

UNIVERSITY OF MINNESOTA EXTENSION SERVICE  
UNIVERSITY OF MINNESOTA – U.S. DEPARTMENT OF AGRICULTURE  
COLLEGE OF FOOD, AGRICULTURAL AND NATURAL RESOURCE SCIENCES  
ST. PAUL, MINNESOTA 55108

**Preliminary Report 24**

**2008 Wheat, Barley and Oat Variety Performance in Minnesota  
Preliminary Report**

**Preface**

Jochum Wiersma

Record high prices for old and new crop wheat in March made many almost giddy about wheat; it is not often that a virtually guaranteed profit can be locked in prior to planting despite rapidly escalating input costs. The record prices for the three major commodities resulted in competition for acreage and consequently higher contract prices for many of the smaller commodities and specialty crops, including barley. The malt and brewing industry also signaled a willingness to work with the region's producers to maintain and even expand barley acreage and ensure a domestic supply of malt barley that is both secure and reliable.

Temperatures in the first half of April were unseasonably cool and late April rains and snow slowed spring fieldwork further. By the third week of April, topsoil moisture was rated adequate for most of Minnesota; likewise, subsoil moisture was rated adequate for all but the northeastern third of the state. By the end of April land preparation and planting for all crops were about two weeks behind the 5-year average. By April 27<sup>th</sup>, only 6% of spring wheat was planted compared to 15% in 2007 and 33% average on that date.

Field work did not start in earnest until the end of first week of May. By May 4<sup>th</sup>, spring wheat was 19% planted compared to 61% last year and 64% for the 5-year average. Just short of half the acreage was planted between May 4<sup>th</sup> and May 11<sup>th</sup>. Planting neared completion by May 18<sup>th</sup> as 91% of spring wheat was planted. All small grains were planted by the fourth week of May. As average temperatures continued to be unseasonable cool, emergence and initial development of the small grains was slow. Only 39% of spring wheat emerged by May 18<sup>th</sup>, compared to 74% emerged in 2007. By the end of May, emergence remained behind at 71%, trailing by 22% compared to last year.

Lack of precipitation started to impact topsoil moisture in the heart of the Red River Valley, but heavy precipitation across the state in the first week of June alleviated any drought concerns. As average temperatures remained below average, crop development continued to be further delayed and was well behind not only last year, but the 5-year average. The wet weather continued through the middle of the month causing drown outs and flooding all along the South Dakota border and well into the southern and central portions of the Red River Valley. The cool temperatures resulted in very lush wheat and barley crop with a tremendous yield potential as both tiller and head initiation occurred during very cool, favorable growing conditions. Fortunately, lodging problems were generally limited to the areas that endured severe thunderstorms in late July.

The trend of slightly cooler to normal growing conditions continued and heading was on average two weeks later than last year. Likewise harvest was several weeks later, with growers in the most northern counties - like Roseau and Lake of the Woods - not being able to harvest until well into the month of September.

The USDA forecasted Minnesota's spring wheat yield to average 50 bushels per acre on July 1. In the September Small Grain Summary, Minnesota's spring wheat yield was adjusted up to 56 bushels per acre, the second highest average yield ever recorded. Individual reports of grain yield exceeding 90 bushels per acre were not uncommon.

The overall quality of the crop was excellent with little to no concerns about contamination with DON, the mycotoxin associated with Fusarium head blight. Test weight was generally excellent while grain protein varied greatly with many producers reporting lower than expected/desired grain protein contents and, consequently, sizeable discounts at harvest.

Disease problems, in general, were low with tan spot being the most prevalent. Leaf rust caused only significant losses when left untreated in late planted spring wheat. Some late planted spring wheat in Roseau and Lake of Woods had significant damage due to FHB. Disheartening and sobering is the fact that the weather-based risk models appeared to under predict the risk of economic losses due to FHB in these instances. This should remind all that vigilance against this disease remains paramount. An integrated approach of not only fungicides but also crop rotation and variety selection are crucial to limit economic losses to this disease.

