of Denton, Texas, and throughout the southern Great Plains. In order to learn more about varietal reaction to this disease the work herein reported was started by the Division of Cereal Crops and Diseases and the Texas Experiment Station, as a part of the coordinated winter wheat improvement program.

Inoculation was obtained by means of the vacuum type of apparatus designed by Moore (Phytopathology 26: 397-400. 1937). Spores for the inoculum were collected on the Substation and no attempt was made to determine the physiologic race or races present. All of the work was done in the field. In 1937 most of the varieties were inoculated two or three times to determine the stage of maturity at which highest infection might be expected. When the readings were obtained in 1938 for 36 varieties it was found that the percentages of infection were as follows: First bloom, 17.0; full bloom, 14.9; post bloom, 9.4. The best infection is obtained by inoculating soon after the spike begins shedding anthers.

The data on varietal reaction are presented in table 24. These data must be considered as preliminary since they are for only one or two years. Varieties showing high infection for one or both years may be classed as susceptible. Those showing no infection may have escaped or they may have resistance. Low infections may be due to partial escape or to a certain degree of resistance. Varieties such as Early Blackhull, Clarkan, Kanred, and Early Premium are known to be susceptible under field conditions but so far have shown low or no infection. On the other hand, Nebraska No. 60, Denton, and a number of Turkey selections are known to develop considerable smut in the field and they were also high in these tests. Kawvale and certain Kawvale hybrids have shown very little infection. A number of varieties of soft wheat have shown no infection as yet.

These tests are being continued and, with improved technique and more readings, worth-while information should be obtained.

Texas Substation No. 6, Denton, Texas
December 28, 1939

Table 24.- Infection of loose smut obtained in winter wheat varieties by artificial inoculation at Denton Substation No. 6, Denton, Tex., 1938 and 1939.

Variety or selection	Number		Loose smut infection		Average
	C. I.	Texas	1938 ¹	1939 ²	
			(Pct.)	(Pct.)	(Pct.)
Akron selection	11660	-----	3.4	0.0	1.7
Arco	8246	-----	0.0	50.0	25.0
Beloglina x Hussar	11513	-----	6.7	---	---
Berkeley Rock	8272	-----	0.0	---	---
Blackhull	6251	-----	5.8	---	---
Blackhull selection	11737	-----	16.6	---	---
C. I. 8034 x Tenmarq	11668	-----	11.2	---	---
Cheyenne	8885	-----	0.0	---	---
Cheyenne selection	11666	-----	2.5	100.0	51.3
Clarkan	8858	-----	0.0	12.5	6.3
Cooperatorka	8861	-----	0.0	---	---
Dawson	3342	-----	0.0	---	---
Denton	8265	-----	15.9	44.0	30.0
Early Blackhull	8856	-----	0.0	---	---
Early Kanred	8261	-----	0.0	0.0	0.0
Early Premium	11858	-----	0.0	0.0	0.0
Forward	6691	-----	0.0	0.0	0.0
Forward x Dietz selection (Cornell 250a-1-5-7)	-----	23262	0.0	0.0	0.0
Fulcaster	6471	-----	35.0	6.3	20.7
Fultz	1923	-----	71.8	100.0	85.9
Hard Federation x Kawvale (Kans. J-341716)	-----	-----	6.7	---	---
Hard Federation x Kawvale (Kans. J-341734)	-----	-----	9.4	---	---
Harvest Queen	6199	-----	0.0	---	---
Honor	6161	-----	0.0	0.0	0.0
Honor x Forward selection (Cornell 501e-1-28)	-----	23263	0.0	0.0	0.0
Hope x Mediterranean	-----	Sel. 41-8-4-2	13.6	---	---
Do	-----	Sel. 41-8-4-4	6.7	---	---
Do	-----	Sel. 41-8-5	1.5	---	---
Do	-----	Sel. 41-16-3	1.4	---	---
Do	-----	Sel. 41-17-3	4.2	---	---
Do	-----	Sel. 41-35-1	5.0	---	---
Do	-----	Sel. 41-121	3.0	---	---
Do	-----	College 1254	---	0.0	---
Do	-----	College 1323	---	20.0	---
Do	-----	College 1394	---	0.0	---
Do	-----	College 1523	---	0.0	---
Jones Fife	4468	-----	0.0	0.0	0.0
Kanhull	11877	-----	0.0	0.0	0.0
Kanred	5146	-----	0.0	---	---

