UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
FIELD CROPS RESEARCH BRANCH

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COMPARISON OF WINTER WHEAT VARIETIES GROWN IN COOPERATIVE PLOT AND NURSERY EXPERIMENTS IN THE HARD RED WINTER WHEAT REGION IN 1956

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Preliminary report not for publication 1/

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Nebraska Agricultural Experiment Station
Lincoln, Nebraska
419CC - February, 1957

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By

V. A. Johnson[1/]

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1/ The writer expresses appreciation to Dorothy M. Wilson and Alfred Haunold for their assistance in preparing this report.

CROP AND WEATHER HIGHLIGHTS IN 1956

Continuing severe drought again dominated conditions in most of the hard red winter wheat region. In the southwest plains this has been the story since about 1950. Each year the critically affected drought area has enlarged due to continuing subnormal precipitation and accumulated soil moisture deficiencies. At winter wheat seeding time in the fall of 1955 a serious shortage of subsoil moisture existed throughout the region except in locally favored areas. Generally good stands of wheat were obtained on limited surface moisture in the southern and central districts but lack of rainfall after seeding soon had the new crop in serious trouble. In Texas, the winter was very mild and dry. Little effective rainfall occurred in March and April and winter wheat deteriorated rapidly. By the end of April most of the dryland wheat in the Texas Panhandle and large areas in the Rolling Plains had been abandoned. Most of the Texas wheat crop came from irrigated fields in the Panhandle and the favored Wichita Falls-Vernon area.

Oklahoma produced a good quality winter wheat crop of 64 million bushels in 1956 despite the fact that, following generally heavy rains in October, precipitation was substantially below normal throughout the remainder of the wheat growing season. Accumulated precipitation deficit for the season (July, 1955, through May, 1956) at Stillwater was 14.42 inches. Lower-than-normal mean temperatures in April and periodically in May undoubtedly contributed in a major way to the fair yields reported and the exceptional quality of the grain. Wheat in the Oklahoma Panhandle was a failure as was the wheat crop in eastern New Mexico. In the latter state only 25 percent of the seeded acreage was harvested.

Wheat in Kansas emerged to good stands but entered the winter dormant period with small top growth and limited root development. Precipitation received during the wheat growing season was well below normal in all areas. Abandonment of the crop was heavy in the western third of the state due primarily to wind erosion and extremely dry soil during late winter and early spring. Rains in May greatly improved the soil moisture situation in central and eastern Kansas and cool damp weather slowed depletion of the critically low moisture supplies in the western counties. The grain harvested had high bushel weight and protein content.

Nebraska also experienced a serious precipitation deficit in 1956. At Lincoln during the 12-month period beginning with August 1, 1955, the deviation from normal rainfall was in excess of nine inches. However, wheat abandonment was very low and a 62-million-bushel crop was produced.

Abandonment of planted wheat acres in Colorado was 48 percent this year, down 12 percent from 1955, but indicative of the adverse season-long conditions that persisted there. In Montana the reverse was true with an increase in abandonment from 4.4 percent in 1955 to 35.5 percent this year. Pertinent data on winter wheat production in 11 states of the hard red winter wheat region are reported on page 4.

Diseases caused the least damage to wheat in the hard red winter wheat region in several years. The rusts moved into south Texas in early winter and, while a potential threat, were prevented from building up to epidemic proportions by the spring drought. Northward in the region, natural infections of leaf and stem rust were limited to trace amounts.

Greenbugs became established in irrigated wheat in the Texas Panhandle and were noted in portions of Oklahoma but were of minor importance this year. The brown wheat mite was present in Texas but caused little damage. In Oklahoma, an eastward extension of the brown wheat mite was observed, probably associated with continued drought in the area. Some fields in central Texas were damaged by the winter grain mite. The wheat curl mite was identified from a wheat field near Denton, Texas, but

streak mosaic was not found. Little or no damage due to streak mosaic was reported from Kansas. Pale western cutworm and the army cutworm infested much of the wheat land in northeastern Colorado and several counties in the Nebraska panhandle and southwestern Nebraska. In the latter state the most severe infestation occurred in Cheyenne county where 150,000 acres were treated. More than 90 percent of the cutworm population in both states was determined to be the pale western cutworm. Estimated loss in 1956 from the cutworm was 195,000 bushels in Colorado and 850,000 bushels in Nebraska. Army cutworms also were prevalent in South Dakota where they caused an estimated wheat loss of 197,520 bushels.

State	Acres planted 1/	Acres harvested 1/	Abandonment	1956 production 1/	1956 average acre yields 2/	1945-54 average acre yields 2/
			%	Bu.	Bu.	Bu.
Texas	4,050	2,111	47.9	26,388	12.5	10.8
Oklahoma	4,972	4,198	15.6	67,168	16.0	13.4
New Mexico	450	114	74.7	912	8.0	7.8
Kansas	10,907	9,244	15.2	143,282	15.5	15.8
Nebraska	3,531	3,308	6.3	62,852	19.0	20.2
Colorado	3,184	1,636	48.6	17,996	11.0	17.2
Wyoming	289	238	17.6	4,403	18.5	18.7
Montana	1,885	1,216	35.5	24,928	20.5	20.3
South Dakota	424	317	25.2	4,121	13.0	15.7
Iowa	134	115	14.2	2,070	18.0	19.6
Minnesota	43	37	14.0	888	24.0	19.4
United States	44,503	35,637	20.0	734,995	20.6	18.3

1/ In thousands.
2/ Yields based on harvested acres.
Data taken from the 1956 Annual Summary of Crop Production, U. S. Dept. Agr., Agr. Marketing Service, Crop Reporting Board.

EXPERIMENTS IN 1956

This report follows the pattern that is familiar to the cooperator with a few minor changes. Data from the several uniform experiments grown throughout the region are summarized.

An endeavor has been made in this report to acknowledge those who cooperated in the regional program during the year. Such a listing always falls short of being adequate. To the many who gave a little or a lot of their time a special word of appreciation is due. Those who contributed in special ways to the planning and execution of the program are listed below:

COOPERATING AGENCIES, STATIONS, AND PERSONNEL

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Moccasin	Central Mont. Br. Sta.	James Krall, Arthur Dubbs
Havre	North Mont. Branch Sta.	D. Ferguson
Huntley	Huntley Branch Station	D. Baldridge
CANADA DEPARTMENT OF AGRICULTURE:		
Lethbridge	Alta. Agr. Exp. Station	J. E. Andrews

* Denote federal employees, full-time or part-time.

A few personnel changes have occurred in the hard red winter wheat region since last year. In Texas, J. S. Rogers succeeded J. B. Page as Chairman of the Department of Agronomy. M. D. Huffman resigned his position on the wheat rust project at Kansas State College. The position has not yet been refilled. W. H. Paulson was appointed agronomist at the Fort Lewis Substation, Hesperus, Colorado. The passing of J. H. Parker, Director of the Malting Barley Improvement Association, on October 27, 1956, is noted with regret. Dr. Parker was Professor of Plant Breeding at Kansas State College from 1917 to 1938 and Director of the Kansas Wheat Improvement Association from 1938 to 1945. His contributions as a scientist have been of inestimable benefit to American agriculture. As a teacher, he was an inspiration to all who knew and studied under him.

ACCESSION NUMBERS ASSIGNED

Cereal Investigation, or C. I., numbers were assigned to 10 varieties of hard red winter wheat in 1956. When a number is assigned, seed of that variety is added to the permanent collection maintained by the Cereal Crops Section at Beltsville, Md., under the direction of D. J. Ward. C. I. numbers take precedence over state and local numbers in this report and it is hoped that they will be used whenever available when workers publish reports or correspond. New numbers assigned this year are as follows:

C. I. No.	Name	State No.
13185	Improved Blue Jacket x Comanche	Okla. III-1
13186	Improved Blue Jacket x Comanche	Okla. I-18
13187	Blackhull-Oro x Pawnee	Wd. 43h1-236
13188	Comanche-Med.-Hope x Iowin	Ia. 55176
13279	Pn. x (Iowin x T. timopheevi-Wis. 5)	Ia. 5373
13285	Quiv.-Kan.-H. F.-Prelude-Kan. x Kv.-Mqo.-Kv.-Tq.	Kans. 53429
13365	Frontana x Med.-Hope-Pawnee	Kans. 55771
13366	Centenario x Med.-Hope-Pawnee	Kans. 55845
13367	McMurachy-Exchange-Redman^3 x Chey.	Nebr. 56159
13368	McMurachy-Exchange-Redman^3 x Chey.	Nebr. 56158

NEW VARIETIES

Distribution of seed of Crockett (C. I. 12702) to certified growers was made in Texas this year. Crockett was named and approved for release in 1955 and 70 bushels

of seed were grown under contract. Crockett has high resistance to leaf rust and some races of stem rust. It has produced excellent yields of high test weight, good quality grain in Texas experimental plots and in regional nurseries. The variety is recommended for production in the main commercial wheat producing areas of Texas and should contribute materially to the stability and improvement of wheat production in that state.

Approximately 3,300 bushels of Bison wheat seed were distributed to Kansas growers this year. Decision to release the variety was made in 1955 but distribution was delayed until this year to allow removal of impurities from the foundation seed stocks of the variety. Bison (C. I. 12518) is a sister line of Kiowa and similar to the latter in agronomic characteristics but superior in baking quality. It is recommended for the same area as Kiowa, i.e., central and western Kansas. Following the Kansas action, Nebraska placed Bison on its list of varieties recommended for production in south-central and southwestern Nebraska and distributed a limited quantity of seed to certified growers in those areas. It is anticipated that Bison will replace Pawnee and to a lesser extent Nebred in south-central and southwestern Nebraska.

UNIFORM VARIETIES IN FIELD PLOTS OR IN ADVANCED NURSERIES

The uniform variety tests are organized by districts. Texas, New Mexico, and Oklahoma are included in the southern district; Kansas, Colorado, and Nebraska in the central district; Iowa, South Dakota, and Minnesota are in the northeastern district; and Wyoming and Montana in the northwestern district. The tabulation which follows indicates the varieties which were grown uniformly in the field plot or advanced variety test in each district in 1956, as well as those designated as uniform varieties for 1957.

Variety	C. I. No.	1956				1957			
		S	C	NE	NW	S	C	NE	NW
Kharkof	1442	X	X		X	X	X		X
Early Blackhull	8856	X				X			
Comanche	11673	X	X			X	X		
Concho	12517	X	X			X	X		
Red Chief	12109	X	X						
Crockett	12702	X				X			
Bison	12518		X				X		
Pawnee	11669		X				X		
E. Blkh.-Tq. x Oro-Med.-Hope	12871					X	X		
Minturki	6155			X				X	
Minter	12138			X	X			X	X
Minturki x Timopheevi-Vulg. [2]	12806			X					
Nebred	10094							X	
Yogo	8033				X				X

In addition to the uniform set of varieties, each station grows varieties of local interest. All varieties reported by the various cooperators have been included in the station data for plot varieties in this report, thus giving a rather complete account of advanced testing in the region.

Permanent check varieties in 1956 were Kharkof and Early Blackhull in the southern district; Pawnee and Kharkof in the central district. Minturki and Kharkof were so

designated in the northeastern and northwestern districts, respectively.

PLOT DATA

Cooperators growing the various uniform nurseries in 1956 were requested to summarize weather, soil moisture, diseases, insects, and other factors affecting the nurseries during the growing season at their stations. The basis for this request was that such information would have considerable value to the coordinator and the cooperators for evaluation of performance of the various experimental strains in the nurseries and would be more complete and accurate than comparable information acquired by the coordinator during his single visit to the stations late in the season. The response to this request was excellent. The information contributed by each station is presented below, together with comments about the experimental results as reported in table 1.

The variety test at Denton was seeded in dry soil on November 15. Precipitation amounting to 0.8 inch was received on November 30 and December 1 and was the first rain of any consequence since June, 1955. The rain initiated vernalization with some uneven emergence by December 15. There was no subsoil moisture. Rainfall slightly in excess of 3 inches occurred in January and February. Temperatures as high as 96° F. occurred in March with only 0.25 inch of rain. The winter wheat wilted each day and made little growth. The weather remained very dry at Denton until April 30 and May 1 when 4/ inches of rain fell. The wheat recovered sufficiently to produce fair yields of normal test weight grain. No leaf rust developed and stem rust came in too late to cause much damage. Greenbugs and winter grain mites were present but were not major factors in the yields reported which ranged from a high of 17.1 bushels made by C. I. 13022 down to 10.8 bushels for the soft wheat variety Denton. Several Texas selections with Oro parentage showed excellent resistance to bunt at Denton. The 50 percent reading recorded for Concho seems abnormally high and must be verified. Concho and Crockett in that order have been the most productive of varieties tested five years at Denton.

Rainfall totaling 13.58 inches was received at Chillicothe during September and the first five days of October. Moisture stored during this period carried the experimental plantings through the season. The nurseries were seeded November 9 in good soil moisture and emerged rapidly to good stands. Infrequent showers and light snow during the winter were for the most part ineffective. Growth was rapid in March except for two freezes that caused minor leaf injury to the wheat. Only traces of rain fell during March and April and the nurseries suffered severely from drought and high temperatures. An infestation of brown wheat mite caused some damage. The rusts did not develop but loose smut was prevalent. Benefits from rains in May were largely reflected in high test weights rather than increased yields. Triumph was the high yielder in the variety test with 24.8 bushels. Crockett and Early Blackhull followed closely with 22.3 bushel yields. Only C. I. 13022 made a test weight less than 60 pounds. C. I. 13023 has made the highest 2-year average yield at Chillicothe, whereas Concho and Crockett are high for a 4-year period.

The winter wheat variety test at Bushland was seeded on October 13. Three replications were on dry land and three on irrigated ground. Good stands were established on very limited surface soil moisture. Following moderately heavy snows in February, little effective moisture was received until late May. The dryland tests failed to survive the drought. The irrigated tests received water prior to planting in the fall and four additional irrigations during the winter and spring. Fifty pounds of nitrogen were applied to the irrigated tests in late February. Four varieties exceeded 50 bushels per acre among which were C. I. 13023, Concho, and Cheyenne. Kharkof, Red Chief, Wichita, and Early Blackhull were among six varieties that made less than 40 bushels. The 62.0 pound test weight recorded for C. I. 13023 was high for the nursery.

The variety plots at Clovis, New Mexico, were a failure due to the drought. Subsoil moisture to a depth of 2 to 3 feet existed at planting time but precipitation from planting to harvest amounted to only 4.9 inches, 54 percent of normal.

Sub-normal precipitation during spring, particularly in March and April, following a dry fall and winter was the major factor associated with somewhat below-average yields reported from the Oklahoma stations. Sub-normal mean temperature during May very likely offset some of the adverse effects of the extended drought. The drought-resisting ability of KanKing is apparent from its performance at Stillwater where it was high yielder this year with 18.5 bushels and has been the most productive in the last two years. Blackhull-Oro x Pawnee (Wd. 43h1-236, C. I. 13187), in the plots for the first time this year, was tied with Westar for second rank. The appearance and performance of Wd. 43h1-236 was outstanding at all Oklahoma stations except Cherokee this year, suggesting that it also may have excellent tolerance to adverse conditions. Only Pawnee and Triumph produced grain weighing less than 60 pounds per bushel at Stillwater.

Five bushels separated the high and low yielding varieties at Cherokee. Red Chief and KanKing were most productive with yields of 23.5 and 23.2 bushels, respectively, and made the highest test weights as well. Ponca and Comanche yielded poorly and also had the lowest test weights in the nursery. Concho has had an outstanding performance at Cherokee, yielding an average 31 bushels per acre since 1950, 4.1 bushels better than second ranked Wichita.

Performance of varieties in the test at Woodward was much the same as at Stillwater. Yields varied from 13.2 to 19.5 bushels and, as at Stillwater, all varieties except Pawnee and Triumph produced grain weighing more than 60 pounds. Relative yields of varieties also were similar at the two stations. Wd. 43h1-236 was high in the nursery with Concho and KanKing third and fourth ranked, respectively, whereas Ponca, Kharkof, Triumph, and C. I. 12406 were low yielding.

Duplicate irrigated and dryland variety tests were seeded at Goodwell. The latter did not survive the severe drought. The irrigated nursery received water prior to planting in the fall and again in March, April, and May. Approximately 4 inches of water were applied with each irrigation. On May 5, one day after the last irrigation, the nursery was subjected to excessively high winds (50-70 m.p.h.) coupled with temperatures above 90° F. and very low relative humidities which continued for several days. Severe damage to the nursery in the form of scalding, head sterility, and incomplete spike exsertion occurred and is reflected in short plant height and relatively low yields of grain made by the varieties. Wd. 43h1-236 was outstanding in the nursery, making a yield of 40.5 bushels as compared with 35.5 bushels made by second ranked Concho. Its test weight of 62.0 pounds was exceeded only by KanKing. Concho has made the highest 2- and 4-year average yields at Goodwell.

A 6-replication nursery-type variety test was seeded at Manhattan on October 14. Surface moisture was adequate for fair stand establishment. Very little fall growth occurred due to the early onset of cold weather. Spring growth of the wheat began in late February and by the end of March most of the available soil moisture had been depleted. Subsequent growth was slow and little or no tillering occurred. Rains which came in May contributed mainly to high test weight of the grain. Yields ranged from 26.6 down to 19.7 bushels. Varietal differences in yield were not significant due to the high drought-induced variability in the nursery.

The variety test at Hays was planted in two parts. Four replications of 1/130-acre plots were seeded on fallow ground and two replications of rod-row plots were put on a pre-irrigated area. The fallow plots contained approximately 30 inches of subsoil moisture while the pre-irrigated ground contained water in excess of 3 feet.

Total precipitation from seeding to harvest was 4.6 inches. High temperatures prevailed prior to heading but were cooler during filling and ripening. Yields made by the 1/130-acre plots on fallow were in the 16 to 22 bushel range. Six varieties, among which were 12871, Kiowa, Cheyenne, and Ponca, yielded more than 50 bushels in the pre-irrigated nursery. Strangely enough, Pawnee, which was second most productive in the fallowed plots, made only 22.7 bushels in the rod-row nursery. Varietal differences in yield were not significant. All varieties produced grain weighing more than 60 pounds except Turkey and Kharkof. Wichita has the highest 5-year average yield at Hays.

Excellent yields of grain were produced by the variety plots at Garden City on stored soil moisture and one effective rain which came 2 weeks after seeding. Subsoil moisture to a depth of 6 feet existed at planting time. Following a rain on September 26 the wheat emerged with good stands, stooled well, and developed excellent crown roots. The winter at Garden City was the driest on record. Total precipitation from October 1 through May 31 was only 2.52 inches. Heading was somewhat earlier than usual and the heading to ripening period was reduced to less than 1 month for all but one variety in the test. High and low yielding varieties were Concho and Triumph with 27.3 and 19.2 bushels, respectively. High bushel weight was made by C. I. 12871 Concho has been the most productive variety at Garden City during the last 2 years but is exceeded by Kiowa and Comanche in 4 years of testing.

Drought, dust storms, cutworms, and brown mites were the story at Colby this year. The 12-month period from July 1, 1955, to June 30, 1956, was the second driest on record (less than 9 inches). Seeding was delayed until October 4 because of a dry, hard seedbed but emergence was prompt and fall stands were excellent. The plots survived severe spring dust storms but had to be sprayed for cutworms in the latter part of April. Brown mites were plentiful in the plots until mid-May and undoubtedly caused some damage. A rain in late May helped the wheat through to maturity. Light hail prior to harvest caused some lodging and limited shattering. Yields of grain ranged downward from 11.8 bushels made by C. I. 12871. Only C. I. 12871 and KanKing had test weights higher than 60 pounds.

Mid-September seeding of the winter wheat field plots was made at Akron in four replications, two of which were on cornland and two on fallowed ground. Precipitation at Akron, which measured .93 inch in September, was barely enough for emergence and establishment of fair fall stands. In the ensuing six months total precipitation measured only 1.76 inches as compared with a normal of 3.31 inches. The cornland plots succumbed to the drought but the plots on fallow made good progress and produced yields of grain ranging from 17.4 bushels for Pawnee down to 12.8 bushels for Alton. Bison and Wichita were the second and third ranked varieties. The 62.0 pound bushel weight made by Wichita was high for the nursery. The grain of Comanche and Red Chief also weighed more than 60 pounds. Red Chief was the tallest growing variety at 25 inches. Cheyenne and Kiowa were the shortest at 17 and 18 inches, respectively.

A nursery-type variety test was grown in seven replications at Ft. Collins. The test was irrigated once in May. All varieties exceeded 40 inches in height, and, with the exception of two Ft. Collins selections, lodged heavily. Disease or insect damage in the nursery was not apparent. High yields of heavy test weight grain were produced. F. C. 1262, the high-yielding variety with 74.9 bushels, also lodged only 12 percent. Second ranked Bison yielded 63.4 bushels, followed by Concho with 58.5 bushels. Kharkof and Sioux were least productive and the latter variety was the only one in the nursery which failed to make a 60-pound bushel weight.

The most noteworthy aspect of the winter wheat field plots grown at Lincoln this year was their near-spectacular recovery during June from the effects of one of the

driest winters and springs on record. Concho exhibited outstanding drought tolerance and ability to recover from adverse conditions making the high yield in the test of 25.8 bushels. The performance of Pawnee, the second-ranked variety, was not unexpected in view of its excellent record throughout the central district since its release to farmers in 1942. Ponca and Comanche were the least productive among 15 varieties included in the plots yielding only 18.0 and 18.3 bushels, respectively. It would appear from the Lincoln test in 1956 that neither of these varieties have the drought resisting ability of Concho and Pawnee. Only Red Chief and Red Chief x Pawnee (521366) made test weights higher than 60 pounds. The consistently superior performance of Concho at Lincoln is indicated also by its 2- and 4-year high yield averages of 36.2 and 39.3 bushels. Pawnee has been exceeded slightly by Red Chief in each of these periods.

North Platte recorded a precipitation deficit of 4.6 inches for the period August 1, 1955, through July, 1956. Precipitation was normal in December and January and above normal only in the month of June. Satisfactory field plot stands were obtained but drought-induced individual plot variability in yield prevented the establishment of significant varietal yield differences. Bushel weights ranged from 62 pounds for Red Chief to 58 pounds for Pawnee and C. I. 13021. Cheyenne and Nebred have the best 3-year averages at North Platte.

