

Wheat, Hard Red Spring



Spring wheat varieties were sown in trial plots at Crookston, Lambertson, Morris, Roseau, St. Paul and Waseca and on-farm sites near Benson, Fergus Falls, Hallock, Kimball, Oklee, Perley, Stephen and Strathcona. 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 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. In 2013 leaf rust infections

throughout Minnesota were low, however Faller and Prosper were among the most susceptible cultivars. Carefully consider a variety's rating for leaf rust, and plan to use a fungicide if a variety is rated 5 or higher and disease levels warrant treatment. Varieties with ratings of 4 or better should not experience economic levels of damage in most years. Stripe

rust was a problem in some locations in 2012, but not 2013. We do not have adequate data to provide cultivar ratings for this disease, but most varieties are resistant or moderately resistant. 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. Stem rust ratings

Table 1. Origin and agronomic characteristics of hard red spring wheat varieties in Minnesota in single-year (2013) and multiple-year comparisons.

Entry	Origin ¹	PVP Status ²	Days to Heading ³	Height Inches ³	Straw Strength ⁴
Advance	2012 SDSU	PVP (pending)	56.4	28.2	6
Barlow	2009 NDSU	PVP (94)	54.5	31.0	6
Breaker	2008 WestBred	PVP (94)	56.8	30.9	4
Edge	2008 WestBred	PVP (94)	55.4	29.3	6
Elgin-ND	2013 NDSU	PVP (pending)	57.4	33.4	5
Faller	2007 NDSU	PVP (94)	56.7	31.4	5
Forefront	2012 SDSU	PVP (pending)	52.9	32.2	4
Glenn	2005 NDSU	PVP (94)	55.2	32.1	4
Jenna	2009 Syngenta	PVP (94)	58.5	29.5	4
Knudson	2001 Syngenta	PVP (94)	56.1	29.1	5
LCS Albany	2009 Limagrain Cereal Seeds	PVP (94)	60.1	29.9	5
LCS Breakaway	2012 Limagrain Cereal Seeds	PVP (pending)	54.5	26.7	4
LCS Iguacu	2013 Limagrain Cereal Seeds	PVP (pending)	58.6	29.8	—
LCS Powerplay	2012 Limagrain Cereal Seeds	PVP (pending)	55.8	29.9	6
Linkert	2013 MN	PVP (pending)	56.4	27.9	2
Marshall	1982 MN	None	59.8	30.3	4
Norden	2012 MN	PVP (pending)	56.6	29.7	3
Prosper	2011 NDSU	PVP (94)	56.6	31.0	5
RB07	2007 MN	PVP (94)	55.2	30.1	5
Rollag	2011 MN	PVP (94)	55.9	27.9	3
Rollag (1.3X) ⁵	2011 MN	PVP (94)	55.5	27.4	4
Samson	2007 WestBred	PVP (94)	55.2	27.5	3
Select	2011 SDSU	PVP (94)	53.2	29.8	5
SY-Rowyn	2013 Syngenta	PVP (pending)	54.9	28.6	—
SY-Soren	2011 Syngenta	PVP (94)	55.3	26.5	4
Vantage	2007 WestBred	PVP (94)	59.4	28.1	2
WB-Digger	2010 WestBred	PVP (94)	56.3	30.6	5
WB-Mayville	2011 WestBred	PVP (94)	54.7	26.3	3
Mean			56.2	29.5	

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

² PVP = plant variety protection. When the letters are followed by (94), seed of that variety may not be sold by a grower to anyone without express permission of the variety's developer/owner. If the PVP designation is followed by (pending) consider that the variety has PVP (94) protection.

³ 2013 data.

⁴ 1-9 scale in which 1 is the strongest straw and 9 is the weakest. Based on 2008-2013 data.

The rating of newer entries may change by as much as one rating point as more data are collected.

⁵ Rollag (1.3X) is a 30% higher seeding rate, approximately 1.56 vs. 1.20 million pure live seeds per acre.

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 varieties.

