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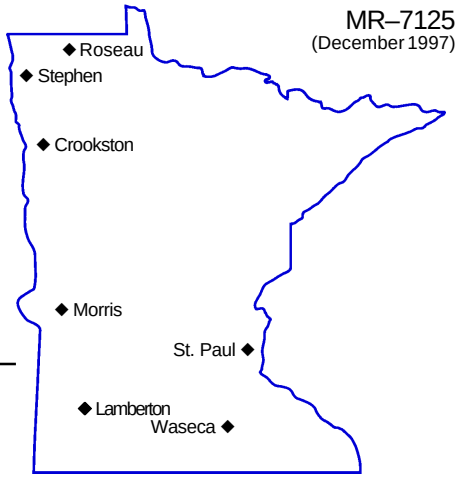
Minnesota Agricultural Experiment Station

VARIETY TRIALS

Hard Red Spring Wheat



Locations of hard red spring wheat trials.

Successful production of hard red spring wheat depends to a considerable extent on selecting the best varieties for a particular farm. For that reason, varieties are compared in trial plots on Minnesota Agricultural Experiment Station fields at Waseca, Lamberton, Morris, Crookston, Stephen, Roseau, and St. Paul. Wheat varieties are grown in replicated plots at each location. These plots are handled so that the factors affecting yield and other characteristics are as nearly the same for all varieties at each location as is possible.

Variety Classifications

Tested hard red spring wheat varieties are listed in the order of their maturity. Only new varieties or those varieties with better than susceptible reaction to scab are being tested. Variety descriptions are arranged in order of maturity within both the text and tables of this report.

Seed of tested varieties may be eligible for certification, and the use of certified seed is suggested. However, certification does not imply recommendation. Registered and certified seed of varieties described in this report can be purchased from seed dealers or from growers listed in the Minnesota Registered and Certified Seed Directory for 1997 Planting This annual publication can be obtained without charge from the Minnesota Crop Improvement Association, 1900 Hendon Avenue, St. Paul, MN 55108, or from county extension offices of the University of Minnesota Extension Service. The information is also available on-line at:

<http://www.rrtrade.org/mcia/>.

Interpreting the Tables

The LSD (Least Significant Difference) figures listed for grain yield are statistical measures of variability within the trials. This statistic is used to determine whether the differences between two measures are due primarily to genetic difference in the varieties.

If the quality difference between two varieties equals or exceeds the LSD value listed at the bottom of each quality test column, you can conclude that the variety with the higher score was superior. If the difference is less, greater attention should be given to other traits that are also important in making your variety choices.

These hard red spring wheat trials are not designed for crop (species) comparisons, because the various crops are grown on different fields or with different management. The data should only be used to compare varieties within a table.

Authors/Researchers

The authors of this report are Robert H. Busch and Gary L. Linkert. Information on the reactions of varieties to rust was obtained by Donald V. McVey, USDA-ARS. Information on scab and other pathogens was largely obtained by Ruth Dill-Macky, Department of Plant Pathology.

Fieldwork for wheat trials was supervised by Gary Linkert, John Wiersma, Jochum Wiersma, Paul Porter, George Nelson, and Greg Johnson.

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For Crop Production 1997 _____

HARD RED SPRING WHEAT VARIETY TRIALS

Minnesota Agricultural Experiment Station — University of Minnesota
December 1996

Results of hard red spring wheat variety tests conducted by the Minnesota Agricultural Experiment Station. This report was prepared by research geneticist Robert H. Busch [phone: 612/625-1975; e-mail: <busch005@maroon.tc.umn.edu>] and scientist Gary L. Linkert [phone: 612/625-5263; e-mail: linke002@maroon.tc.umn.edu], Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN 55108.

Crop Background

Recommendations for hard red spring wheat varieties are no longer being made by Minnesota Agricultural Experiment Station evaluators. The basis on which recommendations were made in the past are no longer considered appropriate because of the severity of scab epidemics.

Scab epidemics in hard red spring wheat growing areas have demonstrated the clear need to give greater weight to selecting varieties for their tolerance to this devastating disease. Consequently, only newly released varieties where reaction to scab has not been well documented, and older varieties with scab ratings better than susceptible, are tested and described. Scab evaluations provide severity ratings, based on visual observations of spread of the disease on the spike, and tolerance scores, reflecting the variety's ability to maintain plump seed. These ratings should be considered together to reduce risk of loss. Use of more than one variety and/or different seeding dates are highly recommended to provide differing days to heading to reduce risk of scab.

Variety descriptions do not provide information on scab resistance. Table information should be used for that purpose. Varieties are listed in maturity order in both text and tables.