Below-normal precipitation occurred at Alliance in all months except September, 1955, and July, 1956. The August to July accumulated deficit was 4 inches. Total variation in varietal yields was 5.8 bushels. Yield differences were not significant.

A combined variety test-uniform yield nursery was grown at Ames. Yields and other agronomic data are reported for the three northeastern district uniform varieties. Minter continues to show considerable yield superiority over Minturki and late maturing C. I. 12806 at Ames.

Field plots containing 11 varieties were grown at four locations in Minnesota this year. Yields in the 30-40 bushel range were recorded at St. Paul where several stem rust resistant Blackhawk derivatives were outstanding. Somewhat lower yields were reported from Waseca where winterkilling and lodging occurred. Relative varietal performance was similar to St. Paul. Light winterkilling also occurred at Grand Rapids and Sleepy Eye with some stem and leaf rust at the latter location. The test at Sleepy Eye was a virtual failure with yields of grain ranging downward from 11.3 bushels.

Field plot data were obtained from Brookings, Highmore, and Cottonwood in South Dakota. Moderate to severe winterkilling occurred at all locations which in combination with severe drought resulted in very low yields and bushel weights for varieties in the plot tests. Wichita completely winterkilled at Brookings as compared with 45 and 35 percent survival for Minter and Yogo, respectively. Heavy killing of C. I. 12806 and Sioux with subsequent excessive spring weed growth resulted in complete loss of these varieties at Brookings. Winterkilling was less severe at Highmore where only Pawnee, Sioux, and Wichita survived with less than 50% stands. Yields ranged from 16.2 bushels made by Minturki to 8.5 bushels for C. I. 12806. The latter variety had a high test weight of 55 pounds. Only 5 out of 10 varieties exceeded 10 bushels in yield at Cottonwood. Cheyenne, Pawnee, and Sioux were most productive with 11.5, 11.0, and 11.0 bushel yields, respectively. Kharkof M. C. 22 survived 90 percent as compared with 60 percent survival for Wichita.

Data were reported from three Wyoming stations in 1956. A combination variety test-uniform winterhardiness nursery was grown at each location. Data are presented in table 1 for the entire nursery at each location. Unusually high yields were made by the varieties at Laramie where winter and spring moisture was excellent and no winterkilling occurred. The yields of both Nebred and Cheyenne exceeded 50 bushels, whereas Comanche, Concho, and C. I. 13015 were among the low yielders in the

nursery, making 32.4, 31.9, and 26.9 bushels, respectively. Variable fall emergence of varieties was recorded at Archer where soil moisture at seeding time was less favorable. The number of plants emerged per 3 feet of row was counted in late fall revealing wide differences among varieties. The Yogo x Rescue selections, C. I. 13180 and C. I. 13181, showed the greatest emergence followed by Yogo, C. I. 13184, and Concho in that order. Conversely, Nebred, C. I. 12711, and Sioux had low emergence. Some winterkilling occurred at Archer. Lowest survival was recorded for C. I. 13183 with a 35 percent reading. No killing was observed in C. I. 12711, C. I. 13015, Sioux, Minturki, Kharkof M.C. 22, and C. I. 12806. C. I. 12711 was most productive in the nursery, yielding 24.8 bushels. Only Cheyenne and C. I. 12806 produced grain weighing 60 pounds. No winterkilling occurred at Wheatland, Wyoming, where Wichita made 25 bushels, the high for the nursery.

Winter wheat variety tests were grown at Bozeman, Huntley, Moccasin, and Havre in Montana. The test at Havre failed to survive the winter, thus no data were reported from that station in 1956. Yields and test weights at Bozeman were high. Only Bison made less than 40 bushels and two varieties, Karmont and Yogo, exceeded 60 bushels slightly. All varieties in the test at Bozeman except five produced grain weighing 60 pounds per bushel or more. Some lodging was reported. Moderate winterkilling was reported from Moccasin where yields ranged from 12.3 to 31.7 bushels per acre. Spring and summer drought at Huntley was reflected in low yields and test weights. More than half the varieties in the test yielded less than 10 bushels and all test weights were below 60 pounds.

Table 1. Yields and other data for varieties of winter wheat grown in replicated plots in cooperative experiments at stations in the region in 1956, with period average yields.

Denton, Texas
Eight plots, rod rows

Variety	C. I. or Sel. No.	Date Headed	Date Ripe	Plant Height	Rust 2/ Leaf	Rust 2/ Stem	3/ Bunt	Stand	Weight per bushel	Av. acre yield 1956	Av. acre yield 1955-1956	Av. acre yield 1952-1956	No. years grown	Percent of Kharkof
		May	June	Ins.	%	%	%	%	Lbs.	Bus.	Bus.	Bus.		
Am. x Hope-Chey.	13022	6	5	24	50S	60	30	85	59.0	17.1	12.5	----	2	108.2
Blackhull	6251	11	13	26	40MS	50	70	85	60.0	16.1	13.4	26.7	23	109.8
Crockett	12702	6	5	24	15MR	50	10	95	60.0	16.0	12.9	27.5	6	116.4
Knox 1/	12798	2	5-30	21	20MR	50	80	70	59.5	15.8	----	----	1	-----
Red Chief	12109	11	11	26	50S	50	80	82	61.0	15.5	12.3	23.9	12	103.0
Triumph	12132	2	5-31	22	60S	50	50	84	61.0	15.4	12.0	27.0	9	107.3
Ea. Blackhull	8856	3	2	26	60S	50	5	82	61.0	15.3	12.2	26.6	21	117.8
Kan.-H. F.-Tq.-Med-Hope x Cim.	274-50-1	5	4	25	30S	50	60	84	60.0	14.9	12.5	----	2	108.2
Kan.-H. F.-Tq. xMqo.-Oro	218-49-82	8	7	24	10R	50	5	92	57.5	14.8	----	----	1	-----
Kan.-H. F.-Tq.-Med.-Hope x Cim.	13023	6	5	21	50S	50	50	82	61.0	14.5	13.5	----	2	116.9
Cim.-Hope-Chey. xCom.	13024	8	8	24	40S	60	40	76	59.0	14.3	11.6	----	2	100.9
do	275-51-A4	7	6	21	60S	60	0	82	59.0	14.2	----	----	1	-----
do	275-51-A46	9	9	22	50S	40	0	85	59.0	14.2	----	----	1	-----
Frisco 1/	13106	4	4	24	5R	40	10	72	56.5	14.2	----	----	3	101.3
Cim. x Hope-Chey.	256-50-3	10	10	22	30S	50	60	76	58.0	13.9	----	----	1	-----
R. Ch.-Oro-Tk.-Flo. xMqo-Oro	240-49-7	8	6	25	15R	60	10	85	59.0	13.6	----	----	1	-----
Concho	12517	10	9	22	60S	50	50	81	59.0	13.4	13.0	28.6	5	119.6
Cim.-Hope-Chey. x Com.	275-51-A42	8	9	22	---	50	10	70	58.0	13.2	----	----	1	-----
Comanche	11673	9	10	23	40S	50	3	79	59.0	13.0	11.0	25.9	16	126.1
Quanah	12145	8	7	22	10R	30	5	85	59.0	12.9	9.7	23.8	8	102.0
Tenmarq	6936	12	13	24	60S	60	50	84	58.0	12.9	10.3	25.4	23	116.1
Red May 1/	7250-1	5	3	23	40S	70	15	79	57.0	12.7	----	----	12	104.1
Sinv.-Wich.-Hope-Chey. x Wich.	12703	5	5	23	10R	50	50	85	59.5	12.5	10.5	23.0	6	97.2
Ponca	12128	10	11	23	20MR	50	15	77	59.0	11.8	10.9	26.1	7	107.1
Kharkof	1442	12	13	24	50S	50	20	81	58.0	11.8	11.6	23.9	23	100.0
Mqo.-Oro x Wich.	13176	11	12	20	15MR	50	30	87	59.0	11.3	12.2	----	2	105.2
Denton 1/	8265	13	14	26	40MR	70	30	75	56.0	10.8	11.4	22.0	23	104.4

1/ Soft wheat varieties. Frisco and Red May not grown in 1955. Standard error of a difference = 1.39 bushels
2/ Rust notes taken at College station. 3/ Data from inoculated nursery.

Chillicothe, Texas
Eight plots, rod rows

Variety	C.I. or Sel. No.	Date Headed	Date Ripe	Plant height	Forage estimate 3-20 1/	Weight per bushel	Av. acre yield 1956	Av. acre yield 1955-1956	Av. acre yield 1953-1956	No. years grown	Percent of Kharkof
		April	May	Ins.	%	Lbs.	Bus.	Bus.	Bus.		
Triumph	12132	14	18	17	100	60	24.8	----	----	10 2/	95.9
Crockett	12702	21	23	20	120	61	22.3	21.1	19.2	8	116.4
Early Blackhull	8856	13	20	21	110	60	22.3	19.3	16.7	19	105.0
Kan.-H.F.-Tq.-Med.-Hope x Cim.	13023	20	22	18	90	61	22.2	20.2	----	2	157.8
Apache	12122	21	24	18	90	60	21.3	20.0	18.9	9	107.1
Wester	12110	24	26	20	90	61	20.6	19.5	18.6	12	106.0
Blackhull	6251	25	27	19	100	62	20.4	16.7	----	18 3/	105.6
Wichita	11952	16	22	20	110	61	20.0	18.4	17.6	15	111.3
Klowa	12133	22	24	19	100	61	20.0	19.8	18.6	9	106.7
Concho	12517	23	25	19	90	61	19.8	18.3	19.6	5	109.7
Cim.-Hope-Chey. x Com.	275-51-A42	23	25	20	80	60	19.8	----	----	1	-----
do.	275-51-A4	19	21	19	100	60	19.5	----	----	1	-----
Cim. x Hope-Chey.	256-50-3	24	25	18	100	60	19.4	----	----	1	-----
Tenmarq.	6936	25	28	21	90	60	19.0	17.1	17.6	19	106.9
Cim.-Hope-Chey. x Com.	13024	21	23	20	90	60	19.0	17.5	----	2	137.1
Kan.-H.F.-Tq.-Med.-Hope x Cim.	274-50-1	20	22	19	100	60	18.9	16.8	----	2	131.2
Mqo.-Oro x Wichita	13176	27	30	18	100	61	18.9	16.9	----	2	132.0
Ponca	12128	25	25	18	90	60	18.8	18.2	18.1	9	107.8
Red Chief	12109	25	26	21	110	63	18.5	16.7	15.3	15	104.0
Cim.-Hope-Chey. x Com	275-51-A46	22	23	17	90	60	17.6	----	----	1	-----
Kanred	5146	28	30	18	80	61	17.0	----	----	17 2/3/	104.0
Cim. x Hope-Chey.	13022	19	21	18	100	59	15.9	16.2	----	2	126.6
Comanche	11673	22	24	19	100	61	15.4	15.9	16.5	19	111.9
R.Ch.-Oro-Tk.-Flo. x Mqo.-Oro	240-49-7	23	25	16	90	60	14.3	----	----	1	-----
Kharkof	1442	29	31	21	80	61	14.2	12.8	16.4	19	100.0

1/ Standard variety = Comanche
2/ Not grown in 1955.
3/ Not grown in 1953.
Standard error of a difference = 1.83 bushels.

Bushland, Texas
Three plots, rod rows, irrigated

Variety	C.I. or Sel. No.	Date		Plant height	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
		Headed	Ripe			1956	1955-1956	1952-1956		
		May	June	Ins.	Lbs.	Bus.	Bus.	Bus.		
Cim.-Hope-Chey. x Com.	275-51-A4	9	15	29	59.5	53.5	----	----	1	-----
Kan.-H. F.-Tq.-Med.-Hope x Cim.	13023	9	16	30	62.0	51.2	----	----	1	-----
Concho	12517	11	16	29	59.5	51.2	41.3	27.6	6	120.0
Cheyenne	8885	16	20	27	60.0	50.5	----	----	10	106.0
Kan.-H. F.-Tq.-Med.-Hope x Cim.	274-52-A182	10	16	30	60.0	47.1	----	----	1	-----
Ponca	12128	11	16	29	58.5	46.7	----	----	7	108.3
Comanche	11673	11	16	28	59.5	45.8	37.8	24.5	17	110.4
Mqo.-Oro x Wichita	218-49-44	12	17	28	60.5	45.6	----	----	1	-----
Westar	12110	12	17	29	59.0	45.3	----	----	8	113.6
Cim. x Hope-Chey.	256-50-3	13	17	30	59.0	45.3	----	----	1	-----
Cim.-Hope-Chey. x Com.	275-51-A46	11	16	29	58.0	45.1	----	----	1	-----
Tenmarq	6936	13	18	29	58.0	45.0	36.7	22.9	20	103.1
Apache x Pawnee	K. 5059	11	16	28	58.0	44.7	----	----	1	-----
Cim. x Hope-Chey.	13022	10	17	29	59.0	44.6	----	----	1	-----
Kiowa	12133	10	16	30	59.5	43.5	----	----	6	115.0
Crockett	12702	9	16	32	60.0	43.3	36.4	----	3	107.7
Bison	12518	10	16	29	59.5	42.9	----	----	2	107.5
Apache	12122	9	16	30	58.5	41.8	----	----	2	102.9
Cim.-Hope-Chey. x Com.	275-51-A42	11	16	29	58.5	41.6	----	----	1	-----
do.	13024	10	16	30	59.5	40.6	----	----	1	-----
Kharkof	1442	18	20	29	58.5	39.6	35.4	23.2	20	100.0
Kan.-H. F.-Tq.-Med.-Hope x Cim.	274-50-1	9	16	32	59.0	38.8	----	----	1	-----
Red Chief	12109	12	17	33	61.0	38.3	29.8	22.0	13	106.3
Wichita	11952	7	15	31	59.0	35.4	----	----	8	94.9
R. Ch.-Oro-Tk.-Flo. x Mqo.-Oro	240-49-7	11	16	28	59.0	35.2	----	----	1	-----
Early Blackhull	8856	5	14	31	59.5	33.0	30.1	20.6	19	93.7

Standard error of a difference = 2.82 bushels.

Stillwater, Oklahoma
Four 1/76 acre plots

Variety	C.I. or Sel. No.	Date		Plant height	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
		Headed	Ripe			1956	1955-1956	1950-1956		
				Ins.	Lbs.	Bus.	Bus.	Bus.		
Kanking	12719	4-29	5-29	26	62.7	18.5	13.4	----	2	149.7
Blackhull-Oro x Paw.	Wd43hl-236	4-30	5-28	22	60.2	17.7	----	----	1	-----
Westar	12110	5-3	5-31	26	61.1	17.7	13.2	21.0	11	113.9
Crockett	12702	4-28	5-25	24	60.4	17.6	11.7	----	3	123.2
Concho	12517	5-2	5-30	23	60.8	16.8	11.6	23.2	7	125.7
Early Blackhull	8856	4-24	5-21	25	60.0	16.5	11.7	17.5	24	94.9
Wichita	11952	4-26	5-23	24	60.8	16.4	10.8	18.1	12	95.0
Pawnee	11669	5-2	5-29	23	59.7	16.4	11.3	18.5	16	109.4
Comanche	11673	4-30	5-29	23	60.7	16.1	11.3	19.4	16	109.0
Ponca	12128	5-3	5-29	22	60.4	15.8	11.2	19.3	9	104.3
Triumph	12132	4-24	5-19	23	59.5	15.6	11.1	16.8	14	99.7
Kharkof	1442	5-6	6-2	24	60.5	14.0	9.0	18.4	24	100.0
Red Chief	12109	5-5	6-2	29	62.9	13.5	10.0	18.7	14	104.5
Mqo.-Oro x Oro-Tq.	12406	5-3	6-1	24	61.0	13.0	9.5	----	2	105.6

Standard error of a difference = 0.65 bushels.

Cherokee, Oklahoma
Five plots, rodrows

Variety	C.I. or Sel. No.	Plant height	Weight per bushel	Av. acre yield		No. years grown	Percent of Kharkof
				1956	1950 1/- 1956		
		Ins.	Lbs.	Bus.	Bus.		
Red Chief	12109	27	60.7	23.5	25.2	10	116.7
Kanking	12719	28	61.0	23.2	----	1	-----
Triumph	12132	26	59.4	22.9	24.5	10	115.7
Early Blackhull	8856	28	60.0	22.1	25.5	10	112.4
Wichita	11952	27	59.8	21.6	26.9	10	116.7
Crockett	12702	27	58.3	21.5	----	2	100.2
Concho	12517	26	58.5	21.4	31.0	6	133.8
Blackhull-Oro x Paw.	Wd. 43h1-236	24	57.0	21.4	----	1	-----
Pawnee	11669	26	55.8	19.9	23.1	10	106.6
Westar	12110	25	58.8	19.9	23.9	10	108.8
Mqo.-Oro x Oro-Tq.	12406	25	58.9	19.8	----	1	-----
Ponca	12128	25	56.2	19.2	22.0	8	99.4
Kharkof	1442	24	58.4	18.8	23.2	10	100.0
Comanche	11673	26	56.3	18.5	24.8	10	111.8

1/ Average of six years. No data in 1955. Standard error of a difference = 0.94 bushels.

Woodward, Oklahoma
Five plots, rod rows

Variety	C.I. or Sel. No.	Date		Plant height	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
		Headed	Ripe			1956	1955-1956	1950-1956		
		May	June	Ins.	Lbs.	Bus.	Bus.	Bus.		
Bluckhull-Oro x Paw.	Wd. 43h1-236	4	3	20	60.9	19.5	----	----	1	----
Apache	12122	4	2	21	61.4	17.4	18.4	----	5 1/	120.5
Concho	12517	5	3	21	61.1	17.2	17.0	20.7	7	118.5
Kanking	12719	4	3	22	62.6	16.9	20.6	----	2	108.4
Red Chief	12109	6	6	23	62.6	16.6	17.5	19.7	15	115.0
Pawnee	11669	4	3	20	59.5	16.5	20.4	18.7	19	121.3
Comanche	11673	5	2	21	60.8	16.4	20.6	19.3	19	115.3
Westar	12110	6	3	21	60.6	16.4	20.1	18.7	13	109.7
Early Blackhull	8856	4-27	5-30	20	60.8	16.1	15.6	17.0	25	98.0
Crockett	12702	4	2	21	61.1	16.0	17.6	----	3	101.1
Ponca	12128	5	3	21	60.4	15.8	18.7	17.6	9	104.3
Kharkof	1442	10	7	21	60.2	15.3	18.9	17.5	25	100.0
Wichita	11952	1	1	20	60.6	14.8	15.8	17.7	15	114.4
Triumph	12132	4-29	5-30	19	59.0	14.4	13.7	16.0	12	102.7
Mqo.-Oro x Oro-Tq.	12406	6	3	21	60.5	13.2	16.7	----	2	87.8

1/ Apache not grown 1948-1954.
Standard error of a difference = 0.94 bushels.

Goodwell, Oklahoma
Five plots, rod rows, irrigated

Variety	C.I. or Sel. No.	Date Headed	Date Ripe	Plant height	Spring stand	Weight per bushel	Av. acre yield 1956	Av. acre yield 1955-1956	Av. acre yield 1953-1956	No. years grown	Percent of Kharkof
		May	June	Ins.	%	Lbs.	Bus.	Bus.	Bus.		
Blackhull-Oro x Paw.	Wd. 43h1-236	18	17	29	80	62.0	40.5	----	----	1	-----
Concho	12517	17	14	30	89	60.6	35.5	33.1	30.6	4	202.8
Triumph	12132	11	12	31	81	60.4	35.3	32.4	28.7	8	135.5
Kanking	12719	18	17	32	79	62.3	33.2	30.7	----	2	218.9
Comanche	11673	18	17	32	85	60.3	32.9	27.2	27.1	12	138.3
Ponca	12128	18	17	29	87	60.4	31.8	25.8	25.4	7	131.4
Wichita	11952	10	12	32	89	59.4	29.8	29.2	27.3	10	144.5
Early Blackhull	8856	10	13	34	90	59.4	29.3	23.6	26.7	16	105.6
Apache	12122	17	14	31	85	60.5	29.1	30.9	30.3	7	178.6
Westar	12110	20	17	31	86	60.0	27.4	26.3	23.5	10	134.1
Pawnee	11669	20	17	31	83	59.3	26.7	25.9	23.6	12	121.3
Mqo.-Oro x Oro-Tq.	12406	19	18	31	82	59.8	25.6	24.6	----	2	175.1
Crockett	12702	16	13	31	89	58.6	25.4	22.9	22.4	4	148.7
Red Chief	12109	19	19	31	84	61.8	21.0	23.9	23.9	10	130.6
Kharkof	1442	22	18	31	89	56.0	7.6	14.0	15.1	16	100.0

Standard error of a difference = 3.59 bushels.

Manhattan, Kansas
Six plots, rod rows

Variety	C. I. No.	Date headed	Plant height	Loose Smut	Bunt	Hessian fly	Weight per bushel	Av. Acre Yield			No. Years grown	Percent of Kharkof
								1956	1955-1956	1953-1956		
		May	Ins.	No.[1]			lbs.	Bus.	Bus.	Bus.		
Pawnee	11669	17	19	0	20	S	59.0	26.6	29.1	31.3	19	142.8
Kanking	12719	16	21	4	70	S	62.0	25.5	29.7	31.6	4	112.0
Kharkof	1442	21	19	T	40	S	59.5	24.9	29.4	28.2	25	100.0
Bison	12518	17	20	12	1	S	60.0	23.2	29.3	---	5[2]	118.9
Turkey	1558	21	19	1	20	S	60.5	23.1	27.8	28.3	25	103.9
Concho	12517	17	19	1	2	S	60.5	23.0	29.3	32.0	5	122.3
Wichita Sel.	-----	14	19	2	--	S	60.5	21.9	----	----	1	-----
Wichita	11952	14	19	1	70	S	60.0	21.3	26.3	28.8	17	129.4
Triumph	12132	13	19	2	90	S	60.0	21.1	25.5	26.9	11	130.7
Ponca	12128	17	18	2	70	R	60.0	20.8	27.0	30.4	12	135.3
Med.-Hope-Paw. xOro-Ill. 1-Com.	12804	15	17	3	--	R	58.5	20.4	27.4	----	3	104.6
Comanche	11673	17	19	4	0	S	59.5	20.2	25.8	29.5	19	130.4
Ea. Blk.-Tq. xOro-Med.-Hope	12871	16	18	2	2	MS	61.5	20.2	----	----	1	-----
Kiowa	12133	17	19	13	5	S	60.0	20.1	27.5	30.1	11	129.1
Red Chief	12109	17	21	9	90	S	62.5	19.8	26.0	27.6	15	107.1
Cheyenne	8885	20	18	1	70	S	60.5	19.7	26.2	----	19[3]	112.0

1/ Number of smutted heads per 16 feet of row.
Bunt readings by E. D. Hansing from inoculated seed.
Hessian fly readings by E. T. Jones from Nursery at Columbia, Missouri.
2/ Bison not grown 1952 - 1954
3/ Cheyenne not grown 1949 - 1954
Standard error of a difference = not significant.

