

# 2014 Hard Red Spring Wheat Field Crop Trials Results



**Minnesota Agricultural Experiment Station and the College of Food, Agricultural and Natural Resource Sciences**

Spring wheat entries were sown in trial plots at Crookston, Lamberton, Morris, Roseau, St. Paul and Waseca, and on-farm sites near Benson, Fergus Falls, Hallock, LeCenter, Kimball, Oklee, Perley, Stephen and Strathcona. Plots are handled so that the factors affecting yield and other characteristics are as nearly the same for all entries 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 entries within a table. Tested hard red spring wheat entries are listed in alphabetical order in the tables.

## Variety Selection Criteria

While grain yield is an important economic trait, return per acre also is affected by grain quality. Because Fusarium Head Blight (FHB), or scab, can reduce grain quality and yield dramatically, it is an important consideration. Disease ratings are on a 1-9 scale where 1 = most resistant and 9 = most susceptible. Rating differences of 2 or more should be considered significant.

Faller and Prosper are susceptible to leaf rust races that have increased since 2010. Leaf rust infections throughout Minnesota were low during the past two years; however, Faller and Prosper were among the most susceptible cultivars. Carefully consider a

entry's rating for leaf rust, and plan to use a fungicide if a variety is rated 5 or higher and disease levels warrant treat-

ment. Varieties with ratings of 4 or better should not experience economic levels of damage in most years.

**Table 1. Origin and agronomic characteristics of hard red spring wheat entries in Minnesota in single-year (2014) and multiple-year comparisons.**

Entry	Origin <sup>1</sup>	PVP Status	Days to Heading <sup>2</sup>	Height, Inches <sup>2</sup>	Straw Strength <sup>3</sup>
Advance	2012 SDSU	PVP (94)	60.2	31.5	6
Barlow	2009 NDSU	PVP (94)	56.8	32.8	6
Breaker	2008 WestBred	PVP (94)	59.2	33.1	4
Elgin-ND	2013 NDSU	PVP (94)	58.2	35.8	6
Faller	2007 NDSU	PVP (94)	61.8	34.2	5
Forefront	2012 SDSU	PVP (94)	55.9	35.7	5
Glenn	2005 NDSU	PVP (94)	56.4	34.2	4
HRS 3361	2013 CROPLAN by WinField	PVP (pending)	59.6	31.2	3
HRS 3378	2013 CROPLAN by WinField	PVP (pending)	58.0	30.7	5
HRS 3419	2014 CROPLAN by WinField	PVP (pending)	63.0	30.7	2
Jenna	2009 Syngenta	PVP (94)	62.3	31.3	4
Knudson	2001 Syngenta	PVP (94)	59.9	31.6	5
LCS Albany	2009 Limagrain Cereal Seeds	PVP (94)	61.1	31.2	5
LCS Breakaway	2012 Limagrain Cereal Seeds	PVP (pending)	56.9	29.8	4
LCS Iguacu	2014 Limagrain Cereal Seeds	PVP (pending)	60.8	30.8	4
LCS Powerplay	2012 Limagrain Cereal Seeds	PVP (94)	58.7	30.8	5
Linkert	2013 MN	PVP (pending)	58.2	30.0	2
Marshall	1982 MN	None	63.1	32.2	4
Norden	2012 MN	PVP (94)	59.6	31.0	3
Prevail	2014 SDSU	PVP (pending)	58.1	34.3	4
Prosper	2011 NDSU	PVP (94)	61.8	34.6	6
RB07	2007 MN	PVP (94)	58.2	31.7	5
Rollag	2011 MN	PVP (94)	58.6	30.3	3
Samson	2007 WestBred	PVP (94)	57.6	28.9	3
SY Ingmar	2014 Syngenta	PVP (pending)	59.4	31.2	4
SY Rowyn	2013 Syngenta	PVP (pending)	56.3	29.4	5
SY Soren	2011 Syngenta	PVP (94)	58.0	29.6	4
Vantage	2007 WestBred	PVP (94)	62.8	32.3	2
WB-Digger	2010 WestBred	PVP (94)	58.4	32.2	5
WB-Mayville	2011 WestBred	PVP (94)	56.4	30.9	3
WB9507	2013 Westbred	PVP (pending)	57.9	33.1	5
Mean			59.1	31.8	

<sup>1</sup>Abbreviations: MN = Minnesota Agricultural Experiment Station; NDSU = North Dakota State University Research Foundation; SDSU = South Dakota Agricultural Experiment Station.

