

# Minnesota Agricultural Experiment Station

# VARIETY TRIALS

## Hard Red Spring Wheat

Successful production of hard red spring wheats depend 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 Grand Rapids and Rosemount. 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 not classed into any sub-groupings such as "early" and "late" maturity. Only a limited number of varieties are being tested, and all are publicly developed. Variety descriptions are arranged alphabetically in the text and within the 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 agents' offices. The information is also avail-

able on-line at:

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

### Interpreting the Tables

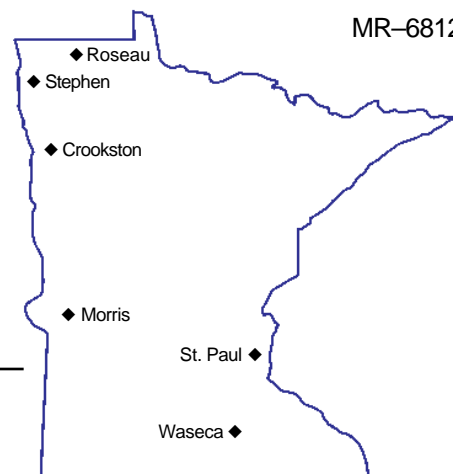
The LSD (Least Significant Difference) figures listed for forage yield are statistical measures of variability within the trials. This statistic is used to determine whether the differences between two quality tests are due primarily to genetic difference in the varieties.

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 higher quality variety was superior in quality. If the difference is less, greater attention should be given to other traits which 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 author of this report is Robert H. Busch. Information on the reactions of varieties to rust was obtained by Donald V. McVey, Department of Plant Pathology. Information on scab and other pathogens was largely obtained by Ruth Dill-Macky, Department of Plant Pathology.



**Locations of hard red spring wheat trials.**

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

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*For Crop Production 1997* \_\_\_\_\_

# **HARD RED SPRING WHEAT** **VARIETY TRIALS**

Minnesota Agricultural Experiment Station — University of Minnesota  
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Results of Hard Red Spring Wheat Variety Tests Conducted by the Minnesota Agricultural Experiment Station. This report was prepared by Robert H. Busch, agronomist, Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN 55108. [phone: 612/625-1975; e-mail: <busch005@maroon.tc.umn.edu>].

## **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 spread of the disease on the spike, and *tolerance scores*, which reflect 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 is also highly recommended to reduce risk.

Variety descriptions do not provide information on scab resistance. Table information should be used. Varieties are listed in maturity order.

## **Publicly Developed Varieties**

**BacUp**—Awned, very early, normal height. Leaf and stem rust resistant. Low to medium yield and very high test weight. Moderately 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.

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

**Grandin**—Awned, early, semidwarf. Resistant to stem rust and leaf rust. High yield and test weight. Good lodging resistance. Moderately tolerant to loose smut. High protein percent. Moderately susceptible to foliar diseases. Released by North Dakota Agricultural Experiment Station in 1989.

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

**Marshall**—Awned, midseason, semidwarf. Resistant to stem rust and moderately susceptible to leaf rust. Moderately tolerant of loose smut and ergot. Good lodging resistance. High yield and high test weight. Low to medium protein percent. Satisfactory milling. Released by Minnesota Agricultural Experiment Station and USDA-ARS in 1982. Seed sale regulated by U.S. Plant Variety Protection Act.

**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. Medium protein percent. Moderately susceptible to foliar diseases. Released by South Dakota Agricultural Experiment Station in 1995.

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

**Stoa**—Awned, midseason, medium height. Resistant to stem and to leaf rust. Moderately tolerant of loose smut and ergot. Very high yield and medium test weight. Medium protein percent. Higher potential for lodging. Released by North Dakota Agricultural Experiment Station in 1984.

**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. Medium to low protein percent. Moderately resistant to foliar diseases. Released by Minnesota Agricultural Experiment Station and USDA-ARS 1995. Seed sale regulated by the U.S. Plant Variety Protection Act, PVP(94).

**Trenton**—Awned, early, medium height. Resistant to stem rust and moderately resistant to leaf rust. High yield and medium test weight. Moderately susceptible to lodging. Medium-high protein percent. Moderately susceptible to foliar diseases. 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).

## Privately Developed Varieties

**2375**—Awned, early, medium height. Resistant to stem rust and moderately resistant to leaf rust. Tolerant to loose smut. Very high yield and test weight. Medium to high protein percent. Moderately susceptible to lodging, shattering and foliar diseases. 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.

**2370**—Awned, early, semidwarf. Moderately resistant to stem and leaf rust. High yield and medium test weight. Good 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.

**Sharpshooter**—Awned, early, normal height. Leaf and stem rust resistant. 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.

**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. Medium to low protein percent. Moderately resistant to foliar diseases. Released by AgriPro 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. Low-medium protein percent. Moderately resistant to foliar diseases. Released by AgriPro in 1995. Seed sale regulated by the U.S. Plant Variety Protection Act, PVP(94).

**Nordic**—Awned, midseason, semidwarf. Resistant to stem rust and moderately susceptible to leaf rust. Moderately tolerant of loose smut. High yield and medium test weight. Low protein percent. Medium lodging resistance. Released by AgriPro in 1986. Seed sale regulated by the U.S. Plant Variety Protection Act.