Hays, Kansas
Four 1/30 acre plots, two rod rows pre-irrigated

Variety	C.I.No.	Date headed	Plant height	Lodging	Weight per bushel	Av. acre yield 1956			1949-1956 1/	No. years grown	Percent of Kharkof
						1/130 acre plots	Rod rows	Average			
		May	Ins.	%	Lbs.	Bus.	Bus.	Bus.	Bus.		
Ea. Blk. - Tq. xOro-Med. -Hope	12871	19	29	13	63.0	19.0	54.3	36.7	----	1	-----
Kiowa	12133	20	29	0	61.5	19.1	51.4	35.3	26.9	9	118.0
Cheyenne	8885	24	31	0	60.5	19.9	50.4	35.2	----	18	111.2
Kanking	12719	19	29	0	63.8	22.0	47.6	34.8	----	1	-----
Ponca	12128	20	27	3	61.3	16.3	52.6	34.5	25.2	8	98.5
Turkey	1558	24	31	5	58.8	18.0	50.3	34.2	22.7	22	98.8
Concho	12517	19	27	6	62.0	19.1	48.6	33.9	----	2	108.3
Kharkof	1442	24	30	8	59.8	16.6	50.5	33.6	24.4	22	100.0
Bison	12518	20	28	0	61.8	18.2	46.1	32.2	25.8	5	105.7
Wichita	11952	18	30	4	63.3	19.1	40.7	29.9	27.7	13	111.9
Comanche	11673	20	28	9	61.5	17.7	40.2	29.0	25.6	17	113.6
Med.-Hope -Paw.xOro-Ill.1-Com.	12804	19	25	0	61.8	18.2	38.8	28.5	----	1	-----
Red Chief	12109	20	30	0	63.0	17.5	38.5	28.0	24.0	13	110.0
Pawnee	11669	20	28	3	60.8	20.6	22.7	21.7	24.3	16	117.9

1/ No data in 1953, 1954, and 1955.
Standard error of a difference = not significant.

Garden City, Kansas
Four 1/50 acre plants

Variety	C.I. or Sel. No.	Date Headed		Plant height	Weight per bushel	Av. acre yield			No. years grown	Percent of Turkey
						1956	1955-1956	1952-1/ 1956		
		May	June	Ins.	Lbs	Bus.	Bus.	Bus.		
Concho	12517	16	14	22	59.7	27.3	31.3	22.1	4	116.8
Wichita	11952	14	13	24	60.2	26.4	27.8	19.2	14	112.8
Bison	12518	17	15	24	59.7	26.0	30.3	----	2	115.5
Kanking	12719	16	14	25	60.8	25.7	28.6	----	3	111.2
Kiowa	12133	17	15	24	59.6	25.6	30.3	23.6	9	126.8
Ea. Blk. -Tq. x Oro-Med. - Hope	12871	15	14	24	61.0	25.4	28.0	----	2	107.1
Med. - Hope -Paw. x Oro-Ill. 1-Com.	12804	15	14	22	58.4	24.6	28.5	----	3	108.0
Paw. -Mqo. -Oro x Chfk. - Ea. Blk. - Tq.	52H1036	10	12	23	57.8	24.4	----	----	1	-----
Comanche	11673	18	15	23	59.1	24.3	29.7	22.6	16	131.1
Pawnee	11669	18	15	23	58.6	24.3	25.6	19.6	16	126.1
Red Chief	12109	20	17	27	60.9	22.8	28.1	21.7	13	114.7
Ponca	12128	18	15	22	58.4	21.8	24.2	19.7	8	114.7
Kharkof	1442	22	19	24	57.6	21.6	25.9	----	3	99.6
Cheyenne	8885	21	18	22	59.2	20.8	24.2	----	2	92.4
Turkey	1558	22	19	24	57.9	20.7	26.2	18.9	16	100.0
Triumph	12132	13	12	23	59.3	19.2	25.6	22.1	9	108.7

1/ Average of four years. No data in 1953.
Standard error of a difference = 1.37 bushels

Colby, Kansas
Three 1/50 acre plots

Variety	C. I. No.	Date headed	Plant height	Stand May 22	Weight per bushel	Av. acre yield			No. years grown	Percent of Turkey
						1956	1955-1956	1952-1/ 1956		
		May	Ins.	%	Lbs.	Bus.	Bus.	Bus.		
Ea.Blk.-Tq. x Oro-Med.-Hope	12871	21	18	92	60.7	11.8	----	----	1	-----
Kanking	12719	22	18	92	60.5	10.2	20.9	----	3	113.7
Bison	12518	22	18	94	57.5	9.5	20.9	----	2	102.7
Wichita	11952	20	17	91	59.7	9.2	19.4	29.3	13	111.8
Red Chief	12109	24	20	92	59.7	9.2	21.5	29.9	12	105.9
Pawnee	11669	22	18	91	57.3	9.1	20.2	29.9	13	115.6
Kiowa	12133	22	18	92	57.8	8.8	20.2	29.6	8	113.3
Comanche	11673	23	18	92	57.5	8.6	20.3	28.0	14	110.7
Ponca	12128	22	18	91	57.0	8.6	20.3	28.8	8	105.6
Concho	12517	22	18	93	58.2	8.4	21.5	29.4	4	102.9
Kharkof	1442	28	21	88	56.7	8.3	19.4	----	10*	99.0
Cheyenne	8885	27	19	90	57.8	8.2	21.5	29.4	17	108.1
Med.-Hope-Paw. x Oro-Ill. 1-Com.	12804	21	17	89	57.3	8.2	20.0	----	3	98.4
Turkey	1558	27	20	90	56.0	7.3	20.3	28.5	17	100.0

1/ No data in 1953
Standard error of a difference = 1.02 bushels.

Akron, Colorado

Two 1/41 acre plots

Variety	C. I. No.	Date Headed	Date Ripe	Plant height	Weight per bushel	Av. acre yield 1956	Av. acre yield 1955-1956	Av. acre yield 1953-1956	No. years grown	Percent of Kharkof
		May	June	Ins.	Lbs.	Bus.	Bus.	Bus.		
Pawnee	11669	22	19	22	59.8	17.4	15.0	12.4	18	106.1
Bison	12518	23	20	22	59.2	17.0	13.5	----	4 1/	91.2
Wichita	11952	21	19	21	62.0	16.9	13.9	12.5	16	105.0
Hyberline	-----	22	19	21	58.5	16.2	----	----	1	-----
Early Colorado	-----	23	18	20	58.8	16.0	----	----	1	-----
Concho	12517	23	20	20	59.2	15.9	14.3	11.6	4	95.9
Comanche	11673	21	18	23	61.5	15.9	14.6	13.1	18	108.7
Cheyenne	8885	28	20	17	59.5	15.4	13.7	11.4	25	105.4
Red Chief	12109	23	20	25	61.5	15.3	14.2	12.1	15	104.9
Kharkof	1442	27	19	23	58.2	15.2	15.6	12.1	25	100.0
Ponca	12128	24	20	21	59.0	15.1	13.7	11.4	9	96.3
Tenmarq	6936	24	19	21	56.5	14.2	13.9	11.4	25	106.4
Kiowa	12133	23	18	18	58.5	13.9	13.6	12.0	10	104.1
Sioux	12142	28	21	20	58.2	13.4	11.2	9.0	4	74.4
Alton	1438	30	23	24	58.5	12.8	11.7	9.4	25	81.5

1/ Bison not grown in 1953

Standard error of a difference = not significant.

Fort Collins, Colorado
Seven plots, rod rows irrigated once

Variety	C.I. or Sel. No.	Date Headed	Date Ripe	Plant height	Lodging	Weight per bushel	Av. acre yield 1956	Av. acre yield 1955-1956	Av. acre yield 1954-1956	No. years grown	Percent of Kharkof 1/
		May	July	Ins.	%	Lbs.	Bus.	Bus.	Bus.		
Mqo.-Oro-Oro-Tq. x Med.-Hope-Paw.	F.C.1262	26	9	43	12	62.3	74.9	----	----	1	-----
Bison	12518	27	10	45	86	61.9	63.4	64.0	64.9	3	125.2
Concho	12517	26	9	42	81	61.5	58.5	63.5	63.1	3	121.8
Comanche	11673	27	10	44	82	60.8	53.8	58.6	58.8	11	105.4
Mqo.-Oro-Oro-Tq. x Med.-Hope-Paw.	F.C.1264	27	10	43	67	61.7	53.4	----	----	1	-----
Med.-Hope x Paw. 2	12873	27	9	41	31	61.4	53.4	58.6	57.0	3	110.0
Pawnee	11669	26	10	40	64	60.7	52.7	58.5	58.0	11	105.9
Triumph	12132	26	9	44	49	63.7	51.4	52.9	50.8	5	89.4
Ponca	12128	27	10	42	66	60.5	51.3	51.6	53.4	7	97.4
Wichita	11952	25	9	44	44	62.5	49.8	49.1	50.0	11	100.7
(Mqo.-Oro-Oro-Tq.) x (Med.-Hope-Paw.) x Com.	F.C.1265	26	9	41	31	61.6	49.3	----	----	1	-----
Red Chief	12109	26	11	47	83	63.3	48.7	54.9	55.1	9	99.0
Mqo.-Oro-Oro-Tq. x Med.-Hope-Paw.	F.C.1263	27	10	42	70	61.1	45.4	----	----	1	-----
Sioux	12142	30	12	42	87	59.7	45.0	55.2	55.9	3	108.0
Kharkof	1442	31	12	44	90	60.1	40.0	49.0	51.8	9	100.0

1/ Kanred used for 1944 and 1945 when Kharkof was not grown.
Standard error of a difference = 4.47 bushels.

Lincoln, Nebraska
Five 1/47 acre plots

Variety	C.I. or Sel. No.	Date		Plant height	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
		Headed	Ripe			1956	1955-1956	1953-1956		
		May	June	Ins.	Lbs.	Bus.	Bus.	Bus.		
Concho	12517	24	23	20	59.6	25.8	36.2	39.3	4	128.0
Pawnee	11669	25	23	18	58.7	23.7	34.5	36.2	20	124.0
Pawnee x Cheyenne	483310	27	25	17	59.4	23.1	----	----	1	-----
Red Chief x Pawnee	521366	23	23	20	60.2	22.9	----	----	1	-----
Pawnee x Cheyenne	13017	26	25	19	59.6	22.6	33.8	----	3	115.6
Bison	12518	25	24	21	59.0	22.6	34.0	----	3	118.4
Red Chief	12109	24	24	24	61.8	22.5	34.9	36.3	14	115.2
Pawnee x Cheyenne	13007	25	23	18	57.9	22.2	32.0	35.6	4	116.2
Pawnee x Nebred	13015	25	23	18	58.6	21.4	33.4	----	3	120.2
Pawnee x Nebred	13006	28	25	16	58.4	21.4	33.6	----	2	109.2
Turkey	12137	28	26	19	58.1	20.9	31.5	32.0	25	100.4
Nebred	10094	27	25	16	59.3	20.4	33.8	35.4	25	109.3
Kharkof	1442	29	27	20	57.9	18.9	30.8	30.7	25	100.0
Comanche	11673	25	24	18	58.6	18.3	30.6	34.1	18	111.3
Ponca	12128	25	23	18	58.1	18.0	30.2	34.9	9	108.3

Standard error of a difference = 2.02 bushels.

North Platte, Nebraska
Four 1/50 acre plots

Variety	C.I. or Sel. No.	Date		Plant height	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
		Headed	Ripe			1956	1955-1956	1953 1/ - 1956		
		June	July	Ins.	Lbs.	Bus.	Bus.	Bus.		
Pawnee x Cheyenne	483310	5	6	28	59	36.3	----	----	1	-----
Pawnee x Nebred	13021	4	4	28	58	35.8	43.0	----	2	108.9
Pawnee x Cheyenne	13017	4	4	30	60	35.1	36.4	----	2	92.4
Nebred	10094	5	6	28	61	34.8	40.4	38.7	21	107.6
Pawnee	11669	2	3	29	58	34.3	36.2	35.9	17	104.9
Pawnee x Nebred	13006	4	4	28	60	33.9	37.8	----	2	95.9
Bison	12518	5	5	30	60	33.8	36.5	----	2	92.5
Cheyenne	8885	5	6	29	61	33.5	39.7	38.7	23	107.2
Comanche	11673	5	5	30	59	32.6	35.5	35.2	17	100.8
Pawnee x Cheyenne	13007	4	3	27	59	32.3	33.4	34.4	3	92.7
Pawnee x Nebred	13015	2	3	28	59	32.2	35.3	----	2	89.4
Concho	12517	4	5	30	60	31.7	36.4	35.8	3	96.4
Kharkof	1442	8	7	30	60	30.6	39.4	37.1	23	100.0
Red Chief	12109	4	6	33	62	30.2	35.6	35.5	13	106.3

1/ Average of three years. No data in 1954.
Standard error of a difference = not significant.

Alliance, Nebraska
Six plots, rod rows

Variety	C.I. or Sel. No.	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
			1956	1955-1956	1953 1/ - 1956		
		Lbs.	Bus.	Bus.	Bus.		
Cheyenne	8885	60.9	30.8	32.1	28.4	18	111.0
Ea. Blk.-Tq. x Oro-Med.-Hope	12871	63.1	30.2	----	----	1	-----
Bison	12518	60.6	29.9	29.0	----	2	109.8
Pawnee x Nebred	13021	59.5	29.7	----	----	1	-----
Pawnee x Cheyenne	13017	59.5	29.2	29.8	----	2	113.1
Comanche	11673	59.5	29.2	28.2	26.2	15	102.3
Pawnee x Cheyenne	13007	59.3	29.0	29.9	----	2	113.3
Red Chief x Pawnee	521366	61.3	29.0	----	----	1	-----
Concho	12517	60.2	28.8	29.1	23.8	3	97.1
Red Chief	12109	63.1	28.4	29.4	29.5	13	93.8
Ponca x Cheyenne	13019	60.2	28.1	----	----	1	-----
Pawnee	11669	59.1	28.0	28.5	29.1	15	104.3
Pawnee x Cheyenne	483310	59.0	26.8	----	----	1	-----
Nebred	10094	60.4	26.6	28.6	28.4	16	106.3
Kharkof	1442	60.0	25.0	26.4	24.5	18	100.0

1/ Average of three years. No data in 1954.
Standard error of a difference = not significant.

Ames, Iowa
Three plots, rod rows

Variety	C.I. No.	Date		Plant height	Weight per bushel	Av. acre yield			No. years grown	Percent of Minter
		Headed	Ripe			1956	1955-1956	1954-1956		
		June	June	Ins.	Lbs.	Bus.	Bus.	Bus.		
Minter	12138	3	28	33	59.7	34.1	41.2	34.6	7	100.0
Minturki	6155	4	28	33	59.2	30.7	34.5	25.2	6	87.8
Mint. x Tim.-Vulg. [2]	12806	9	7-4	34	59.0	26.1	34.3	24.9	3	72.0

Standard error of a difference = 2.80 bushels.

St. Paul, Minnesota
Three 1/40 acre plots

Variety	C.I. or Sel. No.	Date Headed	Date Ripe	Plant height	Stem rust	Weight per bushel	Av. acre yield 1956	Av. acre yield 1955-1956	Av. acre yield 1953 1/ - 1956	No. years grown	Percent of Minturki
		June	July	Ins.	%	Lbs.	Bus.	Bus.	Bus.		
H255-49-5-1-4 x Blackhawk	2889	11	13	34	T	58.3	48.4	----	----	1	-----
do.	2890	10	13	33	T	58.3	46.9	----	----	1	-----
do.	2892	11	14	34	T	59.3	45.6	----	----	1	-----
H227-10-3-1-1 x H255-49-5-1-3	2891	9	11	35	T	58.3	44.9	----	----	1	-----
Blackhawk	12218	11	14	36	15SR	59.7	44.3	----	----	9 2/	103.0
Minter	12138	11	12	34	10SR	60.3	43.7	42.5	39.9	11	106.1
Minhardi	5149	13	14	34	70S	59.7	43.4	----	----	7 3/	94.9
Minturki	6155	12	15	35	35S	59.7	42.8	40.4	37.8	16	100.0
H255-49-5-1-4 x Blackhawk	2893	10	11	37	T	58.0	42.8	----	----	1	-----
do.	2894	12	12	33	T	58.3	36.1	----	----	1	-----
Minturki x Tim.-Vulg. [2]	12806	14	19	35	10SR	60.0	34.0	29.8	30.5	4	81.7

1/ Average of three years. No data in 1954.
2/ Blackhawk not grown in 1954 and 1955.
3/ Minhardi not grown during the period 1943 - 1955.
Standard error of a difference = 2.20 bushels.

Waseca, Minnesota
Three 1/40 acre plots

Variety	C.I. of Sel. No.	Date Headed	Date Ripe	Winter Survival	Plant height	Lodging	Weight per bushel	Av. acre yield 1956	Av. acre yield 1955-1956	Av. acre yield 1952-1/ 1956	No. years grown	Percent of Minturki
		June	July	%	Ins.	%	Lbs.	Bus.	Bus.	Bus.		
H255-49-5-1-4 x Blackhawk	2889	13	19	60	29	20	59.0	33.4	----	----	1	-----
do.	2890	13	19	57	27	20	58.7	32.4	----	----	1	-----
do.	2893	15	18	53	32	17	57.3	31.7	----	----	1	-----
do.	2894	16	20	55	30	10	58.3	31.5	----	----	1	-----
do.	2892	14	20	60	29	13	58.3	31.3	----	----	1	-----
Minter	12138	13	18	70	32	27	60.3	30.5	41.2	37.4	13 2/	107.3
Blackhawk	12218	13	20	67	34	23	59.7	29.4	----	----	11 2/	103.2
H227-10-3-1-1 x H255-49-5-1-3	2891	12	19	53	28	23	57.7	28.8	----	----	1	-----
Minturki	6155	17	19	57	33	23	57.7	24.5	37.9	34.0	22	100.0
Minhardi	5149	13	17	67	31	13	54.7	23.8	----	----	1	-----
Minturki x Tim.-Vulg. 2	12806	21	27	62	40	27	58.3	19.6	42.1	36.1	4	106.0

1/ Average of four years. No data in 1954.
2/ Blackhawk not grown in 1955.
Standard error of a difference = 3.35 bushels.

Grand Rapids, Minnesota
Three 1/40 acre plots

Variety	C.I. or Sel. No.	Date Headed	Date Ripe	Winter survival	Plant height	Weight per bushel	Av. acre yield 1956	Av. acre yield 1952-1/ 1956	No. years grown	Percent of Minturki
		June	July	%	Ins.	Lbs.	Bus.	Bus.		
H227-10-3-1-1 x H255-49-5-1-3	2891	22	28	92	22	60.3	22.5	----	1	-----
H255-49-5-1-4 x Blackhawk	2894	22	30	97	24	60.7	21.8	----	1	-----
Minter	12138	22	28	88	25	63.7	20.1	26.6	10	110.8
H255-49-5-1-4 x Blackhawk	2893	22	27	97	24	60.3	20.0	----	1	-----
Blackhawk	12218	22	29	95	27	60.0	19.6	23.8	9	98.8
Minturki x Tim.-Vulq.[2]	12806	24	8-3	87	29	61.3	19.4	23.8	3	110.2
H255-49-5-1-4 x Blackhawk	2889	22	29	88	24	60.0	19.4	----	1	-----
Minturki	6155	22	30	88	27	61.0	18.4	21.6	14	100.0
H255-49-5-1-4 x Blackhawk	2890	23	28	82	22	59.7	18.4	----	1	-----
do.	2892	22	28	93	24	60.0	18.3	----	1	-----
Minhardi	5149	23	29	88	26	60.7	18.1	----	1	-----

1/ Average of three years. No data in 1954 and 1955.
Standard error of a difference = 2.90 bushels.

Sleepy Eye, Minnesota
Three 1/40 acre plots

Variety	C.I. or Sel. No.	Date Headed	Date Ripe	Winter survival	Plant height	Rust Stem	Rust Leaf	Weight per bushel	Average acre yield
		June	July	%	Ins.	%	%	Lbs.	Bus.
Minturki x Tim.-Vulg.[2]	12806	19	30	68	27	60	5	58.5	11.3
H255-49-5-1-4 x Blackhawk	2892	17	17	70	18	0	0	59.5	10.4
Minter	12138	17	14	87	20	22	T	60.0	9.0
H255-59-5-1-4 x Blackhawk	2890	17	16	53	16	T	0	60.0	8.7
Minturki	6155	17	18	82	21	48	T	58.7	8.2
H227-10-3-1-1 x H255-49-5-1-3	2891	16	15	67	17	0	0	59.3	7.8
Blackhawk	12218	17	19	62	21	32	T	57.5	6.7
Minhardi	5149	18	15	85	19	77	3	58.5	6.3
H255-49-5-1-4 x Blackhawk	2893	17	17	57	19	T	0	55.5	5.7
do.	2894	19	20	42	21	2	0	56.0	5.7
do.	2889	18	17	65	18	T	T	56.0	5.4

Standard error of a difference = 2.10 bushels.