<sup>2</sup>2014 data

<sup>3</sup>1-9 scale in which 1 is the strongest straw and 9 is the weakest. Based on 2008-2014 data; the rating of newer entries may change by as much as one rating point as more data are collected.

Stripe rust 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. We do not have adequate data to provide cultivar ratings for this disease, but most entries are resistant or moderately resistant.

Stem rust ratings are included in the disease tables because there are differences in variety reaction. However, the levels of this disease have been very low in production fields in recent years, even on susceptible entries.

Bacterial leaf streak ratings of all entries are presented in the disease table.

This disease cannot be controlled with fungicides. If you have a history of problems with this disease selection of more-resistant varieties is the only recommended practice at this time. Bacterial leaf streak symptoms are highly variable from one environment to the next. The rating of newer varieties may change by as much as one rating point as more data are collected.

The “Other leaf diseases” rating represents a combined reaction to septoria 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 fungal leaf diseases with fungicides may be warranted, even for varieties with an above-average rating.

Prosper was the leading entry in Minnesota based on acres planted in 2014, with 20.7% of the state’s wheat acres. Faller, a sister line of Prosper came in third at 13.5%. WB-Mayville was the second most popular variety at 18.1%.

The next four entries, each with between 4% to 8% of the acres, were SY-Soren, LCS Albany, Rollag and Linkert. The 2013 releases HRS 3361 and HRS 3378 (CROPLAN by WinField), and WB907 (Westbred) and 2014 releases HRS 3419 (CROPLAN by WinField), LCS Iguacu (Limagrain Cereal Seeds), Prevail (SDSU), and SY Ingmar (Syngenta) were included, and their data (multi-year for LCS Iguacu and Prevail) are presented for the first time this year.

Testing of Edge, Sabin, and Select was discontinued.

Due to the increased use of fungicides on wheat in Minnesota, we initiated an additional variety trial in 2004 in which fungicides are applied at the time of herbicide application (Feekes 5), flag leaf emergence (Feekes 9), and at the onset of flowering (Feekes 10.51).

The practice of three fungicide applications during the growing season is not recommended. This fungicide regime was implemented to measure plant performance when fungal diseases were controlled to the maximum extent possible. A grower’s decisions regarding fungicide applications should be based on the available decision support systems, and only if and when disease levels are forecasted to reach economic damaging levels.

**Table 2. Grain quality of hard red spring wheat entries in Minnesota in single-year (2014) and multiple-year comparisons.**

