

UNITED STATES DEPARTMENT OF AGRICULTURE

Bureau of Plant Industry

COMPARISON OF WINTER WHEAT VARIETIES GROWN IN COOPERATIVE PLOT AND NURSERY EXPERIMENTS IN THE HARD RED WINTER WHEAT REGION

IN 1941

by

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EXPERIMENTS IN 1941

The 1941 crop was the eleventh harvested since the cooperative winter wheat improvement program has been in operation. Plans have not been altered greatly since the beginning, but each year changes are made in the lists of varieties tested in both plot and nursery experiments. The cooperating stations have changed from time to time owing to reorganization of State and Federal work.

This report is a summary of the 1941 data from all cooperating stations as well as a summary of yield data for the 3-year period ending in 1941. Because of the labor involved complete summaries of average yields will not be made each year as in the past. Such summaries will be made at 2-year or longer intervals, since varieties do not change their positions greatly in long time averages from year to year. The cooperating agencies, stations, and personnel concerned in these experiments are as follows:

^{1/} The writer wishes to express his appreciation to Theodore H. Johnston, Edwin H. Park, and Dale E. Weibel, Agents, and Ruben M. Heerram, Student Assistant, of Lincoln, Nebr., for their assistance in assembling the data and making the computations in this summary.

Wheat Investigations
Hard Red Winter Wheat
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Leaf Rust
Milling and Baking

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Bushland	Amarillo Experiment Station

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Stillwater	A. & M. College
*Woodward	Southern Great Plains Field Sta. 2
Goodwell	Panhandle Agr. Expt. Station

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Moccasin	Judith Basin Branch Station
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2/ Cooperation with Division of Dry Land Agriculture, Bureau of Plant Industry, as well as with the State experiment stations.

ACCESSION NUMBERS ASSIGNED

The following C. I. numbers have been assigned to wheats of the Region during the past year.

<u>C. I. No.</u>	<u>Name</u>	<u>State No.</u>
12022	H-44-Minturki x Minturki	Minnesota N.S.N. II-29-68
12107	Newturk x Kanred-Beloglina	Moccasin Bulk Hybrid 39-9
12108	Montana 36-Beloglina x Kanred	Moccasin Bulk Hybrid 31-143
12109	Red Chief	
12110	Kanred-Hard Federation x Tenmarq	Amarillo No. 25-34-116
12111	Tenmarq x Oro	Denton No. 70-38-44
12112	Cheyenne x Blackhull	Nobr. sel. No. 3120-A-1-7
12113	Marquillo x Tenmarq	Kans. No. 2755
12114	Cheyenne x Early Blackhull	Hoys Cereal No. 40-91

In August, 1941, the Kansas Station named Oro x Tenmarq (C.I. 11673) Comanche.

In September, 1941, the Nebraska Station named Kawvale x Tenmarq (C.I. 11669) Pawnee.

These names are used in this report.

UNIFORM VARIETIES IN PLOTS

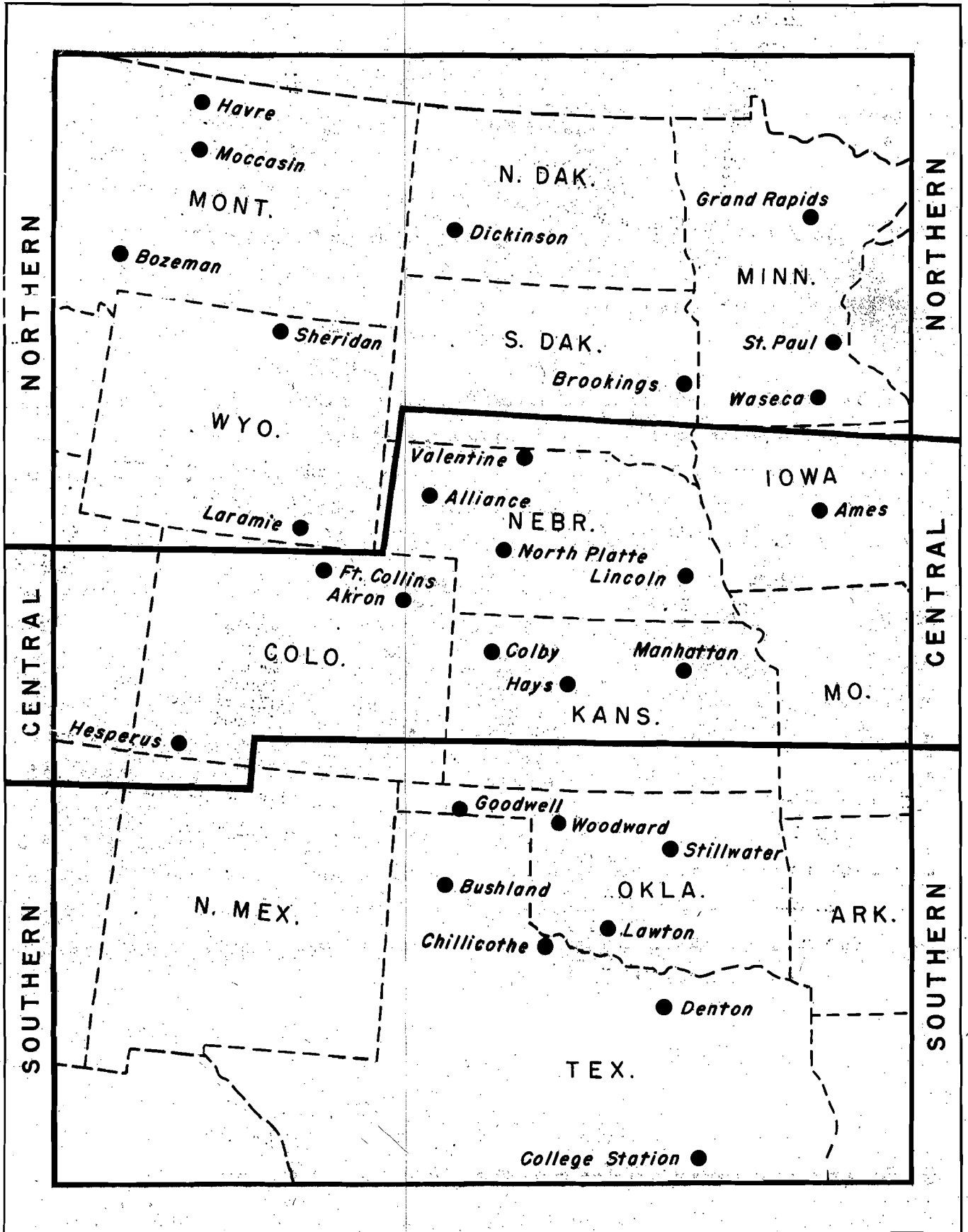
Because of the wide variation in environment encountered in the region from Texas to Montana, it has not seemed advisable to seed the same varieties at all stations. The region has been divided into three districts, as shown by the map on the following page, and the varieties grown uniformly at the cooperating experiment stations are somewhat different in each of the three districts. The varieties grown uniformly in each district in 1941 were as follows:

<u>Southern</u>		<u>Central</u>		<u>Northern</u>	
<u>Variety</u>	<u>C. I. No.^{3/}</u>	<u>Variety</u>	<u>C. I. No.^{3/}</u>	<u>Variety</u>	<u>C. I. No.^{3/}</u>
Kharkof	1442	Kharkof	1442	Kharkof	1442
Tenmarq	6936	Tenmarq	6936	Minturki	6155
Blackhull	6251	Blackhull	6251	Yogo	8033
Early Blackhull	8856	Chiefkan	11754	Karnont	6700
Chiefkan	11754	Comanche	11673	Marmin	11502
Comanche	11673	Pawnee	11669	Minard x Minhardi	8888
Pawnee	11669	Nebred	10094	Nebred	10094
Kawvale	8180	Cheyenne	8885		
Kawvale x Tenmarq	11956				

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.

^{3/} C. I. refers to accession number of the Division of Cereal Crops and Diseases.



PLOT DATA

In the fall of 1940 conditions for seeding wheat were rather spotted. At some stations, especially those to the south, the summer was hot with little moisture and the surface soil became very dry, thus causing poor seed beds. Farther north in Kansas and Nebraska, August rains permitted the preparation of good seed beds, and also caused considerable volunteer growth. Rains were received at all stations in time to allow good fall stands. Plots were seeded at 23 cooperating stations. Complete failures were reported from Alliance and Valentine due to severe winterkilling and drought. Wet weather delayed threshing at Goodwell and no data were available at the time of this report. At Stillwater, seed treatment for loose smut caused differential stands so no data were reported. Yield and other agronomic data for varieties grown at each of 19 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 1941, and, where possible, average yields are given for the period 1939-41. For the most part the data need little explanation.

As stated before, most stations received enough moisture to insure good fall stands, and growth was rapid since the fall was rather warm. On November 9 the "Armistice Day" storm hit the northern stations and from November 11 to 15 the southern stations felt the effects of this disturbance. At the northern stations the ground was covered with snow when the temperature dropped, but in parts of Kansas and Nebraska the crop had very little protection against the readings of zero and below. In some cases, especially eastern Nebraska and Kansas, and western Iowa this was the first freezing weather of the winter and the damage to wheat, shade trees, fruit trees, and shrubs was terrific. Farther west where the wheat plants had been hardened by cool weather there was much less loss. For the most part the winter was rather mild after this storm and the ground stayed moist with normal rainfall. Spring weather was mild and damp and at some of the southern stations entirely too wet. Growth became rank in the south but from Nebraska north a May drought caused some damage. Leaf rust appeared early, having overwintered as far north as Lincoln, Nebr., and increased rapidly in some places. Hessian fly infestation was very heavy in eastern Nebraska and Kansas and caused considerable damage. The infestation became heavy due to excessive volunteer growth that was not destroyed. Also some seeding was done too early, although late seeded wheat suffered from spring infestation. Beginning about June 1 there were heavy rains over most of the area causing considerable difficulty in harvesting and injury to grain quality. At Denton, Chillicothe, Amarillo, and Lawton harvest was most difficult.

The 1941 season was unique in that so many hazards influenced the crop at the different stations. Due to excessive moisture leaf rust and septoria were heavy at the southern stations, and probably other wet weather diseases were present. Such hazards as stem rust, hessian fly, and winter injury have been mentioned. The result was that susceptible varieties suffered considerable damage and the range in yields was much greater than usual.

At Denton, growth was very abnormal due to excessive rainfall, and one of the four replications was so poor that it was abandoned. Because of continued rains quadrats were harvested from the plots and yields are based on these. Leaf rust was rather heavy on Early Blackhull, Blackhull, Kanred, and Kharkof, while a number of varieties showed considerable resistance. Stem rust was heavy on susceptible varieties but Kawvale x Tennarq (C.I. 11956), Early Blackhull, and Hope x Mediterranean (Sel. 41-16-3-3) were resistant. Kanred also showed considerable resistance. Test weights ranged from 56 pounds per bushel for Early Blackhull down to 41 pounds per bushel for Red May, part of this light weight being due to rust and part to excessive rains. All yields were very low with Comanche, Kawvale x Tennarq (C.I. 11956), and Martin x Tennarq³ (C.I. 11805) at the top of the list. For the period 1939-41, Comanche, Chiefkan, and Pawnee had the highest average yields.

Yields at Chillicothe were low and quality was very poor due to excessive moisture after the crop was ripe. Because of a failure to obtain stands it was necessary to reseed four varieties, all of which gave poor yields. The highest yields were recorded for Mediterranean, Martin x Tennarq³ (C.I. 11805), and Kawvale x Tennarq (C.I. 11956). For the last three years Tennarq has a slight advantage in yield, followed by Martin x Tennarq³ (C.I. 11805), Mediterranean, and Pawnee.

The irrigated plots were the only ones harvested at Bushland and these gave yields ranging from 18.7 to 39.7 bushels per acre. Straw was unusually tall but test weights were all below 60 pounds due to excessive moisture at maturity. The highest yielding varieties were Kawvale x Tennarq (C.I. 11956), Pawnee, and Martin x Tennarq³ (C.I. 11805). At the bottom of the list will be found Blackhull and Early Blackhull. Based on the 3-year average, Pawnee, Martin x Tennarq³ (C.I. 11805), and Chiefkan have had the highest yields, with Turkey and Blackhull the lowest.

At Lawton, growth was heavy and the straw fairly tall. Leaf rust infection was heavy on all varieties except those having Tennarq or Kawvale as a parent. Lodging was severe with Cheyenne, Kawvale, Oro x Tennarq (C.I. 11672), and Turkey x Kawvale (Lawton 35-93) standing up the best. Test weights were fairly good with Early Blackhull and Early Blackhull x Tennarq (C.I. 11952) weighing 60 pounds per bushel. Oro x Tennarq (C.I. 11672), Comanche, and Kawvale gave the highest yields, while Blackhull and Harvest Queen gave the lowest ones. Two Oro x Tennarq strains, C.I. 11672, and Comanche showed the highest yields for the 2-year period, 1940-41.

Tennarq and Pawnee also had good averages for the same period, while Clarkan, Sibley 62, and Harvest Queen were low.

Straw was tall at Woodward with all varieties having plant heights of 40 inches or more. Lodging was rather general in all varieties with Kawvale x Tennarq (C.I. 11956) and Cheyenne standing up the best. Test weights were above 55 pounds per bushel with the grain of some varieties weighing 60 and 61 pounds. Kawvale x Tennarq (C.I. 11956) and Pawnee gave the highest yields followed by Tennarq x Nebr. No. 28 (C.I. 11847) and Tennarq. Turkey, Kanred, and Kharkof gave the lowest yields. Pawnee has had the highest average yield for the period 1939-41. For this same period Conanche, Tennarq x Nebr. 28 (C.I. 11847), and Quivira have had good yields, while the later varieties Turkey, Kanred, and Kharkof had the lowest yields.

At Manhattan, rather complete data again were obtained and reported. Some winterkilling occurred in the varieties, especially Fulcaster and Blackhull. Lodging was heavy in Early Blackhull, Early Blackhull x Tennarq (C.I. 11952), and Turkey. Leaf rust was very heavy on all susceptible varieties, and considerable stem rust developed, especially on Fulcaster and Harvest Queen. Culm counts, head size, and grain weight and size data are shown in table 1. The highest yields were made by Cheyenne x Tennarq (C.I. 11972 and C.I. 12103), Pawnee, and Conanche. A Marquillo x Oro hybrid being tested in plots for the first time yielded fairly well. Neither Chiefkan nor Red Chief were outstanding for yield, but both had high test weights per bushel. The later varieties, Oro, Nebred, and Turkey, along with the soft wheats had the lowest yields. For a 2-year period Pawnee, Cheyenne x Tennarq (C.I. 11972 and C.I. 12103), and Early Blackhull x Tennarq (C.I. 11952), all early varieties, have been the highest for yield.

Winterkilling was reported from Hays, although no variety killed badly. Leaf rust was heavy, especially on the susceptible varieties. Test weights were unusually high with all varieties having weights of 60 pounds or better, while Chiefkan weighed 65 and Red Chief 66 pounds per bushel. Pawnee, Conanche, and Cheyenne x Tennarq (C.I. 11972) gave the highest yields, while the later varieties such as Oro, Nebred, Cheyenne, and Kharkof gave rather low yields. Red Chief yielded slightly less than Chiefkan although neither was especially high. Pawnee, Conanche and Oro x Tennarq (C.I. 11672) have given the highest average yields for the 3-year period 1939-41. During this period the later varieties have been near the bottom of the list.

Yields and test weights were very good at Colby. Pawnee, Tennarq, and Conanche yielded highest while Blackhull and Early Blackhull were the lowest. No long time averages are shown since this was the first crop harvested since 1938.

At Akron, all varieties came through the winter with good stands and made very heavy spring growth. In fact the growth probably was too heavy and caused some reduction in yield because of lack of moisture before maturity. Some leaf rust developed but was not especially

heavy on any variety. Test weights were fairly good and yields ranged from 7.7 to 18.5 bushels per acre. Comanche and Early Blackhull x Tenmarq (C.I. 11952), two early varieties, were at the top of the list, followed by Chiefkan and Blackhull. The later varieties gave lower yields, no doubt being more injured by the summer drought. Based on the average for 1939 and 1941, Comanche has had a slight yield advantage over Chiefkan and the Blackhulls.

Winterkilling was severe at Lincoln, with Nebred and Cheyenne selection showing the best survivals. During the May drought those varieties having the better stands suffered the most, and thin stands seemed to be an advantage. Leaf rust was heavy on nearly all varieties, and hessian fly did considerable damage as shown by the lodging index. This index was an attempt to record the down straws left after the binder had gone over the plot. The resistance of the Kawvale x Tenmarq selections is striking, and may explain in part why these strains all yielded so high. Of the standard wheats Nebred gave the highest yield, followed by Chiefkan, Iobred, Clarkan, and Cheyenne. The poor performance of Kharkof cannot be explained. The variety was hard hit in the November storm and never fully recovered. During the 3-year period 1939-41, Pawnee, Kawvale x Tenmarq (C.I. 11992), and Kawvale x Tenmarq (Nebr. No. 1113) have had the best average yields. During this same period Cheyenne ranked fifth, Chiefkan sixth, and Nebred twelfth.

At North Platte, winterkilling was very severe in the more tender varieties and survival was closely associated with yield. Nebred, Cheyenne selection, and Cheyenne had the highest yields, and also the best survivals. Chiefkan with a low survival gave an unusually good yield, a characteristic of the variety observed at several places in Nebraska. For the 3-year average Cheyenne selection, Nebred, and Cheyenne have been the highest in yield. Pawnee and Comanche have been very poor at this station due in part to lack of hardiness.

Winter survival at Waseca ranged from 70 percent for Marnin to zero for Karnont. Both stem and leaf rust developed and test weights were low except for Minard x Minhardi (C.I. 8888). Marnin gave the highest yield, followed by H-44 x Minturki² (Minn. 2701) a new rust-resistant strain. Two other selections from the same cross gave fairly good yields, although each was rather heavily winterkilled. Marnin, Minard x Minhardi (C.I. 8888), and Yogo have had the highest average yields for the last three years.

Winterkilling was heavy at St. Paul, with Minhardi having the highest survival of 53 percent. Both stem and leaf rust were heavy on susceptible varieties, but the newer winter x spring hybrids were resistant to both rusts. Yields ranged from 21.4 to 7.4 bushels per acre, with Minard x Minhardi (C.I. 8888), Minhardi, and Marnin at the top. Of the four varieties grown for three years none is especially outstanding for yield.

At Grand Rapids, eight varieties were grown and all survived the winter 100 percent. Leaf rust was heavy on all varieties. Yields differed very little, except that H-44 x Minturki² (Minn. 2702) was the highest and Minturki the lowest. For the 3-year period Minturki has had the highest average yield.

Winter survivals were rather high at Dickinson, but yields were low due to a hail storm just previous to harvest. Leaf rust was reported for all varieties and some stem rust developed. Test weights ranged from 57.0 to 60.5 pounds per bushel. The yield data are reported but their value is open to question and they are not used in the averages. Marmin, Nebred, and Minturki had the highest average yields for the 2-year period 1939-40.

At Sheridan, there was some winterkilling but no sharp varietal differences. Karmont, Montana No. 36, and Yogo gave the highest yields with Cheyenne and Minturki yielding the lowest. Cheyenne has had the highest average yield for the 1939-41 period due in part to a very high yield in 1939.

Yields were lower than usual at Bozeman, with Kharkof, Karmont, and Relief yielding the highest and Yogo and Marmin the lowest. For the 2-year period 1939 and 1941 Cheyenne had the highest average, followed by Kharkof and Karmont.

Survivals were good at Moccasin, and with sufficient moisture a very good crop was harvested. Bunt data taken from the bunt nursery are shown. Test weights were above 60 pounds per bushel for all varieties. Newturk and Yogo gave yields above 40 bushels per acre, while several new selections made good records. Nebred and Marmin gave the lowest yields. Yogo, Newturk, and Turkey x Kanred (C.I. 11725) had the highest 3-year average yield while Nebred and Marmin had the lowest.

Winter wheat made a good crop at Havre as shown by yields of from 18.1 to 25.8 bushels per acre and test weights over 60 pounds per bushel. Karmont and Minhardi x Minturki (C.I. 8034) gave the highest yields, while Nebred and Marmin were at the bottom of the list. Kanred, Newturk, and Karmont had the highest average yields for the 3-year period. Yogo ranked fifth, Minturki eighth, and Marmin last for this period.

