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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 1963

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Preliminary report, not for publication1/

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Nebraska Agricultural Experiment Station
Lincoln, Nebraska
CR-9-64

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By

V. A. Johnson[1/]

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

PERSONNEL CHANGES

C. O. Johnston, A.R.S. Plant Pathologist at Kansas State University retired on November 1. Mr. Johnston, an authority on leaf rust of wheat and oats, conducted race survey and identification work for A.R.S. and provided invaluable counsel and assistance to the regional wheat improvement program.

Paul Nordquist, agronomist at the North Platte Experiment Station in Nebraska accepted an A.R.S. position as sorghum breeder at the University of Nebraska. He will also continue graduate study at the University. Robert Johnson who recently completed graduate study at North Dakota State University, has replaced Mr. Nordquist at the North Platte station.

COOPERATING AGENCIES, STATIONS, AND PERSONNEL
(The asterisk indicates U. S. D. A. employees)

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*
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College Station	Texas A. & M. College	
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Chillicothe	Substation No. 12	K. A. Lahr
Bushland	Southwestern Great Plains Field Sta.	K. B. Porter
		N. E. Daniels
NEW MEXICO AGRICULTURAL EXPERIMENT STATION:		
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		C. H. Hsi
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		E. E. Sebesta*
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		R. M. Oswalt
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		A. W. Pauli
		F. W. Stickler

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		E. D. Hansing
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Garden City	Garden City Agr. Exp. Sta.	W. D. Stegmeier
Colby	Colby Branch Station	J. R. Lawless

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Agronomy		R. E. Atkins

NEBRASKA AGRICULTURAL EXPERIMENT STATION:

Lincoln	University of Nebraska	
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		P. J. Mattern
		J. D. Eastin
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		K. P. Pruess
Alliance	Box Butte Exp. Station	P. L. Ehlers
		C. R. Fenster
Concord	Northeast Nebr. Exp. Sta.	A. D. Flowerday

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Crops		B. J. Kolp
Plant Pathology and Horticulture		G. H. Bridgmon
Cheyenne	Archer Substation	A. F. Gale
Gillette	Gillette Substation	L. R. Landers
Sheridan	Sheridan Substation	L. R. Richardson

SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION:

Brookings	South Dakota State College	
Agronomy		D. G. Wells
Plant Pathology		G. W. Buchanau
Highmore	Central Substation	W. R. Pringle

NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION:		
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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*
		C. A. Watson
Moccasin	Central Mont. Branch Sta.	A. L. Dubbs
		H. R. Guenthner
Huntley	Huntley Branch Station	D. E. Baldridge
Havre	North Montana Branch Sta.	B. A. McCallum
IDAHO AGRICULTURAL EXPERIMENT STATION:		
Aberdeen	Aberdeen Branch Station	D. W. Sunderman*
Tetonia	Tetonia Branch Station	G. D. Ames
MINNESOTA AGRICULTURAL EXPERIMENT STATION:		
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Agronomy and Plant Genetics		E. R. Ausemus*
Waseca	Southern Experiment Sta.	R. E. Hodgson
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Urbana	University of Illinois	
Agronomy		R. O. Weibel
Plant Pathology		W. M. Bever
MISSOURI AGRICULTURAL EXPERIMENT STATION:		
Columbia	University of Missouri	
Field Crops		C. F. Hayward
CANADA DEPARTMENT OF AGRICULTURE:		
Lethbridge	Alberta Agr. Exp. Sta.	M. N. Grant

COOPERATIVE HARD RED WINTER WHEAT NURSERY LOCATIONS

Nursery Designation	Abbreviation
Southern District Quality Series	SDQS
Central District Quality Series	CDQS
Northern District Quality Series	NDQS
Southern Regional Performance Nursery	SRPN
Northern Regional Performance Nursery	NRPN
Uniform Winterhardiness Nursery	UWHN
Uniform Bunt Nursery	UBN
Soil-borne Mosaic Nursery	SBMN
Streak Mosaic Nursery	SMN
Uniform Rust Nursery	URN
International Rust Nursery	IRN

Texas
- College Station ---------- URN, IRN
- Denton ---------- SRPN, URN
- Chillicothe ---------- SDQS, SRPN
- Bushland ---------- SDQS, SRPN,UBN

New Mexico
- Clovis ---------- SDQS, SRPN, NRPN

Oklahoma
- Stillwater ---------- SDQS, SRPN, SMN, UBN, URN, IRN
- Woodward ---------- SDQS, SRPN
- Cherokee ---------- SDQS, SRPN
- Goodwell ---------- SDQS

Missouri
- Columbia ---------- SRPN (1964), URN

Kansas
- Manhattan ------ CDQS, SRPN, SMN, SBMN*, UBN, URN, IRN
- Hays ---------- CDQS, SRPN, SMN
- Garden City ---------- CDQS, SRPN, SMN
- Colby ---------- CDQS, SRPN, SMN

  * Nursery grown at Powhattan, Kansas near Manhattan

Iowa
- Ames ---------- SRPN, URN

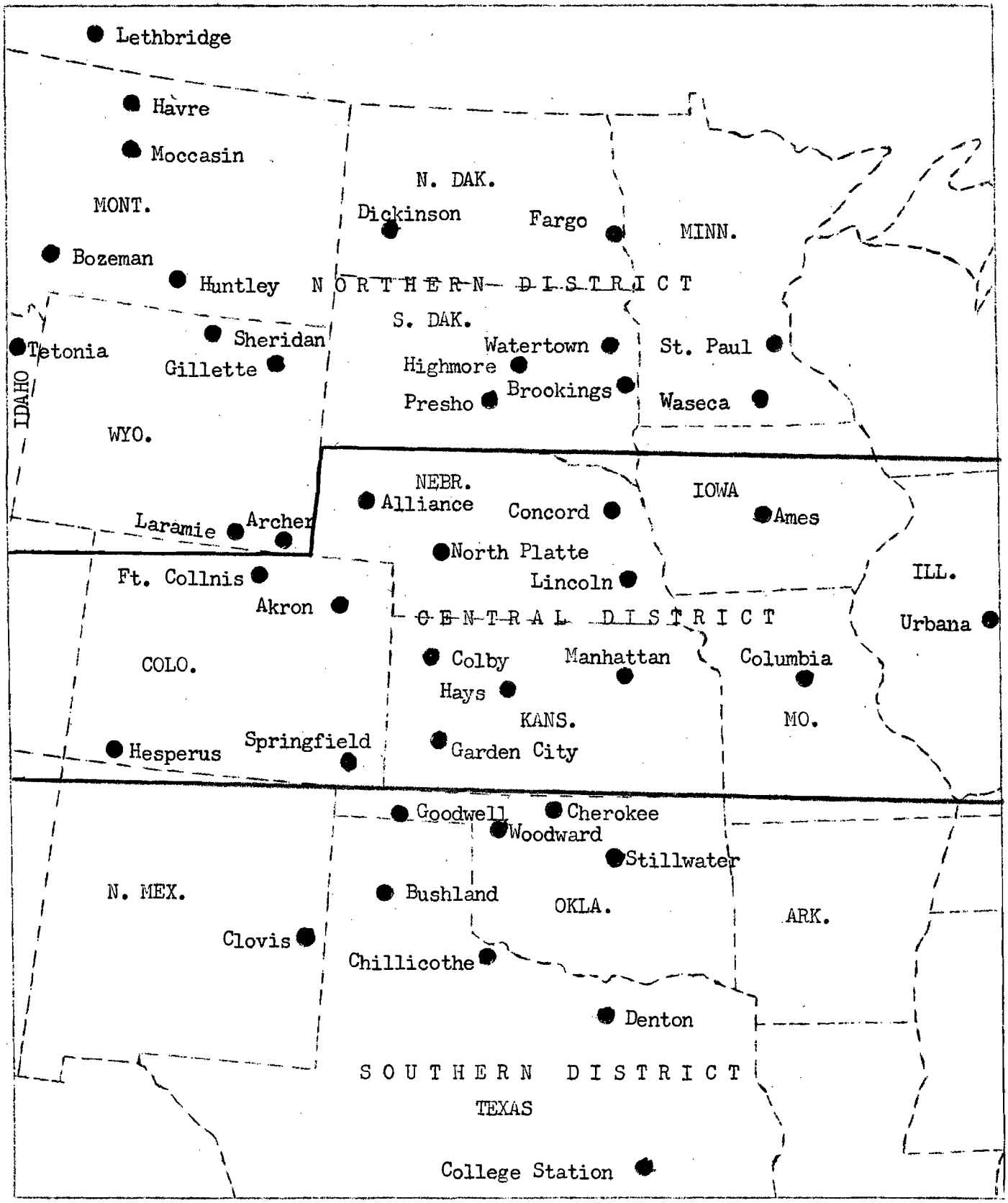
Illinois
- Urbana ---------- SRPN, SBMN, URN

Colorado
- Ft. Collins ---------- CDQS, SRPN, UBN
- Akron ---------- CDQS, SRPN
- Springfield ---------- SRPN
- Hesperus ---------- SRPN

Nebraska
- Lincoln --------- CDQS, SRPN, NRPN, SMN, UBN, URN, IRN
- North Platte ---------- CDQS, SRPN, NRPN, UBN
- Alliance ---------- CDQS, NDQS, SRPN, NRPN, UWHN, SMN
- Concord --- Special Cooperative Winterhardiness Test (1964)

Minnesota
- St. Paul ---------- NDQS, NRPN, UWHN
- Waseca ---------- NDQS, NRPN, UWHN

South Dakota
- Brookings ---------- NDQS, NRPN, UWHN, UBN, URN
- Watertown ---------- UWHN
- Presho ---------- NDQS, NRPN
- Highmore ---------- NDQS, NRPN


Lethbridge
Havre
Moccasin
MONT.
N. DAK.
Dickinson
Fargo
MINN.
Bozeman
Huntley
NORTHERN DISTRICT
S. DAK.
Sheridan
Tetonia
Gillette
Watertown
St. Paul
Highmore
Brookings
Presho
Waseca
IDAHO
WYO.
NEBR.
Alliance
IOWA
Concord
Ames
Laramie
Archer
North Platte
Ft. Collnis
Lincoln
ILL.
Akron
CENTRAL DISTRICT
Urbana
COLO.
Colby
Manhattan
Columbia
Hays
KANS.
MO.
Hesperus
Springfield
Garden City
Goodwell
Cherokee
Woodward
Stillwater
N. MEX.
Bushland
OKLA.
ARK.
Clovis
Chillicothe
Denton
SOUTHERN DISTRICT
TEXAS
College Station

Wyoming
- Laramie ---------- UWHN, URN
- Archer ---------- NDQS, NRPN
- Sheridan ---------- NDQS, NRPN

Idaho
- Tetonia ---------- NRPN

Montana
- Bozeman ---------- UBN
- Moccasin ---------- UWHN
- Havre ---------- NDQS, NRPN

North Dakota
- Fargo ---------- UWHN
- Dickinson ---------- NRPN

Alberta, Canada
- Lethbridge ---------- NRPN, UWHN

ACCESSION NUMBERS ASSIGNED

Seventy three hard red winter wheat varieties were assigned C. I. numbers in 1963. They are listed below. When a number is assigned, seed of the variety is added to the permanent collection maintained 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
13685	Cnn Sel. x 1279 A9 III-16	N. 501316	Nebraska
13686	do	N. 494617	do
13687	do	N. 494620	do
13688	do	N. 494646	do
13689	Mida-Ky 117A x Cnn Sel.-1279 A9 III-16	N. 57454	do
13690	1279 A9 III-4 x Nebred	N. 542437	do
13696	do	N. 494659	do
13697	do	N. 494663	do
13698	1279 A9 III-12-Cnn Sel. x Cnn	N. 542490	do
13699	Il 1-Cns^2-Tt x Cnn-Tm-Mi-Hope	N. 58319	do
13700	Tt Sel. 473 x Cnn-RCh-Pn-Mql-Oro	N. 61908	do
13739	Norin 10-Brevor 14 x Burt^5	Sel. 11	Washington
13789	Il 1-Cns-Tt x Wis. Ped. 2 Tk	H143-1-1-9-4	Wisconsin
13790	do	-2-12	do
13791	do	-3-4-1	do
13792	do	-3-6	do
13793	do	-3-16	do
13794	do	-4-13	do
13795	do	-4-24	do
13796	do	-5-38-5	do
13797	do	-5-43	do
13798	do	-5-62	do

C. I. No.	Pedigree	State No.	Source
13799	Il 1-Cns-Tt x Wis. Ped. 2 Tk	H143-1-1-6-2-1	Wisconsin
13800	do	-8-3	do
13801	do	-8-5-4-4	do
13802	do	-8-35-7-5-5	do
13803	do	-8-50	do
13804	do	-8-69-3-1	do
13805	do	-9-24	do
13806	do	-12-5-7	do
13807	do	-13-5	do
13808	do	-13-7	do
13809	do	-13-8	do
13810	do	-13-8-2	do
13811	do	-13-10	do
13812	do	-13-17	do
13813	do	-13-19	do
13814	do	-13-20	do
13815	do	-14-13	do
13816	do	-15-4	do
13817	do	-15-54	do
13818	do	-15-54-7	do
13819	do	-16-17-3-3	do
13820	do	-16-43	do
13837	Burt x P. I. 178383	Sel. C 61-9	Montana
13838	Bankuti 1201		Washington
13839	Columbia x Utah 175_a-53	275-40-3-1	Utah
13840	do	-2-2	do
13841	Burt x Itana	Sel. 215WC	Washington
13842	do	Sel. 125WC	do
13843	do	Sel. 50	do
13844	do	Sel. 34	do
13845	do	Sel. 42	do
13846	Itana	Sel. W-1	Idaho
13847	Triumph x Mql-Oro*Oro-Tm	61 Stw 8617	Oklahoma
13848	do	8620	do
13849	do	8627	do
13850	do	8631	do
13851	do	8635	do
13852	do	8637	do
13853	Wichita[5] x Cns + Au	K. 6317	Kansas
13854	Bison[5] x C. I. 9058	K. 6322	do
13855	Norin 10 x C. I. 12500	Tx. 1826-1	Texas
13856	Cheyenne[2] x Ky-Mta	N. 61608	Nebraska
13857	Nebred x Cnn-Ky-Mta	N. 61660	do
13858	H44-Mtr[2] x Minter	Minn. 2939	Minnesota
13859	Yogo x Rushmore 57-135	---	Montana
13860	do 57-27	---	do
13861	Yogo x Cheyenne 1-1-2-1	---	do
13862	do 11-5-3	---	do
13863	Bulk Winterhardiness 1376-8	---	do
13864	Ky 58-Nth x (Cnn-Tm-Mi-Hope)[2]	N. 61976	Nebraska
13865	Tt Sel. 473 x Cheyenne	N. 61904	do

NEW VARIETIES

Texas has released Wichita x Marquillo-Oro (C. I. 13536) under the name Caddo. Approximately 2000 bushels of foundation seed was distributed to growers in the fall of 1963. Caddo is an attractive variety selected at Denton, Texas. It is widely adapted in Texas. Among its outstanding characteristics are high test weight, seedling and adult resistance to leaf rust, stiff straw, early maturity and quality similar to that of Comanche. It is anticipated that Caddo will replace the early varieties Early Blackhull and Wichita, and to some extent Triumph and Crockett.

