

## **Preliminary Report 24**

### **2007 Spring Wheat and Barley Variety Performance in Minnesota Preliminary Report**

#### **Preface**

Jochum Wiersma

Worries about the drought extending into the 2007 growing season preoccupied many producers throughout the fall and winter. Adequate snowfall and some timely rains early in the spring alleviated those worries. By the second week of April, topsoil moisture was rated adequate for most of Minnesota; likewise, subsoil moisture was rated adequate for all but the northeastern 1/3 of the State.

Temperatures in the first half of April were unseasonably cool. The cold snap just prior to Easter that affected winter wheat throughout the Great Plains also damaged Minnesota's winter wheat crop as it broke dormancy. The average temperatures rebounded very slowly with the average temperature in the second week of April being 7°F lower at 34°F.

Field work did not start in earnest until the fourth week of April. By April 22<sup>nd</sup>, only 4% of spring wheat, barley, or oats had been planted. Planting picked up pace with 20% of wheat planted by the end of April as temperatures increased from well below average to well above average. This was well behind the last year's mark of 90% completed by the end April. Warm weather and favorable conditions continued in the first half of May and by May 14<sup>th</sup>, spring wheat, barley and oats planting passed the 90% mark, jumping ahead of the 5-year average by 20%.

Crop development also benefited from the warm weather with emergence being equal to or slightly ahead of 2006 as well as the 5-year average. The rapid crop development continued during the second half of May. Timely rains at the end of May and beginning of June relieved concerns about adequate soil moisture in many parts of the State. Unfortunately, the southern half of the Red River Valley received excess precipitation that led to temporary flooding and ultimately drowned out fields.

The warmer than normal weather continued for much of the month of June pushing crop development well ahead of 2006 and the 5-year average. On June 24, USDA reported that 93% of the spring wheat crop had jointed compared to 87% in 2006 and 72% for the 5-year average. Nearly half the spring wheat was heading compared to just over 30% for the 5-year average. USDA estimated that the pace of heading was about 7 days ahead of the average.

Despite rapid development and above normal temperatures, USDA forecast Minnesota's hard red spring wheat yield to average 48 bushels per acre on July 1. In the September Small Grain Summary, Minnesota's spring wheat yield was adjusted down to an average of 47 bushels per acre, the same as in 2006. Variability within Minnesota, however, was much greater than in previous years with the southern Red River Valley reporting average yields well below the State's average.

The overall quality of the crop was excellent with little to no concerns about contamination with DON, the mycotoxin associated with Fusarium head blight. Disease problems, in general, were minimal. The notable exception was leaf rust. Leaf rust appeared in early June and caused significant damages when left untreated in winter and spring wheat varieties that were rated susceptible to leaf rust. A cause for concern is that varieties previously rated as resistant showed significantly higher levels of leaf rust infections. This indicates that some of the commonly used leaf rust resistance genes no longer may prove to be effective.

Despite market pressure last fall and winter that favored corn, wheat acreage remained stable at 1.75 million acres planted and 1.65 million acres harvested. Winter wheat acreage jumped another 50% to 60,000 acres statewide. The average winter wheat yield declined 12 bushels per acre to 48 bushels per acres. Barley acreage rebounded some 20%, from the historical low of 90,000 acres largely due to more favorable contract prices and drought concerns. Oats acreage declined with 60,000 acres to 180,000 acres.

It should be noted that during harvest and immediately following harvest, world and US grain markets reached historical highs. Strong export demands, a weak dollar, and a tightening of world stocks created a perfect storm that pushed prices as high as \$ 9.60 a bushel on the Chicago Board of Trade in the final days of September. Unlike some previous market runs, many farmers were able to catch this 'train' with grain to sell.

## **Introduction**

Successful small grain production begins with selecting the best varieties for a particular farm or field. For that reason, varieties are compared in trial plots on the Minnesota Agricultural Experiment Station (MAES) sites at St. Paul, Rosemount, Waseca, Lamberton, Morris, and Crookston. In addition to the six MAES locations, trials are also planted with a number of farmer cooperators. These plots are handled such that the factors affecting yield and performance are as identical for all entries at each location as is possible.