Table 1. - Agronomic and other data for winter wheat varieties grown in replicated plots in cooperative experiments at 19 experiment stations in the hard red winter wheat area in 1941, and average yields for 1939-41

Denton, Texas
(Four 1/44-acre plots seeded)
(Three plots harvested; 144 square feet per plot)

Variety or cross	C.I. number	Date		Hgt. (In.)	Rust		Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
		Head- ed	Ripe		Leaf	Stem			Average	Rank
		May	June		(Pct.)	(Pct.)			1939-41 (Bu.)	
Comanche	11673	6	4	28	10	15	52.0	11.0	23.1	1
Kawvale x Tennarq	11956	8	3	27	T	5	51.0	8.6		
Martin x Tennarq ³	11805	9	7	30	10	30	49.0	8.3	20.2	4
Kanred-Hard Federation x Tennarq	12105	4	4	30	T	35	51.0	7.9		
Do	12106	5	5	28	T	25	49.0	7.8		
Tennarq	6936	10	7	30	20	20	49.0	7.4	19.3	6
Pawnee	11669	7	3	27	0	10	48.0	6.9	20.5	3
Early Blackhull	8856	Apr. 28	May 3	30	40	T	56.0	6.6	19.8	5
Quivira	8886	5	4	32	10	10	50.5	6.5	19.3	6
Blackhull	6251	12	7	28	35	5	48.0	5.4	18.5	8
Hope x Mediterranean (Sel. 41-16-3-3)	-----	12	8	29	0	0	45.0	5.3		
Chiefkan	11754	11	7	29	25	10	51.0	5.2	21.3	2
Kanred	5146	13	12	28	40	10	46.0	4.8	17.2	11
Kawvale	8180	11	7	29	T	10	45.0	4.8	17.4	9
Mediterranean (Campbell) (T.S. 23250)	-----	7	6	30	40	60	45.0	4.5	17.4	9
Mediterranean selection	10086	8	4	29	10	60	46.0	3.9	15.7	13
Red May selection (T.S. 7250-1)	-----	6	1	27	15	60	41.0	3.4		
Denton	8265	12	6	33	8	70	43.0	3.4	14.7	15
Fulcaster	6471	9	7	31	20	40	43.0	3.2	13.5	16
Kharkof	1442	13	13	27	45	10	44.0	2.9	14.8	14
Clarkan	8858	12	7	31	10	50	43.0	2.8	16.0	12

Standard error of a difference between the mean yields of any two varieties = 1.61 bushels.

Chillicothe, Texas
(Four plots; seeded October 16, 1940)

Variety or cross	C.I. number	Date headed	Height (In.)	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
						Average	Rank
						1939-41 (Bu.)	
Mediterranean	11587	May 6	38	55	18.8	19.6	3
Martin x Tennarq ³	11805	May 6	40	50	17.6	19.8	2
Kawvale x Tennarq	11956	May 6	36	53	17.2		
Tennarq	6936	May 2	37	51	16.5	19.9	1
Kanred-Hard Federation x Tennarq	12105	May 1	37	52	14.8		
Martin x Tennarq ³	11823	May 6	38	48	14.6		
Pawnee	11669	May 6	36	50	13.2	19.0	4
Chiefkan	11754	May 2	37	51	12.9	17.2	9
Quivira	8886	May 1	40	53	12.7	19.0	4
Denton	8265	May 6	39	51	11.5	16.6	11
Certified Turkey	1558	May 6	40	50	11.1	16.8	10
Early Blackhull	8856	April 19	37	51	10.8	18.1	6
Kanred-Hard Federation x Tennarq	12105	May 1	39	48	10.3		
Comanche	11673	May 1	37	49	10.1	17.7	8
Blackhull	6251	May 6	35	50	10.0	18.0	7
Cheyenne	8885	May 6	34	49	8.1	16.2	12
Kharkof	1442	May 8	33	49	7.7	15.0	16
Kawvale	8180	May 7	42	50	7.4	15.2	15
Vaughn Turkey (T.S. 15133)	-----	May 8	37	49	6.9	15.5	14
Kanred	5146	May 7	36	48	5.7	15.8	13

Standard error of a difference between the mean yields of any two varieties = 1.54 bushels.

1/ Replanted on December 11, 1940.

Table 1 (Continued)

Bushland, Texas
(Four 1/40.4-acre plots)
(Irrigated)

Variety or cross	C.I. number	Date		Hgt. (In.)	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
		Headed	Ripe				Average 1939-41 (Bu.)	Rank
		May						
Kawvale x Tenmarq	11956	25	July 1	40	57.9	39.7		
Pawnee	11669	23	June 30	39	58.0	36.8	18.8	1
Martin x Tenmarq ³	11805	22	June 29	43	54.0	35.5	17.4	2
Comanche	11673	22	June 28	38	56.2	33.3	16.9	4
Chiefkan	11754	24	July 3	42	58.4	32.5	17.0	3
Kawvale	8180	30	July 4	44	54.8	30.3	15.5	5
Tenmarq	6936	26	July 3	43	53.6	29.9	15.0	6
Kanred	5146	28	July 4	41	54.1	26.8	14.2	7
Kanred-Hard Federation x Tenmarq	12106	22	June 28	38	53.8	25.6		
Cheyenne	8886	30	July 6	42	51.2	25.1	13.4	10
Kharkof	1442	28	July 4	41	51.0	24.5	13.5	9
Turkey	1558	28	July 4	41	54.1	23.1	12.5	12
Blackhull	6251	24	July 1	42	55.4	19.1	13.2	11
Early Blackhull	8856	16	June 24	36	54.6	18.7	13.6	8

Standard error of a difference between the mean yields of any two varieties = 2.55 bushels.

Lawton, Oklahoma
(Three .01332-acre plots; seeded October 7,
emerged October 15, 1940)

Variety or cross	C.I. number	Date		Hgt. (In.)	Leaf rust (Pct.)	Lodg- ing (Pct.)	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
		Headed	Ripe						Average 1940-41 (Bu.)	Rank
Oro x Tenmarq	11672	Apr. 26	June 2	40	5	17	58	35.5	27.9	1
Comanche	11673	Apr. 26	June 2	39	5	75	57	31.6	26.7	2
Kawvale	8180	May 1	June 3	41	10	17	57	28.7	23.4	6
Kawvale x Tenmarq	11956	May 1	June 2	38	5	50	58	28.2		
Turkey x Kawvale (La. 35-93)	-----	May 1	June 3	40	90	20	57	27.0	22.9	8
Tenmarq	6936	May 1	June 4	39	25	65	55	26.7	24.5	3
Kawvale x Tenmarq	11750	Apr. 29	June 2	39	10	20	53	26.7	23.6	5
Pawnee	11669	Apr. 28	June 2	36	10	25	56	26.3	24.4	4
Cheyenne	8885	May 4	June 6	38	90	51	58	25.0	23.4	6
Early Blackhull x Tenmarq	11952	Apr. 22	May 30	39	90	90	60	24.9		
Early Blackhull	8856	Apr. 19	May 30	39	90	95	60	24.2	20.6	11
Kanred	5146	May 4	June 5	39	90	75	55	21.9	22.0	9
Iobred x Kawvale (La. 35-95)	-----	Apr. 30	June 5	41	10	50	58	21.4	20.2	12
Chiefkan	11754	May 1	June 4	40	90	85	58	20.5	21.4	10
Kharkof	1442	May 6	June 6	38	90	60	56	19.9	20.0	13
Turkey	1558	May 6	June 6	37	90	60	55	19.6	19.6	14
Clarkan	8858	May 2	June 6	42	90	25	58	17.6	18.1	17
Penquite	11745	Apr. 30	June 4	41	90	65	57	17.4	18.3	15
Sibley 62	11523	May 4	June 6	37	90	80	54	16.3	18.1	17
Blackhull	6251	May 1	June 4	41	90	65	56	15.1	18.3	15
Harvest Queen	6199	May 1	June 4	42	90	40	54	13.3	15.0	19

Standard error of a difference between the mean yields of any two varieties = 1.87 bushels.

1/ Higher at time of harvest.

Table 1. - (Continued)

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Woodward, Oklahoma
(Four 1/47-acre plots; seeded October 8; emerged October 13, 1941)

Variety or cross	C.I. number	Date		Hgt.	Lodg- ing	Weight per bushel	Average acre yield	Yield	
		Headed	Ripe					Average	Rank
		May	June					(In.) (Pct.)	(Lbs.) (Bu.)
Kawvale x Tenmarq	11956	13	17	43	20	60	42.9		
Pawnee	11669	10	16	42	35	61	42.7	36.0	1
Tenmarq x Nebraska 28	11847	11	15	49	25	60	39.8	32.5	3
Tenmarq	6936	13	16	47	35	60	38.8	30.4	6
Kawvale	8180	15	16	46	40	60	38.8	29.8	8
Comanche	11673	9	16	45	40	61	38.8	32.7	2
Quivira	8886	9	14	47	41	61	38.4	32.5	3
Blackhull x Oro	11961	13	16	46	51	60	32.5	29.2	9
Cheyenne	8885	16	17	42	29	59	30.4	30.4	6
Chiefkan	11754	13	16	47	47	61	30.2	31.5	5
Early Blackhull	8856	2	10	43	35	61	29.4	28.6	11
Blackhull	6251	13	15	48	50	60	29.0	29.2	9
Turkey	1558	16	16	46	36	55	28.4	28.4	12
Kanred	5146	15	16	45	44	57	24.9	27.3	13
Kharkof	1442	16	17	43	44	59	24.1	27.1	14
Cheyenne x Early Blackhull	11999	6	12	42	45	61	37.2 ^{1/2}		
Cheyenne x Early Blackhull	12000	5	11	42	60	61	31.3 ^{1/2}		

Standard error of a difference between the mean yields of any two varieties = 3.92 bushels.

^{1/} Two-plots only.

Hays, Kansas
(Four plots; seeded October 7; emerged October 13, 1940)

Variety or cross	C.I. number	Survival (Pct.)	Date		Hgt. (In.)	Leaf rust (Pct.)	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
			Head- ed May	Ripe June					Average 1939-41 (Bu.)	Rank
Pawnee	11669	91	24	21	37	5	64	42.7	24.6	1
Comanche	11673	95	24	23	38	20	63	40.6	24.4	2
Cheyenne x Tenmarq	11972	91	25	25	36	15	62	40.2		
Oro x Tenmarq	11672	98	23	23	38	25	63	39.4	23.4	3
Cheyenne x Tenmarq	11973	91	24	25	38	5	63	37.1		
Early Blackhull Hybrid	11846	94	24	25	39	45	62	36.5	21.7	7
Early Blackhull x Tenmarq	11952	99	22	20	40	70	62	36.5		
Tenmarq	6936	93	24	26	39	40	62	35.0	21.8	6
Chiefkan	11754	96	24	29	40	15	65	35.0	22.7	4
Early Blackhull	8856	96	19	18	40	80	62	33.7	22.0	5
Red Chief	12109	96	24	26	42	40	66	33.0		
Oro	8220	98	28	27	37	80	61	26.3	17.1	9
Nebred	10094	100	28	25	34	90	61	25.9	17.6	8
Cheyenne	8885	99	29	27	36	80	61	25.4	16.0	13
Kanred	5146	99	28	27	39	80	61	25.1	16.6	11
Kharkof	1442	98	28	27	38	80	60	24.9	16.4	12
Blackhull	6251	96	24	26	40	77	61	23.6	16.7	10
Turkey	1558	99	28	27	37	90	60	21.8	15.3	14
Blackhull selection H.C.369	----	99	25	26	39	90	60	17.5		

Standard error of a difference between the mean yields of any two varieties = 1.53 bushels.

Table 1. - (Continued)

Manhattan, Kansas
(Three 1/40-acre plots)

Variety or cross	C.I. number	Survival (Pct.)	Date		Hgt. (In.)	Lodg- ing (Pct.)	Wt. 100 10 cm. sections, straw (Grams)	Rust ^{1/}		No. of culms at ma- turity (10 M)	Size of head		Weight per 1,000 kernels (Gms.)	Weight per bu- shel (Lbs.)	Ave- rage acre yield (Bu.)	Yield	
			Head- ed May	Ripe June				Stem (Pct.)	Leaf (Pct.)		No. of ker- nels	Weight of grain (Gms.)				Ave- rage 1940-41 (Bu.)	Rank
Cheyenne x Tennarq	11972	98	16	20	33	0	5.41	1	20	233	14.4	.381	26.5	57.7	32.5	31.5	2
Do	12103	97	16	20	34	0	6.04	1	22	225	14.4	.381	26.5	58.3	31.4	30.0	3
Pawnee	11669	97	14	17	33	T	5.09	4	30	261	12.6	.327	25.9	58.3	31.4	31.8	1
Comanche	11673	98	14	18	34	5	6.02	3	15	205	15.0	.398	26.6	56.7	29.6	29.1	6
Cheyenne x Tennarq	12104	98	14	18	33	0	5.87	T	22	218	13.2	.371	28.0	59.1	29.5	29.4	5
Oro x Tennarq	11672	96	14	19	34	T	6.08	5	20	219	13.4	.355	26.5	57.4	28.6	28.4	7
Marquillo x Oro	11851	93	16	23	36	0	6.17	T	5	253	11.4	.308	27.0	57.2	28.5		
Cheyenne	8885	98	17	22	35	0	4.95	4	83	260	12.1	.295	24.2	57.5	28.1	27.0	11
Early Blackhull x Tennarq	11952	98	13	16	36	22	6.33	T	78	184	14.3	.415	28.9	59.8	27.9	29.5	4
Iobred selection	11997	97	16	22	38	T	6.46	22	30	173	16.4	.430	26.2	58.2	27.3		
Kawvale	8180	94	16	20	37	T	6.23	25	13	201	14.5	.367	25.3	56.0	27.2	27.5	10
Quivira	8886	94	14	17	36	2	6.33	T	15	195	14.9	.374	25.1	56.9	26.7	28.1	8
Early Blackhull Hybrid	11846	97	15	21	36	3	5.90	3	65	207	13.0	.352	27.1	56.3	26.7		
Chiefkan	11754	98	15	22	38	5	5.45	10	40	208	13.2	.348	26.3	60.0	26.3	28.1	8
Red Chief	12109	96	14	22	39	0	5.90	20	63	188	13.3	.366	27.4	61.6	25.3		
Cheyenne x Tennarq	11973	98	15	17	33	3	6.06	58	18	231	12.4	.293	23.5	56.8	24.7	27.0	11
Tennarq	6936	88	16	22	37	2	7.04	3	45	179	14.1	.363	25.8	56.0	23.9	26.9	13
Early Blackhull	8856	98	10	15	36	53	5.99	T	75	201	11.9	.321	27.0	59.9	23.8	25.0	17
Blackhull	6251	98	15	21	37	8	5.30	12	77	230	11.5	.276	24.0	58.2	23.3	26.0	14
Kanred x Marquis	11589	94	15	20	34	0	6.37	3	12	202	12.4	.309	24.9	57.1	22.9	26.0	14
Oro	8220	98	19	23	37	3	5.62	T	77	227	11.6	.265	22.9	55.5	22.1	22.8	18
Nebred	10094	99	16	19	33	0	4.58	5	88	291	9.7	.206	21.4	57.3	22.0	25.2	16
Kanred	5146	95	19	21	35	10	5.29	T	53	226	11.3	.250	22.1	54.2	20.8	22.8	18
Turkey	1558	97	18	22	36	15	4.91	10	70	244	10.4	.221	21.2	54.8	19.6	22.4	20
Kharkof	1442	98	19	22	37	5	5.02	15	73	213	11.8	.245	20.9	55.6	18.7	21.6	22
Clarkan	8858	96	16	21	41	0	6.76	63	58	179	11.5	.271	23.5	55.9	17.6	22.2	21
Fulcaster	6471	90	16	20	40	5	6.23	77	83	188	10.5	.250	23.7	54.3	17.2	21.6	22
Harvest Queen	6199	97	16	21	42	3	6.40	70	87	178	8.7	.177	20.4	52.6	11.6	18.5	24

Standard error of a difference between the mean yields of any two varieties = 1.53 bushels.

^{1/} Notes on disease reaction obtained in cooperation with members of the Department of Plant Pathology.

Table 1. - (Continued)

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Colby, Kansas
(Three plots)

Variety or cross	C.I. number	Date		Height (Inches)	Weight per bushel (Pounds)	Average acre yield (Bushels)
		Headed	Ripe			
		May	June			
Pawnee	11669	21	23	35	58	41.0
Tenmarq	6936	21	26	34	55	38.6
Comanche	11673	20	27	36	57	37.5
Early Blackhull x Tenmarq	11952	17	22	33	59	37.1
Chiefkan	11754	21	25	40	59	36.7
Kanred	5146	26	29	35	55	35.2
Oro	8220	26	30	35	57	35.2
Nebred	10094	25	29	32	58	34.6
Cheyenne	8885	26	29	34	56	34.2
Turkey	1558	25	29	36	56	33.2
Kharkof	1442	25	29	38	56	33.1
Blackhull	6251	21	25	36	56	32.5
Early Blackhull	8856	16	22	30	58	29.2

Standard error of the difference between the mean yields of any two varieties = 1.84 bushels.

Akron, Colorado
(Four 1/41-acre plots--2 on fallow; 2 on cornland;
seeded September 9; emerged September 15, 1940)

Variety or cross	C.I. number	Date		Leaf rust	Height (In.)	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
		Headed	Ripe					Average	Rank
		July	(Est.)					1939 and 1941 (Bu.)	
Comanche	11673	May 27	7	13	24	56.5	18.5	13.5	1
Early Blackhull x Tenmarq	11952	May 26	7	30	26	58.0	17.3		
Chiefkan	11754	May 29	7	20	27	58.0	16.4	13.1	2
Blackhull	6251	May 28	7	25	26	56.5	16.3	12.5	4
Early Blackhull	8856	May 23	7	38	29	57.0	16.1	12.5	4
Kanred-Hard Federation x Minhardi-Minturki	11970	May 26	7	30	24	58.0	16.0	13.0	3
Tenmarq	6936	May 30	12	23	23	56.5	15.9	12.4	6
Pawnee	11669	May 26	7	10	22	56.5	15.2	11.0	7
Kanred	5146	June 1	14	25	24	57.5	13.3	10.8	8
Cheyenne	8885	June 1	12	33	24	57.0	12.9	10.7	9
Kharkof	1583	June 2	19	25	25	56.0	12.6	10.2	11
Kharkof	1442	June 1	19	25	25	55.5	12.0	9.3	13
Nebred	10094	May 31	12	43	21	58.0	11.8	10.5	10
Minturki	6155	June 1	19	8	28	56.0	10.8	8.4	14
Kanred x Marquis (Akron No.44)	----	May 30	12	13	23	56.5	10.5	9.5	12
Alton	1438	June 3	19	18	27	57.5	7.7	6.6	15

Standard error of a difference between the mean yields of any two varieties = 2.75 bushels.