South Dakota Selection C. I. 13526 is undergoing further seed increase and testing in South Dakota. In addition to excellent winterhardiness, C. I. 13526 is moderately early maturing, has short straw, and possesses resistance to currently prevalent stem rust races except 15 B. Decision on the release of C. I. 13526 in South Dakota probably will be made in 1964.

The performance of the Canadian hard red winter wheat variety Winalta has been impressive in the northern regional performance nursery in 1962 and 1963. Winalta was selected from the cross Minter x Wichita at the Lethbridge station in Alberta. It is a good quality winterhardy variety similar to Nebred in maturity. It segregates for the Hope resistance to stem rust. A wide area of adaptation for Winalta is indicated by its record in the northern regional nursery.

THE WINTER WHEAT CROP

Conditions for fall seeding of the winter wheat were generally good throughout the plains area. Moisture was ample for early seeding and stand establishment. Warm weather encouraged heavy fall growth which seriously depleted soil moisture reserves. Fall leaf rust was widespread and severe in many states of the southern and central districts. Severe fall stem rust developed in parts of Kansas. A heavy fall infestation of hessian fly occurred in the western two thirds of Kansas and in southern Nebraska. However, spring fly infestation was light in these states. Wheat in the Texas and Oklahoma panhandles, western Kansas, Colorado, Nebraska and South Dakota suffered extensive damage during record or near record low temperatures in January. Acreage abandonment was high. An early spring outbreak of army cutworms in southwestern Kansas and adjacent areas in bordering states resulted in further loss of stands and acreage abandonment. A severe outbreak of wheat streak mosaic in the Nebraska panhandle caused an estimated 10 million dollar loss. Drought conditions in the spring prevailed over most of the wheat areas in the southern and central plains and reduced yields on the remaining acreage. Stem and leaf rust, although present, failed to increase in the dry spring except in South Dakota and Minnesota where moisture was more plentiful. Wheat harvest in 1963 was one of the earliest of record throughout the region. Rains in late May helped the wheat in Kansas, Colorado and Nebraska but were generally too late for wheat in Oklahoma and Texas.

Winter wheat yields were below the five-year average in all states in the region except Iowa and Montana. Total winter wheat production, while 10 percent more than in 1962, was 9 percent below the 1957-61 average. Acreage

abandonment ranged from 39.7 and 36.0 percent respectively in Texas and Colorado down to 3.1 and 9.4 percent in Iowa and Montana.

State	Acres			1963	1963	1957-61
	Seeded 1/	Harvested 1/	Abandonment	Production 1/	Av. acre 2/	Av. acre 2/
			%	Bu.	Bu.	Bu.
Texas	3,848	2,321	39.7	40,618	17.5	19.6
Oklahoma	4,740	3,591	24.2	75,411	21.0	21.7
New Mexico	284	200	29.6	3,800	19.0	20.5
Kansas	10,641	8,627	18.9	185,480	21.5	24.6
Nebraska	3,335	2,953	11.5	63,490	21.5	27.0
Colorado	2,681	1,715	36.0	21,438	12.5	24.4
Wyoming	239	211	11.7	4,431	21.0	23.4
Montana	2,087	1,891	9.4	49,166	26.0	24.0
So. Dakota	595	515	13.4	9,785	19.0	24.7
Iowa	98	95	3.1	2,612	27.5	26.2
Minnesota	19	14	26.3	329	23.5	25.4

1/ In thousands.

2/ Based on harvested acres. Data taken from the 1963 Annual Summary, Crop Production, U.S. Dept. of Agriculture, Statistical Reporting Service, Crop Reporting Board.

UNIFORM QUALITY SERIES

The 1963 uniform quality series was comprised of 8 varieties each in the southern and central districts and 4 varieties in the northern district. The series provides seed of advanced experimental strains and newly released varieties along with selected check varieties for quality evaluation at the Hard Winter Wheat Quality Laboratory at Kansas State University. Ten pounds of grain from each variety in the series is made available to the Laboratory. Varieties included in the series in each district in 1963 were:

Southern District		Central District	
Pawnee*	11669	Pawnee*	11669
Comanche*	11673	Comanche*	11673
Caddo	13536	Gage	13532
Triumph x T-Ae	13523	Cmn x Mi-Hope-Pn-Oro-Il 1-Cmn	13548
Gage	13532	Scout	13546
Chiefkan x Tenmarq	K.501097	Chiefkan x Tenmarq	K.501097
do	K.501099	do	K.501099
Qv-Tm x Mql-Oro	12995	Qv-Tm x Mql-Oro	12995

Northern District	
Yogo*	8033
Warrior*	13190
Lancer	13547
So. Dak. Selection	13526

* Check variety

SOUTHERN REGIONAL PERFORMANCE NURSERY

All 20 stations growing the southern regional nursery reported data in 1963. Only survival data were obtained from Ames, Iowa where killing during the winter was severe and the nursery was abandoned in the spring. Yield data were not obtained at Bushland, Texas where hail occurred before harvest. Pedigrees and C. I. numbers of varieties grown in the nursery in 1963 are as follows:

Entry No.		C. I. No.	State submitting
1	Kharkof	1442	---
2	Early Blackhull	8856	---
3	Comanche	11673	---
4	Triumph x T.-Ae	13523	Okla.
5	Triumph	12132	do
6	Improved Triumph	13667	do
7	Newest Improved Triumph	13668	do
8	Super Triumph	13669	do
9*	Rust Resistant Triumph	13679	do
10	Gage	13532	Nebr.
11	Scout	13546	do
12**	Lancer	13547	do
13	Cmn x Mi-Hope-Pn-Oro-Il 1-Cmn	13548	Kans.
14	Caddo	13536	Texas
15	Cmn-Hnr-Fw-Cmn-Mi-Hope x LPr 25	13680	do
16	Svl-Wi-Hope-Cnn-Wi^2 x SS	13681	do
17*	do (Tx.391-56-D1-1)	13683	do
18*	do (Tx.391-56-D1-23)	13684	do

* New entry in 1963
** Entered from northern regional performance nursery

DATA OBTAINED

Data provided by the cooperating stations are reported in table 1.

The nursery at Denton, Texas was seeded October 4 on fallowed ground. No fertilizer was used. Moisture was adequate during October and November and heavy growth of the wheat occurred. Leaf rust was present on most varieties in late fall and early winter. Temperature dropped to 8° F on January 12, causing some leaf damage on tender strains and stopping development of leaf rust. Some plots in the nursery were damaged by a low of 5° F and strong winds on January 24. Rainfall at Denton of 0.26 inches in January, 0.12 in February, and 0.41 in March was the lowest of record for these months at the Denton station. Precipitation was above-normal in April. The wheat matured approximately 10 days earlier than normal. Light leaf rust, and traces of stem rust on late varieties and mildew were the only diseases observed. Insects were not a problem. Grain yields ranged from 34.3 to 22.6 bushels. Test weights were 60 pounds or higher for all varieties.

Fall and winter growing conditions similar to those at Denton prevailed at Chillicothe. Moisture shortage persisted during the spring and contributed to early heading and very short straw of the varieties. Grain yields and the test weight of varieties were lower than at Denton. The Triumph wheats, Caddo, and Scout were highest yielding.

The dry fall, a very dry and cold winter and intense spring drought at Bushland resulted in the near failure of the dryland nursery. The nursery was abandoned following hail in early June. Fall leaf rust became heavy on late planted wheat in the Bushland area. However, only trace amounts were observed in the irrigated southern regional nursery at the Bushland station. Streak mosaic symptoms became evident with resumption of wheat growth in the spring. Winter survival of varieties ranged from 73 to 90 percent with exception of C. I. 13523, C. I. 13680, and Caddo (C. I. 13536) which survived only 53, 53, and 58 percent respectively. Yield data were not obtained due to the hail.

Moisture at seeding time was adequate for good stands at Stillwater. Winter precipitation through February, although below normal, was sufficient to maintain the wheat in good condition. Above-normal rainfall in March and April was reflected in high grain yields at Stillwater. The major depressing factor during the winter was extreme temperature variations resulting in growth initiation in warm spells and injury during subsequent cold periods. While little actual plant kill occurred, the recovery from low temperature shockkwas slow and in some cases incomplete. The yield of four Triumph strains and Scout exceeded 50 bushels per acre. Only Caddo, Early Blackhull and C. I. 13548 produced grain that weighed more than 60 pounds per bushel.

Low soil moisture combined with abnormally low temperatures during the winter at Woodward resulted in some loss of plants among varieties in the southern regional nursery. Injury to plants associated with breaking of dormancy during warm periods and cold shock during low temperature periods was apparent. Winter recovery was poor in some varieties and marked deterioration during April and May occurred in C. I. 13523. Yields ranged from 34.5 to 14.6 bushels with Scout, two Triumph strains, and Comanche exceeding 30 bushels per acre. Test weight was 60 pounds or higher in 5 varieties.

Growing conditions very similar to those at Woodward prevailed at Cherokee. Some actual loss of plants during the winter was noted and winter recovery was poor in several varieties - particularly C. I. 13523. The performance of Scout and the Triumph strains was outstanding. Heavy grain was produced by all varieties, the lowest test weight being 59.4 pounds per bushel.

Both an irrigated and dryland nursery were grown at Clovis. The fall was dry and non-irrigated seedings had only spotty emergence 8 days after planting. Pre-planting irrigation was necessary to obtain desired stands in the irrigated nursery. Temperature at Clovis during the winter dropped to -14° F for an all-time low at the station. Snow cover during the cold period prevented winterkilling. The spring remained dry and much dryland wheat in the Clovis area was abandoned. The drought was broken on May 21 and from then until harvest rainfall was excessive. The dryland nursery was under water most of the two weeks period prior to ripening and was heavily damaged by the standing water. The irrigated nursery was well drained and not damaged by the heavy rains. All varieties except C. I. 13523 had heavy leaf rust in

the fall. Wheat streak mosaic was a problem in very late material on the station but did not affect the regional nurseries measurably. Yields reported for the dryland nursery are of questionable value because of the excessive water before harvest and have not been used in regional yield averages. In the irrigated nursery Scout with a 59 bushel yield significantly outyielded all yarieties except C. I. 13523, Comanche, and C. I. 13548. Test weight of all varieties was 60 pounds or higher. C. I. 13669 lodged and shattered severely. Heavy lodging was recorded also for C. I. 13668, Early Blackhull, and C. I. 13667.

High soil moisture and warm fall temperatures made for lush growth of the wheat at Manhattan. Precipitation in the spring was light until heading time. Diseases and insects were not factors in the performance of varieties. Eleven varieties in the southern nursery yielded more than 40 bushels per acre with C. I. 13548, Scout, and Gage in that order the most productive. The Triumph strains and Early Blackhull showed the greatest tendency to lodge. Lowest bunt infections were recorded for C. I. 13548, Comanche, and C. I. 13667.

Soil moisture in the fall at Hays was excellent. The winter was dry and cold. There was no loss of stand during the winter but top growth of the wheat was completely killed. The spring was dry with no effective rain in April and very little in May. Some moisture in June aided the wheat. There were no serious disease or insect problems. The wheat averaged approximately 2 feet in height and produced fair yields of lighter than normal grain. The early varieties were generally the most productive and made the highest test weight. Light to moderate shattering was noted in all varieties in the nursery.

Although soil moisture was above average at Garden City at seeding, the surface soil dried out after emergence and prevented strong secondary root development until mid-November. Drought and widely fluctuating temperatures during the winter and early spring produced considerable winter injury but very little actual loss of stands. The nursery was sprayed in the spring to control a serious outbreak of army cutworms. Spring drought and high temperatures enhanced early heading but rains in late May and June prolonged the fruiting period. Traces of rust appeared at ripening time. Scout significantly outyielded all other varieties in the nursery. Bushel weights ranged from fair to poor with Caddo the best with 58.3 pounds per bushel. The Texas semi-dwarf strains and C. I. 13523 were the least productive. The latter winterkilled 50 percent.

Fall, winter and spring growing conditions at Colby were similar to those at Hays and Garden City. Some loss of stand occurred in the nursery although it was light in most varieties. C. I. 13523 was most seriously killed with a 74% stand remaining in the spring. All varieties exceeded 20 bushels in yield and 4 exceeded 30 bushels. Scout, C. I. 13669, and Caddo in that order were the most productive. Caddo with a 61.3 pound test weight was the only variety producing grain heavier than 60 pounds per bushel.

Little fall growth of the wheat occurred in an irrigated nursery at Ft. Collins. Snow protection during critically cold periods during the winter permitted good survival although the tender varieties C. I. 13523 and C. I. 13680 had severe leaf injury. The nursery was spring irrigated on May 21. A light

infection of leaf rust occurred late. Stem rust was noted only in a localized area of the nursery. Yields and test weights were very high. Scout with an 89.8 bushel yield, significantly outproduced all other varieties in the test except Caddo. Bushel weights ranged from 64.6 pounds for Caddo to 62.6 pounds for Kharkof.

The period from August, 1962 through June, 1963 was the driest in 52 years of precipitation records at Akron, Colorado. A good rain in mid-June permitted the grain to fill well and higher than expected yields were recorded. Straw length varied from only 16 inches for C. I. 13523 and Scout to 20 inches for Early Blackhull and 3 other varieties. Early Blackhull and C. I. 13584 yielded 25.7 and 25.1 bushels per acre respectively. Twelve varieties yielded more than 20 bushels per acre. Bushel weights were below normal ranging from 58.6 to 55.2 pounds.

The nursery at Hesperus, Colorado was seeded in good soil moisture and emerged to full stands. Temperatures as low as -35° F were recorded during the winter but the wheat had good snow cover and survived well. Winter, spring and early summer moisture was about $\frac{1}{2}$ of normal. The nursery was irrigated twice during the spring growing season. Diseases and insects were no problem. Four varieties yielded more than 70 bushels per acre, the most productive being Scout with 77.2 bushels per acre. Caddo, the second-most productive variety, also had the heaviest grain with a test weight of 63.1 pounds.

It was necessary to sprinkler irrigate the nursery area at Springfield, Colorado prior to seeding to insure germination and emergence. Continued dry weather, extreme cold and high winds caused some damage during the winter and resulted in the abandonment of one replication of the nursery. Total precipitation from seeding until harvest was only 6.06 inches, the heaviest rain being 0.68 inches on June 16. Parathion spray was necessary to control a heavy infestation of brown wheat mites in March and April. Grain yields were very low, ranging from 7.9 bushels for Lancer down to 1.8 bushels for C. I. 13667. Bushel weights were about normal. Caddo had the highest with 62.5 pounds and C. I. 13523 with 57.3 pounds was the lowest. Straw was very short with only 2 inches separating the tallest from the shortest varieties.

Winter injury was extensive in the nursery at Lincoln. All varieties showed severe leaf kill and loss of stand occurred in the most tender varieties. Gage, Scout, and C. I. 13548 significantly outyielded other varieties. Bushel weights were near-normal with only 5 varieties weighing less than 58 pounds per bushel. C. I. 13548 and Comanche were highly resistant to bunt. C. I. 13523 survived the winter with only a 6 percent stand. Less severe stand losses were recorded for C. I. 13680, C. I. 13667, C. I. 13668, and C. I. 13684. Among the hardier varieties the lowest leaf damage occurred in Kharkof and Scout.