Spring wheat acreage increased 6% to 1.85 million acres planted and 1.80 million acres harvested. Winter wheat acreage jumped another 15% to 75,000 acres statewide in 2008. The average winter wheat yield improved 4 bushels to 52 bushels per acre this year. Barley acreage remained stable at 110,000 acres while oat acreage declined slightly to 175,000 acres. The increase in acreage and the near record production meant that Minnesota spring wheat production was up 30 percent from 2007, breaking 100 million bushels for the first time since 2003.

## **Introduction**

Successful small grain production begins with selection of 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 close to uniform for all entries at each location as possible.

The MAES 2008 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 alphabetically. 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 2009 Directory', available 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 (2008) and multiple year (2006-2008) 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 difference between any two varieties is 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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Special thanks are also due to all cooperating producers.

### **SPRING WHEAT**

James Anderson, Jochum Wiersma, Gary Linkert, Susan Reynolds, Catherine Springer, John Wiersma, George Nelson, Ruth Dill-Macky, James Kolmer, Charla Hollingsworth, and Yue Jin

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 56 bu/A in 2008. This compares to an average of 58 bu/A in 2007 and a three-year average of 66 bu/A. The northern locations (Crookston, Stephen and Roseau) averaged 82 bu/A in 2008 compared to 74 bu/A last year and the three-year average.

Tables 2, 3, and 4 present the relative grain yield of tested varieties in 1, 2, and 3-year comparisons. 'Traverse', the 2006 release from SDSU, was the top yielding cultivar in both the northern and southern testing locations in 2008. 'Faller' continued to impress in the northern locations but did not do as well in the southern locations in 2008, largely due to below par results in St. Paul and Waseca. In the 2-year comparisons Traverse and Faller share the high mark for grain yield. Based on three years of trial comparisons, 'Briggs', 'Faller', '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 2008. Vigilance toward FHB remains paramount while close attention should be given to the leaf rust resistance ratings. Varieties that are rated 4 or better are considered the best hedge against the diseases. Varieties that are rated 7 or higher are likely to suffer significant economic losses under even moderate disease pressure. Briggs, Glenn, Steele-ND, Howard, Faller, and RB07 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. 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' and 'Hat Trick' which are rated susceptible to powdery mildew. 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.

Leading varieties in Minnesota, based on acres planted in 2007, include Knudson, 'Freyr', Glenn, Oklee and Briggs with approx. 12%, 11%, 10%, 9%, and 8% respectively. 'Breaker' was the only new entry in the trials, while testing of some well-known varieties including 'Oxen', 'Granite', 'Ulen' and 'Polaris' was discontinued.

Variety selection for 2009 continues to be a balance between yield potential, disease responses, and grain quality. Faller and Glenn are proven varieties that provide the best available genetic resistance to

FHB and should be considered as hedges against this disease. Other varieties with a 4 or better scab rating and above-average yield include Blade, Cromwell, Freyr, Hat Trick, and Tom. Faller, Briggs, Knudson, Traverse, and RB07 continue to impress as high yielding varieties across the state. Traverse's poor agronomic characteristics and grain protein content, however are a major drawback for this variety. Varieties with above-average yield in on-farm testing and protein include Blade, Briggs, Cromwell, Granger, Howard, RB07 and Steele-ND.

## **BARLEY**

**Kevin Smith, John Wiersma, Ruth Dill-Macky, Jochum Wiersma,  
Brian Steffenson, and Ed Schiefelbein**

Yield averages for barley in Minnesota were 65 Bu/A compared to 56 Bu/A last year resulting in production of about 7.2 million bushels. Growing conditions were generally good across the five test locations for barley variety trials in Minnesota. The highest yields were in Roseau and the lowest in St. Paul (Table 7). Fusarium head blight (FHB) was essentially absent presumably due to unfavorable conditions for disease development.

The yield data in Table 7 were collected from advanced yield trials that contain the important varieties for the region planted in five locations in the state. Yield data is presented as percent of the mean of the varieties listed in the table. The mean of the varieties is presented in bu/A. Rasmusson, Legacy, Tradition, 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.

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.