Table 24.- (Continued)

Variety or selection	Number		Loose smut infection		Average
	C. I.	Texas	1938 ¹	1939 ²	
			(Pct.)	(Pct.)	(Pct.)
Kanred x Hard Federation	10092	-----	2.7	---	---
Kanred x Kanred-Marquis	11592	-----	0.0	---	---
Kanred x Marquis	11589	-----	23.6	40.0	31.8
Do	11746	-----	0.0	66.7	33.4
Kawvale	8180	-----	0.0	0.0	0.0
Kawvale x Tenmarq	11669	-----	0.0	---	---
Do	11750	-----	0.0	10.0	5.0
Do	11953	-----	10.4	0.0	5.2
Kharkof	1442	-----	5.2	30.0	17.6
Leap	4823	-----	0.0	0.0	0.0
Mediterranean selection	10085	5933-20	38.1	46.2	42.2
Do	11523	5933-23	20.2	---	---
Do	11587	3015-105-1	2.0	38.5	20.3
Do	10086	3015-81	6.7	---	---
Do	-----	5933-38	21.2	100.0	60.6
Minhardi	5149	-----	0.0	0.0	0.0
Minturki	6155	-----	0.0	---	---
Minturki x Blackhull	11815	-----	12.0	---	---
Nebraska No. 60	6250	-----	44.6	66.7	55.6
Nebred	10094	-----	0.0	25.0	12.5
Oro	8220	-----	0.0	---	---
Oro x Fulhard	11579	-----	0.0	40.0	20.0
Oro x Tenmarq	11672	-----	38.0	---	---
Do	11673	-----	54.4	---	---
Penquite selection	11745	-----	8.6	42.9	25.8
Prelude x Kanred	11591	-----	56.4	---	---
Purdue No. 4	11932	23249	0.0	0.0	0.0
Purplestraw	1915	-----	0.0	0.0	0.0
Quivira	8886	-----	47.4	---	---
Red May selection	12023	7250-1	32.9	100.0	66.5
Ridit	6703	-----	0.0	---	---
Shephard	6162	-----	0.0	---	---
Sibley No. 62	11523	-----	0.0	---	---
Tenmarq	6936	-----	9.2	---	---
Tenmarq x Minturki	11580	-----	46.2	100.0	73.1
Turkey selection	10016	-----	8.7	---	---
Do	10083	-----	4.4	85.7	45.0
Do	11576	-----	5.0	14.3	9.7
Do	11577	-----	0.0	10.0	5.0
Do	11667	-----	3.3	---	---
Do	11734	-----	0.0	0.0	0.0
Zimmerman	2907	-----	0.0	0.0	0.0

¹/ Based on culm counts and average infection from 2 to 3 inoculations at different stages of growth.

²/ Based on plant counts from spaced plantings.

Table 25 - Severity of leaf rust infection on winter-wheat varieties grown in the Uniform Rust Observation Nursery, 1939

