

# Small grain varieties for grain and forage in Wisconsin



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Performance trials for small grain varieties are conducted each year at several locations throughout Wisconsin (table 1). Trials include released varieties, experimental lines from Wisconsin and neighboring states, and lines from private seed companies. The primary objective of these trials is to obtain data on how varieties perform in different locations and years. Growers use these data to help them in their choice of varieties to plant, and breeders use performance data to determine whether or not to release a new variety.

New varieties developed and released in Wisconsin are entered in the Wisconsin Certification Program. These varieties have demonstrated superior production qualities. In addition, superior varieties from other states may be recommended and/or certified in the state. As new varieties are released to the public, older varieties with inferior qualities are removed from the recommended list and eventually dropped from the certified list as seed production declines.

Occasionally, varieties are certified without being recommended to Wisconsin growers. Varieties in this category may include commercial varieties developed by private seed companies or varieties where there is a substantial market for Wisconsin-produced seed.

Thus, in Wisconsin, recommendation and certification do not mean the same thing. Recommended varieties are those with superior in-state production performance records, while certification provides the assurance of seed purity and seed quality.

## VARIETY SELECTION

Factors to consider when selecting small grain varieties include grain or forage yield, maturity, straw strength (or resistance to lodging), disease resistance, and winterhardiness.

Disease ratings are performed by the Department of Agronomy for oats and barley. Barley growers should consider whether or not a variety is acceptable for malting. Several varieties are now being evaluated for forage yield (tables 4 and 7).



Table 1. Location and agronomics of small grain variety trials in Wisconsin

Location	Cooperators	Soil type	Row spacing (inches)	Average nitrogen applied (lb/a)	Planting date	Harvest date
Arlington (wheat)	M. Martinka, J. Gaska	silt loam	7.5	90	Oct.3	July 24
Arlington (barley, oat)	J. Albertson, S. Klapoetke	silt loam	6	30*	April 5	Aug. 2
Chilton (wheat)	Kolbe Seeds, M. Glewen	red clay	7.5	90	Oct. 5	July 31
Chilton (barley, oat)	Kolbe Seeds, M. Glewen	red clay	12	150	April 26	Aug. 22
Janesville	Rock Co. Farm, J. Stute	silt loam	7.5	90	Oct. 12	July 19
Lancaster	T. Wood	silt loam	7.5	20	April 10	Aug. 3
Madison	J. Mochon	silt loam	6	30*	April 13	Aug. 5
Marshfield	M. Bertram	silt loam	6	60	April 20	July 26
Racine	Henderson Seeds	silt loam	7.5	60	Oct. 7	July 22
Spooner	P. Holman	sandy loam	7.5	50	April 10	July 25
Sturgeon Bay	R. Weidman	silt loam	12	56	April 19	Aug. 1

\*Nitrogen credited from previous alfalfa or soybean.

## Growing conditions

**2006 Season.** Wisconsin's 2006 winter wheat yield was the highest on record at 78 bushels per acre; a 9 bushel increase from the previous 2003 record yield of 69 bushels per acre. Increased yield can be attributed to a low winterkill rate and ample, timely moisture in the major growing areas of east central, south central, and southeast Wisconsin. For the 2006 growing season, 250,000 acres were planted to winter wheat, a 50,000 acre rise from 2005. Area harvested for grain was 230,000 acres, up 55,000 acres from the previous year. An increase in acres planted, acres harvested for grain, and yield resulted in record production at 17.9 million bushels, a jump of 80 percent over 2005's production of 9.98 million bushels.

Oats yielded 63 bushels per acre in Wisconsin during 2006, a 1 bushel decrease from the previous year. Oats are grown in different regions of Wisconsin than winter wheat. Northwest Wisconsin, a major growing area, experienced dry growing conditions and lower yields compared to the rest of the state. In 2006, 370,000 acres were planted to oats, a 30,000 acre decrease from 2005. Acres harvested for grain reached 230,000 acres, a 15,000 acre increase from last year. Even though oat yield and area planted to oats declined in Wisconsin during 2006, Wisconsin ranks first in U.S. oat production at 14.5 million bushels, 15 percent of the national total.

The state barley crop yielded 54 bushels per acre, a 1 bushel increase from 2005. Area harvested was unchanged from last year at 30,000 acres. Area planted to barley, declined 5,000 acres from 2005 to 50,000 acres in 2006. Due to the slightly higher yield, 2006 production rose 2 percent, reaching 1.62 million bushels.