Entry	Test Weight (Lb/Bu)		Protein (%) <sup>1</sup>		Baking Quality <sup>2</sup>	Pre-Harvest Sprouting <sup>3</sup>
	2014	2-Year	2014	2-Year		
Advance	60.9	61.1	13.6	13.4	Low-Medium	4
Barlow	60.5	60.5	14.5	14.6	Medium-High	2
Breaker	60.7	61.1	14.0	14.0	Medium-High	4
Elgin-ND	60.0	59.9	14.4	14.3	Medium-High	2
Faller	60.2	60.3	13.3	13.4	Medium	2
Forefront	60.9	60.9	14.6	14.5	Medium	4
Glenn	61.8	61.8	14.8	14.7	High	1
HRS 3361	59.5	—	13.9	—	—	—
HRS 3378	60.0	—	14.0	—	—	—
HRS 3419	59.9	—	12.9	—	—	—
Jenna	59.7	60.0	14.2	14.2	Medium	5
Knudson	59.6	59.8	13.4	13.5	Medium-High	2
LCS Albany	60.4	60.5	13.0	12.9	Low-Medium	5
LCS Breakaway	61.4	61.4	14.4	14.5	Medium	3
LCS Iguacu	61.2	61.2	12.6	12.7	—	2
LCS Powerplay	60.9	60.9	13.4	13.6	—	1
Linkert	60.3	60.4	14.9	15.0	High	2
Marshall	59.5	59.5	13.3	13.2	Low	2
Norden	61.4	61.7	13.9	13.9	Medium	1
Prevail	60.5	60.2	13.7	13.7	—	5
Prosper	60.4	60.3	13.4	13.5	Medium	2
RB07	60.2	60.3	14.2	14.3	Medium-High	2
Rollag	61.1	61.1	14.8	14.9	Low-Medium	1
Samson	58.0	58.8	14.2	14.1	Medium	5
SY Ingmar	60.9	—	14.4	—	—	—
SY Rowyn	61.1	60.8	13.7	13.7	—	4
SY Soren	60.6	60.6	14.4	14.5	Medium	1
Vantage	61.9	61.7	15.2	15.1	Medium	3
WB-Digger	58.5	59.0	13.9	13.8	Low-Medium	5
WB-Mayville	58.9	59.4	14.7	14.7	Medium-High	4
WB9507	58.9	—	13.7	—	—	—
Mean	60.3	60.5	14.1	14.1		
No. Environments	12	22	12	22		

<sup>1</sup>12% moisture basis.

<sup>2</sup>2004-2013 crop years.

<sup>3</sup>1-9 scale in which 1 is best and 9 is worst. Values of 1-3 should be considered as resistant.

**Table 3. Disease reactions<sup>1</sup> of hard red spring wheat entries in Minnesota in multiple-year comparisons (2009-2014).**

Entry	Leaf Rust	Stem Rust <sup>2</sup>	Bacterial Leaf Streak <sup>3</sup>	Other Leaf Diseases <sup>4</sup>	Scab
Advance	3	1	4	5	—
Barlow	4	1	4	4	4
Breaker	2	2	2	3	4
Elgin-ND	2	2	4	5	5
Faller	5	1	4	4	4
Forefront	2	4	3	4	3
Glenn	4	1	4	5	3
HRS 3361	—	3	4	4	—
HRS 3378	—	3	6	5	—
HRS 3419	—	1	6	3	—
Jenna	3	2	5	4	7
Knudson	2	3	4	3	6
LCS Albany	2	3	6	5	4
LCS Breakaway	4	2	3	5	5
LCS Iguacu	4	2	4	4	—
LCS Powerplay	5	1	5	5	5
Linkert	3	1	4	4	5
Marshall	8	1	6	7	7
Norden	2	1	4	4	5
Prevail	1	3	2	6	—
Prosper	5	2	4	4	5
RB07	2	2	6	6	4
Rollag	4	2	4	5	3
Samson	5	1	5	6	8
SY Ingmar	—	1	3	6	—
SY Rowyn	2	1	3	6	—
SY Soren	3	1	4	4	4
Vantage	6	3	7	6	5
WB-Digger	3	1	5	5	7
WB-Mayville	3	2	6	7	7
WB9507	—	3	6	3	—

<sup>1</sup>1-9 scale where 1=most resistant, 9=most susceptible.

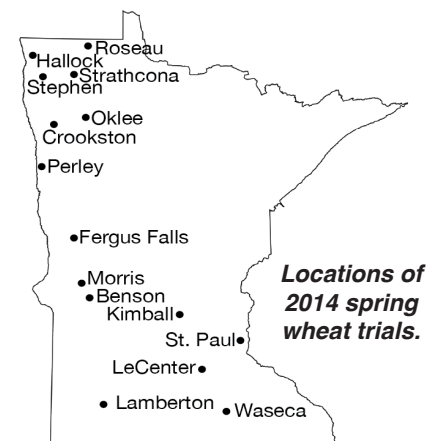
<sup>2</sup>Stem rust levels have been very low in production fields in recent years, even on susceptible varieties.