Bacterial leaf streak ratings of all varieties are presented in the disease table. This disease cannot be controlled with fungicides. Variety selection of more resistant varieties is the only recommend practice at this time if you have a history of problems with this disease. 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 is collected.

The “Other leaf diseases” rating represents a combined reaction to septoria and tan spot. Although va-

rieties 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.

Faller and Prosper were the leading varieties in Minnesota based on acres planted in 2013, each with 17.3% of state’s wheat acres. WB-Mayville was the 3rd most popular variety with 13.4%. The next four varieties, each with between 5-7% of the acres were Samson, SY-Soren, LCS Albany, and Rollag. The 2013 releases Elgin-ND (NDSU), Linkert (U of MN), LCS Iguacu (Limagrain Cereal Seeds) and

SY-Rowyn (Syngenta) were included and their data (multi-year for Elgin-ND and Linkert) is presented for the first time this year. Testing of Brennan, Brick, Briggs, Cromwell, and Velva was discontinued.

Fungicide Evaluations

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 performance of the entries when fungal diseases were controlled to the maximum extent possible. Grower’s decisions regarding fungicide applica-

Table 2. Grain quality of hard red spring wheat varieties in Minnesota in single-year (2013) and multiple-year comparisons.

Entry	Test Weight (Lb/Bu)		Protein (%) ¹		Baking Quality ²	Pre-Harvest Sprouting ³
	2013	2-Year	2013	2-Year		
Advance	61.3	61.4	13.3	13.7	—	4
Barlow	60.6	61.0	14.7	15.0	Medium-High	2
Breaker	61.5	61.7	13.9	14.5	Medium-High	4
Edge	59.1	59.4	14.2	14.7	—	2
Elgin-ND	59.9	59.8	14.3	14.7	—	2
Faller	60.4	60.2	13.5	14.0	Medium	2
Forefront	60.9	61.0	14.5	14.8	—	3
Glenn	61.8	62.1	14.5	15.1	High	1
Jenna	60.4	60.3	14.2	14.4	Medium	5
Knudson	60.0	60.3	13.7	14.0	Medium-High	2
LCS Albany	60.6	60.3	12.9	13.4	Low-Medium	4
LCS Breakaway	61.3	61.6	14.5	14.9	Medium	3
LCS Iguacu	61.3	—	12.8	—	—	—
LCS Powerplay	60.9	60.7	13.7	14.0	—	1
Linkert	60.4	60.5	15.1	15.4	High	1
Marshall	59.5	58.8	13.2	13.6	Low	2
Norden	62.0	61.8	13.9	14.3	Medium	1
Prosper	60.3	60.3	13.6	14.1	Medium	2
RB07	60.4	60.4	14.4	14.8	Medium-High	2
Rollag	61.0	60.9	14.9	15.1	Low-Medium	2
Rollag (1.3X) ⁴	61.1	61.2	14.8	15.1	Low-Medium	—
Samson	59.6	59.8	13.9	14.3	Medium	5
Select	60.8	61.4	14.1	14.5	Low-Medium	3
SY-Rowyn	60.5	—	13.6	—	—	—
SY-Soren	60.6	60.6	14.6	14.8	—	2
Vantage	61.6	61.5	15.1	15.5	Medium	2
WB-Digger	59.6	59.9	13.6	14.0	—	5
WB-Mayville	60.0	60.3	14.7	15.0	—	—
Mean	60.6	60.6	14.1	14.6		
No. Environments	10		10			

¹ 12% moisture basis.

² 2004-2011 crop years.

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

⁴ Rollag (1.3X) is a 30% higher seeding rate, approximately 1.56 vs. 1.20 million pure live seeds per acre.

Table 3. Disease reactions¹ of hard red spring wheat varieties in Minnesota in multiple-year comparisons (2009-2013).

