--

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
CROPS RESEARCH DIVISION

****

COMPARISON OF WINTER WHEAT VARIETIES GROWN IN COOPERATIVE NURSERY EXPERIMENTS IN THE HARD RED WINTER WHEAT REGION IN 1960

****

Preliminary report not for publication[1/]

1/ This is a progress report of cooperative investigations containing data, the interpretation of which may be modified with additional experimentation. Therefore, publication, display, or distribution of any data or any statements herein should not be made without prior written approval of the Crops Research Division, ARS, USDA, and the cooperating agency or agencies concerned.

Nebraska Agricultural Experiment Station
Lincoln, Nebraska
CR-20-61

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
Crops Research Division

COMPARISON OF WINTER WHEAT VARIETIES GROWN IN COOPERATIVE NURSERY EXPERIMENTS IN THE HARD RED WINTER WHEAT REGION IN 1960

By

V. A. Johnson[1/]

CONTENTS

1/ The writer expresses appreciation to Dorothy M. Wilson and Mrs. Alyce Ann Schmidt for their assistance in preparing this report.

VARIETAL ABBREVIATIONS

The subcommittee on wheat variety name abbreviations of the National Wheat Improvement Committee recently has made 3 corrections and a number of additions to the list distributed in October, 1959, and which also appeared in the 1959 Wheat Newsletter. The corrections and additions are listed below.

1. Corrections:
   Change Crm for Cimarron to Crr
   Change Pwn for Pawnee to Pn
   Change Pn for Pennoll to Pnl

2. Additions:

Asosan[1/]	Asn	C.I. 12665
Baldwin	Bw	6271
Canthatch	Cth	13345
Colorow	Cor	12865
Dietz[1/]	Dz	4862
Georgia 1123	Gg 1123	13292
Hard Red Calcutta	HRC	-----
Kenya Gular	KG	-----
Klein Titan	KT	12615
Lakota	Lk	13335
Milam	Ml	13369
Omaha[1/]	Om	13015
Ottawa	Ot	12804
Pembine	Pb	13332
Redcoat	Rct	13170
Red Egyptian	RE	6090, 6102, 12345
Red Wonder	RWn	3502, 3503, 5389, 5817
Sawtana	Stn	13304
Shansi	Sns	12612
Tendoy	Td	13426
Warrior[1/]	Wrr	13190
Wells	Wls	13333
Willet	Wlt	13099
Yaqui	Yq	13218

1/ Asosan, Dietz, Omaha, and Warrior are listed in the 1959 Wheat Newsletter Abbreviation list

RANDOM NOTES FROM THE REGION

The Hard Winter Wheat Quality Advisory Council was organized in 1960. It replaces the Hard Winter Wheat Collaborators Conference. It is composed of representatives of the milling and baking industries, commercial wheat and flour testing laboratories, grain trade, wheat improvement associations, wheat commissions, state experiment stations, and the Agricultural Research Service. Objectives of the Council are to evaluate through collaborative effort the milling and baking properties of new wheats in the region, to advise State Experiment Stations in the region and A.R.S. concerning industry appraisal of the quality of new varieties, and to advise State Experiment Stations and A.R.S. concerning immediate and long-range wheat quality needs

of the milling and baking industries. State participation in the activities of the Council is voluntary. The Council urges that new hard winter wheat varieties be submitted for evaluation twice before release and once subsequent to release. The first meeting of the Council was held at Kansas City, Missouri, on February 9 and 10. Nineteen varieties from Oklahoma, Kansas, Nebraska, Wyoming, and Iowa were evaluated.

A new project in which the protein and air classification properties of high protein wheat strains will be studied was initiated at the University of Nebraska in September, 1960. The project is financed by a $75,000 grant from the Nebraska Agricultural Research Fund Committee and the Nebraska Wheat Commission. The work will be carried on in a recently established wheat quality laboratory at the College of Agriculture.

PERSONNEL CHANGES

H. R. Myers is now the superintendent and cooperator at the Wheat Land Conservation Experiment Station, Cherokee, Oklahoma.

Vernon Cardwell is the new agronomist at the San Juan Basin Branch Station at Hesperus, Colorado. He succeeds W. H. Paulson.

J. R. Lawless succeeds T. E. Walter as agronomist at the Colby Branch Station, Colby, Kansas. Mr. Walter has assumed new duties in the Agronomy Department at Kansas State University, Manhattan, Kansas.

Bruce McCallum replaces Gordon Geeseman as agronomist at the North Montana Branch Station, Havre, Montana.

J. E. Andrews, Lethbridge, Alberta, has assumed new duties as Superintendent of the Experimental Farm at Brandon, Manitoba. M. N. Grant, Head of the Cereal Breeding Section at the Lethbridge Experiment Station, will carry on winter wheat research there.

COOPERATING AGENCIES, STATIONS, AND PERSONNEL

CEREAL CROPS RESEARCH BRANCH, A.R.S., U.S.D.A.		
Wheat Investigations		L. P. Reitz*
Hard Red Winter Wheat Region		V. A. Johnson*
Rust Investigations		W. Q. Loegering*
Quality Investigations		K. F. Finney*
TEXAS AGRICULTURAL EXPERIMENT STATION:		
College Station	Texas A. & M. College	
Agronomy		I. M. Atkins* (State Leader)
Plant Physiology and Pathology		M. C. Futrell*
Denton	Substation No. 6	E. C. Gilmore*
Chillicothe	Substation No. 12	K. A. Lahr
Bushland	Southwestern Great Plains Field Sta.	K. B. Porter
		N. E. Daniels
NEW MEXICO AGRICULTURAL EXPERIMENT STATION:		
Clovis	Plains Substation	R. W. Livers

* Part- or full-time Federal employees.

OKLAHOMA AGRICULTURAL EXPERIMENT STATION:		
Stillwater	Oklahoma State University	
Agronomy		A.M. Schlehuber(State Leader)
		B. C. Curtis
		E. E. Sebesta*
		B. B. Tucker
		O. D. Smith
		R. M. Oswalt
Botany and Plant Pathology		H. C. Young
		R. C. Bellingham*
Entomology		C. F. Henderson*
		E. A. Woods, Jr.*
Biochemistry		D. C. Abbott
Cherokee	Wheat Land Conservation Sta.	H. R. Myers
Woodward	Southern Great Plains Field Sta.	R. A. Hunter
Goodwell	Panhandle Agr. Exp. Station	R. A. Peck
KANSAS AGRICULTURAL EXPERIMENT STATION		
Manhattan	Kansas State University	
Agronomy		E. G. Heyne
		A. W. Pauli
		F. C. Stickler
Botany and Plant Pathology		C. O. Johnston*
		W. H. Sill
		E. D. Hansing
		L. E. Browder*
Entomology		R. H. Painter
		E. T. Jones*
		H. W. Somsen*
Flour and Feed Milling Industries		J. A. Shellenberger
		J. A. Johnson
		B. S. Miller*
Hays	Ft. Hays Branch Station	J. A. Wilson
		W. M. Ross*
Garden City	Garden City Agr. Exp. Sta.	W. D. Stegmeier
Colby	Colby Branch Station	J. R. Lawless
COLORADO AGRICULTURAL EXPERIMENT STATION:		
Ft. Collins	Colorado State University	
Agronomy		T. E. Haus
Akron	U.S. Central Gr. Plains Sta.	F. P. Frazier
Hesperus	San Juan Basin Branch Sta.	V. B. Cardwell
Springfield	Southeastern Colo. Br. Sta.	H. O. Mann
IOWA AGRICULTURAL EXPERIMENT STATION:		
Ames	Iowa State University	
Agronomy		R. E. Atkins
NEBRASKA AGRICULTURAL EXPERIMENT STATION		
Lincoln	University of Nebraska	
Agronomy		V. A. Johnson*
		J. W. Schmidt
		M. R. Morris
		P. J. Mattern

NEBRASKA AGRICULTURAL EXPERIMENT STATION: (Cont.)		
North Platte	North Platte Exp. Station	P. T. Nordquist
		K. P. Pruess
Alliance	Box Butte Exp. Station	P. L. Ehlers
		C. R. Fenster
Concord	Northeast Nebr. Exp. Sta.	A. D. Flowerday
WYOMING AGRICULTURAL EXPERIMENT STATION:		
Laramie	University of Wyoming	
Crops		B. J. Kolp
Plant Pathology	and Horticulture	G. H. Bridgmon
Archer	Archer Substation	T. L. Birch
Gillette	Gillette Substation	L. R. Landers
Sheridan	Sheridan Substation	A. F. Gale
SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION:		
Brookings	South Dakota State College	
Agronomy		V. A. Dirks
NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION:		
Fargo	North Dakota Agricultural College	
Agronomy		G. S. Smith
Dickinson	Dickinson Substation	T. J. Conlon
MONTANA AGRICULTURAL EXPERIMENT STATION:		
Bozeman	Montana State College	
Agronomy and Soils		E. R. Hehn
		C. R. Haun*
		R. K. Bequette
		C. A. Watson
Moccasin	Central Mont. Branch Station	A. L. Dubbs
Huntley	Huntley Branch Station	D. E. Baldridge
Havre	North Montana Branch Station	B. McCallum
MINNESOTA AGRICULTURAL EXPERIMENT STATION:		
St. Paul	Institute of Agriculture	
Agronomy and Plant Genetics		E. R. Ausemus*
Waseca	Southern Experiment Sta.	R. E. Hodgson
Grand Rapids	North Central Exp. Station	W. Matalamaki
ILLINOIS AGRICULTURAL EXPERIMENT STATION:		
Urbana	University of Illinois	
Agronomy		R. O. Weibel
Plant Pathology		W. M. Bever
CANADA DEPARTMENT OF AGRICULTURE:		
Lethbridge	Alberta Agr. Exp. Station	M. N. Grant

ACCESSION NUMBERS ASSIGNED

Hard winter wheats assigned C. I. numbers at Lincoln in 1960 are listed on the following page. When a number is assigned, seed of that variety is added to the permanent collection maintained by the Cereal Crops Research Branch at Beltsville, Maryland. C. I. numbers take precedence over state and

local numbers in this report, and their use by wheat workers in published reports and correspondence is urged.

C. I. No.	Pedigree	State No.	Source
13196	Cheyenne x Chiefkan	451169	Nebr.
13197	Cheyenne x Chiefkan	422121	Nebr.
13546	Nbr-Hope-Tk x Cnn-Pnc	56178	Nebr.
13547	Tk-Cnn x Hope-Cnn^2	57167	Nebr.
13548	Cmn x (Mi-Hope-Pn x Oro-Il#1-Cmn)	56644	Kans.
13549	Wheat-Rye x IVc1-Comanche	M. 438	Kans.
13550	RedChief x Nb 60-Mi-Hope	513585	Nebr.
13660	RedChief x Marquillo-Oro	517259	Nebr.
13661	RedChief x Marquillo-Oro-Pawnee	514281	Nebr.
13662	Mq1-Oro-Pawnee x RedChief	524050	Nebr.
13663	RedChief x Pawnee	524878	Nebr.

NEW VARIETIES

New hard red winter wheat varieties distributed to growers in the region in 1960 included:

Name	C. I. No.	States recommending
Colorow	12865	Colorado
Kaw	12871	Kansas, Oklahoma
Ottawa	12804	Kansas, Nebraska
Omaha	13015	Nebraska, South Dakota
Warrior	13190	Nebraska, Colorado, Wyoming, S. Dak.

All of these varieties were described in the 1959 Hard Red Winter Wheat Regional Report. Colorow is recommended for the dwarf smut infested areas of western Colorado. Kaw, released jointly by Kansas and Oklahoma, is generally recommended for production in areas in the two states now growing Wichita with the exception of northwest Kansas. Ottawa is recommended for production in eastern Kansas and southeastern Nebraska, particularly in areas where soil-borne mosaic is a problem. Omaha is intended for production in the eastern one-third of Nebraska and in the eastern portion of the winter wheat producing area of South Dakota. Warrior will be grown principally in western Nebraska and adjacent areas in Colorado, Wyoming, and South Dakota.

THE HARD WINTER WHEAT CROP

This year saw the production of another large winter wheat crop despite acreage restrictions. The crop was the second largest of record, a fifth larger than the 1959 crop and a third larger than average. An average yield of 27.5 bushels per harvested acre ranks as the second highest of record.

Winter wheat production data for the 11 states in the hard red winter wheat region appear in the tabulation that follows.

State	Acres planted	Acres harvested 1/	Abandonment	1960 production 1/	1960 average acre yields 2/	1949-58 average acre yields 2/
			%	Bu.	Bu.	Bu.
Texas	4,287	3,762	12.2	84,645	22.5	12.0
Oklahoma	4,984	4,756	4.6	121,278	25.5	14.0
New Mexico	280	256	8.6	4,480	17.5	9.1
Kansas	10,761	10,380	3.5	290,640	28.0	16.7
Nebraska	3,293	2,999	8.9	85,472	28.5	22.0
Colorado	2,575	2,419	6.1	65,313	27.0	16.4
Wyoming	235	207	11.9	4,761	23.0	18.8
Montana	2,116	2,042	3.5	44,924	22.0	22.2
South Dakota	681	639	6.2	17,253	27.0	18.3
Iowa	116	101	12.9	2,525	25.0	22.6
Minnesota	21	20	4.8	500	25.0	21.7

1/ In thousands.

2/ Based on harvested acres. Data taken from the 1960 Annual Summary, Crop Production, U. S. Dept. of Agriculture, Agr. Marketing Service, Crop Reporting Board.

Winter wheat abandonment exceeded 10 percent only in Texas, Wyoming, and Iowa. It was less than 5 percent in Oklahoma, Kansas, Montana, and Minnesota. Average acre yields exceeded 20 bushels in all states except New Mexico.

UNIFORM QUALITY SERIES

The uniform quality series is comprised of a limited number of newly released and advanced experimental varieties that are grown with selected check varieties to produce seed for annual quality evaluation at the Hard Winter Wheat Quality Laboratory at Kansas State University. Ten pounds of seed of each variety from each location is submitted to the laboratory. This year the varieties comprising the series in each district were as follows:

Southern		Central		Northern	
Pawnee*	11669	Pawnee*	11669	Minter*	12138
Comanche*	11673	Comanche*	11673	Yogo*	8033
Concho	12517	Concho	12517	Nebred*	10094
Crockett	12702	Bison	12518	Warrior	13190
Aztec	13016	Kaw	12871		
Kaw	12871	Ottawa	12804		
Tascosa	13023	Omaha	13015		

*Check variety.