<sup>3</sup>Bacterial leaf streak symptoms are highly variable from one environment to the next. The rating of newer entries may change by as much as one rating point as more data are collected.

<sup>4</sup>Combined rating of tan spot and septoria.

The additional performance evaluations were carried out adjacent to the conventional (no fungicides applied) trials, so results can be compared directly. Data from trials conducted in Lamberton, Morris, Crookston and Roseau are included in the 2014 and multi-year summaries.

In 2014, the fungicide regime as applied in these trials increased grain yield on average by 14.9 bu/acre in the two northern locations and 11.3 bu/acre over the past three years. The 2014 Roseau trial had a severe infection of tan spot that was controlled well by the fungicide treatments. The two southern locations, Lamberton and Morris, averaged 4.8 and 4.5 bu/acre higher grain yield when fungicide



### Hard red spring wheat seeding rate calculator.

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 the 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:

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

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	117

protected in 2014 and 3-year data, respectively.

Rather than the average increases in grain yield, the responses of individual entries provide the most useful information; entries rated susceptible to leaf rust and other fungal leaf diseases

usually benefited most from fungicide applications.

#### Project Leaders

Jim Anderson, Jochum Wiersma, Susan Reynolds, Matt Green, Roger Caspers, Jim Kolmer, Yue Jin, Ruth Dill-Macky and Jae Ohm.

#### Test Plot Managers

Matt Bickell, Robert Bouvette, James Cameron, Dave Grafstrom, Mark Hanson, George Nelson, Steve Quiring, Galen Thompson and Donn Vellekson.

**Table 4. Relative grain yield of hard red spring wheat entries in northern Minnesota locations in single-year (2014) and multiple-year (2012-2014) comparisons.**