Table 1. - (Continued)

Lincoln, Nebraska
(Five 1/40-acre plots; seeded September 25 and 26; emerged October 1 and 2, 1940)

Variety or cross	C.I. number	Winter survi- val (Pct.)	Date		Leaf rust (Pct.)	Height (In.)	Lodg- ing index ^{1/}	No. of culms per acre (1,000)	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
			Headed	Ripe							Average 1939-41 (Bu.)	Rank
			May	June								
Kawvale x Tenmarq	11992	72	23	24	70	34	2.5	2141	58.7	30.6	24.4	2
Pawnee	11669	75	22	23	50	31	1.1	2586	60.4	29.8	25.1	1
Kawvale x Tenmarq (Sel. 23867)	-----	71	21	23	70	31	1.2	2349	60.0	29.7		
Do (Nebr. No. 1104)	-----	65	22	23	60	32	1.0	2119	60.2	27.8		
Do (Sel. 23819)	-----	67	23	24	60	32	1.3	1867	59.3	27.4		
Do (Nebr. No. 1113)	-----	68	22	23	70	32	1.1	2203	60.2	27.1	23.1	3
Minturki x Blackhull (Sel. 31A-899)	-----	79	26	26	80	36	4.0	2060	61.8	25.3		
Kanred x Blackhull	11844	71	24	26	80	34	2.9	1879	60.3	23.8	21.6	4
Iobred selection	11997	76	25	26	80	33	3.4	1777	60.4	22.6		
Iobred	10094	87	25	24	80	29	3.6	2103	60.2	20.7	18.4	12
Cheyenne selection	11666	79	26	25	70	30	3.8	2022	59.8	20.0	19.8	7
Chieftan	11754	46	26	26	80	35	2.6	1590	61.1	19.2	20.0	6
Hope x Turkey	11964	76	23	24	60	28	4.6	1979	59.5	19.0		
Iobred	6934	78	26	26	80	31	3.7	1395	62.0	18.9	16.9	17
Clarkan	8858	66	27	26	90	38	2.8	1537	60.3	18.8	19.8	7
Cheyenne	8885	72	26	26	80	29	3.9	1693	59.3	18.4	20.2	5
Cheyenne x Tenmarq	11972	54	26	26	70	30	3.9	1339	58.4	17.8		
Do	12103	50	26	26	80	32	4.6	1235	60.0	17.8		
Turkey selection	11577	65	26	25	80	31	3.3	1814	57.9	17.3	18.9	9
Cheyenne x Tenmarq	11973	45	24	25	70	31	3.5	1478	59.8	16.3		
Nebraska No. 60	6250	74	27	26	80	31	3.8	1789	58.2	16.2	17.2	16
Blackhull	6251	51	26	26	80	32	3.2	1588	58.6	15.9	18.7	10
Turkey (Nebr. No. 312)	-----	71	27	26	80	31	4.0	1696	58.7	15.7	17.4	15
Cheyenne x Tenmarq	12104	43	24	25	60	32	4.0	1329	59.7	15.6		
Turkey (Nebr. No. 1)	-----	71	27	26	80	31	4.2	1634	58.5	15.4	17.8	13
Comanche	11673	52	23	24	50	33	4.8	1179	57.2	15.2	16.6	11
Tenmarq	6936	55	26	26	80	31	4.4	1304	57.2	15.1	17.5	14
Kharkof	1442	51	28	27	80	31	3.6	1307	56.3	11.6	15.4	18

Standard error of a difference between the mean yields of any two varieties = 1.82 bushels.

^{1/} Notes taken from 1 (light) to 5 (heavy).

Table 1. - (Continued)

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North Platte, Nebraska

(Four 1/40-acre plots; 2 replications on fallow, 2 replications on cornland; seeded October 3, 1940)

Variety or cross	C.I. number	Winter survi- val (Pct.)	Date headed	Height (Inches)	Weight per bushel (Pounds)	Average acre yield (Bushels)	Yield	
							Average 1939-41 (Bushels)	Rank
Nebred	10094	81	June 2	22	55.5	19.5	19.4	2
Cheyenne selection	11666	66	June 2	26	55.5	18.3	20.0	1
Cheyenne	8885	68	June 3	25	56.0	17.6	19.0	3
Kanred x Blackhull	11844	42	June 2	29	54.0	16.3		
Turkey selection	11577	63	June 3	30	53.0	16.2		
Turkey selection	10015	64	June 2	29	54.0	15.8	16.2	8
Chiefkan	11754	25	June 2	35	57.5	15.2	16.1	9
Kanred	5146	44	June 4	25	54.5	14.8	17.2	6
Kharkof	1442	49	June 5	32	55.5	14.3	16.9	7
Nebraska 60	6250	39	June 5	27	55.5	14.3	17.7	4
Oro	8220	50	June 5	33	56.0	13.7	17.6	5
Turkey (local)	-----	44	June 3	33	54.0	12.7	15.4	11
North Platte 11	8884	23	June 4	31	55.0	12.3	15.0	12
Tenmarq	6936	24	June 4	32	54.0	11.1	14.4	14
Blackhull	6251	30	June 4	30	55.0	11.0	15.8	10
Comanche	11673	14	May 31	30	54.5	10.2	14.5	13
"Alton"	-----	30	June 5	35	53.5	9.5	13.9	15
Pawnee	11669	13	May 31	29	55.0	9.0	12.9	16

Standard error of a difference between the mean yields of any two varieties = 1.88 bushels.

Table 1. - (Continued)

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

Variety or cross	C.I. number	Winter survi- val (Pct.)	Date		Rust		Grain		Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
			Headed	Ripe	Stem	Leaf	Plump- ness (Pct.)	Tex- ture (Pct.)			Average 1939-41 (Bu.)	Rank
Marmin	11502	70	2	7	20	80	83	60	54.8	18.5	34.9	1
H-44 x Minturki ² (Minn. 2701)	-----	58	3	9	T	10	85	65	53.0	17.6		
Minard x Minhardi	8888	60	2	7	25	100	90	80	57.3	16.7	36.6	2
Minhardi x Marquis (Minn. 2699)	-----	65	2	7	T	60	83	68	52.9	15.1		
H-44 x Minturki ² (Minn. 2702)	-----	32	4	7	T	10	85	70	53.3	12.8		
Do (Minn. 2700)	-----	38	4	7	T	70	80	63	52.6	10.5		
Minturki	6155	23	3	7	T	100	82	65	53.1	10.1	31.6	5
Nebred	10094	17	2	7	5	100	85	70	53.6	9.0	34.5	4
Yogo	8033	15	4	9	5	95	73	60	52.3	8.7	35.3	3
Kharkof	1442	5	3	7	35	95	77	67	51.7	6.6	30.8	6
Karmont	6700	0	--	--	--	--	--	--	45.3	.2	--	

Standard error of a difference between the mean yields of any two varieties = 2.04 bushels.

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

Variety or cross	C.I. number	Winter survi- val (Pct.)	Date		Hgt. (In.)	Rust		Grain		Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
			Headed	Ripe		Stem	Leaf	Plump- ness (Pct.)	Tex- ture (Pct.)			Average 1939-41 (Bu.)	Rank
Minard x Minhardi	8888	38	May 30	9	41	30SR	70	92	73	59.0	21.4	39.5	2
Minhardi	5149	53	June 1	10	41	50S	100	93	62	56.2	20.0	37.5	4
Marmin	11502	33	May 31	9	41	T	80	92	67	56.3	20.0	39.2	3
Minturki	6155	32	June 1	10	41	10SR	95	90	65	56.6	17.9	39.6	1
Yogo	8033	25	June 2	11	41	10SR	80	88	68	56.6	17.5		
H-44 x Minturki ² (Minn. 2701)	-----	24	May 31	9	42	T	T	88	65	54.9	16.0		
Minhardi x Marquis (Minn. 2699)	-----	18	May 31	10	37	T	T	95	77	57.1	13.5		
H-44 x Minturki ² (Minn. 2702)	-----	8	June 3	11	40	T	5	93	62	55.9	7.9		
Do (Minn. 2700)	-----	13	June 1	8	40	T	15	90	63	54.6	7.4		

Standard error of a difference between the mean yields of any two varieties = 2.93 bushels.

Table 1. - (Continued)

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

Variety or cross	C.I. number	Date		Height (Inches)	Leaf rust (Percent)	Grain tex- ture	Weight per bushel (Pounds)	Average acre yield (Bushels)	Yield	
		Headed	Ripe						Average 1939-41 (Bushels)	Rank
		June	July							
5-44 x Minturki ² (Minn. 2702)	-----	15	18	40	70	70	60.2	29.8		
Marmin	11502	13	14	41	63	75	61.0	24.7	26.2	3
Minard x Minhardi	8888	15	15	36	65	85	62.7	24.6	24.9	4
5-44 x Minturki ² (Minn. 2700)	-----	14	14	39	72	75	61.1	24.6		
Do (Minn. 2701)	-----	13	16	43	63	65	60.4	24.3		
Yogo	8033	13	15	39	85	68	61.8	24.2	27.5	2
Minhardi x Marquis (Minn. 2699)	-----	16	15	40	48	65	59.4	23.4		
Minturki	6155	13	15	41	73	70	60.9	23.2	28.0	1

Standard error of a difference between the mean yields of any two varieties = 3.08 bushels.

Dickinson, North Dakota
(Two 1/40-acre plots; seeded September 12; emerged September 30, 1940)

Variety or cross	C.I. number	Survival (Percent)	Date headed June	Height (Inches)	Stem rust (Percent)	Weight per bushel (Pounds)	Average acre yield (Bushels)	Yield	
								Average 1939-40 (Bushels)	Rank
Minard x Minhardi	8888	87	20	36	8	60.0	8.6	9.5	4
Kharkof	1442	84	20	37	15	58.0	8.4	9.2	5
Turkoy	1571	82	20	36	15	57.0	8.2	9.2	5
Nebred	10094	93	19	34	8	60.5	8.1	11.6	2
Minturki	6155	89	20	37	15	57.0	7.8	9.7	3
Marmin	11502	80	17	37	8	58.0	7.8	13.5	1
Karmont	6700	75	20	36	10	58.0	7.3	8.0	8
Nebraska No. 60	6250	95	19	36	15	58.0	6.8	7.8	9
Yogo	3033	87	18	36	5	59.0	6.3	8.7	7
Bologlina	1543	78	19	36	15	57.5	5.7	7.1	10

1/ Badly damaged by hail.

Table 1. - (Continued)

Sheridan, Wyoming
(Three 1/55-acre plots; seeded September 25; emerged October 6, 1940)

Variety or cross	C. I. number	Survival (Pct.)	Date		Height (In.)	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
			Headed	Ripe				Average 1939-41 (Bu.)	Rank
			June	July					
Karnont	6700	83	6	11	33	60	38.2	36.2	7
Montana No. 36	5549	80	8	11	33	60	38.2	36.3	6
Yogo	8033	80	10	10	37	58	37.9	36.0	8
Marmin	11502	83	5	12	38	60	36.7	35.9	9
Nebred	10094	82	6	8	34	59	36.4	39.6	2
Kharkof	1442	82	6	10	36	60	36.4	38.3	5
Nebraska No. 60	6250	82	7	10	35	58	35.4	39.3	3
Minard x Minhardi	8888	83	9	12	35	59	35.1	35.5	10
Kanred	5146	80	7	11	33	59	34.8	38.9	4
Cheyenne	8885	82	7	10	35	60	34.5	40.9	1
Minturki	6155	82	7	10	36	57	33.3	34.9	11

Standard error of a difference between the mean yields of any two varieties = 4.19 bushels.

Bozeman, Montana
(Three 1/56-acre plots; seeded September 16; emerged September 26, 1940)

Variety or cross	C.I. number	Average acre yield (Bushels)	Yield	
			Average 1939 and 1941 (Bushels)	Rank
Kharkof	1442	39.7	49.4	2
Karnont	6700	38.7	49.4	2
Relief	10032	38.5		
Montana 36	5549	38.0	45.2	10
Ridit x Utah Kanred 54a-40	11599	37.1		
Cheyenne	8885	36.6	53.0	1
Nebred	10094	35.7	49.3	4
Burcka x Minhardi	8036	34.5	45.3	9
Nowburk	6935	34.3	46.1	6
Minard x Minhardi	8888	32.9	45.7	8
Minturki	6155	31.5	46.4	5
Yogo	8033	30.8	45.9	7
Marmin	11502	30.3	40.4	11

Standard error of a difference between the mean yields of any two varieties = 3.95 bushels.

Table 1.--(Continued)

Moccasin, Montana
(Four 1/50-acre plots; seeded September 17, 1940)

Variety or cross	C.I. number	Date		Height (In.)	Bunt (Pct.)	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
		Headed	Ripe					Average 1939-41 (Bu.)	Rank
		June	July						
Newturk	6935	19	22	41	62.5	62	41.0	31.0	2
Yogo	8033	22	23	39	4.0	61	40.2	31.1	1
Kanred x Minhardi	11726	22	23	38	65.0	61	39.0	29.5	4
Newturk x Kanred-Beloglina 1667	12107	20	21	40	2.0	60	38.9		
Montana 36-Beloglina 1667 x Kanred	12108	20	22	39	6.5	63	38.7		
Minturki	6155	22	22	40	77.5	60	38.6	28.5	9
Turkey x Kanred	11725	23	24	40	42.5	60	38.4	30.2	3
Minard x Minhardi	8888	22	23	38	60.0	63	38.2	29.0	6
Yogo x Oro, selection 5	----	22	22	40	45.0	61	38.1		
Karmont	6700	21	23	37	32.5	61	38.1	28.2	10
Turkey	1558	21	22	38	30.0	62	38.1	28.6	8
[Kanred-(Beloglina-Buffum 5545)-Karmont] x									
(Minhardi-Karmont-Minhardi)									
	11744	21	22	41	3.0	60	37.9		
Eureka x Minhardi	8036	21	22	40	80.0	62	37.6	28.8	7
Kharkof	1442	20	22	39	12.5	62	37.4	27.7	11
Minturki x Beloglina-Buffum	11661	22	23	40	10.5	61	37.3	29.3	5
Nebred	10094	19	21	38	45.0	62	36.8	26.3	12
Marmin	11502	19	22	40	70.0	62	32.9	24.6	13

Standard error of a difference between the mean yields of any two varieties = 1.44 bushels.

Havre, Montana
(Three 1/50-acre plots; seeded September 23; emerged October 4, 1940)

Variety or cross	C.I. number	Date		Height (In.)	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
		Headed	Ripe				Average 1939-41 (Bu.)	Rank
		June	July					
Karmont	6700	7	14	27	61.6	25.8	20.2	3
Minhardi x Minturki	8034	8	14	28	61.0	25.8	19.3	7
Kanred	5146	6	14	26	61.6	25.6	20.5	1
Newturk	6935	6	14	27	61.4	25.6	20.5	1
Montana No. 36	5549	7	14	28	61.2	25.3	19.7	6
Kharkof	1412	7	14	27	61.0	25.0	20.0	4
Yogo	8033	9	14	27	60.4	24.7	19.9	5
Minhardi x Minturki	8215	7	15	27	60.2	24.7	17.6	12
Minturki	6155	8	14	30	60.4	24.4	18.4	8
Turkey x Minnessa	8028	8	14	26	60.6	24.4	16.9	13
Minard x Minhardi	8888	8	14	28	61.0	22.5	17.3	10
Minard x Minhardi	8889	9	15	28	60.8	22.5	17.3	10
Nebred	10094	9	14	26	61.0	21.4	18.0	9
Marmin	11502	9	14	29	60.6	18.1	15.4	14

Standard error of a difference between the mean yields of any two varieties = 1.30 bushels.

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 all 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 1940 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 for the plot test at each cooperating station, 1941

Station	Number of plots	Average yield of varieties (Bushels)	Standard error of a			
			Single plot (Bushels)	Difference between means (Bushels)	Mean in	
					Bushels	Percent
Texas:						
Denton	3	5.73	1.98	1.61	1.14	19.90
Chillicothe	4	11.89	2.19	1.54	1.09	9.17
Bushland	4	28.63	3.59	2.55	1.80	6.29
Oklahoma:						
Lawton	3	23.22	2.29	1.87	1.32	5.68
Woodward	4	33.91	5.53	3.92	2.77	8.17
Kansas:						
Manhattan	3	24.83	1.87	1.53	1.08	4.35
Hays	4	31.59	2.15	1.53	1.08	3.42
Colby	3	35.25	2.25	1.84	1.30	3.69
Colorado:						
Akron	4	13.95	3.89	2.75	1.94	13.91
Nebraska:						
Lincoln	5	20.32	2.88	1.82	1.29	6.35
North Platte	4	13.98	2.66	1.88	1.33	9.51
Minnesota:						
Waseca	3	11.45	2.50	2.04	1.44	12.58
St. Paul	3	15.72	3.59	2.93	2.07	13.17
Grand Rapids	3	24.85	3.78	3.08	2.18	8.77
North Dakota:						
Dickinson	2	-----	----	----	----	----
Wyoming:						
Sheridan	3	36.09	5.14	4.19	2.96	8.20
Montana:						
Bozeman	3	35.27	4.84	3.95	2.79	7.91
Moccasin	4	38.07	2.05	1.44	1.02	2.68
Havre	3	23.99	1.59	1.30	0.92	3.83

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 for the last years (1939-41) are also given.

Districts

Summaries of the yield data for the uniform varieties grown in 1941 and the 1939-41 averages where available are presented in tables 3 to 8.

In the southern district in 1941 yields were reported from five stations where ten varieties were grown uniformly. The data are presented in table 3 where the varieties are listed in order of average yield. Kawvale x Tenmarq (C.I. 11956), in the uniform plots for the first time, ranked first with an average yield of 27.3 bushels per acre. Parmec ranked second and Comanche third. Chiefkan had an average 7 bushels less than the leading variety. Kanred, Kharkof, and Blackhull were at the bottom of the list.

Table 3. - Summary of average yields of the uniform winter wheat varieties grown in plot tests at 5 stations in the southern district, 1941

Variety or cross	C.I. number	Average yield in bushels per acre at:					Average
		Denton	Chilli- cothe	Bushland	Lawton	Woodward	
Kawvale x Tonnarq	11956	8.6	17.2	39.7	28.2	42.9	27.3
Pawnee	11669	6.9	13.2	36.8	26.3	42.7	25.2
Comanche	11673	11.0	10.1	33.3	31.6	38.8	25.0
Tonnarq	6936	7.4	16.5	29.9	26.7	38.8	23.9
Kawvale	8180	4.8	7.4	30.3	28.7	38.8	22.0
Chiefkan	11754	5.2	12.9	32.5	20.5	30.2	20.3
Early Blackhull	8856	6.6	10.8	18.7	24.2	29.4	17.9
Kanred	5146	4.8	5.7	26.8	21.9	24.9	16.8
Kharkof	1442	2.9	7.7	24.5	19.9	24.1	15.8
Blackhull	6251	5.4	10.0	19.1	15.1	29.0	15.7
Standard error of a mean (bushels)		1.14	1.09	1.80	1.32	2.77	0.78
Standard error of a mean (percent)		19.90	9.17	6.29	5.68	8.17	4.97

In order to show the behavior of the varieties for a somewhat longer period, the average yields for 1939-41 are summarized for 9 varieties in table 4. The varieties are listed in order of the weighted average yield based on the results of 18 station-year tests. Pawnee had the highest average followed by Comanche, Chiefkan, and Tonnarq. Kharkof and Kanred had the lowest average yields. The order of the leading varieties is the same as for the 1938-40 average except that Tonnarq now ranks higher than Blackhull.

Table 4. - Summary of average yields of 9 winter wheat varieties grown in plot tests at 7 stations in the southern district for all or a part of the period 1939-41

Variety	C.I. number	Average yield in bushels per acre at:							Weighted average
		Denton	Chilli- cothe	Bush- land	Lawton	Wood- ward	Good- well	Still- water	
Number of years grown		3	3	3	2	3	2	2	
Pawnee	11669	20.5	19.0	18.8	24.4	36.0	17.5	39.6	24.8
Comanche	11673	23.1	17.7	16.9	26.7	32.7	18.3	38.7	24.4
Chiefkan	11754	21.3	17.2	17.0	21.4	31.5	17.0	36.7	22.8
Tonnarq	6936	19.3	19.9	15.0	24.5	30.4	16.7	33.7	22.4
Blackhull	6251	18.5	18.0	13.2	18.3	29.2	17.6	38.9	21.5
Kawvale	8180	17.4	15.2	15.5	23.4	29.8	---	30.5	21.3
Early Blackhull	8856	19.8	18.1	13.6	20.6	28.6	19.2	29.4	21.0
Kharkof	1442	14.8	15.0	13.5	20.0	27.1	16.0	34.4	19.6
Kanred	5146	17.2	15.8	14.2	22.0	27.3	15.1	---	18.6

For the central district, data were reported from six stations in 1941 (table 5). The data are fairly consistent except in the case of North Platte. Pawnee ranked first with an average yield nearly 3 bushels higher than Comanche which ranked second. Chiefkan ranked third, Tonnarq fourth, and Cheyenne fifth. Nebred, Blackhull, and Kharkof were at the bottom of the list. In view of the amount of winterkilling at some of these stations the high averages of Pawnee and Comanche were a surprise. In table 6 the average yields for the last three years

for nine varieties grown at six stations are summarized. Pawnee ranked first having an advantage in yield of 1.4 bushels over Comanche. In third place was Chiefkan, followed by Tenmarq and Cheyenne. Kanred and Kharkof had the lowest average yields for the period.