Entry	Leaf Rust	Stem Rust ³	Bacterial Leaf Streak ⁴	Other Leaf Diseases ⁵	Scab
Advance	3	—	4	4	—
Barlow	4	1	5	4	4
Breaker	2	2	2	4	4
Edge	5	—	6	6	—
Elgin-ND	2	—	4	5	5
Faller	5 ²	1	4	4	4
Forefront	2	—	3	4	3
Glenn	3	1	4	4	3
Jenna	3	2	5	4	7
Knudson	2	3	4	3	6
LCS Albany	2	3	6	5	4
LCS Breakaway	4	1	4	5	5
LCS Iguacu	4	—	—	—	—
LCS Powerplay	5	—	6	5	5
Linkert	3	1	4	4	5
Marshall	8	1	5	7	7
Norden	2	1	4	4	5
Prosper	5 ²	1	4	4	5
RB07	2	2	6	6	4
Rollag ⁶	4	2	5	5	3
Samson	5	1	5	6	8
Select	3	4	6	7	4
SY-Rowyn	2	—	—	—	—
SY-Soren	3	—	4	4	4
Vantage	6	3	6	6	5
WB-Digger	3	—	5	5	7
WB-Mayville	3	—	6	7	7

¹ 1-9 scale where 1 = most resistant, 9 = most susceptible.

² Faller and Prosper are susceptible to leaf rust races that have increased since 2010. In 2013 leaf rust infections throughout Minnesota were low, however Faller and Prosper were among the most susceptible cultivars.

³ Stem rust levels have been very low in production fields in recent years, even on susceptible varieties.

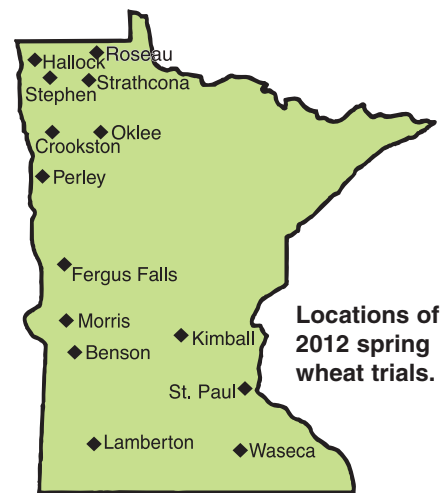
⁴ Bacterial leaf streak symptoms are highly variable from one environment to the next. The rating of newer entries may change by as much as one rating point as more data is collected.

⁵ Combined rating of tan spot and septoria.

⁶ Rollag (1.3X) is a 30% higher seeding rate, approximately 1.56 vs. 1.20 million pure live seeds per acre.

tions should be based on the available decision support systems, and only if and when disease levels are forecasted to reach economic damaging levels.

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 2013 and multi-year summaries. In the two northern locations the fungicide regime as applied in these trials increased grain yield on average by 7.9 bu/acre in 2013 and 9.1 bu/acre over the past three years. The two southern locations, Lamberton and Morris, both had slightly (but not statistically significant) lower yields, on average when fungicide protected. The reasons for this decrease are not clear, but the Lamberton location experienced moderate barley yellow dwarf virus damage and some varieties had some bacterial leaf streak damage, with no apparent fungal damage in the untreated plots.



Locations of 2012 spring wheat trials.

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

The Morris location had minimal disease and experienced hail about a week before harvest. Rather than the average increases in grain yield, the responses of individual varieties provide the most useful information; varieties rated susceptible to leaf rust and other fungal leaf diseases usually benefited most from fungicide applications.

Least Significant Difference (LSD)

LSD numbers beneath the table yield columns indicate whether the difference between yields is due to

genetics or to other factors, such as variations in environment. If yield difference between two entries equals or exceeds the LSD value the higher-yielding entry probably was superior in yield. A difference less than the LSD value probably is due to environmental factors.

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Table 4. Relative grain yield of hard red spring wheat varieties in northern Minnesota locations in single-year (2013) and multiple-year comparisons (2011-2013).