Entry	Crookston			Fergus Falls			Hallock			Oklee			Perley		Roseau			Stephen			Strathcona	
	2014	2-Yr	3-Yr	2014	2-Yr	3-Yr	2014	2-Yr	3-Yr	2014	2-Yr	3-Yr	2014	2-Yr	2014	2-Yr	3-Yr	2014	2-Yr	3-Yr	2014	2-Yr <sup>1</sup>
Advance	101	100	101	91	97	99	104	101	102	96	96	93	105	104	90	95	95	95	97	96	101	96
Barlow	84	89	93	80	85	91	99	97	97	100	99	98	94	95	101	102	103	99	102	100	98	101
Breaker	99	100	96	95	96	99	98	97	99	90	93	94	96	98	98	103	103	96	100	101	101	97
Elgin-ND	99	101	103	99	99	100	106	101	99	96	99	98	99	100	97	101	102	103	106	102	94	95
Faller	123	118	116	115	114	108	114	112	110	110	110	107	106	105	103	109	109	108	109	108	108	98
Forefront	103	102	107	112	106	108	104	96	96	98	101	102	102	100	102	96	96	107	100	101	100	105
Glenn	85	87	90	81	88	89	99	91	90	97	96	93	93	94	98	94	90	96	97	95	101	94
HRS 3361	99	—	—	107	—	—	99	—	—	102	—	—	99	—	105	—	—	96	—	—	95	—
HRS 3378	89	—	—	80	—	—	98	—	—	92	—	—	103	—	94	—	—	97	—	—	97	—
HRS 3419	108	—	—	132	—	—	107	—	—	112	—	—	108	—	110	—	—	100	—	—	112	—
Jenna	99	100	103	112	112	112	97	98	100	100	102	102	98	101	102	101	106	101	97	102	100	106
Knudson	106	104	101	100	102	102	107	103	101	98	100	99	100	100	96	97	98	103	100	100	93	95
LCS Albany	116	113	111	116	121	121	108	110	112	115	112	116	101	99	105	112	114	112	109	110	109	111
LCS Breakaway	85	89	89	77	87	93	98	99	99	103	98	103	98	99	97	93	97	97	92	97	98	99
LCS Iguacu	111	109	—	120	118	—	99	101	—	114	109	—	102	107	108	109	—	106	100	—	108	—
LCS Powerplay	97	102	106	104	101	101	100	103	102	102	104	107	94	97	107	108	107	98	105	105	106	101
Linkert	95	97	95	84	87	92	97	99	99	95	94	96	95	96	104	98	98	96	94	93	100	98
Marshall	92	96	95	88	96	92	98	99	96	82	90	90	100	99	90	95	94	96	100	96	91	88
Norden	96	99	99	96	97	96	99	98	97	101	101	101	98	99	92	96	98	101	100	100	100	101
Prevail	98	99	99	118	109	107	101	102	101	101	97	97	98	98	104	101	100	100	95	97	103	104
Prosper	116	112	107	116	113	109	112	109	109	111	112	111	107	108	107	107	110	105	113	110	107	99
RB07	102	101	100	98	98	98	96	101	100	98	97	99	102	101	100	98	98	102	99	98	98	99
Rollag	102	97	102	97	98	99	99	98	98	96	96	96	97	97	94	91	93	97	95	98	95	96
Samson	87	93	96	84	94	102	102	103	104	107	105	108	102	104	113	105	103	104	101	102	106	107
SY Ingmar	104	—	—	100	—	—	98	—	—	94	—	—	99	—	94	—	—	97	—	—	101	—
SY Rowyn	111	106	—	114	108	—	103	102	—	104	101	—	98	97	99	94	—	97	93	—	97	—
SY Soren	102	99	100	102	100	102	99	96	99	99	100	103	95	99	105	100	102	98	95	99	101	108
Vantage	93	92	93	100	103	98	93	95	94	95	95	94	99	99	93	98	95	90	101	100	102	101
WB-Digger	94	100	102	92	97	101	106	105	106	108	108	110	99	103	105	100	101	98	102	102	110	107
WB-Mayville	86	93	93	81	87	96	98	99	99	102	100	101	99	94	106	97	98	94	91	94	99	102
WB9507	111	—	—	116	—	—	112	—	—	109	—	—	107	—	103	—	—	112	—	—	99	—
Mean (Bu/Acre)	94.7	91.2	81.3	78.4	82.4	78.2	87.8	101.0	97.3	93.5	86.1	84.9	82.1	86.8	87.7	79.4	78.1	60.4	79.0	78.3	89.9	80.1
LSD (0.10)	3.1	6.6	6.7	5.7	8.3	8.4	5.4	5.9	4.7	5.6	5.7	6.5	3.7	3.4	6.4	8.3	5.8	2.7	6.9	5.6	5.8	8.1

<sup>1</sup>Strathcona 2-Yr is 2012 and 2014.

**Table 5. Relative grain yield of hard red spring wheat entries in southern Minnesota locations in single-year (2014) and multiple-year comparisons (2012-2014).**