SOUTHERN REGIONAL PERFORMANCE NURSERY

The nursery was grown at 19 stations in 1960. Data were reported from 18. Fall stands were not obtained at Akron, Colorado, and the nursery was abandoned. The nursery contained only 13 entries making it the smallest in many years. Varieties in the nursery are listed below.

Entry No.	Variety or pedigree	C. I. No.	State submitting
1	Kharkof	1442	----
2	Blackhull	6251	----
3	Early Blackhull	8856	----
4	Pawnee	11669	----
5	Comanche	11673	----
6	Concho	12517	----
7	Tascosa	13023	----
8*	Pnc x Mi-Hope-Pn	13532	Nebr.
9*	(Mql-Oro x Oro-Tm) x Mi-Hope-Pn	13533	Colo.
10*	(Cmn x Mi-Hope) x Iowin	13534	Iowa
11*	Kv x (Iow x Tt-WP35)	13535	Iowa
12*	Wichita x Mql-Oro	13536	Texas
13*	(RCh x Tk-Oro-Fn) x Mql-Oro	13537	Texas

* New entry in 1960.

DATA OBTAINED

Nursery data submitted by the reporting stations appear in table 1.

An excellent nursery was grown at Denton. Fall stands were good, no winter killing occurred, and the nursery was not subjected to moisture stress until April. Rain late in April and the first week in May permitted the wheat to finish well. Insects were not a problem. Septoria tritici Rob. ex Desm. developed in the spring and became sufficiently severe to kill the leaves on approximately the lower third of the plants by mid-May. Leaf rust came in late and stem rust was found only in isolated infection centers. The wheat headed nearly 2 weeks later than in 1959. All varieties except two were significantly more productive than Kharkof. High resistance to leaf rust was exhibited by C. I. 13536 and C. I. 13532, the highest yielding varieties.

The coldest November since 1929 limited fall growth of the nursery at Chillicothe. Abnormally cold weather prevailed throughout much of the winter until March. Lack of moisture became severe in April and greatly reduced the prospects for high yields. Septoria tritici, leaf and stem rust, loose smut, and foot rot were present but in trace to light amounts only. Insects were not a problem. Tascosa was significantly higher yielding than all other entries in the nursery in 1960 and has as well the best period-of-years record at Chillicothe.

Both an irrigated and a dryland nursery were grown at Bushland. Data are reported for both but only the dryland data were used in the regional yield summary. Water was applied to the irrigated nursery ahead of seeding, once in

April and twice in May. An estimated 3½ inches was applied at each irrigation. Approximately 100 pounds of nitrogen per acre was used. Leaf rust came in late and was not damaging. The dryland nursery had good stands but suffered from drought during May. The dryland nursery yields were about average. Yields were not significantly different.

A good supply of soil mösiture allowed uniform emergence of the wheat at Clovis. The wheat maintained its good condition throughout the winter but deteriorated during a spring that was without any effective precipitation. Rain on June 6 benefited only the latest maturing varieties. The condition of the wheat in the nursery was highly variable due to the drought with some portions good and others very poor. Early Blackhull and Blackhull were the most productive varieties in the nursery. Tascosa has the highest average yield among varieties tested more than 1 year.

The 1959-60 season in Oklahoma was characterized by hard freezes on November 6 and 17, a long, cool spring, and near ideal temperatures during the period of flowering and grain development. Moisture was abundant at seeding time in the fall and moisture stress was not apparent at any time during the growing season. Rainfall was above normal and well distributed. Development of the wheat was slower than normal during the cool spring. Leaf rust infection was late and probably caused little or no damage. Light stem rust appeared just prior to maturity. Both yields and test weights were very high at Stillwater. All varieties yielded more than 40 bushels per acre and produced grain weighing more than 60 pounds per bushel. C. I. 13537 and Concho were highest and second highest in yield, respectively. Concho and Tascosa have outstanding yield records at Stillwater.

Nursery yields at Cherokee averaged about 12 bushels per acre less than at Stillwater. The grain was approximately 2 pounds lighter in test weight. The Texas entry C. I. 13537 was at least 4.2 bushels per acre more productive than any other variety in the nursery. Tascosa has been 60 percent more productive than Kharkof in 5 years of testing at Cherokee.

Yields and test weights were high at Woodward but variation in the nursery did not permit the establishment of statistically significant differences in yield. Consistent with its performance at Stillwater and Cherokee, C. I. 13537 was the highest yielding variety. All bushel weights exceeded 60 pounds.

Subnormal temperatures at two different times in November caused considerable damage to the wheat at Manhattan, Kansas. The wheat had made little growth prior to November due to delayed seeding and the severe cold in November stopped further growth. Stands were thinned by as much as 30 percent in some entries in the southern regional nursery. Kharkof was the only variety rated as having a full stand in the spring. C. I. 13537 was significantly higher yielding than other entries in the nursery. C. I. 13532 exhibited good resistance to stem rust, indicating the predominance of race 56 at Manhattan. C. I. 13535 and C. I. 13533 were segregating. Among the experimental varieties in the nursery only C. I. 13534 had a lower bunt reading than Pawnee. The resistance of C. I. 13535 appeared to be equal to that of Pawnee.

The nursery was seeded on October 10 at Hays and all varieties came up to good stands. The low temperatures in November prevented normal fall development. Heavy snow occurred during the winter. The spring was late and cool.

Yields and bushel weights were high. Yields were not significantly different due possibly to injury and stand losses during the November cold. C. I. 13532 and C. I. 13535 showed combined resistance to leaf and stem rust.

A record total snowfall of 45 inches during the winter at Garden City afforded much protection to the wheat and winterkilling did not occur during a winter that for the most part was abnormally cold. Snow drifts on portions of the nursery area are believed to have been associated with high variation in nursery yields. The wheat was under some moisture stress in the latter part of May but rain in 13 days of June permitted good recovery and moderately high yields and test weights. Yield differences were not statistically significant.

Weather conditions at Colby were similar to those at Garden City. Spring growth was somewhat delayed but moisture was adequate throughout the season. A week of wet weather in early July during which bundles harvested from the nursery plots lay in the field probably reduced test weight. Grain yields were very high with six varieties producing more than 50 bushels per acre and no variety less than 43 bushels.

Moisture was adequate during the fall and winter at Ft. Collins but late spring and summer were very dry. There was no damage from diseases or insects. Application of irrigation water during the growing season produced moderately high grain yields at Ft. Collins and high test weights. Some lodging occurred in Blackhull, Early Blackhull, and Kharkof.

The winter was colder than normal at Springfield but no winter damage to the nursery entries was apparent. Moisture in March, April, and May was below normal and slightly less than normal in June. Grain yields and bushel weights were high despite the lack of spring moisture. Yield differences were not statistically significant.

Spring irrigation was necessary during a dry spring and summer at Hesperus. The nursery was located in an area subjected to water seepage during the summer with the result that severe lodging occurred in all varieties. Yields were well below normal for Hesperus but bushel weights were high. Statistical significance could not be demonstrated for varietal yield differences.

Late seeding and early occurrence of low temperatures resulted in substantially less-than-normal fall growth for varieties in the southern regional nursery at Lincoln. Stands probably were thinned by the severe cold in November but not differentially. Leaf and stem rust became heavy and were factors in the below-normal test weights recorded. C. I. 13537 significantly outyielded other varieties in the nursery. C. I. 13532 showed good combined resistance to leaf and stem rust. C. I. 13532 and C. I. 13534 were the only experimental varieties with lower bunt infections than Pawnee.

C. I. 13532 was the highest yielding variety at North Platte but it shattered an estimated 10 percent as compared with only 2 percent for Pawnee. Bushel weights were unusually high with only one variety weighing less than 61 pounds. Varietal differences in yield were not statistically significant.

Conditions were highly favorable at Alliance and for the most part were similar to those at North Platte. Yields were high and bushel weights very high.

Blowing during the winter and spring caused damage to portions of the nursery and probably was the main reason for a high coefficient of variation and non-significant yield differences among varieties.

Near-optimum conditions prevailed during the entire winter wheat season at Ames, Iowa. Evidence of winter injury was slight, lodging occurred but was not severe, and Septoria leaf blotch was the only disease of consequence. C. I. numbers 13532, 13537, and 13536 yielded 67.0, 65.0, and 64.7 bushels per acre, respectively, and all were significantly more productive than the remaining 10 varieties in the nursery. Kharkof was the only variety that yielded less than 55 bushels per acre. C. I. 13536 and Tascosa lodged the least.

Table 1.--Yield and other data for varieties grown in the southern regional performance nursery at 18 stations in the hard red winter wheat region in 1960.

Denton, Texas
Four replications

C.I. No.	Date Headed	Date Ripe	Plant height	Leaf rust Severity	Leaf rust Response	Lodging	Weight per bushel	Av. acre yield 1960	Av. acre yield 1955-1960 1/	No. years grown	Percent of Kharkof
	May	June	In.	%		%	Lbs.	Bu.	Bu.		
13536	4-30	3	40	0	fleck	15	62	45.4	--	1	140.0
13532	6	5	42	0	0	20	59	45.2	--	1	137.4
13537	9	5	43	10	R	18	60	42.4	--	1	128.9
13023	4	3	37	30	S	2	61	41.5	21.6	5	104.2
12517	4	4	42	70	S	5	57	40.7	21.5	9	113.3
11673	6	4	42	50	S	15	59	40.5	22.3	20	132.0
13533	5	5	41	30-10	S-R	8	58	40.5	--	1	123.1
8856	4-27	5-31	40	50	S	55	62	40.1	23.1	24	129.8
13534	7	6	41	60	S	20	57	38.5	--	1	117.0
11669	11	8	41	40	MS	28	60	36.8	19.7	21	123.0
13535	13	8	45	T	MR	33	58	35.4	--	1	107.6
6251	10	8	45	70	S	95	60	34.5	20.9	24	104.9
1442	12	9	42	50	S	95	57	32.9	20.7	24	100.0

1/ No data in 1957.

Standard error of a difference = 3.30 bushels.

Chillicothe, Texas
Four replications

C.I. No.	Date Headed	Date Ripe	Plant height	Forage estimate 1/	Weight per bushel	Av. acre yield 1960	Av. acre yield 1955-1960	No. years grown	Percent of Kharkof
	April	May	In.		Lbs.	Bu.	Bu.		
13023	27	30	22	100	60.5	34.8	27.9	6	138.9
8856	22	25	28	110	60.0	31.9	22.7	22	105.5
13533	27	30	23	100	59.0	31.9	--	1	115.2
13536	24	28	26	110	60.0	30.4	--	1	109.7
13537	5-2	6-2	22	100	59.0	29.6	--	1	106.9
11673	28	31	25	100	59.5	29.1	25.6	22	117.3
6251	5-1	6-2	25	100	59.0	29.0	22.1	22	104.3
13532	27	30	23	90	59.0	28.1	--	1	101.4
1442	5-5	6-6	28	90	59.0	27.7	20.1	22	100.0
12517	28	30	23	100	59.0	27.0	24.5	11	104.8
11669	29	31	24	90	58.5	26.0	25.6	22	119.3
13535	5-4	6-5	24	90	58.0	24.6	--	1	88.8
13534	29	6-2	24	100	58.0	18.6	--	1	67.1

1/ Visual estimate of forage value; Comanche = 100 percent.

Standard error of a difference = 2.62 bushels.

Bushland, Texas
Three replications, irrigated

C.I. No.	Date Headed	Date Ripe	Plant height	Leaf rust	Weight per bushel	Av. acre yield 1960	Av. acre yield 1958-1960
	May	June	In.	%	Lbs.	Bu.	Bu.
13537	16	28	43	10	62.0	69.5	--
13023	11	24	41	40	63.7	68.8	51.4
12517	13	26	43	30	62.5	68.4	50.8
13536	10	25	40	Tr	64.7	68.3	--
11669	14	27	41	40	61.8	64.9	46.4
6251	14	26	44	70	63.2	64.8	46.8
13533	15	28	43	35	62.9	64.7	--
13534	15	28	41	60	59.5	64.1	--
13532	15	28	41	10	60.1	64.0	--
11673	14	25	42	40	61.3	59.1	45.7
8856	6	22	42	40	62.2	58.0	46.6
1442	19	30	44	60	60.3	56.8	41.4
13535	19	30	44	Tr	60.3	55.3	--

Standard error of a difference = 3.71 bushels.

Bushland, Texas
Four replications, dryland

C.I. No.	Date Headed	Date Ripe	Plant height	Weight per bushel	Av. acre yield 1960	Av. acre yield 1955-1960	No. years grown	Percent of Kharkof
	May	June	In.	Lbs.	Bu.	Bu.		
13536	10	24	23	60.3	22.9	--	1	134.7
13533	12	25	21	57.9	22.5	--	1	132.4
8856	6	22	22	58.2	22.1	25.0	22	98.7
13023	11	24	20	57.8	21.9	28.5	6	116.7
13534	14	27	21	58.4	20.2	--	1	118.8
11669	14	27	20	56.5	19.8	23.3	22	108.4
13532	13	25	22	55.8	19.5	--	1	114.7
12517	12	25	18	57.7	19.4	28.5	12	113.8
6251	15	28	22	59.1	18.4	26.7	22	109.3
11673	13	25	20	58.9	17.6	25.9	22	106.5
1442	17	30	20	58.7	17.0	24.5	22	100.0
13535	18	30	22	56.4	16.0	--	1	94.1
13537	15	28	20	59.8	15.9	--	1	93.5

Standard error of a difference = not significant

Clovis, New Mexico
Six replications

C.I. No.	Date headed	Plant height	Shattering score 1/	Weight per bushel	Av. acre yield 1960	Av. acre yield 1955-1960	No. years grown	Percent of Kharkof
	May	In.		Lbs.	Bu.	Bu.		
8856	5	21	2.4	59.1	18.5	17.7	8	97.8
6251	13	21	2.1	59.4	17.5	18.1	8	102.2
13536	9	20	2.2	60.2	15.4	--	1	121.3
13532	12	20	2.5	58.0	15.3	--	1	120.5
12517	11	20	3.3	59.0	14.4	17.8	8	101.2
13023	11	18	1.9	60.2	13.5	18.7	6	103.6
13534	12	18	4.1	59.0	13.0	--	1	102.4
1442	17	18	2.6	58.8	12.7	18.1	8	100.0
11673	16	18	2.8	59.2	12.6	17.6	8	95.6
11669	12	19	3.9	57.7	12.5	15.6	8	89.8
13533	11	19	2.0	59.1	12.2	--	1	96.1
13537	14	18	2.1	60.0	10.3	--	1	81.1
13535	15	17	2.0	56.6	10.0	--	1	78.4

1/ Rating based on 1-5 scale; 1 = no shattering.