Winterkilling did not occur in the nursery at North Platte. Moisture throughout the crop year was sufficient for high grain yields. Scout with a 48.9 bushel yield was significantly more productive than other varieties in the nursery. High bushel weights were recorded. Caddo had the heaviest grain (63.9 pounds) and C. I. 13523 the lowest grain weight with 60.6 pounds.

Although the winter was severe at Alliance, loss of stand was recorded

in only two nursery varieties. A serious moisture shortage existed in the spring and reduced yield potential. A hailstorm in mid-May caused moderate damage. Recovery was generally best in the late maturing varieties. Five varieties yielded more than 20 bushels per acre. Lancer was highest yielding with 26.7 bushels. Kharkof, Scout, C. I. 13681 and C. I. 13548 were the other varieties in the 20 bushel category. The grain was light with bushel weights ranging from 59.1 pounds for Caddo and C. I. 13548 down to 53.1 pounds per bushel for C. I. 13683. C. I. 13680 survived with a 23 percent stand and C. I. 13523 with 68 percent stand.

Moisture in the fall at Ames, Iowa was ample for good stand establishment. The winter was the most severe of recent years. Eight varieties in the southern regional nursery were completely winterkilled. Six varieties survived with less than 8 percent stands. Best survival was recorded for Kharkof with 58 percent survival, followed by Scout with 50 percent, Lancer with 28 percent, and Gage with 27 percent survival. The nursery was abandoned in the spring.

Fall and winter growing conditions at Urbana were good. No winterkilling occurred in the nursery. The spring was dry but relatively cool weather permitted maximum utilization of available moisture. Timely late rains promoted filling of the grain and high yields of high test weight grain were realized. The 61.9 bushel yield made by Gage was high for the nursery. Slightly less productive were Caddo, C. I. 13548 and Comanche in that order. As at most other locations Caddo produced the highest test weight grain. All varieties exceeded 60 pounds per bushel. Comanche and Gage were the only varieties that exhibited resistance to soil-borne mosaic.

Table 1. Yield and other data for varieties grown in the southern regional performance nursery at 20 stations in the hard red winter wheat region in 1963.

Denton, Texas
Four replications

C. I. No.	Date Headed	Date Full ripe	Plant height	Leaf rust	Leaf damage 1/	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	April	May	In.	%		Lbs.	Bu.	Bu.		
13679	10	14	30	10	6	63	34.3	--	1	109.6
13546	13	15	29	30	8	61	32.5	29.7	3	114.2
13547	18	23	31	10	6	61	32.2	--	1	102.9
11673	16	17	32	T	6	61	32.2	29.1	23	127.3
1442	19	27	33	15	5	61	31.3	26.0	27	100.0
13536	10	14	30	T	9	63	31.2	39.0	4	129.1
8856	11	14	32	15	8	62	30.4	34.0	27	127.0
13669	10	14	26	15	8	61	29.9	29.2	3	97.5
13681	17	20	26	25	6	61	29.7	30.4	2	117.1
13548	16	20	31	T	7	61	29.4	31.6	3	116.6
12132	12	14	28	10	7	62	28.9	30.4	3	103.0
13668	10	14	28	5	7	63	28.3	33.1	3	115.8
13532	14	15	29	0	8	61	27.4	32.7	4	124.9
13667	11	14	29	10	7	62	26.9	33.0	3	115.9
13523	14	20	31	T	10	61	26.8	31.9	3	116.6
13680	12	17	30	T	10	60	25.1	31.0	2	119.2
13683	11	23	29	T	7	61	24.1	--	1	77.0
13684	9	14	25	T	7	61	22.6	--	1	72.2

1/ Rated 1-10; 1= light, 10= all top growth dead.

$LSD_{.05}$ = 7.2 bushels; CV = 17.7%

Chillicothe, Texas
Four replications

C. I. No.	Date Headed	Date Full ripe	Plant height	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	April	May	In.	Lbs.	Bu.	Bu.		
13668	16	16	22	59.5	27.9	19.4	3	131.4
13536	23	25	21	60.0	27.3	19.0	4	118.2
13669	18	16	21	59.5	26.6	16.6	3	120.1
13546	24	26	23	57.5	26.5	19.0	3	123.0
13667	17	17	22	59.5	25.8	18.0	3	122.0
12132	18	18	22	59.5	24.4	17.4	3	121.2
13684	19	21	19	58.5	24.4	--	1	116.7
13548	29	30	24	60.0	23.5	15.8	3	110.7
13679	18	18	21	60.0	23.5	--	1	112.4
8856	19	21	25	60.0	23.0	17.2	25	106.1
13680	26	27	24	59.5	22.6	13.4	2	94.0
13547	29	30	25	58.0	22.3	--	1	106.7
13532	27	28	25	58.5	22.2	16.1	4	105.6
13683	19	22	21	59.0	21.9	--	1	104.8
1442	5-1	6-1	28	58.0	20.9	14.2	25	100.0
13523	28	29	23	57.0	20.5	16.6	3	119.8
11673	26	27	23	58.5	20.4	14.8	25	115.9
13681	28	29	20	57.5	18.0	11.6	2	81.0

$LSD_{.05}$ = 3.7 bushels; CV = 8.2%

Bushland, Texas
Three replications, irrigated

C. I. No.	Winter survival	Date headed	Plant height	Streak mosaic May 20 [1]	Weight per bushel [2]
	%	May	In.		Lbs.
1442	83	13	30	1.0	56.1
8856	83	4-30	31	1.5	58.8
11673	83	8	28	3.5	56.8
13523	53	-	--	--	--
12132	82	3	30	1.5	60.2
13667	78	1	29	1.0	61.9
13668	80	2	29	1.0	61.7
13669	75	4-28	28	2.0	59.3
13679	87	1	30	1.0	61.3
13532	82	7	29	2.0	56.4
13546	73	3	31	2.5	59.3
13547	88	9	28	2.5	56.5
13548	90	9	30	1.1	56.9
13536	58	3	30	1.5	60.2
13680	53	4	28	1.0	57.1
13681	77	10	24	5.0	52.7
13683	73	3	24	2.0	55.0
13684	75	3	23	1.5	55.7

1/ Rated on 1-5 scale; 1= slight forage symptoms, 5= severe forage symptoms.
At maturity C.I. Nos. 13679, 13536 and 13546 showed the least damage from streak mosiac.

2/ All Triumph strains were harvested before a heavy rain and hail. Other varieties after. Time of harvest probably accounts for substantial differences in test weight between the Triumphs and other varieties.

Stillwater, Oklahoma
Four replications

C. I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	April	In.	Lbs.	Bu.	Bu.		
13667	20	32	59.5	53.2	45.1	3	157.8
13668	20	31	59.3	50.8	44.4	3	146.0
13669	20	34	58.8	50.5	44.0	3	141.9
13679	21	31	59.9	50.5	--	1	157.3
* 13546	24	34	58.5	50.4	41.8	3	159.2
12132	21	31	59.9	49.4	40.5	2	144.9
8856	21	34	60.5	46.0	40.2	29	116.1
13684	21	26	58.2	44.3	--	1	138.0
13548	28	38	60.1	41.4	37.3	3	140.3
13532	24	33	57.7	41.0	36.8	4	130.1
11673	27	37	59.0	41.0	36.6	23	119.6
13536	23	32	60.9	40.0	35.5	4	123.0
13680	28	28	59.8	39.4	32.8	2	117.4
13683	21	28	58.4	39.0	--	1	121.5
13681	29	30	58.9	35.4	32.2	2	115.0
13547	30	37	58.8	34.3	--	1	106.8
13523	29	37	58.6	33.8	30.3	3	116.8
1442	5-2	40	59.6	32.1	28.0	29	100.0

$LSD_{.05}$ = 4.8 bushels; CV = 7.9%

Woodward, Oklahoma
Four replications

C. I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	April	In.	Lbs.	Bu.	Bu.		
13546	24	27	59.0	34.5	37.7	3	157.0
13669	20	25	58.3	34.2	40.0	3	165.8
13679	22	23	59.5	31.0	--	1	136.0
11673	27	27	59.4	30.6	33.8	27	117.2
13532	26	26	59.6	29.6	37.0	4	135.3
13547	30	28	60.0	29.1	--	1	127.6
13548	30	28	59.8	29.0	34.3	3	139.2
13668	22	24	59.2	28.6	35.6	3	150.4
12132	23	24	59.5	27.3	33.2	3	141.5
13536	25	26	61.1	27.1	33.1	4	131.2
13667	23	24	59.1	25.1	32.4	3	149.2
13684	22	22	58.0	25.0	--	1	109.6
8856	22	26	60.4	23.8	30.4	32	107.7
1442	5-3	29	61.6	22.8	25.0	32	100.0
13683	23	22	58.5	22.3	--	1	97.8
13681	5-1	23	59.2	21.4	33.1	2	132.4
13680	28	26	60.0	20.7	24.9	2	99.6
13523	5-2	26	58.8	14.6	24.2	3	117.5

$LSD_{.05}$ = 4.2 bushels; CV = 11.1%

Cherokee, Oklahoma
Four replications

C. I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield: 1963	Av. acre yield: 1962-1963	No. years grown	Percent of Kharkof
	April	In.	Lbs.	Bu.	Bu.		
13546	28	34	59.9	51.7	40.2	3	173.2
13668	24	30	60.5	50.9	42.8	3	175.1
13679	24	30	60.9	50.0	--	1	140.4
13667	24	30	60.6	49.4	40.8	3	170.1
13669	22	30	59.4	48.9	38.4	3	163.3
13547	5-1	36	61.9	47.8	--	1	134.3
13548	5-1	37	62.3	47.5	37.3	3	160.6
13536	29	33	62.4	47.3	39.0	4	148.9
12132	27	33	61.1	46.8	37.3	3	161.9
11673	5-1	35	61.5	45.6	33.6	16	128.6
8856	24	33	62.0	44.5	36.1	16	136.6
13532	29	34	60.5	44.4	35.0	4	148.4
13684	24	26	59.7	43.4	--	1	121.9
13680	5-1	34	62.4	37.9	27.0	2	104.2
13683	25	30	60.7	37.9	--	1	106.5
13681	5-4	28	60.9	37.1	31.8	2	123.0
1442	5-6	37	62.6	35.6	25.8	16	100.0
13523	5-3	35	61.6	35.5	28.5	3	146.7

$LSD_{.05}$ = 3.9 bushels; CV = 6.2%

Clovis, New Mexico
Three replications, dryland

C. I.	Date Headed	Date Ripe	Plant height	Appearance 1/	Weight per bushel	Av. acre yield 1963 2/
	May	June	In.		Lbs.	Bu.
13546	3	13	20	3	59	21
13547	4	15	20	2	61	20
13536	1	14	21	2	60	18
13667	4-30	11	19	3	61	18
13532	7	15	20	2	59	17
13523	7	14	22	3	60	16
13668	4-30	11	19	3	62	16
13679	4-30	12	19	2	60	16
13680	4	15	22	3	60	16
11673	6	15	20	2	60	15
12132	1	11	21	3	60	15
13669	4-29	11	20	3	60	13
13548	7	15	20	2	60	13
13681	7	15	19	2	59	13
13683	5	15	18	3	59	13
1442	10	25	19	2	59	13
13684	5	15	17	3	59	12
8856	4-30	11	21	3	60	12

1/ Rating on 1-5 scale; 1= good, 5= poor

2/ Yields for 1963 of questionable value. Nursery was under several inches of water for 2 weeks during heavy rains in early June. All entries were lodged severely and difficult to harvest.

Clovis, New Mexico
Three replications, irrigated*

C. I. No.	Date headed	Plant height	Lodging 1/	Shattering 2/	Appearance 3/	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	May	In.				Lbs.	Bu.	Bu.		
13546	8	36	1	1	1	61	59	44.2	3	136.0
13523	11	39	1	3	1	60	54	35.2	3	110.0
11673	9	40	2	3	1	61	53	38.3	11	102.6
13548	13	38	1	3	2	60	52	37.5	3	114.1
13532	10	39	1	2	1	61	50	35.9	4	108.7
13536	5	37	1	1	1	62	49	37.6	4	112.7
13547	10	39	1	3	1	62	48	--	1	102.1
13680	10	39	3	1	2	61	48	36.2	2	103.0
13667	4	35	4	2	3	60	47	35.0	3	99.3
1442	18	43	3	1	2	60	47	35.2	11	100.0
13679	2	36	1	1	2	61	46	--	1	97.9
12132	5	36	3	1	3	62	45	36.0	3	102.4
13683	9	35	1	1	3	60	45	--	1	95.7
8856	2	40	4	2	2	60	44	35.1	11	99.4
13668	2	36	5	2	3	60	41	33.4	3	99.2
13681	12	32	1	1	1	60	40	28.0	2	79.5
13684	10	30	1	1	2	60	39	--	1	83.0
13669	1	34	5	5	3	60	36	28.9	3	83.9

* fertilized with 100-40-0 per acre; irrigated 4 times.