Table 5. - Summary of average yields of the uniform winter wheat varieties grown in plot tests at 6 stations in the central district, 1941

Variety	C.I. number	Average yield in bushels per acre at:						Average
		Manhattan	Hays	Colby	Akron	Lincoln	North Platte	
Pawnee	11669	31.4	42.7	41.0	15.2	29.8	9.0	28.2
Comanche	11673	29.6	40.6	37.5	18.5	15.2	10.2	25.3
Chiefkan	11754	26.3	35.0	36.7	16.4	19.2	15.2	24.8
Tenmarq	6936	23.9	35.0	38.6	15.9	15.1	11.1	23.3
Cheyenne	8885	28.1	25.4	34.2	12.9	18.4	17.6	22.8
Nebred	10094	22.0	25.9	34.6	11.8	20.7	19.5	22.4
Blackhull	6251	23.3	23.6	32.5	16.3	15.9	11.0	20.4
Kharkof	1442	18.7	24.9	33.1	12.0	11.6	14.3	19.1
Standard error of a mean (bushels)		1.08	1.08	1.30	1.94	1.29	1.33	0.56
Standard error of a mean (percent)		4.35	3.42	3.69	13.91	6.35	9.51	3.20

Table 6. - Summary of average yields of 9 winter wheat varieties grown in plot tests at 6 stations in the central district for all or a part of the period, 1939-41

Variety	C.I. number	Average yield in bushels per acre at:						Weighted average
		Manhattan	Hays	Colby	Akron	Lincoln	North Platte	
Number of years grown		2	3	1	2	3	3	
Pawnee	11669	31.8	24.6	41.0	11.0	25.1	12.9	22.5
Comanche	11673	29.1	24.4	37.5	13.5	18.6	14.5	21.1
Chiefkan	11754	28.1	22.7	36.7	13.1	20.0	16.1	21.1
Tenmarq	6936	26.9	21.8	38.6	12.4	17.5	14.4	19.9
Cheyenne	8885	27.0	16.0	34.2	10.7	20.2	19.0	19.7
Nebred	10094	25.2	17.6	34.6	10.5	18.4	19.4	19.4
Blackhull	6251	26.0	16.7	32.5	12.5	18.7	15.8	18.8
Kanred	5146	22.8	16.6	35.2	10.8	---	17.2	18.5
Kharkof	1442	21.6	16.4	33.1	9.3	15.4	16.9	17.2

The yields obtained in the northern district in 1941 are presented in table 7. Data were reported from 7 stations with four varieties being grown uniformly. For the average yields of these stations, Minard x Minhardi (C.I. 8888) had a slight advantage in yield, followed by Yogo, Marnin, and Minturki in the order named. Excluding the data from St. Paul and Grand Rapids from the averages, Minard x Minhardi (C.I. 8888) ranked first, Kharkof second, and Yogo third. Minturki and Marnin had the lowest averages, although the spread between the highest and lowest average yields was less than two bushels. Over a 3-year period at 6 stations (table 8) Yogo and Nebred had the same average yield, closely followed by Minard x Minhardi (C.I. 8888) and Kharkof, with Marnin having the lowest yield.

Table 7. - Summary of average yields of 7 varieties of winter wheat grown in plot tests at 7 stations in the northern district, 1941

Variety or cross	C.I. number	Average yield in bushels per acre at:							Average Yield	
		Waseca	St. Paul	Grand Rapids	Shoridan	Bozoman	Moscasin	Havre	7 stations	5 stations
Minard x Minhardi	8888	16.7	21.4	24.6	35.1	32.9	38.2	22.5	27.3	29.1
Kharkof	1442	6.6	----	----	36.4	39.7	37.4	25.0	----	29.0
Yogo	8033	8.7	17.5	24.2	37.9	30.8	40.2	24.7	26.3	28.5
Karmont	6700	0.2	----	----	38.2	38.7	38.1	26.8	----	28.2
Nebrod	10094	9.0	----	----	36.4	35.7	36.8	21.4	----	27.9
Minturki	6155	10.1	17.9	23.2	33.3	31.5	38.6	24.4	25.6	27.6
Marmin	11502	18.5	20.0	24.7	36.7	30.3	32.9	18.1	25.9	27.3
Standard error of a mean (bushels)		1.44	2.07	2.18	2.96	2.79	1.02	0.92	0.78	0.91
Standard error of a mean (percent)		12.58	13.17	8.77	8.20	7.91	2.68	3.83	3.38	3.52

1/ Excluding St. Paul and Grand Rapids.

Table 8. - Summary of average yields of 7 winter wheat varieties grown in plot tests at 6 stations in the northern district for all or a part of the period, 1939-41

Variety or cross	C.I. number	Average yield in bushels per acre at:						Weighted average
		Waseca	Dickinson	Shoridan	Bozoman	Moscasin	Havre	
Number of years grown		3	2	3	2	3	3	
Yogo	8033	35.3	8.7	36.0	45.9	31.1	19.9	29.8
Nebrod	10094	34.5	11.6	39.6	49.3	26.3	18.0	29.8
Minard x Minhardi	8888	36.6	9.5	35.5	45.7	29.0	17.8	29.2
Kharkof	1442	30.8	9.2	38.3	49.4	27.7	20.0	29.2
Karmont	6700	----	8.0	36.2	49.4	28.2	20.2	28.4
Minturki	6155	31.6	9.7	34.9	46.4	28.5	18.4	28.3
Marmin	11502	34.9	13.5	35.9	40.4	24.6	15.4	27.5

States

In several of the States there were two or more cooperating stations from which data were received in 1941. 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 yields from all stations within a State. In 1941, more than one station reported data in Texas, Oklahoma, Kansas, Nebraska, Minnesota, and Montana, and summaries were made up for these.

In Texas, 12 varieties were grown at the three stations and the average yields are shown in table 9. Kawvale x Tonnarq (C.I. 11956), Martin x Tonnarq³ (C.I. 11805), Pawnee, and Comanche had the highest average yields. For the years 1939-41, including 9 station-years, Pawnee, Comanche, and Martin x Tonnarq³ (C.I. 11805) ranked the highest.

Two stations reported data in Oklahoma in 1941 (table 10). Kawvale x Tonnarq (C.I. 11956) ranked first, Comanche second, and Pawnee third. For all or a part of the period 1939-41, 5 station-years, Pawnee has had the highest average yield followed by Comanche and Tonnarq.

Table 9. - Average yield in bushels per acre of winter wheat varieties grown in plot tests in Texas in 1941, and weighted averages for 1939-41

Variety or cross	C.I. number	Average yield in bushels		
		1941 (3 stations)	1939-41 (9 station-years)	Rank
Kawvale x Tonmarq	11956	21.8	----	1
Martin x Tonmarq ³	11805	20.5	19.1	3
Pawnee	11669	19.0	19.4	1
Comanche	11673	18.1	19.2	2
Tonmarq	6936	17.9	18.1	5
Chiefkan	11754	16.9	18.5	4
Kanred-Hard Federation x Tonmarq	12106	14.6	----	-
Kawvale	8180	14.2	16.0	8
Kanred	5146	12.4	15.7	9
Early Blackhull	8856	12.0	17.2	6
Kharkof	1442	11.7	14.4	10
Blackhull	6251	11.5	16.6	7

Table 10. - Average yield in bushels per acre of winter wheat varieties grown in plot tests in Oklahoma in 1941, and weighted averages for 1939-41

Variety or cross	C.I. number	Average yield in bushels		
		1941 (2 stations)	1939-41 (5 station-years)	Rank
Kawvale x Tonmarq	11956	35.6	----	-
Comanche	11673	35.2	30.3	2
Pawnee	11669	34.5	31.4	1
Kawvale	8180	33.8	27.2	6
Tonmarq	6936	32.8	28.0	3
Choyenne	8885	27.7	27.6	4
Early Blackhull	8856	26.8	25.4	7
Chiefkan	11754	25.4	27.5	5
Turkey	1558	24.0	24.9	9
Kanred	5146	23.4	25.2	8
Blackhull	6251	22.1	24.8	10
Kharkof	1442	22.0	24.3	11

Data were reported from three stations in Kansas in 1941 (table 11), with thirteen varieties being grown uniformly. Pawnee had the highest average yield followed by Comanche and Early Blackhull x Tonmarq (C.I. 11952). Chiefkan ranked fourth and Tonmarq fifth. For the 1939-41 period, including 5 station-years, the varieties rank in the following order for yield: Pawnee, Comanche, Chiefkan, and Tonmarq.

In Nebraska two stations reported data and at these Nebred had the highest average yield, followed by Kanred x Blackhull (C.I. 11844) and Pawnee (table 12). Comanche ranked last due to winterkilling and hessian fly damage. Choyenne selection, Choyenne, Pawnee, and Nebred had the highest long time averages.

Marnin had the highest average yield in Minnesota in 1941 (table 13). Minard x Minhardi (C.I. 8888) and H-44 x Minturki² (Minn. 2701) also ranked high. Three varieties, Minard x Minhardi (C.I. 8888), Marnin, and Minturki were about equal for yield for the last three years.

Table 11. - Average yield in bushels per acre of winter wheat varieties grown in plot tests in Kansas in 1941, and weighted averages for 1939-41

Variety or cross	C.I. number	Average yield in bushels		Rank
		1941 (3 stations)	1939-41 (5 station-years)	
Pawnee	11669	38.4	27.5	1
Comanche	11673	35.9	26.3	2
Early Blackhull x Tennara	11952	33.8	-----	-
Chiefkan	11754	32.7	24.9	3
Tennara	6936	32.5	23.8	4
Cheyenne	8885	29.2	20.4	7
Early Blackhull	8856	28.9	23.2	5
Oro	8220	27.9	19.4	9
Nobred	10094	27.5	20.6	6
Kanred	5146	27.0	19.1	10
Blackhull	6251	26.5	20.4	7
Kharkof	1442	25.6	18.5	11
Turkey	1558	24.9	18.1	12

Table 12. - Average yield in bushels per acre of winter wheat varieties grown in plot tests in Nebraska in 1941, and weighted averages for 1939-41

Variety or cross	C.I. number	Average yield in bushels		Rank
		1941 (2 stations)	1939-41 (4 station-years)	
Nobred	10094	20.1	18.9	4
Kanred x Blackhull	11844	20.1	-----	-
Pawnee	11669	19.4	19.0	3
Cheyenne selection	11666	19.2	19.9	1
Cheyenne	8885	18.0	19.6	2
Chiefkan	11754	17.2	18.1	5
Turkey selection	11577	16.8	-----	-
Nebraska No. 60	6250	15.3	17.5	6
Blackhull	6251	13.5	17.3	7
Tennara	6936	13.1	16.0	10
Kharkof	1442	13.0	16.2	9
Comanche	11673	12.7	16.6	8

Table 13. - Average yield in bushels per acre of winter wheat varieties grown in plot tests in Minnesota in 1941, and weighted averages for 1939-41

Variety or cross	C.I. number	Average yield in bushels		Rank
		1941 (3 stations)	1939-41 (6 station-years)	
Marmin	11502	21.1	33.4	2
Minard x Minhardi	8888	20.9	33.7	1
H-44 x Minturki ² (Minn. 2701)	-----	19.3	-----	-
Minhardi x Marquis (Minn. 2699)	-----	17.3	-----	-
Minturki	6155	17.1	33.1	3
H-44 x Minturki ² (Minn. 2702)	-----	16.8	-----	-
Yogo	8033	16.8	-----	-
H-44 x Minturki ² (Minn. 2700)	-----	14.2	-----	-

In Montana eight varieties were grown uniformly at 3 stations as shown in table 14. Kar-
mont, Kharkof, and Newturk ranked highest in 1941, while Newturk, Yogo, and Kar-
mont had the high-
est yields during the 3-year period 1939-41.

Table 14. - Average yield in bushels per acre of winter wheat varieties grown in plot tests in Montana in 1941, and weighted averages for 1939-41

Variety or cross	C.I. number	Average yield in bushels		Rank
		1941 (3 stations)	1939-41 (8 station-years)	
Karmont	6700	34.2	30.5	3
Kharkof	1442	34.0	30.2	4
Newturk	6935	33.6	30.8	1
Yogo	8033	31.9	30.6	2
Minturki	6155	31.5	29.2	5
Nebred	10094	31.3	28.9	7
Minard x Minhardi	8888	31.2	29.0	6
Marmin	11502	27.1	25.1	8

SUMMARY OF AGRONOMIC DATA

The agronomic data other than yield have been summarized for each district for 1941 in tables 15 to 17. In each case the data are averaged for as many varieties and as many stations as possible. The number of stations entering the average is shown at the top of each column.

The data for the southern district are presented in table 15. The crop headed considerably earlier than in 1940, but the relative earliness of the varieties remained the same. Early Blackhull headed the earliest, while Pawnee and Comanche were earlier than Tonmarq. Chiefkan averaged one day earlier than Blackhull. Ripening dates showed a narrower range, and in this case Blackhull averaged one day earlier than Chiefkan. For height Kawvale was the tallest, and Pawnee the shortest. Lodging data from two stations show that Chiefkan and Early Blackhull lodged the most, while Comanche and Blackhull were also weak. It was generally observed that the straw of all Blackhull wheats was inclined to be weak in 1941. Kawvale x Tonmarq (C.I. 11956), Pawnee, Kawvale, and Comanche had low average infections of leaf rust. Test weights were low in the district with Early Blackhull having the highest average of 56.5 pounds per bushel. Kawvale x Tonmarq (C.I. 11956) ranked second and Chiefkan third for average test weight.

Table 15. - Summary of agronomic data other than yield for winter varieties grown at cooperating stations in the southern district, 1941

Variety or cross	C.I. number	Date		Average			Test weight per bushel (Pounds)
		Headed	Ripe June	Height (Inches)	Lodging (Percent)	Leaf rust (Percent)	
Number of stations		5	4	5	2	2	5
Kawvale x Tonmarq	11956	May 11	13	37	35	3	56.0
Pawnee	11669	May 9	13	36	30	5	54.6
Comanche	11673	May 7	13	37	58	8	55.0
Tonmarq	6936	May 10	15	39	50	23	54.7
Kawvale	8180	May 13	15	40	29	5	53.4
Chiefkan	11754	May 10	15	39	66	58	55.9
Early Blackhull	8856	April 29	8	37	65	65	56.5
Konrod	5146	May 13	17	38	60	65	52.0
Kharkof	1442	May 14	18	36	52	68	51.8
Blackhull	6251	May 11	14	39	58	63	53.9

The central district data are averaged for 8 varieties and are presented in table 16. Nebred and Cheyenne had the highest average winter survivals. The two earliest varieties were Pawnee and Comanche, both averaging two days earlier in heading than Tennarq. Kharkof headed the latest. Pawnee ripened two days earlier than Comanche and four days earlier than Tennarq. For plant height Nebred was the shortest and Chiefkan the tallest. Leaf rust infection averaged the lowest on Pawnee and Comanche and the highest on Nebred. Culm counts show Pawnee and Nebred to have had the thickest and Tennarq the thinnest stands at two stations. Chiefkan had the highest average test weight per bushel, with Nebred ranking second and Pawnee third.

Table 16. - Summary of agronomic data other than yield for winter wheat varieties grown at co-operating stations in the central district, 1941

Variety	C.I. number	Winter survival (Percent)	Date		Average		Number culms at maturity (10,000)	Test weight per bushel (Pounds)
			Headed May	Ripe	Height (Inches)	Leaf rust (Percent)		
Number of stations		4	6	5	6	3	2	6
Pawnee	11669	69	23	June 24	31	24	260	58.0
Comanche	11673	65	23	June 26	33	25	162	57.5
Chiefkan	11754	66	25	June 28	36	39	184	60.1
Tennarq	6936	65	25	June 28	33	47	155	56.8
Cheyenne	8885	84	27	June 29	31	69	215	57.8
Nebred	10094	92	26	June 28	29	75	251	58.3
Blackhull	6251	69	25	June 27	34	65	195	57.6
Kharkof	1442	74	28	July 1	34	65	172	56.5

In the northern district seven varieties may be compared for characters other than yield (Table 17) although the data are somewhat fragmentary. Marmin and Minard x Minhardi (C.I. 8888) had the highest average survivals. Marmin headed the earliest but was not ripe as early as some other varieties. At four stations Nebred had slightly the shorter straw. Leaf rust averages showed no differences for the varieties, but for stem rust Yogo and Nebred had the lowest averages. Minard x Minhardi (C.I. 8888) had the highest average test weight per bushel, with Marmin and Nebred being fairly good.

Table 17. - Summary of agronomic data other than yield for winter wheat varieties grown at co-operating stations in the northern district in 1941

Variety or cross	C.I. number	Winter survival (Pct.)	Date		Average Height (In.)	Average Rust		Average Grain		Test wt. per bu. (lbs.)
			Headed June	Ripe July		Leaf (Pct.)	Stem (Pct.)	Purpleness (Pct.)	Texture (Pct.)	
Number of stations		3	5	4	4	3	2	3	3	5
Minard x Minhardi	8888	77	12	14	34	78	17	92	79	60.1
Kharkof	1442	57	11	13	35	---	25	---	---	58.5
Yogo	8033	61	13	14	35	87	5	85	65	58.1
Karmont	6700	53	---	---	35	---	---	---	---	57.2
Nebred	10094	64	11	13	33	---	7	---	---	59.2
Minturki	6155	65	12	13	36	89	8	89	67	57.5
Marmin	11502	78	10	14	36	74	44	90	67	59.3

SUMMARY OF PLOT DATA

The 1941 crop was subjected to severe winterkilling in Nebraska and Minnesota, hessian fly and leaf rust damage in Nebraska and Kansas, and both leaf and stem rust infection farther south.

In Oklahoma and Texas too much moisture was received and at some stations harvest was difficult.

In the southern district Kawvale x Tenmarq (C.I. 11956) a new variety in plots ranked first for yield, with Pawnee and Comanche second and third, respectively.

The Blackhull wheats (Blackhull, Early Blackhull, and Chiefkan) lodged or broke over badly in the southern district under the extremely wet conditions.

In the central district Pawnee, Comanche, and Chiefkan had the highest average yields at six stations. These varieties made these averages in spite of winterkilling in Nebraska caused by the Armistice Day storm.

The behavior of Pawnee and Comanche is fairly consistent at all stations in the southern and central districts except at North Platte. Here neither variety did well in 1941 due to winterkilling, and neither ranks high in the longer time averages for yield.

In the northern district, Minard x Minhardi (C.I. 8888) had the highest average yield at five stations. Kharkof ranked second and Yogo third.

The two newly named wheats, Comanche and Pawnee, made good records. Comanche is being increased at Chillicothe and the plan is to distribute it from that station in 1942. Pawnee is being increased and purified at Manhattan and Lincoln. Nebraska has decided to distribute the variety as soon as seed is available, but no definite action has been taken by Kansas. While neither is a perfect variety, it is felt that each is a step forward and each should do well in its adapted area.

In Minnesota the behavior of certain H-44 x Minturki² strains was pleasing. These winter wheats carry the Hope resistance to leaf and stem rust.

UNIFORM YIELD NURSERY

In the fall of 1940 the uniform yield nursery was seeded at the same 14 stations in the central and southern districts as in 1939. At Bushland, the nursery was seeded on both dry and irrigated land. The nursery consisted of 30 varieties and strains, each seeded in three row-plots. The number of plots of each variety at a station varied from three to five. In table 18 the varieties making up the 1941 nursery, together with State and C.I. numbers are shown.