Standard error of a difference = 2.46 bushels.

Stillwater, Oklahoma
Four replications

C.I. No.	Date headed	Plant height	Leaf rust: Severity	Leaf rust: Type pustule	Weight per bushel	Av. acre yield: 1960	Av. acre yield: 1955-1960 [1]	No. years grown	Percent of Kharkof
	May	In.	%		Lbs.	Bu.	Bu.		
13537	8	38	8	0;-2	62.7	54.2	--	1	130.9
12517	6	40	15	4	62.1	52.0	33.1	11	131.3
6251	10	43	20	4	62.5	51.8	30.2	26	111.7
13536	3	37	Tr	0;-3	62.9	50.4	--	1	121.7
13023	6	37	8	4	63.9	50.2	32.1	5	130.0
13534	6	40	20	4	60.4	50.0	--	1	120.8
13532	5	37	Tr	0;-1	61.9	50.0	--	1	120.8
13533	6	40	15	4	61.2	48.4	--	1	116.9
11669	7	39	20	4	62.0	46.9	29.8	23	119.6
13535	11	43	Tr	3-4	60.8	46.3	--	1	111.8
11673	6	39	15	4	61.7	44.5	29.5	21	116.5
8856	4-30	37	35	4	62.6	42.0	32.4	26	113.1
1442	11	42	45	4	61.7	41.4	24.7	26	100.0

1/ No data in 1957.

Standard error of a difference = 3.59 bushels.

Cherokee, Oklahoma
Four replications

C.I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield 1960	Av. acre yield 1955-1960 1/	No. years grown	Percent of Kharkof
	May	In.	Lbs.	Bu.	Bu.		
13537	17	40	59.6	41.1	--	1	129.7
13535	21	41	58.1	36.9	--	1	116.4
13534	16	40	58.9	36.7	--	1	115.8
11673	15	38	56.5	36.0	25.4	13	125.6
13532	16	38	58.1	35.9	--	1	113.2
13536	11	38	63.0	35.7	--	1	112.6
13023	13	38	60.3	34.0	28.2	5	160.6
8856	8	39	60.8	33.2	30.8	13	129.5
11669	17	38	58.4	32.5	21.5	13	110.8
1442	19	40	58.5	31.7	17.6	13	100.0
12517	16	39	56.2	31.2	24.7	11	140.8
13533	15	39	57.1	30.5	--	1	96.2
6251	20	41	57.1	29.5	22.2	13	109.4

1/ No data in 1955.
Standard error of a difference = 1.41 bushels.

Woodward, Oklahoma
Four replications

C.I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield 1960	Av. acre yield 1955-1960	No. years grown	Percent of Kharkof
	May	In.	Lbs.	Bu.	Bu.		
13537	11	33	62.6	39.5	--	1	107.9
13535	12	38	61.0	38.7	--	1	105.7
12517	10	32	62.4	37.4	31.7	12	123.4
13536	6	31	62.8	36.8	--	1	100.5
8856	3	32	61.7	36.6	28.4	29	105.2
13533	9	34	61.0	36.6	--	1	100.0
1442	13	36	62.5	36.6	26.7	29	100.0
11669	10	34	61.5	36.4	28.3	26	116.2
13532	9	33	60.4	35.8	--	1	97.8
6251	12	36	63.5	35.7	28.6	29	106.0
13534	10	33	60.4	34.7	--	1	94.8
11673	9	33	61.7	34.4	29.4	24	113.7
13023	9	30	63.7	32.7	31.4	6	117.7

Standard error of a difference = not significant.

Manhattan, Kansas
Four replications

C.I. No.	Date headed	Plant height	Spring stand 1/	Diseases: Stem rust	Diseases: Bunt 2/	Weight per bushel	Av. acre yield: 1960	Av. acre yield: 1955-1960	No. years grown	Percent of Kharkof
	May	In.			%	Lbs.	Bu.	Bu.		
13537	26	35	8	SR	97	61.5	44.1	--	1	138.7
13532	25	34	8	MR	70	59.4	38.9	--	1	122.3
13534	26	36	9	S	10	59.3	37.7	--	1	118.6
6251	25	41	9	S	80	61.2	37.2	33.8	29	113.2
11673	25	37	9	S	2	58.5	32.7	34.2	24	119.3
13536	25	35	7	S	95	62.0	32.5	--	1	102.2
12517	25	37	8	S	5	57.4	32.1	36.4	12	122.4
1442	27	37	10	VS	90	58.9	31.8	30.9	29	100.0
8856	24	38	8	S-Es.	90	61.5	31.2	32.1	29	113.0
13535	27	38	8	R-S	17	59.4	30.8	--	1	96.9
11669	26	36	9	S	15	58.2	30.3	31.3	26	121.7
13533	26	36	7	MR-S	90	57.9	27.5	--	1	86.5
13023	25	35	8	VS	90	60.6	24.9	33.6	6	108.8

1/ Scale of 1-10; 10 = 100 percent.
2/ Bunt data from E. D. Hansing.
Standard error of a difference = 1.82 bushels.

Hays, Kansas
Four replications

C.I. No.	Date headed	Plant height	Lodging 1/	Rust		Weight per bushel	Av. acre yield		No. years grown	Percent of Kharkof
				Leaf	Stem		1960	1955-1960 2/		
	May	In.	%			Lbs.	Bu.	Bu.		
13532	24	39	60	R	R	60.8	51.4	--	1	116.8
11669	25	40	55	S+	S+	60.5	49.8	38.7	21	124.1
11673	24	42	40	S+	S	60.5	49.0	39.6	20	120.9
13023	23	37	45	S+	S	61.8	48.1	42.1	3	113.0
13536	23	39	40	S	R	61.8	47.4	--	1	107.7
6251	25	41	95	S+	S	60.5	47.2	37.1	24	110.6
12517	24	41	75	S+	S	60.5	46.6	38.3	8	123.6
13533	24	40	50	S+	R	60.3	45.0	--	1	102.3
1442	30	42	90	S+	S	60.3	44.0	37.3	24	100.0
13535	29	42	50	R	R	60.3	43.9	--	1	99.8
8856	21	42	90	S++	S	61.8	42.4	37.1	24	112.7
13537	24	39	55	S	R	61.3	40.2	--	1	91.4
13534	24	39	80	S+	R	59.8	39.3	--	1	89.3

1/ Lodging based on extra replications seeded on bottom land.
2/ No data in 1955, 1957, and 1959.
Standard error of a difference = not significant.

Garden City, Kansas
Four replications

C.I. No.	Date Headed	Date Ripe	Plant height	Weight per bushel	Av. acre yield 1960	Av. acre yield 1955-1960	No. years grown	Percent of Kharkof
	May	June	In.	Lbs.	Bu.	Bu.		
6251	23	20	36	62.7	34.8	25.8	7	103.2
13537	22	20	33	59.8	34.6	--	1	100.9
13534	20	19	32	59.7	34.4	--	1	100.3
1442	24	22	32	60.6	34.3	24.2	7	100.0
13532	19	18	31	60.2	34.0	--	1	99.1
13533	21	18	32	60.1	33.8	--	1	98.5
13535	25	20	33	57.9	32.4	--	1	94.5
13536	16	17	31	62.5	31.9	--	1	93.0
11669	19	18	32	59.1	31.6	25.3	7	103.0
11673	19	18	31	58.8	30.8	25.6	7	105.6
12517	19	18	31	59.5	30.8	26.4	7	109.1
8856	15	14	33	60.0	28.6	25.8	7	102.7
13023	20	18	30	62.3	25.5	27.9	6	115.3

Standard error of a difference = not significant.

Colby, Kansas
Four replications

C.I. No.	Date headed	Plant height	Weight per Bushel	Av. acre yield 1960	Av. acre yield 1955-1960	No. years grown	Percent of Kharkof
	May	In.	Lbs.	Bu.	Bu.		
12517	21	37	59.5	55.8	38.8	8	115.9
13537	23	37	59.5	54.4	--	1	112.4
13533	19	36	59.5	53.6	--	1	110.7
13023	19	35	60,0	53.1	39.6	5	117.8
6251	24	38	60.0	52.6	39.5	10	106.0
13536	18	37	60.0	50.7	--	1	104.8
11669	22	35	58.5	49.5	37.4	9	105.9
1442	27	38	58.5	48.4	33.6	10	100.0
11673	22	37	58.0	47.7	34.2	9	100.3
13534	22	36	58.0	46.7	--	1	96.5
13535	24	36	58.0	46.6	--	1	96.3
13532	20	36	57.5	46.6	--	1	96.3
8856	17	38	59.0	43.6	33.7	10	91.9

Standard error of a difference = 3.18 bushels.

Fort Collins, Colorado
Five replications, irrigated

C.I. No.	Date headed	Plant height	Lodging	Weight per bushel	Av. acre yield 1960	Av. acre yield 1955-1960 1/	No. years grown	Percent of Kharkof
	May	In.	%	Lbs.	Bu.	Bu.		
13534	31	36	0	62.2	56.7	--	1	129.5
13536	29	34	0	64.5	55.2	--	1	126.0
13533	29	36	0	63.0	53.0	--	1	121.0
12517	29	35	0	62.7	52.8	50.5	8	123.8
11673	31	35	0	62.2	50.2	49.2	20	109.7
11669	6-1	34	0	63.1	48.1	44.3	22	107.9
8856	27	35	28	62.9	47.9	49.8	24	100.8
13023	28	32	0	63.0	46.7	52.8	4	125.0
13532	31	35	0	62.7	46.7	--	1	106.6
13537	31	35	0	64.0	45.9	--	1	104.8
6251	31	37	44	62.7	45.5	41.5	24	100.5
1442	6-2	37	14	62.8	43.8	42.2	24	100.0
13535	6-3	40	0	61.7	42.4	--	1	96.3

1/ No data in 1955 and 1956.
Standard error of a difference = 3.84 bushels.

Springfield, Colorado
Five replications

C.I. No.	Date Headed	Date Ripe	Plant height	Weight per bushel	Av. acre yield 1960	Av. acre yield 1958-1960	No. years grown	Percent of Kharkof
	May	June	In.	Lbs.	Bu.	Bu.		
12517	21	28	24	61.3	44.0	40.7	3	108.3
13533	19	26	23	60.8	44.0	--	1	103.8
13534	21	28	23	60.7	43.7	--	1	103.1
6251	22	28	26	63.2	43.3	38.3	3	102.0
11673	20	27	24	61.1	43.0	38.6	3	102.7
1442	24	29	24	60.7	42.4	37.6	3	100.0
13537	23	27	24	61.5	41.8	--	1	98.6
13536	18	27	23	64.0	41.1	--	1	96.9
8856	14	25	24	64.2	39.9	39.5	3	105.1
13532	21	27	23	60.6	39.7	--	1	93.6
13023	16	27	21	63.4	39.3	40.1	3	106.7
13535	25	29	25	59.1	38.6	--	1	91.0
11669	24	29	23	60.8	37.0	35.0	3	93.1

Standard error of a difference = not significant.

Hesperus, Colorado
Seven replications, irrigated

C.I. No.	Date headed	Plant height	Lodging	Weight per bushel	Av. acre yield 1960	Av. acre yield 1955-1960	No. years grown	Percent of Kharkof
	June	In.	%	Lbs.	Bu.	Bu.		
1442	20	37	96	62.8	54.6	62.7	20	100.0
13536	15	35	98	64.1	51.5	--	1	94.3
13535	19	37	96	62.5	50.8	--	1	93.0
13533	16	36	94	62.9	49.7	--	1	91.0
13537	16	35	99	64.4	49.3	--	1	90.3
13532	15	33	93	62.0	49.1	--	1	89.9
13534	17	37	97	61.6	48.7	--	1	89.2
12517	14	35	98	64.0	47.2	66.7	10	106.5
6251	16	37	96	64.2	45.8	60.5	20	107.3
13023	13	33	91	65.2	44.8	60.7	6	96.9
8856	12	35	94	63.5	43.5	58.5	20	99.7
11673	15	37	98	63.1	42.3	65.8	20	115.3
11669	13	34	98	61.9	40.0	55.4	20	100.8

Standard error of a difference = not significant.

Lincoln, Nebraska
Six replications

C.I. No.	Date headed	Plant height	Rust: Leaf	Rust: Stem	Bunt 1/	Weight per bushel	Av. acre yield: 1960	Av. acre yield: 1955-1960 2/	No. years grown	Percent of Kharkof
	June	In.	%	%	%	Lbs.	Bu.	Bu.		
13537	1	36	8	40	90	62.4	46.1	--	1	144.1
11673	5-31	35	65	60	0	57.8	42.3	42.2	23	117.3
13532	1	34	T	18	35	60.6	41.6	--	1	130.0
13534	1	35	62	33	20	58.6	41.3	--	1	129.1
13535	5	37	T	65	50	58.0	40.7	--	1	127.2
11669	5-31	35	53	58	40	59.1	39.8	43.3	25	130.3
13023	5-31	33	57	60	20	61.1	39.0	44.6	5	129.9
13536	1	33	3-58	80	70	59.9	37.8	--	1	118.1
8856	5-30	36	70	38	50	61.6	37.8	39.6	28	121.2
13533	1	34	3-52	25	50	57.9	37.2	--	1	116.3
12517	1	34	58	70	5	56.0	35.7	41.7	11	126.0
6251	1	39	67	60	40	60.4	35.0	39.0	28	111.1
1442	5	38	68	70	60	56.6	32.0	34.3	28	100.0

1/ Data from bunt nursery.
2/ No yield data in 1959.
Standard error of a difference = 2.19 bushels.