1/ Rating 1-5 scale; 1= none, 5= severe

2/ Rating 1-5 scale; 1= none, 5= severe

3/ Rating 1-5 scale; 1= good, 5= poor

$LSD_{.05}$ = 7.3 bushels; CV= 9.6%

Manhattan, Kansas
Four replications

C. I. No.	Date headed	Plant height	Loose smut	Bunt 1/	Leaning degrees 2/	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	May	In.	%	%		Lbs.	Bu.	Bu.		
13548	14	34	0	T	90	59.8	46.1	38.0	3	141.1
13546	10	35	T	38	80	59.0	45.2	35.8	3	127.1
13532	12	34	0	55	90	60.0	45.0	41.2	4	140.6
12132	8	36	0	85	75	61.6	43.3	33.0	3	112.6
13669	8	36	T	42	55	60.9	42.7	32.0	3	113.5
13679	8	36	0	82	55	61.5	42.5	--	1	119.7
13536	11	34	4	40	90	61.8	41.4	31.3	4	110.6
13668	8	36	0	10	55	61.3	40.9	31.2	3	109.1
13680	11	36	1	65	90	60.6	40.7	25.6	2	88.0
13667	8	35	0	8	55	61.2	40.4	30.6	3	115.4
8856	8	36	1	80	75	61.2	40.1	28.6	32	111.9
13547	13	33	28	33	90	58.1	37.7	--	1	106.2
13523	14	34	0	45	90	58.7	37.2	27.4	3	111.1
13684	9	30	0	15	90	59.6	36.8	--	1	103.7
11673	12	35	T	2	90	58.8	36.4	38.6	27	119.9
1442	16	36	0	38	90	56.4	35.5	29.1	32	100.0
13683	10	31	T	60	90	59.4	34.1	--	1	96.1
13681	12	29	3	15	90	58.0	31.6	24.0	2	82.6

1/ Data from E. D. Hansing

2/ 90° = erect; 0° = flat

$LSD_{.05}$ = 2.9 bushels; CV = 10.8%

Hays, Kansas
Four replications

C. I. No.	Date Headed	Date Ripe	Plant height	Shattering 1/	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	May	June	In.		Lbs.	Bu.	Bu.		
13668	4	7	25	2.5	58.2	25.2	25.4	3	159.2
12132	5	7	25	2.5	59.0	24.4	24.0	3	148.1
13546	8	8	24	2.1	58.5	24.0	25.5	3	172.1
13667	4	7	24	2.6	58.0	23.8	26.0	3	157.5
8856	5	8	26	2.2	58.9	22.4	23.4	27	115.7
13679	4	7	23	2.8	59.1	22.0	--	1	148.6
13547	11	13	22	2.4	57.8	21.2	--	1	143.2
13680	9	8	24	2.1	57.4	21.1	19.9	2	145.8
11673	10	10	24	3.2	57.7	20.9	20.8	23	122.5
13532	9	9	22	2.5	57.1	20.8	24.0	4	145.1
13669	3	6	24	2.8	56.9	20.1	23.2	3	137.6
13684	7	8	22	2.4	58.1	19.6	--	1	132.4
13683	7	14	24	2.2	58.2	19.3	--	1	130.4
13523	10	11	25	2.2	56.9	18.8	17.6	3	128.6
13536	8	9	24	2.0	58.1	18.4	22.0	4	127.6
13548	11	10	24	2.5	56.9	17.1	22.8	3	159.4
13681	10	9	22	3.0	56.1	15.8	17.6	2	129.3
1442	15	18	24	2.4	56.0	14.8	13.6	27	100.0

1/ 1= no shattering; 5= severe shattering

$LSD_{.05}$ = 3.6 bushels; CV = 12.2%

Garden City, Kansas
Four replications

C. I. No.	Date Headed	Date Ripe	Plant height	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	May	June	In.	Lbs.	Bu.	Bu.		
13546	8	12	28	57.8	34.4	27.8	3	125.8
12132	4	8	27	56.9	26.8	25.4	3	111.3
13668	3	8	25	57.2	26.6	25.3	3	113.8
1442	19	21	27	56.8	26.4	22.2	10	100.0
13679	3	8	26	57.6	25.9	--	1	98.1
13532	10	15	27	57.0	25.8	22.9	4	106.2
13667	3	7	24	57.4	25.7	25.2	3	113.1
11673	10	18	28	56.8	25.6	23.4	10	105.6
13536	6	9	28	58.3	25.2	22.0	4	104.7
8856	3	10	27	57.7	25.2	22.5	10	102.9
13669	1	6	25	56.8	23.4	21.4	3	103.3
13547	12	12	27	57.0	22.7	--	1	86.0
13548	13	13	29	57.0	22.2	20.4	3	106.0
13680	12	13	27	54.5	19.0	17.9	2	80.6
13683	10	12	24	54.5	18.1	--	1	68.6
13684	8	12	22	55.0	17.5	--	1	66.3
13523 1/	14	18	24	57.5	16.3	16.9	3	96.9
13681	13	13	24	54.0	16.2	15.7	2	70.7

1/ Winterkilled 50%

$LSD_{.05}$ = 5.6 bushels; CV = 16.7%

Colby, Kansas
Four replications

C. I. No.	Date headed	Plant height	Winter survival	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	May	In.	%	Lbs.	Bu.	Bu.		
13546	8	28	99	59.0	33.7	32.1	2	141.1
13669	6	27	88	58.5	32.7	27.6	2	121.5
13536	8	28	95	61.3	32.6	29.7	3	117.2
8856	7	28	94	59.5	30.9	28.8	12	96.2
13679	7	27	99	59.0	29.8	--	1	143.3
12132	7	28	99	58.8	29.7	27.4	2	120.4
13667	7	26	93	58.0	29.2	27.9	2	122.6
11673	12	27	94	59.5	29.2	26.6	11	102.6
13532	11	26	98	57.5	28.4	28.2	3	109.7
13548	12	27	98	59.0	27.7	26.8	2	117.8
13547	12	25	99	59.0	27.2	--	1	130.8
13668	7	26	97	57.8	27.2	27.2	2	119.8
13680	10	27	86	59.5	26.4	24.0	2	105.7
13523	11	27	74	58.5	25.4	22.4	2	98.7
13684	8	24	97	58.5	24.9	--	1	119.7
13683	9	26	96	58.5	23.8	--	1	114.4
13681	11	25	98	57.8	22.6	22.4	2	98.7
1442	17	30	99	57.5	20.8	22.8	12	100.0

$LSD_{.05}$ = 4.6 bushels; CV = 11.7%

Ft. Collins, Colorado
Five replications

C. I. No.	Date headed	Plant height	Leaf rust		Weight per bushel	Av. acre yield		No. years grown	Percent of Kharkof
			Type	Sev.		1963	1962-1963		
	May	In.		%	Lbs.	Bu.	Bu.		
*13546	25	43	2-4	T	63.8	89.8	87.6	3	146.9
13536	25	43	0-2	T	64.6	81.9	80.4	4	131.0
13532	26	43	0;-4	T	63.6	81.0	83.8	4	129.8
13669	19	41	4	8	63.6	81.0	71.4	3	120.8
1442	30	47	2-4	T	62.6	78.7	63.6	27	100.0
13680	26	44	2	T	64.0	78.4	82.4	2	129.4
13681	27	34	0;-4	T	63.7	78.2	70.5	2	110.8
13547	28	43	2-4	T	64.0	77.3	--	1	98.2
13667	23	40	4	5	64.0	77.1	74.4	3	126.9
13668	23	41	4	T	64.0	75.5	72.8	3	123.6
11673	26	43	4	T	63.7	74.0	69.9	23	109.8
13679	22	37	4	T	63.9	73.1	--	1	92.9
13548	27	44	0;-2	T	64.0	72.8	78.0	3	127.7
13683	25	35	0;	0	63.1	72.1	--	1	91.6
12132	23	41	4	T	63.4	71.7	71.2	3	124.2
13523	26	44	0	0	63.4	71.6	79.8	3	130.0
13684	25	33	0;	0	62.9	68.9	--	1	87.5
8856	22	44	4	T	64.0	68.4	68.4	27	102.2

$LSD_{.05}$ = 8.3 bushels; CV = 8.6%

Akron, Colorado
Four replications

C. I. No.	Date headed	Plant height	Lodging	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	May	In.	%	Lbs.	Bu.	Bu.		
8856	12	20	20	58.1	25.7	24.7	21	111.4
13684	13	17	0	57.8	25.1	--	1	141.8
13680	15	18	T	57.9	23.7	27.0	2	116.1
13683	14	20	0	55.2	23.2	--	1	131.1
13546	15	16	T	58.3	23.1	25.6	3	126.0
13679	13	20	10	57.8	23.1	--	1	130.5
13548	17	20	T	58.4	22.4	29.4	3	130.2
13547	19	17	T	58.6	22.2	--	1	125.4
13681	15	17	T	57.1	21.0	22.8	2	98.1
12132	13	19	5	56.7	20.8	21.2	3	106.7
13532	16	18	T	56.2	20.6	28.8	3	125.0
13667	13	18	10	56.8	20.4	26.8	3	127.0
13523	13	16	T	58.1	19.1	23.2	3	100.7
13536	15	17	5	57.9	18.9	24.2	3	115.3
11673	18	19	T	58.1	18.3	28.4	18	108.4
13668	13	18	10	57.2	18.1	26.0	3	129.2
1442	27	17	T	58.3	17.7	23.2	21	100.0
13669	10	18	20	58.1	11.3	13.9	3	86.4

$LSD_{.05}$ = 4.6 bushels; CV = 24.0%

Hesperus, Colorado
Five replications

C. I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	June	In.	Lbs.	Bu.	Bu.		
13546	2	35	61.4	77.2	78.6	3	135.3
13536	2	35	63.1	72.8	70.1	4	111.9
13547 1/	8	37	62.1	72.5	--	1	126.1
13523	5	37	60.2	70.4	74.8	3	133.4
13683 1/	1	27	60.4	69.2	--	1	120.3
13680	8	37	61.0	69.1	68.0	2	112.0
13681	4	28	57.5	68.6	73.9	2	121.6
13548	8	36	61.1	65.9	71.2	3	117.6
13684	1	26	60.4	65.9	--	1	114.6
13532	5	34	61.5	64.0	66.6	4	106.9
11673	4	37	60.9	62.7	65.4	23	114.4
13667	5-31	34	60.9	62.6	68.8	3	116.7
13668	5-31	34	61.3	61.3	63.4	3	103.8
13679	1	34	61.0	59.9	--	1	104.2
8856	3	38	61.3	58.9	60.6	23	100.8
1442	12	38	60.6	57.5	60.8	23	100.0
13669	5-29	34	59.4	56.5	55.4	3	100.8
12132	5-30	37	60.1	53.3	55.4	3	100.5

1/ Loose smut in the amounts of 3% in 13547 and a trace in 13683 was observed.

$LSD_{.05}$ = 7.4 bushels; CV = 11.4%

Springfield, Colorado
Five replications 1/

C. I. No.	Date Headed	Date Ripe	Plant height	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	May	June	In.	Lbs.	Bu.	Bu.		
13547	16	20	12	61.0	7.9	--	1	175.6
13536	10	20	11	62.5	7.7	15.6	4	106.8
13548	14	20	12	60.0	6.8	17.6	3	122.6
11673	14	25	11	59.5	6.5	19.3	6	110.3
13684	10	19	11	60.0	5.9	--	1	131.1
13532	12	20	10	58.3	4.8	15.0	4	104.2
13683	13	23	11	59.0	4.6	--	1	102.2
1442	15	25	11	61.0	4.5	12.4	6	100.0
13680	12	20	10	60.0	4.4	13.2	2	105.6
13546	10	19	10	60.8	4.2	16.6	3	120.6
8856	10	21	11	62.0	4.2	14.6	6	105.6
13681	18	24	10	57.5	4.1	16.2	2	129.7
13523	12	23	11	57.3	4.0	14.4	3	101.0
13679	13	21	10	61.0	3.1	--	1	68.9
12132	14	22	11	60.0	3.0	9.4	3	83.1
13669	10	19	10	60.0	2.5	7.5	3	76.0
13668	12	20	11	61.5	2.3	10.8	3	91.6
13667	11	19	10	60.0	1.8	12.6	3	104.5

1/ Only 4 replications harvested. Replication 5 complete failure.

$LSD_{.05}$ = not significant.

Lincoln, Nebraska
Four replications

C. I. No.	Date headed	Winter injury: Surv.	Winter injury: Leaf damage 1/	Plant height	Bunt 2/	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	May	%		In.	%	Lbs.	Bu.	Bu.		
13532	18	100	1.5	38	36	59.5	47.4	50.1	4	176.2
13546	16	100	1.0	38	42	58.2	46.5	47.5	3	184.3
13548	20	100	1.3	38	0	59.9	45.2	49.9	3	201.4
11673	18	100	2.3	38	0	58.8	40.1	38.0	26	119.3
13547	21	100	2.0	37	44	59.3	38.3	--	1	109.1
13536	17	100	2.3	34	16	59.9	35.6	38.6	4	148.9
1442	28	100	1.0	40	36	56.8	35.1	28.3	31	100.0
13669	11	100	2.8	32	35	59.7	30.8	36.2	3	137.2
12132	12	100	2.5	29	47	59.9	30.4	35.0	3	132.2
13681	17	100	2.3	28	41	57.2	30.1	29.1	2	102.8
13680	18	58	3.0	37	53	57.7	28.8	25.2	2	88.9
8856	14	98	2.5	34	44	59.4	28.5	33.4	31	122.0
13683	15	100	2.3	28	29	56.8	28.2	--	1	80.3
13679	12	100	2.3	28	51	59.0	24.8	--	1	70.6
13684	14	95	3.0	24	48	58.0	22.3	--	1	63.5
13668	12	88	3.0	28	- 3/	59.0	21.8	30.2	3	128.1
13667	12	83	3.0	27	- 3/	59.0	20.8	27.8	3	115.7
13523	30	6	3.0	30	- 3/	57.0	7.5	11.1	3	84.0

1/ Based on 0-3 scale; 0= no leaf damage, 1= light damage; 3= severe damage.

2/ Data from bunt nursery.

3/ No data available; varieties did not survive winter.

$LSD_{.05}$ = 4.5 bushels; CV = 10.2%

North Platte, Nebraska
Four replications

C. I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	May	In.	Lbs.	Bu.	Bu.		
13546	15	30	63.5	48.9	49.4	3	243.2
11673	18	31	62.8	42.3	38.9	23	117.5
13536	16	27	63.9	39.6	38.7	4	146.2
13532	17	31	62.1	39.4	43.8	4	185.6
13667	15	25	62.4	38.8	35.0	3	169.5
12132	15	28	62.2	37.8	36.8	3	178.4
8856	15	32	63.1	35.1	32.0	26	107.2
13547	18	29	62.6	35.0	--	1	169.1
13679	15	26	62.5	33.3	--	1	160.9
13669	14	25	61.9	33.1	33.0	3	157.9
13680	18	28	62.3	32.2	25.5	2	99.0
13668	15	25	62.3	32.1	31.8	3	162.4
13681	18	27	61.8	30.3	27.2	2	105.8
13548	19	30	62.5	29.2	37.8	3	224.4
13683	21	26	61.0	27.3	--	1	131.9
13684	20	25	61.6	26.9	--	1	130.0
13523	21	31	60.6	23.5	19.3	3	139.3
1442	27	35	61.5	20.7	25.8	27	100.0

$LSD_{.05}$ = 4.7 bushels; CV = 9.9%

Alliance, Nebraska
Four replications

C. I. No.	Date headed	Plant height	Winter survival	Weight per bushel	Av. acre yield	No. years grown	Percent of Kharkof
		In.	%	Lbs.	Bu.		
13547	6-1	30	100	58.8	26.7	1	101.9
1442	6-7	32	100	55.7	26.2	25	100.0
13546	5-30	27	100	59.0	22.0	2	113.3
13681	6-1	23	100	57.5	21.8	1	83.2
13548	6-2	30	100	59.1	21.3	2	100.9
13532	5-30	27	100	57.3	19.6	3	94.3
13536	5-30	25	100	59.1	17.8	3	94.3
13523	6-7	27	68	53.9	17.1	2	79.8
13683	6-5	23	100	53.1	17.0	1	64.9
11673	5-30	28	100	55.5	16.5	22	98.7
8856	5-30	28	100	56.3	16.2	25	92.2
13684	6-6	22	100	53.3	16.0	1	61.1
12132	5-29	27	100	56.3	13.8	2	88.2
13669	5-30	23	100	56.9	13.7	2	92.5
13679	5-29	24	100	57.0	12.8	1	48.8
13667	5-29	24	100	55.7	12.4	2	86.9
13668	5-29	23	100	55.1	12.0	2	91.1
13680	6-1	23	23	54.7	10.7	1	40.8

$LSD_{.05}$ = 5.1 bushels; CV = 20.9%

Ames, Iowa
Three replications 1/

C. I. No.	Winter survival %
1442	58
13546	50
13547	28
13532	27
13548	7
13681	3
13679	2
11673	1
13683	1
13523	1
8856	0
12132	0
13667	0
13668	0
13669	0
13536	0
13680	0
13684	0

1/ Nursery abandoned in the spring.