Brookings, South Dakota
Two 1/50 acre plots

Variety	C.I. No.	Date ripe	Winter survival	Spring vigor rating 1/	Plant height	Stem rust	Weight per bushel	Av. acre yield 1956	Av. acre yield 1955-1956	Av. acre yield 1950-1956 3/	No. years grown	Percent of Minturki
		July	%		Ins.	%	Lbs.	Bus.	Bus.	Bus.		
Marmin	11502	22	52	5	30	30	52.3	7.5	16.3	25.3	8	103.9
Minter	12138	24	45	6	30	40	53.6	6.1	15.5	25.6	10	112.5
Minturki	6155	25	35	7	31	65	49.3	4.0	13.0	21.6	10	100.0
Nebred	10094	20	25	8	28	20	54.8	3.6	12.9	22.9	10	99.3
Pawnee	11669	18	10	9	28	20	52.8	2.4	9.3	19.0	8	89.5
Yogo	8033	28	35	3	30	80	48.9	1.8	----	----	1	-----
Karkof M.C. 22	6938	24	38	7	32	60	41.4	0.7	----	----	1	-----
Minturki x Timo.-Vulg. 2 2/	12806	30	22	9	40	60	----	0.0	8.5	----	2	65.6
Sioux 2/	12142	30	10	5	28	60	----	0.0	8.5	----	2	65.3
Wichita	11952	--	0	-	--	--	----	0.0	7.0	----	2	54.4

1/ Vigor rating on a 1-10 scale, 1 best.
2/ C.I. 12806 and 12142 total loss due to stem rust and weeds.
3/ Five year average. No data in 1951 and 1954.
Standard error of a difference = 1.00 bushels.

Highmore, South Dakota

Two 1/50 acre plots

Variety	C.I. No.	Winter survival	Spring vigor rating1/	Weight per bushel	Av. acre yield	
					1956	1955-1956
		%		Lbs.	Bus.	Bus.
Minturki	6155	78	8	53.1	16.2	20.7
Kharkof M.C. 22	6938	85	7	53.2	14.5	----
Pawnee	11669	35	9	53.0	13.8	18.0
Yogo	8033	80	6	53.1	12.8	20.4
Nebred	10094	60	9	53.8	12.6	18.9
Minter	12138	70	8	53.8	12.0	22.1
Wichita	11952	20	10	54.0	11.2	15.4
Sioux	12142	40	8	53.2	10.4	17.1
Marmin	11502	85	7	53.2	8.8	----
Minturki x Timo.-Vulg.[2]	12806	78	6	55.0	8.5	16.7

1/ Vigor rating on a 1-10 scale, 1 best.
Standard error of a difference = 2.30 bushels.

Cottonwood, South Dakota

Two 1/50 acre plots

Variety	C. I. No.	Winter survival	Spring vigor rating1/	Plant height	Weight per bushel	Av. acre yield
		%		Ins.	Lbs.	Bus.
Cheyenne	8885	65	8	27	59.2	11.5
Pawnee	11669	70	6	26	52.6	11.0
Sioux	12142	70	7	26	53.0	11.0
Nebred	10094	80	7	24	55.2	10.9
Wichita	11952	60	6	31	56.0	10.8
Minter	12138	78	9	26	57.8	7.7
Minturki	6155	88	9	28	59.0	5.7
Kharkof M. C. 22	6938	90	8	26	56.8	4.9
Yogo	8033	78	9	26	58.2	4.6
Minturki x Timo.-Vulg.[2]	12806	65	7	25	48.0	0.5

All varieties were ripe on July 11 except C.I. 12806 which ripened on July 18.
1/ Vigor rating on a 1-10 scale, 1 best
Standard error of a difference = 1.75 bushels.

Laramie, Wyoming
Four plots, rod rows

Variety	C.I. or Sel. No.	Date headed	Plant height	Weight per bushel	Av. acre yield
		June	Ins.	Lbs.	Bus.
Nebred	10094	21	31	59	52.5
Cheyenne	8885	22	34	60	50.5
Kharkof	1442	23	34	60	49.4
Yogo	8033	26	35	61	45.6
Minter	12138	24	34	60	44.5
Sioux	12142	20	30	60	43.9
Cheyene x Hope-Turkey(C.I. 13183)	494738	18	33	57	43.8
Chey.-R.Ch. x Paw.-Mqo.-Oro	13008	22	33	60	43.2
Turkey x Cheyenne ^{2}	12711	20	30	60	42.7
Mint. x Tim.-Vulg. ^{2}	12806	7-6	38	61	41.1
Kharkof M.C. 22	6938	27	39	58	39.5
Minturki	6155	23	33	59	39.1
Wichita	11952	16	30	60	38.9
Hope x Cheyenne ^{2} (C.I. 13184)	451406	21	33	58	38.4
Hope-TurkeyX Chey. (C.I. 13182)	494951	18	30	60	36.0
Chey.-Chfk. x H44-Mint. ^{2}	13115	23	35	60	35.4
Yogo x Rescue (C.I. 13181)	56-28	22	34	60	34.9
Yogo x Resuce (C.I. 13180)	66-22	21	32	60	32.9
Comanche	11673	17	31	60	32.4
Concho	12517	17	29	59	31.9
Kharkof M.C. 22-1	6938-1	28	35	57	31.0
Pawnee x Nebred	13015	16	27	58	26.9

Standard error of a difference = 6.11 bushels.

Archer, Wyoming
Four plots, rod rows

Variety	C.I. or Sel. No	Date ripe	Fall emergance 1/	Winter survival	Plant height	Weight per bushel	Av. acre yield
		July		%	Ins.	Lbs.	Bus.
Turkey x Cheyenne	12711	17	16	100	26	59	24.8
Chey.-R.Ch. x Paw.-Mqo.-Oro	13008	23	23	78	27	59	24.4
Hope-Tk. x Chey. (C.I. 13182)	494951	17	23	83	27	59	24.0
Pawnee x Nebred	13015	17	31	100	26	57	23.9
Kharkof	1442	23	25	80	26	57	23.8
Nebred	10094	23	11	82	24	58	23.3
Yogo x Rescue (C.I. 13181)	56-28	23	47	74	27	55	23.2
Yogo	8033	17	36	89	25	59	22.9
Sioux	12142	23	17	100	25	56	22.2
Chey.-Chfk. x H44-Mint.^{2}	13115	23	29	72	28	59	21.7
Minter	12138	17	28	89	26	59	21.5
Concho	12517	23	33	61	28	56	21.3
Hope x Chey.^{2} (C.I. 13814)	451406	23	34	68	26	54	20.4
Kharkof M.C. 22-1	6938-1	23	21	90	27	55	20.3
Minturki	6155	23	27	100	26	56	19.8
Wichita	11952	17	21	86	28	59	19.7
Kharkof M.C. 22	6938	23	19	100	27	56	18.8
Cheyenne	8885	17	23	96	23	60	18.4
Comanche	11673	23	25	60	27	55	18.1
Yogo x Rescue (C.I. 13180)	66-22	23	41	78	26	57	17.6
Mint. x Tim.-Vulg.^{2}	12806	8-2	14	100	25	60	17.2
Chey. x Hope-Tk. (C.I. 13183)	494738	23	17	35	26	56	16.1

1/ Number of plants per three feet of row. An equal number of kernels of each variety planted. Standard error of a difference = 2.70 bushels.

Wheatland, Wyoming
Four plots, rod rows

Variety	C.I. or Sel. No.	Weight per bushel	Av. acre yield
		Lbs	Bus.
Wichita	11952	60	25.3
Chey.-R.Ch. x Paw.-Mqo.- Oro	13008	61	24.9
Nebred	10094	58	24.2
Pawnee x Nebred	13015	60	24.1
Chey.-Chfk. x H44-Mint.^{2}	13115	59	23.9
Yogo x Rescue (C.I. 13181)	56-28	55	23.8
Kharkof	1442	58	23.1
Turkey x Cheyenne	12711	59	22.3
Hope-Tk. x Chey. (C.I. 13182)	494951	59	21.1
Minter	12138	58	21.0
Cheyenne	8885	58	20.6
Concho	12517	62	20.3
Yogo	8033	58	20.1
Minturki	6155	58	20.0
Kharkof M.C. 22	6938	56	19.4
Kharkof M.C. 22-1	6938-1	56	18.9
Hope x Cheyenne (C.I. 13184)	451406	57	18.3
Chey. x Hope-Tk. (C.I. 13183)	494738	60	17.9
Sioux	12142	57	17.7
Yogo x Rescue (C.I. 13180)	66-22	58	14.1
Comanche	11673	57	13.1
Mint. x Tim.-Vulg.^{2}	12806	--	7.8

Standard error of a difference = 4.11 bushels.

Bozeman, Montana

Six plots, rod rows

Variety	C.I. or Sel. No.	Date headed	Plant height	Lodging		Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
				Degree	Percent		1956	1955-1956	1953-1956 1/		
		June	Ins.			Lbs.	Bus.	Bus.			
Karmont	6700	23	41	5	50	62	60.4	67.4	69.3	18	102.5 2/
Yogo	8033	24	44	10	80	61	60.3	61.6	65.0	20	101.0 2/
Cheyenne	8885	22	40	10	100	62	59.1	69.1	73.1	12	107.4 2/
Mint. x Timo.-Vulg.[2]	12806	25	45	1	15	61	58.9	58.5	----	2	89.8
Blackhull-Rex x Chey.	12933	23	39	15	100	63	58.8	66.5	----	2	102.1
Blackhull-Rex x Rio-Rex	12932	20	40	0	0	61	57.4	65.2	----	2	100.1
Yogo x Rescue	Mont.56-30	23	40	15	80	61	57.2	68.1	----	2	104.5
27-15 x Rex-Rio-41	12692	23	31	5	70	60	57.0	69.6	----	2	106.8
Kharkof	1442	23	41	1	15	61	55.4	65.2	69.6	19	100.0
Yogo Sel.	Mont.166	23	39	0	0	60	54.2	----	----	1	-----
Kharkof Sel.	Mont.18-7	22	39	15	80	60	52.3	61.2	----	2	93.9
Yogo x Rescue (Mont.66-22)	13180	20	37	0	0	61	50.8	54.9	----	2	84.3
Kharkof M.C. 22	6938	25	43	0	0	59	50.7	----	----	1	-----
Yogo Brown-awned Sel.	-----	20	36	5	50	62	49.1	63.9	----	2	98.1
Yogo x Rescue (Mont.56-28)	13181	23	39	1	30	59	49.0	63.1	----	2	96.8
Newturk	6935	22	38	10	70	62	48.7	60.2	65.2	19	96.1
Yogo x Rescue	Mont.17-7	20	36	1	15	61	48.6	59.6	----	2	91.4
Comanche x C.I. 12250	13180	20	32	1	15	62	45.5	----	----	1	-----
Wasatch	6938	22	40	0	0	60	44.9	56.1	60.7	10	93.5 2/
Norin 10 x Brevor-11	-----	22	22	0	0	58	44.4	----	----	1	-----
Norin 10 x Brevor 17	13254	22	24	3	15	59	43.7	----	----	1	-----
Yogo x Rescue	Mont.56-19	22	38	0	0	58	43.6	53.8	----	2	82.7
H44 x Minturki 4	Minn.2844	22	41	0	0	60	40.2	48.7	----	2	74.8
Bison	12518	21	37	0	0	60	37.2	----	----	1	-----

1/ Three year average. No data in 1954.
2/ Kharkof not grown in 1952. Percentage values based on one year less than indicated.
Standard error of a difference = 5.05 bushels.

Moccasin, Montana
Six plots, rod rows

Variety	C. I. Or Sel. No.	Date headed	Plant height	Winter survival	Weight per bushel	Av. acre yield		No. years grown	Percent of Kharkof
						1956	1951-1956 1/		
		June	Ins.	%	Lbs.	Bus.			
Karmont	6700	25	25	78	59.0	31.7	24.7	21	103.1
Yogo Sel.	Mont. 166	26	25	83	59.2	29.0	----	1	-----
Yogo	8033	26	25	86	58.1	27.7	24.5	21	106.8
Kharkof	1442	25	26	78	59.4	27.5	22.4	21	100.0
Blackhull-Rex x Chey.	12933	25	25	68	61.1	27.0	----	2	98.2
Cheyenne	8885	25	25	68	60.4	26.8	25.9	9	108.1
Newturk	6935	24	27	57	58.9	26.7	24.5	20	103.3
Wasatch	11925	25	25	58	59.1	25.5	22.3	7	82.5
Yogo x Rescue (Mont. 66-22)	13180	23	24	63	60.2	24.8	----	1	-----
Yogo Brown-awned Sel.	----	21	23	60	60.3	24.2	----	1	-----
27-15 x Rex-Rio-41	12696	27	22	38	58.3	24.2	----	1	-----
Kharkof Sel.	Mont. 17-7	26	26	52	59.6	24.0	----	1	-----
Minter	12138	23	25	80	59.8	23.9	21.8	10	97.5
Kharkof M. C. 22	6938	27	25	88	56.0	23.6	----	3	95.3
Blackhull-Rex x Rio-Rex	12932	23	23	71	59.0	20.4	----	1	-----
Yogo x Rescue (Mont. 56-28)	13181	25	25	56	56.4	20.1	----	1	-----
do	Mont. 56-19	25	24	78	57.7	20.0	----	1	-----
do	Mont. 77-11	24	24	51	59.1	19.2	----	1	-----
Bison	12518	23	23	61	57.8	18.2	----	1	-----
Norin 10 x Brevor-4	----	28	21	34	58.8	12.3	----	1	-----

1/ Four year average. No data in 1954 and 1955.
Standard error of a difference = 3.50 bushels.

Huntley, Montana
Six plots, rod rows

Variety	C. I. or Sel. No.	Date		Plant height	Weight per bushel	Av. acre yield		No. years Grown	Percent of Kharkof
		Headed	Ripe			1956	1951-1956 1/		
		June	July	Ins.	Lbs.	Bus.			
27-15 x Rex-Rio-41	12696	17	19	17	57.0	12.9	----	1	-----
Yogo Brown-awned Sel.	-----	11	15	21	55.5	11.8	----	1	-----
Blackhull-Rex x Rio-Rex	12932	15	17	21	58.5	10.4	----	1	-----
Cheyenne	8885	15	16	20	58.5	10.4	17.5	4	111.1
Newturk	6935	16	16	19	57.0	10.4	16.1	6	100.9
Blackhull-Rex x Chey.	12933	16	17	20	59.0	10.3	----	2	105.0
Kharkof	1442	14	15	20	59.0	10.3	15.7	6	100.0
Bison	12518	11	14	21	55.0	10.1	----	1	-----
Yogo x Rescue (Mont. 56-28)	13181	16	17	19	54.0	10.0	----	1	-----
Karmont	6700	15	15	20	59.0	9.7	16.2	6	94.3
Kharkof Sel.	Mont. 17-7	17	17	21	58.5	9.6	----	1	-----
Yogo	8033	17	16	21	58.0	9.6	14.8	4	93.8
Wasatch	11925	15	17	20	59.5	9.3	15.1	4	95.9
Yogo x Rescue	Mont. 56-19	16	14	19	58.0	9.3	----	1	-----
Yogo Sel.	Mont. 166	18	16	20	57.0	9.3	----	1	-----
Yogo x Rescue (Mont. 66-22)	13180	15	17	20	57.7	9.0	----	1	-----
do	Mont. 77-11	16	15	21	55.0	9.0	----	1	-----
Minter	12138	16	15	20	59.0	8.6	13.7	4	87.3
Kharkof M.C. 22	6938	22	22	19	55.0	7.7	----	1	-----
Norin 10 x Brevor-4	-----	17	17	13	54.0	7.7	----	1	-----

1/ Average of four years. No data in 1954 and 1955.
Standard error of a difference = 1.20 bushels.

STANDARD ERRORS

Standard errors on the yield data for the current year are reported in table 2, together with the number of plots and mean yields at each location. A footnote indicates where nursery plots were grown in place of field plots.

The analysis of variance was applied to the data from each reporting station. This was done by the cooperators at many of the stations and at Lincoln for the rest. In those cases where only mean yields and an L. S. D. were reported by the cooperator the errors recorded in table 2 were determined from the L. S. D. Where individual plot data were reported the standard error of the mean was obtained by dividing the standard deviation by the square root of the number of replications. The standard error of a difference between any two variety means was calculated by multiplying the standard error of a mean by the square root of 2. Error expressed as a percentage of the mean is presented also. These statistics have considerable value to the agronomist even though complete random arrangement of plots was not followed at all stations.

SUMMARY OF PLOT DATA

Summaries of average yields and other agronomic data are reported in tables 3 through 12. For the southern and central districts, average yields are summarized for both 1956 and the 1955-56 2-year period. Yield summaries for the northeastern and northwestern districts are reported for 1956 only. Averages of other agronomic data for 1956 in each district appear in tables 9 through 12.

Yields by Districts

In the southern district, 7 varieties were grown uniformly at seven reporting stations in 1956. Westar, Wichita, and Triumph were grown at six stations and are included as well. Concho made the highest 7-station average yield in the southern district, exceeding the other varieties by 1.8 bushels or more. However, Concho's yield superiority in 1956 over Crockett was due to its better performance than Crockett in the irrigated nurseries at Bushland and Goodwell. Red Chief and Kharkof were the least productive in 1956. The poor performance of Kharkof at Goodwell accounts in large part for its very low average yield. On a 2-year basis, Concho has shown a 1.8-bushel yield advantage over second ranked Comanche and a 2-bushel advantage over Crockett.

Bison was the most productive among six varieties grown uniformly at 9 stations in the central district. Its 28.6-bushel average yield was 0.5 bushel higher than second-ranked Concho. Pawnee and Comanche ranked third and fourth, respectively, with 26.4 and 25.8 bushel yields. Concho and Bison also have had the highest 2-year average yields in the central district with Concho the higher of the two by 0.5 bushels.

Only three varieties were tested uniformly in the northeastern district. The 8-station average yield of Minter exceeded Minturki by 1.3 bushels and late-maturing C. I. 12806 by 5.5 bushels.

Kharkof, Yogo, Cheyenne, and Kharkof M.C. 22 were grown uniformly at 6 reporting stations in the northwestern district. Minter was grown at 5 of the stations. The 31.6-bushel average yield of Kharkof was 0.6 bushel higher than the yields of Yogo and Cheyenne.

Summary of Agronomic Data

Only limited agronomic data other than yield were reported from the southern and central districts in 1956. If the same kind of note was recorded on varieties at more than one station in a district, an average was calculated and included in the appropriate table of agronomic data. Data for the 4 districts are reported in tables

9 through 12. Varieties are listed in declining order of bushel weight.

Red Chief had the highest average weight per bushel in the southern district with 61.9 pounds. Concho, Early Blackhull, and Crockett also produced grain weighing an average of 60 pounds or more. Red Chief, Crockett, and Early Blackhull were the tallest growing varieties. Early Blackhull was the earliest maturing and Kharkof the latest maturing variety.

The 62-pound average test weight made by Red Chief was high for the central district. Concho and Bison were the only other varieties averaging 60 pounds or more. Two stations reported lodging with Pawnee averaging slightly the lowest percentage, followed by Red Chief and Bison in that order. Concho, Bison, Comanche, and Pawnee averaged one day earlier in heading than Red Chief and 5 days earlier than Kharkof. Concho, Comanche, and Pawnee were earliest ripening and had slightly the shortest straw.

Minter was the earliest ripening and heading variety grown uniformly in the northeastern district. It also had slightly the highest winter survival and bushel weight, and the lowest average stem rust infection at the reporting stations.

Cheyenne made the highest bushel weight among five varieties uniformly grown in the northwestern district. Kharkof M. C. 22 had the highest winter survival at two reporting stations and Kharkof the lowest although differences were not great.

Table 2. Number of plots, average yields and standard errors for the variety tests at the cooperating stations in 1956.

State and Station	No. of plots	No. of vars.	Average yield all varieties	Standard error of a Difference in means	Standard error of a Mean	Coefficient of variability
			Bus.	Bus.	Bus.	%
TEXAS						
Denton	8*	27	14.0	1.39	0.98	20.0
Chillicothe	8*	25	19.2	1.83	1.29	19.0
Bushland	3*	26	43.7	2.82	2.00	7.9
OKLAHOMA						
Stillwater	4	14	16.1	0.65	0.46	5.7
Woodward	5*	15	16.2	0.94	0.66	9.2
Cherokee	5*	14	21.0	0.94	0.66	7.0
Goodwell	5*	15	28.7	3.59	2.54	19.7
KANSAS						
Manhattan	6*	16	22.0	N.S.	----	----
Hays	6 1/	14	27.5	N.S.	----	----
Garden City	4	16	23.8	1.37	0.97	8.2
Colby	3	14	26.9	1.02	0.72	4.7
COLORADO						
Akron	2	15	15.4	N.S.	1.90	17.5
Ft. Collins	7*	15	53.0	4.47	3.16	15.8
NEBRASKA						
Lincoln	5	15	21.7	2.02	1.43	14.7
North Platte	4	14	33.4	N.S.	1.59	9.5
Alliance	6*	15	28.5	N.S.	1.55	13.3
IOWA						
Ames	3*	36	37.0	2.80	1.98	9.3
MINNESOTA						
St. Paul	3	11	43.0	2.20	1.56	6.3
Waseca	3	11	29.8	3.35	2.37	13.8
Grand Rapids	3	11	19.6	2.90	2.05	18.1
Sleepy Eye	3	11	7.8	2.10	1.48	33.2
SOUTH DAKOTA						
Brookings	2	10	2.6	1.00	0.71	38.5
Highmore	2	10	12.1	2.30	1.63	19.0
Cottonwood	2	10	8.1	1.75	1.24	21.7
WYOMING						
Laramie	4*	22	39.7	6.11	4.32	21.7
Wheatland	4*	22	20.1	4.11	2.91	28.9
Archer	4*	22	21.0	2.70	1.91	18.1
MONTANA						
Bozeman	6*	24	51.1	5.05	3.57	17.1
Moccasin	6*	20	23.8	3.50	2.47	25.5
Huntley	6*	20	9.8	1.20	0.85	21.3

* = nursery plots. N.S. = non-sighificant at the 5% level.