North Platte, Nebraska
Three replications

C.I. No.	Date headed	Plant height	Shattering	Weight per bushel	Av. acre yield 1960	Av. acre yield 1955-1960	No. years grown	Percent of Kharkof
	June	In.	%	Lbs.	Bu.	Bu.		
13532	3	36	10	61.7	54.0	--	1	127.1
12517	1	36	0	62.4	49.6	39.5	12	114.6
11669	5-31	37	2	62.5	48.0	39.2	22	117.2
13023	2	35	0	61.7	47.7	40.0	6	109.5
13537	3	37	1	62.8	47.6	--	1	112.0
11673	2	37	2	61.6	46.7	38.3	20	109.8
13533	2	37	1	61.9	45.8	--	1	107.8
13536	2	36	0	63.1	44.7	--	1	105.2
13534	2	36	1	61.4	44.7	--	1	105.2
6251	2	43	0	62.6	43.9	36.0	23	97.3
8856	5-31	40	0	63.2	43.8	35.7	23	98.0
1442	4	42	1	61.8	42.5	36.5	23	100.0
13535	3	43	0	60.8	42.4	--	1	99.8

Standard error of a difference = not significant.

Alliance, Nebraska
Three replications

C.I. No.	Date headed	Weight per bushel	Av. acre yield 1960	Av. acre yield 1955-1960	No. years grown	Percent of Kharkof
	June	Lbs.	Bu.	Bu.		
12517	7	62.9	53.2	40.3	10	120.7
13537	7	63.1	51.7	--	1	111.4
11673	7	63.0	49.1	33.8	20	100.0
13534	9	61.5	48.3	--	1	104.1
13023	6	64.1	47.8	34.8	6	108.1
13533	8	62.2	47.6	--	1	102.6
1442	12	61.9	46.4	32.2	23	100.0
13536	7	63.2	44.7	--	1	96.3
11669	7	62.6	43.8	35.7	20	104.9
8856	5	63.2	43.3	33.2	23	92.7
13532	8	62.0	43.3	--	1	93.3
13535	9	61.1	40.5	--	1	87.3
6251	8	63.2	39.5	32.3	23	95.9

Standard error of a difference = not significant.

Ames, Iowa
Three replications

C.I. No.	Date Headed	Date Ripe	Plant height	Lodging	Weight per bushel	Av. acre yield 1960	Av. acre yield 1955-1960	No. years grown	Percent of Kharkof
	June	July	In.	%	Lbs.	Bu.	Bu.		
13532	2	11	42	13	59.7	67.0	--	1	145.7
13537	5	11	43	12	62.1	65.0	--	1	141.3
13536	5-31	11	43	8	61.1	64.7	--	1	140.7
11673	2	11	43	40	57.9	61.0	45.8	18	109.9
13023	1	11	42	10	62.3	60.4	51.0	6	128.3
8856	5-31	11	44	42	61.6	59.0	47.0	18	112.6
13534	2	11	43	23	58.3	58.4	--	1	127.0
6251	4	12	47	47	61.7	58.4	45.4	18	106.7
11669	2	9	43	18	61.4	56.5	46.9	18	119.3
13535	6	12	47	45	60.4	56.3	--	1	122.4
12517	1	11	43	35	60.2	55.2	50.7	10	133.1
13533	2	11	44	12	59.9	55.1	--	1	119.8
1442	7	14	46	43	57.9	46.0	39.8	18	100.0

Standard error of a difference = 2.76 bushels.

STANDARD ERRORS

Standard errors for the southern regional performance nursery at the reporting locations appear in table 2. The failure of many locations to report a significant difference in yields between varieties despite generally high yield levels and test weights raises the question of what occurred. The available information suggests the possibility of fall and winter injury to the wheat at severallocations due to low temperature that was not necessarily reflected in measurable stand differences associated with varieties. Mean nursery yields lower than 30 bushels per acre occurred only at Chillicothe, Bushland (dryland nursery), and Clovis. Coefficients of variation larger than 10 percent were reported from 11 nurseries.

SUMMARY OF NURSERY YIELDS

Yields by location, state averages and ranks, and regional yield averages for varieties in the southern regional performance nursery are summarized in table 3. Two-year averages and ranks appear in table 4.

The performance of C. I. 13537 in Oklahoma, Kansas, Nebraska, and Iowa is particularly noteworthy. Individual station data show that C. I. 13537 did particularly well at locations in the eastern part of the region. C. I. 13532, the second ranked variety in the nursery, also did best relatively at the more eastern locations in the region. No experimental variety in the nursery in 1960 was grown in 1959. Therefore, the 2-year comparisons are between named varieties. Among these, Concho has a 2-bushel yield advantage over Tascosa, the second most productive variety. Concho ranks first in all states except Texas, New Mexico, and Iowa. Tascosa ranks first in Texas and second in Oklahoma and Nebraska.

SUMMARY OF AGRONOMIC DATA

Wichita x Mql-Oro (C. I. 13536) and Tascosa in that order produced the highest test weight grain in the region in 1960 (table 5). The same varieties were earliest maturing among experimental strains in the nursery. Tascosa was the shortest strawed variety by 2 inches. Lodging differences among experimental strains were not large. All lodged somewhat more than Tascosa on the average. Tascosa and C. I. 13535 showed the least tendency to shatter. Good leaf rust resistance was exhibited by C. I. 13535, C. I. 13532, C. I. 13536, and C. I. 13537. Among the experimentals, only C. I. 13534 was more resistant than Pawnee to bunt on the average. The lack of bunt resistance among wheat strains in regional tests should be cause for concern. Excellent sources of bunt resistance are available in hard red winter wheats and should be utilized as fully as possible in breeding programs.

Table 2.--Number of replications, mean yields, and standard errors for the southern regional performance nursery at the reporting stations in 1960.

State and station	No. replications	No. varieties	Av. yield all varieties	Standard error of Diff. in means	Standard error of Mean	Coefficient of variability
			Bu.	Bu.	Bu.	%
TEXAS						
Denton	4	26	41.0	3.30	2.33	11.4
Chillicothe	4	26	29.1	2.62	1.85	12.7
Bushland(dryland)	4	29	19.5 1/	n.s.	n.s.	18.5
do. (irrigated)	3	29	63.6 1/	3.71	2.63	7.3
NEW MEXICO						
Clovis	6	13	15.7	2.46	1.74	27.2
OKLAHOMA						
Stillwater	4	13	48.3	3.59	2.54	10.5
Woodward	4	13	36.3	n.s.	n.s.	11.0
Cherokee	4	13	34.2	1.41	1.00	5.9
KANSAS						
Manhattan	4	13	33.2	1.82	1.29	7.8
Hays	4	13	45.7	n.s.	n.s.	16.1
Garden City	4	13	32.1	n.s.	n.s.	13.4
Colby	4	13	50.0	3.18	2.25	9.0
COLORADO						
Ft. Collins	5	13	48.8	3.84	2.72	12.4
Springfield	5	13	41.4	n.s.	n.s.	9.8
Hesperus	7	13	47.5	n.s.	n.s.	15.3
NEBRASKA						
Lincoln	5	13	39.0	2.19	1.55	8.9
North Platte	3	13	46.3	n.s.	n.s.	8.6
Alliance	3	13	46.1	n.s.	n.s.	11.0
IOWA						
Ames	3	64	58.7 1/	2.76	1.95	6.0

1/ Average yield based upon 13 varieties in southern regional nursery.

Table 3.--Summary of average yields in bushels per acre made by 13 varieties grown in the southern regional performance nursery at 18 stations in 1960, with state averages and rank.

Variety	C.I. No.	Texas					New Mexico		Oklahoma				
		Denton	Chillicothe	Bushland	Ave.	Rank	Clovis	Rank	Stillwater	Chero-kee	Woodward	Ave.	Rank
(RCh x Tk-Oro-Fn) x Mql-Oro	13537	42.4	29.6	15.9	29.3	6	10.3	12	54.2	41.1	39.5	44.9	1
Pnc x Mi-Hope-Pn	13532	45.2	28.1	19.5	30.9	5	15.3	4	50.0	35.9	35.8	40.6	3-4
Wichita x Mql-Oro	13536	45.4	30.4	22.9	32.9	1	15.4	3	50.4	35.7	36.8	41.0	2
Concho	12517	40.7	27.0	19.4	29.0	8	14.4	5	52.0	31.2	37.4	40.2	6
(Mql-Oro x Oro-Tm)x Mi-Hope-Pn	13533	40.5	31.9	22.5	31.6	3	12.2	11	48.4	30.5	36.6	38.5	10
(Cmn x Mi-Hope) x Iowin	13534	38.5	18.6	20.2	25.8	12	13.0	7	50.0	36.7	34.7	40.5	5
Comanche	11673	40.5	29.1	17.6	29.1	7	12.6	9	44.5	36.0	34.4	38.3	11
Tascosa	13023	41.5	34.8	21.9	32.7	2	13.5	6	50.2	34.0	32.7	39.0	7-8
Blackhull	6251	34.5	29.0	18.4	27.3	10	17.5	2	51.8	29.5	35.7	39.0	7-8
Early Blackhull	8856	40.1	31.9	22.1	31.4	4	18.5	1	42.0	33.2	36.6	37.3	12
Pawnee	11669	36.8	26.0	19.8	27.5	9	12.5	10	46.9	32.5	36.4	38.6	9
Kv x (Iow x Tt-WP 5)	13535	35.4	24.6	16.0	25.3	13	10.0	13	46.3	36.9	38.7	40.6	3-4
Kharkof	1442	32.9	27.7	17.0	25.9	11	12.7	8	41.4	31.7	36.6	36.6	13

C.I. No.	Iowa		Kansas						Colorado					Nebraska					18 station average
	Ames	Rank	Manhattan	Hays	Garden City	Colby	Ave.	Rank	Ft. Collins	Hesperus	Spring-field	Ave.	Rank	Lincoln	North Platte	Alliance	Ave.	Rank	
13537	65.0	2	44.1	40.2	34.6	54.4	43.3	1	45.9	49.3	41.8	45.7	6	46.1	47.6	51.7	48.5	1	41.9
13532	67.0	1	38.9	51.4	34.0	46.6	42.7	3	46.7	49.1	39.7	45.2	7-8	41.6	54.0	43.3	46.3	2	41.2
13536	64.7	3	32.5	47.4	31.9	50.7	40.6	5	55.2	51.5	41.1	49.3	2	37.8	44.7	44.7	42.4	9	41.1
12517	55.2	11	32.1	46.6	30.8	55.8	41.3	4	52.8	47.2	44.0	48.0	4	35.7	49.6	53.2	46.2	3	40.3
13533	55.1	12	27.5	45.0	33.8	53.6	40.0	8	53.0	49.7	44.0	48.9	3	37.2	45.8	47.6	43.5	8	39.7
13534	58.4	7-8	37.7	39.3	34.4	46.7	39.5	10	56.7	48.7	43.7	49.7	1	41.3	44.7	48.3	44.8	5-6	39.5
11673	61.0	4	32.7	49.0	30.8	47.7	40.1	7	50.2	42.3	43.0	45.2	7-8	42.3	46.7	49.1	46.0	4	39.4
13023	60.4	5	24.9	48.1	25.5	53.1	37.9	12	46.7	44.8	39.3	43.6	12	39.0	47.7	47.8	44.8	5-6	39.2
6251	58.4	7-8	37.2	47.2	34.8	52.6	43.0	2	45.5	45.8	43.3	44.9	9	35.0	43.9	39.5	39.5	13	38.9
8856	59.0	6	31.2	42.4	28.6	43.6	36.5	13	47.9	43.5	39.9	43.8	11	37.8	43.8	43.3	41.6	10	38.1
11669	56.5	9	30.3	49.8	31.6	49.5	40.3	6	48.1	40.0	37.0	41.7	13	39.8	48.0	43.8	43.9	7	38.1
13535	56.3	10	30.8	43.9	32.4	46.6	38.4	11	42.4	50.8	38.6	43.9	10	40.7	42.4	40.5	41.2	11	37.4
1442	46.0	13	31.8	44.0	34.3	48.4	39.6	9	43.8	54.6	42.4	46.9	5	32.0	42.5	46.4	40.3	12	37.0

Table 4.--Summary of two-year average yields in bushels per acre for 7 varieties grown in the southern regional performance nursery at 16 stations in 1959 and 1960, with state averages and rank.

Variety	C.I. No.	Texas					New Mexico		Oklahoma					Iowa	
		Denton	Chillicothe	Bushland	Average	Rank	Clovis	Rank	Stillwater	Chero-kee	Woodward	Average	Rank	Ames	Rank
Concho	12517	36.9	25.3	24.8	29.0	2	15.3	4	48.8	26.8	44.5	40.0	1	50.3	3
Tascosa	13023	35.8	29.4	24.1	29.8	1	13.9	6	44.6	30.3	41.2	38.7	2	46.9	6
Comanche	11673	38.0	24.4	23.0	28.5	3	15.2	5	41.6	28.3	36.8	35.6	4	51.1	1
Early Blackhull	8856	37.1	23.1	24.2	28.1	4	16.2	3	44.8	35.5	35.2	38.5	3	50.5	2
Blackhull	6251	32.1	24.1	23.7	26.6	7	18.6	1	42.7	23.7	37.9	34.8	5	48.1	5
Kharkof	1442	33.9	25.6	21.6	27.0	5	17.9	2	36.2	22.5	37.2	32.0	7	41.0	7
Pawnee	11669	32.2	24.1	23.8	26.7	6	12.4	7	41.6	22.8	37.0	33.8	6	48.6	4

C.I. No.	Kansas					Colorado					Nebraska				16 station average
	Manhattan	Garden City	Colby	Average	Rank	Ft. Collins	Hesperus	Spring-field	Average	Rank	North Platte	Alliance	Average	Rank	
12517	39.0	26.6	42.5	36.0	1	46.1	60.5	40.4	49.0	1	47.2	40.2	43.7	1	38.5
13023	31.9	23.9	40.3	32.0	5	45.2	57.1	38.6	47.0	5	47.9	32.8	40.4	2	36.5
11673	35.7	27.7	34.6	32.7	3	43.4	61.8	38.8	48.0	3	45.9	34.4	40.2	3	36.3
8856	33.9	25.0	36.5	31.8	6	49.0	54.8	38.8	47.5	4	42.8	30.9	36.9	5	36.1
6251	34.6	29.4	39.2	34.4	2	40.3	60.3	39.1	46.6	6	43.5	29.0	36.3	7	35.4
1442	29.7	27.3	34.6	30.5	7	40.7	66.0	38.4	48.4	2	40.7	32.2	36.5	6	34.1
11669	33.2	27.2	37.0	32.5	4	38.2	53.7	33.6	41.8	7	45.2	29.7	37.5	4	33.8

Table 5.--Summary of agronomic data other than yield for varieties grown in the southern regional performance nursery in 1960.