Urbana, Illinois
Three replications

C. I. No.	Date headed	Plant height	Soil-borne mosaic: Mottling	Soil-borne mosaic: Rosette	Weight per bushel	Av. acre yield: 1963	Av. acre yield: 1962--1963	No. years grown	Percent of Kharkof
	May	In.	%	%	Lbs.	Bu.	Bu.		
13532	21	35	35	0	61.9	61.7	55.1	3	120.0
13536	19	36	100	0	63.8	59.1	52.8	3	109.8
13548	26	38	100	0	63.2	58.8	55.8	3	117.8
11673	22	38	10	0	62.6	58.4	49.5	3	119.1
13679	15	31	100	0	62.7	57.9	--	1	110.5
13667	15	32	100	0	62.5	56.7	53.8	3	114.9
13669	15	34	100	0	61.7	56.2	49.1	3	102.5
13684	18	27	100	0	60.8	55.4	--	1	105.7
13546	19	37	100	0	62.2	55.0	53.5	3	111.8
12132	16	33	100	0	62.5	53.1	47.9	3	106.2
1442	30	39	100	0	62.7	52.4	47.6	3	100.0
13523	27	39	100	0	63.5	50.7	42.1	3	98.1
13680	21	38	100	0	61.9	50.0	47.2	2	99.0
8856	17	36	100	0	62.6	47.8	42.9	3	94.4
13547	26	37	100	0	62.8	47.3	--	1	90.3
13683	18	29	100	0	61.9	46.4	--	1	88.5
13681	21	28	100	0	61.8	46.2	43.2	2	90.6
13668	15	32	100	0	62.1	45.3	48.8	3	107.2

$LSD_{.05}$ = 3.6 bushels; CV = 3.4%

SUMMARY OF NURSERY YIELDS

A summary of grain yields at individual locations growing the southern regional performance nursery in 1963 together with state and regional average yields and ranks are contained in table 2. Two-year average yields and ranks are summarized in table 3.

The apparent wide range of adaptation of Scout again was demonstrated in 1963. It's regional average yield of 42.1 bushels per acre was highest in the nursery and 4.7 bushels above second-ranked Gage and Caddo. Scout ranked first in yield in all states growing the nursery except Illinois. Caddo, a new Texas variety, was outstanding in Texas, Colorado and Illinois but only average in other states. Gage performed best in Illinois, Nebraska and Kansas. Rust resistant Triumph had the most consistent and slightly the best performance among the Triumph strains, ranking third in the nursery in Texas, Oklahoma, and Kansas. As a group the semidwarf strains from Texas did poorly on the average in the region as did C, I. 13523 and Kharkof. Winter injury was a factor in the poor regional record of the semidwarfs and C. I. 13523. In general, the season favored early maturing varieties--particularly in Texas, Oklahoma, and Kansas.

On a 2-year basis, the most productive varieties in the nursery have been Scout, Gage, C. I. 13548, and Caddo in that order. Kharkof and C. I. 13523 have been the least productive on a 2-year basis. Scout ranked first in 4 states and no lower than fifth in any state in 1962 and 1963.

SUMMARY OF AGRONOMIC DATA

Varieties are arranged in table 4 (Summary of agronomic data other than yield) according to bushel weight. Average bushel weight ranged from 58.4 pounds to 61.2 pounds. Caddo produced the heaviest grain and 6 other varieties including 4 Triumph strains, Early Blackhull and C. I. 13548 weighed 60 or more pounds per bushel. The 3 semidwarf varieties from Texas produced the lightest test weight grain on the average. Lowest average bunt infection at two reporting stations was recorded for C. I. 13548, Comanche, C. I. 13667 and C. I. 13668. Leaf rust averages are probably unreliable since there were only light infections at two stations. Highest average winter survival was reported for Kharkof, Scout, Lancer and Gage in that order, all with 80 percent or higher surviving stands. C. I. 13523 and C, I. 13680 were distinctly the least hardy varieties. Super Triumph was earliest heading on the average being 1 day earlier than the other Triumph strains and Early Blackhull. Scout, Caddo, C. I. 13683 and C, I. 13684 headed 2-3 days later than the Triumph wheats on the average but were 8 or more days earlier than Kharkof and 2 days earlier than Comanche.

Table 2.--Summary of average yields in bushels per acre made by 18 varieties grown in the southern regional performance nursery at 18 stations in 1963, with state averages and rank.

Variety	C. I. No.	Texas				Oklahoma					Kansas					
		Denton	Chillicothe	Average	Rank	Stillwater	Woodward	Cherokee	Average	Rank	Manhattan	Hays	Garden City	Colby	Average	Rank
Scout	13546	32.5	26.5	29.5	1	50.4	34.5	51.7	45.5	1	45.2	24.0	34.4	33.7	34.3	1
Gage	13532	27.4	22.2	24.8	13	41.0	29.6	44.4	38.3	9	45.0	20.8	25.8	28.4	30.0	4-5
Caddo	13536	31.2	27.3	29.3	2	40.0	27.1	47.3	38.1	10-11	41.4	18.4	25.2	32.6	29.4	9
Cmn x Mi-Hope-Pn-Cro-Il 1-Cmn	13548	29.4	23.5	26.5	9	41.4	29.0	47.5	39.3	7	46.1	17.1	22.2	27.7	28.3	10
Comanche	11673	32.2	20.4	26.3	11	41.0	30.6	45.6	39.1	8	36.4	20.9	25.6	29.2	28.0	11
Lancer	13547	32.2	22.3	27.3	6	34.3	29.1	47.8	37.1	13	37.7	21.2	22.7	27.2	27.2	12
Rust resistant Triumph	13679	34.3	23.5	28.9	3	50.5	31.0	50.0	43.8	3	42.5	22.0	25.9	29.8	30.1	3
Improved Triumph	13667	26.9	25.8	26.4	10	53.2	25.1	49.4	42.6	5	40.4	23.8	25.7	29.2	29.8	6
Triumph	12132	28.9	24.4	26.7	7-8	49.4	27.3	46.8	41.2	6	43.3	24.4	26.8	29.7	31.1	2
Super Triumph	13669	29.9	26.6	28.3	4	50.5	34.2	48.9	44.5	2	42.7	20.1	23.4	32.7	29.7	7-8
Newest Imp. Triumph	13668	28.3	27.9	28.1	5	50.8	28.6	50.9	43.4	4	40.9	25.2	26.6	27.2	30.0	4-5
Early Blackhull	8856	30.4	23.0	26.7	7-8	46.0	23.8	44.5	38.1	10-11	40.1	22.4	25.2	30.9	29.7	7-8
Cmn-Hnr-Fw-Cmn-Mi-Hope x LPr 25	13680	25.1	22.6	23.9	14-15	39.4	20.7	37.9	32.7	15	40.7	21.1	19.0	26.4	26.8	13
Svl-Wi-Hope-Cnn-Wi^2 x SS	13684	22.6	24.4	23.5	17	44.3	25.0	43.4	37.6	12	36.8	19.6	17.5	24.9	24.7	14
Kharkof	1442	31.3	20.9	26.1	12	32.1	22.8	35.6	30.2	17	35.5	14.8	26.4	20.8	24.4	15-16
Svl-Wi-Hope-Cnn-Wi^2 x SS	13683	24.1	21.9	23.0	18	39.0	22.3	37.9	33.1	14	34.1	19.3	18.1	23.8	23.8	17
do	13681	29.7	18.0	23.9	14-15	35.4	21.4	37.1	31.3	16	31.6	15.8	16.2	22.6	21.6	18
Triumph x T-Ae	13523	26.8	20.5	23.7	16	33.8	14.6	35.5	28.0	18	37.2	18.8	16.3	25.4	24.4	15-16

Table 2.--Concluded.

C. I. No.	New Mexico		Colorado						Nebraska					Illinois		18 station average
	Clovis	Rank	Ft. Collins	Akron	Hesperus	Springfield	Average	Rank	Lincoln	North Platte	Alliance	Average	Rank	Urbana	Rank	
13546	59	1	89.8	23.1	77.2	4.2	48.6	1	46.5	48.9	22.0	39.1	1	55.0	9	42.1
13532	50	5	81.0	20.6	64.0	4.8	42.6	6	47.4	39.4	19.6	35.5	2	61.7	1	37.4
13536	49	6	81.9	18.9	72.8	7.7	45.3	2	35.6	39.6	17.8	31.0	6	59.1	2	37.4
13548	52	4	72.8	22.4	65.9	6.8	42.0	8	45.2	29.2	21.3	31.9	5	58.8	3	36.6
11673	53	3	74.0	18.3	62.7	6.5	40.4	12	40.1	42.2	16.5	32.9	4	58.4	4	36.3
13547	48	7-8	77.3	22.2	72.5	7.9	45.0	3	38.3	35.0	26.7	33.3	3	47.3	15	36.1
13679	46	11	73.1	23.1	59.9	3.1	39.8	13	24.8	33.3	12.8	23.6	15	57.9	5	35.8
13667	47	9-10	77.1	20.4	62.6	1.8	40.5	11	20.8	38.8	12.4	24.0	13	56.7	6	35.4
12132	45	12-13	71.7	20.8	53.3	3.0	37.2	18	30.4	37.8	13.8	27.3	8-9	53.1	10	35.0
13669	36	18	81.0	11.3	56.5	2.5	37.8	17	30.8	33.1	13.7	25.9	11	56.2	7	35.0
13668	41	15	75.5	18.1	61.3	2.3	39.3	15-16	21.8	32.0	12.0	21.9	16	45.3	18	34.2
8856	44	14	68.4	25.7	58.9	4.2	39.3	15-16	28.5	35.1	16.2	26.6	10	47.8	14	34.2
13680	48	7-8	78.4	23.7	69.1	4.4	43.9	4	28.8	32.2	10.7	23.9	14	50.0	13	33.2
13684	39	17	68.9	25.1	65.9	5.9	41.5	9	22.3	26.9	16.0	21.7	17	55.4	8	32.4
1442	47	9-10	78.7	17.7	57.5	4.5	39.6	14	35.1	20.7	26.2	27.3	8-9	52.4	11	32.2
13683	45	12-13	72.1	23.2	69.2	4.6	42.3	7	28.2	27.3	17.0	24.2	12	46.4	16	31.9
13681	40	16	78.2	21.0	68.6	4.1	43.0	5	30.1	30.3	21.8	27.4	7	46.2	17	31.6
13523	54	2	71.6	19.1	70.4	4.0	41.3	10	7.5	23.5	17.1	16.0	18	50.7	12	30.4

Table 3.--Summary of 2-year average yields in bushels per acre for 14 varieties grown in the southern regional performance nursery at 17 stations in 1962 and 1963, with state averages and rank.

Variety	C. I. No.	Texas				Oklahoma					Kansas					
		Denton	Chillicothe	Average	Rank	Stillwater	Woodward	Cherokee	Average	Rank	Manhattan	Hays	Garden City	Colby	Average	Rank
Scout	13546	29.7	19.0	24.4	5-6	41.8	37.7	40.2	39.9	3	35.8	25.5	27.8	32.1	30.3	1
Gage	13532	32.7	16.1	24.4	5-6	36.8	37.0	35.0	36.3	6-7	41.2	24.0	22.9	28.2	29.1	2
Cmn x Mi-Hope-Pn-Oro-Il 1-Cmn	13548	31.6	15.8	23.7	9	37.3	34.3	37.3	36.3	6-7	38.0	22.8	20.4	26.8	27.0	7
Caddo	13536	39.0	19.0	29.0	1	35.5	33.1	39.0	35.9	8	31.3	22.0	22.0	29.7	26.2	8
Improved Triumph	13667	33.0	18.0	25.5	4	45.1	32.4	40.8	39.4	4	30.6	26.0	25.2	27.9	27.4	3-5
Comanche	11673	29.1	14.8	22.0	12	36.6	33.8	33.6	34.7	10	38.6	20.8	23.4	26.6	27.4	3-5
Newest Imp. Triumph	13668	33.1	19.4	26.2	2	44.4	35.6	42.8	40.9	1	31.2	25.4	25.3	27.2	27.3	6
Triumph	12132	30.4	17.4	23.9	8	40.5	33.2	37.3	37.0	5	33.0	24.0	25.4	27.4	27.4	3-5
Early Blackhull	8856	34.0	17.2	25.6	3	40.2	30.4	36.1	35.6	9	28.6	23.4	22.5	28.8	25.8	10
Super Triumph	13669	29.2	16.6	22.9	10	44.0	40.0	38.4	40.8	2	32.0	23.2	21.4	27.6	26.0	9
Cmn-Hnr-Fw-Cmn-Mi-Hope x LPr 25	13680	31.0	13.4	22.2	11	32.8	24.9	27.0	28.2	12	25.6	19.9	17.9	24.0	21.8	12
Svl-Wi-Hope-Cnn-Wi^2 x SS	13681	30.4	11.6	21.0	13	32.2	33.1	31.8	32.4	11	24.0	17.6	15.7	22.4	19.9	14
Triumph x T-Ae	13523	31.9	16.6	24.2	7	30.3	24.2	28.5	27.7	13	27.4	17.6	16.9	22.4	21.1	13
Kharkof	1442	26.0	14.2	20.1	14	28.0	25.0	25.8	26.3	14	29.1	13.6	22.2	22.8	21.9	11

Table 3.--Concluded.

C. I. No.	New Mexico		Colorado						Nebraska				Illinois		17 station average
	Clovis	Rank	Ft. Collins	Akron	Hesperus	Springfield	Average	Rank	Lincoln	North Platte	Average	Rank	Urbana	Rank	
13546	44.2	1	87.6	25.6	78.6	16.6	52.1	1	47.5	49.4	48.4	1	53.5	4	40.7
13532	35.9	7	83.8	28.8	66.6	15.0	48.6	3	50.1	43.8	47.0	2	55.1	2	38.4
13548	37.5	4	78.0	29.4	71.2	17.6	49.0	2	49.9	37.8	43.8	3	55.8	1	37.7
13536	37.6	3	80.4	24.2	70.1	15.6	47.6	5-6	38.6	38.7	38.6	4	52.8	5	37.0
13667	35.0	11	74.4	26.8	68.8	12.6	45.6	9	27.3	35.0	31.4	9	53.8	3	36.1
11673	38.3	2	69.9	28.4	65.4	19.3	45.8	7-8	38.0	38.9	38.4	5	49.5	6	35.6
13668	33.4	12	72.8	26.0	63.4	10.8	43.2	10	30.2	31.8	31.0	10	48.8	8	35.4
12132	36.0	6	71.2	21.2	55.4	9.4	39.3	13	35.0	36.8	35.9	6	47.9	9	34.2
8856	35.1	10	68.4	24.7	60.6	14.6	42.1	11	33.4	32.0	32.7	8	42.9	13	33.7
13669	28.9	13	71.4	13.9	55.4	7.5	37.0	14	36.2	33.0	34.6	7	49.1	7	33.4
13680	36.2	5	82.4	27.0	68.0	13.2	47.6	5-6	25.2	25.5	25.4	13	47.2	11	31.8
13681	28.0	14	70.5	22.8	73.9	16.2	45.8	7-8	29.1	27.2	28.2	11	43.2	12	31.2
13523	35.2	8-9	79.8	23.2	74.8	14.4	48.0	4	11.1	19.3	15.2	14	42.1	14	30.3
1442	35.2	8-9	63.6	23.2	60.8	12.4	40.0	12	28.3	25.8	27.0	12	47.6	10	29.6

Table 4.--Summary of agronomic data other than yield for varieties grown in the southern regional performance nursery in 1963.

