

HARD RED SPRING WHEAT



Spring wheat varieties are compared in trial plots at Waseca, Lamberton, Morris, Crookston, Stephen, Roseau, and St. Paul. Wheat varieties are grown in replicated plots at each location, and plots are handled so that the factors affecting

yield and other characteristics are as nearly the same for all varieties at each location as possible. 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.

Tested hard red spring wheat varieties are listed in the order of their flowering date in the tables and year of release within variety categories. Only new varieties or those varieties with better than susceptible reaction to scab are being tested.

Variety Selection Criteria

Although all data presented should be considered when choosing wheat varieties, scab epidemics in the hard red spring wheat growing areas of the state have demonstrated the clear need to give greater weight to selecting varieties for their tolerance to this devastating disease. Scab evaluations include *disease severity*, based on visual spread of the disease on the spike and *grain soundness*, which reflects the variety's ability to maintain plump, sound kernels. These ratings should be considered together to reduce risk of loss. Use of more than one variety to provide different days to head-

Characteristics of hard red spring wheat varieties.

Variety	Heading Date ¹	Height, Inches ¹	Straw Strength ²	Test Weight, Lb/Bushel ¹	% Protein at 12% Moisture	Baking Quality ³
BacUp	6-16	35	Medium	62.3	16.8	High
Forge	6-16	34	M. Strong	61.7	14.2	Medium
Ingot	6-16	37	M. Strong	62.6	15.0	Medium-high
Oxen	6-17	32	M. Strong	60.0	14.8	High
2375	6-18	34	Medium	60.8	14.2	Medium
Alsen	6-18	34	Strong ¹	62.0	15.2	—
Argent	6-18	36	Strong	60.7	15.0	High-medium
Dandy	6-18	34	V. Strong ¹	60.7	14.8	—
Ember	6-18	34	M. Strong ²	62.0	13.7	Low-medium
McKenzie	6-18	38	Medium ¹	61.1	15.3	—
Parshall	6-18	38	Strong	62.3	15.2	Medium-high
Russ	6-18	36	Medium	60.4	14.3	High-medium
Mercury	6-18	30	Strong	60.5	14.3	Medium
Reeder	6-18	35	Strong ²	61.0	14.9	Medium
HJ98	6-19	33	Medium	59.4	14.1	Medium-low
Norm	6-20	33	Strong	60.5	13.9	Medium-high
NorPro	6-20	33	V. Strong ²	59.6	14.4	Medium-low
AC Barrie	6-20	38	Medium	60.4	15.1	High-medium
Aurora	6-20	29	M. Strong ²	58.6	13.6	Low-medium
Verde	6-20	33	M. Strong	60.4	14.1	Low-medium
Ivan	6-21	32	V. Strong	59.8	13.7	Low
McVey	6-21	35	Medium	58.2	13.2	Low-medium
Marshall	6-21	32	V. Strong	59.5	13.8	Low-medium
Gunner	6-22	37	M. Strong	60.0	15.5	High-medium
Mean	6-19	34		60.6	14.7	
LSD	1	1		1.1	0.4	

¹2000 data. ²1999-2000 data, except where indicated. ³1998-1999 data.

Grain yield (percent of the mean) of hard red spring wheat varieties in Minnesota, northern locations.

Variety	Crookston 2000	Crookston 1999-2000	Roseau 2000	Roseau 1998-2000	Stephen 2000	Stephen 1998-2000
BacUp	68	77	71	78	55	71
Forge	107	107	74	87	96	89
Ingot	99	100	86	93	99	99
Oxen	104	106	106	111	107	107
2375	99	103	110	113	99	108
Alsen	88	—	100	—	97	—
Argent	97	96	87	85	90	90
Dandy	108	—	118	—	97	—
Ember	112	—	84	—	109	—
McKenzie	94	—	84	—	96	—
Parshall	100	103	97	100	102	96
Russ	92	96	117	96	117	109
Mercury	112	110	115	109	105	105
Reeder	103	—	109	—	100	—
HJ98	96	101	113	112	124	121
Norm	102	102	100	105	93	96
NorPro	108	—	109	—	108	—
AC Barrie	95	88	80	78	89	81
Aurora	100	—	97	—	108	—
Verde	103	102	105	111	100	105
Ivan	107	113	119	118	95	106
McVey	102	101	107	112	119	118
Marshall	99	99	110	102	101	90
Gunner	78	74	88	90	105	104
LSD	9	14	14	21	11	16
Mean, Bu/Acre	69.1	57.8	59.5	52.9	47.4	48.2

ing and use of different seeding dates is highly recommended to reduce risk. Variety descriptions do not provide information on scab resistance; table information should be used.