Variety	C.I. No.	Date Headed	Date Ripe	Plant height	Lodging	Shattering 1/	Diseases Leaf rust	Diseases Bunt	Weight per bushel
		May	June	In.	%		%	%	Lbs.
Number of stations		18	6	17	5	2	4	2	18
Wichita x Mql-Oro	13536	19	18	33	32	1.6	7	83	62.1
Tascosa	13023	20	18	31	30	1.5	34	55	61.8
Early Blackhull	8856	17	16	34	62	1.7	49	70	61.5
(RCh x Tk-Oro-Fn)xMql-Oro	13537	23	21	33	37	2.1	9	94	61.5
Blackhull	6251	23	21	36	75	1.6	57	60	61.3
Pawnee	11669	22	20	33	40	3.0	38	28	60.1
Concho	12517	21	19	33	43	2.1	43	5	60.0
Pnc x Mi-Hope-Pn	13532	21	19	33	37	3.8	3	53	60.0
(Mql-Oro x Oro-Tm)xMi-Hope-Pn	13533	21	19	34	33	2.0	24	70	60.0
Kharkof	1442	26	23	35	68	2.3	56	75	59.9
Comanche	11673	22	19	34	39	2.4	43	1	59.9
(Cmn x Mi-Hope) x Iowin	13534	20	21	34	44	3.1	51	15	59.6
Kv x (Iow x Tt-WP 5)	13535	25	22	36	45	1.5	T	34	59.3

1/ Rating based on 1-5 scale, 1 = no shattering.

NORTHERN REGIONAL PERFORMANCE NURSERY

The nursery contained 29 entries in 1960. Data were reported from 14 locations. Twelve of the stations grew replicated rod-row plots from which yields were reported. The nursery at Dickinson, North Dakota, did not survive the winter and at Havre, Montana, it was not seeded. Nursery data from reporting stations appear in table 6. Entries in the 1960 nursery with state and C. I. numbers are shown in the listing that follows.

Entry No.	Variety or pedigree	State No.	C. I. No.
1	Kharkof		1442
2	Minter		12138
3	Yogo		8033
4	Nebred		10094
5	Warrior		13190
6	Cheyenne		8885
7	Cheyenne selection		13192
8	Cheyenne selection		13193
9	Minnesota selection		13506
10	do.		13280
11	do.		13281
12*	do.	III-54-26	13194
13*	Nebred x RedChief	533570	13195
14*	(Cmn x Mi-Hope) x Iowin	55175	13534
15*	Kv x (Iow x Tt-WP5)	55172	13535
16	South Dakota selection		13526
17	do.		13528
18*	do.	56-197	13198
19*	do.	56-292	13530
20*	do.	56-423	13531
21	Yogo x (Tk x Oro 221)-66		13427
22*	do. -9		13538
23*	do. -14		13539
24*	do. -29		13540
25*	do. -60		13541
26*	do. -117		13542
27*	Yogo x (Yogo x Rescue 5)-1612		13543
28*	(Yogo x Rescue 21) x Marmin-1065		13544
29*	Marmin x (Yogo x Rescue 5)-342		13545

* New entry in 1960.

DATA OBTAINED

The nursery at Ames was seeded at the normal date, Full stands were obtained and fall growth was adequate. All entries survived the winter and satisfactory conditions of moisture and temperature during the spring permitted high yields of grain. Septoria leaf blotch became heavy and was the only disease of consequence in the nursery. The Nebraska entries Warrior and Nebred x RedChief (C. I. 13195) and C. I. 13530 from South Dakota were the most productive. Nebred x RedChief lodged the least in the nursery but C. I. 13530 lodged heavily. Warrior was intermediate in lodging.

Soil moisture was good at seeding time and during the winter at Clovis but there was no effective precipitation in March, April, and May. Late-maturing varieties may have benefited from rain that fell on June 6. Kharkof produced the most grain although yield differences were not statistically significant.

High yields of grain at Colby reflect the generally excellent conditions that prevailed throughout the season. Nearly 3 inches of rain on June 11 caused heavy lodging and many of the varieties failed to fill properly. Shriveled grain and below-normal bushel weights resulted. Plot variability was high and yield differences were not significant. Cheyenne and Warrior produced the highest yields.

High yields of high-test-weight grain were made by entries in the northern regional nursery at North Platte. Fourteen varieties yeilded more than 40 bushels per acre and all varieties produced grain weighing more than 60 pounds per bushel. Severe shattering occurred in several of the Minnesota entries before the plots were harvested.

Both yields of grain and test weights were lower at Alliance than at North Platte. Yield differences were not statistically significant.

Rod-row observation plots were grown at Lincoln for disease and agronomic information other than yield. Leaf rust became epidemic as did stem rust. The latter resulted in part from artificial inoculation of adjacent breeding nurseries. Bunt readings were from an inoculated bunt nursery. The combined disease resistance of the Minnesota entries was outstanding and was reflected in test weight of the grain which was several pounds higher than that of the rust susceptible varieties. C. I. 13526, a promising early maturing strain from South Dakota, segregated for leaf rust and exhibited moderate resistance to stem rust.

Low temperatures occurred early in the fall at Laramie and little fall growth of the wheat occurred. Some winter killing was noted in the nursery. Stem and stripe rust was present but not heavy. The nursery was irrigated. Yields and test weights varied widely. Warrior was exceeded in yield only by Minter and has an outstanding 4-year yield record at Laramie.

The dryland nursery grown at Archer was highly uniform and yield differences of only 1.99 bushels were required for significance. South Dakota selection (C. I. 13526) was the second-most-productive variety and has as well an outstanding 2-year average yield at Archer.

Heavy runoff in the spring caused washing and loss of stand in several plots at Sheridan. Below-normal precipitation during the growing season was associated with temperatures that were above normal. A total of 4 inches of rain was received between January 1 and July 31. Cheyenne, the Cheyenne selections (C. I. 13192 and C. I. 13193), and Warrior have the best period-of-years yield records at Sheridan.

Winter killing, heavy leaf and stem rust, scab, and intense heat and drought in early July affected the nursery at Brookings. The Minnesota and South Dakota entries survived the winter best with C. I. 13198, C. I. 13526, and Yogo the least damaged. The stem-rust-resistant strains from these two states were significantly the most productive. They also made grain with the highest test weight. The same strains had the lowest scab readings.

Winter killing and stem rust were the dominating factors affecting performance at St. Paul. Generally the strains that were most resistant to stem rust and survived well were the most productive. C. I. 13280 was the highest yielding but did not survive as well as C. I. 13526, C. I. 13530, and C. I. 13528 from South Dakota. C. I. 13280 exhibited high resistance to mildew.

An observation row of each entry was grown at Waseca. Stem rust became heavy and light to moderate lodging occurred. C. I. 13526, C. I. 13534, and C. I. 13530 were the earliest maturing strains.

Some winter killing occurred in all varieties at Grand Rapids but was not severe in any of the varieties. Stem and leaf rust were epidemic and lodging was severe in some entries. Varieties with combined resistance to leaf and stem rust were highest yielding. Stem-rust-resistant varieties produced grain with the highest test weight.

Cheyenne Selection (C. I. 13192), Warrior, and Cheyenne yielded the best at Lethbridge. Winter killing did not occur. Nebred x RedChief (C. I. 13195) produced the heaviest grain. Among varieties in the nursery grown more than 1 year, C. I. 13427 from Montana has the highest yield average at Lethbridge.

Table 6.--Yield and other data for varieties grown in the northern regional performance nursery at 14 locations in 1960, with period-of-years averages.

Ames, Iowa
Three replications

C.I. No.	Date Headed	Date Ripe	Plant height	Lodging	Weight per bushel	Av. acre yield 1960	Av. acre yield 1959-1960	No. years grown	Percent of Kharkof
	June	July	In.	%	Lbs.	Bu.	Bu.		
13190	4	11	43	25	59.1	59.3	49.8	3	147.6
13195	5	13	46	10	62.2	59.2	--	1	128.7
13530	5	11	45	52	59.6	59.2	---	1	128.7
13534	2	11	43	23	58.3	58.4	--	1	127.0
13280	7	14	46	55	58.8	58.0	54.7	3	159.8
13528	5	13	44	22	59.9	57.5	48.2	2	117.6
13538	6	15	50	42	59.4	57.4	--	1	124.8
13506	7	14	46	47	59.8	57.3	52.2	3	149.9
10094	5	11	45	50	60.3	57.1	46.0	8	102.2
13535	6	12	47	45	60.4	56.3	--	1	122.4
13194	8	14	47	30	60.3	55.4	--	1	120.4
13193	7	13	45	55	57.9	55.2	45.6	3	138.8
13545	7	14	49	50	60.2	54.8	--	1	119.1
13544	9	14	49	33	59.4	54.4	--	1	118.3
8885	6	11	44	38	57.9	53.8	44.4	3	141.2
13543	7	13	49	63	59.2	53.7	--	1	116.7
13281	9	14	45	50	59.0	53.5	51.5	3	141.4
13192	6	12	43	23	58.8	53.4	45.1	3	131.8
13531	9	14	47	43	57.8	52.9	--	1	115.0
13526	3	11	43	17	60.2	52.7	49.3	2	120.3
13427	8	15	50	47	58.2	52.6	40.6	2	99.1
12138	9	14	48	37	59.7	51.4	44.8	8	104.4
13542	7	14	49	55	55.8	50.6	--	1	110.0
13539	8	14	49	52	58.1	48.7	--	1	105.9
8033	10	15	48	65	58.9	48.7	40.5	8	91.8
13198	9	13	46	32	59.7	48.7	--	1	105.9
13540	9	15	51	57	57.5	48.6	--	1	105.7
13541	8	14	49	46	55.9	48.1	--	1	104.6
1442	7	14	46	43	57.9	46.0	41.0	8	100.0

Standard error of a difference = 2.76 bushels.

Clovis, New Mexico
Six replications

C.I. No.	Date headed	Plant height	Shattering score 1/	Weight per bushel	Av. acre yield 1960	Av. acre yield 1959-1960	No. years grown	Percent of Kharkof
	May	In.		Lbs.	Bu.	Bu.		
1442	17	20	2.5	58.9	14.1	16.8	2	100.0
13506	18	19	2.5	56.4	12.1	14.9	2	88.7
13280	17	19	2.0	56.1	11.8	13.5	2	80.3
13190	14	16	2.7	58.6	11.6	13.8	2	82.1
13195	15	21	1.9	60.0	11.6	--	1	82.3
8885	16	15	2.2	59.3	11.5	16.1	2	95.8
13531	18	21	2.2	57.0	11.3	--	1	80.1
13192	16	16	2.8	59.2	11.1	14.9	2	88.7
13193	18	18	2.2	59.5	11.1	15.7	2	93.5
13534	13	19	4.0	57.9	11.0	--	1	78.0
13526	13	16	1.9	58.3	10.8	10.7	2	63.7
10094	16	17	2.0	58.8	10.6	15.2	2	90.5
13194	18	18	2.2	56.6	10.4	--	1	73.8
13528	17	18	2.0	57.8	10.2	13.9	2	82.7
13198	19	19	2.0	58.4	10.0	--	1	70.9
13539	18	17	2.0	57.0	9.7	--	1	68.8
13535	15	19	1.9	55.7	9.6	--	1	68.1
8033	19	19	2.0	58.3	9.3	12.5	2	74.4
13427	19	19	2.0	58.1	9.3	14.1	2	83.9
13530	16	20	2.0	57.5	9.1	--	1	64.5
13544	18	21	2.0	57.4	9.0	--	1	63.8
13281	18	17	2.1	55.7	8.7	11.7	2	69.6
13542	18	18	2.0	57.8	8.4	--	1	59.6
13538	18	18	2.0	57.2	8.3	--	1	58.9
12138	18	19	2.0	57.9	7.9	14.8	2	88.1
13541	18	19	2.0	57.5	7.7	--	1	54.6
13540	18	18	2.0	57.4	6.4	--	1	45.4
13543	17	17	1.9	58.3	5.9	--	1	41.8
13545	18	19	2.1	57.6	5.4	--	1	38.3

1/ Based on 1 to 5 scale; 1 = no shattering.

Standard error of a difference = not significant.

Colby, Kansas
Four replications

C.I. No.	Date headed	Weight per bushel	Average acre yield	Percent of Kharkof
	May	Lbs.	Bu.	
8885	30	56.5	47.5	115.6
13190	26	53.5	47.3	115.1
13280	30	55.5	43.1	104.9
13195	28	58.5	41.6	101.2
1442	31	55.5	41.1	100.0
13528	30	55.0	41.0	99.8
13535	27	55.5	40.9	99.5
13545	30	55.0	40.0	97.3
13192	31	54.0	39.7	96.6
13534	26	52.5	39.2	95.4
12138	6-1	56.5	39.2	95.4
13194	30	55.0	39.0	94.9
13198	6-1	55.0	37.2	90.5
13538	30	54.0	36.9	89.8
13281	31	55.5	36.6	89.1
13539	6-1	55.0	36.4	88.6
13543	30	54.5	36.0	87.6
13526	26	54.0	35.8	87.1
13531	6-1	52.0	35.4	86.1
13193	30	54.0	35.3	85.9
13506	31	53.0	33.0	80.3
13544	6-2	54.5	32.5	79.1
10094	28	54.5	32.0	77.9
13427	6-1	54.0	31.5	76.6
13542	6-1	54.0	31.2	75.9
8033	31	54.0	30.1	73.2
13530	30	53.5	29.2	71.0
13541	31	54.0	28.7	69.8
13540	6-2	53.0	25.4	61.8

Standard error of a difference = not significant.