1/ = Two nursery plots and four 1/130 acre plots.

Table 3. Summary of average yields of varieties grown uniformly at 7 stations in the southern district in 1956.

Variety	C.I. No.	Average yield in bushels per acre at ----							Seven-station average
		Denton	Chillicothe	Bushland 3/	Stillwater	Woodward	Cherokee	Goodwell 3/	
Concho	12517	13.4	19.8	51.2	16.8	17.2	21.4	35.5	25.0
Westar	12110	----	20.6	45.3	17.7	16.4	19.9	27.4	24.6 1/
Crockett	12702	16.0	22.3	43.3	17.6	16.0	21.5	25.4	23.2
Wichita	11952	----	20.0	35.4	16.4	14.8	21.6	29.8	23.0 1/
Ponca	12128	11.8	18.8	46.7	15.8	15.8	19.2	31.8	22.8
Comanche	11673	13.0	15.4	45.8	16.1	16.4	18.5	32.9	22.6
Early Blackhull	8856	15.3	22.3	33.0	16.5	16.1	22.1	29.3	22.1
Triumph	12132	15.4	24.8	----	15.6	14.4	22.9	35.3	21.4 2/
Red Chief	12109	15.5	18.5	38.3	13.5	16.6	23.5	21.0	21.0
Kharkof	1442	11.8	14.2	39.6	14.0	15.3	18.8	7.6	17.3

1/ Six-station average. Comparable average for Concho = 26.8 bushels, and for Crockett = 24.4 bushels.
2/ Six-station average. Comparable average for Concho = 20.7 bushels, and for Crockett = 19.8 bushels.
3/ Irrigated nursery.

Table 4. Two-year summary of the average yields of varieties grown uniformly in the southern district in 1955 and 1956.

Variety	C.I. No.	Average yield in bushels per acre at ----						Two-year average
		Denton	Chillicothe	Bushland	Stillwater	Woodward	Goodwell	
Concho	12517	13.0	18.3	41.3	11.6	17.0	33.1	22.4
Comanche	11673	11.0	15.9	37.8	11.3	20.6	27.2	20.6
Crockett	12702	12.9	21.1	36.4	11.7	17.6	22.9	20.4
Early Blackhull	8856	12.2	19.3	30.1	11.7	15.6	23.6	19.0
Red Chief	12109	12.3	16.7	29.8	10.0	17.5	23.9	18.4
Ponca	12128	10.9	18.2	----	11.2	18.7	25.8	17.0 1/
Kharkof	1442	11.6	12.8	35.4	9.0	18.9	14.0	17.0

1/ Five-station average. Comparable average for Concho = 18.6 bushels, and for Crockett = 17.2 bushels.

Table 5. Summary of average yields of varieties grown uniformly at 9 stations in the central district in 1956.

Variety	C.I. No.	Average yield in bushels per acre at -----									Nine-station average
		Manhattan	Hays	Garden City	Colby	Akron	Ft. Collins	Lincoln	North Platte	Alliance	
Bison	12518	23.2	32.2	26.0	9.5	17.0	63.4	22.6	33.8	29.9	28.6
Concho	12517	23.0	33.9	27.3	8.4	15.9	58.5	25.8	31.7	28.8	28.1
Pawnee	11669	26.6	21.7	24.3	9.1	17.4	52.7	23.7	34.3	28.0	26.4
Comanche	11673	20.2	29.0	24.3	8.6	15.9	53.8	18.3	32.6	29.2	25.8
Red Chief	12109	19.8	28.0	22.8	9.2	15.3	48.7	22.5	30.2	28.4	25.0
Kharkof	1442	24.9	33.6	21.6	8.3	15.2	40.0	18.9	30.6	25.0	24.2

Table 6. Two-year summary of the average yields of varieties grown uniformly in the central district in 1955 and 1956.

Variety	C.I. No.	Average yield in bushels per acre at ----								Two-year average
		Manhattan	Garden City	Colby	Akron	Ft. Collins	Lincoln	North Platte	Alliance	
Concho	12517	29.3	31.3	21.5	14.3	63.5	36.2	36.4	29.1	32.7
Bison	12518	29.3	30.3	20.9	13.5	64.0	34.0	36.5	29.0	32.2
Pawnee	11669	29.1	25.6	20.2	15.0	58.5	34.5	36.2	28.5	31.0
Red Chief	12109	26.0	28.1	21.5	14.2	54.9	34.9	35.6	29.4	30.6
Comanche	11673	25.8	29.7	20.3	14.6	58.6	30.6	35.5	28.2	30.5
Kharkof	1442	29.4	25.9	19.4	15.6	49.0	30.8	39.4	26.4	29.5

Table 7. Summary of average yields of varieties grown uniformly at eight stations in the northeastern district in 1956.

Variety	C.I. No.	Average yield in bushels per acre at ----								Eight station average
		Ames	St. Paul	Waseca	Grand Rapids	Sleepy Eye	Brookings	High-more	Cotton-wood	
Minter	12138	34.1	43.7	30.5	20.1	9.0	6.1	12.0	7.7	20.4
Minturki	6155	30.7	42.8	24.5	18.4	8.2	4.0	16.2	7.7	19.1
Mint. x Timo.-Vulg [2]	12806	26.1	34.0	19.6	19.4	11.3	0.0	8.5	0.5	14.9

Table 8. Summary of average yields of varieties grown uniformly at six stations in the northwestern district in 1956.

Variety	C.I. No.	Average yield in bushels per acre at ----						Six-station average
		Lar-amie	Archer	Wheat-land	Boze-man	Mocc-asin	Hunt-ley	
Kharkof	1442	49.4	23.8	23.1	55.4	27.5	10.3	31.6
Yogo	8033	45.6	22.9	20.1	60.3	27.7	9.6	31.0
Cheyenne	8885	50.5	18.4	20.6	59.1	26.8	10.4	31.0
Kharkof M.C. 22	6938	39.5	18.8	19.4	50.7	23.6	7.7	26.6
Minter	12138	44.5	21.5	21.0	----	23.9	8.6	23.9 1/

1/ Five-station average. Minter not grown at Bozeman.

Table 9. Agronomic data other than yield summarized from the variety tests in the southern district, 1956.

Variety	C. I. No.	Average date		Average plant height	Average weight per bushel
		Headed	Ripe		
		May	June	Ins.	Lbs.
Number of stations----		6	6	7	7
Red Chief	12109	8	8	27	61.9
Concho	12517	6	6	24	60.1
Early Blackhull	8856	4-29	1	26	60.1
Crockett	12702	4	4	25	60.0
Comanche	11673	6	6	25	59.7
Ponca	12128	7	7	24	59.3
Kharkof	1442	11	10	25	58.9

Table 10. Agronomic data other than yield summarized from the variety tests in the central district, 1956.

Variety	C. I. No.	Average date		Av. plant height	Av. lodging	Average weight per bushel
		Headed	Ripe			
		May	June	Ins.	%	Lbs.
Number of stations----		8	5	8	2	9
Red Chief	12109	24	28	28	42	62.0
Concho	12517	23	26	25	44	60.1
Bison	12518	23	27	26	43	60.0
Comanche	11673	23	26	25	46	59.7
Pawnee	11669	23	26	25	34	59.1
Kharkof	1442	28	29	26	49	58.9

Table 11. Summary of agronomic data other than yield for varieties grown uniformly in the northeastern district in 1956.

Variety	C.I. No.	Average date		Average winter survival	Average plant height	Average stem rust	Average weight per bushel
		Headed	Ripe				
		June	July	%	Ins.	%	Lbs.
Number of stations----		5	6	6	7	3	8
Minter	12138	13	16	73	29	24	58.7
Minturki	6155	14	17	71	30	49	57.2
Mint. x Timo.-Vulg. [2]	12806	17	24	64	33	43	57.2 1/

1/ Seven-station average. No bushel weight for CI12806 from Brookings.

Table 12. Summary of agronomic data other than yield for varieties grown uniformly in the northwestern district in 1956.

Variety	C.I. No.	Average date headed	Average winter survival	Average plant height	Average bushel weight
		June	%	Ins.	Lbs.
Number of stations----		4	2	5	6
Cheyenne	8885	21	82	28	59.8
Yogo	8033	23	88	30	59.2
Minter	12138	21 1/	85	26 1/	59.2 1/
Kharkof	1442	21	79	29	59.1
Kharkof M.C. 22	6938	25	94	31	56.7

1/ Data averaged for one less station than the number indicated. Minter not grown at Bozeman.

UNIFORM YIELD NURSERY

Eighteen stations in 7 states of the southern and central plains grow the uniform yield nursery each year. In 1956 data were obtained from 15 of the stations. Season-long drought caused the abandonment of the nursery at Colby, Kansas, and Akron, Colorado. Data from Ft. Collins, Colorado, were not usable this year due to severe carry-over effects of sodium chlorate soil treatment on portions of the uniform yield nursery site. Kharkof, Blackhull, and Early Blackhull continue as permanent check varieties. Only one new strain was included in the nursery this year, that being Mqo.-Oro x Wichita (C. I. 13176) from Texas. The nursery contained a total of 21 varieties which are listed below:

Entry No.	Variety or Cross	State No.	C. I. No.
1	Kharkof		1442
2	Blackhull		6251
3	Early Blackhull		8856
4	Pawnee		11669
5	Comanche		11673
6	Concho		12517
7	Ea. Blackhull-Tq. x Oro-Med.-Hope		12871
8	Med.-Hope-Pn. x Oro-Ill. 1-Comanche		12804
9	Crockett		12702
10	Med.-Hope x Pawnee[3]		13112
11	Pawnee x Cheyenne		13007
12	Pawnee x Cheyenne		13017
13	Pawnee x Nebred		13021
14	Pawnee x Nebred		13015
15	Ponca x Cheyenne		13019
16	Ponca x Cheyenne		13018
17	KanKing		12719
18	Cimarron x Hope-Cheyenne		13022
19	Kan.-H. Fed.-Tq.-Med.-Hope x Cimarron		13023
20	Cim.-Hope-Chey. x Comanche		13024
21*	Mqo.-Oro x Wichita	Tx. 218-48-44	13176

*New entry in 1956.

DATA OBTAINED

Uniform yield nursery data obtained from the 15 reporting stations are reported in table 13. The nursery was grown at most stations in close proximity to the field plots. Thus, the particular conditions affecting the performance of the field plot varieties, which were reported in some detail in the plot section of this report, apply as well to the uniform yield nursery and will not be discussed here.

For the second consecutive year, the yields reported from Denton were very low due to the continued drought and probably are not a reliable indication of normal varietal performance in that area. Late maturing Blackhull was the most productive in 1956 and has, as well, the best 2-year average yield. Kharkof and C. I. 13176, also late varieties, were among the least productive varieties in the nursery. C. I. 12871 which ripened 10 days earlier than Blackhull was nearly as high yielding as the latter and was tied for second rank with KanKing. Yield performance of the varieties appears rather closely correlated with test weight suggesting that the

varieties best able to hang on during the severe March and April dry weather were able to take advantage of the heavy rain on April 30 and May 1. The Blackhull wheats, KanKing, Concho, and Pawnee have demonstrated such ability over the region and were among the top-yielding 7 varieties in the Denton nursery. In rust tests run at College Station, C. I. 12871, Crockett, and C. I. 13176 gave the lowest readings to leaf rust while all the uniform yield nursery entries were susceptible to stem rust. Lowest bunt infection occurred on C. I. 12871, C. I. 13112, C. I. 13021, C. I. 13015, and Comanche. Concho came up with a surprisingly high bunt reading of 50% at Denton and had, as well, a high infection rating for loose smut.

Fair yields were obtained at Chillicothe, ranging from 22.1 bushels made by Crockett down to only 10.5 bushels for Kharkof. Bushel weights varied from 57 to 62 pounds. Varieties were extremely short strawed. Only Blackhull attained a height of 20 inches and 4 varieties were only 15 inches tall. C. I. 13023 and Crockett have the highest 2-year average yields at Chillicothe. Concho, with a rather mediocre performance at Chillicothe in the last two years, still continues the most productive variety in the nursery since 1953.

Irrigated and dryland sections of the uniform yield nursery, each with 3 replications, were planted at Bushland. The non-irrigated portion did not survive the drought; thus data are reported for the irrigated nursery only. Nearly 20 bushels separated the high and low yielding varieties. Both Concho and C. I. 13023 made high yields of 51.2 bushels although the 62-pound test weight of the latter variety exceeded that of Concho by 2.5 pounds. Kharkof, KanKing, C. I. 13015, and Early Blackhull all yielded less than 40 bushels. Concho has given superior performance at Bushland and has the best 2- and 4-year yield averages at that station. C. I. 13007 has the second highest 2-year average and Crockett the second best 4-year average.

The uniform yield nursery at Clovis was planted in 6 replications. Only 3 replications were harvested because of total or partial failure of 3 replications due to drought and damage from the western wheat aphid, Brachycolus tritici. Damage from this aphid was extreme in localized spots throughout the nursery area and contributed in a major way to the yield variability in the nursery. The variety Westar, in an adjacent nursery, appeared to have some tolerance or resistance to the aphid. The 21.5-bushel yield made by Crockett was high for the uniform yield nursery this year. It also has made the highest 2-year average yield but is second to Concho on a 3-year basis.

C. I. 12871, KanKing, and C. I. 13022 in that order were most productive at Stillwater. All made slightly more than 29-bushel yields. In general, the early maturing varieties seemed to be favored with the exception of Early Blackhull. Bushel weights ranged from 58.1 pounds for C. I. 13018 to 61.3 pounds for C. I. 12871. The latter variety has the unusual combination of earliness, high test weight, and long dough mixing requirement. KanKing has the best 2-year and Crockett slightly the best 4-year yield records at Stillwater.

At Woodward varietal yields varied only 4.5 bushels with all varieties making less than 20 bushels per acre. C. I. 13007, C. I. 13017, and C. I. 12871 all made 17 bushels or more. All but 5 varieties produced grain weighing 60 or more pounds with C. I. 12871 and KanKing exceeding 62 pounds. In the last 2 years, C. I. 13007 has been the most productive variety at Woodward, whereas Concho and Blackhull have been the highest yielders on the average since 1953.

Only 3 varieties produced more than 20 bushels per acre at Cherokee, they being KanKing, Early Blackhull, and C. I. 12871 with 21.8, 20.9, and 20.7 bushel yields, respectively. Bushel weights were below normal for all varieties, the highest being 59.9 pounds made by C. I. 12871 and the lowest 54.3 pounds for C. I. 13112. Concho

has the highest 2-year average yield at Cherokee with an advantage of nearly 2 bushels over C. I. 12804, its nearest competitor. However, since 1953 Concho has yielded somewhat less than Early Blackhull and C. I. 12871.

Varietal differences in yield were not significant at Manhattan this year. Yield average for the nursery was somewhat less than 20 bushels with Blackhull, KanKing, and C. I. 13017 the most productive and C. I. 13022 and C. I. 13023 the least productive varieties. Bushel weights were quite variable ranging downward from 62.0 pounds made by C. I. 12871 to 57.5 pounds recorded for the Nebraska selections C. I. 13007 and C. I. 13021. Low bunt readings were obtained on C. I. 12871, Concho, Comanche, and the Nebred derivatives C. I. 13015 and C. I. 13021. Only Blackhull, C. I. 13176, and Kharkof exceeded 20 inches in plant height. KanKing has been the most productive at Manhattan since 1955 and Concho since 1953.

Yield data were obtained at Hays for the first time since 1953. The nursery was grown in 4 replications at two locations on the station with 2 of the replications given pre-planting irrigation in the fall. The 4-replication average yields are reported. Although rather wide varietal differences were obtained, they are not significant due to the variability that existed. All varieties exceeded 60 pounds in test weight.

Yields reported from Garden City in 1956 were very low. Only 4 varieties exceeded 10 bushels and they only slightly. Crockett, C. I. 12871, and Pawnee were high for the nursery. Spring survival, primarily associated with winter drought, ranged from a low of 64 percent for C. I. 13018 up to 92 and 90 percent for C. I. 13024 and Kharkof, respectively. Blackhull and Crockett were the only varieties attaining a height of 20 inches or more. The 29.4-bushel, 2-year-average yield made by C. I. 13022 is high for the nursery, whereas the yield of Concho is high for a 3-year period of testing at Garden City.

Yields reported from Hesperus in southwestern Colorado were unusually high this year. C. I. 13007 made 101.7 bushels per acre and Comanche, C. I. 13176 and C. I. 12871 all exceeded 90 bushels. Lowest yields in the nursery were made by Kharkof and C. I. 12804 with 69.8 and 68.2 bushels, respectively. Despite the high mean yields, plot variability was excessive and significant varietal differences could not be demonstrated. Bushel weights all exceeded 61 pounds with 64.1 and 64.0 pounds being recorded for C. I. 12871 and C. I. 13023, respectively. All varieties attained heights of 40 inches or more. Comanche and C. I. 13007 in that order have been the most productive in 2 years of testing at Hesperus and C. I. 12871 and Comanche have the highest 3-year averages.

Preplanting irrigation in the fall contributed considerably to the normal yields and bushel weights obtained in the uniform yield nursery grown at Lincoln. Only four varieties made less than 30 bushels per acre. Pawnee, the high yielder in the nursery produced 41.7 bushels. C. I. 13019, C. I. 13007, C. I. 12804, and Comanche did well, all yielding 36 bushels or more. C. I. 13022 has made the highest 2-year average yield followed by Pawnee and C. I. 13019 and C. I. 13023. Concho and C. I. 12871 have the best 4-year average yields.

Yields in the uniform nursery at North Platte ranged from 19.2 to 26.9 bushels but the varietal differences were non-significant. Only Early Blackhull and C. I. 13176 produced less than 20 bushels per acre. About half the varieties exceeded 60 pounds in test weight. Surprisingly, Kharkof has the best 2-year yield record at North Platte and is exceeded only by Concho in 4 years of testing. This, despite the fact that there has been little or no winterkilling during the period which would give Kharkof an advantage on a survival basis. Only Pawnee, Concho, and Comanche have been superior to Kharkof during the years they have been in the nursery.

Yields of grain and bushel weights only are reported from Alliance. Ten varieties yielded more than 25 bushels with C. I. 13015, the top yielder, making nearly 30 bushels. Consistent with its performance at North Platte and Lincoln, the yield of C. I. 13176 was very poor. All varieties produced grain weighing 59 pounds per bushel or more, the heaviest being 63.1 pounds reported for C. I. 12871. The best 2-year yield records at Alliance have been made by C. I. 13112 and C. I. 12804. Concho has been superior in a five-year period of testing.

High yields and bushel weights were reported from Ames. All varieties made more than 33 bushels per acre with KanKing and C. I. 13019 exceeding 40 bushels and Concho 45 bushels. Both KanKing and C. I. 12871 had 63-pound test weights and only C. I. 13176 weighed less than 60 pounds. Concho has made the highest 3-year average yield at Ames but is exceeded by KanKing and C. I. 13019 in the last 2 years of testing.

Table 13. Yield and other date for varieties grown in the uniform yield nursery in cooperative experiments at 15 stations in the hard red winter wheat region in 1956, and period averages.

Denton, Texas
Four plots

C.I. No.	Date		Plant height	Rust 1/		Bunt	Loose smut	Stand	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharfof
	Headed	Ripe		Leaf	Stem					1956 2/	1955-1956	1953-1956		
	May	June	Ins.	%	%	%		%	Lbs.	Bus.	Bus.	Bus.		
6251	11	13	26	40MS	50	70	VH	84	60.0	15.9	13.6	21.9	21	110.9
12871	5	3	24	20R	50	1	H	90	62.5	15.7	12.9	26.0	4	127.9
12719	7	8	23	50S	50	70	N	73	61.5	15.7	12.4	----	2	121.0
8856	3	2	26	60S	50	5	H	74	61.0	14.8	11.6	23.7	21	133.6
13022	6	5	24	50S	60	30	H	85	59.5	14.1	10.9	----	2	106.8
12517	10	9	22	60S	50	50	H	75	58.0	13.8	12.4	24.6	6	122.5
11669	8	8	23	40MS	50	10	N	69	57.0	13.3	11.2	21.8	18	130.2
12702	6	5	24	15MR	50	10	L	86	60.0	13.3	11.8	23.8	6	119.2
13023	6	5	21	50S	50	50	H	86	61.0	13.2	12.4	----	2	120.5
13024	8	8	24	40S	60	40	H	75	59.0	13.0	9.7	----	2	95.1
13017	10	10	22	50S	50	15	N	78	58.0	12.4	10.0	----	2	98.0
11773	9	10	23	40S	50	3	M	69	58.0	12.3	9.7	22.7	17	137.5
13019	9	8	22	20MS	60	5	N	74	58.0	12.1	10.2	----	2	99.5
13018	9	9	22	40S	60	10	M	83	58.0	12.0	11.0	----	2	107.8
13112	10	10	23	40S	50	1	N	71	56.0	11.4	11.6	----	2	113.7
13021	10	9	21	60S	50	1	L	79	58.5	11.3	11.1	----	2	108.3
12804	8	7	22	30S	50	10	H	63	58.0	11.0	10.2	20.9	4	103.1
1442	12	13	24	50S	50	20	VH	64	58.5	10.8	10.3	20.3	21	100.0
13176	11	12	20	15MR	50	30	H	79	58.0	10.7	----	----	1	-----
13015	9	8	22	40MS	50	0	L	80	58.5	9.9	9.6	----	2	93.7
13007	8	9	22	60S	50	60	N	49	58.0	9.7	9.1	----	3	95.8

1/ Rust notes taken at College Station.
2/ Adjusted yields.
Standard error of a difference = 1.70 bushels.