General Purpose Varieties

McVey – Awned, late maturity, medium height. Resistant to stem rust and moderately susceptible to leaf rust. Moderately susceptible to other leaf diseases. High to medium yield and low test weight. Medium straw strength. Low protein percent. Released by Minn. AES and USDA-ARS in 1999. **PVP (pending)**

Parshall – Awned, early-midseason maturity, tall. Resistant to stem rust and moderately resistant to leaf rust. Moderately resistant to other leaf diseases. High to medium yield and very high test weight. Strong straw. High protein per-

cent. Released by N.D. AES in 1999. **PVP (pending)**

HJ98 – Awned, midseason maturity, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. Moderately susceptible to other leaf diseases. Very high yield and medium test weight.

Medium straw strength. Medium to low protein percent. Released by Minn. AES and USDA-ARS in 1998. **PVP (94)**

Ingot – Awned, very early, tall. Resistant to stem rust and moderately susceptible to leaf rust. Moderately susceptible to other leaf diseases. High to medium yield and very high test weight. Moderately strong straw. Medium to high protein percent. Released by the S.D. AES in 1998. **PVP (pending)**

Ivan – Awned, late maturity, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. Moderately resistant to other leaf diseases. Very high yield and medium test weight. Very strong straw. Low to medium protein percent. Released by AgriPro in 1998. **PVP (94)**

Forge – Awned, very early, medium height. Resistant to stem rust and moderately susceptible to leaf rust. Moderately susceptible to other leaf diseases. High to medium yield and high test weight. Moderately strong straw. Medium to low protein percent. Released by S.D. AES in 1997. **PVP (94)**

Mercury – Awned, early-midseason maturity, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. Moderately resistant to other leaf diseases. Very high yield and medium test weight. Strong straw. Medium protein percent. Released by NorthStar Genetics in 1997.

Gunner – Awned, late maturity, tall. Resistant to stem rust and moderately sus-

Grain yield (percent of the mean) of hard red spring wheat varieties in Minnesota.

Variety	State 2000	State 1998-2000	North 2000	North 1998-2000	South 2000	South 1998-2000	On-Farm ¹ 2000 1998-2000	
BacUp	67	73	65	75	69	72	—	—
Forge	96	95	93	94	98	96	96	101
Ingot	98	103	94	96	101	108	99	105
Oxen	110	113	105	110	114	115	102	113
2375	101	103	103	109	99	98	98	104
Alsen	103	—	94	—	110	—	92	—
Argent	94	96	92	90	96	99	89	—
Dandy	108	—	108	—	108	—	102	—
Ember	97	—	102	—	93	—	100	—

Variety	State	State	North	North	South	South	On-Farm ¹	
	2000	1998-2000	2000	1998-2000	2000	1998-2000	2000	1998-2000
McKenzie	94	—	91	—	96	—	88	—
Parshall	98	100	100	100	97	100	93	—
Russ	108	107	107	99	109	112	98	111
Mercury	112	113	111	109	112	115	109	—
Reeder	106	—	104	—	108	—	103	—
HJ98	106	106	109	110	103	104	111	109
Norm	99	104	99	103	99	105	—	—
NorPro	107	—	109	—	106	—	110	—
AC Barrie	81	79	88	81	76	78	84	81
Aurora	102	—	101	—	103	—	—	—
Verde	106	110	102	107	109	112	103	108
Ivan	106	113	108	114	105	112	110	—
McVey	102	105	108	110	97	101	111	—
Marshall	95	86	103	98	89	79	102	96
Gunner	82	86	89	87	76	86	89	90
LSD	10	7	13	11	14	9	—	—
Mean, Bu/A	57.4	51.7	58.7	52.5	56.5	51.2	72.4	61.5

¹On-farm tests were conducted at locations in eight northwestern Minnesota counties in 2000.

ceptible to leaf rust. Moderately resistant to other leaf diseases. Low yield and medium test weight. Moderately strong straw. High protein percent. Released by AgriPro in 1996. **PVP (94)**

Oxen – Awned, early, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. Moderately susceptible to other leaf diseases. Very high yield and

medium test weight. Moderately strong straw. Medium protein percent. Released by S.D. AES in 1996. **PVP (94)**

Russ – Awned, early-midseason maturity, medium height. Resistant to stem rust and moderately resistant to leaf rust. Moderately susceptible to other leaf diseases. High yield and medium test weight. Medium straw strength. Medium protein percent. Released by S.D. AES in 1995. **PVP (94)**

Verde – Awned, midseason-late maturity, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. Moderately resistant to other leaf diseases. Very high yield and medium test weight. Moderately strong straw. Medium to low protein percent. Released by Minn. AES and USDA-ARS in 1995. **PVP (94)**

AC Barrie – Awnless, midseason-late maturity, tall. Resistant to stem rust and moderately susceptible to leaf rust. Moderately susceptible to other leaf diseases.