**Norlander**—Awned, early, semidwarf. Moderately susceptible to stem rust and moderately resistant to leaf rust. High yield and medium test weight. Good lodging resistance. Medium protein percent. Moderately resistant to foliar diseases. Released by AgriPro 1995. Seed sale regulated by the 1995 U.S. Plant Variety Protection Act.

**Gunner**—Awned, late, normal height. Leaf rust resistant and moderately resistant to stem 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 (1994-96; 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 1994-96.

[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]	6-26	32	3.0	60.0	17.3	High
Sharp	6-27	32	2.9	59.7	15.4	Medium-High
Kulm	6-27	33	2.8	58.7	15.8	High-Medium
Norlander	6-27	31	2.3	57.3	14.9	Medium
Butte 86	6-27	33	2.7	58.3	15.5	Medium-High
2375	6-28	31	3.7	58.8	15.3	Medium
Russ	6-28	32	3.2	57.7	15.1	Medium
Oxen	6-28	30	2.8	57.9	15.2	Medium
2370	6-29	32	2.3	57.8	15.1	Medium
Grandin	6-29	32	2.4	58.6	15.4	High
Hamer	6-29	30	1.9	57.7	15.1	Medium-Low
Trenton	6-29	36	2.9	58.4	15.8	High-Medium
Lars	6-30	28	2.1	56.5	14.2	Medium-Low
Stoa	6-30	35	3.2	56.2	15.1	Medium-High
Norm [7]	6-30	31	2.3	56.2	14.1	Medium-High
Verde	7-1	30	2.1	57.4	14.3	Medium
Nordic	7-2	31	2.4	56.9	13.7	Low
Marshall	7-2	30	1.8	57.5	14.1	Medium-Low
AC Cora [6]	7-3	35	2.6	57.2	16.2	High-Medium

Table 2. Disease susceptibility and tolerances of hard red spring wheat varieties ((1994-96; only new varieties and older varieties with scab ratings better than susceptible are included in trials). Sorted by heading date). Sorted by heading date to match order in Table 1.

Note Key:

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

[2] Rated based on NDSU data from 1994-96.

[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 1994-96.

[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 [4]	R	R	MS	MR	1
Sharp	MR	R	MS	MR-MS	2.5
Kulm	MR	R	S	MS	3
Norlander	MR	MS	MS	MS-MR	4
Butte 86	MR	R	S	MR-MS	3
2375	MR	R	S	MR-MS	2
Russ	MR	MR	S	MS	3
Oxen	MR	MR	—	MR-MS	3
2370	MR	MR	S	MS-S	3.5
Grandin	R	R	S	MS-S	3
Hamer	R	R	MR	MS	3.5
Trenton	MS	MR	MR	MS	2
Lars	R	R	MR	S	5
Stoa	R	R	S	MS	3
Norm [5]	R	R	MR	S	5
Verde	MR	R	MR	MS	3
Nordic	R	R	MR	MS	3.5
Marshall	MR	R	MS	MS	3
AC Cora [4]	MR	R	MR	MS-S	3

Table 3. Yields, in bushels per acre, of hard red spring wheat varieties in Minnesota (1994-96; only new varieties and older varieties with scab ratings better than susceptible are included in trials). Sorted by heading date to match order in Table 1.

Note Key:

[1] 2-year average 1994 and 1996.

[2] 2-year average 1995-96.

[3] 2-year average 1994-95.

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

Locations: Cr=Crookston; Stn=Stephen; Rou=Roseau; StP=Saint Paul; Mor-Morris; Was=Waseca; N.AVG=average for three northern sites (Crookston, Stephen and Roseau); S.AVG=average for three southern sites (Saint Paul, Morris and Waseca); AVG=average for all six sites.

Variety	Cr	Stn [1]	Rou [2]	N.AVG	StP	Mor [3]	Was [2]	S.AVG	AVG
BacUp [2]	39	38	43	40	45	50	49	48	44
Sharp	50	42	42	48	53	62	59	59	54
Kulm	48	39	39	48	50	67	59	59	54
Norlander	50	47	47	51	65	58	54	62	57
Butte 86	47	34	34	46	54	62	59	58	52
2375	48	46	46	50	54	66	61	61	56
Russ	47	38	38	46	55	66	64	63	55
Oxen	50	46	46	50	63	67	61	65	58
2370	51	41	41	50	59	64	54	62	56
Grandin	48	37	37	46	58	56	56	59	53
Hamer	50	40	40	49	60	72	62	64	57
Trenton	45	35	35	44	47	61	62	58	52
Lars	55	45	45	52	61	67	60	63	58
Stoa	47	42	42	48	49	55	59	57	53
Norm [4]	39	29	30	39	62	58	63	62	52
Verde	50	44	44	51	65	62	56	63	57
Nordic	47	42	42	48	57	51	62	58	54
Marshall	49	41	41	46	59	56	55	59	53
AC Cora [2]	47	42	47	45	47	54	47	49	45
LSD 0.05	8	10	10	5	7	11	12	6	4

## 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	80	28/square foot	Early Spring