## **OATS**

**Deon Stuthman, Roger Caspers, Ruth Dill-Macky,  
Martin Carson, and Jochum Wiersma**

Oat acreage declined 3% to 175,000 acres across the state. The state average yield improved with 8 bu/A to 68 bu/A. The cooler growing conditions favored not only crop development yield potential but also crown rust development. By early June buckthorn bushes in most parts of the state were heavily infected, providing a majority of the local inoculum. The level of crown rust infection in the oat crop, however, was less than expected in most areas due to drier, unfavorable conditions as the progressed. The average yield across the five primary test sites was 107 bu/A, 3 bushels less than last year's 110 bu/A average.

Stallion (SD) and Excel (Purdue) continue to be top ranking oat varieties for grain yield across the state in both single year and multiple year comparisons. Esker (WI) is a close third.

**Table 1.** Origin and agronomic characteristics of Hard Red Spring Wheat varieties in Minnesota in single year (2008) and multiple year comparisons (2006-2008).

<i>Variety</i>	<i>Agent/Origin<sup>1</sup></i>	<i>Year of Release</i>	<i>Days to Heading<sup>2</sup></i>	<i>Plant Height<sup>2</sup></i>	<i>Straw Strength<sup>3</sup></i>
			- days -	- inches -	
Ada	MN	2006	62.3	31.1	4
Alsen	NDSU	2000	61.7	32.9	4
Bigg Red	WestBred	2004	62.6	35.1	6
Blade	WestBred	2007	63.0	32.7	4
Breaker	WestBred	2008	62.6	32.5	3
Briggs	SDSU	2002	60.3	32.5	7
Cromwell	Thunder Seed	2007	63.6	32.3	5
Faller	NDSU	2007	63.4	31.9	5
Freyr	AgriPro	2004	63.0	32.9	6
Glenn	NDSU	2005	60.6	34.2	4
Granger	SDSU	2004	61.8	35.4	7
Hat Trick	Trigen	2006	62.7	31.3	5
Howard	NDSU	2006	61.9	34.2	7
Kelby	AgriPro	2006	60.1	29.0	4
Knudson	AgriPro	2001	62.7	31.1	5
Kuntz	AgriPro	2007	63.0	30.1	4
Marshall	MN	1982	64.8	30.1	4
Oklee	MN	2003	60.3	31.7	6
RB07	MN	2007	60.5	31.6	5
Rush	WestBred	2006	60.8	31.7	2
Samson	WestBred	2007	62.8	29.6	2
Steele-ND	NDSU	2004	62.0	34.1	7
Tom	MN	2008	61.9	32.9	7
Traverse	SDSU	2006	60.3	34.6	6
Vantage	WestBred	2007	66.3	32.1	2
<b>Mean</b>			62.2	28.9	

<sup>1</sup> Abbreviations: MN = Minnesota Agricultural Expt. Station; NDSU = North Dakota State University Research foundation; SDSU = South Dakota Agricultural Expt. Station.; Trigen = Trigen Seed Services LLC.

<sup>2</sup> 2008 data.

<sup>3</sup> 1-9 scale in which 1 is the strongest straw and 9 is the weakest. Based on 2004-2008 data. The rating of newer entries may change by as much as one rating point as more data is collected.

**Table 2.** Relative grain yield of Hard Red Spring Wheat varieties in southern locations in Minnesota in single year (2008) and multiple year comparisons (2006-2008).