Grain yield (percent of the mean) of hard red spring wheat varieties in Minnesota, southern locations.

Variety	Lamberton	Lamberton	Morris	Morris	St. Paul	St. Paul	Waseca	Waseca
	2000	1998-2000	2000	1998-2000	2000	1999-2000	2000	1998-2000
BacUp	74	74	67	75	59	60	82	72
Forge	101	96	93	94	96	88	112	105
Ingot	107	107	106	114	79	88	110	112
Oxen	120	116	107	115	118	120	118	112
2375	95	94	103	101	92	96	104	100
Alsen	123	—	104	—	99	—	123	—
Argent	104	105	95	100	98	94	85	93
Dandy	112	—	110	—	105	—	96	—
Ember	85	—	92	—	99	—	102	—
McKenzie	98	—	99	—	84	—	110	—
Parshall	100	104	97	101	93	95	98	97
Russ	112	107	114	113	103	110	102	119
Mercury	93	107	110	112	125	126	138	125
Reeder	116	—	103	—	113	—	99	—
HJ98	100	98	111	107	106	108	81	103
Norm	97	108	104	104	98	103	93	106
NorPro	128	—	100	—	102	—	85	—
AC Barrie	71	77	79	82	83	83	62	72
Aurora	87	—	114	—	115	—	83	—
Verde	105	115	105	105	117	121	120	114
Ivan	119	114	94	109	114	121	94	108
McVey	84	94	114	106	79	94	102	109
Marshall	88	83	91	76	111	107	50	59
Gunner	75	86	91	89	70	81	43	81
LSD	13	15	10	17	12	22	16	21
Mean, Bu/A	57.7	50.1	87.3	68.1	50.8	42	30	41.5

Low yield and medium test weight. Medium straw strength. High to medium protein percent. Released by Agriculture and Agri-Food Canada Swift Current Research Station in 1994.

Norm – Awned, midseason-late, semi-dwarf. Resistant to stem rust and to leaf rust. Moderately resistant to other leaf diseases. High to medium yield and medium test weight. Strong straw. Low to medium protein percent. Included in trials as a scab-susceptible check. Released by Minn. AES and USDA-ARS in 1992. **PVP**

2375 – Awned, early-midseason maturity, medium height. Resistant to stem rust and moderately susceptible to leaf rust. Susceptible to other leaf diseases. High to medium yield and test weight. Medium straw strength. Tolerant to loose smut. Moderately susceptible to shattering. Medium to low protein percent.

Released by Pioneer Hi-Bred in 1988. Sold by N.D. State University Research Foundation 1990. **PVP (94)**

Marshall – Awned, late maturity, semi-dwarf. Resistant to stem rust and moderately susceptible to leaf rust. Moderately susceptible to other leaf diseases. Medium yield and test weight. Very strong straw. Low to medium protein percent. Released by Minn. AES and USDA-ARS in 1982. **PVP**

Special-Purpose Varieties

Argent – Hard white spring wheat, awned, early-midseason maturity, medium height. Resistant to stem rust and moderately resistant to leaf rust. Moderately susceptible to other leaf diseases. Medium to high yield and high to medium test weight. Strong straw. Medium to high protein percent. Released by N.D. AES in 1998. **PVP (pending)**

BacUp – Awned, very early, medium height. Resistant to stem rust and moderately susceptible to leaf rust. Susceptible to other leaf diseases. Low yield and very high test weight. Medium straw strength. Very high protein percent. Specialty variety release for scab tolerance, with recommendation that it not be used on over 15 to 20 percent of acreage. Released by Minn. AES and USDA-ARS in 1996.