Entry	Benson			Kimball		LeCenter		Lamberton			Morris			St. Paul			Waseca		
	2014	2-Yr	3-Yr	2014	2-Yr	2014	2-Yr <sup>1</sup>	2014	2-Yr	3-Yr	2014	2-Yr	3-Yr	2014	2-Yr	3-Yr	2014	2-Yr	3-Yr
Advance	100	102	102	97	99	77	96	106	111	108	106	110	109	86	107	100	82	102	101
Barlow	89	94	94	91	96	77	91	98	102	100	98	101	103	91	100	99	83	85	90
Breaker	100	97	97	97	98	83	95	99	100	100	99	100	101	104	107	104	94	95	99
Elgin-ND	90	94	93	94	95	74	88	102	102	102	101	101	99	98	98	100	75	87	88
Faller	107	108	106	108	100	122	110	106	105	107	107	106	103	111	106	107	98	97	97
Forefront	95	100	102	105	105	109	108	98	98	101	110	104	108	109	104	104	114	115	114
Glenn	96	93	93	88	97	90	89	92	93	94	101	98	96	81	87	87	79	83	77
HRS 3361	99	–	–	106	–	105	–	98	–	–	98	–	–	104	–	–	109	–	–
HRS 3378	99	–	–	94	–	82	–	100	–	–	84	–	–	83	–	–	120	–	–
HRS 3419	101	–	–	114	–	137	–	116	–	–	103	–	–	109	–	–	115	–	–
Jenna	96	102	103	106	103	99	109	101	101	106	106	103	107	111	104	110	111	105	117
Knudson	93	97	98	103	103	99	102	104	101	105	99	98	102	95	97	102	96	98	105
LCS Albany	108	110	111	112	107	98	116	118	115	121	111	111	115	119	114	119	134	132	134
LCS Breakaway	100	102	102	98	99	99	106	93	96	91	97	98	102	84	98	97	84	92	93
LCS Iguacu	104	108	–	110	105	122	–	102	104	–	101	103	–	118	116	–	104	119	–
LCS Powerplay	100	100	101	104	102	117	109	105	106	101	96	101	103	94	95	96	104	94	96
Linkert	92	93	94	99	101	96	104	92	93	95	88	90	90	88	90	95	101	95	102
Marshall	102	99	99	97	93	77	79	90	89	87	88	88	80	88	83	82	78	82	78
Norden	101	99	99	95	91	90	97	100	99	99	91	94	98	97	95	93	113	104	109
Prevail	107	105	101	104	105	118	106	95	101	100	114	111	112	114	111	110	126	134	119
Prosper	112	108	110	102	103	109	105	106	109	105	113	113	112	111	111	111	120	115	112
RB07	95	97	99	99	96	97	99	104	106	102	94	100	98	88	91	94	80	87	88
Rollag	100	95	98	99	97	86	96	95	94	91	94	93	93	97	88	90	83	83	84
Samson	93	97	100	92	97	91	111	92	96	98	87	93	96	94	94	99	100	105	107
SY Ingmar	113	–	–	106	–	131	–	102	–	–	106	–	–	102	–	–	94	–	–
SY Rowyn	108	105	–	106	110	120	–	103	107	–	118	115	–	103	104	–	119	106	–
SY Soren	99	99	100	101	100	96	104	107	102	104	105	100	100	98	97	101	94	94	100
Vantage	97	97	96	98	99	84	90	95	92	100	94	92	89	101	93	94	78	92	93
WB-Digger	97	103	107	94	99	94	104	92	101	99	87	98	98	97	100	103	71	89	101
WB-Mayville	99	102	103	90	98	107	114	87	88	95	82	85	90	99	97	103	80	89	97
WB9507	104	–	–	110	–	123	–	107	–	–	106	–	–	114	–	–	122	–	–
Mean (Bu/Acre)	113.0	99.9	95.0	88.3	77.8	53.7	56.0	81.6	69.7	56.2	80.6	69.3	66.4	67.1	73.4	62.1	37.6	44.0	42.2
LSD (0.10)	8.5	7.7	7.2	4.9	7.3	9.5	10.7	7.6	5.7	4.2	8.0	8.1	6.5	4.7	7.3	5.2	6.5	6.0	5.5

<sup>1</sup>LeCenter 2-Yr is 2012 and 2014.

**Table 6. Relative grain yield of hard red spring wheat varieties in Minnesota in single-year (2014) and multiple-year comparisons (2012-2014).**