Variety	C.I. No.	Date		Winter survival	Plant height	Diseases		Weight per bushel
		Headed	Ripe			Leaf rust	Bunt	
		May	June					
Number of stations		19	6	5	19	2	2	19
Caddo	13536	9	5	71	28	T	28	61.2
Rust Resistant Triumph	13679	6	3	78	27	5	67	60.4
Early Blackhull	8856	6	4	75	30	8	62	60.4
Newest Improved Triumph	13668	6	2	73	27	3	10	60.1
Triumph	12132	7	3	76	28	5	66	60.0
Improved Triumph	13667	6	2	71	27	8	8	60.0
Cmn x Mi-Hope-Pn-Oro-Il 1-Cmn	13548	13	8	79	30	T	T	60.0
Lancer	13547	13	8	82	29	5	41	59.9
Scout	13546	9	5	84	29	15	40	59.8
Super Triumph	13669	5	2	73	27	12	39	59.5
Cmh-Hnr-Fw-Cmn-Mi-Hope x LPr 25	13680	11	6	44	28	T	59	59.5
Comanche	11673	11	8	76	30	T	1	59.5
Gage	13532	11	7	81	29	T	46	59.2
Kharkof	1442	17	14	88	31	8	37	59.1
Triumph x T-Ae	13523	14	9	40	29	T	25	59.0
Svl-Wi-Hope-Cnn-Wi^2 x SS	13684	8	4	73	23	T	32	58.7
do	13683	9	8	74	25	T	45	58.6
do	13681	12	8	76	25	13	28	58.4

NORTHERN REGIONAL PERFORMANCE NURSERY

The northern regional nursery was comprised of 14 varieties in 1963. It was grown at 16 stations. The nursery did not survive the winter at Dickinson, North Dakota. It was grown for the first time at Tetonia, Idaho. Varieties in the nursery in 1963 are listed below. Data from the reporting stations appear in table 5.

Entry No.		C. I. No.	State submitting
1	Kharkof	1442	---
2	Minter	12138	---
3	Yogo	8033	---
4	Nebred	10094	---
5	Cheyenne	8885	---
6	Winalta	13670	Lethbridge, Alta.
7	So. Dak. Selection	13526	So. Dak.
8	do	13528	do
9	Frontana x Minter^2	13682	Minn.
10	Scout	13546	Nebr.
11	Lancer	13547	do
12	Ponca x Cheyenne^2	13666	do
13*	Caddo	13536	Texas
14	Yogo x (Tk-Oro 221)-117	13542	Mont.

* Entered from the southern regional nursery.

DATA OBTAINED

Precipitation was below normal through the fall and winter at St. Paul, Minnesota. The winter was severe with several periods of low temperature and little or no snow cover. Late winter and spring moisture was good but July was dry. Winter survival of varieties in the northern nursery ranged from 88 percent down to zero survival for the Texas variety Caddo. Yogo and the Montana experimental C. I. 13542 with 88 percent survivals were the most hardy followed by C. I. 13682, C. I. 13528 and Minter in that order. All other varieties survived with 10 or less percent stands. Grains yields were largely a reflection of survival at St. Paul. Bushel weights among surviving varieties were about normal.

The winter was less severe at Waseca than at St. Paul. There was good soil moisture at the time of seeding continuing through the winter and early spring. June and July were dry. Snow cover was light during early and mid-winter but was heavier in late winter. Stem and leaf rust became heavy by harvest time. All varieties survived the winter at Waseca with stands of 60 percent or more except C. I. 13666, Scout, and Caddo. The last named had only a 2 percent stand remaining in the spring. Because of differential winter survival, yields ranged from 0 to 41.3 bushels per acre. Bushel weights were about normal except in varieties highly susceptible to stem rust or heavily damaged by the winter. Highest resistance to stem rust was shown by Lancer, C. I. 13682 and Scout. Winalta segregated. All surviving varieties were more or less susceptible to leaf rust. Lancer and C. I. 13666 had the best lodging ratings.

Good stands were established in the fall at Brookings. The winter was comparable in severity on winter wheat seedings to that at Waseca. The spring and summer were abnormally wet. The temperature fell to 21° F on May 23 causing some freeze injury to the wheat. Both leaf and stem rust became severe as did Septoria. Poorest winter survivals were recorded for Caddo, Scout, C. I. 13666 and Lancer in that order with 1, 5, 15, and 20 percent remaining stands in the spring. C. I. 13542 and Yogo had the highest survivals with 90 and 85 percent respectively. Some resistance to stem rust was exhibited by C. I. 13528, C. I. 13682, Lancer, Minter, Winalta, and Scout. All surviving varieties were susceptible to leaf rust. The combination of winter injury, excessive spring moisture and heavy rust and Septoria resulted in near yield failure of most varieties and extremely low test weight grain. C. I. 13526 yielded 34.5 bushels which was significantly more than any other variety in the nursery. Test weights of 54.7 and 54.3 pounds for Lancer and C. I. 13526 were highest in the nursery. Four varieties produced grain weighing less than 40 pounds per bushel.

Conditions at Presho and Highmore, South Dakota were better than at Brookings. The winter was less severe on the wheat and no loss of stand was reported from either location. Stem rust was present but not so severe as at Brookings.

Scout the earliest variety in the nursery was damaged by the May 23 frost at Presho. Yields ranged from 14.7 bushels for Caddo to 28.0 bushels for Lancer. Test weights were only fair, ranging from 59.5 pounds for Caddo and Scout to 54.0 pounds for Yogo. Highest resistance to stem rust was indicated for C. I. 13682, Lancer and the two South Dakota Selections C. I. 13526 and C. I. 13528.

Scout, Lancer and C. I. 13528 were highest yielding at Highmore - all producing more than 30 bushels per acre. Yogo and C. I. 13542 were the only varieties yielding less than 20 bushels and had the lowest bushel weights as well. C. I. 13682, C. I. 13526, Scout and Lancer were the most resistant to stem rust, whereas Caddo, C. I. 13666, and C. I. 13682 had the best resistance to leaf rust.

Fall and spring moisture was excellent at Archer, Wyoming. June and July were very dry. No winterkilling was recorded. Bushel weights ranged from 60 pounds for Winalta down to 55 pounds for Minter and Caddo. Highest grain yields were made by Scout, C. I. 13542 and Lancer in that order with 26.0, 25.6 and 25.2 bushels respectively. C. I. 13528 was the only variety that failed to make a 20 bushel yield.

Good precipitation throughout the spring at Sheridan produced heavy and rank growth of the wheat. Although little rain was received after June 1 all varieties were completely lodged at least 2 weeks prior to harvest due to the excessively tall straw and heavy spike development. Yields were sharply reduced by the early lodging as evidenced by a 54 bushel yield of a field of Shoshoni adjacent to the station at Sheridan in which lodging was not as severe. Caddo with a 40.6 bushel yield of 62 pound grain had the highest yield and test weight.

Grain yields were low at Havre, Montana ranging from 7.7 to 14.3 bushels per acre. Lack of moisture during the fall and winter reduced emergence of the wheat. All varieties suffered light to moderate winterkilling.

Soil moisture at Lethbridge at seeding time was barely enough to permit germination and emergence of the wheat. The dry conditions continued through the winter and spring. Reduced stands in the spring were the result of winter drought combined with low temperatures. Grain yields were extremely low and were not considered reliable. C. I. 13542 and C. I. 13682 had the highest winter survival. The latter was also the tallest variety with 14 inches height.

Growing conditions at Lincoln, North Platte and Alliance, Nebraska have been described in connection with the southern regional nursery. Single rod-row plots of the entries in the northern nursery are grown at Lincoln for observation and agronomic data other than yield. Only Caddo lost stand from winterkilling although several varieties showed leaf damage. Seven of the 14 varieties were resistant to bunt. They included the experimental varieties C. I. 13528, C. I. 13542, and C. I. 13682.

Winalta and Scout produced 41.1 and 40.9 bushels per acre respectively for high yield honors at North Platte. The same varieties also have the best 2-year average yields. All varieties produced high test weight grain, the lightest being 61.2 pounds per bushel for C. I. 13542.

Late maturing varieties were the most productive at Alliance probably because they were able to better recover from a hail storm in mid-May than the early maturing varieties. Caddo and Scout normally the earliest maturing varieties were the lowest yielding and the heading of Caddo was delayed as well, probably because of winter and hail injury.

The northern regional nursery was grown for the first time in 1963 at Tetonia, Idaho. Environmental and other factors affecting performance of varieties are not known. Cheyenne and Nebred were the highest yielding varieties with yields over 40 bushels. C. I. 13682, the least productive variety yielded 32.7 bushels. Test weights were near normal, ranging from 56.5 to 62.3 pounds per bushel. All varieties except C. I. 13542 and Yogo gave resistant reactions to stripe rust.

The northern regional nursery was grown under irrigation at Colby, Kansas. The nursery is being discontinued in 1964. Caddo was significantly more productive than the other varieties and had the highest test weight.

High yields were recorded in an irrigated nursery grown at Clovis, New Mexico. Scout was highest yielding with a 64 bushel yield. Winalta ranked second yielding 58 bushels. All varieties produced grain weighing 60 pounds per bushel or more. Yogo, C. I. 13542, and Kharkof lodged heavily. C. I. 13666 showed moderate shattering.

Table 5. Yield and other data for varieties grown in the northern regional performance nursery at 14 stations in the hard red winter wheat region in 1963.

St. Paul, Minnesota
Three replications

C. I. No.	Date headed	Plant height	Winter survival	Rust		Weight per bushel	Av. acre yield 1963	No. years grown	Percent of Kharkof
				Leaf	Stem				
	June	In.	%	%	%	Lbs.	Bu.		
13528	13	37	52	50	5	60.2	40.8	3	177.2
13682	15	39	70	10	10	60.0	34.0	1	425.0
8033	16	41	88	60	5	60.2	33.3	3	152.3
13542	15	40	88	70	60	60.3	32.7	3	131.2
12138	16	39	40	20	3	60.5	28.0	3	160.9
10094	14	36	10	30	40	59.5	17.7	3	111.0
13526	15	33	5	30	3	60.0	17.5	3	155.4
13670	14	36	5	50	15	60.5	15.5	1	193.8
8885	16	35	7	30	3	58.5	9.2	3	106.8
1442	16	37	5	40	10	57.5	8.0	3	100.0
13666	11	34	3	--	--	60.0	7.1	1	88.8
13547	13	--	T	100	70	60.0	6.5	2	110.2
13546	--	--	T	90	70	--	0	2	93.2
13536	--	--	0	--	--	--	0	1	0

$LSD_{.05}$ = 13.1 bushels; CV = 43.1%

Waseca, Minnesota
Three replications

C. I. No.	Date Headed	Date Ripe	Lodging class 1/	Plant height	Winter survival	Rust Leaf	Rust Stem	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	June	July		In.	%	%	%	Lbs.	Bu.	Bu.		
13682	11	16	2.7	44	83	50	5	61.8	41.3	35.8	2	171.1
13528	9	14	2.0	39	80	70	20	60.7	36.4	31.1	3	134.2
12138	13	18	3.3	44	83	40	30	60.7	33.5	33.6	3	136.8
13547	9	15	1.0	38	60	50	0	61.0	30.0	32.6	3	134.0
1442	11	14	3.0	43	82	90	90	56.3	28.3	21.0	3	100.0
13670	11	16	2.3	40	65	80	T-70	59.2	27.4	30.2	2	143.9
13542	12	14	3.0	47	85	70	90	56.8	26.6	19.8	3	86.6
13526	9	14	2.0	37	75	70	50	60.5	24.5	25.4	3	110.8
8033	13	16	3.0	44	82	70	80	55.5	23.1	22.6	3	97.3
10094	9	13	2.0	39	70	100	90	57.5	22.5	16.8	3	71.9
8885	11	15	2.0	41	65	70	80	55.5	20.3	17.6	3	72.7
13666	10	16	1.7	38	20	--	90	55.0	14.9	11.5	2	54.9
13546	8	18	3.3	36	17	--	5	55.8	12.9	20.0	3	117.9
13536	--	--	--	--	2	--	--	--	0	--	1	0

$LSD_{.05}$ = 14.0 bushels; CV = 34.2%

1/ Based on 1-9 scale; 1 =least lodged, 9 = completely lodged.

Brookings, South Dakota
Four replications 1/

C. I. No.	Date headed	Plant height	Rust		Winter survival	Weight per bushel	Av. acre yield		No. years grown	Percent of Kharkof
			Leaf	Stem			1963	1962-1963		
	June	In.	%	%	%	Lbs.	Bu.	Bu.		
13526	11	38	65	40R	80	54.3	24.5	19.8	4	225.6
13528	12	39	65	40R-5S	80	51.0	17.2	13.6	4	208.6
13682	15	40	65	25R-TS	83	53.0	17.1	14.8	2	548.1
13547	12	37	65	25R-5S	20	54.7	16.2	11.8	2	438.9
12138	16	40	65	40R-5S	83	51.0	14.4	12.6	10	139.6
13670	13	40	65	40R-40S	78	51.0	13.5	11.2	2	414.8
10094	10	37	65	65S	73	44.7	6.8	4.4	10	108.8
13546	13	33	65	40R-40S	5	46.3	3.2	8.2	2	301.8
13666	13	36	65	65S	15	43.3	2.4	3.0	2	109.2
1442	14	36	65	65S	50	38.5	2.2	2.7	10	100.0
8033	15	42	65	65S	85	34.3	2.1	2.2	10	114.0
8885	15	37	65	65S	38	39.5	1.6	2.2	6	91.9
13542	15	41	65	65S	90	36.5	1.5	1.8	3	65.4
13536	--	--	--	--	1	--	0	--	1	0

1/ Only 3 replications harvested for yield.

$LSD_{.05}$ = 3.3 bushels; CV = 23.0%

Presho, South Dakota
Four replications

C. I. No.	Date headed	Stem rust		Weight per bushel	Av. acre yield 1963
	June	%		Lbs.	Bu.
13547	4	T	R	58.0	28.0
13666	4	45	S	59.0	27.4
13670	7	5	S	58.0	26.8
8885	6	65	S	57.0	26.7
13528	5	T	R	56.0	26.3
1442	6	5	S	57.0	25.4
10094	4	40	S	58.0	25.1
12138	8	T	S	55.0	25.0
13526	2	T	R	58.5	24.5
13542	8	65	S	54.5	24.3
8033	9	65	S	54.0	23.6
13682	8	0		55.0	22.7
13546 1/	3	T	S	59.5	17.9
13536	6	40	S	59.5	14.7

1/ Damaged on May 23 by late frost.