Variety	Lamberton			Morris <sup>1</sup>			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 -----											
Ada	85	95	100	99			74	77	86	104	82	87
Alsen	103	97	96	89			103	98	96	90	92	96
Bigg Red	111	102	101	99			99	100	98	92	99	98
Blade	106	108	–	-			101	103	–	96	100	–
Breaker	100	–	–	-			103	–	–	105	–	–
Briggs	100	111	110	108			110	110	107	83	92	95
Cromwell	88	87	–	-			99	99	–	90	90	–
Faller	104	119	117	115			87	97	102	93	106	105
Freyr	99	100	101	109			104	108	105	95	95	97
Glenn	92	98	95	82			100	101	95	88	95	92
Granger	129	124	120	105			99	99	98	76	100	102
Hat Trick	96	104	100	105			76	78	83	94	105	103
Howard	117	114	112	107			112	114	110	115	118	111
Kelby	99	100	96	84			121	127	119	97	106	103
Knudson	123	124	119	109			91	89	93	109	104	103
Kuntz	86	94	–	-			105	103	–	94	96	–
Marshall	59	61	67	83			74	73	82	65	56	69
Oklee	89	89	90	95			111	112	106	98	108	105
RB07	99	103	105	100			109	110	107	111	105	102
Rush	92	92	91	88			112	104	99	95	95	91
Samson	96	102	–	-			108	105	–	110	109	–
Steele-ND	100	107	106	111			104	109	105	118	119	111
Tom	101	98	95	91			105	107	106	86	90	91
Traverse	129	123	124	115			98	99	103	117	119	117
Vantage	93	96	–	-			100	90	–	100	95	–
<b>Mean (bu/A)</b>	40	44	46	69			70	65	74	59	56	60
<b>LSD (0.05)</b>	23.8	22.3	14.2	17.1			9.6	12.4	13.8	23.3	21.6	17.0

<sup>1</sup> The Morris 2008 trial was abandoned due to herbicide drift damage. The 2-year data is from 2006-2007.

**Table 3.** Relative grain yield of Hard Red Spring Wheat varieties in northern locations in Minnesota in single year (2008) and multiple year comparisons (2006-2008).

Variety	Crookston			Roseau			Stephen			On-Farm		
	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 -----											
Ada	99	97	97	93	98	98	99	98	94	99	100	99
Alsen	95	92	93	91	85	92	87	88	91	96	94	95
Bigg Red	92	92	93	105	89	94	88	90	91	96	91	93
Blade	101	101	–	101	104	–	93	100	–	99	103	–
Breaker	102	–	–	104	–	–	106	–	–	101	–	–
Briggs	96	100	105	97	112	108	87	94	98	98	101	104
Cromwell	102	101	–	103	110	–	95	97	–	99	103	–
Faller	114	123	117	123	125	121	103	115	110	106	112	–
Freyr	105	107	104	95	99	99	95	98	98	99	103	101
Glenn	94	97	95	103	100	104	105	98	98	95	99	100
Granger	95	95	95	93	99	101	85	88	93	103	101	104
Hat Trick	100	97	92	104	96	94	100	108	98	100	103	100
Howard	98	99	103	103	105	107	95	102	103	98	–	–
Kelby	101	101	102	104	112	103	108	103	98	96	95	97
Knudson	100	104	106	98	103	104	100	106	106	104	108	108
Kuntz	106	109	–	105	100	–	107	103	–	102	107	–
Marshall	96	84	89	89	81	85	86	84	83	82	72	76
Oklee	94	95	95	105	104	99	103	99	97	100	99	101
RB07	106	108	108	94	90	91	112	109	112	102	105	105
Rush	88	89	88	99	103	96	103	98	99	93	95	94
Samson	110	112	–	112	111	–	108	112	–	104	108	–
Steele-ND	96	99	101	93	99	104	96	96	100	99	105	106
Tom	99	101	103	100	105	105	118	107	110	104	101	102
Traverse	103	107	108	110	115	115	118	115	116	104	111	111
Vantage	89	96	–	117	104	–	91	98	–	91	93	–
Ada	99	97	97	93	98	98	99	98	94	99	100	99
<b>Mean (bu/A)</b>	98	88	84	68	59	66	79	74	73	91	81	75
<b>LSD (0.05)</b>	5.7	10.4	11.5	11.9	17.9	14.8	17.3	17.2	12.6	17.1	13.6	10.4

**Table 4.** Relative grain yield of Hard Red Spring Wheat varieties in Minnesota in single year (2008) and multiple year comparisons (2006-2008).