Entry	State			North			South		
	2014	2-Yr	3-Yr	2014	2-Yr	3-Yr	2014	2-Yr	3-Yr
Advance	97	100	100	98	99	98	96	102	103
Barlow	93	96	97	95	96	97	91	96	97
Breaker	97	99	99	97	98	98	97	99	100
Elgin-ND	96	98	98	99	100	100	93	96	96
Faller	110	109	107	111	111	108	108	106	105
Forefront	104	102	103	103	100	102	104	104	106
Glenn	93	93	92	94	93	92	91	92	91
HRS 3361	101	—	—	100	—	—	102	—	—
HRS 3378	94	—	—	94	—	—	94	—	—
HRS 3419	111	—	—	111	—	—	112	—	—
Jenna	102	102	105	101	101	104	103	103	107
Knudson	99	100	101	100	100	100	98	100	102
LCS Albany	111	112	114	110	111	112	113	113	117
LCS Breakaway	94	96	98	94	94	97	95	98	99
LCS Iguacu	108	108	—	108	107	—	108	109	—
LCS Powerplay	101	102	103	101	103	104	102	101	101
Linkert	95	95	96	96	95	96	93	94	96
Marshall	91	93	91	92	96	94	91	90	87
Norden	98	98	98	98	98	99	97	97	98
Prevail	105	104	103	103	100	100	109	110	107
Prosper	110	110	109	110	110	108	110	110	109
RB07	98	98	98	100	99	99	95	97	97
Rollag	96	95	96	97	96	97	95	93	93
Samson	97	99	102	100	101	103	92	96	101
SY Ingmar	103	—	—	98	—	—	108	—	—
SY Rowyn	106	104	—	103	100	—	110	109	—
SY Soren	101	99	101	100	99	101	101	99	102
Vantage	95	96	96	96	98	97	94	94	95
WB-Digger	98	101	103	102	103	104	92	99	102
WB-Mayville	94	95	98	96	95	97	93	95	100
WB9507	109	—	—	108	—	—	110	—	—
Mean (Bu/Acre)	79.8	79.3	74.6	84.3	86.9	83.1	74.6	70.6	64.8
LSD (0.10)	2.9	2.0	1.6	4.0	2.5	2.2	4.1	3.1	2.3
No. Environments	15	28	41	8	15	22	7	13	19

**Table 7. Grain yield (bushels per acre) of hard red spring wheat varieties grown under conventional and intensive management.**