The MAES 2006 Wheat, Barley and Oat Variety Performance in Minnesota Preliminary Report is presented under authority granted by the Hatch Act of 1887 to the Minnesota Agricultural Experiment Station to conduct performance trials on farm crops and interpret data to the public.

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## **Variety Classifications**

Varieties are listed in the tables by heading date from earliest to latest. No other distinction or classification is used to group varieties. Seed of tested varieties can be eligible for certification, and use of certified seed is encouraged. However, certification does not imply a recommendation. Registered and certified seed is available from seed dealers or from growers listed in the Minnesota Crop Improvement Association 2008 Directory, available at through the Minnesota Crop Improvement Association office in St. Paul or online at <http://www.mncia.org/publications.html>.

## **Interpretation of the Data**

The presented data are the preliminary variety trial information for single (2007) and multiple year (2005-2007) comparisons in Minnesota. The yields are reported as a percentage of the location mean, with overall mean (bu/A) listed below. Two-year and especially one-year data are less reliable and should be interpreted with caution. Similarly, averages across multiple environments, whether they are different years and/or locations, provide a more reliable estimate of mean performance. The least significant difference or LSD is a statistical method to determine whether the observed yield differences between two varieties are due to true, genetic differences between the varieties or to interactions with other variables such as a difference in soil fertility or experimental error. If the difference in yield between two varieties equals or exceeds the LSD value, the higher yielding one was indeed superior in yield. If the difference is less, the yield difference may have been due to chance rather than genetic differences, and we are unable to distinguish between the two varieties. The 5% unit indicates that with 95% confidence, the observed difference is indeed a true difference in performance. Lowering this confidence level will allow more varieties to appear different from each other, but also increases the chances that false conclusions are drawn.

## **The Authors and Contributors**

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## **SPRING WHEAT**

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The results of the state yield trials are summarized in Tables 1 through 6. The average yield across the southern testing locations (St. Paul, Waseca, Lamberton and Morris) was 57 bu/A in 2007. This compares to an average of 77 bu/A in 2006 and a three-year average of 55 bu/A. The northern locations (Crookston, Stephen and Roseau) averaged 65 bu/A in 2007 compared to 76 bu/A last year and a three-year average of 70 bu/A.

Tables 2, 3, and 4 present the relative grain yield of tested varieties in 1, 2, and 3-year comparisons. 'Faller', the 2007 release from NDSU, was the top yielding cultivar in both the northern and southern testing locations in 2007. In the 2-year comparisons Traverse and Faller share the high mark for grain yield. Based on 3 years of trial comparisons, 'Briggs', 'Granger', 'Howard', 'Knudson', 'RB07', and 'Steele-ND' continue to do well across the State.

The varietal characteristics are presented in Tables 1, 5, and 6. Losses and damages due to Fusarium head blight (FHB) were minimal in 2007. Yield losses due to leaf rust, however, were significant. Vigilance toward FHB remains paramount while closer attention should be given to the leaf rust resistance ratings. Varieties that are rated 4 or better for FHB are considered the best hedge against the diseases. The continuous change in leaf rust virulence resulted in a breakdown of some of our more common leaf rust resistance genes. Briggs, Glenn, Steele-ND, and Faller maintained a 1 rating for leaf rust. Carefully consider a variety's rating to leaf and stripe rust, and plan to use a fungicide if a variety is rated 5 or higher to either leaf rust or stripe rust and disease levels warrant treatment. Varieties rated 4 or better should not experience economic levels of damage to either of these two fungi in most years. The foliar disease rating

represents the total complex of leaf diseases other than the rusts, and 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. Exceptions are 'Ada', 'Hat Trick', and 'Trooper' which are rated susceptible to powdery mildew, and 'Granite' which is rated susceptible to bacterial leaf blight. Therefore, the rating should be used as a general indication and only for varietal selection in areas where these diseases historically have been a problem or if the previous crop is wheat or barley. Control of leaf diseases with fungicides may be warranted, even for those varieties with an above average rating. Fungicides, however, have no activity against bacterial leaf blight