Table 18. - Varieties of winter wheat grown in the uniform yield nursery, 1941

Variety or cross	C.I. number	State or hybrid number
Kharkof	1442	-----
Blackhull	6251	-----
Early Blackhull	8856	-----
Nebred	10094	Nebr. No. 1063
Comanche	11673	Kans. No. 2729
Kanred x Blackhull	11844	Nebr. No. 1098
Pawnee	11569	Nebr. No. 1086
Hope x Cheyenne	11969	Nebr. sel. No. 363339
Kawvale x Tennarq	11950	Kans. No. 2726
Early Blackhull x Tennarq	11952	Kans. No. 2739
Kanred-Hard Federation x Minhardi-Minturki	11970	Akron No. 130
Fort Collins selection	11971	F. C. 1143
Cheyenne x Tennarq	11972	Kans. No. 2748
Cheyenne x Tennarq	11973	Kans. No. 2751
Kawvale x Tennarq	11956	Denton No. 35-34-117
Martin x Tennarq ³	11823	Denton No. 50-34-128
Kanred-Hard Federation x Tennarq	11974	Denton No. 37-34-54
Kanred x Hope-Hard Federation	11975	Akron No. 533
Kanred x Hope	11976	Akron No. 850
Compound Cross	11977	Akron No. 874
Cheyenne x Early Blackhull	11999	Woodward No. 1126
Cheyenne x Early Blackhull	12000	Woodward No. 1127
Blackhull x Cheyenne	12101	H. C. No. 40-102
Blackhull x Tennarq	12102	H. C. No. 40-115
Cheyenne x Tennarq	12103	Kans. No. 2749
Cheyenne x Tennarq	12104	Kans. No. 2750
Kawvale x Tennarq	11992	Nebr. No. 1114
Hope x Turkey 1069	11964	Nebr. sel. No. 363401
Kanred-Hard Federation 25007 x Tennarq	12106	Denton sel. No. 25-34-44
Kanred-Hard Federation 142 x Tennarq	12105	Denton sel. No. 33-34-303

A comparison of the 1941 list with that of 1940 will show a number of changes in the nursery. Ten 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.

DATA OBTAINED

In table 19 are presented the data from the 13 nurseries. No data were reported from Stillwater because of differential stands due to seed treatment, and from North Platte, due to winterkilling. For each station the varieties are listed in order of the 1941 yields; and only the C.I. numbers are given for identification. Average yields and ranks for the 2-year period 1940-41 are given wherever possible. Data other than yield are included when characters concerned seemed to be related to yield or when the data showed differences believed to be of interest.

At Denton the nursery yields were somewhat better than those obtained from the plots.

Considerable rust developed, especially on susceptible varieties, while C.I. Nos. 11964, 11969, and 11956 showed some resistance to both leaf and stem rust. Septoria infection was heavy on all varieties except C.I. 11956. Test weights were low, ranging from 46.6 to 58.8 pounds per bushel. The highest yielding varieties were C.I. 11952, Comanche, C.I. 12104 and 11956. For the 2-year period 1940-41, C.I. numbers 11952, 11956, and Pawnee have had the highest average yields. Kharkof had the lowest average yield for this same period.

The straw was rather tall at Chillicothe, and before harvest considerable lodging occurred in most of the varieties. A few of the stiffer strawed strains were Comanche, C.I. numbers 12102, 11964, and Kharkof, while Blackhull and Early Blackhull showed the weakest straw. Leaf rust was present on all except the more resistant varieties. Yields ranged from 24.1 to 6.2 bushels per acre with Pawnee, C.I. numbers 11992, and 12104 at the top of the list and C.I. numbers 11976 and 11971 at the bottom. For the 2-year period, three strains are tied for first place in yield, namely Pawnee, Comanche, and C.I. 11973. During this same period Nebred, Kharkof, and C.I. 11977 had the lowest average yields.

In the irrigated nursery at Bushland test weights ranged from 55.0 to 61.5 pounds per bushel and the yields from 40.4 to 21.2 bushels per acre. The highest yielding varieties were Pawnee, C.I. numbers 11972, and 11956, while Early Blackhull and C.I. 11975 were low. The 1940 and 1941 yields are in accord in that the same three varieties that ranked first in 1941 were also high for the 2-year average.

The dry land nursery at Bushland gave yields only slightly lower than those in the irrigated nursery. In this test considerable leaf rust developed on susceptible varieties, and the test weights were somewhat lower than in the irrigated nursery. The varieties having the highest yields were C.I. numbers 12105, 11992, and Pawnee, while C.I. 11975, Nebred, and C.I. 11971 were low. C.I. 11950, Pawnee, and C.I. 11956 have the highest 2-year average in this dry land nursery test.

Straw was unusually tall at Woodward with heights ranging from 45 to 53 inches and, as might be expected, considerable lodging occurred before harvest. Some of the stronger strawed strains were C.I. numbers 11977, 11971, and 12102. Test weights were fairly good in most cases, although one variety had a weight of 46 pounds per bushel. Two varieties, C.I. numbers 11952 and 11972, yielded more than 50 bushels per acre, and 11 varieties had yields between 40 and 50 bushels per acre. Based on the 2-year average the highest yielding varieties were C.I. numbers 11972, 11952, and 11974, while Nebred, C.I. 11969, and C.I. 11977 made the poorest yield record.

At Manhattan lodging was reported for all varieties, although C.I. numbers 11974, 11971, and 11977 stood up the best. Leaf rust readings were fairly high in most cases and considerable stem rust developed. Grain texture was fairly good and test weights, with one exception, ranged

from 55 to 61.6 pounds per bushel. The highest yielding variety, C.I. 11950, gave 41.3 bushels per acre, while the lowest yield was 16.8 bushels per acre. Additional varieties giving the better yields were C.I. 12105, C.I. 11956, and Pawnee. For the 2-year period, C.I. 11950 ranked first, Pawnee second, and C.I. 11952 third. This last named variety is extremely early and is being considered as a possible substitute for Early Blackhull. Strains such as Kharkof, Blackhull, and Nebred have been quite low in yield the last two years.

Winterkilling occurred at Hays, with some varieties having survivals as low as 63 percent while others came through the winter with perfect stands. Straw was fairly tall and considerable leaf rust developed on all susceptible varieties. The yields ranged from 52.5 to 19.6 bushels per acre. Ranking at the top of the list were C.I. numbers 11950, 11974, and 11972, while at the bottom were Nebred and Early Blackhull, in this case a late and an extremely early variety. In general, the 1941 yields are in line with the 2-year average.

No winterkilling was reported from Akron but the dry weather previous to harvest caused straw to be short, test weights light, and yields low. The highest yields were reported for C. I. numbers 12105, 12106, and 11952. No 2-year averages are shown for this station since the 1940 crop was a failure.

At Fort Collins growth was heavy as usual, the straw was tall, and before harvest all varieties were lodged completely. Yields ranged from 69.3 to 44.9 bushels per acre. The three highest yielding strains in 1941 were C.I. numbers 11974, 11970, and Comanche. For the 2-year period, C.I. 11974 ranked first, followed by C.I. numbers 11950, 11970, and Comanche.

Test weights at Hesperus ranged from 60 to 64 pounds per bushel and the yields from 64.8 to 34.9 bushels per acre. The highest yielding varieties were Blackhull, C.I. 11971, Nebred, and Comanche, all of which gave more than 50 bushels per acre. Based on a 2-year average, Comanche had the highest average yield, followed by Blackhull, C.I. 11972, and C.I. 11974. The agreement between the 2-year average and the 1941 yields is not so good at this station.

Winterkilling was very severe at Ames, but the relationship between survival and yield is not very close. For example, C.I. 11969 with a winter survival of 86 percent yielded close to the bottom, while C.I. 12101 with a survival of 26 percent ranked second for yield, so it is apparent that other hazards were present. Test weights, where obtained, ranged from 54.3 to 59.0 pounds per bushel. The highest yielding varieties were Nebred, C.I. 12101, and Kharkof. The six lowest yielding strains gave less than 10 bushels per acre. For the 2-year period 1940-41, C.I. 11971 has had the highest average yield, followed by Nebred, Pawnee, and C.I. 11952.

At Lincoln, the November freeze caused considerable winterkilling and the relationship between winter survival and yield was fairly good. There are some exceptions in that Nebred, C.I. 11971, and Kharkof with good survivals ranked relatively low in yield. This was probably

caused by a combination of leaf rust infection, hessian fly damage, and the May drought. All varieties except Pawnee carried a fairly heavy leaf rust infection, and test weights were rather low ranging from 44.0 to 59.2 pounds per bushel. Two varieties, C.I. numbers 11950 and 11952, had yields above 30 bushels per acre, while four varieties, C.I. numbers 11975, 12105, 11977, and 11976, yielded less than 10 bushels per acre. These low yields were accompanied by extremely low winter survivals. Based on the 2-year average, Early Blackhall had the highest average yield, followed by C.I. numbers 11950, 11956, and Pawnee. All of these strains are early and inclined to be winter-tender.

Considerable winterkilling was reported from Alliance but the data are not too consistent with what is known of the hardiness of the different varieties. For example, C.I. 11964 had a survival of 100 percent compared to 88 percent for Kharkof. It is very doubtful if this relationship is correct. Grain quality was fairly good and yields ranged from 21.3 to 8.4 bushels per acre. C.I. numbers 12102, 12101, and Kharkof gave the highest yields in 1941 and C.I. numbers 11975, 11956, and 11977 gave the lowest ones. For the 2-year period C.I. 11972 ranked first for yield, Kharkof second, Comanche third, and Pawnee fourth.

Table 19. - Agronomic and other data for uniform winter wheat varieties grown in replicated nursery plots in cooperative experiments at 12 stations in the hard red winter wheat area in 1941, and average yields for 1939-41.

Denton, Texas
(Four plots)

C.I. number	Date		Rust		Reaction to sep- toria	Height (In.)	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
	Headed	Ripe	Leaf (Pct.)	Stem (Pct.)					Average 1940-41 (Bu.)	Rank
11952	April 22	May 26	60	15	VS	36	58.0	19.6	28.1	1
11673	April 30	May 31	15	20	VS	34	55.0	18.1	25.2	4
12104	April 30	June 1	15	15	VS	35	56.0	17.9		
11956	May 5	June 1	5	15	MS	32	56.0	16.9	27.8	2
11669	May 2	June 1	13	15	S	31	54.5	16.7	25.4	3
12105	April 29	May 30	4	28	VS	37	55.0	16.6		
12000	April 24	May 26	60	23	VS	35	58.8	16.5		
11992	April 30	May 30	10	23	VS	35	54.0	16.5		
12103	May 2	June 2	10	25	VS	33	56.0	16.4		
11974	April 29	June 1	13	45	VS	34	53.5	16.1	24.5	6
11823	May 6	June 2	10	18	VS	36	50.0	15.5	21.5	11
12106	May 1	June 1	5	28	VS	35	52.5	15.4		
11972	May 4	June 1	18	20	VS	33	56.0	15.4	24.1	7
11964	May 2	June 1	T	0	VS	31	56.5	15.0		
11975	April 28	May 31	35	5	VS	34	54.0	14.9	23.3	9
10094	May 6	June 2	73	13	VS	34	54.0	14.6	22.1	10
11950	May 2	June 2	3	25	VS	34	54.0	14.4	20.4	14
8856	April 22	May 24	56	8	VS	34	56.0	14.4	25.2	4
11969	May 5	May 30	0	0	VS	34	58.0	13.9	23.5	8
11999	May 4	June 2	48	35	VS	35	56.0	13.6		
11844	May 2	June 2	56	25	VS	35	54.5	13.5	20.3	15
12101	May 4	June 2	58	18	VS	32	56.0	12.4		
12102	May 2	June 1	53	20	VS	33	56.0	11.9		
6251	May 6	June 2	55	18	VS	32	56.0	11.5	21.3	12
11973	May 2	June 1	18	55	VS	32	50.3	11.3	19.3	17
11976	May 3	June 1	63	20	VS	34	49.0	11.1	21.2	13
11970	May 1	June 1	65	83	VS	42	47.0	9.7	19.6	16
11977	May 6	June 3	80	35	VS	31	50.0	7.4	14.9	19
11971	May 2	June 2	73	35	VS	32	47.0	7.3	18.2	18
1442	May 6	June 4	55	40	VS	34	46.6	6.7	13.0	20

Standard error of a difference between the mean yields of any two varieties = 1.87 bushels.

Table 19. - (Continued)

Chillicothe, Texas
(Four plots)

C.I. number	Date headed	Height (Inches)	Leaf rust (Percent)	Lodging (Percent)	Average acre yield (Bushels)	Yield	
						Average 1940-41 (Bushels)	Rank
11669	May 7	39	T	30	24.1	21.3	1
11992	May 6	39	20	10	23.7		
12104	May 2	40	20	15	22.1		
11673	May 2	42	8	5	21.6	21.3	1
11973	May 2	38	25	15	21.4	21.3	1
11972	May 7	41	25	20	21.1	20.5	4
12103	May 7	41	20	10	20.6		
11956	May 9	40	T	10	19.3	17.8	9
12102	May 5	37	65	5	17.4		
11964	May 2	35	0	5	17.0		
11970	May 2	42	50	20	15.9	18.0	8
11952	April 26	33	50	60	15.6	17.6	10
8856	April 24	34	65	95	15.2	18.3	5
11950	May 2	39	T	75	15.2	15.1	12
11823	May 8	41	25	10	14.8	18.1	6
11999	May 6	34	65	90	14.7		
12106	May 5	38	20	75	14.7		
12105	May 2	42	5	40	14.5		
11974	May 2	40	20	30	14.0	16.2	11
11844	May 6	37	50	60	13.6	18.1	6
12000	April 25	33	65	95	13.6		
12101	May 6	38	65	15	12.8		
11969	May 8	38	T ^{1/}	25	12.0	14.2	13
11975	May 1	36	65	45	9.7	12.9	15
1442	May 11	40	65	5	9.0	11.1	19
6251	May 6	36	50	100	8.8	14.1	14
10094	May 8	37	75	10	7.8	10.2	20
11977	May 10	37	40	85	7.4	11.3	18
11976	May 7	37	65	60	6.4	11.7	17
11971	May 7	38	75	100	6.2	12.8	16

Standard error of a difference between the mean yields of any two varieties = 3.21 bushels.

^{1/} Severe firing of leaves.

Table 19. - (Continued)

Bushland, Texas
(Irrigated)
(Four plots)

C.I. number	Date		Height (Inches)	Plumpness (Percent)	Weight per bushel (Pounds)	Average acre yield (Bushels)	Yield	
	Headed May	Ripe					Average 1940-41 (Bushels)	Rank
11639	16	June 25	32	87	61.0	40.4	32.0	1
11972	20	June 29	34	87	59.5	39.2	29.9	2
11956	21	June 29	33	85	60.0	38.3	29.7	3
12103	20	June 30	35	88	60.0	38.3		
11992	18	June 28	34	85	60.0	36.1		
11969	22	June 30	34	87	59.5	35.6	29.0	4
11823	20	July 1	36	82	55.0	34.0	26.3	8
11973	16	June 27	32	86	60.0	34.0	29.0	4
12104	18	June 27	35	88	60.0	33.8		
11673	16	June 27	32	85	60.0	32.5	23.6	13
11999	20	June 30	35	83	60.5	32.5		
12105	16	June 24	32	82	60.0	32.1		
11950	17	June 27	33	84	58.0	31.9	28.1	6
11964	17	June 25	28	86	61.0	31.2		
11976	18	June 28	32	85	57.0	30.9	25.0	9
11977	20	June 29	35	77	57.0	30.7	23.6	13
12102	20	June 30	34	86	60.0	30.7		
11844	20	June 30	34	86	59.5	29.9	26.9	7
1442	24	July 1	36	86	59.0	29.8	23.9	12
11952	12	June 22	32	87	61.5	29.8	23.1	15
12101	21	June 30	33	85	60.0	28.9		
10094	21	July 1	31	85	59.0	27.9	24.6	10
11970	20	June 29	37	85	59.5	27.4	21.4	17
11974	18	June 28	31	77	56.5	27.2	24.3	11
12000	14	June 25	32	83	59.0	27.2		
12106	14	June 24	32	83	57.0	27.1		
6251	20	June 30	33	82	58.0	26.3	21.3	18
11971	20	June 29	34	81	57.5	24.3	22.9	16
8856	10	June 21	32	80	58.0	22.7	18.5	20
11975	16	June 28	33	80	56.5	21.2	21.1	19

Standard error of a difference between the mean yields of any two varieties = 3.35 bushels.

Table 19. - (Continued)

Bushland, Texas
(Dryland)
(Four plots)

C.I. number	Date		Height (Inches)	Leaf rust (Percent)	Plumpness (Percent)	Weight per bushel (Pounds)	Average acre yield (Bushels)	Yield	
	Headed	Ripe						Average 1940-41 (Bushels)	Rank
12105	May 27	July 5	40	5	86	58.5	35.2		
11992	May 27	July 4	39	5	83	52.5	33.5		
11669	May 26	July 3	36	T	83	58.5	33.4	19.1	2
11950	May 27	July 5	40	T-20	83	55.5	32.7	19.7	1
11956	May 30	July 8	38	T	86	58.0	31.0	18.6	3
11972	May 31	July 8	38	T	87	56.5	30.9	18.1	4
12103	May 29	July 8	40	10	86	57.0	29.6		
12104	May 28	July 7	40	15-50	87	57.5	29.3		
11673	May 27	July 6	38	10	84	57.0	28.7	16.8	7
11844	May 29	July 7	38	65	84	57.0	28.7	16.9	6
11969	May 31	July 8	38	0	86	55.5	28.7	17.0	5
11964	May 28	July 7	34	T-50	88	57.5	28.1		
11974	May 28	July 6	37	10	79	53.0	27.2	16.2	8
11952	May 23	July 1	34	65	84	57.5	26.4	15.5	9
12106	May 27	July 5	38	30	86	56.5	26.4		
12102	May 29	July 7	38	65	82	56.5	25.8		
11973	May 28	July 7	38	15	84	55.0	24.1	15.0	10
12101	May 31	July 8	38	50	83	54.5	23.6		
11823	May 31	July 9	40	10	73	53.0	23.0	14.8	11
11999	May 31	July 9	39	50	83	56.0	22.4		
12000	May 24	July 2	36	40	77	55.5	22.1		
1442	June 2	July 9	39	40	81	53.5	21.7	13.4	13
11977	May 30	July 8	37	10	71	53.0	21.0	13.6	12
11970	May 31	July 8	42	5-90	82	54.0	20.7	13.2	14
6251	May 29	July 7	39	30	79	55.0	19.6	13.0	15
11976	May 28	July 7	36	75	80	52.0	19.5	12.5	16
8856	May 21	June 29	34	35	77	55.5	18.6	11.3	17
11975	May 27	July 7	36	T-90	76	53.5	18.5	10.6	19
10094	June 1	July 9	34	95	82	54.0	16.1	10.8	18
11971	May 31	July 8	38	90	75	53.0	12.0	8.5	20

Standard error of a difference between the mean yields of any two varieties = 2.05 bushels.

Table 19. - (Continued)

Woodward, Oklahoma
(Four plots)

C.I. number	Date		Height (Inches)	Lodging (Percent)	Weight per bushel (Pounds)	Average acre yield (Bushels)	Yield	
	Headed May	Ripe June					Average 1940-41 (Bushels)	Rank
11952	11	15	50	34	53	53.7	40.1	2
11972	14	14	49	34	59	50.9	40.5	1
12105	5	12	51	39	62	49.3		
12103	12	16	49	24	61	49.1		
12104	8	14	49	50	61	47.9		
11669	10	14	48	51	61	47.3	37.0	4
11974	9	14	50	29	58	45.2	38.0	3
12102	11	15	51	4	61	44.7		
12106	8	13	50	53	60	44.6		
11992	10	14	50	46	60	43.3		
11956	14	15	49	48	61	42.7	36.4	5
12101	13	16	47	18	59	42.6		
11844	12	17	49	40	59	42.1	34.8	6
11973	10	15	49	45	60	39.9	34.0	8
8856	2	10	49	20	61	39.6	31.4	12
11950	9	15	51	54	60	39.6	34.4	7
11673	9	13	50	49	59	39.4	32.7	9
11990	12	16	48	31	60	37.9		
11964	9	13	46	39	59	37.6		
11823	14	16	48	30	55	37.2	32.5	10
11970	10	16	53	25	58	35.6	31.4	12
11971	12	16	49	11	59	34.2	31.5	11
6251	12	16	49	24	61	32.6	28.7	15
1442	15	17	49	41	57	32.6	27.1	17
11975	9	16	48	29	56	30.2	29.4	14
11976	13	16	46	13	46	28.8	27.4	16
10094	14	15	47	31	58	27.1	26.7	18
12000	4	11	50	55	60	26.2		
11977	15	18	45	9	56	24.8	22.7	20
11969	14	16	45	50	59	24.7	23.7	19

Standard error of a difference between the mean yields of any two varieties = 4.92 bushels.

