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. 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 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. Only new varieties or varieties with better than susceptible reaction to scab are being tested.

Variety Selection Criteria

While grain yield is an important economic trait, return per acre also is affect-

Origin, characteristics and disease reactions of hard red spring wheat varieties.

Variety	Origin[1]	PVP Status	Days to Heading[2]	Height Inches[2]	Straw Strength[3]	Leaf Rust[4]	Stripe Rust[4]	Other Leaf Diseases[4]	Scab Disease Severity[4]	Scab Grain Soundness[5]
Ingot	1998 SDSU	PVP (94)	65	40	Medium	S	R	MS	MR-MS	2.0
Briggs	2002 SDSU	PVP (94)	65	36	Medium	R	R	MR	MR-MS	2.5
Walworth	2001 SDSU	PVP (94)	65	38	Medium	MS	MS	MS	MR-MS	2.5
Oklee	2003 MN	PVP (pending)	66	35	Medium	MR-MS	R	MR	MR-MS	2.5
Trooper	2004 Westbred	PVP (pending)	66	32	V. Strong	MR	MS-S	–	MR-MS	2.5
Banton	2004 Trigen	PVP (pending)	66	36	V. Strong	R	R	–	MR-MS	2.5
2375	1990 NDSU	PVP (94)	66	36	Medium	MS	R	S	MR-MS	2.5
Granger	2004 SDSU	PVP (pending)	66	40	Medium	MR	R	MR	MR-MS	2.5
Oxen	1995 SDSU	PVP (94)	67	37	M. Strong	MS-S	R	MS	MS-S	3.0
Dapps	2003 NDSU	PVP (pending)	67	42	Medium	MR	MR	MR-R	MS	3.0
Mercury	1999 N. Star G.	PVP (94)	67	33	Strong	MR	R	MR	S	5.0
Alsen	2000 NDSU	PVP (94)	67	36	Strong	MR	R	MR-R	MR	2.0
Freyr	2004 AgriPro	PVP (94)	67	37	Medium	MR-MS	R	–	MR	2.0
Steele-ND	2004 NDSU	PVP (94)	67	39	Medium	R	R	MR	MS	2.5
Parshall	1999 NDSU	PVP (94)	68	42	Strong	MS-S	R	MR-R	MR-MS	2.0
Reeder	1999 NDSU	PVP (94)	68	39	Strong	MS	R	MR-R	MS	3.5
Knudson	2001 AgriPro	PVP (94)	68	37	M. Strong	R	MR	MR-R	MR-MS	2.5
Hanna	2002 AgriPro	PVP (94)	68	41	M. Strong	MS	R	MR	MR	2.0
HJ98	1998 MN	PVP (94)	68	36	Medium	MS	R	MS	MS	3.0
Norpro	1999 AgriPro	PVP (94)	70	35	Strong	MR	MR	MR-R	MS	3.5
Verde	1995 MN	PVP (94)	70	36	M. Strong	MR	R	MR-R	MS	3.5
Granite	2002 Westbred	PVP (94)	71	35	V. Strong	MR-MS	MR	MR	MR-MS	2.5
Marshall	1982 MN	–	71	36	Strong	MS	R	MS	MS	3.5
Saturn	2004 N. Star G.	PVP (pending)	73	39	V. Strong	MR-MS	R	–	MS	3.5
Polaris	2004 N. Star G.	PVP (pending)	74	39	V. Strong	MS	R	–	MS	3.5
Mean			68	37						

1. Abbreviations: MN = Minnesota Agricultural Experiment Station and USDA-ARS; N. Star G. = North Star Genetics; NDSU = North Dakota State University Research Foundation; SDSU = South Dakota Agricultural Experiment Station; Trigen = Trigen Seed Services LLC.

2. 2004 data. 3. 2000-2004 data. 4. R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

5. Ability to maintain plump, sound kernels under scab epidemics. 1=good, 5=poor.

ed by grain quality. Because Fusarium Head Blight (FHB), or scab, can reduce grain quality and yield dramatically, it is an important consideration.

The foliar disease rating, which represents the total complex of leaf diseases other than leaf rust, includes the Septoria complex and tan spot. Although varieties may differ for their response to each of those diseases, the rating does not differentiate among them. Consequently, the rating should be used as a general indication and only for varietal selection in areas where these diseases have been a problem or if the previous crop was wheat or barley.

Control of leaf diseases with fungicides may be warranted, even for varieties with an above-average rating.

The varietal response to FHB is presented as a severity rating, similar to the rating for leaf and stem rust. Resistance to spread in the head, the basis for this severity rating, is one of the resistance mechanisms to the disease. A second rating is provided to characterize ability to maintain sound, plump kernels despite visual disease symptoms on the head. This ability to maintain sound kernels and thus, test weight is another component to resistance.