Leading varieties in Minnesota, based on acres planted in 2007, include Freyr, Oklee, and Knudson, each with around 14% of the acres. Glenn, Briggs, and Alsen form the second tier of varieties with around 8% of the acres each. The flood of new release continues with six new entries in the state variety trials. Tested for the first time this year were 'Blade', 'Cromwell', 'Kuntz', 'Hot Shot', 'Norwell', 'Sampson', and 'Vantage'.

Variety selection for 2007 continues to be a balance between yield potential, disease responses, and grain quality. Freyr and Glenn are proven varieties that provide the best available genetic resistance to FHB and should be considered as hedges against this disease. Faller, Briggs, Traverse, and RB07 impress as high yielding HRSW across the state. Steele-ND, Howard, and Ulen are balanced varieties that combine yield potential with grain protein content.

## **BARLEY**

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Yield averages for barley in Minnesota were 56 bu/A compared to 60 bu/A in 2007 resulting in production of about 6.2 million bushels. Robust had the highest acreage planted at 45.5 percent followed by Lacey (36.5%), Tradition (5.8%), and Stellar-ND (4.3%). Growing conditions were generally dry across the five test locations for barley variety trials in Minnesota. Precipitation early in the season and the lack of precipitation later in the season resulted in the nearly complete absence of disease. The highest yields were in Stephen and the lowest in Roseau (Table 7). FHB was essentially absent presumably due to unfavorable conditions for disease development.

The yield data in Table 7 were collected from the yield trials that contained the important varieties for the region planted in five locations in the state. Tradition, Legacy, Stander, and Lacey were the highest yielding varieties based on three year state averages (Table 7). Drummond is the most lodging resistant of the group (Table 8). The two-rowed variety Conlon had the plumpest grain while Legacy was a little thinner than the other varieties. All of the more recent varieties (Lacey, Drummond, Legacy, Tradition, and Stellar-ND) are shorter than Robust.

Table 9 describes the reaction of the currently grown varieties to the five major diseases in the region. Disease reaction is based on at least three years of data and scored from 1–9 where 1 is most resistant and 9 is most susceptible. While there are some small differences among the varieties for resistance to some of these diseases, these differences are small and should not be the primary basis for selection among the different varieties.

**Table 1.** Origin and agronomic characteristics of Hard Red Spring Wheat varieties in Minnesota in single year (2007) and multiple year comparisons (2005-2007).

<i>Variety</i>	<i>Agent/Origin</i> <sup>1</sup>	<i>Year of Release</i>	<i>Days to Heading</i> <sup>2</sup> - days -	<i>Plant Height</i> <sup>2</sup> - inches -	<i>Straw Strength</i> <sup>3</sup>
Rush	WestBred	2006	53	29	v. strong
Ulen	MN	2005	53	32	medium
Kelby	AgriPro	2006	53	28	strong
Briggs	SDSU	2002	53	32	medium
Trooper	WestBred	2004	53	29	v. strong
Samson	WestBred	2007	53	29	–
Traverse	SDSU	2006	54	34	medium
Banton	Trigen	2004	54	32	strong
Glenn	NDSU	2005	54	34	strong
Oklee	MN	2003	54	31	medium
Granger	SDSU	2004	54	35	medium
Oxen	SDSU	1996	54	31	m. strong
Norwell	Thunder Seed	2006	54	34	–
Steele-ND	NDSU	2004	55	33	medium
Freyr	AgriPro	2004	55	32	medium
Howard	NDSU	2006	55	32	medium
Kuntz	AgriPro	2007	55	29	–
Alsen	NDSU	2000	55	32	strong
Knudson	AgriPro	2001	55	30	m. strong
FBC-Dylan	NPSAS/FBC	2006	55	31	medium
Ada	MN	2006	55	31	m. strong
Blade	WestBred	2007	55	31	–
RB07	MN	2007	55	30	m. strong
Bigg Red	WestBred	2004	55	34	medium
Faller	NDSU	2007	56	32	m. strong
Hat Trick	Trigen	2006	56	30	strong
Cromwell	Thunder Seed	2007	57	31	–
Granite	WestBred	2002	57	29	v. strong
Fireball	N. Star G.	2006	57	29	strong
Marshall	MN	1982	58	30	strong
Vantage	WestBred	2007	58	29	v. strong
Hot Shot	N. Star G.	2007	58	30	–
Polaris	N. Star G.	2003	61	31	v. strong
Bakker Gold	N. Star G.	2006	61	31	v. strong
<b>Mean</b>			55.4	31.1	