Table 19. - (Continued)

Manhattan, Kansas
(Three plots)

(Seeded September 30 to October 2, 1940)

C.I. number	Date		Height (In.)	Lodging (Pct.)	Rust ^{1/}		Grain texture	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
	Hooded May	Ripe June			Leaf (Pct.)	Stem (Pct.)				Average 1940-41 (Bu.)	Rank
11950	18	20	38	43	17	15	DH	58.3	41.3	41.9	1
12105	16	18	38	13	15	20	SC+	61.6	40.7		
11956	21	23	37	22	13	17	DH	58.2	38.0	37.3	4
11669	18	20	35	43	35	7	DH	59.6	37.6	39.0	2
11992	17	21	39	20	17	13	DH	58.6	37.0		
11972	20	24	37	28	40	15	DH	57.4	36.7	36.9	5
12104	18	21	37	45	45	10	DE	60.5	36.3		
8856	12	16	39	77	65	T	SC	61.7	35.8	33.6	7
11952	14	17	37	63	70	3	SC	61.1	35.7	38.4	3
12103	19	23	38	38	35	10	DH	58.5	34.9		
11673	17	20	35	37	35	10	DH	58.2	33.2	35.0	6
11974	17	20	34	8	35	17	SC	57.0	33.1	33.2	9
12000	15	17	35	40	65	T	SC+	60.0	31.5		
12106	16	17	36	17	45	10	SC+	58.3	31.3		
11964	18	19	32	20	17	3	DH	57.8	31.0		
12102	20	22	38	33	90	7	DH	59.6	30.0		
11999	19	22	35	37	65	10	SC	57.6	29.2		
11969	20	21	35	40	20	7	SC+	55.8	27.8	27.8	13
11844	20	25	38	30	65	7	SC	57.0	26.6	31.7	10
11973	18	20	37	42	50	70	DH	58.0	26.6	33.6	7
11970	17	20	40	47	60	65	SC	56.0	25.2	26.7	15
11975	17	24	34	28	55	7	SC	55.7	25.2	26.0	17
12101	21	25	37	47	80	3	SC+	57.0	24.6		
11971	19	20	36	8	60	60	SC-	56.3	23.7	29.8	11
11976	18	21	34	12	65	15	SC+	56.0	22.3	25.7	18
11823	21	24	33	20	45	7	SC	52.3	21.5	26.7	15
6251	21	25	39	43	65	13	SC+	58.3	21.3	28.1	12
1442	23	25	38	30	70	17	SC+	55.7	17.6	27.2	14
10094	21	22	36	17	95	7	SC+	55.5	17.2	24.9	19
11977	21	24	36	2	60	45	DH	55.0	16.8	20.3	20

Standard error of the difference between the mean yield of any two varieties = 3.01 bushels.

^{1/} Notes on disease reaction obtained in cooperation with members of the Department of Plant Pathology.

Table 19. - (Continued)

Hays, Kansas
(Three plots)

C.I. number	Survival (Percent)	Date		Height (Inches)	Leaf rust (Percent)	Average acre yield (Bushels)	Yield	
		Hooded May	Ripe June				Average 1940-41 (Bushels)	Rank
11950	100	25	25	43	5	52.5	35.2	1
11974	90	26	25	42	40	48.5	33.4	2
11972	100	27	25	42	60	47.0	32.4	3
12104	76	25	25	42	50	45.2		
11992	93	24	25	43	5	44.8		
11952	91	20	20	43	90	43.7	31.1	4
12103	90	26	25	44	25	43.5		
12106	83	23	21	44	50	43.5		
11669	96	25	25	42	20	42.9	29.9	6
11956	100	27	25	41	5	42.3	30.5	5
11964	86	25	24	39	10	41.7		
11999	96	26	26	42	75	40.3		
12000	100	22	21	42	50	38.0		
12101	98	26	25	44	75	37.8		
11973	88	25	25	43	50	37.8	27.6	7
11970	100	26	26	47	60	37.4	26.2	9
11969	88	27	25	40	5	36.3	26.4	8
12102	80	25	25	44	80	36.0		
12105	65	25	24	43	5	31.1		
11673	77	25	25	42	50	29.8	23.9	11
11844	85	26	25	45	80	29.7	24.3	10
11823	80	28	26	41	50	28.8	22.6	12
11971	100	27	26	43	90	27.5	21.5	13
11975	63	26	26	39	60	26.9	21.4	15
11976	76	27	26	38	85	26.8	21.5	13
11977	77	28	28	38	75	25.7	20.7	16
1442	100	29	28	42	90	25.1	18.2	20
6251	96	26	26	42	80	24.1	20.5	17
10094	100	27	26	39	80	21.1	18.6	18
8856	98	18	18	43	80	19.6	18.4	19

Standard error of a difference between the mean yields of any two varieties = 5.36 bushels.

Table 19. - (Continued)

Akron, Colorado
(Five plots)

(Seeded September 11; emerged September 17, 1940)

C.I. number	Date headed	Height (Inches)	Weight per bushel (Pounds)	Average acre yield (Bushels)
12105	May 26	23	54.5	18.2
12106	May 28	22	55.0	17.1
11952	May 27	21	56.5	14.7
11972	June 3	19	57.5	14.7
11669	May 28	21	55.0	14.1
11970	May 29	23	56.0	13.9
8856	May 26	22	56.0	13.6
11974	May 31	20	54.5	13.5
11999	June 1	20	57.0	13.3
11844	May 31	22	56.5	13.3
12103	June 2	20	56.0	13.0
11992	May 31	19	54.0	12.6
12104	May 30	21	57.0	12.5
10094	June 3	20	57.0	12.5
12000	May 28	21	54.5	12.4
6251	June 2	21	56.0	11.4
11950	May 29	21	54.5	11.3
11964	May 31	18	53.5	11.2
12101	June 3	21	54.5	11.0
11971	June 2	21	53.5	10.1
11823	June 3	20	54.0	9.9
11975	May 27	19	56.0	9.1
12102	May 31	21	56.0	8.9
1442	June 4	21	56.0	8.9
11969	June 3	18	55.0	8.7
11976	June 1	19	54.0	8.6
11673	May 30	21	58.0	8.5
11973	June 1	20	55.5	8.2
11977	June 3	18	54.5	6.2
11956	June 3	18	56.5	5.8

Standard error of a difference between the mean yields of any two varieties = 2.09 bushels.

Table 19. - (Continued)

Fort Collins, Colorado
(Five plots)

C.I. No.	Date	Height (Inches)	Lodging (Percent)	Average acre yield (Bushels)	Yield	
					Average 1940-41 (Bushels)	Rank
11974	May 29	49	0	69.3	56.7	1
11970	May 31	52	0	64.8	52.3	3
11673	May 30	50	0	58.3	51.6	4
12106	May 29	51	0	57.0		
11823	June 2	48	0	56.6	50.6	5
11950	May 30	49	0	56.0	54.4	2
12000	May 30	50	0	56.0		
12105	May 28	53	0	56.0		
8856	May 27	52	7	55.7	45.9	14
11971	June 2	51	0	55.6	50.3	7
12102	June 1	46	6	54.8		
11973	May 31	48	0	54.3	46.4	13
11952	May 29	49	18	53.7	47.5	10
11975	May 30	48	0	53.1	47.1	12
11956	June 3	46	0	52.6	48.9	8
11972	June 2	46	3	52.5	50.6	5
11669	May 30	48	0	52.1	45.9	14
11976	June 1	47	0	50.6	43.3	19
11999	June 1	47	14	50.6		
11992	May 30	47	32	50.4		
11844	June 2	48	18	49.9	48.5	9
12101	June 2	46	14	49.9		
1442	June 4	48	32	48.2	47.3	11
6251	May 31	49	18	47.4	44.4	18
11969	June 2	47	0	47.0	45.2	16
10994	June 3	47	0	46.3	44.9	17
12103	June 3	48	0	46.0		
11977	June 3	46	0	45.8	38.1	20
11964	May 30	46	5	45.7		
12104	May 30	49	0	44.9		

Standard error of a difference between the mean yields of any two varieties = 5.46 bushels.

Table 19. - (Continued)

Hesperus, Colorado
(Three plots; soded September 27, 1940)

C.I. number	Date ripe August	Height (Inches)	Weight per bushel (Pounds)	Average acre yield (Bushels)	Yield	
					Average 1940-41 (Bushels)	Rank
6251	10	44	63	64.8	50.9	2
11971	10	42	63	56.4	41.9	3
10094	8	40	62	55.8	44.2	5
11673	8	42	62	53.9	51.4	1
8856	5	44	63	49.2	44.0	7
11974	9	42	62	47.5	44.3	4
12101	10	44	64	47.4		
12000	8	42	63	46.3		
12102	12	44	62	45.8		
11823	10	43	60	45.6	40.0	10
11976	12	40	62	45.6	44.2	5
11844	9	44	63	45.1	40.8	9
11972	8	40	62	44.7	47.2	3
11950	6	41	62	43.4	39.9	11
1442	9	42	62	42.8	38.8	12
11973	8	41	63	42.3	37.0	17
11969	10	42	61	41.8	34.3	19
11992	8	44	62	41.7		
11999	8	41	64	41.7		
11964	8	42	62	41.2		
11669	7	38	63	40.7	37.8	14
12104	12	44	62	40.4		
12105	11	44	62	40.4		
11956	9	44	63	40.1	37.4	15
12106	11	43	62	39.6		
11975	12	42	62	39.4	36.7	18
11952	3	40	64	37.7	31.0	20
11977	10	38	64	35.7	37.4	15
12103	12	44	62	34.9		
11970	11	45	62	32.9	38.8	12

Standard error of a difference between the mean yields of any two varieties = 7.68 bushels.

Table 19. - (Continued)

Ames, Iowa
(Four plots)

C.I. number	Winter survival (Percent)	Weight per bushel (Pounds)	Average acre yield (Bushels)	Yield	
				Average 1940-41 (Bushels)	Rank
10094	69.	58.8	28.8	40.3	2
12101	26.	58.6	25.5		
1442	34.	52.8	24.7	36.6	7
11950	51.	55.4	22.1	37.7	5
11999	45.	58.8	22.1		
11844	51.	57.8	22.0	35.6	11
11971	13.	55.6	22.0	42.4	1
11972	35.	57.2	20.8	36.6	7
11956	55.	59.0	20.1	36.4	9
12103	88.	58.7	19.5		
11952	60.	58.8	17.0	39.0	4
12104	64.	58.5	16.8		
12000	6.	57.9	16.2		
11669	78.	58.4	16.1	39.1	3
11992	10.	57.3	16.1		
11974	61.	54.3	16.0	36.9	6
12102	29.	59.8	15.8		
6251	78.	57.9	15.5	34.6	13
11973	54.	58.6	15.5	35.4	12
11823	84.	54.4	15.4	35.7	10
11970	28.	57.4	14.4	34.2	14
11673	60.	56.3	13.9	33.5	15
11964	51.	57.9	13.5		
8856	18.	58.1	11.9	32.8	16
12106	15.	56.3	9.5		
11977	60.	----	8.0	28.2	18
11975	71.	----	7.2	29.9	17
11969	86.	----	5.7	27.0	20
12105	13.	----	4.1		
11976	55.	----	3.2	27.1	19

Standard error of a difference between the mean yields of any two varieties = 2.49 bushels.

Table 19. - (Continued)

Lincoln, Nebraska
(Five plots; seeded September 25; emerged September 30, 1940)

C.I. number	Winter survival (Pct.)	Date		Leaf rust reaction ^{1/}	Height (In.)	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
		Headed May	Ripe June					Average 1940-41 (Bu.)	Rank
11950	65	24	24	2	35	56.8	31.7	31.6	2
11992	65	25	25	2	34	55.7	30.9		
8856	69	20	20	3	36	59.2	29.5	32.5	1
11956	66	26	26	2	32	57.1	28.0	28.0	3
11669	65	23	24	2	34	56.4	26.8	27.7	4
11844	66	25	27	3	36	56.8	25.8	27.6	5
11952	70	22	20	3	35	58.8	24.4	27.2	6
12102	56	26	27	3	33	57.7	22.1		
12101	61	26	27	3	32	56.8	19.4		
11973	57	25	26	3	34	55.0	19.1	23.9	9
12000	51	23	25	3	33	55.4	18.6		
10094	84	26	26	3	32	54.3	17.4	24.2	8
11964	56	26	25	2	30	54.0	17.1		
11971	74	26	26	3	34	51.8	15.4	22.7	11
11972	60	27	27	3	32	51.8	15.1	22.1	13
11673	57	25	26	3	34	52.6	14.8	23.2	10
1442	76	27	28	3	34	55.0	14.6	22.5	12
11999	46	27	28	3	31	53.9	14.6		
12104	44	25	28	3	32	54.0	13.7		
6251	69	27	28	3	34	55.0	13.5	24.4	7
11970	63	26	26	3	37	51.0	13.4	20.6	15
12103	46	27	27	3	30	53.9	13.3		
11823	51	27	28	3	31	47.2	13.2	19.5	16
11969	52	27	27	1	32	53.3	13.0	18.6	18
11974	43	26	27	3	28	49.5	12.3	20.7	14
12106	41	25	25	3	30	51.0	11.4		
11975	29	27	28	3	28	49.0	6.6	19.2	17
12105	29	26	28	3	32	51.0	6.5		
11977	39	29	28	3	28	44.0	5.5	17.4	20
11976	23	29	28	3	27	47.0	5.4	18.5	19

Standard error of a difference between the mean yields of any two varieties = 2.98 bushels.

^{1/} 1 and 2 are degrees of resistance; 3 and 4 degrees of susceptibility.

Table 19. - (Continued)

Alliance, Nebraska
(Three plots)

C.I. number	Winter survival (Pct.)	Date		Height (In.)	Weight per bushel (Lbs.)	Average acre yield (Bu.)	Yield	
		Headed	Ripe				Average 1940-41 (Bu.)	Rank
			July					
12102	80	June 3	11	21	61.0	21.3		
12101	88	June 3	12	20	62.5	20.6		
1442	88	June 8	16	27	61.0	19.9	15.0	2
11669	85	June 2	11	20	60.5	19.8	14.1	4
11972	83	June 3	13	19	61.5	19.7	15.4	1
12103	90	June 2	11	20	60.0	18.9		
6251	75	June 2	14	23	62.0	18.3	13.7	5
11973	87	June 2	11	19	61.5	18.1	14.7	3
11673	85	June 2	12	21	61.0	18.1	13.0	6
12105	60	June 1	11	23	60.5	17.9		
10094	97	June 4	12	18	61.5	16.5	12.8	7
11844	90	June 1	11	20	60.0	15.9	12.4	8
12104	83	June 2	11	20	59.5	15.7		
12106	83	June 1	11	22	59.0	15.4		
11992	87	June 1	11	21	56.0	15.3		
11964	100	June 2	11	19	58.0	14.9		
8856	83	May 30	11	20	59.0	13.4	10.9	10
11999	88	June 2	13	17	60.0	13.3		
12000	88	June 2	12	18	59.5	13.3		
11950	87	June 2	11	17	57.0	12.2	10.6	11
11969	90	June 2	11	17	59.0	11.7	9.1	17
11974	88	June 1	13	18	58.0	11.6	12.0	9
11971	92	June 2	11	17	57.5	11.2	9.4	15
11952	80	June 2	11	16	58.0	10.7	10.6	11
11823	87	June 1	13	18	58.0	10.3	10.1	13
11970	88	June 2	12	18	61.0	9.9	9.3	16
11976	68	June 2	14	19	58.5	9.6	7.9	20
11975	75	June 2	17	21	58.5	8.9	9.0	18
11956	93	June 2	14	17	57.5	8.6	9.6	14
11977	78	June 3	17	19	60.0	8.4	8.5	19

Standard error of a difference between the mean yields of any two varieties = 3.99 bushels.

STANDARD ERRORS

Standard errors were calculated for each station as outlined on page 21 of this report. In table 20 will be found the number of plots, average yields, and standard errors for the uniform nursery grown at each of the 12 stations.

Table 20. - Number of plots, average yield, and standard errors for the uniform yield nursery at each cooperating station in 1941

Station	Number of plots	Average yield of varieties (Bushels)	Standard error of a			
			Single plot (Bushels)	Difference between means (Bushels)	Mean in	
					Bushels	Percent
Texas:						
Denton	4	14.03	2.65	1.87	1.32	9.41
Chillicothe	4	15.01	4.53	3.21	2.27	15.12
Bushland (Irrigated)	4	31.05	4.74	3.35	2.37	7.63
Bushland (Dry)	4	25.21	2.90	2.05	1.45	5.75
Oklahoma:						
Woodward	4	39.04	6.96	4.92	3.48	8.91
Kansas:						
Manhattan	3	29.64	3.69	3.01	2.13	7.19
Hays	3	35.85	6.56	5.36	3.79	10.57
Colorado:						
Akron	5	11.57	3.31	2.09	1.48	12.79
Fort Collins	5	52.70	8.64	5.46	3.86	7.32
Hesperus	3	44.16	9.40	7.68	5.43	12.28
Iowa:						
Ames	4	15.99	3.53	2.49	1.76	11.01
Nebraska:						
Lincoln	5	17.10	4.73	2.98	2.11	12.34
Alliance	3	14.65	4.88	3.99	2.82	19.25

SUMMARY OF NURSERY YIELDS

The yields of the 30 varieties of winter wheat grown at 12 stations (13 nurseries) are summarized in table 21, where the varieties are listed in order of the 13-nursery 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.

Pawnee had the highest average yield in 1941. This variety ranked first in Texas and Nebraska, sixth in Oklahoma and Kansas, fourteenth in Iowa, and seventeenth in Colorado. In 1940 Pawnee ranked second in the nursery and again made its poorest record in Colorado. Choyenne x Tenmarq (C.I. 11972) ranked second, making its best record in Kansas. This strain had the highest average yield in 1940. In third place was Kawvale x Tenmarq (C.I. 11950), a wheat that has been high in yield for several years, in spite of a tendency to shatter under certain conditions. Kawvale x Tenmarq (C.I. 11992) ranked fourth and Kawvale x Tenmarq (C.I. 11956) fifth. The average yields of the four leading varieties differed very little. It should be pointed out that the first twelve varieties had Tenmarq as one parent. In this same group four varieties had Kawvale as one parent, and in three cases Choyenne was used in the cross. Eighteen hybrid strains

Table 21. - Summary of average yields of the 30 varieties grown as uniform yield nurseries at 12 stations in the hard red winter wheat region, 1941