Chillicothe, Texas
Four plots

C.I. No.	Date		Plant height	Forage estimate	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
	Headed	Ripe				1956	1955-1956	1953-1956		
	April	May	Ins.		Lbs.	Bus.	Bus.	Bus.		
12702	21	22	18	130	60	22.1	20.6	21.1	7	110.3
13023	22	23	17	90	61	21.7	20.9	----	2	200.0
12871	20	22	18	100	62	21.6	19.7	20.1	4	119.6
8856	15	20	19	120	59	21.2	17.9	16.7	18	106.7
11669	24	23	16	100	58	19.7	20.6	21.8	18	121.0
12719	23	25	19	100	61	19.6	19.1	----	2	182.8
13024	23	24	17	120	60	19.0	17.5	----	2	167.0
13015	25	23	15	110	58	17.9	17.0	----	2	162.2
13112	26	26	14	90	57	17.9	16.7	----	2	159.8
12517	22	24	17	110	60	17.4	17.5	22.2	7	121.1
6251	24	26	20	120	61	17.2	15.1	18.1	18	104.7
13017	26	28	15	120	60	17.1	18.2	----	2	173.2
13019	23	23	16	110	58	17.0	17.3	----	2	165.6
13018	23	23	17	120	60	16.9	18.4	----	2	175.6
13007	25	26	16	120	58	16.8	16.7	----	3	106.1
13176	29	30	16	90	61	15.3	----	----	1	-----
12804	23	25	15	110	60	14.6	16.4	19.5	4	115.9
11673	22	24	17	100	60	14.2	16.4	17.4	18	116.1
13021	26	25	14	120	57	12.1	16.9	----	2	161.2
13022	19	21	15	120	59	11.9	12.9	----	2	123.4
1442	29	31	17	100	61	10.5	10.5	16.8	18	100.0

Standard error of a difference = 2.50 bushels.

Bushland, Texas
Three plots, irrigated

C.I. No.	Date		Plant height	Weight per bushel	Av. Acre yield			No. years grown	Percent of Kharkof
	Headed	Ripe			1956	1955-1956	1953-1956		
	May	June	Ins.	Lbs.	Bus.	Bus.	Bus.		
12517	11	16	29	59.5	51.2	41.3	32.7	8	112.7
13023	9	16	30	62.0	51.2	38.7	----	2	109.3
13017	13	18	28	59.0	49.4	37.9	----	2	107.1
11673	11	16	28	59.5	45.8	37.8	28.2	18	106.9
13176	12	17	28	60.5	45.6	----	----	1	-----
13007	11	17	27	58.0	45.5	39.3	----	3	114.6
13112	12	17	27	56.5	45.1	35.6	----	2	100.4
11669	12	17	29	57.5	44.6	30.7	26.4	18	109.5
13022	10	17	29	59.0	44.5	34.2	----	2	96.6
6251	13	18	30	60.0	44.5	37.8	27.2	18	108.7
12702	9	16	32	60.0	43.3	36.4	29.4	7	82.0
13019	12	18	29	58.0	43.0	31.5	----	2	89.0
13021	13	18	26	58.0	42.5	33.1	----	2	93.5
13018	11	17	28	58.5	42.5	31.8	----	2	89.7
12804	10	16	28	59.0	42.2	34.5	28.0	4	102.8
12871	8	15	29	61.0	41.4	33.1	28.0	4	102.8
13024	10	16	30	59.5	40.6	35.2	----	2	99.3
1442	18	20	29	58.5	39.6	35.4	27.2	18	100.0
12719	11	17	28	59.5	39.6	31.6	----	2	89.3
13015	10	16	29	59.0	36.5	34.0	----	2	95.9
8856	5	14	30	59.5	33.0	30.1	23.3	18	94.5

Standard error of a difference = 3.05 bushels.

Clovis, New Mexico
Three plots

C.I. No.	Date		Plant height	Shattering 1/ index	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
	Headed	Ripe				1956 2/	1955-1956	1953 3/ - 1956		
	May	June	Ins.		Lbs.	Bus.	Bus.	Bus.		
12702	10	12	25	2.7	61.4	21.5	12.7	10.1	4	111.0
11673	10	15	22	3.3	59.6	18.7	11.8	9.4	4	100.0
13007	13	14	22	3.7	57.2	18.5	11.6	----	2	108.5
13021	12	14	21	2.0	57.7	18.5	11.0	----	2	103.3
12517	12	14	21	3.7	60.0	17.6	11.0	10.6	4	114.5
12804	10	16	23	2.7	59.9	17.5	11.6	9.4	3	103.3
13017	13	15	21	4.0	58.3	17.5	12.3	----	2	115.5
6251	12	16	25	1.7	61.0	16.7	9.5	9.0	4	100.3
12871	8	11	22	2.0	62.8	16.6	10.2	9.5	3	103.6
13112	13	14	22	3.3	56.7	16.4	9.9	----	2	93.0
13015	12	14	23	3.0	58.4	15.9	9.3	----	2	86.9
8856	4	9	22	2.0	60.1	15.8	9.4	8.3	4	90.3
13019	11	15	20	2.0	58.6	15.8	9.7	----	2	91.1
13176	14	18	20	2.0	59.8	15.8	----	----	1	-----
13023	10	15	21	2.0	62.3	15.7	10.6	----	2	99.1
13024	11	15	23	2.3	60.2	15.7	9.3	----	2	86.9
12719	11	13	23	2.0	61.3	15.6	10.4	----	2	97.7
1442	16	19	24	3.3	59.0	15.6	10.7	9.1	4	100.0
13022	10	14	24	2.0	59.5	15.6	10.0	----	2	93.9
13018	11	15	21	2.3	59.1	15.3	9.1	----	2	85.9
11669	11	13	22	3.7	57.8	15.2	9.5	9.3	4	102.4

1/ Shattering index on 1-5 scale, 1 best.
2/ Adjusted yields.
3/ Average of three years, no data in 1954.
Standard error of a difference = 1.78 bushels.

Stillwater, Oklahoma
Four plots

C.I. No.	Date		Plant height	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
	Headed	Ripe			1956	1955-1956	1953-1956		
	April	May	Ins.	Lbs.	Bus.	Bus.	Bus.		
12871	24	27	26	61.3	30.6	17.4	19.9	4	132.9
12719	27	28	28	61.2	29.8	19.8	----	2	147.2
13022	26	28	27	59.1	29.2	17.5	----	2	129.7
13018	26	28	26	58.1	28.9	17.3	----	2	128.3
13019	28	28	27	59.4	28.2	17.9	----	2	133.1
13112	30	29	24	58.5	28.1	18.0	----	2	134.2
13024	27	29	27	60.0	28.0	16.0	----	2	119.3
13017	30	6-1	28	60.9	27.8	15.8	----	2	117.5
13023	26	27	23	60.3	27.0	16.8	----	2	124.9
13007	28	28	23	59.3	26.6	17.7	----	3	140.5
13021	5-1	29	25	59.7	26.6	15.4	----	2	114.1
12702	27	28	25	59.7	26.5	17.7	20.4	7	126.3
11669	28	30	25	59.7	26.3	16.8	18.9	20	119.7
13015	27	30	25	59.5	25.9	16.7	----	2	123.8
12517	29	31	29	60.8	25.7	15.6	19.5	8	127.1
11673	29	6-1	27	60.2	25.3	14.8	17.2	18	115.2
6251	5-1	6-2	28	60.9	24.8	15.3	19.4	23	109.3
8856	22	26	27	59.0	23.4	14.7	18.7	23	108.8
12804	28	30	24	60.1	23.2	14.2	17.3	4	115.2
13176	5-3	6-1	27	61.0	22.8	----	----	1	-----
1442	5-3	6-1	27	59.8	22.6	13.5	15.0	23	100.0

Standard error of a difference = 2.24 bushels.

Woodward, Oklahoma
Four plots

C. I. No.	Date		Plant height	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
	Headed	Ripe			1956	1955-1956	1953-1956		
	May	June	Ins.	Lbs.	Bus.	Bus.	Bus.		
13007	5	4	21	59.4	17.9	22.2	----	3	107.3
13017	6	4	22	60.0	17.2	20.8	----	2	101.0
12871	2	2	22	62.9	17.0	20.3	19.3	4	109.5
12719	4	3	24	62.5	16.9	20.4	----	2	99.3
12517	5	4	23	60.6	16.5	21.4	20.2	8	123.4
12702	3	2	23	60.6	16.4	20.7	19.6	7	118.6
13112	6	5	21	57.8	16.4	20.9	----	2	101.5
13022	3	2	22	59.8	16.3	20.9	----	2	101.5
1442	9	7	23	59.4	16.3	20.6	17.6	25	100.0
13024	5	4	24	60.2	15.7	20.0	----	2	97.6
11673	4	3	22	60.3	15.7	20.2	18.0	20	113.6
11669	5	4	21	60.0	15.5	20.6	18.0	22	118.2
6251	8	7	23	60.7	15.4	21.9	20.2	25	105.8
8856	4-28	5-30	22	60.8	15.3	17.6	17.2	25	103.5
13018	5	4	22	61.1	15.3	19.6	----	2	95.4
13015	5	4	21	60.0	15.2	20.0	----	2	97.6
13023	5	4	20	61.8	15.1	19.1	----	2	92.9
13019	5	4	22	60.2	14.9	17.5	----	2	84.9
12804	4	3	20	61.0	13.9	19.7	17.5	4	99.7
13176	12	7	20	60.7	13.9	----	----	1	-----
13021	7	6	20	58.3	13.4	20.0	----	2	97.3

Standard error of a difference = 0.99 bushels.

Cherokee, Oklahoma
Four plots

C.I. No.	Plant height	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
			1956	1954-1956	1953 1/-1956		
	Ins.	Lbs.	Bus.	Bus.	Bus.		
12719	28	59.8	21.8	----	----	1	-----
8856	26	59.6	20.9	20.7	24.4	9	109.5
12871	28	59.9	20.7	21.0	24.2	3	127.8
13007	24	55.7	19.9	20.8	----	2	111.5
13017	26	55.3	19.9	----	----	1	-----
13023	25	59.7	19.9	----	----	1	-----
12702	27	58.2	19.5	20.1	21.8	6	120.6
13021	24	55.3	19.4	----	----	1	-----
13022	26	56.7	18.9	----	----	1	-----
13112	25	54.3	18.9	----	----	1	-----
12517	25	57.2	18.7	22.7	23.6	7	137.2
6251	25	58.9	18.4	21.7	22.0	9	104.2
13015	24	56.9	18.2	----	----	1	-----
11669	25	55.3	18.0	20.3	21.1	9	105.5
11673	25	56.8	17.8	20.1	20.8	9	115.5
12804	25	55.9	17.3	20.9	23.1	3	122.2
1442	25	58.2	17.2	18.7	18.9	9	100.0
13024	25	57.3	16.7	----	----	1	-----
13018	25	54.9	16.4	----	----	1	-----
13019	25	54.5	15.9	----	----	1	-----
13176	23	59.0	15.6	----	----	1	-----

1/ Average of three years, no data in 1955.
Standard error of a difference = 0.76 bushels.

Manhattan, Kansas
Four plots

C.I. No.	Date headed	Plant height	Bunt	Loose smut	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
						1956	1955-1956	1953-1956		
	May	Ins.	%		Lbs.	Bus.	Bus.	Bus.		
6251	19	22	55	0	61.0	23.9	28.7	31.6	25	113.4
12719	16	21	75	1	61.5	23.6	30.6	----	2	110.3
13017	19	19	25	0	59.5	22.7	28.9	----	2	104.2
12871	16	19	2	1	62.0	20.8	28.1	32.2	4	107.4
12804	15	19	60	1	58.0	20.6	27.2	31.0	4	103.4
12517	17	19	6	T	60.0	20.4	29.2	34.7	8	121.9
13019	18	18	70	T	60.0	20.0	25.1	----	2	90.6
12702	18	20	80	0	60.0	19.9	23.9	31.5	7	113.1
13007	17	17	70	0	57.5	19.9	23.7	----	3	99.1
13018	17	18	70	0	60.0	19.9	27.8	----	2	100.4
11673	19	18	2	2	59.5	19.8	27.8	31.7	20	108.5
13112	17	18	18	0	58.0	19.7	26.3	----	2	94.9
13015	15	17	1	T	58.5	19.6	24.2	----	2	87.2
13176	21	18	60	T	60.0	19.6	----	----	1	-----
11669	17	19	20	0	59.0	19.4	25.9	31.5	22	125.4
13021	17	17	2	0	57.5	19.1	28.2	----	2	101.8
13024	17	19	15	T	60.5	18.8	27.8	----	2	100.2
1442	21	18	70	T	59.5	18.6	27.7	30.0	25	100.0
8856	14	19	85	T	60.5	18.5	27.7	30.8	25	114.5
13022	17	18	80	0	58.5	17.5	25.6	----	2	92.2
13023	15	18	90	T	61.0	16.9	24.4	----	2	88.1

Bunt readings by E. D. Hansing using local composite of inoculum.
Standard error of a difference = not significant.

Hays, Kansas
Four plots 1/

C.I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield		No. years grown	Percent of Kharkof
				1956	1953/ 2/ 1956		
	May	Ins.	Lbs.	Bus.	Bus.		
13022	19	27	61.5	36.8	----	1	-----
11673	19	28	61.0	36.1	23.6	18	123.4
1442	23	29	60.3	35.4	22.3	22	100.0
12719	19	30	63.8	35.2	----	1	-----
13023	18	27	63.3	34.1	----	1	-----
13176	21	28	61.3	33.3	----	1	-----
13007	19	26	60.8	32.6	----	1	-----
12702	18	29	62.8	32.4	21.0	5	119.5
12517	19	27	61.5	31.9	21.3	6	132.7
13017	21	29	61.0	31.7	----	1	-----
8856	16	27	62.5	31.7	21.3	22	114.0
12804	18	27	61.5	31.5	20.7	2	92.6
12871	18	27	63.3	31.2	21.5	2	96.2
6251	20	28	62.8	30.9	21.8	22	111.4
13021	20	26	60.3	30.2	----	1	-----
11669	19	27	60.3	30.2	21.2	19	126.2
13015	18	26	62.0	29.6	----	1	-----
13019	18	27	61.3	29.0	----	1	-----
13112	20	26	60.8	28.0	----	1	-----
13024	18	27	61.8	25.3	----	1	-----
13018	18	29	60.3	21.5	----	1	-----

1/ Two replications given pre-planting irrigation.
2/ No yield data in 1954 and 1955.
Standard error of a difference = not significant.

Garden City, Kansas
Four plots

C.I. No.	Date		Plant height	Spring survival	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
	Headed	Ripe				1956	1955-1956	1954-1956		
	May	June	Ins.	%	Lbs.	Bus.	Bus.	Bus.		
12702	15	14	20	81	62.0	13.2	26.5	21.4	3	105.6
12871	16	14	18	86	63.0	11.2	25.1	20.2	3	99.8
11669	17	15	18	86	59.0	10.6	23.6	19.5	3	96.4
6251	19	16	21	89	60.5	10.3	24.4	19.0	3	93.9
13007	18	16	17	72	59.0	9.2	25.7	21.6	3	106.9
1442	22	19	18	90	58.5	9.2	23.9	20.2	3	100.0
13024	17	15	19	92	60.5	9.1	25.7	----	2	107.5
11673	18	16	17	86	60.0	9.1	25.7	21.5	3	106.3
8856	12	12	18	85	61.5	9.0	25.4	19.4	3	95.9
13112	18	15	16	89	57.0	8.7	25.6	----	2	107.3
13017	20	17	17	80	59.0	8.6	24.1	----	2	101.0
12517	17	15	17	80	61.0	8.4	27.2	22.8	3	112.5
13022	15	14	18	86	60.5	8.4	29.4	----	2	123.3
13021	20	18	17	80	58.0	8.2	28.9	----	2	121.4
13015	18	15	16	81	59.5	8.1	23.3	----	2	97.7
13023	15	14	16	72	62.0	7.3	25.6	----	2	107.3
13019	20	18	17	70	59.0	7.1	22.6	----	2	94.5
12804	17	16	15	81	59.0	7.0	24.0	20.0	3	98.7
12719	16	15	18	85	61.5	6.6	23.4	----	2	97.9
13018	20	18	16	64	59.0	6.4	20.6	----	2	86.4
13176	20	19	16	75	59.0	5.8	----	----	1	-----

Standard error of a difference = not significant.

Hesperus, Colorado

Five plots

C.I. No	Date		Plant height	Weight per bushel	Av. Acre yield			No. years grown	Percent of Kharkof
	Headed	Ripe			1956	1955-1956	1953-1/ 1956		
	June	July	Ins.	Lbs.	Bus.	Bus.	Bus.		
13007	11	8-1	46	62.4	101.7	68.7	----	2	125.8
11673	11	29	44	62.8	98.4	69.4	57.2	16	121.8
13176	13	29	46	63.9	94.4	----	----	1	-----
12871	9	30	45	64.1	93.2	65.8	57.3	3	125.2
12417	8	22	44	63.4	87.9	65.3	53.3	6	112.5
13022	8	22	42	62.6	85.4	58.8	----	2	107.7
13015	8	23	42	62.5	84.6	59.4	----	2	108.9
13019	10	27	43	62.8	84.4	60.6	----	2	111.0
13024	8	24	44	62.5	82.2	59.1	----	2	108.3
13021	12	23	40	61.6	80.6	57.7	----	2	105.8
13018	8	25	42	62.0	80.1	60.1	----	2	110.1
13023	5	24	40	64.0	77.7	56.9	----	2	104.2
13017	11	23	45	62.7	77.6	56.0	----	2	102.6
12702	6	23	47	63.9	76.6	59.0	50.5	5	110.1
8856	5	25	45	62.2	75.5	57.4	49.0	16	104.3
6251	7	21	45	62.6	74.4	55.8	45.8	16	112.7
11669	8	25	43	61.8	72.1	54.7	46.6	16	108.0
13112	12	25	42	61.4	71.3	55.1	----	2	100.9
12719	6	22	45	63.8	71.1	53.5	----	2	98.1
1442	19	8-1	44	62.9	69.8	54.6	45.8	16	100.0
12804	6	20	40	62.3	68.2	53.4	47.0	3	102.5

1/ Average of three years. No data in 1954.
Standard error of a difference = not significant.

Lincoln, Nebraska

Five plots, fall irrigated

C. I. No.	Date Headed	Date Ripe	Plant height	Weight per bushel	Av. acre yield 1956	Av. acre yield 1955-1956	Av. acre yield 1953-1956	No. years grown	Percent of Kharkof
	May	June	Ins.	Lbs.	Bus.	Bus.	Bus.		
11669	25	24	25	59.3	41.7	46.2	44.3	22	131.1
13019	26	24	25	59.8	38.9	45.5	----	2	124.7
13007	25	25	23	58.4	37.6	45.2	----	3	134.3
12804	25	24	24	59.1	36.5	45.0	43.1	4	130.3
11673	26	25	25	59.2	36.0	44.4	41.8	20	116.2
6251	26	25	28	61.3	35.9	42.0	40.8	25	110.9
12517	24	24	25	59.9	35.8	44.5	45.9	8	127.9
12871	25	24	24	61.8	35.1	45.3	45.8	4	138.3
13015	25	24	23	58.8	34.6	44.0	----	2	120.6
13017	27	25	25	59.5	33.8	40.6	----	2	111.2
13112	27	25	22	58.0	33.6	42.7	----	2	117.1
12702	24	23	27	60.4	33.4	42.3	43.1	7	120.2
12719	24	23	25	61.6	33.3	41.6	----	2	114.3
13022	25	24	25	58.2	33.2	48.6	----	2	133.5
13018	26	24	24	59.5	31.8	41.6	----	2	114.1
1442	29	26	25	58.0	31.8	36.4	33.1	25	100.0
13021	26	24	21	57.0	31.0	39.2	----	2	107.4
8856	21	23	24	60.8	29.8	41.3	42.8	25	121.9
13023	24	23	23	60.4	29.8	45.5	----	2	124.8
13024	25	24	24	59.5	29.5	39.7	----	2	108.9
13176	29	26	23	51.3	27.8	----	----	1	-----

Standard error of a difference = 3.36 bushels.

North Platte, Nebraska
Three plots

C.I. No.	Date		Plant height	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
	Headed	Ripe			1956	1955-1956	1953-1956		
	June	July	Ins.	Lbs.	Bus.	Bus.	Bus.		
12719	5-31	1	31	61.5	26.9	24.4	----	2	74.9
13017	3	2	28	59.1	25.2	29.2	----	2	89.7
6251	3	1	30	61.5	25.0	28.2	25.3	19	95.3
11669	2	1	28	57.0	24.6	26.4	27.8	18	116.9
12517	2	1	28	57.8	23.7	29.0	28.8	8	113.5
13007	2	2	26	56.2	23.4	23.7	----	3	80.3
13022	1	1	28	54.0	23.2	25.8	----	2	79.2
12702	2	2	29	60.1	22.9	23.9	25.5	7	90.5
13024	3	2	28	58.0	22.5	31.0	----	2	95.4
13018	5	4	27	60.5	22.4	22.1	----	2	68.0
12871	3	2	29	61.6	22.0	24.3	26.1	4	92.0
12804	2	2	27	58.8	21.9	25.4	26.0	4	91.7
11673	4	2	27	58.3	21.6	27.4	26.6	16	108.4
1442	7	6	28	60.6	21.5	32.5	28.4	19	100.0
13023	5	4	27	63.0	20.9	25.3	----	2	77.7
13019	5	5	26	60.5	20.9	21.3	----	2	65.4
13112	3	1	27	54.9	20.7	25.6	----	2	78.8
13021	3	2	24	55.3	20.5	25.6	----	2	78.6
13015	1	1	25	56.8	20.4	21.6	----	2	66.5
8856	5-30	6-30	30	60.4	19.8	23.4	21.9	19	94.8
13176	7	5	26	62.2	19.2	----	----	1	----

Standard error of a difference = not significant.