<sup>1</sup> Abbreviations: MN = Minnesota Agricultural Expt. Stn.; NPSAS/FBC = Northern Plains Sustainable Agriculture Society/Farmer Breeder Club; N. Star G. = North Star Genetics; NDSU = North Dakota State University Research Foundation; SDSU = South Dakota Agricultural Expt. Stn.; Trigen = Trigen Seed Services LLC.

<sup>2</sup> 2007 data.

<sup>3</sup> 2005-2007 data.

**Table 2.** Relative grain yield of Hard Red Spring Wheat varieties in southern locations in Minnesota in single year (2007) and multiple year comparisons (2005-2007).

Variety	Lamberton			Morris			St. Paul			Waseca		
	1 yr.	2 yr.	3 yr.	1 yr.	2 yr.	3 yr.	1 yr.	2 yr.	3 yr.	1 yr.	2 yr.	3 yr.
	----- % of mean -----											
Rush	92	90	–	93	88	–	96	93	–	95	89	–
Ulen	101	100	105	97	103	102	105	107	109	108	113	119
Kelby	102	94	–	94	84	–	134	117	–	116	106	–
Briggs	123	115	116	107	108	111	111	105	105	101	102	104
Trooper	71	73	73	105	106	108	83	99	100	74	82	81
Samson	108	–	–	106	–	–	103	–	–	108	–	–
Traverse	116	122	135	114	115	120	100	105	103	121	117	122
Banton	91	88	96	97	90	96	116	107	105	95	93	96
Glenn	104	96	94	86	82	84	101	93	103	102	94	102
Oklee	88	91	100	94	95	97	112	103	100	118	109	114
Granger	120	116	118	112	105	105	99	97	97	124	116	129
Oxen	87	89	85	96	106	96	116	113	99	85	95	97
Norwell	92	–	–	95	–	–	109	–	–	100	–	–
Steele-ND	113	109	115	106	111	107	113	105	114	119	108	114
Freyr	101	102	109	103	109	109	111	106	100	95	98	99
Howard	111	109	112	98	107	106	116	109	112	121	109	117
Kuntz	103	–	–	107	–	–	100	–	–	98	–	–
Alsen	90	93	90	91	89	94	93	92	95	95	99	97
Knudson	126	117	108	112	109	110	87	94	105	99	101	101
FBC-Dylan	82	87	–	94	105	–	101	98	–	85	91	–
Ada	106	108	111	105	99	101	80	92	87	61	79	89
Blade	109	–	–	102	–	–	104	–	–	104	–	–
RB07	107	108	114	88	100	95	111	106	101	98	97	103
Bigg Red	93	97	–	99	99	–	101	98	–	105	101	–
Faller	133	123	–	120	115	–	107	109	–	119	111	–
Hat Trick	112	103	–	101	105	–	81	87	–	115	107	–
Cromwell	86	–	–	97	–	–	98	–	–	89	–	–
Granite	103	104	109	97	91	94	103	99	97	107	107	101
Fireball	88	89	–	90	97	–	95	92	–	89	91	–
Marshall	64	71	60	69	83	71	72	87	73	47	72	58
Vantage	98	–	–	97	–	–	80	–	–	89	–	–
Hot Shot	73	–	–	82	–	–	77	–	–	68	–	–
Polaris	86	97	84	89	105	99	59	76	83	66	89	83
Bakker Gold	79	93	–	91	95	–	58	77	–	70	88	–
<b>Mean (Bu/A)</b>	76.7	46.7	42.2	70.8	68.9	58.6	59.9	75.9	66.8	52.0	59.8	52.5
<b>LSD (0.05)</b>	17.5	16.8	19.3	10.7	17.3	16.1	18.4	19.3	23.7	21.0	24.2	22.6