Entry	Crookston			Fergus Falls			Hallock			Oklee			Perley	Roseau			Stephen		
	2013	2-Year	3-Year	2013	2-Year	3-Year	2013	2-Year	3-Year	2013	2-Year	3-Year	2013	2013	2-Year	3-Year	2013	2-Year	3-Year
Advance	99	101	98	103	101	102	100	101	103	98	90	95	103	104	99	105	100	97	97
Barlow	94	98	99	89	95	96	97	96	97	98	96	98	96	106	105	99	105	101	102
Breaker	103	98	101	97	99	97	98	99	97	98	96	99	100	112	106	101	104	103	106
Edge	100	95	94	94	94	94	99	101	98	98	99	97	98	94	96	94	98	98	95
Elgin-ND	103	105	101	98	101	101	99	97	98	103	98	99	100	110	106	100	110	102	104
Faller	114	112	110	113	103	105	111	108	108	111	104	105	103	120	113	112	112	108	106
Forefront	102	109	107	100	105	106	91	93	96	105	105	101	99	91	93	95	98	99	103
Glenn	89	93	94	94	91	94	87	86	88	96	89	87	94	93	86	89	99	95	96
Jenna	101	105	102	111	109	108	101	102	100	104	103	104	104	104	109	106	96	102	100
Knudson	102	97	98	104	101	101	102	100	101	103	98	98	101	102	100	99	99	100	103
LCS Albany	110	107	104	126	121	119	113	113	116	110	117	118	97	124	121	112	109	110	112
LCS Breakaway	94	90	92	95	100	103	101	100	96	93	105	101	99	90	98	100	91	97	96
LCS Iguacu	108	—	—	116	—	—	104	—	—	103	—	—	112	113	—	—	98	—	—
LCS Powerplay	107	111	109	97	98	98	106	104	103	108	109	109	100	114	108	107	112	109	102
Linkert	99	94	96	90	95	96	101	101	99	94	96	96	98	94	96	97	94	92	96
Marshall	100	97	95	102	92	86	100	95	95	101	92	94	97	104	97	89	104	96	95
Norden	102	104	98	96	94	95	97	97	97	102	100	99	100	105	102	103	100	100	102
Prosper	108	101	103	110	103	105	108	108	109	113	110	111	109	110	112	107	119	112	113
RB07	100	101	100	97	96	95	106	102	100	98	99	96	100	98	99	95	98	98	98
Rollag	93	103	102	99	99	98	99	98	97	97	95	93	96	91	93	95	95	98	96
Rollag (1.3X) ¹	99	99	99	98	100	98	96	99	97	97	105	102	99	86	89	94	97	98	97
Samson	100	102	102	102	109	108	106	105	105	103	109	108	106	98	98	102	101	102	101
Select	97	96	97	97	104	103	95	97	96	103	100	100	98	89	101	100	95	97	95
SY-Rowyn	101	—	—	102	—	—	102	—	—	99	—	—	95	91	—	—	92	—	—
SY-Soren	99	98	99	97	101	100	95	99	96	101	106	104	102	96	103	104	94	100	95
Vantage	91	93	95	105	95	95	97	97	99	95	92	96	99	107	97	103	110	108	107
WB-Digger	107	106	106	102	104	103	105	106	107	108	110	108	107	97	100	101	106	104	100
WB-Mayville	99	96	98	91	102	100	100	99	100	99	100	99	90	88	94	97	91	94	96
Mean (Bu/Acre)	87.4	75.2	72.8	86.8	79.4	75.6	113.0	101.9	95.4	78.2	81.5	80.9	91.4	68.8	72.7	73.5	96.1	87.0	76.3
LSD (0.10)	6.1	11.1	8.3	4.1	12.5	9.5	3.8	5.3	5.5	4.6	8.8	6.9	5.6	8.9	11.8	11.6	6.3	10.2	9.8
CV	4.5	—	—	3.0	—	—	2.8	—	—	3.4	—	—	4.1	6.6	—	—	4.7	—	—

¹ Rollag (1.3X) is a 30% higher seeding rate, approximately 1.56 vs. 1.20 million pure live seeds per acre.