Entry	North						South						State					
	2014		2-Yr		3-Yr		2014		2-Yr		3-Yr		2014		2-Yr		3-Yr	
	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int
Advance	87.0	105.3	83.1	99.4	78.1	92.4	85.9	91.8	76.7	75.2	66.3	71.5	86.4	98.5	79.9	87.3	72.2	82.0
Barlow	84.4	101.4	80.9	94.5	78.2	89.3	79.5	83.0	70.7	67.5	62.2	67.2	81.9	92.2	75.8	81.0	70.2	78.2
Breaker	89.8	103.7	86.6	97.4	79.0	90.3	80.3	84.8	69.2	70.3	61.8	67.0	85.0	94.2	77.9	83.9	70.4	78.7
Elgin-ND	89.6	102.6	86.2	96.9	81.9	90.1	82.4	86.3	70.7	68.5	61.4	65.4	86.0	94.5	78.4	82.7	71.6	77.8
Faller	103.1	117.1	97.1	106.9	89.8	99.3	86.3	90.3	73.1	71.0	64.1	68.6	94.7	103.7	85.1	88.9	77.0	84.0
Forefront	93.7	106.0	84.9	94.9	81.1	89.0	84.3	84.7	70.0	68.3	64.3	65.8	89.0	95.4	77.4	81.6	72.7	77.4
Glenn	83.2	99.5	77.0	90.7	72.0	83.3	78.5	85.4	66.5	66.9	58.2	64.1	80.8	92.5	71.8	78.8	65.1	73.7
HRS 3361	93.2	110.0	—	—	—	—	79.2	84.0	—	—	—	—	86.2	97.0	—	—	—	—
HRS 3378	83.4	103.2	—	—	—	—	74.7	81.6	—	—	—	—	79.0	92.4	—	—	—	—
HRS 3419	99.2	118.1	—	—	—	—	88.8	94.0	—	—	—	—	94.0	106.1	—	—	—	—
Jenna	91.4	102.2	85.6	95.6	83.2	91.2	84.0	85.4	70.8	68.7	65.2	67.5	87.7	93.8	78.2	82.1	74.2	79.4
Knudson	92.4	105.9	86.1	97.2	79.3	91.6	82.1	82.6	69.3	67.7	63.1	65.3	87.3	94.2	77.7	82.5	71.2	78.4
LCS Albany	100.7	111.0	95.7	105.7	89.7	98.0	92.7	87.1	78.7	72.1	72.1	70.4	96.7	99.0	87.2	88.9	80.9	84.2
LCS Breakaway	83.2	104.4	77.6	93.1	74.1	88.2	76.9	87.9	67.5	69.8	59.4	66.7	80.0	96.1	72.6	81.4	66.7	77.5
LCS Iguacu	99.6	111.9	92.8	102.5	—	—	82.4	88.5	72.2	71.1	—	—	91.0	100.2	82.5	86.8	—	—
LCS Powerplay	92.9	110.9	89.5	102.8	85.0	96.6	81.7	85.9	71.9	70.0	62.5	69.1	87.3	98.4	80.7	86.4	73.7	82.8
Linkert	90.5	103.7	83.1	92.9	77.0	86.1	73.1	78.6	63.7	63.3	56.5	61.6	81.8	91.1	73.4	78.1	66.8	73.9
Marshall	83.1	105.7	81.3	96.6	75.5	89.5	72.2	82.2	61.7	64.4	50.8	62.5	77.7	94.0	71.5	80.5	63.1	76.0
Norden	85.7	103.0	83.3	96.9	78.5	90.1	77.1	84.0	67.1	66.7	60.4	64.9	81.4	93.5	75.2	81.8	69.4	77.5
Prevail	92.2	103.1	85.3	94.9	79.5	89.3	84.8	82.7	73.7	67.6	65.3	65.0	88.5	92.9	79.5	81.2	72.4	77.2
Prosper	101.8	115.5	93.5	104.9	86.5	99.5	88.7	90.0	77.2	72.5	66.8	70.2	95.3	102.8	85.3	88.7	76.7	84.8
RB07	92.3	108.9	84.7	98.2	79.0	91.1	80.3	84.0	71.5	67.7	61.2	63.1	86.3	96.5	78.1	82.9	70.1	77.1
Rollag	89.3	103.8	80.6	93.8	78.0	87.8	76.2	79.7	64.9	62.2	56.4	59.5	82.8	91.7	72.7	78.0	67.2	73.7
Samson	90.6	104.0	84.1	94.4	79.3	89.4	72.5	86.1	65.6	71.4	59.6	69.0	81.6	95.0	74.9	82.9	69.4	79.2
SY Ingmar	90.7	103.0	—	—	—	—	84.5	88.7	—	—	—	—	87.6	95.8	—	—	—	—
SY Rowyn	96.0	106.9	85.6	96.0	—	—	89.7	91.9	77.1	71.7	—	—	92.8	99.4	81.4	83.8	—	—
SY Soren	94.4	107.2	85.3	95.3	80.6	92.4	86.0	86.3	70.2	68.7	62.7	65.4	90.2	96.7	77.7	82.0	71.6	78.9
Vantage	85.0	95.4	80.7	91.5	75.2	86.3	76.4	82.6	64.0	65.8	57.5	62.1	80.7	89.0	72.3	78.7	66.4	74.2
WB-Digger	90.8	107.9	85.5	101.1	81.1	96.0	72.6	84.3	68.9	69.1	60.5	67.9	81.7	96.1	77.2	85.1	70.8	81.9
WB-Mayville	87.2	105.1	80.4	94.6	75.9	90.9	68.4	80.6	60.0	65.4	56.4	61.5	77.8	92.8	70.2	80.0	66.1	76.2
WB9507	97.6	110.4	—	—	—	—	86.2	92.9	—	—	—	—	91.9	101.6	—	—	—	—
Mean (Bu/Acre)	91.4	106.3	85.2	97.3	79.9	91.2	80.9	85.7	69.7	68.6	61.4	65.9	86.2	96.0	77.5	82.9	70.7	78.5
LSD (0.10)	9.6	8.2	5.3	5.4	4.4	4.2	8.1	5.7	4.4	3.7	4.0	3.0	5.7	4.9	3.6	3.2	3.0	2.6
No. Environments	2	2	4	4	6	6	2	2	4	4	6	6	4	4	8	8	12	12