Variety	State			North			South		
	1 yr.	2 yr.	3 yr.	1 yr.	2 yr.	3 yr.	1 yr.	2 yr.	3 yr.
<i>No. Environments</i>	6	13	20	3	6	9	3	7	11
	----- % of mean -----								
Ada	93	93	94	97	98	96	84	86	91
Alsen	94	92	93	91	89	92	98	95	95
Bigg Red	96	95	96	94	90	92	99	99	99
Blade	99	102	–	98	102	–	100	103	–
Breaker	103	–	–	104	–	–	103	–	–
Briggs	95	103	104	93	102	104	98	104	104
Cromwell	97	98	–	100	103	–	93	93	–
Faller	105	114	112	113	121	116	93	106	107
Freyr	99	101	102	99	102	100	99	101	102
Glenn	98	97	95	100	98	99	94	96	92
Granger	95	101	101	91	94	96	100	107	106
Hat Trick	95	98	96	101	100	95	87	95	96
Howard	103	106	106	96	101	103	114	113	110
Kelby	105	107	102	104	105	101	107	109	103
Knudson	102	105	105	99	105	105	105	105	105
Kuntz	102	102	–	106	104	–	96	99	–
Marshall	81	75	81	91	83	86	67	65	74
Oklee	100	101	99	100	99	97	101	102	100
RB07	106	104	104	108	104	105	107	104	104
Rush	98	97	94	98	97	95	101	98	94
Samson	108	109	–	109	111	–	106	106	–
Steele-ND	100	104	105	95	98	101	108	110	108
Tom	102	102	101	106	105	106	97	98	96
Traverse	111	112	113	110	112	113	112	112	114
Vantage	98	96	–	97	98	–	98	95	–
<b>Mean (bu/A)</b>	69	65	67	82	74	74	56	58	61
<b>LSD (0.05)</b>	9.1	6.9	5.3	10.1	8.1	6.7	15.6	11.3	8.0

**Table 5.** Grain quality characteristics of Hard Red Spring Wheat varieties in Minnesota in single year (2008) and multiple year comparisons (2006-2008).

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 ----		---- % ----			
Ada	61.9	61.7	14.1	14.2	med.-high	2
Alsen	61.5	61.1	14.7	15.0	high	2
Bigg Red	63.2	62.5	14.0	13.7	med.-low	4
Blade	62.5	62.6	14.5	14.7	–	5
Breaker	62.7	–	14.3	–	–	–
Briggs	61.2	61.3	14.4	14.7	med.	2
Cromwell	61.9	61.8	14.6	14.7	–	3
Faller	60.8	60.9	14.3	14.3	med.	2
Freyr	60.0	60.0	14.2	14.3	med.	2
Glenn	63.5	63.4	15.3	15.5	high	1
Granger	60.9	60.8	14.9	14.7	med.	4
Hat Trick	62.0	61.6	14.0	14.0	med.-low	4
Howard	60.8	61.2	14.7	14.9	med.-high	1
Kelby	61.4	61.2	14.6	14.7	med.	1
Knudson	61.1	61.0	13.6	13.8	med.-high	3
Kuntz	60.4	60.3	13.9	13.9	–	2
Marshall	58.4	57.8	13.6	13.5	low	2
Oklee	62.0	61.4	15.0	14.9	low-med.	3
RB07	60.8	60.6	14.4	14.8	med.-high	2
Rush	62.5	62.0	14.7	14.7	med.-high	2
Samson	60.2	59.9	13.9	13.9	–	4
Steele-ND	61.5	61.5	14.8	15.0	high	2
Tom	61.2	61.0	14.2	14.3	med.	1
Traverse	58.9	58.5	13.9	13.8	low	4
Vantage	62.6	62.2	15.4	15.3	–	2
<b>Mean</b>	61.4	61.1	14.4	14.5		

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

<sup>2</sup> 2003-2007 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 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>
Ada	5	1	2	5 <sup>4</sup>	6
Alsen	5	1	1	6	4
Bigg Red	8	–	2	7	3
Blade	2	–	2	3	4
Breaker	2	–	2	3	–
Briggs	1	1	2	5	5
Cromwell	4	–	1	4	4
Faller	1	–	1	3	4
Freyr	4	1	4	4	4
Glenn	1	1	1	4	3
Granger	3	1	1	4	5
Hat Trick	5	–	4	5 <sup>4</sup>	4
Howard	1	–	1	4	6
Kelby	3	–	1	4	5
Knudson	2	3	3	3	6
Kuntz	3	–	1	4	6
Marshall	8	1	1	7	7
Oklee	4	1	1	5	5
RB07	1	1	1	5	5
Rush	5	–	4	5	5
Samson	5	–	1	6	7
Steele-ND	1	1	1	4	6
Tom	4	–	1	5	4
Traverse	5	–	2	5	5
Vantage	5	–	3	6	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.