Alliance, Nebraska
Three plots

C.I. No.	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
		1956	1955-1956	1950 1/ 1956		
	Lbs.	Bus.	Bus.			
13015	60.8	29.3	28.2	----	2	121.3
12804	59.7	27.1	29.1	----	2	125.4
13017	59.5	26.8	27.6	----	2	119.0
13007	59.3	26.2	27.0	----	2	116.4
13021	59.5	26.1	26.0	----	2	112.3
12719	62.8	26.1	26.6	----	2	114.7
12517	60.2	26.0	27.3	22.8	6	113.5
12871	63.1	25.9	25.2	----	2	108.4
13022	59.5	25.8	26.4	----	2	114.0
11673	59.5	25.8	24.0	20.4	16	98.0
12702	61.2	24.9	27.0	21.1	5	98.8
8856	62.0	24.9	24.0	19.2	19	89.4
13018	60.0	24.8	24.8	----	2	106.7
13024	60.0	24.8	25.0	----	2	107.7
13112	58.1	24.8	30.2	----	2	130.0
6251	61.4	24.6	25.0	20.3	19	95.1
13019	60.2	24.0	24.8	----	2	106.7
11669	59.1	23.2	23.8	21.2	16	101.8
1442	60.0	22.2	23.2	21.4	19	100.0
13023	62.2	21.8	22.7	----	2	97.6
13176	60.1	19.3	----	----	1	-----

1/ Average of five years, no data in 1953 and 1954.
Standard error of a difference = 3.69 bushels.

Ames, Iowa
Three plots

C.I. No.	Date		Plant height	Weight per bushel	Av. acre yield			No. years grown	Percent of Kharkof
	Headed	Ripe			1956	1955-1956	1954-1956		
	May	June	Ins.	Lbs.	Bus.	Bus.	Bus.		
12517	25	26	28	62.4	46.0	49.0	42.0	6	141.8
12719	26	26	28	63.4	41.2	52.8	----	2	146.5
13019	29	26	27	61.2	40.4	49.6	----	2	137.8
13018	29	25	25	61.5	38.9	47.4	----	2	131.5
13017	30	27	26	62.1	38.2	38.5	----	2	106.9
13024	27	25	25	61.5	37.7	44.6	----	2	123.9
11673	28	25	26	61.2	37.7	39.3	31.7	14	106.7
13023	28	25	24	62.5	37.4	47.2	----	2	131.0
6251	30	27	28	62.2	37.0	41.8	31.9	14	104.1
13007	28	25	23	62.1	36.4	45.8	36.2	3	135.1
1442	6-2	28	31	60.7	36.3	36.0	26.8	14	100.0
13022	28	25	24	62.1	36.2	42.9	----	2	119.0
13015	27	24	25	62.1	36.1	42.4	----	2	117.8
8856	25	26	26	62.4	34.9	43.7	36.1	14	110.9
12871	30	24	25	63.2	34.8	48.0	39.4	3	147.1
12702	28	25	26	62.9	34.7	40.0	35.8	5	136.5
12804	29	25	25	61.9	34.4	44.5	37.8	3	141.2
11669	28	24	25	61.9	33.9	41.6	33.0	14	119.3
13021	6-1	26	23	61.0	33.7	37.5	----	2	104.2
13176	6-2	28	25	59.8	33.4	----	----	1	-----

Uniform yield nursery entry C.I. 13112 missing from table.
Standard error of a difference = 2.80 bushels.

STANDARD ERRORS

Standard errors, number of plots, and number of varieties grown at each reporting station are summarized in table 14. Methods of computing the various error terms are described in connection with the plot tests.

SUMMARY OF NURSERY YIELDS

Yields of grain for varieties in the uniform yield nursery at the 15 reporting stations have been assembled in table 15. Varieties are listed in decreasing order of their 15-station average yields. State yield averages also were calculated and varieties ranked according to state performance. Finally, 14-station yield averages with Hesperus, Colorado, omitted, were calculated and varietal rank on a 14-station basis established. These latter are reported in the extreme right-hand columns of table 15. Omission of the Hesperus data was prompted by the very high yields, the wide but non-significant varietal yield differences, and by the fact that Hesperus growing conditions are not representative of the main hard red winter wheat region. Comparison of average varietal performance at 14 stations is probably more valid for evaluation of general adaptation than the 15-station average which includes Hesperus. However, the latter station does provide information about the yield potential of varieties when grown under more nearly optimum conditions than generally exist in the main winter wheat region.

Only 4.3 bushels per acre separated the varieties with the high and low 15-station average yields in 1956. The spread in average yields omitting Hesperus was even less, being 2.3 bushels per acre. C. I. 13007, Concho, C. I. 12871, and Comanche in that order had the highest 15-station average yields, all with 29.0 bushels or higher. However, omission of Hesperus from the averages gave Concho the highest regional rank followed closely by KanKing, C. I. 13017, C. I. 12871, and Crockett. The most productive varieties on a regional basis with very few exceptions were those with the most consistent performance. Examples of this are Concho, C. I. 12871, and C. I. 13007 which ranked no lower in any state than twelfth, with exception of the fifteenth rank of C. I. 12871 in Iowa. The rank of Comanche, likewise, was in the upper 11 in all states except in Oklahoma. KanKing was outstanding in Oklahoma, Kansas, Iowa, and Nebraska where it ranked first, first, second, and third, respectively. Crockett, on the other hand, had its best performance in Texas, New Mexico, Oklahoma, and Kansas.

Two-year average yields are summarized in table 16. Both 13- and 12-station (Hesperus omitted) average yields are reported. Concho with a 2-year yield rank no lower than ninth in any state ranked first on a regional basis, thereby continuing to demonstrate its wide area of adaptation in the hard red winter wheat region. C. I. 13007 with the second high 13-station and fifth high 12-station yield also has high state ranks except in Kansas. The 2-year performance of Crockett has been excellent in the southern district but only fair in the central district. An even more restricted area of adaptation for C. I. 13023 is suggested by its superior 2-year performance in Texas and mediocre rank elsewhere.

SUMMARY OF AGRONOMIC DATA

Agronomic data other than yield for entries in the uniform yield nursery are summarized in table 17. Varieties are listed in declining order of bushel weight. Eight varieties produced grain that averaged 60 pounds or more in bushel weight. Early maturing C. I. 12871 exhibited exceptionally high test weight with a 15-station average of 62.3 pounds. KanKing and C. I. 13023 averaged 61.8 pounds. Other varieties exceeding 60 pounds included Blackhull, Crockett, Early Blackhull, Concho, and C. I. 13024. Two stations reported bunt infection. C. I. 13015, C. I. 13021, C. I. 12871, and Comanche, all with average readings of 3 percent or less, showed excellent resistance.

Table 14. Number of plots, average yields, and standard errors for the uniform yield nursery at the reporting stations in 1956.

State and Station	No. of plots	No. of vars.	Average yield all varieties	Standard error of a		Coefficient of variability
				Difference in means	Mean	
			Bus.	Bus.	Bus.	%
TEXAS						
Denton	4	21	12.6	1.70	1.20	19.2
Chilicothe	4	21	17.2	2.50	1.76	20.5
Bushland	3	21	43.4	3.05	2.16	8.6
NEW MEXICO						
Clovis	3	25 1/	16.9	1.78	1.26	12.9
OKLAHOMA						
Stillwater	4	21	26.5	2.24	1.58	11.9
Woodward	4	21	15.7	0.99	0.70	8.9
Cherokee	4	21	18.6	0.76	0.54	5.8
KANSAS						
Manhattan	4	21	20.3	N.S.	1.51	14.9
Hays	4	21	31.4	N.S.	3.10	19.8
Garden City	4	21	8.7	N.S.	1.37	31.7
COLORADO						
Hesperus	5	21	81.3	N.S.	7.78	21.4
NEBRASKA						
Lincoln	5	21	33.9	3.36	2.38	15.7
North Platte	3	21	22.4	N.S.	1.96	15.1
Alliance	3	40 1/	24.1	3.69	2.61	18.8
IOWA						
Ames	3	36 1/	37.0	2.80	1.98	9.3

1/ Uniform yield nursery grown as part of a larger nursery.
N.S. - non-significant at the 5% level.

Table 15. Summary of average yields in bushels per acre made by the 21 entries grown in the uniform yield nursery at 15 stations in 1956, with state averages.

Variety	C. I. No.	Texas					New Mexico		Oklahoma					Kansas					Colorado		Nebraska					
		Denton	Chillicothe	Bushland	Average	Rank	Clovis	Rank	Stillwater	Woodward	Cherokee	Average	Rank	Manhattan	Hays	Garden City	Average	Rank	Hesperus	Rank	Lincoln	North Platte	Alliance	Average	Rank	A
Pawnee x Cheyenne	13007	9.7	16.8	45.5	24.0	12	18.5	3	26.6	17.9	19.9	21.5	4	19.9	32.6	9.2	20.6	9	101.7	1	37.6	23.4	26.2	29.1	2	36
Concho	12517	13.8	17.4	51.2	27.5	2	17.6	5	25.7	16.5	18.7	20.3	9	20.4	31.9	8.4	20.2	10	87.9	5	35.8	23.7	26.0	28.5	5	46
Ea. Blk.-Tq. x Oro-Med.-Hope	12871	15.7	21.6	41.4	26.2	4	16.6	9	30.6	17.0	20.7	22.8	1	20.8	31.2	11.2	21.1	5	93.2	4	35.1	22.0	25.9	27.7	11	34
Comanche	11673	12.3	14.2	45.8	24.1	11	18.7	2	25.3	15.7	17.8	19.6	17	19.8	36.1	9.1	21.7	3	98.4	2	36.0	21.6	25.8	27.8	10	37
Pawnee x Cheyenne	13017	12.4	17.1	49.4	26.3	3	17.5	6	27.8	17.2	19.9	21.6	3	22.7	31.7	8.6	21.0	7	77.6	13	33.8	25.2	26.8	28.6	4	38
KanKing	12719	15.7	19.6	39.6	25.0	8	15.6	17	29.8	16.9	21.8	22.8	1	23.6	35.2	6.6	21.8	1	71.1	19	33.3	26.9	26.1	28.8	3	41
Crockett	12702	13.3	22.1	43.3	26.2	4	21.5	1	26.5	16.4	19.5	20.8	7	19.9	32.4	13.2	21.8	1	76.6	14	33.4	22.9	24.9	27.1	13	34
Cim. x Hope-Chey.	13022	14.1	11.9	44.5	23.5	16	15.6	17	29.2	16.3	18.9	21.5	4	17.5	36.8	8.4	20.9	8	85.4	6	33.2	23.2	25.8	27.4	12	36
Blackhull	6251	15.9	17.2	44.5	25.9	6	16.7	8	24.8	15.4	18.4	19.5	18	23.9	30.9	10.3	21.7	3	74.4	16	35.9	25.0	24.6	28.5	5	37
Ponca x Cheyenne	13019	12.1	17.0	43.0	24.0	12	15.8	12	28.2	14.9	15.9	19.7	16	20.0	29.0	7.1	18.7	19	84.4	8	38.9	20.9	24.0	27.9	9	40
Kan.-H. Fed.-Tq.-Med.-Hope x Cim.	13023	13.2	21.7	51.2	28.7	1	15.7	15	27.0	15.1	19.9	20.7	8	16.9	34.1	7.3	19.4	15	77.7	12	29.8	20.9	21.8	24.2	20	37
Pawnee	11669	13.3	19.7	44.6	25.9	6	15.2	21	26.3	15.5	18.0	19.9	12	19.4	30.2	10.6	20.1	11	72.1	17	41.7	24.6	23.2	29.8	1	33
Pawnee x Nebred	13015	9.9	17.9	36.5	21.4	20	15.9	11	25.9	15.2	18.2	19.8	14	19.6	29.6	8.1	19.1	17	84.6	7	34.6	20.4	29.3	28.1	8	36
Cim.-Hope-Chey. x Com.	13024	13.0	19.0	40.6	24.2	10	15.7	15	28.0	15.7	16.7	20.1	11	18.8	25.3	9.1	17.7	20	82.2	9	29.5	22.5	24.8	25.6	17	37
Mqo.-Oro x Wichita	13176	10.7	15.3	45.6	23.9	14	15.8	12	22.8	13.9	15.6	17.4	21	19.6	33.3	5.8	19.6	14	94.4	3	27.8	19.2	19.3	22.1	21	33
Ponca x Cheyenne	13018	12.0	16.9	42.5	23.8	15	15.3	20	28.9	15.3	16.4	20.2	10	19.9	21.5	6.4	15.9	21	80.1	11	31.8	22.4	24.8	26.3	15	38
Pawnee x Nebred	13021	11.3	12.1	42.5	22.0	19	18.5	3	26.6	13.4	19.4	19.8	14	19.1	30.2	8.2	19.2	16	80.6	10	31.0	20.5	26.1	25.9	16	33
Early Blackhull	8856	14.8	21.2	33.0	23.0	17	15.8	12	23.4	15.3	20.9	19.9	12	18.5	31.7	9.0	19.7	12	75.5	15	29.8	19.8	24.9	24.8	19	34
Med.-Hope-Paw. x Oro-Ill. 1-Com. [3]	12804	11.0	14.6	42.2	22.6	18	17.5	6	23.2	13.9	17.3	18.1	20	20.6	31.5	7.0	19.7	12	68.2	21	36.5	21.9	27.1	28.5	5	34
Med.-Hope x Paw.	13112	11.4	17.9	45.1	24.8	9	16.4	10	28.1	16.4	18.9	21.1	6	19.7	28.0	8.7	18.8	18	71.3	18	33.6	20.7	24.8	26.4	14	--
Kharkof	1442	10.8	10.5	39.6	20.3	21	15.6	17	22.6	16.3	17.2	18.7	19	18.6	35.4	9.2	21.1	5	69.8	20	31.8	21.5	22.2	25.2	18	36

1/ 14 station average. Comparable average for Concho = 28.2 bushels and for Kharkof = 24.4 bushels.
2/ Hesperus, Colorado yields omitted.

Table 16. Summary of two-year average yields in bushels per acre for 20 varieties grown in the uniform yield nursery at 13 stations in 1955 and 1956, with state averages.

Variety	C. I. No.	Texas					New Mexico		Oklahoma					Kansas			Colorado			Nebraska					Iowa	
		Denton	Chillicothe	Bushland	Average	Rank	Clovis	Rank	Stillwater	Woodward	Average	Rank	Manhattan	Garden City	Average	Rank	Hesperus	Rank	Lincoln	North Platte	Alliance	Average	Rank	Ames	R
Concho	12517	12.4	17.5	41.3	23.7	2	11.0	6	15.6	21.4	18.5	9	29.2	27.2	28.2	2	65.3	4	44.5	29.0	27.3	33.6	1	49.0	
Pawnee x Cheyenne	13007	9.1	16.7	39.3	21.7	7	11.6	4	17.7	22.2	20.0	2	23.7	25.7	24.7	17	68.7	2	45.2	23.7	27.0	32.0	7	45.8	
Ea. Blk.-Tq. x Oro-Med.-Hope	12871	12.9	19.7	33.1	21.9	6	10.2	11	17.4	20.3	18.9	6	28.1	25.1	26.6	7	65.8	3	45.3	24.3	25.2	31.6	11	48.0	
Comanche	11673	9.7	16.4	37.8	21.3	8	11.8	3	14.8	20.2	17.5	17	27.8	25.7	26.8	5	69.4	1	44.4	27.4	24.0	31.9	8	39.3	1
KanKing	12719	12.4	19.1	31.6	21.0	10	10.4	10	19.8	20.4	20.1	1	30.6	23.4	27.0	4	53.5	19	41.6	24.4	26.6	30.9	15	52.8	
Kan.-H. Fed.-Tq.-Med.-Hope x Cim.	13023	12.4	20.9	38.7	24.0	1	10.6	9	16.8	19.1	18.0	13	24.4	25.6	25.0	15	56.9	13	45.5	25.3	22.7	31.2	13	47.2	
Cim. x Hope-Chey.	13022	10.9	12.9	34.2	19.3	19	10.0	12	17.5	20.9	19.2	4	25.6	29.4	27.5	3	58.8	10	48.6	25.8	26.4	33.6	1	42.9	1
Crockett	12702	11.8	20.6	36.4	22.9	3	12.7	1	17.7	20.7	19.2	4	23.9	26.5	25.2	14	59.0	9	42.3	23.9	27.0	31.1	14	40.0	1
Pawnee x Cheyenne	13017	10.0	18.2	37.9	22.0	5	12.3	2	15.8	20.8	18.3	12	28.9	24.1	26.5	10	56.0	14	40.6	29.2	27.6	32.5	5	38.5	1
Cim.-Hope-Chey. x Com.	13024	9.7	17.5	35.2	20.8	11	9.3	18	16.0	20.0	18.0	13	27.8	25.7	26.8	5	59.1	8	39.7	31.0	25.0	31.9	8	44.6	
Blackhull	6251	13.6	15.1	37.8	22.2	4	9.5	15	15.3	21.9	18.6	8	28.7	24.4	26.6	8	55.8	15	42.0	28.2	25.0	31.7	10	41.8	1
Med.-Hope-Paw. x Oro-Ill. 1-Com.	12804	10.2	16.4	34.5	20.4	13	11.6	4	14.2	19.7	17.0	19	27.2	24.0	25.6	13	53.4	20	45.0	25.4	29.1	33.2	3	44.5	
Ponca x Cheyenne	13019	10.2	17.3	31.5	19.7	18	9.7	14	17.9	17.5	17.7	15	25.1	22.6	23.9	19	60.6	5	45.5	21.3	24.8	30.5	17	49.6	
do	13018	11.0	18.4	31.8	20.4	13	9.1	20	17.3	19.6	18.5	9	27.8	20.6	24.2	18	60.1	6	41.6	22.1	24.8	29.5	20	47.4	
Pawnee	11669	11.2	20.6	30.7	20.8	11	9.5	15	16.8	20.6	18.7	7	25.9	23.6	24.8	16	54.7	17	46.2	26.4	23.8	32.1	6	41.6	1
Pawnee x Nebred	13021	11.1	16.9	33.1	20.4	13	1.0	6	15.4	20.0	17.7	15	28.2	28.9	28.6	1	57.7	11	39.2	25.6	26.0	30.3	18	37.5	1
do	13015	9.6	17.0	34.0	20.2	16	9.3	18	16.7	20.0	18.4	11	24.2	23.3	23.8	20	59.4	7	44.0	21.6	28.2	31.3	12	42.4	1
Med.-Hope x Paw.[3]	13112	11.6	16.7	35.6	21.3	8	9.9	13	18.0	20.9	19.5	3	26.3	25.6	26.0	11	55.1	16	42.7	25.6	30.2	32.8	4	----	--
Early Blackhull	8856	11.6	17.9	30.1	19.9	17	9.4	17	14.7	17.6	16.2	20	27.7	25.4	26.6	8	57.4	12	41.3	23.4	24.0	29.6	19	43.7	1
Kharkof	1442	10.3	10.5	35.4	18.7	20	10.7	8	13.5	20.6	17.1	18	27.7	23.9	25.8	12	54.6	18	36.4	32.5	23.2	30.7	16	36.0	1

1/ 12 station average. Comparable average for Concho = 28.5 bushels and for Kharkof = 24.9 bushels.
2/ Hesperus, Colorado yields omitted.

Table 17. Summary of agronomic data other than yield for varieties grown in the uniform yield nursery in 1956.

Variety	C. I. No.	Date Headed	Date Ripe	Plant height	Bunt	Weight per bushel
		May	June	Ins.	%	Lbs.
Number of stations - - - - - -		13	11	14	2	15
Ea. Blk. -Tq. x Oro-Med. -Hope	12871	14	16	25	2	62.3
Kanking	12719	15	18	27	73	61.8
Kan. -H.Fed.-Tq.-Med.-Hope x Cim.	13023	15	16	24	70	61.8
Blackhull	6251	17	18	27	63	61.1
Crockett	12702	15	16	27	45	60.9
Early Blackhull	8856	11	14	26	45	60.8
Concho	12517	16	17	25	28	60.2
Cim. -Hope - Chey. x Com.	13024	16	17	25	28	60.0
Mqo. -Oro x Wichita	13716	20	20	24	45	59.8
Comanche	11673	16	18	25	3	59.7
Kharkof	1442	20	21	26	45	59.7
Med. -Hope-Paw. x Oro-Ill. 1-Com.	12804	15	17	24	35	59.6
Pawnee x Cheyenne	13017	18	18	25	20	59.6
Ponca x Cheyenne	13018	16	17	24	40	59.5
do	13019	17	18	25	38	59.4
Pawnee x Nebred	13015	16	16	24	1	59.4
Cim. x Hope - Chey.	13022	15	16	25	55	59.3
Pawnee x Cheyenne	13007	16	18	24	65	58.8
Pawnee	11669	16	17	25	15	58.8
Pawnee x Nebred	13021	18	18	23	2	58.3
Med. -Hope x Paw. 3 1/	13112	16	17	24	10	57.5

1/ Average of one less than the number of stations indicated except for bunt infection.

UNIFORM WINTERHARDINESS NURSERY

A limited number of varieties are evaluated each year in a uniform winterhardiness nursery grown at stations in the northern part of the region. Data were reported this year from Laramie, Archer, and Wheatland in Wyoming, Alliance, Ames, St. Paul, Brookings, Dickinson, and Lethbridge, Alberta. Nurseries at Sheridan, Wyoming, and Havre, Montana, did not survive the winter and at Dickinson, North Dakota, the nursery was abandoned in the spring due to heavy winterkilling. Replicated rod-row plots were grown at all stations except St. Paul where only observation rows were seeded. Fifteen varieties were evaluated this year.

Differential winter survival reported from 5 stations is summarized in table 18. On the average, none of the experimental strains in the nursery, except C. I. 12806, survived as well as Kharkof M. C. 22, Yogo, Minter, and Minturki. The Nebraska selections C. I. 13015 and C. I. 12711 and C. I. 13115 from Minnesota appear to possess about the same level of hardiness as Nebred and Kharkof on the basis of the 1956 results. None are the equal of Yogo and Minter. The Montana selections, C. I. 13180 and C. I. 13181, also appear to lack the level of hardiness adequate for production in that state. Both survived less than 40 percent as compared with 73 and 68 percent for Yogo and Minter, respectively.

Yields of grain were reported from 7 stations. Yield data are assembled in table 19. Winterkilling did not occur at 4 of the stations reporting yields. Seven varieties made average yields of 32 to 34 bushels with the remainder making less than 30 but more than 21 bushels. Nebred had slightly the highest average yield followed by Minturki, C. I. 13115, and C. I. 12711 in that order. Yogo x Rescue, C. I. 13180, was the least productive variety making a 7-station average yield of 21.7 bushels.