$LSD_{.05}$ = 6.4 bushels; CV = 18.5%

Highmore, South Dakota
Four replications

C. I. No.	Rust: Leaf 6-26		Rust: Stem 6-26		Stem necrosis 6-26	Weight per bushel	Av. acre yield 1963
	%		%			Lbs.	Bu.
13546	100	S	1	MR	mod.	58.2	34.9
13547	80	S	1	MR	sl.	60.2	34.7
13528	100	S	5	S	sl.	57.5	30.2
13526	100	S	0		sev.	57.8	29.2
13666	5	R	60	S	sl.	59.5	28.7
13536	T	R	1	X	sl.	60.5	28.7
10094	100	S	20	S	sl.	60.0	26.9
13670	100	S	20	S	mod.	60.0	25.6
12138	80	S	1	MS	sl.	56.0	23.9
1442	100	S	20	S	sl.	56.0	23.8
13682	5	X	0		sl.	56.8	23.3
8885	100	S	20	S	sl.	56.0	22.5
13542	100	S	20	S	sl.	52.2	18.4
8033	100	S	20	S	sl.	53.8	16.9

$LSD_{.05}$ = 6.0 bushels; CV = 15.7%

Archer, Wyoming
Four replications

C. I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	June	In.	Lbs.	Bu.	Bu.		
13546	3	25	58	26.0	30.7	2	103.9
13542	6	27	57	25.6	32.1	3	102.7
13547	3	26	58	25.2	29.8	2	100.8
13526	3	22	57	24.1	28.5	4	103.7
13536	3	27	55	24.0	--	1	110.1
13682	6	23	57	23.2	28.7	2	97.1
13666	4	25	59	23.1	31.4	2	106.1
8885	5	23	59	23.1	31.2	6	100.8
8033	6	28	56	23.0	29.5	8	94.2
13670	5	25	60	22.2	31.9	2	108.0
1442	5	26	59	21.8	29.6	8	100.0
12138	6	27	55	21.7	30.3	8	94.9
10094	5	21	59	20.2	28.4	8	101.4
13528	5	22	57	17.6	26.0	4	92.8

$LSD_{.05}$ = 4.1 bushels; CV = 12.7%

Sheridan, Wyoming
Four replications

C. I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	June	In.	Lbs.	Bu.	Bu.		
13536	2	49	62	40.6	--	1	116.6
13670	5	48	60	39.8	34.9	2	107.6
13528	4	51	59	35.3	32.6	5	97.4
1442	9	47	59	34.8	32.4	12	100.0
10094	5	48	60	34.7	30.5	12	104.3
8033	9	49	59	33.0	32.1	12	104.4
13682	7	48	60	32.6	29.8	2	91.8
8885	5	48	60	31.6	33.2	7	112.0
13542	5	47	59	29.6	30.9	4	93.8
13546	2	45	60	29.4	30.0	3	107.6
13666	4	49	60	28.5	26.1	2	80.4
13526	4	45	59	27.5	25.6	5	82.1
13547	4	42	60	24.6	27.1	3	94.1
12138	5	47	59	20.7	22.4	12	94.8

All entries in nursery completely lodged 2 weeks after heading.
$LSD_{.05}$ = 11.0 bushels; CV = 24.6%

Havre, Montana
Three replications

C. I. No.	Emergence 1/	Winter injury 2/	Date headed	Plant height	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	%		June	In.	Lbs.	Bu.	Bu.		
13682	80	M	6	25	58	14.3	13.0	2	105.7
13670	76	L	6	23	59	14.2	13.2	2	106.5
12138	76	L	8	25	60	12.5	11.5	10	88.2
13526	83	L	1	23	57	12.1	12.3	4	104.8
8033	93	L	7	22	60	11.8	11.6	10	97.3
13542	93	L	7	24	59	11.5	14.0	3	101.6
13528	83	L	1	19	58	11.2	13.9	4	94.6
8885	70	L	7	22	61	11.1	9.8	5	98.0
13547	63	M	5-31	20	59	10.8	13.2	3	119.5
10094	80	L	4	21	59	10.8	12.1	10	95.7
1442	66	L	7	24	59	10.6	12.4	10	100.0
13666	66	M	5-31	20	59	8.0	9.8	2	79.4
13546	53	M	5-30	22	59	7.9	9.7	3	94.8
13536	30	M	1	23	62	7.7	--	1	72.6

1/ Values based on fall or early spring emergence.

2/ L= light; M= medium degree of winterkilling.

$LSD_{.05}$ = 3.1 bushels; CV = 9.5%

Lethbridge, Alberta
Four replications

C. I. No.	Date		Plant height	Winter survival	1000-kernel weight	Weight per bushel
	Headed	Ripe				
	June	July	In.	%	g.	Lbs.
1442	12	25	12	76	26.4	63
12138	13	24	12	79	22.8	62
8033	12	24	11	69	22.6	61
10094	10	24	12	71	23.2	63
8885	10	24	12	63	23.8	62
13670	10	23	12	76	26.8	66
13526	10	23	13	58	21.2	61
13528	10	23	13	81	22.8	62
13682	11	23	14	84	21.0	62
13546	9	22	11	78	28.2	62
13547	9	22	12	73	23.6	62
13666	9	22	12	71	26.8	62
13536	9	24	12	64	29.6	64
13542	11	24	13	84	21.6	62

Lincoln, Nebraska
Single plot

C. I. No.	Date headed	Winter injury: Survival	Winter injury: Leaf damage 1/	Plant height	Bunt	Weight per bushel
	May	%		In.	%	Lbs.
1442	28	100	0	36	35	55.0
12138	29	100	0	37	9	55.7
8033	30	100	0	38	8	54.5
10094	27	100	0	35	5	57.0
8885	28	100	1	36	40	56.5
13670	27	100	0	36	34	57.1
13526	22	100	2	35	41	54.0
13528	26	100	0	38	1	54.5
13682	29	100	1	41	4	55.0
13546	16	100	1	35	26	57.5
13547	21	100	2	36	27	57.0
13666	21	100	0	37	31	57.0
13536	20	80	3	34	14	57.0
13542	29	100	0	39	2	55.7

1/ Ratings on 1-3 scale; 1= mild leaf damage, 3= severe leaf damage.

North Platte, Nebraska
Four replications

C. I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	May	In.	Lbs.	Bu.	Bu.		
13670	24	34	63.4	41.1	44.8	2	152.0
13546	16	31	63.3	40.9	43.5	3	209.8
8033	27	36	62.2	37.4	31.3	5	99.8
13536	17	30	63.7	37.2	--	1	137.8
10094	24	31	62.8	35.2	36.0	5	123.7
13526	21	30	63.2	34.3	37.8	5	147.5
13666	19	30	63.3	33.9	36.4	2	123.4
8885	24	33	62.9	33.9	33.5	5	121.6
13547	20	30	62.9	31.8	40.0	3	199.7
13542	28	37	61.2	27.4	27.7	4	106.2
12138	27	36	61.8	27.0	35.3	5	129.6
1442	25	36	61.3	27.0	29.4	5	100.0
13528	23	34	61.5	24.7	36.1	5	148.2
13682	26	36	62.0	23.1	35.2	2	119.7

$LSD_{.05}$ = 5.0 bushels; CV = 10.9%

Alliance, Nebraska
Four replications

C. I. No.	Date headed	Plant height	Weight per bushel	Av. acre yield 1963	No. years grown	Percent of Kharkof
	June	In.	Lbs.	Bu.		
8033	5	37	58.9	30.9	11	91.2
13682	4	32	57.2	29.9	1	118.6
12138	5	37	57.9	29.5	11	94.1
8885	4	30	58.6	29.4	5	112.7
13670	4	32	59.8	28.4	1	112.7
13542	7	35	56.0	26.8	3	100.5
10094	4	29	58.3	25.3	11	117.6
1442	6	36	56.6	25.2	11	100.0
13547	4	28	57.5	22.7	2	102.8
13526	1	30	57.5	22.1	3	102.6
13666	5-31	28	58.3	22.1	1	87.7
13528	2	32	56.3	21.9	3	101.2
13546	5-30	26	58.0	21.7	2	111.2
13536	6	26	58.5	16.9	1	67.1

$LSD_{.05}$ = 4.6 bushels; CV = 12.7%

Tetonia, Idaho
Three replications

C. I. No.	Stripe rust	Plant height	Weight per bushel	Av. acre yield 1963
		In.	Lbs.	Bu.
8885	0;-1	42	60.2	42.2
10094	1	40	59.3	41.3
13526	0;-1	44	59.3	39.2
13670	0;	46	61.2	38.5
13547	0;	45	58.2	38.7
13528	1	44	59.0	38.2
13536	0;	44	62.3	38.2
13666	1	43	61.2	37.8
13542	3	45	59.2	36.6
12138	0;	56	58.0	35.8
1442	0;	44	59.2	35.6
13546	1-2	44	58.6	35.2
8033	2	46	57.6	33.2
13682	0;	46	56.5	32.7

$LSD_{.05}$ = 4.1 bushels; CV = 6.7%

Colby, Kansas
Four replications, irrigated

C. I. No. 1/	Date headed	Plant height	Weight per bushel	Av. acre yield: 1963	1962-1963	No. years grown	Percent of Kharkof
	May	In.	Lbs.	Bu.	Bu.		
13536	9	37	61.5	40.2	--	1	147.8
13670	17	41	58.5	33.5	32.3	2	130.0
13546	11	39	60.0	32.2	32.6	2	131.0
10094	15	39	58.0	30.2	28.8	3	98.6
13526	13	38	59.0	29.5	32.9	3	111.9
1442	18	42	57.5	27.2	24.8	3	100.0
13666	16	42	58.0	27.0	25.4	2	102.0
8885	16	40	58.0	27.0	24.6	3	106.4
8033	21	43	57.5	26.9	21.8	3	81.3
13542	20	41	57.0	25.1	21.1	3	80.8
13528	16	42	57.5	19.4	25.6	3	101.6
12138	19	42	56.5	17.0	24.4	3	97.0
13682	19	42	56.5	13.4	23.2	2	93.2

1/ An unidentified variety (probably C. I. 13195) was mistakenly seeded in place of C. I. 13547.

$LSD_{.05}$ = 4.6 bushels; CV = 11.9%

Clovis, New Mexico
Three replications, irrigated

C. I. No.	Date headed	Plant height	Lodging 1/	Shattering 2/	Weight per bushel	Av. acre yield 1963	Av. acre yield 1962-1963	No. years grown	Percent of Kharkof
	May	In.			Lbs.	Bu.	Bu.		
13546	9	38	1	1	61	64	46.5	3	126.8
13670	16	45	2	1	62	58	41.0	2	104.2
13526	10	38	2	2	60	57	40.6	5	92.6
8885	16	41	1	2	61	57	42.0	5	105.0
13547	14	39	1	2	62	53	35.5	3	100.3
10094	15	39	2	2	61	52	38.8	5	100.8
13536	9	38	1	1	62	51	--	1	104.1
13542	18	45	4	1	61	51	37.2	4	92.9
8033	18	43	5	1	60	51	34.8	5	87.8
12138	18	44	3	1	61	49	30.3	5	84.7
1442	18	42	4	2	61	49	39.4	5	100.0
13666	9	40	1	3	61	45	36.8	2	93.5
13682	19	43	2	2	60	45	29.4	2	74.6
13528	15	42	1	2	61	42	31.1	5	82.5

1/ Based on 1-5 scale; 1= none, 5= severe.

2/ Based on 1-5 scale, 1= none, 5= severe.

$LSD_{.05}$ = 8.8 bushels; CV = 10.4%

SUMMARY OF NURSERY YIELDS

Yields made by varieties in the northern regional nursery in 1963 are summarized in table 6. As in 1962, Winalta was the most productive variety at 13 stations reporting yields. It ranked first in Nebraska, second in Wyoming, Montana, Kansas, and New Mexico, and no lower than sixth in any state. Its consistently good performance indicates a wide adaptation range for Winalta compared with other northern varieties. South Dakota varieties C. I. 13526 and C. I. 13528 had the second and third highest regional yields. Caddo, C. I. 13666 and Scout, the most winter tender varieties, had the lowest average yields among new and experimental varieties, reflecting the extensive winterkilling at several locations. Winalta and C. I. 13526 were also the most productive varieties among 13 varieties grown in the northern regional nursery for 2 years (table 7).

SUMMARY OF AGRONOMIC DATA

Agronomic data for varieties grown in the northern regional nursery are summarized in table 8. Caddo, Winalta and Lancer in that order produced grain with the highest average bushel weight. C. I. 13682 was most resistant to stem rust and Caddo was most resistant to leaf rust. Caddo and Lancer lodged the least and had the shortest straw as well. Average winter survival is of particular interest. Five levels of winterhardiness are suggested by the data and are shown in the listing that follows.

75-90% survival		60-69% survival	
C. I. 13542	89%	Winalta	65%
Yogo	85%	Nebred	65%
C. I. 13682	84%	C. I. 13526	64%
C. I. 13528	79%	Kharkof	63%
Minter	77%		

50-59% survival		40-49% survival		Less than 39% surv.	
Cheyenne	55%	C. I. 13666	42%	Caddo	29%
Lancer	51%	Scout	40%		

The Yogo-Minter level of winterhardiness probably has been attained in the experimental varieties C. I. 13542, C. I. 13682 and C. I. 13528. Winalta and C. I. 13526 appear comparable to Nebred and Kharkof, whereas Lancer is similar to Cheyenne. Scout and C. I. 13666 were similar and Caddo was clearly the most winter-tender of the varieties in the nursery.

Table 6. Summary of average yields in bushels per acre made by 14 varieties grown in the northern regional performance nursery at 13 stations in 1963, with state averages and rank.

Variety	C. I. No.	Minnesota				South Dakota				
		St. Paul	Waseca	Average	Rank	Brookings	Presho	Highmore	Average	Rank
Winalta	13670	15.5	27.4	21.5	6	13.5	26.8	25.6	22.0	4
So. Dakota Sel.	13526	17.5	24.5	21.0	7	24.5	24.5	29.2	26.1	2
do	13528	40.8	36.4	38.6	1	17.2	26.3	30.2	24.6	3
Frontana x Minter[2]	13682	34.0	41.3	37.7	2	17.1	22.7	23.3	21.0	6
Lancer	13547	6.5	30.0	18.3	9	16.2	28.0	34.7	26.3	1
Nebred	10094	17.7	22.5	20.1	8	6.8	25.1	26.9	19.6	7
Yogo	8033	33.0	23.1	28.1	5	2.1	23.6	16.9	14.2	14
Minter	12138	28.0	33.5	30.8	3	14.4	25.0	23.9	21.1	5
Yogo x (Tk-Oro 221)-117	13542	32.7	26.6	29.7	4	1.5	24.3	18.4	14.7	12
Cheyenne	8885	9.2	20.3	14.8	11	1.6	26.7	22.5	16.9	11
Scout	13546	0	12.9	6.5	13	3.2	17.9	34.9	18.7	9
Kharkof	1442	8.0	28.3	18.2	10	2.2	25.4	23.8	17.1	10
Ponca x Cheyenne[2]	13666	7.1	14.9	11.0	12	2.4	27.4	28.7	19.5	8
Caddo	13536	0	0	0	14	0	14.7	28.7	14.5	13

Table 6. Concluded.