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

	Crookston			Roseau[1]		Stephen		
Variety	2004	2-Year	3-Year	2004	2-Year	2004	2-Year	3-Year
Ingot	94	93	94	97	100	99	99	93
Briggs	98	95	100	110	110	102	104	102
Walworth	101	98	100	98	101	100	98	100
Oklee	97	97	103	103	99	103	100	98
Trooper	104	–	–	79	–	111	–	–
Banton	104	–	–	97	–	102	–	–
2375	98	102	98	102	101	109	99	98
Granger	80	84	–	99	97	104	101	–
Oxen	85	89	91	106	103	93	95	96
Dapps	95	96	–	106	100	88	93	–
Mercury	99	100	104	113	109	110	102	108
Alsen	103	97	100	100	96	93	96	100
Freyr	101	–	–	94	–	83	–	–
Steele-ND	90	96	–	100	99	103	107	–
Parshall	83	91	95	100	98	90	87	85
Reeder	87	90	94	105	102	100	102	101
Knudson	115	109	107	89	98	99	103	102
Hanna	101	99	99	94	94	98	101	100
HJ98	116	115	110	102	106	111	113	111
Norpro	101	97	95	94	96	100	103	102
Verde	111	108	105	95	95	97	95	100
Granite	111	102	97	110	98	92	97	94
Marshall	87	93	86	76	88	95	101	98
Saturn	96	–	–	103	–	105	–	–
Polaris	107	–	–	100	–	103	–	–
Mean (Bu/Acre)	86.6	83.5	77.5	89.5	91.9	71.4	71.5	53.8
LSD	12.2	14.8	13.5	10.9	14.7	15.7	13.5	11.7

[1] There are no 3-year Roseau data because 2002 was flooded.

Variety selection for 2005 continues to be a balance between yield potential, disease responses and grain quality. Leading varieties in Minnesota, based on acres planted, include Oxen, Knudson, Alsen, Reeder, Walworth and Briggs. New releases for 2005 are Banton, Freyr, Granger, Polaris, Saturn, Steele-ND and Trooper. Four of these new varieties – Banton, Polaris, Saturn and Trooper – have very strong straw, comparable to Granite.

Leaf rust continues to be a yearly problem on varieties with ratings of MS or worse. Varieties with ratings of MR or better should not experience economic levels of damage to this fungus in most years.

Stripe rust was a serious problem on susceptible varieties in some locations in 2004. This disease is not as widespread and does not occur as regularly as leaf rust, but can be very damaging when temperatures remain unseasonably cool into early July. A column comparing the variety responses to this disease has been added to the disease-reactions table. Most varieties are resistant or moderate-

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Hard Red Spring Wheat Planting Rate and Date.

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:

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

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

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

	Lamberton			Morris			St. Paul			Waseca		
Variety	2004	2-Year	3-Year	2004	2-Year	3-Year	2004	2-Year	3-Year	2004	2-Year	3-Year
Ingot	88	90	90	80	88	94	94	96	99	84	90	89
Briggs	98	96	98	109	98	101	96	96	96	101	99	98
Walworth	102	99	99	80	94	95	103	106	106	108	102	108
Oklee	95	96	104	106	96	98	104	94	100	102	102	107
Trooper	91	–	–	83	–	–	129	–	–	88	–	–
Banton	89	–	–	105	–	–	107	–	–	85	–	–
2375	93	95	90	110	103	101	88	84	85	90	86	84
Granger	109	105	–	110	100	–	97	98	–	92	100	–
Oxen	85	98	99	94	105	104	109	110	113	97	102	110
Dapps	107	97	–	105	94	–	99	98	–	108	101	–
Mercury	115	109	110	113	114	108	135	121	118	124	115	110
Alsen	94	94	92	97	93	90	87	91	91	90	88	85
Freyr	109	–	–	107	–	–	104	–	–	100	–	–
Steele-ND	100	101	–	99	100	–	120	107	–	111	105	–
Parshall	65	70	73	84	87	88	116	112	106	74	86	92
Reeder	90	98	97	105	107	107	114	112	111	98	98	101
Knudson	116	114	114	117	110	110	104	107	104	122	117	114
Hanna	110	95	88	89	91	88	77	87	86	75	83	80
HJ98	93	102	105	94	101	99	76	95	97	95	99	97
Norpro	108	111	110	93	97	101	75	90	96	105	103	101
Verde	107	107	103	112	107	102	98	101	99	108	104	102
Granite	112	116	113	97	104	104	97	98	103	99	100	92
Marshall	79	85	79	70	86	90	45	67	79	64	76	73
Saturn	93	–	–	101	–	–	130	–	–	105	–	–
Polaris	97	–	–	109	–	–	105	–	–	91	–	–
Mean (Bu/Acre)	54.9	53	46.8	83.1	79.9	69.4	66.9	75.6	73.4	66.0	77.3	62.3
LSD	13.2	19.8	16	14.2	22.7	16.5	10.8	25.7	18.6	15.9	15.7	13.2