Publicly Developed Varieties

BacUp—Awned, very early, normal height. Resistant to stem rust and moderately resistant to leaf rust. Low to medium yield and very high test weight. Susceptible to foliar disease complex and lodging. High tolerance to scab. Very high protein content. Specialty variety release for scab tolerance with recommendation that it not be used on over

15-20% of acreage. Released by USDA-ARS and Minnesota Agricultural Experiment Station in 1996.

Kulm—Awned, early, medium height. Resistant to stem rust and moderately resistant to leaf rust. High to medium yield and high test weight. Moderately susceptible to lodging. High protein percentage. Released by North Dakota Agricultural Experiment Station in 1994. Seed sales regulated by the U. S. Plant Variety Protection Act, PVP(94).

Forge—Awned, early, medium height. Resistant to stem rust and moderately resistant to leaf rust. High yield and test weight. Moderately susceptible to lodging. Moderately susceptible to foliar diseases. Medium percent protein. Released by South Dakota Agricultural Experiment Station in 1997. Seed sale regulated by U.S. Plant Protection Act PVP(94).

Sharp—Awned, early, medium height. Resistant to stem rust and moderately resistant to leaf rust. High yield and test weight. Moderately susceptible to lodging and black chaff. Medium protein percent. Best adapted south of I-94. Released by South Dakota Agricultural Experiment Station in 1990.

Sharpshooter—Awned, early, normal height. Resistant to stem rust and leaf rust. Medium to high yield and high test weight. Moderately susceptible to foliar disease complex and lodging. Similar to Sharp, selected from for possibly enhanced scab tolerance. Released by Western Plant Breeders in 1996. Seed sale regulated by U. S. Plant Variety Protection Act.

Butte 86—Awned, early, medium height. Resistant to stem rust and moderately resistant to leaf rust. High yield and test weight. Moderately susceptible to lodging, foliar disease, and black chaff. Medium percent protein. Released by North Dakota Agricultural Experiment Station in 1986.

Oxen—Awned, early-midseason, semidwarf. Moderately resistant to stem rust and leaf rust. Very high yield and medium test weight. Medium percent protein. Moderately susceptible to foliar diseases. Released by South Dakota Agricultural Experiment Station in 1996. Seed sale regulated by the U.S. Plant Protection Act PVP(94).

Russ—Awned, early-midseason maturity, medium height. Moderately resistant to stem rust and leaf rust. High yield and medium test weight. Moderately susceptible to lodging. Susceptible to foliar diseases. Medium protein percent. Released by South Dakota Agricultural Experiment Station in 1995.

2375—Awned, early, medium height. Resistant to stem rest and moderately susceptible to leaf rust. Very high yield and test weight. Tolerant to loose smut. Moderately susceptible to lodging, shattering and foliar diseases. Medium protein percent. Best adapted south of I-94. Released by Pioneer Hi-Bred in 1988. Sold by North Dakota State University Research Foundation 1990. Seed sale regulated by U. S. Plant Variety Protection Act.

Grandin—Awned, early, semidwarf. Resistant to stem rust and moderately susceptible to leaf rust. High yield and test weight. Moderate lodging resistance. Moderately tolerant to

loose smut. Moderately susceptible to foliar diseases. High protein percent. Released by North Dakota Agricultural Experiment Station in 1989.

Hamer—Awned, early-midseason maturity, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. High yield and medium test weight. Good lodging resistance. Moderately resistant to foliar diseases. Medium to low protein percent. Released by AgriPro 1995. Seed sale regulated by the U. S. Plant Variety Protection Act, PVP(94).

2370—Awned, early, semidwarf. Moderately resistant to stem rust and moderately susceptible to leaf rust. High yield and medium test weight. Moderate lodging resistance. Medium protein percent. Released by Pioneer Hi-Bred in 1989. Sold by North Dakota State University Research Foundation in 1990. Seed sale regulated by U. S. Plant Variety Protection Act.

Nora—Awned, midseason, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. Medium to high yield. Moderately susceptible to lodging. Medium percent protein. Released by AgriPro in 1996. Seed sale regulated by U.S. Plant Variety Protection Act, PVP(94)

AC Domain—Awnless, midseason-early, medium height. Resistant to stem rust and moderately resistant to leaf rust. Medium to high yield and test weight. Moderately susceptible to lodging and foliar diseases. High to medium percent protein. Released by Agriculture and Agri-Food, Manitoba, Canada, in 1993. Seed sale regulated by SeCan.