Variety or cross	G.I. number	Bushels per acre																								Average				
		Texas				Oklahoma				Kansas				Iowa				Nebraska				Colorado								
		Bush				Wood				Hays				Ames				Alli				Fort					Akron			
		Den- ton	Chil- li	Land- (lrr- craze)	Ave- ward	Bank- ward	Wood- ward	Bank- ward	Hays- ward	Ave- ward	Rank- ward	Hays- ward	Ave- ward	Rank- ward	Ames- ward	Lin- coln	Alli- ance	Ave- ward	Rank- ward	Fort- ward	Col- lin	Akron- ward	Hos- perus	Ave- ward	Rank- ward		Mar- series			
		toe	11- cothe	(land)	gates					ton			ton																	
Payson	11669	16.7	24.1	33.4	40.4	28.7	1	47.3	6	37.6	42.9	40.3	6	16.1	14	26.8	19.8	23.3	1	52.1	14.1	40.7	35.6	17	31.7					
Chayenne x Temuq	11972	15.4	21.1	30.9	39.2	26.7	3	50.9	2	36.7	47.0	41.9	2	20.8	8	15.1	19.7	17.4	11	52.5	14.7	44.7	37.3	11	31.4					
Kawale x Temuq	11950	14.4	15.2	32.7	31.9	23.6	9	39.6	15	41.3	52.5	46.9	1	22.1	4	31.7	12.2	22.0	3	56.0	11.3	43.4	36.9	13	31.1					
Kawale x Temuq	11992	16.5	23.7	33.5	36.1	27.5	2	43.3	10	37.0	44.8	40.9	3	16.1	14	30.9	15.3	23.1	2	50.4	12.6	41.7	34.9	20	30.9					
Kawale x Temuq	11956	16.9	19.3	31.0	38.3	26.4	4	42.7	11	38.0	42.3	40.2	7	20.1	9	28.0	8.6	18.3	9	52.6	5.8	40.1	32.8	25	29.5					
Early Blackhall x Temuq	11952	19.6	15.6	26.4	29.8	22.9	10	53.7	1	35.7	43.7	39.7	8	17.0	11	24.4	10.7	17.6	10	53.7	14.7	37.7	35.4	18	29.4					
Kanred-Hard Federation x Temuq	11974	16.1	14.0	27.2	27.2	21.1	17	45.2	7	33.1	48.5	40.8	4	16.0	16	12.3	11.6	12.0	25	69.3	13.5	47.5	43.4	1	29.3					
Chayenne x Temuq	12103	16.4	20.6	29.6	38.3	26.2	5	49.1	4	34.9	43.5	39.2	9	19.5	10	13.3	18.9	16.1	15	46.0	13.0	34.9	31.3	29	29.1					
Chayenne x Temuq	12104	17.9	22.1	29.3	33.8	25.8	6	47.9	5	36.3	45.2	40.8	4	16.8	12	13.7	15.7	14.7	19	44.9	12.5	40.4	32.6	27	29.0					
Comanche	11673	18.1	21.6	28.7	32.5	25.2	7	39.4	17	33.2	29.8	31.5	18	13.9	22	14.8	18.1	16.5	14	58.3	8.5	53.9	40.2	4	28.5					
Blackhall x Temuq	12102	11.9	17.4	25.8	30.7	21.5	35	44.7	8	30.0	36.0	33.0	15	15.8	17	22.1	21.3	21.7	4	54.8	8.9	45.8	36.5	14	28.1					
Kanred-Hard Federation x Temuq	12105	16.6	14.5	35.2	32.1	24.6	8	49.3	3	40.7	31.1	35.9	12	4.1	29	6.5	17.9	12.2	24	56.0	18.2	40.4	38.2	6	27.9					
Blackhall x Chayenne	12101	12.4	12.8	23.6	28.9	19.4	21	42.6	12	24.6	37.8	31.2	20	25.5	2	19.4	20.6	20.0	7	49.9	11.0	47.4	36.1	15	27.4					
Kanred x Blackhall	11844	13.5	13.6	28.7	29.9	21.4	16	42.1	13	26.6	29.7	28.1	21	22.0	6	25.8	15.9	20.9	6	49.9	13.3	45.1	36.1	15	27.4					
Kanred-Hard Federation x Temuq	12106	15.4	14.7	26.4	27.1	20.9	18	44.6	9	31.3	43.5	37.4	10	9.5	25	11.4	15.4	13.4	21	57.0	17.1	39.6	37.9	9	27.2					
Chayenne x Temuq	11973	11.3	21.4	24.1	34.0	22.7	12	39.9	14	26.6	37.8	32.2	16	15.5	18	19.1	18.1	18.6	8	54.3	8.2	42.3	34.9	20	27.1					
Chayenne x Early Blackhall	11999	13.6	14.7	22.4	32.5	20.4	19	37.9	18	29.2	40.3	34.8	13	22.1	4	14.6	13.3	14.0	20	50.6	13.3	41.7	35.2	19	26.6					
Hope x Turkey 1069	11964	15.0	17.0	28.1	31.2	22.8	11	37.6	19	31.0	41.7	36.4	11	13.5	23	17.1	14.9	16.0	16	45.7	11.2	41.2	32.7	26	26.6					
Early Blackhall	8856	14.4	15.2	18.6	22.7	17.7	23	39.6	15	35.8	19.6	27.7	22	11.9	24	29.5	13.4	21.5	5	55.7	13.6	49.2	39.5	5	26.1					
Chayenne x Early Blackhall	12000	16.5	13.6	22.1	27.2	19.9	20	26.2	28	31.5	38.0	34.8	13	16.2	13	18.6	13.3	16.0	16	56.0	12.4	46.3	38.2	6	26.0					
Martin x Temuq	11823	15.5	14.8	23.0	34.0	21.8	14	37.2	20	21.5	28.8	25.2	25	15.4	20	13.2	10.3	11.8	26	56.6	9.9	45.6	37.4	10	25.1					
Kanred-Hard Federation x Minhardi- Minturki	11970	9.7	15.9	20.7	27.4	18.4	22	35.6	21	25.2	37.4	31.3	19	14.4	21	13.4	9.9	11.7	27	64.8	13.9	32.9	37.2	12	24.7					
Blackhall	6251	11.5	8.8	19.6	26.3	16.6	26	32.6	23	21.3	24.1	22.7	27	15.5	18	13.5	18.3	15.9	18	47.4	11.4	64.8	41.2	2	24.2					
Hebred	10094	14.6	7.8	16.1	21.9	16.6	26	27.1	27	17.2	21.1	19.2	30	28.8	1	17.4	16.5	17.0	13	46.3	12.5	55.8	38.2	6	23.8					
Hope x Chayenne	11969	13.9	12.9	28.7	35.6	22.6	13	24.7	30	27.8	36.3	32.1	17	5.7	28	13.0	11.7	12.4	23	47.0	8.7	41.8	32.5	28	23.6					
Fort Collins selection	11971	7.3	6.2	12.0	24.3	12.5	30	34.2	22	23.7	27.5	25.6	24	22.0	6	15.4	11.2	13.3	22	55.6	10.1	56.4	40.7	3	23.5					
Kharkof	11442	6.7	9.0	21.7	29.8	16.8	25	32.6	23	17.6	25.1	21.4	28	24.7	3	14.6	19.9	17.3	12	48.2	8.9	42.8	33.3	24	23.2					
Kanred x Hope-Hard Federation	11975	14.9	9.7	16.5	21.2	15.6	29	30.2	25	25.2	26.9	26.1	23	7.2	27	6.6	8.9	7.8	28	53.1	9.1	39.4	33.9	23	20.7					
Kanred x Hope	11976	11.1	6.4	19.5	30.9	17.0	24	28.8	26	22.3	26.8	24.6	26	3.2	30	5.4	9.6	7.5	29	50.6	8.6	45.6	34.9	20	20.7					
Compound cross	11977	7.4	7.4	21.0	30.7	16.6	26	24.8	29	16.8	25.7	21.3	29	8.0	26	5.5	8.4	7.0	30	45.8	6.2	35.7	29.2	30	18.7					
Standard error of a mean (bushels)		1.32	2.27	1.45	2.37	0.96		3.48		2.13	3.79	2.17		1.76		2.11	2.82	1.76		3.86	1.48	5.43	2.28		0.80					
Standard error of a mean (percent)		9.41	15.12	5.75	7.63	5.05		8.91		7.19	10.57	6.39		11.01		12.34	19.25	11.43		7.32	12.79	12.28	6.39		3.14					

ranked above Early Blackhull, and 21 were above Blackhull and Nebred. Again the Hope crosses failed to give good yields as Hope x Turkey 1069 ranked eighteenth, Hope x Cheyenne twenty-fifth, and Kanred x Hope twenty-ninth. In the 1941 nursery three strains had average yields lower than Kharkof check.

Twenty varieties have been grown in the nursery for the 2-year period 1940-1941, at 11 stations, with 12 nurseries. These data are presented in table 22 where the yields are averaged by States and the varieties are listed in order of yield at all stations. Cheyenne x Tenmarq (C.I. 11972) had the highest average yield, being consistently high at all stations except in Iowa and Nebraska, where winterkilling was heavy. Kawvale x Tenmarq (C.I. 11950) ranked second and Pawnee third. These two strains had consistent performances except that Pawnee ranked fifteenth in Colorado, Kawvale x Tenmarq (C.I. 11956) ranked fourth, Comanche sixth, Early Blackhull tenth, and Blackhull twelfth. Nebred and Kharkof had averages considerably lower than the earlier varieties. Early Blackhull x Tenmarq (C.I. 11952) had an average yield considerably higher than Early Blackhull. In spite of the winterkilling at the more northern stations growing nurseries in 1941, the early, leaf-rust-resistant varieties again were at the top of the list for yield.

SUMMARY OF AGRONOMIC DATA

Data for characters other than yield are averaged and presented in table 23. Since all stations did not report the same data, the number of stations entering the averages is shown at the top of each column.

Winter survival data show Nebred to be the most hardy variety in the nursery. Two Kanred-Hard Federation x Tenmarq strains (C.I. 12105 and 12106) proved to be rather tender. The rest of the varieties had survivals that varied over a narrow range.

Early Blackhull is still the earliest variety in the nursery. At eleven stations it averaged two days earlier in heading than Early Blackhull x Tenmarq (C.I. 11952), and three days earlier than Cheyenne x Early Blackhull (C.I. 12000). Seventeen hybrids in the nursery had average dates of heading earlier than Blackhull. Kharkof was the latest variety in the nursery. This gives a clear picture of the emphasis being placed on early wheats in the area. Ripening dates bring out about the same differences although the spread is not so great.

Height measurements were reported from all except one nursery and the averages showed Kanred-Hard Federation x Minhardi-Minturki (C.I. 11970) to be the tallest and Hope x Turkey 1069 (C.I. 11964) the shortest. Other varieties showed very little difference in average height.

Lodging data were reported from four stations and indicated some differences. The weakest strawed varieties were Blackhull, Early Blackhull, and Cheyenne x Early Blackhull (C.I. 12000). The least lodging was reported for Nebred, Martin x Tenmarq³ (C.I. 11823), and Blackhull x Tenmarq (C.I. 12102).

Table 22. - Summary of average yields of 20 winter wheat varieties grown in uniform yield nurseries at 11 stations in the hard red winter wheat region, 1940-41

Variety or cross	Bushels per acre																							Average
	Texas										Oklahoma		Kansas		Colorado		Iowa		Nebraska					
	G.I. number	Den-ton	Chill-cothe	Bush-land		Ave-land	Rank	Wood-ward	Man-hat-ton	Ave-Hays	Rank	Fort-Col-lins	Hoe-perus	Ave-rage	Rank	Ames	Rank	Lin-cola	Alla-ance	Ave-rage	Rank	series		
				(Irrig-ated)	(Dry-land)																			
Chayenne x Fenmarq	11972	24.1	20.5	29.9	18.1	23.2	3	40.5	1	36.9	32.4	34.7	3	50.6	47.2	48.9	3	36.6	7	22.1	15.4	18.8	8	31.2
Kawvals x Fenmarq	11950	20.4	15.1	28.1	19.7	20.8	8	34.4	7	41.9	35.2	38.6	1	54.4	39.9	47.2	5	37.7	5	31.6	10.6	21.1	2	30.8
Pawnee	11669	25.4	21.3	32.0	19.1	24.5	1	37.0	4	39.0	29.9	34.5	4	45.9	37.8	41.9	15	39.1	3	27.7	14.1	20.9	3	30.7
Kawale x Fenmarq	11956	27.8	17.8	29.7	18.6	23.5	2	36.4	5	37.3	30.5	33.9	5	48.9	37.4	43.2	13	36.4	9	28.0	9.6	18.8	8	29.9
Kanred-Hard Federation x Fenmarq	11974	24.5	16.2	24.3	16.2	20.3	10	38.0	3	33.2	33.4	33.3	6	56.7	44.3	50.5	2	36.9	6	20.7	12.0	16.4	13	29.7
Comanche	11673	25.2	21.3	23.6	16.8	21.7	4	32.7	9	35.0	23.9	29.5	8	51.6	51.4	51.5	1	33.5	15	23.2	13.0	18.1	12	29.3
Early Blackhall x Fenmarq	11992	28.1	17.6	23.1	15.5	21.1	6	40.1	2	38.4	31.1	34.8	2	47.5	31.0	39.3	19	39.0	4	27.2	10.6	18.9	7	29.1
Kanred x Blackhall	11844	20.3	18.1	26.9	16.9	20.6	9	34.8	6	31.7	24.3	28.0	9	48.5	40.8	44.7	10	35.6	11	27.6	12.4	20.0	4	28.2
Chayenne x Fenmarq	11973	19.3	21.3	29.0	15.0	21.2	5	34.0	8	33.6	27.6	30.6	7	46.4	37.0	41.7	17	35.4	12	23.9	14.7	19.3	5	28.1
Early Blackhall	8856	25.2	18.3	18.5	11.3	18.3	12	31.4	12	33.6	18.4	26.0	12	45.9	44.0	49.0	9	32.8	16	32.5	10.9	21.7	1	26.9
Martin x Fenmarq	11823	21.5	18.1	26.3	14.8	20.2	11	32.5	10	26.7	22.6	24.7	14	50.6	40.0	45.3	8	35.7	10	19.5	10.1	14.8	16	26.5
Blackmill	6251	21.3	14.1	21.3	13.0	17.4	15	28.7	15	28.1	20.5	24.3	15	44.4	50.9	47.7	4	34.6	13	24.4	13.7	19.1	6	26.3
Kanred-Hard Federation x Minhardi-Minturki	11970	19.6	18.0	21.4	13.2	18.1	13	31.4	12	26.7	26.2	26.5	11	52.3	38.8	45.6	7	34.2	14	20.6	9.3	15.0	15	26.0
Fort Collins selection	11971	18.2	12.8	22.9	8.5	15.6	19	31.5	11	29.8	21.5	25.7	13	50.3	41.9	46.1	6	42.4	1	22.7	9.4	16.1	14	26.0
Nebrad	10094	22.1	10.2	24.6	10.8	16.9	17	26.7	18	24.9	18.6	21.8	19	44.9	44.2	44.6	11	40.3	2	24.2	12.8	18.5	11	25.4
Hope x Chayenne	11969	23.5	14.2	29.0	17.0	20.9	7	23.7	19	27.8	26.4	27.1	10	45.2	34.3	39.8	18	27.0	20	18.6	9.1	13.9	18	24.7
Kharkof	1442	13.0	11.1	23.9	13.4	15.4	20	27.1	17	27.2	18.2	22.7	18	47.3	38.8	43.1	14	36.6	7	22.5	15.0	18.8	8	24.5
Kanred x Hope-Hard Federation	11975	23.3	12.9	21.1	10.6	17.0	16	29.4	14	26.0	21.4	23.7	16	47.1	36.7	41.9	15	29.9	17	19.2	9.0	14.1	17	23.9
Kanred x Hope	11976	21.2	11.7	25.0	12.5	17.6	14	27.4	16	25.7	21.5	23.6	17	43.3	44.2	43.8	12	27.1	19	18.5	7.9	13.2	19	23.8
Compound cross	11977	14.9	11.3	23.6	13.6	15.9	18	22.7	20	20.3	20.7	20.5	20	38.1	37.4	37.8	20	28.2	18	17.4	8.5	13.0	20	21.4

Table 23. - Summary of agronomic data other than yield for 30 varieties of winter wheat grown as uniform yield nurseries at 12 stations in the hard red winter wheat region in 1941.

Variety or cross	C.I. number	Survival	Date		Average		Rust		Kernel plump- ness	Weight per bushel
			Headed	Ripe	Height	Lodging	Leaf	Stem		
Number of stations		4	11	9	12	4	5	2	2	10
Kharkof	1442	75	25	July 2	38	27	64	29	84	55.9
Blackhull	6251	80	22	July 1	37	46	56	16	81	58.2
Early Blackhull	8856	67	14	June 24	37	50	61	4	79	58.8
Nobred	10094	88	23	June 30	35	15	84	10	84	57.4
Pawnee	11669	81	20	June 28	35	31	14	11	85	58.8
Comanche	11673	70	19	June 29	37	23	24	15	85	57.9
Martin x Tenmarq ³	11823	76	23	July 1	37	15	28	13	78	53.9
Kanred x Blackhull	11844	73	21	June 30	37	37	63	16	85	58.1
Kawvale x Tenmarq	11950	76	20	June 28	37	43	7	20	84	57.2
Early Blackhull x Tenmarq	11952	75	16	June 25	36	44	67	9	86	59.8
Kawvale x Tenmarq	11956	79	23	June 30	36	20	5	16	86	58.6
Hope x Turkey 1069	11964	73	20	June 28	33	17	10	2	87	57.7
Hope x Cheyenne	11969	79	23	June 30	35	29	5	4	87	57.3 ^{1/}
Kanred-Hard Federation x Minhardi-Minturki	11970	70	21	June 30	40	23	56	74	84	56.2
Fort Collins selection	11971	70	22	June 30	36	30	78	48	78	55.4
Cheyenne x Tenmarq	11972	70	23	June 30	36	21	29	18	87	57.8
Cheyenne x Tenmarq	11973	72	20	June 29	36	26	32	63	85	57.7
Kanred-Hard Federation x Tenmarq	11974	71	20	June 29	35	17	24	31	78	55.6
Kanred x Hope-Hard Federation	11975	60	19	July 1	35	26	52	6	78	55.7 ^{1/}
Kanred x Hope	11976	56	22	June 30	34	21	71	18	83	53.5 ^{1/}
Compound cross	11977	64	24	July 2	34	24	53	40	74	54.8 ^{1/}
Kawvale x Tenmarq	11992	64	20	June 28	37	27	11	18	84	57.0
Cheyenne x Early Blackhull	11999	69	22	July 1	35	43	61	23	83	58.4
Cheyenne x Early Blackhull	12000	61	17	June 26	36	48	56	12	80	58.4
Blackhull x Cheyenne	12101	68	23	July 1	36	24	66	11	84	58.3
Blackhull x Tenmarq	12102	61	21	June 30	37	12	71	14	84	59.0
Cheyenne x Tenmarq	12103	79	22	July 1	37	18	20	18	87	58.3
Cheyenne x Tenmarq	12104	67	20	June 30	37	28	33	13	88	58.6
Kanred-Hard Federation 142 x Tenmarq	12105	42	18	June 28	38	23	7	24	84	58.3 ^{1/}
Kanred-Hard Federation 25007 x Tenmarq	12106	56	19	June 28	37	36	30	19	85	56.8

^{1/} No test weight for Anos.

Leaf rust readings were reported from five and stem rust readings from two stations. Varieties having low readings for both diseases were Pawnee, Kawvale x Tenmarq (C.I. 11956), Hope x Turkey 1069 (C.I. 11964), Hope x Cheyenne (C.I. 11969), and Kawvale x Tenmarq (C.I. 11992).

Kernel plumpness data were reported from two stations and these have been averaged and show some differences.

Test weight per bushel data were reported from ten stations. Varieties having the higher average test weights were Early Blackhull x Tenmarq (C.I. 11952), Blackhull x Tenmarq (C.I. 12102), Early Blackhull, and Pawnee. Test weights were generally low, no variety averaging 60 pounds per bushel.

DATA FROM THE DISEASE NURSERIES

BUNT NURSERY

For convenience the data from the uniform winter wheat bunt nursery are included in this report. These data (table 24) were secured in cooperation with Agronomists and Pathologists working in the area.

UNITED STATES DEPARTMENT OF AGRICULTURE

Bureau of Plant Industry

SUMMARY OF THE GREAT PLAINS UNIFORM WINTER
WHEAT BUNT NURSERY, 1941

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The uniform winter wheat bunt nursery for the Great Plains area was continued in 1941 in the same manner as in previous years. This report presents a summary of the data obtained in 1941, together with the averages for the varieties grown during different periods from 1932 to 1941.

In the fall of 1940, 50 varieties and strains of winter wheat were sown in duplicate, 8-foot rows at ten stations in the Great Plains and at Bozeman, Mont., Kearneysville, W. Va., Beltsville, Md., and Logan, Utah. Because of unfavorable environmental conditions for bunt infection or subsequent plant growth, no data were obtained in the nurseries seeded at Lincoln and North Platte, Nebr., and at St. Paul, Minn. The data from 10 nurseries are averaged. The smut that developed in the Logan, Utah, nursery was caused entirely by the so-called dwarf bunt organism and therefore the infection percentages are not included in the averages for other stations. The nurseries included varieties that had shown resistance in previous years and promising new strains supplied by several of the cooperating stations.

Inoculum for most stations was obtained from the previous year's nursery at that station by selecting bunted heads from all infected varieties, and from collections made from farmers' fields in the State where the test was made. For the Manhattan experiment the inoculum was a composite of races known to be present in Kansas. For the Kearneysville and Beltsville tests the seed was inoculated with a composite made up of inoculum from all of the other nurseries. Clean seed was planted in the Logan nursery and infection resulted from the soil borne organism.

The varieties are listed in order of the average infection at the 10 stations. These averages ranged from 0.1 to 67.1 percent. The average infections for some standard varieties were as follows: Redit, 2.0; Relief, 2.6; Hussar, 3.2; Minturki, 9.1; Yogo, 9.5; Nebred, 10.3; and Oro, 17.2. Of the susceptible check varieties Kharkof had an average infection of 36.0; Cheyenne, 39.0; Quivira, 51.8; and Chiefkan, 67.1. Two hybrid strains had average infections lower than Redit. These were Oro x Turkey-Florence (P9) and Hussar x Kanred (C.I. 11989). Four selections from the cross, Hope x Turkey 1069, had averages lower than the parent variety, Turkey 1069 (C.I. 10016).