Entries in the uniform winterhardiness nursery made very high bushel weights at Lethbridge. Several varieties weighed 64.5 pounds per bushel and none weighed less than 60 pounds. These and weights reported from six other stations are assembled in table 20. Bushel weights ranged downward from 60 pounds to 45 and 55 pounds at Brookings and Wheatland, respectively. Five varieties had 7-station averages of 60 pounds or higher. Low average test weights of 55.8 and 55.3 pounds were made by Kharkof M. C. 22 and C. I. 13181, respectively.

Heading and maturity data are summarized in table 21. Four stations reported date of heading and only 2 reported date ripe. The Nebraska entries C. I. 13015, C. I. 12711, C. I. 13182, and C. I. 13183 were the earliest varieties to head and ripen on the average and C. I. 12806 was the latest. These same Nebraska varieties were the shortest growing in 1956 and C.I. 12806 the tallest (table 22). Brookings was the only station reporting leaf rust. Level of infection ranged from 5 to 40 percent. Stem rust readings were obtained at Brookings and St. Paul. Fairly high infections occurred at both places. None of the varieties in the nursery were resistant. C. I. 13115, C. I. 13183, C. I. 13182, and Minter with readings of 40 to 43 percent had the losest 2-station averages. Scab also was prevalent at Brookings. Kharkof M. C. 22, Minturki, and the Yogo x Rescue selections C. I. 13180 and C. I. 13181 were rated best among the uniform winterhardiness nursery entries.

Table 18. Winter survivals recorded for entries in the uniform winter hardiness nursery in 1956.

Variety	C. I. or Sel. No.	Winter survival at ----					5-station average
		Brookings	St. Paul	Dickinson	Archer	Lethbridge	
		%	%	%	%	%	%
Kharkof M.C. 22	6938	70	80	50	100	78	76
Yogo	8033	60	82	67	89	67	73
Minturki x Timo.-Vulg. [2]	12806	62	65	52	100	73	70
Minter	12138	55	70	68	89	60	68
Minturki	6155	58	67	52	100	58	67
Chey.-Chfk. x H44-Mint. [2]	13115	37	73	62	72	42	57
Pawnee x Nebred	13015	48	63	43	100	27	56
Turkey x Cheyenne	12711	37	67	57	100	13	55
Nebred	10094	43	85	27	82	26	53
Kharkof	1442	40	75	32	80	18	49
Hope-Tk. x Chey. (N494951)	13182	6	82	55	83	2	46
Yogo x Rescue (Mont.56-28)	13181	4	62	35	74	14	38
Hope x Chey. [2] (N451406)	13184	20	52	43	68	3	37
Yogo x Rescue (Mont.66-22)	13180	13	55	13	78	2	32
Chey. x Hope-Tk. (N494738)	13183	12	43	50	35	1	28

Table 19. Yields of grain recorded for entries in the uniform winter hardiness nursery in 1956.

Variety	C. I. or Sel. No.	Yield in bushels per acre at -----							7-station average
		Alliance	Ames	Brookings	Laramie	Archer	Wheatland	Lethbridge	
Nebred	10094	22.1	47.0	26.0	52.5	23.3	24.2	41.0	33.7
Minturki	6155	22.5	49.0	24.5	39.1	19.8	20.0	57.4	33.2
Chey.-Chfk. x H44-Mint. [2]	13115	23.4	47.0	31.6	35.4	21.7	23.9	48.2	33.0
Turkey x Cheyenne	12711	26.5	59.0	23.8	42.7	24.8	22.3	31.4	32.9
Minter	12138	21.9	42.7	25.3	44.5	21.5	21.0	52.6	32.8
Yogo	8033	21.1	42.7	21.7	45.6	22.9	20.1	54.5	32.7
Kharkof	1442	22.2	50.1	19.7	49.4	23.8	23.1	37.5	32.3
Hope x Chey. [2] (N. 451406)	13184	23.7	50.9	26.2	38.4	20.4	18.3	20.2	28.3
Pawnee x Nebred	13015	29.3	40.4	19.3	26.9	23.9	24.1	29.9	27.7
Yogo x Rescue (Mont. 56-28)	13181	20.3	45.8	6.6	34.9	23.2	23.8	39.5	27.7
Kharkof M.C. 22	6938	18.7	27.7	12.3	39.5	18.8	19.4	55.4	27.4
Minturki x Timo.-Vulg. [2]	12806	12.8	35.5	14.8	41.1	17.2	7.8	59.6	27.0
Chey. x Hope-Tk. (N. 494738)	13183	25.4	56.3	14.2	43.8	16.1	17.9	9.4	26.2
Hope-Tk. x Chey. (N. 494951)	13182	26.3	47.9	8.3	36.0	24.0	21.1	11.2	25.0
Yogo x Rescue (Mont. 66-22)	13180	17.5	40.1	10.4	32.9	17.6	14.1	19.1	21.7
L. S. D. (.05)	----	7.4	10.3	7.5	12.2	5.4	8.2	16.5	----

Table 20. Bushel weights for entries in the uniform winter hardiness nursery at 7 locations in 1956.

Variety	C. I. or Sel. No.	Weight per bushel in pounds at -----							7-station average
		Alli-ance	Ames	Brook-ings	Lar-amie	Archer	Wheat-land	Leth-* bridge	
Minturki x Timo.-Vulg. [2]	12806	61.5	59.6	56.2	61	60	--	64.5	60.5 1/
Chey.-Chfk. x H44-Mint. [2]	13115	60.0	61.0	59.3	60	59	59	64.0	60.3
Pawnee x Nebred	13015	60.8	61.8	60.0	58	57	60	63.5	60.2
Turkey x Cheyenne	12711	60.8	61.4	57.6	60	59	59	63.0	60.1
Nebred	10094	60.4	61.8	58.6	59	58	58	64.5	60.0
Minter	12138	58.9	59.8	58.9	60	59	58	64.5	59.9
Hope-Tk. x Chey. (N.494951)	13182	60.0	61.4	55.8	60	59	59	63.0	59.7
Yogo x Rescue (Mont. 66-22)	13180	60.0	61.6	57.5	60	57	58	62.0	59.4
Yogo	8033	60.2	58.4	52.1	61	59	58	64.5	59.0
Chey. x Hope-Tk. (N.494738)	13183	59.8	62.0	56.9	57	56	60	61.0	59.0
Minturki	6155	59.5	59.2	56.5	59	56	58	64.0	58.9
Kharkof	1442	60.0	58.7	53.4	60	57	58	63.0	58.6
Hope x Chey. [2] (N.451406)	13184	59.5	60.8	56.0	58	54	57	60.0	57.9
Kharkof M.C. 22	6938	59.2	54.2	45.0	58	56	56	62.0	55.8
Yogo x Rescue (Mont. 56-28)	13181	55.2	57.0	45.2	60	55	55	60.0	55.3

* Imperial bushel weights.
1/ 6-station average.

Table 21. Heading and ripening dates for the entries in the uniform winter hardiness nursery at the various reporting stations in 1956.

Variety	C. I. or Sel. No.	Date headed at -----					Date ripe at -----		
		Ames	Brookings	Laramie	St. Paul	4-station average	Ames	Archer	2-station average
		June	June	June	June	June	June	July	July
Kharkof	1442	4	20	23	19	17	30	23	12
Kharkof M.C. 22	6938	6	21	27	14	17	7-3	23	13
Nebred	10094	1	16	21	16	14	29	23	11
Minturki	6155	4	21	23	12	15	30	23	12
Minter	12138	5	20	24	13	16	7-1	17	9
Yogo	8033	5	23	26	13	17	7-2	17	10
Pawnee x Nebred	13015	5-26	13	16	10	8	27	17	7
Turkey x Cheyenne	12711	5-28	15	20	9	10	28	17	8
Minturki x Timo.-Vulg. [2]	12806	5	28	7-6	16	21	7-3	8-2	18
Chey.-Chfk. x H44-Mint. [2]	13115	4	19	23	13	15	30	23	12
Hope-Tk. x Chey. (N.494951)	13182	5-28	18	18	9	10	27	17	7
Chey. x Hope-Tk. (N.494738)	13183	5-28	17	18	10	10	27	23	10
Hope x Chey. [2] (N. 451406)	13184	5-31	19	21	12	13	29	23	11
Yogo x Rescue (Mont. 66-22)	13180	1	22	21	9	13	30	23	12
Yogo x Rescue (Mont. 56-28)	13181	4	25	22	13	16	7-1	23	12

Table 22. Plant height and disease data recorded for entries in the uniform winter hardiness nursery in 1956.

Variety	C. I. or Sel. No.	Plant height at ------						Leaf rust at Brookings	Stem rust at ----			Scab 1/ at Brookings
		Ames	Brookings	Laramie	Archer	Lethbridge	5-station average		Brookings	St. Paul	2-station average	
		Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	%	%	%	%	
Kharkof	1442	37	32	34	26	38	33	20	80	50	65	2
Kharkof M. C. 22	6938	38	33	39	27	36	35	15	80	60	70	1
Nebred	10094	33	30	31	24	30	30	22	50	70	60	4-
Minturki	6155	40	36	33	26	37	34	25	65	50	58	1
Minter	12138	39	34	34	26	36	34	12	45	40	43	2-
Yogo	8033	41	35	35	25	39	35	40	70	40	55	2-
Pawnee x Nebred	13015	34	26	27	26	27	28	10	55	40	48	6-
Turkey x Cheyenne	12711	34	29	30	26	33	30	5	70	50	60	4-
Minturki^2 x Timo.-Vulg.	12806	37	37	38	25	40	35	8	60	60	60	2
Chey.-Chfk. x H44-Mint.^{2}	13115	39	37	35	28	37	35	8	30	40	35	3/
Hope-Tk. x Chey.^{2} (N.494951)	13182	32	28	30	27	32	30	15	50	35	43	3
Chey. x Hope-Tk. (N. 494738)	13183	31	31	33	26	31	30	10	50	30	40	3
Hope x Chey.^{2} (N. 451406)	13184	38	34	33	26	35	33	18	50	40	45	2
Yogo x Rescue (Mont. 66-25)	13180	35	32	32	26	32	31	15	65	50	58	1
Yogo x Rescue (Mont. 56-29)	13181	39	34	34	27	35	34	22	80	50	65	1

1/ Scab ratings on a 1-10 scale, 1 best

SUPPLEMENTARY WINTERHARDINESS NURSERY

This nursery is grown each year as a supplement to the uniform winterhardiness nursery. Since it is an observation-type nursery consisting of single rows seeded in duplicate series, a rather large number of entries can be evaluated for winterhardiness. No harvest is made and the entire nursery is assembled and distributed to the testing stations each year. The supplementary nursery contains the uniform yield nursery entries and new selections submitted from all parts of the region. It has considerable value for the winter wheat breeders, particularly in the southern part of the region where the occurrence of winterkilling is infrequent. In 1956, the nursery included 140 strains. Nursery locations were Alliance, Ames, St. Paul, Brookings, Dickinson, and Moccasin. Differential killing occurred at all locations except Alliance and Ames. Survival data were summarized and distributed to the cooperators before harvest and are not included in this report.

UNIFORM PROTEIN NURSERY

A uniform protein nursery was established in 1953 and grown for 3 years at Denton, Chillicothe, and McGregor, Texas; Stillwater, Oklahoma; and Pullman, Washington. The objective of the nursery was to determine the degree to which varieties lay down differing amounts of protein in the grain. Included on a uniform basis in the nursery were the hard red winter varieties Comanche, Wichita, Quanah, 29-34-275 D. Cr. (C. I. 12511) and the soft winter varieties Frisco, Taylor, Atlas 50, and Atlas 66. The latter 3 soft winter varieties have consistently produced grain with high protein content in the soft red winter wheat region. Testing locations in the southern part of the hard red winter wheat region were selected to avoid winterkilling and to avoid, if possible, the complicating effects of variable stands on yield of grain and protein content.

Complete data on yields of grain and protein content were obtained in 1953 and appeared in the regional report for that year. However, in 1954 and 1955 only yields of grain were contained in the regional reports due to the unavailability of protein data, with the exception of Pullman, Washington, at the time the reports were prepared. Protein analyses of this material have since been completed by the Hard Red Winter Wheat Quality Laboratory and are summarized in this report, together with yields of grain for the 3 years the nursery was grown. Data from Pullman, Washington, have been omitted. Pounds of grain protein per acre also were calculated and appear as the tabular data presented here.

Yields of grain and grain protein on both a percentage and pounds per acre basis are reported in table 23 for individual years and stations. In table 24, 3-year station averages (2 years for McGregor) for yield and protein are presented together with the overall 11 station-year averages for each variety.

Several relationships are apparent from the data in tables 23 and 24. The hard red winter varieties Wichita and Comanche were rather consistently more productive than the soft winter varieties. Conversely, they were the lowest in grain protein whereas the least productive Atlas varieties were high in protein. Comanche was consistently higher in protein than Wichita even at locations and in years where it exceeded Wichita in yield of grain. The difference, however, seldom exceeded 1 percent. The protein superiority of the Atlas varieties over Wichita was generally in the range of 3 percent. Their advantage over Comanche averaged approximately 2 percent. The Atlas varieties' protein advantage over Wichita and Comanche persisted, although not so large, even in the isolated instances where they approached or exceeded the latter two varieties in yield of grain.

Although grain protein calculated on an acre basis was highly erratic due to the variable yields of grain, Comanche and Wichita generally produced somewhat more protein per acre than Atlas 50 and Atlas 66. The average for 11 station-years showed little difference between the 4 hard wheat varieties and only a slight advantage of these over the soft red varieties.

It is apparent from the data that Atlas 50 and Atlas 66 lay down more protein in the grain than do the hard red winter wheat varieties in the test. However, a consistent inverse relationship between yield and grain protein content existed. Little information was gained as to whether the protein superiority of the Atlas wheats would persist under conditions of comparable yield of the varieties. The data from Stillwater in 1953 suggests that it might. The value of Atlas 50 and Atlas 66 as sources of germ plasm for breeding higher protein hard wheats would be greatly enhanced if this could be established. Data on average protein in pounds per acre during 3 years of testing give some indication that varieties do not differ greatly in this respect and that soil nitrogen availability perhaps sets the upper limit on grain protein production per acre. If so, the grain of high yielding varieties would be expected to contain less protein than the grain of less productive varieties. The principal value of the Atlas varieties may lie in their greater ability to produce high grain protein under conditions where soil nitrogen availability is not limiting. Further investigations of grain protein content seems warranted. At Nebraska, a project was initiated in 1956 in which the yield and protein relationships of the Atlas varieties and Wichita and Comanche will be further explored.

Table 23. Average yield and grain protein for varieties of hard and soft red winter wheat grown uniformly at 4 stations in the southern district in 1953, 1954, and 1955.

McGregor, Texas

Variety	C. I. No	Yield (Bu. /A)		Protein (%)		Protein (Lbs. /A)	
		1953	1955	1953	1955	1953	1955
Wichita	11952	27.6	7.1	13.8	12.4	229	53
Comanche	11675	23.9	13.1	15.1	12.8	217	101
Quanah	12145	23.9	17.1	15.8	13.2	227	135
29-34-275 D. Cr.	12511	22.7	17.2	16.5	13.0	225	134
Frisco	13106	18.8	14.4	15.0	12.7	169	110
Taylor	12461	16.4	14.4	15.9	14.0	156	121
Atlas 50	12534	19.4	11.1	17.7	15.5	206	103
Atlas 66	12561	20.9	10.2	17.8	15.8	223	97

Denton, Texas

Variety	C. I. No.	Yield (Bu. /A)			Protein (%)			Protein(lbs. /A)		
		1953	1954	1955	1953	1954	1955	1953	1954	1955
Wichita	11952	37.3	48.2	10.8	10.8	10.6	13.1	242	307	85
Comanche	11673	35.7	44.9	12.1	11.7	11.5	14.6	251	310	106
Quanah	12145	33.5	40.9	11.8	12.2	12.1	14.5	245	297	103
29-34-275 D. Cr.	12511	32.4	43.5	10.6	12.4	12.3	14.9	241	321	95
Frisco	13106	30.2	40.3	15.8	12.3	11.7	14.0	223	283	133
Taylor	12461	32.4	39.6	12.2	12.5	11.8	13.9	243	280	102
Atlas 50	12534	29.5	35.3	8.2	14.2	13.3	16.1	251	282	79
Atlas 66	12561	30.6	33.8	7.8	14.2	13.1	16.6	261	266	78

Chillicothe, Texas

Variety	C. I. No.	Yield (Bu./A.)			Protein (%)			Protein (Lbs./A.)		
		1953	1954	1955	1953	1954	1955	1953	1954	1955
Wichita	11952	15.7	19.8	11.6	15.2	14.8	17.0	143	176	118
Comanche	11673	8.8	25.3	11.3	17.3	15.4	17.8	91	234	121
Quanah	12145	9.4	20.6	8.1	16.5	15.6	18.5	93	193	90
29-34-275 D. Cr.	12511	10.2	18.3	9.6	16.7	15.8	18.3	102	173	105
Frisco	13106	5.6	13.2	7.8	17.0	15.5	17.7	57	123	83
Taylor	12461	7.4	22.0	6.8	17.5	15.4	17.7	78	203	72
Atlas 50	12534	8.8	16.0	8.1	17.7	16.3	19.3	93	156	94
Atlas 66	12561	5.3	16.1	7.3	19.0	17.1	19.8	60	165	87

Stillwater, Oklahoma

Variety	C. I. No.	Yield (Bu./A.)			Protein (%)			Protein (Lbs./A.)		
		1953	1954	1955	1953	1954	1955	1953	1954	1955
Wichita	11952	29.4	12.7	7.4	14.9	16.7	18.8	263	127	83
Comanche	11673	22.4	16.4	7.4	16.4	17.0	20.3	220	167	90
Quanah	12145	25.0	9.6	4.4	16.2	16.2	21.4	243	93	56
29-34-275 D. Cr.	12511	24.0	10.3	7.0	16.6	17.2	20.3	239	106	85
Frisco	13106	30.8	11.3	5.7	15.1	14.7	19.9	279	100	68
Taylor	12461	27.9	10.5	7.5	16.4	16.3	19.7	275	103	89
Atlas 50	12534	26.4	12.4	4.7	18.7	17.5	22.2	296	130	63
Atlas 66	12561	24.5	13.8	5.2	18.9	17.5	22.5	278	145	70

Table 24. Summary of average yields and grain protein for hard and soft red winter wheat varieties grown uniformly at 4 stations in the southern district during the period 1953 to 1955.

Variety	C. I. No.	McGregor (1953 and 1955)			Denton (1953 to 1955)			Chillicothe (1953 to 1955)			Stillwater (1953 to 1955)			4-station average (11-station-years)		
		Yield	Protein	Protein	Yield	Protein	Protein	Yield	Protein	Protein	Yield	Protein	Protein	Yield	Protein	Protein
		Bus.	%	Lbs.	Bus.	%	Lbs.	Bus.	%	Lbs.	Bus.	%	Lbs.	Bus.	%	Lbs.
Wichita	11952	17.4	13.1	141	32.1	11.5	211	15.7	15.7	146	16.5	16.8	158	20.7	14.4	166
Comanche	11673	18.5	14.0	159	30.9	12.6	222	15.1	16.8	149	15.4	17.9	159	20.1	15.4	173
29-34-275-D. Cr.	12511	20.0	14.8	180	28.8	13.2	219	12.7	16.9	127	13.8	18.0	143	18.7	15.8	166
Quanah	12145	20.5	14.5	181	28.7	12.9	215	12.7	16.9	125	13.0	17.9	131	18.6	15.7	161
Taylor	12461	15.4	15.0	139	28.1	12.7	208	12.1	16.9	118	15.3	17.5	156	17.9	15.6	157
Frisco	13106	16.6	13.9	140	28.8	12.7	213	8.9	16.7	88	15.9	16.6	149	17.6	15.1	148
Atlas 50	12534	15.3	16.6	155	24.3	14.5	204	11.0	17.8	114	14.5	19.5	163	16.4	17.1	159
Atlas 66	12561	15.6	16.8	160	24.1	14.6	202	9.6	18.6	104	14.5	19.6	164	16.0	17.5	157

DISEASE NURSERIES

Forty-three varieties and selections were grown in a uniform bunt nursery at eight locations in the region this year. Data on bunt infection were obtained from 6 of the locations. Twelve selections from Kansas and Nebraska also were evaluated for resistance to dwarf bunt at Pullman, Washington, and Pendleton, Oregon. A separate report on these nurseries was compiled and distributed to the cooperators and other interested people.

Several stations in the hard red winter wheat region again cooperated in the growing and evaluation of materials in the uniform and international winter wheat rust nurseries. Data from these nurseries will appear as a separate report.

Since 1955, a limited number of winter wheat strains have been evaluated each year at Urbana, Illinois, for resistance to soil-borne mosaic. This has been made possible through the cooperation of Dr. Wayne Bever and Roland Weibel at the University of Illinois. Soil-borne mosaic is present in the region mainly in eastern Oklahoma, Kansas and Nebraska. Its presence has been noted in recent years with increasing frequency in these areas. Because of occurrence of the disease in a particular area or locality from one year to the next is highly erratic, evaluation of materials for resistance in the hard red winter wheat region has been difficult. Eastward, particularly in Illinois, the disease is much more severe and re-occurs regularly on continuously cropped land in certain areas. Striking symptoms develop on susceptible wheat varieties which in some years may be killed by the disease. The excellent cooperation of Dr. Bever and Mr. Weibel has made possible the rapid evaluation and identification of winter wheat strains carrying resistance to soil-borne mosaic. In 1956, 100 varieties and selections from the hard red winter wheat region were evaluated at Urbana. Several showed outstanding resistance to the disease. Among these were the uniform yield nursery entries Concho, Comanche, C. I. 12804, C. I. 13015, C. I. 13023, and C. I. 13024. Data from the Urbana nursery were distributed to the cooperators before harvest and are not included in this report.

DATA FROM THE QUALITY LABORATORY

Grain harvested from the uniform plots and uniform yield nursery was submitted by cooperators to the Federal Hard Winter Wheat Quality Laborabory at Manhattan, Kansas, for milling and baking evaluation. Many promising new strains of local interest also were submitted for similar evaluation. The report of results of quality evaluation of the 1956 samples will be prepared and distributed by the Quality Laboratory.