C. I. No.	Wyoming				Montana		Nebraska				Kansas		New Mexico		Idaho		13 station average
	Archer	Sheridan	Average	Rank	Havre	Rank	North Platte	Alliance	Average	Rank	Colby	Rank	Clovis	Rank	Tetonia	Rank	
13670	22.2	39.8	31.0	2	14.2	2	41.1	28.4	34.8	1	33.5	2	58	2	38.5	4	29.6
13526	24.1	27.5	25.8	11-12	12.1	4	34.3	22.1	28.2	7	29.5	5	57	3-4	39.2	3	28.2
13528	17.6	35.3	26.5	10	11.2	7	24.7	21.9	23.3	14	19.4	11	42	14	38.2	6-7	27.8
13682	23.2	32.6	27.9	5	14.3	1	23.1	29.9	26.5	12	13.4	13	45	12-13	32.7	14	27.1
13547	25.2	24.6	24.9	13	10.8	9-10	31.8	22.7	27.3	9	--	-	53	5	38.7	5	26.8 1/
10094	20.2	34.7	27.5	8	10.8	9-10	35.2	25.3	30.3	5	30.2	4	52	6	41.3	2	26.8
8033	23.0	33.0	28.0	4	11.8	5	37.4	30.9	34.2	2	26.9	9	51	7-9	33.2	13	26.6
12138	21.7	20.7	21.2	14	12.5	3	27.0	29.5	28.3	6	17.0	12	49	10-11	35.8	10	26.0
13542	25.6	29.6	27.6	7	11.5	6	27.4	26.8	27.1	10-11	25.1	10	51	7-9	36.6	9	25.9
8885	23.1	31.6	27.4	9	11.1	8	33.9	29.4	31.7	3	27.0	7-8	57	3-4	42.2	1	25.8
13546	26.0	29.4	27.7	6	7.9	13	40.9	21.7	31.3	4	32.2	3	64	1	35.2	12	25.1
1442	21.8	34.8	28.3	3	10.6	11	27.0	25.2	26.1	13	27.2	6	49	10-11	35.6	11	24.5
13666	23.1	28.5	25.8	11-12	8.0	12	33.9	22.1	28.0	8	27.0	7-8	45	12-13	37.8	8	23.5
13536	24.0	40.6	32.3	1	7.7	14	37.2	16.9	27.1	10-11	40.2	1	51	7-9	38.2	6-7	23.0

1/ 12-station average yield.

Table 7. Summary of 2-year average yields for 13 varieties grown in the northern regional performance nursery at 8 stations in 1962 and 1963, with state averages and rank.

Variety	C. I. No.	Minnesota		So. Dakota		Nebraska		Montana	
		Waseca	Rank	Brookings	Rank	North Platte	Rank	Havre	Rank
Winalta	13670	30.2	5	11.2	6	44.8	1	13.2	3-4
So. Dak. Selection	13526	25.4	6	19.8	1	37.8	4	12.3	7
Scout	13546	20.0	9	8.2	7	43.5	2	9.7	13
Lancer	13547	32.6	3	11.8	5	40.0	3	13.2	3-4
So. Dak. Selection	13528	31.1	4	13.6	3	36.1	6	13.9	2
Frontana x Minter[2]	13682	35.8	1	14.8	2	35.2	9	13.0	5
Minter	12138	33.6	2	12.6	4	35.3	8	11.5	10
Nebred	10094	16.8	12	4.4	8	36.0	7	12.1	8
Cheyenne	8885	17.6	11	2.2	11-12	33.5	10	9.8	11-12
Kharkof	1442	21.0	8	2.7	10	29.4	12	12.4	6
Yogo	8033	22.6	7	2.2	11-12	31.3	11	11.6	9
Yogo x (Tk-Oro 221)-117	13542	19.8	10	1.8	13	27.7	13	14.0	1
Ponca x Cheyenne[2]	13666	11.5	13	3.0	9	36.4	5	9.8	11-12

C. I. No.	Wyoming				Kansas		New Mexico		8 station average
	Archer	Sheridan	Average	Rank	Colby	Rank	Clovis	Rank	
13670	31.9	34.9	33.4	1	32.3	3	41.0	3	29.9
13526	28.5	25.6	27.1	12	32.9	1	40.6	4	27.9
13546	30.7	30.0	30.4	6	32.6	2	46.5	1	27.7
13547	29.8	27.1	28.5	11	--	-	35.5	9	27.1[1/]
13528	26.0	32.6	29.3	8-9	25.6	5	31.1	11	26.3
13682	28.7	29.8	29.3	8-9	23.2	10	29.4	13	26.2
12138	30.3	22.4	26.4	13	24.4	9	30.3	12	25.1
10094	28.4	30.5	29.5	7	28.8	4	38.8	6	24.5
8885	31.2	33.2	32.2	2	24.6	8	42.0	2	24.3
1442	29.6	32.4	31.0	4	24.8	7	39.4	5	24.0
8033	29.5	32.1	30.8	5	21.8	11	34.8	10	23.2
13542	32.1	30.9	31.5	3	21.1	12	37.2	7	23.1
13666	31.4	26.1	28.8	10	25.4	6	36.8	8	22.6

1/ 7-station average yield.

Table 8. Summary of agronomic data other than yield for varieties grown in the northern regional performance nursery in 1963.

Variety	C. I. No.	Date Headed	Date Ripe	Winter survival	Plant height	Lodging	Rust Leaf	Rust Stem	Weight per bushel
			July	%	In.		%	%	Lbs.
Number of stations		13	2	5	13	2	4	5	15
Caddo	13536	5-27 2/	24 1/	29	32 2/	1.0 1/	T 2/	21 2/	60.7 2/
Winalta	13670	6-3	20	65	35	3.2	74	23	59.7
Lancer	13547	6-2 1/	19	51	32 1/	1.0	74	17	59.3 1/
So. Dak. Selection	13526	5-31	19	64	33	3.0	66	19	58.5
Nebred	10094	6-2	19	65	33	3.0	74	51	58.5
Scout	13546	5-28 1/	20	40	32 1/	2.2	85 1/	23	58.4 1/
Ponca x Cheyenne^2	13666	5-31	19	42	33	1.4	35 3/	65 1/	58.4
Frontana x Minter^2	13682	6-4	20	84	36	3.4	33	6	58.1
So. Dak. Selection	13528	6-1	19	79	35	1.5	71	11	58.1
Minter	12138	6-5	21	77	37	4.6	51	11	58.0
Cheyenne	8885	6-3	20	55	34	1.5	66	47	57.7
Kharkof	1442	6-4	20	63	35	5.5	74	38	57.1
Yogo x (Tk-Oro 221) -117	13542	6-4	19	89	37	5.5	76	60	56.5
Yogo	8033	6-5	20	85	37	6.5	74	47	56.3

1/ Average based on one less station than indicated.

2/ Average based on three less stations than indicated.

3/ Average based on two less stations than indicated.

UNIFORM WINTERHARDINESS NURSERY

The nursery was reorganized into two sections in 1963 in accordance with recommendations developed at the last Hard Winter Wheat Workers Conference. The southern materials section was composed of 242 entries from Texas, Oklahoma, Kansas, and Nebraska. The survival of experimental strains was checked against the standard varieties Minter, Nebred, and Pawnee; the latter varieties being grown singly at 10-row intervals in the nursery. A smaller northern materials section contained 64 entries from Montana and Lethbridge, Alberta. The check varieties Minter and Cheyenne alternated in the nursery at 5-row intervals. The two sections were grown in duplicated single rows at the following locations:

Northern Section	Southern Section
Laramie, Wyoming	Alliance, Nebraska
Brookings, So. Dak.	Laramie, Wyoming
Watertown, So. Dak.	Brookings, So. Dak.
St. Paul, Minnesota	Watertown, So. Dak.
Fargo, No. Dak.	St. Paul, Minnesota
Moccasin, Montana	Fargo, No. Dak.
Lethbridge, Alberta	Moccasin, Montana

Comparison of the winter survival of entries in the northern regional performance nursery with the survival of these same varieties in the uniform winterhardiness nursery shows good agreement between the two.

Entry	% Survival in	
	NRPN	UWHN
C. I. 13542	89	77
Yogo	85	68
C. I. 13682	84	79
C. I. 13528	79	65
Minter	77	61
Winalta	65	59
Nebred	65	49
C. I. 13526	64	32
Kharkof	63	20
Cheyenne	55	19
Lancer	51	7
C. I. 13666	42	17
Scout	40	4
Caddo	29	0

Varietal rank according to survival is nearly the same in each nursery. The data from the uniform winterhardiness nursery is undoubtedly the least reliable since it is based on survival of single rows in only 2 replications whereas the northern regional nursery involves rod-row plots in 3 or more replications. The latter appears to distinguish levels of hardiness more clearly than

the uniform winterhardiness nursery. If the Kharkof-Nebred level of winterhardiness is used as the minimum level acceptable for production in states north of Nebraska then the danger of possible northward movement of varieties like Lancer and Scout is clearly evident. The data also suggest that there has been little if any progress in increasing winterhardiness significantly beyond the Yogo-Minter level.

Winter survival values for varieties in the southern regional performance nursery are compared with the survivals of these same varieties in the uniform winterhardiness nursery in the tabulation that follows.

Entry	% Survival in	
	SRPN	UWHN
Kharkof	88	20
Scout	84	4
Lancer	82	7
Gage	81	3
C. I. 13548	79	3
C. I. 13679	78	3
Comanche	76	6
Triumph	76	1
C. I. 13681	76	0
Ea. Blackhull	75	0
C. I. 13683	74	2
C. I. 13668	73	3
C. I. 13669	73	2
C. I. 13684	73	1
Caddo	71	0
C. I. 13667	71	1
C. I. 13680	44	0
C. I. 13523	40	0

Survival values in the southern regional nursery clearly distinguish only 2 hardiness levels. C. I. 13680 and C. I. 13523 are distinctly less hardy than all other varieties in the nursery. Little if any further differentiation based on hardiness is possible. Varieties that survived with stands of more than 70 percent but less than 80 percent probably are less winter hardy than those that survived more than 80 percent but the differentiation point is not clear.

Survivals in the uniform winterhardiness nursery again permit hardiness separation into 2 categories but the level of differentiation is markedly different than that in the southern regional nursery. Kharkof is in a hardiness class by itself. All other varieties had very low survivals or didn't survive at all, a situation that prevents further hardiness differentiation. Wheat breeders in the southern and central districts may be losing ground in the maintenance of safe levels of winterhardiness in new varieties.

DISEASE NURSERIES

The hard red winter wheat uniform bunt nursery contained 44 entries in 1963. It was grown at 8 stations in the region. Bunt infection data were obtained from 5 stations. Seed of each entry also was sent to the Smut Laboratory at Pullman, Washington where 33 entries were tested for reaction to common bunt tester races T-13, T-15, and T-16. Eleven remaining entries were tested against dwarf smut race D-3. The data have been summarized in a separate report.

A soil-borne mosaic nursery again was grown at Urbana, Illinois and Powhattan, Kansas. It was comprised of 135 entries submitted from Oklahoma, Kansas, and Nebraska. Infection data were summarized and distributed to cooperators prior to harvest.

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

A wheat streak mosaic nursery comprised of 23 entries was grown at 7 locations in Oklahoma, Kansas, and Nebraska. Data reported from 6 stations appear in table 9. Infections from fall inoculations in Kansas were extremely light. Varieties were classified as resistant, intermediate, or susceptible based on visible symptoms. Because the infection was so light the ratings do not reflect the true classification of the varieties in many cases. Seven varieties in the Stillwater nursery showed no stunting. C. I. 12406 and the white component of Rodco (probably C. I. 12406) were the most severely stunted at Stillwater. At Lincoln a satisfactory level of infection was obtained in the fall. Fall leaf rust was extremely heavy on susceptible varieties and many varieties were injured by the cold winter. These factors are believed to have predisposed several varieties to more severe injury from streak mosaic than would be expected on the basis of their reaction in prior years. However, the 2-station 1963 averages for varieties grown more than 1 year agree well with their period-of-years averages.

Table 9. Reaction to streak mosaic of 23 varieties of hard red winter wheat grown in the regional streak mosaic nursery in 1963.

Variety	C. I. or Sel. No.	1963 Mosaic rating 1/							No. years grown	Average rating
		Manhattan	Hays	Garden City	Colby	Stillwater	Lincoln	2-station average		
Scout	13546	R	R	R	R-	0	2.0	1.0	3	1.5
Concho x Tst-Pn^2	Stw59R2349	I-S	R-	R	I-S	0	2.5	1.3	3	1.8
Cns^2-Ae-Pn x Tmp-Kv-Mql-Kv-Tm	K61360	S	S	I	I-S	0	3.0	1.5	1	-
Wheat-Ae x Pawnee	K61408	R	R	R	R	0	3.5	1.8	1	-
Concho x Tst-Pn^2	Stw59R2320	R	R	R	R	0	4.0	2.0	1	-
do	Stw59R2350	R	R	R	R	0	4.0	2.0	1	-
do	Stw59R2417	R	R	R	R	0	4.5	2.3	1	-
Sando P-19	Stw56R3955	R	R	R	R	1.0	3.5	2.3	2	2.4
Wheat-Rye x IVcl-Cmn	13549	R	R-S	R-	R-	1.5	3.0	2.3	5	1.9
Aztec	13016	R	R	R	R-	1.0	4.0	2.5	3	2.3
Bison	12518	R	R	R-	R-I	2.5	3.0	2.8	5	2.6
Ponca x Cheyenne^2	N57234	R	R	R	R	2.5	3.0	2.8	3	3.1
BlueJacket	12502	R	R	R	R	1.8	4.0	2.9	5	2.3
Triumph	12132	R	R-	R	R-I	1.5	4.5	3.0	5	2.7
Caddo	13536	R	R	R	R	2.5	4.0	3.3	2	3.3
So. Dakota Selection	13526	R	S	R	R-	2.0	4.5	3.3	1	-
Concho	12517	R	R	R	R	1.5	5.0	3.3	5	2.7
Rodco (Bronze component)	--	R	R-	R	R	1.5	5.0	3.3	2	2.8
Tascosa	13023	S	S	S	S	2.0	5.0	3.5	2	3.4
Mql-Oro x Pn	12851	S	S	S	S	2.8	4.8	3.8	5	4.4
Pawnee	11669	R	I-S	R	R-I	3.3	4.5	3.9	5	3.9
Rodco (White component)	--	R-I	I	I-S	I	4.0	4.0	4.0	2	3.7
Mql-Oro x Oro-Tm	12406	R-	S	I-S	I-S	4.0	4.0	4.0	2	3.4

1/ Ratings at Stillwater and Lincoln based on 0-5 scale; 0= no stunting, 5= completely stunted. At the Kansas stations, R= resistant, I= intermediate, and S= susceptible.

QUALITY DATA

Grain samples from regional nurseries are submitted each year to the Hard Winter Wheat Quality Laboratory. Where the amount of available seed permits, amounts as follows are submitted from each location.

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

Quality Series samples are evaluated individually from each location. Evaluation of composite samples from each district also is made. Northern and southern regional performance nursery samples are composited from all locations before evaluation. Results are reported to the cooperators by Karl Finney.