North Platte, Nebraska
Three replications

C.I. No.	Date headed	Plant height	Shattering	Weight per bushel	Av. acre yield 1960	Av. acre yield 1959-1960	No. years grown	Percent of Kharkof
	June	In.	%	Lbs.	Bu.	Bu.		
13280	4	40	40	61.8	51.2	39.7	2	123.7
13544	6	47	10	61.8	51.2	--	1	141.4
13506	7	43	40	61.5	51.2	37.7	2	117.4
13530	2	40	0	61.9	50.4	--	1	139.2
13528	3	39	5	62.0	49.7	39.7	2	123.7
13194	7	43	50	62.5	48.9	--	1	135.1
13190	3	37	1	61.6	48.9	42.7	2	133.0
13281	7	43	15	60.9	47.9	39.0	2	121.2
13531	6	41	1	60.1	47.9	--	1	132.3
13534	2	38	15	61.3	46.0	--	1	127.1
13198	6	44	1	61.7	45.5	--	1	125.7
8885	4	40	5	61.8	44.9	39.8	2	124.0
13542	6	47	0	61.7	44.7	--	1	123.5
13195	2	39	0	63.5	44.5	--	1	122.9
13192	4	37	15	61.0	44.5	39.4	2	122.4
13193	5	39	10	61.6	44.4	38.0	2	118.1
13543	5	46	1	61.6	43.9	--	1	121.3
12138	6	43	0	61.8	42.6	34.9	2	108.7
13538	6	49	0	61.6	42.5	--	1	117.4
10094	4	38	0	62.0	42.5	38.3	2	119.3
13526	3	38	0	62.1	42.3	36.5	2	113.7
13535	4	44	1	61.4	41.5	--	1	114.6
13545	6	43	10	62.5	40.4	--	1	111.6
13427	5	47	1	61.6	40.4	32.8	2	102.2
13540	8	49	1	61.6	38.4	--	1	106.1
8033	5	47	0	62.3	37.7	30.4	2	94.4
13541	7	48	1	62.1	37.1	--	1	102.5
13539	7	47	0	60.9	36.3	--	1	100.3
1442	6	41	0	60.8	36.2	32.1	2	100.0

Standard error of a difference = 3.66 bushels.

Alliance, Nebraska
Three replications

C.I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield 1960	Av. acre yield 1958-1960 1/	No. years grown	Percent of Kharkof
	June	In.	Lbs.	Bu.	Bu.		
10094	10	47	60.7	42.1	45.7	9	114.3
13195	9	44	63.9	41.7	--	1	129.1
13193	11	43	61.8	41.5	46.7	2	117.0
8885	11	44	61.9	40.6	45.3	3	113.1
13192	10	46	61.5	39.3	47.8	3	115.2
13198	12	40	61.5	38.3	--	1	118.6
13194	11	45	61.2	37.8	--	1	117.0
13538	12	44	61.7	37.6	--	1	116.4
13526	10	42	61.7	37.0	--	1	114.6
13542	12	42	61.4	36.7	--	1	113.6
13539	12	43	61.2	36.0	--	1	111.5
8033	12	43	60.8	36.0	38.1	9	87.5
13543	11	41	60.5	35.9	--	1	111.1
13541	11	47	61.3	35.4	--	1	109.6
13528	11	43	62.3	35.4	--	1	109.6
12138	11	44	60.7	35.0	40.1	9	92.9
13281	11	48	60.0	35.0	41.6	3	104.6
13535	10	45	60.1	34.5	--	1	106.8
13280	10	45	60.3	34.3	41.3	3	111.5
13534	10	44	59.6	34.3	--	1	106.2
13190	8	45	60.5	34.3	44.2	3	109.1
13531	11	46	59.8	34.2	--	1	105.9
13530	10	47	59.9	33.8	--	1	104.6
13540	12	44	61.2	33.6	--	1	104.0
13545	11	47	61.1	33.3	--	1	103.1
1442	11	44	60.5	32.3	40.0	9	100.0
13544	11	44	60.5	31.6	--	1	97.8
13427	12	42	60.3	31.1	--	1	96.3
13506	11	44	59.1	29.0	38.6	2	96.5

1/ No data in 1959.

Standard error of a difference = not significant.

Lincoln, Nebraska
Single observation plots

C.I. No.	Date headed	Plant height	Rust		Bunt	Weight per bushel
			Leaf	Stem		
	June	In.	%	%	%	Lbs.
13281	6	38	T-60	5MR	2	60.0
13506	6	41	5	5MR	10	59.0
13280	3	36	5-70	5MR	T	59.0
13194	6	37	2	5MR	5	59.0
12138	6	40	45	25MS	2	58.0
13526	2	34	5-65	20MR	35	58.0
13198	6	37	65	20S	10	57.0
13530	2	37	50	10MS	10	57.0
13534	2	33	T-70	20MS	15	56.0
13535	6	38	T	50	25	56.0
13528	3	35	70	20MR-MS	30	56.0
1442	5	42	70	60	70	55.5
13195	2	34	70	90	0	55.5
10094	3	34	85	70	T	54.5
13544	6	42	75	80	1	54.5
13190	3	35	70	50	25	53.5
13545	6	40	75	80	35	53.0
8033	6	43	70	70	5	52.5
8885	4	36	85	70	60	51.5
13541	6	43	85	90	0	51.5
13542	6	43	80	80	0	51.5
13193	4	36	85	70	75	50.5
13531	5	37	10-80	90	5	50.0
13538	6	42	75	80	0	50.0
13543	6	42	85	80	1	49.5
13192	4	34	85	70	60	49.0
13427	6	42	75	90	T	49.0
13539	6	41	85	90	0	49.0
13540	7	44	85	80	0	47.5

Laramie, Wyoming
Four replications, irrigated

C.I. No.	Date headed	Plant height	Rust: Stripe	Rust: Stem	Weight per bushel	Av. acre yield: 1960	Av. acre yield: 1959-1960	No. years grown	Percent of Kharkof
	July	In.	%	%	Lbs.	Bu.	Bu.		
12138	4	46	0	5	58.4	62.7	68.8	9	94.6
13190	6-28	37	5	20	57.8	61.2	73.8	4	113.4
13530	6-29	44	T	5-15 (seg)	57.8	61.0	--	1	107.0
13281	5	42	0	T (R)	56.7	58.4	63.4	4	93.2
1442	2	48	0	25	55.9	57.0	66.2	9	100.0
13528	1	37	T	7(seg)	59.4	54.8	62.9	2	95.0
13280	1	35	0	T (R)	57.7	54.7	65.0	4	101.4
13192	6-30	38	0	20	58.4	53.2	68.1	4	111.6
13543	4	41	7	10	57.0	52.0	--	1	91.2
8885	1	41	0	17	57.2	50.6	65.9	4	109.2
13541	5	42	T	7	55.9	50.4	--	1	88.4
13526	6-29	35	0	T	60.3	49.1	55.8	2	84.3
13542	5	45	T	12	56.5	49.0	--	1	86.0
13193	1	40	0	22	55.4	47.8	65.4	3	102.8
13427	4	46	5	12	56.5	47.8	62.2	2	93.9
8033	5	47	5	20	58.4	45.8	57.2	9	92.6
13198	5	42	T	5	58.0	45.8	--	1	80.4
13535	4	38	T	12(seg)	51.5	45.2	--	1	79.3
10094	6-29	36	T	20	59.2	45.0	58.8	9	88.2
13534	3	30	T	10(seg)	57.9	44.7	--	1	78.4
13531	2	44	0	20	54.9	44.4	--	1	77.9
13540	4	47	T	7	54.6	44.4	--	1	77.9
13506	4	40	0	T	57.3	41.2	52.9	3	78.1
13538	1	43	T	17	56.5	41.1	--	1	72.1
13194	6	38	T	0	57.5	39.6	--	1	69.5
13545	4	37	T	10	53.5	38.4	--	1	67.4
13539	6	42	10	17	53.4	38.3	--	1	67.2
13544	6	39	0	10	52.1	35.6	--	1	62.5
13195	4	35	7	20	56.7	31.1	--	1	54.6

Standard error of a difference = 6.38 bushels.

Archer, Wyoming
Four replications

C.I. No.	Plant height	Weight per bushel	Av. acre yield 1960	Av. acre yield 1959-1960	No. years grown	Percent of Kharkof
	In.	Lbs.	Bu.	Bu.		
10094	31	60.5	29.8	19.3	6	103.5
13534	30	59.0	29.5	--	1	110.1
13526	30	60.0	29.5	20.8	2	115.5
13192	27	60,0	29.1	22.5	4	105,9
13280	32	57.0	28.8	19.2	4	97.3
13531	32	59.0	28.2	--	1	105.2
13190	31	59.5	27.9	19.9	4	108.8
8885	32	59.0	27.4	16.0	4	97.9
13506	30	58.0	27.3	18.8	3	93.4
13193	28	61.0	27.2	18.4	3	102.8
13194	31	58.0	27.1	--	1	101.1
13528	30	58.5	27.0	18.2	2	100.8
1442	32	58.5	26.8	18.0	6	100.0
13198	32	59.0	26.7	--	1	99.6
13281	30	60.0	25.9	17.5	4	97.5
13195	30	60.5	25.1	--	1	93.7
13545	33	60.5	24.9	--	1	92.9
13539	33	57.5	24.8	--	1	92.5
13541	34	57.5	24.7	--	1	92.2
13542	34	57.5	24.0	--	1	89.6
12138	31	60.0	23.8	14.1	6	91.7
13544	32	58.0	23.6	--	1	88.1
13543	33	59.5	23.4	--	1	87.3
13535	32	56.5	23.4	--	1	87.3
13530	29	58.0	22.9	--	1	85.4
13427	31	56.5	22.7	15.9	2	88.3
13538	34	58.0	22.5	--	1	84.0
8033	30	60.0	22.4	13.4	6	91.9
13540	31	58.0	21.6	--	1	80.6

Standard error of a difference = 1.99 bushels.

Sheridan, Wyoming
Four replications

C.I. No.	Plant height	Weight per bushel	Av. acre yield 1960	Av. acre yield 1959-1960	No. years grown	Percent of Kharkof
	In.	Lbs.	Bu.	Bu.		
13193	34	64	32.2	32.3	3	115.4
13192	33	62	31.8	29.2	4	116.2
13530	36	61	31.1	--	1	109.9
13540	39	60	30.4	--	1	107.4
13544	37	60	30.4	--	1	107.4
8033	35	61	29.7	30.0	9	106.3
13541	38	62	29.5	--	1	104.2
13280	36	62	29.4	27.3	4	104.8
13539	37	62	29.2	--	1	103.2
8885	33	62	28.8	32.1	4	118.3
13427	36	60	28.6	29.2	2	97.7
13538	37	60	28.3	--	1	100.0
1442	34	60	28.3	29.9	9	100.0
13531	37	62	28.0	-	1	98.9
13194	35	61	26.8	--	1	94.7
13190	34	61	26.6	27.8	4	112.1
13281	37	60	26.6	27.1	4	101.9
13543	38	59	26.6	--	1	94.0
13506	35	60	26.5	26.7	3	92.3
13542	35	62	26.3	--	1	92.9
12138	36	62	25.6	28.3	9	101.3
13198	35	62	25.6	--	1	90.5
10094	31	64	24.6	27.6	9	105.6
13526	34	61	23.6	23.0	2	77.1
13528	33	60	23.2	24.3	2	81.2
13545	35	60	23.0	--	1	81.3
13535	36	59	21.9	--	1	77.4
13534	33	61	20.6	--	1	72.8
13195	28	60	18.9	--	1	66.8

Standard error of a difference = 2.76 bushels.

Brookings, South Dakota
Three replications

C.I. No.	Date headed	Winter survival	Rust Leaf	Rust Stem	Scab rating 1/	Weight per bushel	Av. acre yield 1960	Av. acre yield 1959-1960	No. years grown	Percent of Kharkof
	June	%	%	%		Lbs.	Bu.	Bu.		
13281	25	63	20	20	5	56.7	31.2	28.2	4	151.1
13506	23	70	15	15	5	56.6	29.8	25.7	3	120.5
13280	23	62	15	10	5	57.2	26.6	25.2	4	130.7
12138	25	73	40	12	5	56.8	24.6	23.8	8	130.2
13198	23	83	50	12	6	56.0	22.2	--	1	200.0
13194	23	47	30	10	6	58.0	21.7	--	1	195.5
13528	22	78	55	15	5	55.5	21.5	23.6	2	156.9
13530	26	73	40	20	7	53.9	20.9	--	1	188.3
13526	21	80	40	5	4	56.0	20.8	20.8	2	135.6
8033	26	87	70	72	7	44.4	13.4	16.2	8	114.9
13538	25	78	70	50	7	44.0	12.0	--	1	108.1
13543	27	72	80	60	6	43.0	11.8	--	1	106.3
1442	23	58	65	60	7	43.2	11.1	15.3	8	100.0
10094	24	60	70	60	8	45.2	10.8	13.3	8	107.3
8885	25	68	75	65	8	45.0	10.7	13.7	4	92.6
13544	26	47	85	60	7	49.3	10.2	--	1	91.9
13535	25	25	60	40	8	54.5	9.3	--	1	83.8
13190	23	48	80	50	9	41.1	8.9	12.5	4	85.3
13534	25	35	50	45	8	50.4	8.6	--	1	77.5
13192	25	55	80	70	9	41.0	7.9	11.9	4	92.7
13427	27	68	80	70	8	41.8	7.8	10.5	2	68.6
13541	28	57	70	70	9	43.7	7.7	--	1	69.4
13542	28	58	80	60	9	45.0	7.1	--	1	64.0
13539	27	67	75	75	7	40.5	7.0	--	1	63.1
13193	24	40	80	60	9	40.2	6.5	13.3	3	86.7
13531	27	55	80	60	9	40.2	4.3	--	1	38.7
13545	27	30	70	80	8	45.7	4.3	--	1	38.7
13540	29	57	85	72	10	39.4	4.3	--	1	38.7
13195	25	33	70	60	10	49.8	2.9	--	1	26.1

1/ Ratings based on 1 to 10 scale

Standard error of a difference = 5.85 bushels.