At the bottom of the table are shown the average infections by stations. The heaviest infections with inoculum other than the dwarf bunt, were obtained at Bozeman, Mont., Fort Collins, Colo., and Manhattan, Kans. A study of the Manhattan, Akron, Fort Collins, and Bozeman data gives some indication that different races may be present at these stations. The behavior of the varieties at Logan is of interest in that some of those carrying resistance to the races present in the Plains are also resistant to the dwarf bunt present at Logan. In other cases strains that are quite susceptible on the Plains seem to be moderately resistant at Logan.

Long-time averages are shown for varieties grown for more than one year. For the period 1932-41, Turkey 1069 (C.I. 10016), Nebred, and Hussar have the lowest averages. For the 3-year period 1939-41, Hope x Hussar (C.I. 11834), Relief, and Hope x Turkey 1069 (C.I. 11964) have shown the most resistance. Several of the varieties that have been highly resistant in these tests and are otherwise agronomically desirable are being tested with individual races that have been identified in all of the wheat growing areas.

Table 24. - Summary of bunt infection on 50 varieties and strains of winter wheat grown in the Great Plains Uniform Winter Wheat Bunt Nursery at 11 stations in 1941, and average bunt infections for 1932-41

Variety or cross	C.I. or selection number	Average percentage of bunt at:											Weighted average			
		Denton, Texas	Ames, Tex.	Sill, Okla.	Woodward, Okla.	Manhattan, Kans.	Akron, Colo.	Fort Collins, Colo.	Boseman, Mont.	Kearney, W. Va.	Belts, Md.	Logan, Utah	Average: 10 stations	1940 and 1941	1939 to 1941	1932 to 1941
Oro x Turkey-Florence	P9	0.0	0.0	0.0	0.0	9.0	0.0	0.7	0.5	0.0	0.0	0.0	0.1			
Hussar x Lared	11989	0.0	0.0	0.0	0.8	1.9	1.7	1.0	6.5	0.0	0.4	0.0	1.2	1.3		
Ridit	6703	7.3	2.3	1.6	0.0	1.5	4.2	1.7	1.0	0.0	0.4	4.2	2.0	2.2	3.2	4.5
Marquillo x Minturki	Ks. 37381231	0.0	1.0	1.7	0.0	5.7	1.2	2.9	10.0	0.0	0.0	12.5	2.3			
Hope x Hussar	11834	0.0	0.6	0.9	0.2	15.4	0.0	0.5	3.5	3.9	0.0	2.7	2.5	1.5	1.3	
Belief	10082	0.0	0.0	0.0	0.0	12.8	0.0	0.2	5.5	6.5	1.1	1.6	2.6	1.6	1.4	
Hussar	4843	0.0	0.0	0.0	0.0	21.7	0.0	0.4	5.0	1.7	3.4	6.5	3.2	1.9	2.1	3.3
Hope x Turkey 1069	N.P. 151	0.0	0.0	0.0	0.2	0.4	2.9	6.9	20.0	1.9	0.0	33.0	3.2			
Hope x Turkey 1069	11964	0.0	0.8	0.0	1.2	2.2	3.1	7.5	17.5	2.1	0.7	19.8	3.5	2.2	1.7	
Hope x Turkey 1069	Ks. 383110	0.7	0.7	0.2	0.0	0.7	2.4	4.2	27.5	1.4	1.0	28.0	3.9			
Ridit x Quivira	Wd. 1177	0.0	0.0	27.0	3.4	3.2	1.1	2.9	2.0	1.2	0.0	1.7	4.1			
Turkey selection	11962	0.0	0.9	0.0	0.2	3.2	5.4	10.0	22.5	0.9	3.6	8.9	4.7	3.6	2.9	
Hope x Turkey 1069	11966	0.0	1.1	0.5	0.0	0.9	2.3	24.8	17.5	0.0	0.4	24.6	4.7	3.1	2.9	
Martin x Temmarq	D. 50-37-85	0.5	0.6	0.0	0.0	20.1	0.2	2.2	5.0	15.1	7.1	2.4	5.1			
Turkey selection	11530	0.0	0.0	0.0	0.0	28.1	0.7	6.0	5.0	12.6	4.0	2.0	5.6	5.4		
Martin x Temmarq	D. 50-37-92	0.8	0.0	0.0	0.9	22.2	0.0	2.7	17.5	9.1	6.4	1.4	6.0			
Turkey 1069 x Cheyenne	Neb. 372765	0.0	1.8	0.0	0.2	1.5	3.0	13.5	42.5	0.0	0.3	43.8	6.3			
Martin x Temmarq	11805	0.0	0.0	0.0	1.4	30.2	1.8	2.5	22.5	7.3	4.3	1.3	7.0	5.0	5.2	
Marquillo x Minturki	Ks. 37381560	5.4	3.0	4.3	0.0	18.8	5.7	6.9	15.0	9.8	4.5	11.3	7.3			
Turkey selection	11984	1.5	1.8	1.7	0.9	1.3	5.9	9.4	42.5	9.4	1.0	21.3	7.5	4.9		
Blackhall x Oro	11961	0.0	1.8	0.0	0.0	0.0	12.5	18.4	42.5	1.0	0.3	6.3	7.7	5.2	5.4	
Turkey 1069 x Quivira	11990	0.0	0.7	0.0	0.2	1.3	4.1	27.2	32.5	9.6	1.8	10.4	7.7	5.5		
Turkey 1069	10016	0.6	8.8	3.0	2.0	3.2	8.0	18.7	30.0	2.7	2.2	45.6	7.9	5.3	4.4	2.4
Turkey 1005 selection	Neb. 47-381	1.5	0.5	0.0	0.0	1.4	3.8	10.0	60.0	1.8	0.0	32.5	7.9			
Minturki	6155	10.9	7.8	0.8	2.5	6.5	6.0	8.0	30.0	11.2	7.0	19.4	9.1	6.2	5.3	5.7
Marquillo x Oro	11980	0.0	15.5	0.3	0.0	1.5	14.4	24.7	37.5	0.0	0.7	29.2	9.5	7.9		
Yogo	8033	3.7	5.5	1.2	1.0	2.2	8.9	15.5	40.0	16.7	0.0	11.2	9.5	6.7	5.9	3.5
Turkey selection	11985	0.0	3.3	1.7	0.0	7.7	4.1	25.0	50.0	1.4	2.8	58.3	9.6	6.3		
Nebred	10094	0.8	2.6	0.4	0.7	8.8	8.6	31.2	35.0	11.4	3.0	22.9	10.3	6.6	5.3	3.1
Turkey 1069 x Quivira	Neb. 372698	0.0	3.1	0.0	0.9	0.5	17.7	26.0	55.0	2.9	1.0	22.5	10.7			
Turkey 1069 x Temmarq	Neb. 372636	0.4	8.5	0.3	0.0	5.5	4.1	22.7	60.0	6.3	0.3	9.6	10.8			
Marquillo x Oro	Ks. 394448	0.0	2.3	0.3	0.2	1.4	29.8	32.7	42.5	1.5	0.4	52.3	11.1			
Temmarq x Oro	D. 70-37-38	0.0	8.0	0.0	0.2	0.3	11.9	25.5	65.0	0.0	0.0	5.9	11.1			
Marquillo x Oro	11851	0.5	8.9	0.4	2.2	6.4	17.1	23.5	55.0	0.0	0.3	9.1	11.4	8.8	8.7	
Temmarq x Oro	D. 70-38-44	1.8	18.4	0.0	0.8	0.5	10.7	27.8	60.0	0.0	0.0	16.0	12.0			
Marquillo x Minturki	Ks. 373812-3	7.1	5.8	14.7	4.4	26.0	8.5	13.9	25.0	9.8	9.7	20.3	12.5			
Turkey 1069 x Quivira	Neb. 372694	0.0	5.0	0.0	1.0	5.4	11.6	36.8	67.5	1.6	0.0	32.5	12.9			
Marquillo x Oro	Ks. 2753	0.2	9.9	0.5	1.9	6.4	27.6	17.7	62.5	2.4	0.4	14.4	13.0			
Marquillo x Oro	11979	1.6	7.7	1.3	1.3	9.2	13.0	42.5	55.0	2.9	0.0	22.2	13.5	10.4		
Marquillo x Oro	11978	1.4	12.1	0.6	1.2	7.7	25.8	31.4	50.0	5.8	0.4	18.7	13.6	10.6		
Comanche	11673	2.2	7.0	0.3	0.4	1.9	25.5	35.0	82.5	0.0	0.3	6.3	15.5	10.1	8.6	
Temmarq x Oro	D. 70-38-25	3.8	13.9	0.5	1.7	1.5	24.5	46.5	77.5	0.0	0.4	9.1	17.0			
Oro	8220	7.9	21.6	1.6	5.0	9.7	18.4	27.3	75.0	2.8	2.7	9.3	17.2	12.1	11.4	7.2
Kharkof x Reliance-Hope	Wd. 364496-11	21.4	13.5	26.7	48.4	39.3	14.5	27.2	35.0	1.6	0.3	2.7	22.8			
Marquillo x Temmarq	Ks. 384012	13.7	12.9	25.2	12.4	61.2	12.6	17.5	42.5	23.8	27.3	29.4	24.9			
Kharkof	1442	20.2	30.0	38.5	37.0	53.5	38.0	41.0	37.5	41.1	23.0	36.5	36.0	37.1	38.5	42.1
Cheyenne	8885	37.1	35.7	33.6	41.8	63.1	33.0	64.9	42.5	5.8	32.2	15.5	39.0	45.8	45.9	43.7
Quivira	8886	45.4	22.2	31.5	49.4	65.3	35.3	73.4	72.5	68.6	54.4	22.1	51.8	48.4	51.2	46.6
Early Blackhall x Temmarq	11952	38.8	52.7	46.9	71.6	71.6	35.3	43.0	77.5	72.5	48.0	13.7	55.8			
Chieftan	11754	76.2	35.5	43.0	79.4	66.3	54.3	82.7	82.5	89.8	61.5	19.6	67.1	66.3	63.9	
Average		6.3	7.9	6.2	7.5	14.5	11.6	20.9	37.4	9.6	6.4	17.0				

UNIFORM WINTER WHEAT RUST NURSERIES

In tables 25 and 26 are presented data on severity of leaf-rust and stem-rust infection on the 30 varieties of winter wheat grown in rust observation nurseries throughout the country in 1941. These nurseries are maintained from year to year as part of a rust research program carried on in cooperation with agronomists and pathologists employed in the several States concerned. Later, 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 in this less detailed report include only figures for the severity of infection.

Differential data for leaf-rust infection were obtained for the varieties at 20 stations (table 25). In calculating the average, a trace (T) was considered as equal to 0. Among the semihard wheats Hope x Hussar (C.I. 11682), Hope x Kawvale (C.I. 11959), and Red Rock x Hope (C.I. 11821) had the lowest average infections. Of the hard wheats, Marquillo x Oro (C.I. 11979 and C.I. 11851), Hope x Cheyenne (C.I. 11969), and Kawvale x Tenmarq (C.I. 11956) had averages less than 20 percent. In the same tests susceptible varieties had average infections of from 60 to 71.5 percent.

Stem-rust readings showing differential reaction were reported from 13 stations (table 26). Among the hard wheats the most pronounced resistance was shown by Hope x Cheyenne (C.I. 11969), Hope x Turkey (C.I. 11964), Marquillo x Oro (C.I. 11979 and C.I. 11851), and H-44-Minturki x Minturki (C.I. 12022). Of the semihard wheats Hope x Kawvale (C.I. 11959) and Hope x Hussar (C.I. 11682) had low average infections.

Table 25. - Severity of leaf rust infection on winter wheat varieties grown in the Uniform Rust Observation Nurseries in 1941

Variety or cross	C.I. number	Percent severity of leaf rust infection at:																				
		Tifton, Georgia	Westminster, S. C.	Blocksburg, Va.	Chilhowie, Va.	Elk Creek, Va.	Jackson's Ferry, Va.	Beltsville, Md.	Bedford, Indiana	Lafayette, Indiana	Chatham, Michigan	East Lan- sing, Mich.	Urbana, Illinois	Madison, Wis.	Fayetteville Arkansas	Columbia, Missouri	Ames, Iowa	Denton, Texas	Stillwater, Oklahoma	Manhattan, Kansas	Lincoln, Nebraska	Average for 20 stations
Soft Red:																						
Michigan Amber	5620	75	50	25	40	15	75	60	75	75	85	90	75	50	95	70	30	25	80	90	80	63.0
Trumbull	5657	80	75	30	75	30	90	60	95	95	100	90	60	70	95	50	25	60	80	90	80	71.5
Denton	8265	50	40	10	55	5	30	10	5	10	25	95	60	5	80	20	15	5	80	80	35	35.8
Fulcaster	6471	90	50	15	80	7	65	45	100	100	40	95	40	80	95	60	20	65	80	90	80	64.9
Mediterranean	3332	65	40	25	75	10	85	65	100	85	65	90	70	60	95	60	20	40	60	85	70	63.3
Minhardi	5149	70	40	10	55	5	85	20	90	100	65	80	65	90	95	60	20	85	90	100	90	65.8
Purdue No. 1	11380	80	20	5	20	5	45	15	20	75	25	85	85	40	90	70	30	40	60	90	80	49.0
Wabash	11384	60	T	1	3	0	20	5	5	5	5	75	40	T	20	10	10	T	25	10	10	15.2
Fultz sel. x Hungarian	11849	50	T	T	.5	0	10	5	T	2	T	70	3	2	5	10	1	T	20	10	10	9.9
Fultz sel. x Hungarian	11850	45	T	T	.5	0	10	30	T	5	3	65	3	2	5	15	5	T	10	20	15	11.7
Fultz sel. x Hungarian	12017	30	T	T+	1	0	15	3	T	2	T	70	25	T	50	5	1	T	10	20	15	12.4
Fultz sel. x Trumbull	12018	40	5	5	20	T+	50	5	T	15	10	80	20	20	70	10	-	T	10	40	65	24.5
Semihard Red:																						
Hussar	4843	50	5	5	35	1	70	2	35	50	40	85	25	50	70	75	-	25	40	80	80	43.3
Kawvale	8180	35	10	5	30	T	50	25	5	60	25	85	35	60	10	30	20	10	10	50	65	31.0
Minturki	6155	50	20	2	50	1	65	65	75	100	85	5	15	80	100	75	35	45	60	90	70	54.4
Hope x Hussar	11682	20	T	T+	25	T	50	1	T	T	1	10	75	T	10	5	5	T	25	5	-	12.8
Hope x Kawvale	11959	20	T	15	30	T	35	15	5	T	T	60	T	T	20	5	20	T	T	10	30	13.3
Red Rock x Hope	11821	35	T	5	15	T+	10	5	T	T	-	65	5	T	10	10	10	T	T	70	-	13.3
Hard Red:																						
Kanred	5146	50	15	T	60	T	30	15	3	35	25	80	10	30	100	40	15	25	45	85	70	36.7
Tenmarq	6936	65	20	1	70	1	50	25	5	25	25	90	30	50	100	60	20	25	45	65	65	41.9
Kharkof	1442	75	25	2	75	1	65	20	25	95	40	70	50	60	100	80	30	85	60	100	75	56.7
Malakof	4898	80	10	2	55	T+	50	10	25	90	25	20	40	30	100	70	30	40	80	100	70	46.4
Comanche	11673	40	15	.5	10	T	5	5	3	5	10	75	40	10	75	40	5	T	25	65	60	24.4
Pawnee	11669	30	10	2	45	0	10	35	25	25	T	80	25	40	20	30	20	5	40	20	60	26.1
Kawvale x Tenmarq	11956	35	10	1	.5	0	1	25	3	25	T	55	20	20	20	40	20	T	25	20	40	18.0
Marquillo x Oro	11851	50	15	1	10	T	25	5	T	T	0	65	20	T	20	15	-	T	25	25	25	15.8
Marquillo x Oro	11979	30	15	T	20	0	25	15	2	T	0	70	5	T	T	10	10	5	25	40	35	15.4
Hope x Turkey 1069	11964	25	20	50	65	T+	30	20	T	10	-	55	5	T	5	10	10	T	25	20	65	21.8
Hope x Cheyenne	11969	20	10	25	60	T+	30	40	3	5	0	40	10	1	5	20	10	T	10	25	65	19.0
H-44-Minturki x Minturki	12022	70	15	10	65	T+	45	25	-	T	T	95	3	3	20	15	1	T	20	45	70	26.4

Table 26. - Severity of stem rust infection on winter wheat varieties grown in the Uniform Rust Observation Nurseries in 1941

Variety or cross	C.I. number	Percentage severity of stem rust infection at:													Average for 13 stations
		Chilhowie, Virginia	Lafayette, Indiana	East Lansing Michigan	Chatham, Michigan	Madison, Wisconsin	Urbana, Illinois	Ames, Iowa	College Sta- tion, Texas	Denton, Texas	Stillwater, Oklahoma	Columbia, Missouri	Manhattan, Kansas	Lincoln, Nebraska	
Soft Red:															
Michigan Amber	5620	40	65	30	100	75	T	30	100	65	65	20	65	20	51.9
Trumbull	5657	2	50	35	100	80	T	20	100	65	60	15	65	15	46.7
Denton	8265	10	65	30	100	80	T	20	100	65	70	15	65	30	50.0
Fulcaster	6471	15	65	35	95	85	5	20	100	65	70	15	65	35	51.5
Mediterranean	3332	5	70	40	100	70	5	25	100	65	70	20	65	5	49.2
Minhardi	5149	10	80	45	100	80	5	40	100	40	80	25	60	35	53.8
Purdue No. 1	11380	10	50	45	85	80	20	20	100	60	70	20	60	15	48.8
Wabash	11384	25	65	50	85	86	10	30	100	65	80	20	80	40	56.6
Fultz selection x Hungarian	11849	20	60	40	90	80	20	30	100	65	80	20	70	50	55.8
Fultz selection x Hungarian	11850	15	60	50	100	88	40	40	100	65	70	10	80	50	59.1
Fultz selection x Hungarian	12017	10	60	35	100	90	10	40	100	65	60	10	70	45	53.5
Fultz selection x Trumbull	12018	2	50	55	90	85	5	--	100	80	60	5	70	40	53.5
Semihard Red:															
Hussar	4843	T	65	10	75	90	25	--	100	65	60	5	65	T	46.7
Kawvale	8180	T	35	10	90	40	10	15	90	20	15	2	25	25	29.0
Minturki	6155	T+	45	5	20	60	T	15	80	15	20	5	10	10	21.9
Hope x Hussar	11682	T	T	T+	--	10	T	0	25	5	10	1	T	20	5.9
Hope x Kawvale	11959	0	T	15	T	T+	0	5	5	T	T	0	T	T	1.9
Red Rock x Hope	11821	T	50	10	-	60	0	20	100	25	45	15	25	-	31.8
Hard Red:															
Kanrod	5146	0	60	10	3	25	10	20	90	5	T	15	T	T	18.3
Tonmarq	6936	T	70	20	10	25	0	15	75	20	10	15	T	T	20.0
Kharkof	1442	T+	75	25	15	55	0	30	100	25	20	15	5	10	28.8
Malakof	4898	T	80	5	20	60	T	20	100	25	25	25	T	10	28.5
Comanche	11673	T	35	20	T	20	0	15	80	5	T	5	T	T	13.8
Pawnee	11669	T+	35	20	5	45	0	15	90	10	15	5	2	T	18.6
Kawvale x Tonmarq	11956	0	25	15	5	10	0	15	90	10	T	3	1	5	13.8
Marquillo x Oro	11851	T	10	20	5	5	0	--	5	T	5	3	T	T	4.4
Marquillo x Oro	11979	T	10	10	T	1	0	5	10	T	T	2	T	T	2.9
Hope x Turkey	11964	0	T	5	-	5	0	0	10	5	T	1	T	T	2.2
Hope x Cheyenne	11969	0	T	5	0	T	0	0	T	T	T	2	T	T	0.5
H-44-Minturki x Minturki	12022	0	T	30	0	2	-	0	10	T	5	2	T	T	4.1