Variety	C. I. No.	Percent severity of leaf rust infection at:																									Average for 25 stations
		Tifton, Ga.	Experiment, Ga.	Statesville, N. C.	Blackburg, Va.	Jackson's Ferry, Va.	Elk Creek, Va.	Chilhowie, Va.	Arlington Farm, Va.	Lexington, Ky.	Wooster, Ohio	Bedford, Ind.	Lafayette, Ind.	Urbana, Ill.	Chatham, Mich.	East Lansing, Mich.	Madison, Wis.	Columbia, Mo.	Kanawha, Iowa	Ames, Iowa	College Station, Tex.	Denton, Tex.	Stillwater, Okla.	Manhattan, Kans.	Lincoln, Nebr.	Granger, Okla.	
Soft Red:																											
Michigan Amber	5620	85	65	75	90	80	80	95	50	50	35	25	95	65	85	90	90	35	40	30	25	80	40	85	45	2	62.8
Trumbull	5657	80	80	50	95	85	95	100	60	75	75	90	95	60	75	95	95	30	50	40	25	80	60	90	45	2	69.1
Denton	8265	10	5	20	85	75	90	95	20	3	2	5	15	40	10	80	75	60	15	15	5	20	10	25	1	0	31.2
Fulcaster	6471	75	65	45	85	80	95	90	50	60	75	90	95	50	80	90	95	50	70	40	25	90	45	90	40	0	66.8
Mediterranean	3332	40	30	80	90	90	70	95	50	50	75	75	95	30	70	90	95	40	55	50	30	20	20	80	10	0	57.2
Minhardi	5149	75	35	70	80	80	80	97	40	90	50	90	100	65	75	90	95	40	95	60	75	100	70	100	15	3	70.8
Purdue No. 1	11380	55	5	65	90	50	55	85	45	25	60	10	80	50	60	90	100	35	60	40	25	90	60	60	1	1	51.8
Fultz selection x Kanred	11748	1	1	15	20	25	60	30	5	1	1	1	1	15	1	30	2	10	10	5	1	15	1	5	1	0	10.0
Wabash	11384	1	0.5	25	20	55	50	60	10	1	3	1	3	15	1	15	2	10	5	5	1	1	1	5	1	0	11.4
Wabash selection	11845	1	1	20	65	40	40	80	20	1	5	1	5	15	1	15	10	10	10	5	1	1	1	5	1	0	14.0
Fultz selection x Hungarian selection	11849	1	0	10	15	65	30	35	10	1	5	1	1	15	1	15	2	5	1	2	1	1	1	2	1	0	8.3
Fultz selection x Hungarian selection	11850	2	1	15	30	60	25	25	25	1	5	1	5	20	1	30	2	10	2	2	10	1	1	5	1	0	11.0
Semi-Hard Red:																											
Bussar	4843	80	5	30	50	70	50	65	30	5	5	10	65	50	35	60	95	50	25	25	80	80	50	60	20	0	43.8
Kawvale	8180	20	5	20	40	75	40	75	10	5	5	5	40	40	15	60	30	40	20	15	10	20	15	25	1	0	26.6
Minturki	6155	80	10	25	60	70	80	80	15	20	60	35	80	80	35	80	100	30	65	50	40	85	45	90	40	0	54.2
Hope x Bussar	11682	1	0.5	20	20	40	10	40	5	1	1	0	1	5	2	40	1	5	2	3	1	5	5	5	5	0	8.5
Hope x Mediterranean	11763	2	0.5	30	25	30	30	30	1	1	1	5	1	0	1	5	1	5	5	5	1	1	1	2	2	0	7.3
Hope x Kawvale	11822	20	1	40	20	65	75	70	5	10	1-25	1	40	15	7	40	1	10	10	10	1-50	1-65	1-65	1-85	1-10	0	24.0
Red Rock x Hope	11821	10	1	45	15	50	35	40	10	1-50	1-75	1	1	5	1	10	1	5	1	1	1	1	1	1	1	0	11.6
Hard Red:																											
Kanred	5146	60	10	10	50	60	50	70	20	10	10	5	25	50	25	70	90	50	45	50	15	65	60	80	25	0	40.2
Temmarq	6936	35	10	25	55	40	40	70	30	10	5-35	5	80	50	8	85	90	40	50	40	25	60	25	65	10	1	38.3
Kharkof	1442	80	15	35	60	45	65	80	50	25	35	25	60	60	25	80	100	50	50	45	60	100	60	100	25	0	53.2
Malakof	4898	65	20	20	40	65	50	50	40	25	20	25	75	50	20	60	85	40	50	40	1-60	100	70	100	30	0	46.8
Oro x Temmarq	11673	20	2	15	45	35	45	50	20	1	1	1	20	40	5	60	80	20	10	5	10	5	5	25	5	0	21.0
Nebrad	10094	85	10	40	70	60	65	75	45	60	25	35	95	50	10	90	95	50	55	35	80	100	60	100	25	1	56.6
Kawvale x Temmarq	11669	10	5	55	60	40	30	40	25	5	10	10	75	30	1	60	50	35	15	15	25	20	20	45	5	0	27.4
Fulcaster x Temmarq	11751	1	2	30	60	70	60	60	35	1	5	1	20	20	1	50	30	10	5	10	1	5	5	25	5	0	20.3
Hard Federation x Kawvale	11753	1	1	40	60	30	10	75	30	1	1	1	50	20	1	35	20	25	2	15	5	1	1	10	1	0	17.6
Marquillo x Oro	11851	1	0.5	35	65	30	10	40	40	1	1	1	5	10	1	30	3	10	2	2	5	2	2	20	1	0	12.4
Kanred-Fulcaster x Temmarq	11752	50	0.5	35	65	65	30	70	45	10	60	25	25	40	8	80	95	20	15	20	1-25	10	2	25	1	0	32.3