**Table 3.** Relative grain yield of Hard Red Spring Wheat varieties in northern locations in Minnesota in single year (2007) and multiple year comparisons (2005-2007).

Variety	<i>Crookston</i>			<i>Roseau</i> <sup>1</sup>		<i>Stephen</i>			<i>On-Farm</i>		
	<i>1 yr.</i>	<i>2 yr.</i>	<i>3 yr.</i>	<i>1 yr.</i>	<i>2 yr.</i>	<i>1 yr.</i>	<i>2 yr.</i>	<i>3 yr.</i>	<i>1 yr.</i>	<i>2 yr.</i>	<i>3 yr.</i>
----- % of mean-----											
Rush	90	88	–	108	94	93	97	–	97	94	-
Ulen	97	98	98	105	107	98	102	97	103	101	101
Kelby	101	102	–	120	102	97	93	–	94	98	-
Briggs	103	110	105	127	114	102	104	100	104	109	105
Trooper	92	99	98	100	89	105	94	97	92	98	97
Samson	114	–	–	109	–	117	–	–	113		-
Traverse	111	111	116	119	117	112	115	112	119	118	-
Banton	97	97	97	104	101	94	95	97	94	101	97
Glenn	100	96	98	98	105	90	94	99	102	102	101
Oklee	96	96	100	103	96	94	95	96	98	101	100
Granger	95	94	102	105	105	91	97	103	100	107	105
Oxen	97	102	101	79	92	97	103	104	95	96	94
Norwell	97	–	–	84	–	93	–	–	90	-	-
Steele-ND	101	103	102	106	109	96	102	99	111	108	105
Freyr	109	103	106	103	101	101	99	106	108	103	103
Howard	100	105	106	107	109	110	107	105	-	-	-
Kuntz	113	–	–	95	–	99	–	–	112	-	-
Alsen	89	92	94	80	93	90	93	92	93	95	94
Knudson	109	108	111	109	106	112	109	110	113	109	107
FBC-Dylan	93	95	–	87	96	91	95	–	95	-	-
Ada	95	96	100	103	100	97	92	95	101	99	98
Blade	101	–	–	106	–	107	–	–	107	-	-
RB07	110	109	110	86	90	106	113	110	109	109	109
Bigg Red	93	94	–	73	88	93	92	–	86	95	-
Faller	131	118	–	127	120	126	114	–	118	-	-
Hat Trick	93	87	–	89	89	117	98	–	106	103	-
Cromwell	101	–	–	118	–	98	–	–	107	-	-
Granite	96	99	102	94	92	108	97	99	92	94	89
Fireball	98	94	–	85	96	88	92	–	93	94	-
Marshall	72	85	87	73	83	83	82	80	63	74	-
Vantage	102	–	–	91	–	104	–	–	95	-	-
Hot Shot	83	–	–	73	–	92	–	–	84	-	-
Polaris	85	88	100	90	98	93	98	111	92	92	94
Bakker Gold	89	88	–	93	101	104	101	–	97	94	-
<b>Mean (Bu/A)</b>	<b>76.7</b>	<b>76.3</b>	<b>71.8</b>	<b>49.1</b>	<b>63.9</b>	<b>69.0</b>	<b>69.5</b>	<b>72.8</b>	<b>77.7</b>	<b>69.4</b>	<b>68.8</b>
<b>LSD (0.05)</b>	<b>11.2</b>	<b>14.4</b>	<b>13.5</b>	<b>12.5</b>	<b>21.5</b>	<b>12.6</b>	<b>17.0</b>	<b>19.0</b>	<b>9.9</b>	<b>14.3</b>	<b>13.1</b>

<sup>1</sup> Roseau was abandoned in 2005 due to flooding.