Table 5. Relative grain yield of hard red spring wheat varieties in southern Minnesota locations in single-year (2013) and multiple-year comparisons (2011-2013).

Entry	Benson		Kimball	Lamberton			Morris			St. Paul			Waseca	
	2013	2-Year	2013	2013	2-Year	3-Year	2013	2-Year	3-Year	2013	2-Year	3-Year	2013	2-Year
Advance	104	102	102	109	110	110	117	109	112	110	109	109	117	106
Barlow	99	97	100	95	102	103	107	105	106	106	105	105	87	91
Breaker	92	96	100	102	102	98	100	102	103	109	104	103	96	99
Edge	98	95	101	100	93	91	102	96	94	101	101	98	101	101
Elgin-ND	98	95	96	97	101	100	102	97	99	100	102	101	96	94
Faller	108	105	90	105	108	109	103	99	103	104	105	105	93	96
Forefront	104	106	105	103	104	107	96	106	108	104	103	102	116	111
Glenn	88	92	108	92	95	95	94	92	90	91	90	90	85	85
Jenna	109	107	98	109	110	107	99	107	108	102	110	111	105	117
Knudson	102	102	102	101	105	106	98	103	106	102	107	110	106	104
LCS Albany	111	112	101	126	124	120	112	117	114	113	120	123	130	131
LCS Breakaway	104	103	101	94	89	89	101	104	105	106	105	105	98	94
LCS Iguacu	111	—	99	113	—	—	107	—	—	115	—	—	122	—
LCS Powerplay	100	102	98	96	97	95	107	106	107	99	98	100	87	91
Linkert	92	94	101	96	97	96	94	91	92	93	100	101	90	100
Marshall	93	97	88	89	84	78	89	73	73	81	73	73	85	76
Norden	96	98	86	92	98	100	99	103	101	94	92	90	97	105
Prosper	103	109	103	98	105	102	113	111	109	111	112	110	111	106
RB07	99	101	91	92	100	96	108	100	101	92	99	98	92	89
Rollag	88	96	93	78	87	85	92	92	88	83	86	81	83	82
Rollag (1.3X) ¹	84	96	91	83	90	90	91	93	91	75	80	76	78	82
Samson	101	105	103	104	105	105	102	101	102	96	99	104	102	109
Select	100	94	104	99	101	107	104	107	109	93	92	95	97	96
SY-Rowyn	100	—	113	100	—	—	112	—	—	109	—	—	99	—
SY-Soren	98	101	99	101	102	104	94	97	97	96	104	100	94	100
Vantage	96	94	99	108	105	101	89	85	87	88	91	94	102	98
WB-Digger	110	113	104	101	106	102	113	105	104	105	107	104	102	111
WB-Mayville	105	106	107	95	102	101	89	94	95	98	106	103	95	102
Mean (Bu/Acre)	87.7	86.2	67.8	50.5	43.5	39.9	57.9	59.8	56.5	77.5	59.1	58.3	50.5	45.5
LSD (0.10)	8.9	9.6	9.9	7.6	12.6	10.6	6.6	13.6	10.2	8.4	11.7	9.8	5.9	16.1
CV	6.5	—	7.3	5.6	—	4.9	—	—	6.2	—	—	—	—	—

¹ Rollag (1.3X) is a 30% higher seeding rate, approximately 1.56 vs. 1.20 million pure live seeds per acre.

Table 6. Relative grain yield of hard red spring wheat varieties in Minnesota in single-year (2013) and multiple-year comparisons (2011-2013).