St. Paul, Minnesota
Three replications

C.I. No.	Date Headed	Date Ripe	Plant height	Winter survival	Lodging 1/	Diseases: Stem rust	Diseases: Mildew 2/	Weight per bushel	Average acre yield	Percent of Kharkof
	June	July	In.	%		%		Lbs.	Bu.	
13280	16	24	39	68	4	T	2	56.7	49.3	191.1
13526	15	25	39	93	2	5	8	57.3	47.7	184.9
13506	17	24	37	82	6	T	8	55.0	45.3	175.6
13530	14	25	37	93	5	40	7	54.2	45.1	174.8
13534	14	24	35	40	3	70	5	53.0	40.8	158.1
13194	18	25	39	62	4	T	6	55.5	40.4	156.6
13528	17	25	38	87	4	10	5	58.3	40.2	155.8
12138	18	25	38	90	4	15	4	56.7	39.9	154.7
13281	18	25	40	75	4	T	7	54.5	37.7	146.1
13198	18	26	39	65	4	15	5	57.8	37.1	143.8
8033	20	25	39	67	4	70	7	55.3	35.4	137.2
8885	18	24	38	55	3	90	8	53.8	32.8	127.1
13531	17	23	41	77	5	80	9	51.2	30.2	117.1
13190	15	25	36	50	3	60	8	52.7	29.5	114.3
13541	20	26	40	43	3	80	7	51.8	29.1	112.8
13545	18	25	38	37	3	50	8	55.7	27.0	104.7
13538	17	25	42	67	4	80	8	51.2	26.9	104.3
13544	19	26	40	33	4	60	7	53.7	26.8	103.9
13535	19	25	39	37	3	25	8	56.5	26.5	102.7
1442	18	24	37	47	5	70	8	51.0	25.8	100.0
10094	16	24	36	40	6	50	9	53.2	24.1	93.4
13427	17	24	40	77	4	90	8	47.7	24.1	93.4
13195	13	24	38	60	4	90	9	59.8	23.2	89.9
13542	19	25	40	57	3	80	6	50.8	23.2	89.9
13540	20	26	41	23	3	80	8	50.8	20.4	79.1
13539	19	26	41	50	3	80	9	53.0	20.0	77.5
13543	17	25	41	68	4	80	9	52.5	19.2	74.4
13192	18	24	36	23	3	90	8	58.5	16.1	62.4
13193	18	25	37	27	3	90	8	54.5	15.0	58.1

1/ Ratings based on 1 to 9 scale; 1 = no lodging, 9 = complete lodging.

2/ Ratings based on 1 to 9 scale; 1 = no mildew.

Standard error of a difference = 6.45 bushels.

Waseca, Minnesota
Observation rows, six feet long

C.I. No.	Date Headed	Date Ripe	Plant height	Lodging 1/	Stem rust
	June	July	In.		%
1442	16	20	38	1	50
12138	15	21	42	2	0
8033	14	18	44	5	40
10094	10	18	40	5	70
13190	9	20	36	4	50
8885	13	20	42	2	60
13192	12	18	39	3	50
13193	12	18	40	6	80
13506	12	23	44	5	0
13280	12	24	43	4	0
13281	15	21	42	4	0
13194	14	20	44	5	0
13195	10	18	41	1	40
13534	9	16	37	2	10
13535	13	18	42	2	T
13526	9	16	41	3	0
13528	12	18	41	4	0
13198	15	20	43	5	0
13530	11	16	44	6	0
13531	14	24	44	3	30
13427	16	24	45	2	50
13538	15	23	45	2	60
13539	16	24	43	2	70
13540	18	24	45	3	60
13541 2/	--	--	--	-	--
13542 2/	--	--	--	-	--
13543	15	18	42	3	60
13544	16	24	46	3	20
13545	15	24	42	2	40

1/ Based on 1 to 9 scale; 1 = no lodging, 9 = complete lodging.

2/ No stands obtained.

Grand Rapids, Minnesota
Three replications

C.I. No.	Date Headed	Date Ripe	Plant height	Winter survival	Lodging 1/	Rust Leaf	Rust Stem	Weight per bushel	Av. acre yield	Percent of Kharkof
	June	Aug.	In.	%		%	%	Lbs.	Bu.	
13280	25	4	39	93	5	T	0	59.5	59.6	266.1
13194	27	5	41	87	6	5	0	59.5	58.3	260.3
13281	28	5	41	93	8	10	15	57.8	57.1	254.9
13506	27	5	41	93	5	T	0	58.5	55.5	247.8
13530	24	3	40	93	4	20	25	58.8	51.9	231.7
13198	26	4	40	92	2	20	20	59.8	50.3	224.6
13526	24	2	39	93	3	50	5	60.7	50.1	223.7
12138	26	3	43	90	4	40	T	60.0	47.8	213.4
13528	24	4	41	92	3	60	5	60.0	45.3	202.2
13534	24	2	36	88	3	5	30	57.2	43.0	192.0
13535	27	5	41	87	2	0	50	58.5	40.8	182.1
13544	27	4	45	85	3	30	70	53.7	35.7	159.4
13545	26	3	44	92	3	20	50	52.0	33.3	148.7
13190	24	1	38	97	2	90	90	51.5	32.2	143.8
13531	26	2	45	90	2	90	80	49.8	31.1	138.8
8033	26	1	47	92	4	50	90	50.0	29.8	133.0
13538	26	3	45	92	4	50	50	48.0	28.5	127.2
13195	25	1	41	93	3	60	80	56.7	27.6	123.2
13543	26	2	46	90	5	90	60	47.5	27.2	121.4
13192	26	1	41	92	3	50	80	47.2	25.8	115.2
13542	27	1	46	95	3	50	90	48.4	25.0	111.6
10094	25	2	39	93	2	70	90	53.5	24.1	107.6
13427	27	3	44	90	3	50	60	47.3	22.6	100.9
13193	26	2	40	92	3	50	80	48.0	22.5	100.4
1442	27	1	42	95	4	50	60	50.5	22.4	100.0
13539	27	2	44	92	4	40	50	49.0	19.9	88.8
8885	26	1	40	93	2	50	80	49.5	19.0	84.8
13541	27	2	47	92	6	50	80	50.0	12.3	54.9
13540	27	3	48	92	3	70	70	43.0	8.3	37.1

1/ Based on 1 to 9 scale; 1 = no lodging, 9 = complete lodging.

Standard error of a difference = 4.50 bushels.

Lethbridge, Alberta
Four replications

C.I. No.	Date Headed	Date Ripe	Plant height	Weight per bushel 1/	Av. acre yield 1960	Av. acre yield 1959-1960	No. years grown	Percent of Kharkof
	June	July	In.	Lbs.	Bu.	Bu.		
13192	22	26	28	65.0	33.1	37.8	4	106.7
13190	20	25	27	64.0	31.0	36.7	4	103.3
8885	24	26	28	64.5	31.0	36.1	4	106.6
13280	22	24	29	64.0	30.4	31.4	4	97.0
13538	23	26	31	63.0	30.1	--	1	114.9
13526	18	24	29	64.0	29.9	33.3	2	101.5
13427	25	26	31	63.0	29.7	36.5	2	111.3
13194	25	26	30	63.5	29.7	--	1	113.4
13506	23	26	29	63.0	29.3	28.4	3	89.7
13543	23	26	30	63.0	29.3	--	1	111.8
13195	18	24	29	66.5	28.8	--	1	109.9
13542	26	26	30	65.0	28.0	--	1	106.9
13281	26	26	29	63.0	27.9	32.1	4	96.0
8033	26	26	31	63.5	27.7	34.6	7	106.6
13198	24	25	30	64.0	27.7	--	1	105.7
13539	25	26	31	63.0	27.5	--	1	105.0
13528	20	25	29	64.0	27.2	31.4	2	95.7
13530	20	23	30	64.0	26.9	--	1	102.7
13541	26	27	30	64.0	26.8	--	1	102.3
13531	21	26	29	61.5	26.7	--	1	101.9
1442	24	26	30	63.5	26.2	32.8	7	100.0
13545	24	27	29	64.0	25.9	--	1	98.9
13193	22	25	29	64.0	25.6	34.7	3	106.3
10094	23	25	29	63.0	25.6	32.4	7	97.3
13544	25	26	30	62.5	25.5	--	1	97.3
12138	25	25	29	64.0	25.3	30.7	7	101.5
13534	18	26	29	65.0	25.3	--	1	96.6
13540	25	26	32	62.5	24.6	--	1	93.9
13535	21	26	31	63.0	23.6	--	1	90.1

1/ Imperial bushel weights.

Standard error of a difference = 1.90 bushels.

STANDARD ERRORS

Mean yields and standard errors for the northern regional performance nursery appear in table 7. Mean yield for nurseries varied widely, the highest being 53.9 bushels at Ames and the lowest 9.8 bushels at Clovis. Three stations reported coefficients of variability of less than 10 percent.

SUMMARY OF NURSERY YIELDS

Yields made by the varieties in the northern regional nursery, state averages and ranks, and regional averages are summarized in table 8. Varieties are arranged according to regional yield rank. The pronounced influence of stem rust resistance on performance in 1960 is reflected in the summary. The stem-rust-resistant Minnesota and South Dakota experimental strains occupy the first seven places in the summary. Warrior, despite susceptibility to stem rust, had a high average yield due mainly to its performance in Wyoming, Kansas, and Iowa. Warrior also has the highest average yield among 14 varieties grown in both 1959 and 1960 (table 9). It is followed by the Minnesota selections (C. I. 13280 and C. I. 13281), Cheyenne, and the Cheyenne selections in that order.

SUMMARY OF AGRONOMIC DATA

Agronomic data other than yield for the entries in the northern regional nursery in 1960 are summarized in table 10. Varieties are arranged in descending order of test weight. Nebred x RedChief (C. I. 13195), although susceptible to the rusts, had the highest average test weight along with South Dakota Selection (C. I. 13526). Particularly noteworthy is the fact that C. I. 13526 was the earliest maturing entry and had the highest average winter survival. In addition, it was second only to Nebred x RedChief in lodging resistance and was resistant to stem rust. It possesses overall excellent quality characteristics and may have good possibilities for eventual commercial production in the northern areas of the hard red winter wheat region.

Table 7 .--Number of replications, mean yields, and standard errors for the northern regional performance nursery at the reporting stations in 1960.

State and station	Number replications	Number varieties	Av. yield all varieties	Standard error of--: Diff. in means	Mean	Coefficient of variability
			Bu.	Bu.	Bu.	%
NEW MEXICO						
Clovis	6	29	9.8	n.s.	n.s.	40.3
KANSAS						
Colby	4	30	36.8	n.s.	n.s.	19.6
NEBRASKA						
North Platte	3	29	44.3	3.66	2.59	10.1
Alliance	3	29	35.8	n.s.	n.s.	12.5
IOWA						
Ames	3	64	53.9 1/	2.76	1.95	6.0
WYOMING						
Laramie	4	29	47.9	6.38	4.51	18.8
Archer	4	29	25.8	1.99	1.41	10.9
Sheridan	4	29	27.0	2.76	1.95	14.4
SOUTH DAKOTA						
Brookings	3	36	11.7	5.85	4.14	6.1
MINNESOTA						
St. Paul	3	29	31.0	6.45	4.56	25.5
Grand Rapids	3	29	34.7	4.50	3.18	15.8
ALBERTA						
Lethbridge	4	30	27.7	1.90	1.30	9.4

1/ Mean yield of 29 varieties in the northern regional nursery.

Table 8.--Summary of average yields in bushels per acre made by 29 varieties grown in the northern regional performance nursery at 12 stations in 1960, with state averages and ranks.

Variety	C.I. No.	New Mexico		Kansas		Nebraska				Iowa	
		Clovis	Rank	Colby	Rank	North Platte	Alliance	Av.	Rank	Ames	Rank
Minnesota Sel.	13280	11.8	3	43.1	3	51.2	34.3	42.8	4-5	58.0	5
do.	13281	8.7	22	36.6	15	47.9	35.0	41.5	13	53.5	17
South Dakota Sel.	13530	9.1	20	29.2	27	50.4	33.8	42.1	8	59.2	2-3
Minnesota Sel.	13506	12.1	2	33.0	21	51.2	29.0	40.1	17-18	57.3	8
do.	13194	10.4	13	39.0	12	48.9	37.8	43.4	1	55.4	11
South Dakota Sel.	13528	10.2	14	41.0	6	49.7	35.4	42.6	6	57.5	5
do.	13526	10.8	11	35.8	18	42.3	37.0	39.7	20	52.7	20
Minter	12138	7.9	25	39.2	10-11	42.6	35.0	38.8	21	51.4	22
Warrior	13190	11.6	4-5	47.3	2	48.9	34.3	41.6	11	59.3	1
South Dakota Sel.	13198	10.0	15	37.2	13	45.5	38.3	41.9	9-10	48.7	24-26
(Cmn x Mi-Hope)x Iowin	13534	11.0	10	39.2	10-11	46.0	34.3	40.2	16	58.4	4
Cheyenne	8885	11.5	6	47.5	1	44.9	40.6	42.8	4-5	53.8	15
Cheyenne Sel.	13192	11.1	8-9	39.7	9	44.5	39.3	41.9	9-10	53.4	18
South Dakota Sel.	13531	11.3	7	35.4	19	47.9	34.2	41.1	14	52.9	19
Kv x (Iow x Tt-WP5)	13535	9.6	17	40.9	7	41.5	34.5	38.0	22	56.3	10
Yogo x (Tk x Oro 221)-9	13538	8.3	24	36.9	14	42.5	37.6	40.1	17-18	57.4	7
Nebred	10094	10.6	12	32.0	23	42.5	42.1	42.3	7	57.1	9
Kharkof	1442	14.1	1	41.1	5	36.2	32.3	34.3	29	46.0	29
Yogo	8033	9.3	18-19	30.1	26	37.7	36.0	36.9	23-24	48.7	24-26
(Yogo x Rescue21)x Marmin-1065	13544	9.0	21	32.5	22	51.2	31.6	41.4	12	54.4	14
Yogo x (Yogo x Rescue 5)-1612	13543	5.9	28	36.0	17	43.9	35.9	39.9	19	53.7	16
Cheyenne Sel.	13193	11.1	8-9	35.3	20	44.4	41.5	43.0	3	55.2	12
Nebred x RedChief	13195	11.6	4-5	41.6	4	44.5	41.7	43.1	2	59.2	2-3
Yogo x(Tk x Oro 221)-117	13542	8.4	23	31.2	25	44.7	36.7	40.7	15	50.6	23
Marmin x(Yogo x Rescue 5)-342	13545	5.4	29	40.0	8	40.4	33.3	36.9	23-24	54.8	13
Yogo x (Tk x Oro 221)-66	13427	9.3	18-19	31.5	24	40.4	31.1	35.8	28	52.6	21
do -60	13541	7.7	26	28.7	28	37.1	35.4	36.3	25	48.1	28
do -14	13539	9.7	16	36.4	16	36.3	36.0	36.2	26	48.7	24-26
do -29	13540	6.4	27	25.4	19	38.4	33.6	36.0	27	48.6	27

Table 8. (Continued).