**Table 4.** Relative grain yield of Hard Red Spring Wheat varieties in Minnesota in single year (2007) and multiple year comparisons (2005-2007).

Variety	State			North			South		
	1 yr.	2 yr.	3 yr.	1 yr.	2 yr.	3 yr.	1 yr.	2 yr.	3 yr.
No. Environments	7	14	20	3	6	8	4	8	12
	----- % of mean-----								
Rush	95	91	–	97	93	–	94	90	–
Ulen	102	104	105	100	102	97	103	106	109
Kelby	109	100	–	106	99	–	111	100	–
Briggs	110	108	107	110	109	103	110	107	109
Trooper	90	92	93	99	94	97	83	90	90
Samson	109	–	–	114	–	–	106	–	–
Traverse	113	115	118	114	114	114	113	115	120
Banton	99	96	98	98	98	97	100	95	98
Glenn	97	94	97	96	98	99	98	91	96
Oklee	101	98	101	98	96	98	103	99	103
Granger	107	104	109	97	99	103	114	109	112
Oxen	94	100	97	91	99	103	96	101	94
Norwell	96	–	–	91	–	–	99	–	–
Steele-ND	108	107	108	101	105	101	113	108	112
Freyr	103	103	105	104	101	106	103	104	104
Howard	109	108	110	105	107	105	111	109	112
Kuntz	102	–	–	102	–	–	102	–	–
Alsen	90	93	94	86	93	93	92	93	94
Knudson	108	106	107	110	108	110	106	105	106
FBC-Dylan	90	95	–	90	95	–	91	95	–
Ada	92	95	97	98	96	97	88	94	97
Blade	105	–	–	105	–	–	105	–	–
RB07	101	103	106	101	104	110	101	103	103
Bigg Red	94	96	–	86	91	–	99	99	–
Faller	123	116	–	128	117	–	120	115	–
Hat Trick	101	97	–	100	92	–	102	101	–
Cromwell	98	–	–	106	–	–	93	–	–
Granite	101	98	100	99	96	101	103	100	100
Fireball	90	93	–	90	94	–	90	92	–
Marshall	68	80	71	76	83	83	63	78	65
Vantage	94	–	–	99	–	–	91	–	–
Hot Shot	78	–	–	83	–	–	75	–	–
Polaris	81	93	93	89	95	106	75	92	87
Bakker Gold	84	92	–	95	97	–	75	88	–
<b>Mean (Bu/A)</b>	60.3	65.8	64.0	65.0	70.0	70.0	56.8	65.8	55.0
<b>LSD (0.05)</b>	9.6	6.6	6.1	12.2	8.8	9.3	13.9	9.2	10.0

**Table 5.** Grain quality characteristics of Hard Red Spring Wheat varieties in Minnesota in single year (2007) and multiple year comparisons (2005-2007).