Varieties Not Adequately Tested

Alsen – Awned, early-midseason maturity, medium height. Resistant to stem rust and to leaf rust. High yield and very high test weight. Strong straw. High protein percent. Released by N.D. AES in 2000. **PVP (pending)**

Aurora – Awned, midseason-late maturity, semi-dwarf. Resistant to stem rust and moderately resistant to leaf rust. High to medium yield and low to medium test weight. Moderately strong straw. Low to medium protein percent. Released by NorthStar Genetics in 1999. **PVP (pending)**

Dandy – Awned, early-midseason maturity, medium height. Resistant to stem rust and moderately susceptible to leaf rust. Very high yield and high to medium test weight. Very strong straw. Medium protein percent. Released by NorthStar Genetics in 1999. **PVP (pending)**

Ember – Awned, early-midseason maturity, medium height. Resistant to stem rust and moderately susceptible to leaf rust. Moderately susceptible to other leaf diseases. Medium to high yield and high test weight. Moderately strong straw. Low to medium protein percent. Released by S.D. AES in 1999. **PVP (pending)**

NorPro – Awned, midseason-late, semi-dwarf. Resistant to stem rust and moderately resistant to leaf rust. Moderately resistant to other leaf diseases. Very high yield and medium test weight. Very strong straw. Medium protein percent. Released by AgriPro in 1999. **PVP (pending)**

Disease susceptibility and tolerances of hard red spring wheat varieties.

Variety	Leaf Rust ¹	Stem Rust ¹	Other		Grain Soundness ²
			Leaf Diseases ¹	Disease Severity ¹	
BacUp	MS	R	S	MR	1.5
Forge	MS	R	MS	MR-MS	2.5
Ingot	MS	R	MS	MR-MS	2.0
Oxen	MR	R	MS	MS	3.0
2375	MS	R	S	MR-MS	2.5
Alsen ³	R	R	–	MR	1.5
Argent	MR-MS	R	MS	MS-MR	3.5
Dandy ³	MS	R	–	MS	3.0
Ember ⁴	MS	R	MS	MR	2.5
McKenzie ³	R	R	–	MS	2.5
Parshall	MR-MS	R	MR-R	MR-MS	2.0
Russ	MR	R	MS	MS	3.0
Mercury	MR	R	MR	S	5.0
Reeder ⁴	MR-MS	R	MR-R	MS	3.5
HJ98	MR	R	MS	MS	3.0
Norm	R	R	MR-R	S	5.0
NorPro ⁴	MR	R	MR-R	MS-S	3.5
AC Barrie	MS	R	MS	MS-MR	2.5
Aurora ⁴	MR-MS	R	–	S	5.0
Verde	MR-MS	R	MR-R	MS	3.5
Ivan	MR	R	MR-R	S-MS	4.0
McVey	MS	R	MS	MR	2.5
Marshall	MS	R	MS	MS	3.5
Gunner	MS	R	MR	MR-MS	2.5

¹ R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible. ² Ability to maintain plump, sound kernels under scab epidemics; 1 = good, 5 = poor ³ 2000 data only. ⁴ 1999-2000 data only.

Reeder – Awned, early-midseason maturity, medium height. Resistant to stem rust and moderately resistant to leaf rust. Moderately resistant to other leaf diseases. High yield and test weight. Strong straw. Medium to high protein percent. Released by N.D. AES in 1999. **PVP** (pending)

McKenzie – Awned, early-midseason maturity, tall. Resistant to stem rust and leaf rust. Medium to high yield and high test weight. Medium straw strength. High protein percent. Developed by AgPro/Saskatchewan Wheat Pool in 1997. Marketed by CroPlan Genetics.

Hard Red Spring Wheat Planting Rate

Calculating and seeding the appropriate amount of seed is an important first step towards maximizing yield. The seeding rate is a function of the number of kernels per pound of seed, the percent germination of the lot, the expected stand loss as a function of the quality of seedbed, and the desired stand.

In Minnesota, an average optimum stand for hard red spring wheat when planted early is between 28 to 30 plants per square foot or approximately 1.25 million plants per acre. This number should increase by 1 to 2 plants per square foot for every week planting is delayed past the early, optimum seeding date. Expected stand loss even under good seedbed conditions is between 10 to 20% and will increase with a poor seedbed or improper seed placement due to poor depth control.

The general formula for calculating a seeding rate is:

$$\text{Seeding Rate (Pounds/Acre)} = \frac{\text{Desired Stand in Plants/Acre} (1 + \text{Expected Stand Loss})}{[(\text{Seeds/Pound}) (\text{Percentage Germination})]}$$

Calculate the seeding rate for every single seed lot and calibrate the drill accordingly.

Example: Early variety.

Desired Stand, Plants/Acre	Expected Stand Loss	Seeds per Pound	Percentage Germination	Seeding Rate, Lb/Acre
1.25 million	0.20	14,000	0.95	113