Entry	State			North			South		
	2013	2-Year	3-Year	2013	2-Year	3-Year	2013	2-Year	3-Year
Advance	104	101	102	102	98	100	108	105	106
Barlow	98	99	99	99	99	99	100	100	101
Breaker	102	101	100	102	99	100	102	101	101
Edge	98	98	96	98	98	96	100	97	96
Elgin-ND	101	100	99	105	101	100	98	98	98
Faller	108	104	105	113	105	106	102	103	103
Forefront	100	103	103	98	101	102	104	105	106
Glenn	92	91	92	93	90	92	91	90	91
Jenna	104	108	106	104	106	104	106	110	109
Knudson	102	101	102	103	99	100	103	104	105
LCS Albany	113	115	114	113	113	113	115	120	118
LCS Breakaway	97	100	99	96	99	99	101	101	101
LCS Iguacu	109	—	—	109	—	—	112	—	—
LCS Powerplay	103	103	102	107	104	103	99	99	100
Linkert	95	96	97	97	96	97	94	97	97
Marshall	96	90	89	102	94	93	87	82	81
Norden	98	99	98	101	100	99	94	98	97
Prosper	109	106	107	112	106	107	107	107	107
RB07	99	99	97	102	100	98	96	98	97
Rollag	92	95	94	97	98	97	86	91	88
Rollag (1.3X) ¹	91	96	95	97	99	98	83	91	90
Samson	102	106	106	104	105	106	100	106	106
Select	97	98	99	97	99	98	99	96	99
SY-Rowyn	101	—	—	98	—	—	107	—	—
SY-Soren	97	102	101	100	103	101	97	101	101
Vantage	100	96	97	103	98	98	98	94	94
WB-Digger	105	106	105	106	105	104	106	108	107
WB-Mayville	96	100	99	95	98	98	99	103	101
Mean (Bu/Acre)	78.4	71.9	69.8	89.5	81.8	78.8	65.1	59.2	56.9
LSD (0.10)	3.4	3.0	2.7	3.7	3.6	3.2	5.4	5.0	4.5
No. Environments	13	26	36	7	14	21	6	12	15

¹ Rollag (1.3X) is a 30% higher seeding rate, approximately 1.56 vs. 1.20 million pure live seeds per acre.