Variety	Test Weight		Protein <sup>1</sup>		Baking Quality <sup>2</sup>	Pre-Harvest Sprouting <sup>3</sup>
	1 yr.	2 yr.	1 yr.	2 yr.		
	---- lbs/bu ----		---- % ----			
Rush	61.6	61.5	14.7	14.7	med.-high	2
Ulen	60.0	60.5	14.8	14.7	med.	5
Kelby	61.1	61.0	14.9	14.8	med.	2
Briggs	61.3	61.4	15.0	14.6	med.	2
Trooper	61.6	61.7	13.8	13.9	med.-high	2
Samson	59.6	–	13.9	–	–	3 <sup>4</sup>
Traverse	58.1	58.6	13.8	13.6	low	4
Banton	62.2	62.3	14.7	14.6	high-med.	3
Glenn	63.2	63.4	15.7	15.2	high	1
Oklee	60.8	61.0	14.8	14.8	low-med.	3
Granger	60.8	61.0	14.5	14.5	med.	4
Oxen	57.8	59.1	14.3	14.3	high-med.	2
Norwell	60.6	–	14.2	–	–	1 <sup>4</sup>
Steele-ND	61.4	61.7	15.3	14.9	high	2
Freyr	60.0	60.5	14.4	14.3	med.	1
Howard	61.5	61.7	15.0	14.8	med.-high	1
Kuntz	60.2	–	14.0	–	–	2 <sup>4</sup>
Alsen	60.8	61.2	15.2	14.9	high	2
Knudson	60.8	60.9	14.1	14.0	med.-high	3
FBC-Dylan	59.9	60.6	14.1	14.1	med.-low	3
Ada	61.4	61.7	14.3	14.3	med.-high	2
Blade	62.6	–	14.9	–	–	5 <sup>4</sup>
RB07	60.4	60.6	15.2	14.9	med.-high	2
Bigg Red	61.9	62.1	13.4	13.4	med.-low	4
Faller	60.9	60.7	14.3	14.0	med.	2
Hat Trick	61.2	61.5	14.1	14.1	med.-low	4
Cromwell	61.6	–	14.8	–	–	3 <sup>4</sup>
Granite	62.0	62.1	15.3	15.2	med.-low	2 <sup>5</sup>
Fireball	58.2	58.8	15.8	15.5	med.	5
Marshall	57.3	58.7	13.5	13.4	low	2
Vantage	61.8	–	15.3	–	–	2 <sup>4</sup>
Hot Shot	58.6	–	12.9	–	–	1 <sup>4</sup>
Polaris	58.4	59.1	13.3	13.3	med.	1
Bakker Gold	58.5	59.2	13.4	13.4	low	1
<b>Mean</b>	60.5	60.8	14.4	14.4		

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

<sup>2</sup> 2001-2006 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.

<sup>4</sup> These ratings are based on one years' data (2007). The rating may change by as much as 1 after additional data is collected.

<sup>5</sup> This variety's Falling Numbers are typically 25-50 seconds (on a scale to 400) less than other varieties.

**Table 6.** Disease reactions<sup>1</sup> of Hard Red Spring Wheat varieties in Minnesota in multiple year comparisons (2005-2007).

<i>Variety</i>	<i>Leaf Rust</i>	<i>Stripe Rust</i>	<i>Stem Rust</i> <sup>2</sup>	<i>Other Leaf Diseases</i> <sup>3</sup>	<i>Scab</i>
Rush	5	–	4	5	–
Ulen	4	1	1	6	6
Kelby	3	–	1	4	–
Briggs	1	1	2	4	5
Trooper	6	7	1	8 <sup>4</sup>	6
Samson	5	–	–	–	–
Traverse	5	–	2	5	–
Banton	3	1	1	5	5
Glenn	1	1	1	4	3
Oklee	5	1	1	5	5
Granger	3	1	1	4	5
Oxen	7	1	3	7	8
Norwell	7	–	–	7	–
Steele-ND	1	1	1	4	6
Freyr	4	1	4	4	4
Howard	1	–	1	4	–
Kuntz	3	–	–	4	–
Alsen	5	1	1	6	4
Knudson	2	3	3	3	6
FBC-Dylan	7	–	1	7	–
Ada	4	1	2	4 <sup>4</sup>	6
Blade	2	–	–	–	–
RB07	1	1	1	4	5
Bigg Red	8	–	2	7	3
Faller	1	–	1	3	–
Hat Trick	4	–	3	5 <sup>4</sup>	–
Cromwell	5	–	–	–	–
Granite	6	3	3	5 <sup>5</sup>	6
Fireball	5	–	1	3	–
Marshall	8	1	1	7	7
Vantage	4	–	–	–	–
Hot Shot	7	–	–	7	–
Polaris	6	1	8	4	7
Bakker Gold	5	–	7	5	–

<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> Includes tan spot, septoria, bacterial leaf blight, and powdery mildew.