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

	State			North[1]			South [2]		
Variety	2004	2-Year	3-Year	2004	2-Year	3-Year	2004	2-Year	3-Year
Ingot	91	94	94	96	97	95	87	91	93
Briggs	102	100	100	103	103	103	101	97	98
Walworth	99	100	101	100	99	100	98	100	102
Oklee	101	98	101	101	99	100	102	97	102
Trooper	98	–	–	98	–	–	98	–	–
Banton	98	–	–	101	–	–	97	–	–
2375	99	96	94	103	101	99	95	92	90
Granger	99	98	–	94	94	–	102	101	–
Oxen	96	100	102	95	96	96	96	104	107
Dapps	101	97	–	96	96	–	105	97	–
Mercury	116	110	109	107	104	107	122	115	111
Alsen	95	94	93	99	97	99	92	91	90
Freyr	100	–	–	92	–	–	105	–	–
Steele-ND	103	102	–	98	101	–	108	103	–
Parshall	87	90	91	91	92	92	84	89	90
Reeder	100	101	102	97	98	98	102	104	104
Knudson	109	108	108	101	103	103	115	112	111
Hanna	92	93	91	98	98	98	88	89	86
HJ98	98	104	103	109	111	109	89	99	99
Norpro	97	99	101	98	99	98	95	100	102
Verde	104	103	101	101	99	100	106	105	102
Granite	103	102	100	104	99	96	101	105	103
Marshall	74	85	85	86	94	91	64	79	80
Saturn	105	–	–	102	–	–	107	–	–
Polaris	102	–	–	103	–	–	101	–	–
Mean (Bu/Acre)	74.1	76.1	66.7	82.5	82.2	72.2	67.7	71.4	63.0
LSD	9.9	6.6	5.9	12.2	8.2	6.5	14.9	9.6	8.2
No. Environments	7	14	20	3	6	8	4	8	12

[1] 2-year data are from 2003 and 2004 Crookston, Roseau and Stephen; 3-year data add 2002 Crookston and Stephen.

[2] Data from Lamberton, Morris, St. Paul and Waseca.

ly resistant. Trooper and Walworth are more susceptible, and sustained economic levels of damage in 2004.

Falling number data, an important end-use quality trait that can be determined at most local elevators, has been added to the grain-quality table. Falling number is measured in seconds, and values of 300 or higher are required for milling quality wheat. Falling number is related to pre-harvest sprouting, in that sprouted grain will always have low falling numbers. In the absence of visual sprouting, falling numbers are generally greater than 400, except in certain varieties. The variety Dandy, which we no longer test, had on average, falling numbers 100 seconds less than other varieties. Granite tends to average about 70 seconds less than other varieties.

Variety descriptions published in previous editions have been discontinued because all of the information they contained is now included in the tables.

Grain quality of hard red spring wheat varieties.

	Test Weight (Lb/Bu)		Protein (%)[1]		Baking	Falling	Pre-Harvest
Variety	2004	2-Year	2004	2-Year	Quality[2]	Number[3]	Sprouting
Ingot	61.9	63.0	14.2	14.7	med.-high	404	Susceptible
Briggs	60.7	61.7	14.6	14.6	med.	493	Resistant
Walworth	58.8	60.2	14.4	14.7	med.-high	387	Resistant
Oklee	61.0	62.2	14.9	15.1	low-med.	398	Resistant
Trooper	59.9	–	13.7	–	–	–	–
Banton	61.0	–	14.5	–	–	–	–
2375	60.4	61.3	14.4	14.7	med.	–	Resistant
Granger	60.1	61.2	14.6	14.8	–	–	Mod. Resistant
Oxen	57.7	59.8	14.4	14.5	high-med.	386	Resistant
Dapps	60.1	61.0	15.7	16.1	high	–	Resistant
Mercury	59.7	60.8	13.8	14.0	med.	–	Mod. Susceptible
Alsen	60.5	61.6	14.9	15.1	high	403	Resistant
Freyr	59.2	–	14.5	–	–	–	Resistant
Steele-ND	61.4	62.5	15.2	15.3	–	–	Resistant
Parshall	61.3	62.4	14.4	14.8	high-med.	395	Resistant
Reeder	59.8	61.1	14.4	14.6	med.-high	398	Resistant
Knudson	59.9	61.1	14.0	14.0	med.-high	404	Resistant
Hanna	60.3	61.1	14.5	14.6	high	449	Resistant
HJ98	57.9	59.8	14.0	14.1	med.-low	400	Mod. Resistant
Norpro	58.1	59.8	14.2	14.3	med.	396	Resistant
Verde	59.5	60.5	13.8	13.9	low-med.	–	Resistant
Granite	61.8	62.7	15.4	15.3	med.-low	329	Resistant
Marshall	57.1	59.4	13.6	13.5	low	400	Resistant
Saturn	57.0	–	15.0	–	–	–	–
Polaris	58.8	–	13.4	–	–	–	–
Mean	59.8	61.2	14.4	14.6			

1. 12% moisture basis. 2. 2001-2003. 3. Based on 7 environments from 2002 and 2003; data from USDA-ARS Wheat Quality Laboratory, Fargo.