Trenton—Awned, midseason, medium height. Moderately resistant to stem rust and moderately susceptible to leaf rust. High yield and test weight. Moderately susceptible to lodging. Moderately susceptible to foliar diseases. Medium-high protein percent. Recommended by North Dakota State University for western and central North Dakota. Released by North Dakota Agricultural Experiment Station in 1995. Seed sale regulated by the U. S. Plant Variety Protection Act, PVP(94).

Verde—Awned, midseason-late maturity, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. High yield and medium test weight. Good lodging resistance. Moderately resistant to foliar diseases. Medium to low protein percent. Released by Minnesota Agricultural Experiment Station and USDA-ARS 1995. Seed sale regulated by the U. S. Plant Variety Protection Act, PVP(94).

Lars—Awned, midseason, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. High yield and low test weight. Good lodging resistance. Moderately resistant to foliar diseases. Low-medium protein percent. Released by AgriPro in 1995. Seed sale regulated by the U. S. Plant Variety Protection Act, PVP(94).

Keene—Awned, midseason-late, tall. Resistant to stem rust and moderately resistant to leaf rust. Medium to high yield and test weight. Moderately susceptible to lodging. Medium percent protein. Released by North Dakota Agricultural Experiment Station in 1997. Seed sale regulated by the U.S. Plant Protection Act, PVP(94).

AC Cora—Awnless, late, tall. Resistant to stem rust and moderately resistant to leaf rust. Medium to low yield and test weight. Susceptible to lodging. Moderately resistant to foliar diseases. High percent protein. Released by Agriculture and Agri-Food, Manitoba, Canada, in 1993. Seed sale regulated by SeCan.

AC Majestic—Awnless, late, medium height. Resistant to stem and moderately resistant to leaf rust. Low to medium yield and test weight. Moderately susceptible to foliar disease. Released by Agriculture and Agri-Food, Manitoba, Canada to Cargill in 1996. Seed sale regulated by the U.S. Plant Protection Act. PVP(94).

Gunner—Awned, late, normal height. Moderately resistant to stem rust and resistant to leaf rust. Medium yield and high test weight. Moderately susceptible to foliar disease complex and lodging. Tolerance to scab. High protein content. Released by AgriPro in 1996.

Table 1. Growth and yield characteristics of hard red spring wheat varieties (1995-97; only new varieties and older varieties with scab ratings better than susceptible are included in trials). Sorted by heading date.

Note Key:

[1] Heading date.

[2] Height expressed in inches.

[3] Lodging score: 1=erect, 9=flat.

[4] Test weight expressed as pounds per bushel.

[5] Protein expressed as a percentage, calculated at 12% moisture.

[6] Two year data adjusted to 1995-97.

[7] Norm is included as a scab susceptible check.

Variety	Heading [1]	Height [2]	Lodging [3]	Test Weight [4]	Wheat Protein [5]	Milling/Baking Quality
BacUp	6-27	33	4.4	60.6	17.1	High
Kulm	6-28	35	3.5	59.1	15.8	High-Medium
Forge	6-28	32	3.5	59.7	15.4	Medium
Sharp	6-28	33	3.7	59.9	15.2	Medium-High
Sharpshooter [6]	6-28	33	3 6	59 8	15 2	Medium-High
Butte 86	6-28	33	3.5	58.6	15 3	Medium-High
Oxen	6-29	31	3.6	58.3	15.2	Medium
Russ	6-29	33	3.9	58.2	14.9	Medium
2375	6-29	32	4.5	59.5	15.0	Medium
Grandin	6-29	33	3.2	59.3	15.4	High
Hamer	6-30	31	2.5	58.4	15.3	Medium-Low
2370	6-30	32	3.2	58.7	15.0	Medium
Nora [6]	6-30	28	3.5	57.8	15.5	
AC Domain	6-30	34	3.7	58.4	15.7	Medium
Trenton	6-30	37	4.0	59.0	15.7	High-Medium
Verde	7-1	32	2.8	58.2	14.4	Medium
Lars	7-1	28	2.9	57.3	14.2	Medium-Low
Norm [7]	7-1	31	2.6	56.2	14 1	Medium-High
Keene [6]	7-1	37	3.7	59.4	15.4	Medium-High
AC Cora	7-2	37	4.3	57.8	16.0	Medium-High
l AC Majestic	7-2	35	3.7	57.4	15.6	Medium
Marshall	7-3	30	2.3	57.8	14.1	Medium-Low
Gunner	7-3	34	3.0	59.8	16.0	Medium

Table 2. Disease susceptibility and tolerances of hard red spring wheat varieties (1995-1997, only new varieties and older varieties with scab ratings better than susceptible are included in trials). Sorted by heading date.