<sup>4</sup> These varieties are more susceptible to powdery mildew.

<sup>5</sup> This variety is more susceptible to bacterial leaf blight.

**Table 7.** Relative grain yield of barley varieties at several locations in Minnesota in single year (2007) and multiple year comparisons (2005-2007).

Variety	Crookston		Morris		Stephen		St. Paul		Roseau		State	
	1 yr	3 yr	1 yr	3 yr	1 yr	2 yr <sup>1</sup>	1 yr <sup>2</sup>	2 yr <sup>3</sup>	1 yr	2 yr <sup>1</sup>	1 yr	3 yr
----- % of mean -----												
Robust	100	96	96	96	81	90	--	104	103	104	95	98
Stander	110	99	94	104	97	92	--	102	113	112	103	102
MNBrite	93	98	98	95	97	92	--	97	109	90	99	96
Lacey	106	100	116	107	106	106	--	100	101	92	107	102
Drummond	102	98	92	98	105	98	--	111	94	102	98	100
Stellar ND	103	102	93	90	101	100	--	93	103	102	100	97
Legacy	100	101	112	108	112	110	--	111	107	103	108	106
Tradition	95	102	100	108	102	108	--	99	90	107	97	105
Conlon	92	103	99	94	100	103	--	84	79	89	92	95
<b>Mean (bu/A)</b>	86	94	82	74	96	93	--	96	53	82	79	87
<b>LSD (0.05)</b>	12	7	16	13	16	11	--	8	17	13	8	5

<sup>1</sup> Only two years of data, 2006 and 2007.

<sup>2</sup> No yield data for 2007.

<sup>3</sup> Only two years of data, 2005 and 2006.

**Table 8.** Agronomic characteristics of barley varieties in Minnesota in multiple year comparisons (2000-2007).

Variety	Type	Use	Days to	Plant	Lodging	Plump	Protein
			Heading	Height			
			-- days --	- inches -	--- % ---		--- % ---
No. Environments			26	23	12	23	20
Robust	6-row	Malt	56	35	med.	84	13.3
Stander	6-row	Feed	57	32	strong	86	12.8
MNBrite	6-row	Feed	56	35	med.	83	14.3
Lacey	6-row	Malt	56	32	strong	85	13.3
Drummond	6-row	Malt	56	33	v. strong	82	13.2
Stellar ND <sup>1</sup>	6-row	Malt	57	32	strong	86	12.7
Legacy	6-row	Malt	57	34	med.	78	12.8
Tradition <sup>2</sup>	6-row	Malt	57	33	med.	85	13.4
Conlon <sup>2</sup>	2-row	Malt	57	31	med.	93	13.3

<sup>1</sup> Only four years of plump and protein data, 2000-2001 and 2005-2006.

<sup>2</sup> Only four years of plump and protein data, 2003-2005.

**Table 9.** Disease reaction<sup>1</sup> of barley varieties in Minnesota in multiple year comparisons (2001-2005).

<i>Variety</i>	<i>Fusarium Head Blight</i>	<i>Net Blotch</i>	<i>Spot Blotch</i>	<i>Septoria Speckled Leaf Blotch</i>	<i>Stem Rust</i>
Robust	8	8	2	9	1
Excel	8	8	2	9	1
Stander	9	8	2	9	1
MNBrite	6	6	1	9	1
Lacey	8	8	2	9	1
Drummond	8	7	2	9	1
Legacy	7	5	2	9	1
Tradition	8	7	2	9	1

<sup>1</sup> Most Resistant = 1, Most Susceptible = 9.

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