**Table 7.** Relative grain yield of barley varieties at several locations in Minnesota in single year (2008) and multiple year comparisons (2006-2008).

Variety	Crookston		Morris		Stephen		St. Paul		Roseau		State	
	1 yr.	3 yr.	1 yr.	2 yr. <sup>1</sup>	1 yr.	3 yr.	1 yr.	3 yr.	1 yr	3 yr.	1 yr.	3 yr.
----- % of mean -----												
Conlon	86	91	-	90	67	88	71	79	101	94	81	88
Drummond	100	100	-	95	102	99	103	107	88	96	98	100
Lacey	109	103	-	104	114	109	115	104	108	99	112	103
Legacy	104	101	-	108	109	109	99	105	95	99	102	104
Rasmusson <sup>2</sup>	103	105	-	110	108	104	111	110	115	--	109	107
Robust	96	97	-	93	94	91	90	98	92	99	93	96
Stander	95	100	-	99	100	94	99	100	97	105	98	100
Stellar-ND	100	101	-	97	107	102	95	93	98	100	100	99
Tradition	107	100	-	104	99	104	116	104	107	107	107	103
<b>Mean (bu/A)</b>	123	110	-	81	118	102	109	101	135	100	121	101
<b>LSD (0.05)</b>	18.4	8.1	-	11.2	9.9	8.9	19.2	8.6	14.8	8.5	7.9	4.0

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

<sup>2</sup> Only 1 year of Roseau data available.

**Table 8.** Agronomic characteristics of barley varieties in Minnesota in multiple year comparisons (2004-2008).

Variety	Type	Use	Days to	Plant	Lodging	Plump	Protein
			Heading	Height			
			-- days --	- inches -			--- % ---
No. Environments			15	14	15	12	12
Conlon	2-row	Malt	57	31.7	med.	93	13.5
Drummond	6-row	Malt	58	32.3	v. strong	83	13.7
Lacey	6-row	Malt	59	32.4	strong	87	14.1
Legacy	6-row	Malt	59	33.5	med.	82	13.4
Rasmusson <sup>2</sup>	6-row	Malt	58	30.9	strong	84	13.2
Robust	6-row	Malt	58	34.5	med.	86	13.9
Stander	6-row	Feed	59	31.7	strong	85	13.5
Stellar-ND <sup>1</sup>	6-row	Malt	58	32.4	strong	86	13.1
Tradition	6-row	Malt	59	33.0	med.	86	13.3

<sup>1</sup> Only three years of plump and protein data, 2005-2007.

<sup>2</sup> Only three years of plump and protein data, 2004-2006.

**Table 9.** Disease reaction<sup>1</sup> of barley varieties in Minnesota in multiple year comparisons.

<i>Variety</i>	<i>FusariumHead Blight</i>	<i>Net Blotch</i>	<i>Septoria Speckled Leaf Blotch</i>	<i>Spot Blotch</i>	<i>Stem Rust<sup>2</sup></i>
Conlon	7	5	9	3	1
Drummond	8	7	9	2	1
Lacey	8	8	9	2	1
Legacy	7	5	9	2	1
Rasmusson	8	9	9	2	1
Robust	8	8	9	2	1
Stander	9	8	9	2	1
Stellar-ND	8	7	9	2	1
Tradition	8	7	9	2	1

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

<sup>2</sup> Reaction to the dominant strain of the stem rust pathogen.