C.I. No.	Wyoming: Laramie	Archer	Sheridan	Average	Rank	Alberta: Lethbridge	Rank	South Dakota: Brookings	Rank	Minnesota: St. Paul	Grand Rapids	Average	Rank	12 station average
13280	54.7	28.8	29.4	37.6	4	30.4	4	26.6	3	49.3	59.6	54.5	1	39.8
13281	58.4	25.9	26.6	37.0	7	27.9	13	31.2	1	37.7	57.1	47.4	6	37.2
13530	61.0	22.9	31.1	38.3	2	26.9	18	20.9	8	45.1	51.9	48.5	5	36.8
13506	41.2	27.3	26.5	31.7	21	29.3	9-10	29.8	2	45.3	55.5	50.4	2	36.5
13194	39.6	27.1	26.8	31.2	23	29.7	7-8	21.7	6	40.4	58.3	49.4	3	36.3
13528	54.8	27.0	23.2	35.0	10	27.2	17	21.5	7	40.2	45.3	42.8	9	36.1
13526	49.1	29.5	23.6	34.1	12	29.9	6	20.8	9	47.7	50.1	48.9	4	35.8
12138	62.7	23.8	25.6	37.4	5-6	25.3	26-27	24.6	4	39.9	47.8	43.9	7	35.5
13190	61.2	27.9	26.6	38.6	1	31.0	2-3	8.9	18	29.5	32.2	30.9	14	34.9
13198	45.8	26.7	25.6	32.7	18	27.7	14-15	22.2	5	37.1	50.3	43.7	8	34.6
13534	44.7	29.5	20.6	31.6	22	25.3	26-27	8.6	19	40.8	43.0	41.9	10	33.5
8885	50.6	27.4	28.8	35.6	9	31.0	2-3	10.7	15	32.8	19.0	25.9	18	33.2
13192	53.2	29.1	31.8	38.0	3	33.1	1	7.9	20	16.1	25.8	21.0	25	32.1
13531	44.4	28.2	28.0	33.5	14	26.7	20	4.3	26-28	30.2	31.1	30.7	15	31.2
13535	45.2	23.4	21.9	30.2	26	23.6	29	9.3	17	26.5	40.8	33.7	11	31.1
13538	41.1	22.5	28.3	30.6	25	30.1	5	12.0	11	26.9	28.5	27.7	17	31.0
10094	45.0	29.8	24.6	33.1	16-17	25.6	23-24	10.8	14	24.1	24.1	24.1	20-22	30.7
1442	57.0	26.8	28.3	37.4	5-6	26.2	21	11.1	13	25.8	22.4	24.1	20-22	30.6
8033	45.8	22.4	29.7	32.6	19	27.7	14-15	13.4	10	35.4	29.8	32.6	12	30.5
13544	35.6	23.6	30.4	29.9	27	25.5	25	10.2	16	26.8	35.7	31.3	13	30.5
13543	52.0	23.4	26.6	34.0	13	29.3	9-10	11.8	12	19.2	27.2	23.2	24	30.4
13193	47.8	27.2	32.2	35.7	8	25.6	23-24	6.5	25	15.0	22.5	18.8	28	30.3
13195	31.1	25.1	18.9	25.0	29	28.8	11	2.9	29	23.2	26.7	25.0	19	29.6
13542	49.0	24.0	26.3	33.1	16-17	28.0	12	7.1	23	23.2	25.0	24.1	20-22	29.5
13545	38.4	24.9	23.0	28.8	28	25.9	22	4.3	26-28	27.0	33.3	30.2	16	29.2
13427	47.8	23.7	28.6	33.4	15	29.7	7-8	7.8	21	24.1	22.6	23.4	23	29.1
13541	50.4	24.7	29.5	34.9	11	26.8	19	7.7	22	29.1	12.3	20.7	26	28.1
13539	38.3	24.8	29.2	30.8	24	27.5	16	7.0	24	20.0	19.9	20.0	27	27.8
13540	44.4	21.6	30.4	32.1	20	24.6	28	4.3	26-28	20.4	8.3	14.4	29	25.5

Table 9.--Summary of two-year average yields for 14 varieties grown in the northern regional performance nursery at 8 stations in 1959 and 1960, with state averages and ranks.

Variety	C.I. No.	New Mexico: Clovis	Rank	Wyoming: Laramie	Archer	Sheridan	Average	Rank
Warrior	13190	13.8	10	73.8	19.9	27.8	40.5	1
Minnesota Sel.	13280	13.5	11	65.0	19.2	27.3	37.2	6
do.	13281	11.7	13	63.4	17.5	27.1	36.0	8
Cheyenne	8885	16.1	2	65.9	16.0	32.1	38.0	4-5
Cheyenne Sel.	13192	14.9	5-6	68.1	17.3	29.2	38.2	3
do.	13193	15.7	3	65.4	18.4	32.3	38.7	2
South Dakota Sel.	13528	13.9	9	62.9	18.2	24.3	35.1	11
Minter	12138	14.8	7	68.8	14.1	28.3	37.1	7
Minnesota Sel.	13506	14.9	5-6	52.9	18.8	26.7	32.8	14
Kharkof	1442	16.8	1	66.2	18.0	29.9	38.0	4-5
Nebred	10094	15.2	4	58.8	19.3	27.6	35.2	10
South Dakota Sel.	13526	10.7	14	55.8	20.8	23.0	33.2	13
Yogo x (Tk x Oro 221)-66	13427	14.1	8	62.2	15.9	29.2	35.8	9
Yogo	8033	12.5	12	57.2	13.4	30.0	33.5	12

C.I. No.	Nebraska: North Platte	Rank	Iowa: Ames	Rank	South Dakota: Brookings	Rank	Alberta: Lethbridge	Rank	8 station average
13190	42.7	1	49.8	4	12.5	12	36.7	2	34.6
13280	39.7	3-4	54.7	1	25.2	3	31.4	11-12	34.5
13281	39.0	6	51.5	3	28.2	1	32.1	10	33.8
8885	39.8	2	44.4	11	13.7	9	36.5	3-4	33.1
13192	39.4	5	45.1	9	11.9	13	37.8	1	33.0
13193	38.0	8	45.6	8	13.3	10-11	34.7	5	32.9
13528	39.7	3-4	48.2	6	24.0	4	31.4	11-12	32.8
12138	34.9	11	44.8	10	23.8	5	30.7	13	32.5
13506	37.7	9	52.2	2	25.7	2	28.4	14	32.2
1442	32.1	13	41.0	12	15.3	8	32.8	8	31.5
10094	38.3	7	46.0	7	13.3	10-11	32.4	9	31.4
13526	36.5	10	49.3	5	20.8	6	33.3	7	31.3
13427	32.8	12	40.6	13	10.5	14	36.5	3-4	30.2
8033	30.4	14	40.5	14	16.2	7	34.6	6	29.4

Table 10.--Summary of agronomic data other than yield for varieties grown in the northern regional performance nursery in 1960.

Variety	C.I. No.	Date		Plant height	Winter survival	Lodging	Rust		Weight per bushel
		Headed	Ripe				Leaf	Stem	
		June	July	In.	%	%	%	%	Lbs.
Number of stations		12	5	12	3	4	3	6	13
Nebred x RedChief	13195	10	22	36	62	23	67	63	59.5
South Dakota Sel.	13526	9	22	35	89	24	52	6	59.5
Minter	12138	14	24	38	84	34	42	10	59.4
South Dakota Sel.	13198	14	24	37	80	36	45	12	59.2
do.	13528	11	23	36	86	33	62	10	59.1
Minnesota Sel.	13194	13	24	37	65	45	12	3	59.0
do.	13280	12	24	37	74	46	7	3	58.9
do.	13281	14	24	38	77	53	10	7	58.4
do.	13506	13	25	37	82	52	7	3	58.2
South Dakota Sel.	13530	11	22	37	86	51	37	17	58.2
Nebred	10094	11	22	35	64	45	75	60	57.6
(Cmn x Mi-Hope) x Iow	13534	10	22	34	54	26	30	31	57.6
Kv x (Iow x Tt-WP 5)	13535	12	25	38	50	29	20	30	57.6
Yogo	8033	14	23	39	82	49	63	60	56.9
Cheyenne	8885	12	23	36	72	27	70	64	56.9
Mm x (Yogo x Rsc 5)-342	13545	13	25	38	53	33	55	52	56.9
(Yogo x Rsc 21)x Mm-1065	13544	14	25	39	55	33	63	50	56.7
Cheyenne Sel.	13192	12	22	35	57	28	72	63	56.6
Warrior	13190	10	23	35	65	29	80	53	56.5
Kharkof	1442	13	23	38	67	36	62	64	56.3
Cheyenne Sel.	13193	12	23	36	53	44	72	67	56.3
Yogo x (Tk x Oro 221)-117	13542	14 1/	24 1/	39 1/	70	38 1/	70	64 1/	56.0
do. -60	13541	14 1/	25 1/	40 1/	64	45 1/	68	65 1/	55.9
Yogo x(Yogo x Rsc 5)-1612	13543	13	23	39	77	46	85	58	55.8
Yogo x (Tk x Oro 221)-9	13538	13	25	40	79	36	65	56	55.7
do. -14	13539	14	25	39	70	36	67	64	55.4
South Dakota Sel.	13531	13	24	39	74	36	83	60	55.0
Yogo x(Tk x Oro 221)-66	13427	14	25	39	78	34	68	62	54.9
do. -29	13540	15	25	41	57	37	80	62	54.3

1/ Values based on 1 station less than number indicated; no data from Waseca, Minn.

UNIFORM WINTER HARDINESS NURSERY

A uniform winter hardiness nursery consisting of duplicated observation rows of experimental strains and appropriate check varieties is grown each year at stations in the central and northern plains states. Winter survival is recorded for strains in the nursery and the survival data are made available prior to harvest to breeders who submitted entries. In 1960 the nursery was comprised of 195 entries and was grown at 7 stations in Nebraska, Wyoming, Montana, South Dakota, North Dakota, and Minnesota. Differential injury and loss of stands occurred at all but one station.

DISEASE NURSERIES

A uniform bunt nursery containing 26 entries was grown at 7 stations. Infection data were compiled in a separate report which was distributed to the cooperators.

A limited number of varieties from the hard winter wheat region are grown each year at Urbana, Illinois, in an area in which soil-borne mosaic is annually recurring. Evaluations are made by W. M. Bever and R. O. Weibel. There were 85 entries in the nursery in 1960. A report of the soil-borne mosaic infection data was distributed to cooperators prior to harvest.

The uniform and international rust nurseries are grown annually at several stations in the region. Data from these nurseries are assembled, summarized, and distributed by W. Q. Loegering, Beltsville, Maryland.

A regional streak mosaic nursery has been grown since 1957. Infection data were available from Hays and Garden City, Kansas, Ft. Collins, Colorado, and Lincoln and Alliance, Nebraska. The data are summarized in table 11. Nebred x RedChief (C. I. 13195) had the lowest level of symptoms and was the least stunted on the average. Next lowest average values were recorded for 53H586, C. I. 13549, and Bison.

Table 11.--Streak mosaic data for 19 varieties grown in the regional streak mosaic nursery at 5 locations in 1960.

Variety	C.I. or Sel. No.	Hays, Kansas		Garden City, Kansas		Ft. Collins Colorado		Lincoln: Nebr.	Alliance: Nebr.	Average symptoms: 3 stations	Average stunting: 5 stations
		Symptoms 1/	Stunting 1/	Symptoms	Stunting	Symptoms	Stunting	Stunting	Stunting		
Pawnee (ck)	11669	3	3	4	4	3	1	5.0	4.0	3.3	3.4
Blue Jacket (ck)	12502	2	2	2	2	2	1	3.0	2.5	2.0	2.1
Mql-Oro x Pn (ck)	12851	5	5	5	5	4	5	5.0	5.0	4.7	5.0
Wheat-Rye x IVc1-Cmn	13549	2	2	2	2	2	1	1.5	1.5	2.0	1.6
do.	M.428	4	4	-	-	3	1	2.5	2.0	3.5	2.4
Foreign Introduction	181457	4	4	4	4	2	1	3.0	2.0	3.3	2.8
do.	166472	4	4	-	-	1	1	-	2.5	2.5	2.5
do.	Hays 5111	4	3	3	3	2	1	2.0	1.5	3.0	2.1
Ctr x Mi-Hope-Pn	R.6002	2	3	2	3	2	3	4.0	3.0	2.0	3.2
Mql-Oro x Pn (ck)	12851	5	5	5	5	4	4	4.5	4.5	4.7	4.6
Ctr x Mi-Hope-Pn	R.6073	3	3	3	3	2	1	3.0	2.0	2.7	2.4
Mql-Oro-Tnf x Pn	52A1	2	3	2	2	2	1	3.5	2.0	2.0	2.3
Concho	12517	3	3	3	3	3	1	4.0	3.0	3.0	2.8
Triumph	12132	3	2	2	2	2	1	4.0	2.5	2.3	2.3
Comanche	11673	4	3	3	3	3	1	4.0	3.0	3.3	2.8
Bison	12518	2	1	2	1	2	2	3.0	2.5	2.0	1.9
Ap x Cfk-Oro-Tm	53H586	1	1	1	1	2	1	3.0	2.0	1.3	1.6
Nbr x RedChief	13195	1	1	1	1	1	1	2.5	1.5	1.0	1.4
Sando Hybrid 797	59Stw. R3148	5	5	-	-	-	-	-	-	5.0	5.0
Rodco	--	4	3	3	3	4	1	4.0	3.0	3.7	2.8
Pawnee (ck)	11669	3	4	3	4	2	1	5.0	3.5	2.7	3.5
Blue Jacket (ck)	12502	3	2	2	2	3	1	3.0	1.0	2.7	1.8
Mql-Oro x Pn (ck)	12851	5	5	5	5	5	3	5.0	5.0	5.0	4.6

1/ Ratings based on 1 to 5 scale; 1 = resistant, 5 = fully susceptible. A rating of 3 = some field tolerance.

QUALITY DATA

Grain samples from regional nurseries are submitted each year to the Hard Winter Wheat Quality Laboratory in the following amounts:

Uniform Quality Series ---------- 10 pounds from each location
Southern Regional Performance Nursery-- 1 pound from each location
Northern Regional Performance Nursery-- 1 pound from each location

Quality Series samples are evaluated individually from each location in addition to which evaluation is made on composite samples from each district. In the Northern and Southern Regional Nurseries evaluation of varieties is based on samples composed of grain from all locations. Results of evaluation of samples are reported annually to the cooperators by Karl Finney.