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

Entry	North						South						State					
	2013		2-Year		3-Year		2013		2-Year		3-Year		2013		2-Year		3-Year	
	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int
Advance	79.2	92.3	73.7	85.1	74.4	84.2	61.4	58.7	56.5	61.3	53.5	55.6	70.3	74.0	65.1	72.7	64.0	69.5
Barlow	77.6	86.4	75.1	82.6	72.7	80.7	55.0	52.0	53.6	59.3	50.4	53.6	66.3	67.6	64.3	70.4	61.5	66.7
Breaker	83.4	90.1	75.8	82.8	74.0	82.6	54.9	55.9	52.5	58.1	48.6	51.2	69.1	71.4	63.7	69.9	60.5	66.5
Edge	76.1	83.0	70.8	78.5	68.9	77.2	54.6	52.7	48.8	55.4	44.7	51.2	65.4	64.8	59.8	65.9	56.8	63.4
Elgin-ND	84.2	90.7	78.3	83.4	73.8	80.5	53.8	50.6	50.8	54.9	47.8	49.8	67.6	68.8	64.0	68.5	60.4	64.7
Faller	91.2	96.0	83.2	89.8	81.2	90.3	56.3	51.6	53.0	57.8	50.7	54.1	73.7	71.8	68.1	73.1	66.0	71.7
Forefront	76.0	81.1	74.8	79.3	74.1	79.3	53.8	51.9	54.3	56.3	51.9	51.5	64.9	65.2	64.5	67.3	63.0	65.0
Glenn	70.9	80.1	66.4	74.0	67.2	73.3	50.5	48.4	48.1	53.5	44.4	49.6	60.7	62.8	57.3	63.3	55.8	61.1
Jenna	79.9	88.0	79.1	85.4	75.9	84.7	56.4	51.9	55.9	58.6	51.8	54.2	68.1	68.3	67.5	71.4	63.9	69.0
Knudson	79.7	87.1	72.8	83.7	72.0	83.0	53.8	52.9	53.6	56.6	51.0	50.6	66.7	68.4	63.2	69.6	61.5	66.3
LCS Albany	90.8	101.1	84.2	91.2	78.8	88.3	64.1	57.2	61.8	62.0	56.4	57.4	77.4	77.1	73.0	76.0	67.6	72.4
LCS Breakaway	72.0	80.0	69.6	79.5	70.3	81.6	52.8	52.0	50.6	56.7	47.4	51.2	62.4	66.0	60.1	68.1	58.9	66.4
LCS Iguacu	86.0	92.1	—	—	—	—	59.5	53.6	—	—	—	—	72.8	71.1	—	—	—	—
LCS Powerplay	86.0	94.2	81.0	89.1	78.8	88.2	55.4	54.1	52.8	60.7	49.1	54.9	70.7	72.3	66.9	74.3	63.9	71.1
Linkert	75.7	78.6	70.3	75.3	70.6	77.1	51.3	48.1	48.2	53.1	45.0	48.4	63.5	60.3	59.2	63.2	57.8	61.9
Marshall	79.4	86.7	71.6	80.8	67.4	79.0	48.2	46.6	40.1	52.7	36.3	47.6	63.8	64.9	55.9	66.2	51.9	62.8
Norden	80.9	89.5	76.1	82.7	73.9	81.4	51.6	49.4	52.0	55.4	48.5	49.5	66.2	67.6	63.5	68.4	60.8	65.0
Prosper	85.2	93.5	78.9	91.2	76.8	90.5	57.6	55.2	55.8	60.8	51.3	55.8	71.4	74.4	67.4	76.0	63.7	73.2
RB07	79.2	86.0	74.1	81.4	71.4	79.6	54.6	51.4	51.7	52.6	47.3	47.5	65.8	67.1	61.9	66.4	59.0	63.1
Rollag	71.9	82.4	72.3	79.2	71.8	80.1	46.4	44.7	46.5	49.4	41.8	45.9	59.1	61.8	58.9	63.7	55.9	62.5
Rollag (1.3X) ¹	72.9	81.4	69.6	78.6	70.6	80.4	47.3	47.5	47.4	53.5	43.9	48.5	60.1	61.1	58.5	64.9	57.2	63.5
Samson	77.6	84.1	73.7	81.8	74.6	83.5	55.6	56.7	53.1	60.4	49.8	54.9	66.6	69.1	63.4	70.6	62.2	68.8
Select	72.8	80.5	72.7	81.0	72.1	80.1	55.2	51.1	54.0	56.6	52.1	51.2	64.0	64.5	63.4	68.3	62.1	65.2
SY-Rowyn	75.2	83.1	—	—	—	—	57.5	50.4	—	—	—	—	66.4	66.8	—	—	—	—
SY-Soren	78.2	81.7	74.3	84.7	74.0	83.9	52.6	51.1	51.0	54.9	47.9	49.7	64.2	65.0	62.2	69.2	60.9	66.3
Vantage	76.4	88.0	70.3	81.8	72.3	83.5	53.0	49.1	48.1	51.8	44.9	47.7	64.7	66.8	59.2	66.2	58.2	65.1
WB-Digger	80.2	94.4	76.3	89.5	75.7	87.7	58.0	54.0	54.5	59.6	49.6	53.4	69.1	70.1	65.4	73.2	62.7	69.5
WB-Mayville	73.6	81.4	70.2	83.0	71.4	84.4	49.8	50.2	50.3	52.0	46.9	47.4	61.7	64.4	60.3	66.8	59.1	65.3
Mean (Bu/Acre)	78.4	86.3	74.0	82.6	73.2	82.3	54.2	51.5	51.6	56.0	48.2	51.2	66.2	67.4	62.7	68.7	60.5	66.3
LSD (0.10)	7.6	7.3	7.9	6.9	6.8	5.3	11.8	11.3	9.3	7.1	7.6	6.3	4.8	6.8	6.1	5.1	5.2	4.3
No. Environments	2	2	4	4	6	6	2	2	4	4	6	6	4	4	8	8	12	12

¹ Rollag (1.3X) is a 30% higher seeding rate, approximately 1.56 vs. 1.20 million pure live seeds per acre.