**Table 10.** Relative grain yield of oat varieties in Minnesota in multiple year comparisons (2006-2008).

<i>Variety</i>	<i>Rosemount</i>		<i>Waseca</i>		<i>Lamberton</i>		<i>Morris</i>		<i>Crookston</i>		<i>State</i>	
	<i>1 yr.</i>	<i>3 yr.</i>	<i>1 yr.</i>	<i>3 yr.</i>	<i>1 yr.</i>	<i>3 yr.</i>	<i>1 yr.</i>	<i>2 yr<sup>1</sup>.</i>	<i>1 yr.</i>	<i>3 yr.</i>	<i>1 yr.</i>	<i>3 yr.</i>
----- % of mean -----												
Baker	108	105	102	99	100	98	-	92	90	99	99	99
Beach	90	95	92	102	107	102	-	108	101	105	99	102
Buckskin	88	95	68	101	102	102	-	113	106	113	94	105
Esker	106	106	109	101	104	101	-	95	93	104	102	102
Excel <sup>2</sup>	105	106	102	108	107	109	-	111	102	103	104	107
Kame	80	94	88	96	107	101	-	92	73	93	87	95
Morton	71	88	96	104	93	96	-	90	100	98	92	95
Souris <sup>2</sup>	104	105	108	105	93	95	-	96	99	105	100	101
Stallion	112	108	92	106	110	109	-	111	91	98	101	106
Winona	91	98	75	79	102	88	-	91	72	82	85	87
<b>Mean (bu/A)</b>	76	93	70	90	115	108	-	127	126	123	97	107
<b>LSD (0.05)</b>	17.6	7.1	14.8	8.9	14.5	8.3	-	9.1	9.9	6.2	6.9	3.5

<sup>1</sup> The Morris 2008 trial was abandoned due to herbicide drift. The 2-year data are from 2006-2007.

<sup>2</sup> Two year data, 2007 and 2008.

**Table 11.** Relative grain yield of oat varieties in Minnesota in a single year (2008) comparison at off-station locations.

<i>Variety</i>	<i>Stephen</i>
--- % mean ---	
Baker	108
Beach	100
Buckskin	95
Esker	105
Excel	103
Kame	76
Morton	103
Souris	110
Stallion	103
Winona	97
<b>Mean (bu/A)</b>	148
<b>LSD (0.05)</b>	5.4

**Table 12.** Agronomic characteristics of oat varieties in Minnesota in multiple year comparisons (2006-2008).

<i>Variety</i>	<i>Days to Heading</i>	<i>Plant Height</i>	<i>Lodging</i> <sup>1</sup>	<i>Test Weight</i>	<i>Groat</i> <sup>2</sup>
	--- days ---	- inches -		- lb/bu -	-- % --
Baker	61	32	2.0	41.3	69.3
Beach	64	36	1.8	42.9	71.4
Buckskin	61	32	1.9	42.6	70.1
Esker	59	32	2.1	40.5	71.7
Excel <sup>2</sup>	59	31	2.0	40.0	67.8
Kame	58	30	1.9	38.8	70.7
Morton	64	36	2.0	40.6	69.4
Souris <sup>2</sup>	63	31	1.7	42.1	72.7
Stallion	63	36	2.4	41.9	70.5
Winona	57	31	1.9	41.0	71.6
<b>Mean</b>	61	33	2.0	41.2	70.5

<sup>1</sup> 1=Erect, 5=Flat.

<sup>2</sup> 2007-08 data, adjusted for 3 years.

**Table 13.** Disease reactions of oat varieties in Minnesota in single year (2008) comparisons.

<i>Variety</i>	<i>Crown Rust</i> <sup>1</sup>	<i>Smut</i> <sup>2</sup>	<i>BYDV</i> <sup>3</sup>
Baker	S	R	3.5
Beach	MS	MR	7.0
Buckskin	S	S	3.5
Esker	MS	R	4.5
Excel	MS	S	1.5
Kame	MS	MR	7.0
Morton	S	R	6.0
Souris	MR	R	5.0
Stallion	MS	S	6.5
Winona	S	MR	4.0

<sup>1</sup> R=resistant, MR=moderately resistant, MS=moderately susceptible and S=susceptible.

<sup>2</sup> Artificially inoculated nursery; R=resistant, MR=moderately resistant, MS=moderately susceptible and S=susceptible.

<sup>3</sup> Barley Yellow Dwarf Virus score from Univ. of Illinois with 1=no symptoms, 9=dead.

Updated: 11/15/2008 11:02 AM