Note Key:

[1] Resistance to rust: R=resistant, MR=moderately resistant, MS=moderately susceptible, S=susceptible.

[2] Rated based on NDSU data from 1995-1997.

[3] Tolerance to maintain plump kernels under scab epidemics: 1=very well, 2=well, 3=moderate, 4=fair, 5=poor.

[4] Two year data adjusted to 1995-1997.

[5] Norm is included as a scab susceptible check.

Variety	Leaf Rust [1]	Stem Rust [1]	Foliar Disease [1] [2]	Scab Severity [3]	Scab Tolerance [3]
BacUp	MR	R	S	MR	1.5
Kulm	MR	R	S	MS-S	3
Forge	MR	R	MS	MR-MS	2
Sharp	MR	R	MS	MS-MR	2.5-3
Sharpshooter [4]	MR	R	MS	MS-MR	2.5-3
Butte 86	MR	R	S	MS-MR	2.5
Oxen	MR	MR	MS	MS	2.5
Russ	MR	MR	S	MS-S	3
2375	MS	R	S	MS	2.5
Grandin	MS	R	S	MS	3
Hamer	MR	R	MR	MS	3.5
2370	MS	MR	S	MS	3.5
Nora [4]	MR	R	S	4	
AC Domain	MR	R	MS	MS	3
Trenton	MS	MR	MS	MS-S	3
Verde	MR	R	MR	MS-S	2.5
Lars	MR	R	MR	S	4.5
Norm [5]	R	R	MR	S	5
Keene [4]	MR	R	—	MS	2.5
AC Cora	MR	R	MR	S-MS	2.5-3
AC Majestic	MR	R	MR	S-MS	3
Marshall	MS R	MS	MS-S	3.5	
Gunner	MR	R	~	MR-MS	2

Table 3. Yields, in bushels per acre, of hard red spring wheat varieties in Minnesota (1995-1997; only new varieties and older varieties with scab ratings better than susceptible are included in trials). Sorted by heading date.

Note Key:

[1] 2-year average 1996-1997.

[2] 1997 only.

[3] 2-year average 1995 and 1997.

[4] Norm is included as a scab susceptible check.

Locations: C=Crookston; L=Lamberton; M=Morris; R=Roseau; SP=Saint Paul; S=Stephen; W=Waseca; N.AVG=average for northern sites (C-S-R); S.AVG=average for southern sites (SP-M-W-L); AVG=average for all seven sites.

Variety	C	S [1]	R	N.AVG	SP	M [2]	W	L	S.AVG	AVG
BacUp	32	40	41	37	38	43	37	50	41	40
Kulm	42	36	52	45	45	56	52	61	52	49
Forge	48	47	52	48	49	50	53	64	55	52
Sharp	45	43	50	46	45	55	51	58	51	49
Sharpshooter [2]	43	43	50	46	47	53	51	50	51	49
Butte 86	45	38	53	46	46	53	50	53	50	48
Oxen	48	47	52	50	57	65	54	64	59	55
Russ	43	46	51	47	48	61	56	58	55	51
2375	44	49	52	48	51	59	51	57	54	51
Grandin	48	38	49	46	56	53	49	58	53	50
Hamer	48	46	54	50	55	60	53	58	56	55
2370	46	45	54	49	54	60	46	64	55	52
Nora [2]	46	42	49	46	43	49	40	53	46	46
AC Domain	40	42	47	43	43	51	44	53	48	44
Trenton	43	41	48	44	44	59	52	62	53	49
Verde	47	49	57	51	59	55	51	60	56	54
Lars	53	49	53	52	56	58	51	58	55	54
Norm [4]	40	38	50	43	55	51	52	59	54	49
Keene [3]	42	46	48	46	46	52	50	58	47	47
AC Cora	40	48	47	45	40	49	42	57	45	45
AC Majestic	37	49	42	42	38	47	39	53	44	42
Marshall	49	47	47	48	54	52	44	55	51	50
Gunner	43	48	49	46	45	53	44	49	47	45
LSD 5%	9.2	8.8	7.4	5.0	7.5	7.4	7.0	9.5	4.0	3.0

Hard Red Spring Wheat Planting Rate and Date

Rate is based on normal seedbeds and on normal size, good quality seed. Rate used can vary greatly depending on seed cost, desired stand, expected mortality, emerging ability, seed weight, seed germination, seedbed condition, depth of planting and planting equipment. Weight given is the most widely accepted in the U.S.

Bushel Weight (pounds)	Seeds/pound (number)	Rate/acre (pounds)	Rate (seeds)	Planting Date
60	15,200	90-120	28/square foot	Early Spring