Table 26. - Severity of stem rust infection on winter wheat varieties grown in the Uniform Rust Observation Nursery in 1939

Variety or cross	C.I. no.	Percent severity of stem rust infection at:												College Sta- tion, Texas	Denton Texas	Man- hattan Kans.	Average for 14 sta- tions
		Tifton Ga.	Jack- sons Ferry, Va.	Elk Creek, Va.	Chil- howie, Va.	Black- burg, Va.	States- ville, N.C.	East Lansing Mich.	Chatham Mich.	Colum- bia, Mo.	Anes, Iowa	Kana- wha, Iowa					
Soft Red:																	
Michigan Amber	5620	T	40	95	70	50	20	25	75	10	30	50	60	2	25	39.4	
Trumbull	5657	1	40	90	70	50	40	30	75	5	20	45	60	1	10	38.4	
Denton	8265	T	65	95	80	40	10	60	90	10	15	50	80	10	40	46.1	
Fulcaster	6471	1.5	35	90	80	10	10	80	70	15	15	55	70	5	40	41.3	
Mediterranean	3332	3.0	65	98	80	30	2	60	75	30	30	60	70	5	30	45.6	
Minhardi	5149	T	50	95	90	50	5	70	75	10	40	65	80	2	40	48.0	
Purdue No. 1	11380	5	80	96	60	15	T	50	60	10	40	25	60	5	25	37.9	
Fultz selection x Kanred	11748	2	50	75	40	10	0	10	45	5	60	30	70	10	25	30.9	
Wabash	11384	1.5	70	60	40	30	T	10	85	20	15	25	70	2	30	32.8	
Wabash selection	11845	2	80	75	65	40	5	10	95	20	15	60	60	10	50	41.9	
Fultz selection x Hun- garian selection	11849	T	80	80	85	40	T	15	65	30	65	65	80	2	30	45.5	
Do	11850	T	90	50	30	30	3	25	75	20	15	65	70	5	30	36.3	
Semihard Red:																	
Hussar	4843	T	60	75	60	40	T	10	50	30	5	40	80	15	25	35.0	
Kawvale	8180	T	20	90	25	5	T	25	25	5	5	15	80	1	15	22.2	
Minturki	6155	T	15	90	30	35	0	25	15	10	10	15	60	T	20	23.2	
Hope x Hussar	11682	T	10	T	10	3	0	T	10	0	0	0	25	0	T	4.1	
Hope x Mediterranean	11763	T	50	1	20	-	0	5	5	0	0	10	15	0	T	7.8	
Hope x Kawvale	11822	T	0	10	15	35	0	10	2	10	0	5	20	0	T-20	3.3	
Red Rock x Hope	11821	T	15	60	10	20	0	10	2	0	0	5	25	T	5	10.9	
Hard Red:																	
Kanred	5146	T	30	70	35	35	T	30	10	10	5	25	60	5	10	23.2	
Tenmarq	6936	T	20	60	40	10	T	30	25	10	10	30	70	10	25	24.3	
Kharkof	1442	T	50	90	20	15	T	70	20	10	10	40	70	2	40	31.2	
Malakof	4898	T	25	95	30	20	0	5	10	5	30	15	75	T	20	23.5	
Oro x Tenmarq	11673	T	5	40	10	10	0	45	5	0	0	15	25	T	T	11.1	
Nebred	10094	T	T	60	30	25	0	50	15	0	0	10	80	1	25	21.1	
Kawvale x Tenmarq	11669	T	1	85	20	10	0	60	10	0	0	10	80	T	T	19.8	
Fulcaster x Tenmarq	11751	T	3	85	35	15	T	20	3	5	5	10	90	T	15	20.5	
Hard Federation x Kawvale	11753	T	30	80	60	15	0	60	20	5	5	10	95	5	T	27.5	
Marquillo x Oro	11851	T	0	20	25	10	0	40	5	0	0	0	15	T	2	8.3	
Kanred-Fulcaster x Tenmarq	11752	T	25	95	50	45	T	50	T	5	5	5	25	T	T	21.0	

^{1/} Average includes only 13 stations.