**2005 Season.** Growing conditions in fall 2004 were good in most areas of Wisconsin, allowing excellent stand and early growth of small grains. Warm weather in February melted snow into sheets of ice. In many places, the ice was buried in snow and remained frozen for several days or weeks causing significant stand losses. Fair weather in March and April provided plenty of opportunities for nitrogen application. Dry weather in May, June, and July reduced disease pressure. Grain size varied widely across region and varieties. Seed health was excellent and yield was higher than expected in most fields.

Winter wheat averaged 57 bushels per acre (up 1 bushel from 2004). However, only 175,000 acres were harvested in 2005, down 50,000 from the previous year. The large decrease in winter wheat acreage may be partially explained by an epidemic of wheat scab and the late soybean harvest in 2004.

Oats yielded 64 bushel per acre, down 1 bushel from 2004. Harvested acres increased from 210,000 acres in 2004 to 215,000 acres. Wisconsin is the second

largest producer of oats in the nation following North Dakota state.

Barley yielded 53 bushels per acre (down 2 bushels from 2004). Thirty thousand acres were harvested in 2005 (same as in 2004). Production in 2005 was 1.59 million bushels, down from the 1.65 million bushels produced in 2004.

**2004 Season.** Growing conditions in fall 2003 were excellent in most areas of Wisconsin allowing excellent stand establishment and early growth. The mild winter meant good winter survival for most varieties across the state. Fair weather conditions in March and April provided plenty of opportunities for nitrogen application. Summer began with cool, wet conditions which were favorable for the establishment of fungal diseases, including head scab on winter wheat across much of the state. Yield and test weights were generally lower than those obtained in 2003.

Winter wheat averaged 56 bushels per acre (down 13 bushels from 2003). Despite the reduced yield, more acreage was harvested, for a total of 12.6 million bushels, an increase of 4 percent over last year.

Oats yielded 65 bushel per acre, down 2 bushels from 2003. Harvested acres also decreased from 230,000 acres in 2003 to 210,000 acres in 2004. Wisconsin's oat production is currently fourth in the nation.

Barley yielded 55 bushels per acre, as it did in 2003. Thirty thousand acres were harvested in 2004 (down 5,000 acres from 2003). Production in 2004 was 1.65 million bushels compared to 1.93 million bushels in 2003.

*Source: USDA National Agricultural Statistics Service (USDA-NASS). Agricultural Statistics Database.*

## Licensed varieties

The Wisconsin Agricultural Experiment Station has granted sole authority to the Wisconsin Crop Improvement Association to issue formal licenses for the production of certified seed of Chilton and Kewaunee barley; Bay, Belle, Dane, ForagePlus, Gem, Horicon, Prairie, and Vista oats; Spooner rye; and Glacier winter wheat. The Wisconsin Alumni Research Foundation has granted sole authority to the Wisconsin Crop Improvement Association to issue formal licenses for the production of certified seed of Moraine, Drumlin, Esker, and Kame oats. These procedures are intended to reinforce Plant Variety Protection regulations and to generate research and development funds for the Wisconsin small-grain breeding program. These varieties are "protected" and "licensed" and can be marketed only as certified seed. Each bag of seed will have a special red and white Licensed Variety tag attached or preprinted on the bag.

## Testing agencies

The small grain variety tests were conducted by the Department of Agronomy, College of Agricultural and Life Sciences and the University of Wisconsin-Extension in cooperation and with support from the Wisconsin Crop Improvement Association.

## ADDITIONAL INFORMATION

Check the following publications for additional information on small grain production and seed availability. Both are updated annually.

*Pest Management in Wisconsin Field Crops* (A3646)

—available at [learningstore.uwex.edu](http://learningstore.uwex.edu)

*The Wisconsin Certified Seed Directory*

—available at [www.wisc.edu/wcia](http://www.wisc.edu/wcia)

For information on seed availability of public varieties, contact the Wisconsin Crop Improvement Association, 554 Moore Hall, 1575 Linden Drive, Madison, WI 53706, (608) 262-1341, [www.wisc.edu/wcia](http://www.wisc.edu/wcia).

Table 2. Oat variety descriptions

Variety	Origin	Year released	Kernel color	Maturity <sup>a</sup>		HT <sup>b</sup> (in.)	Lodging	Test wt <sup>c</sup> (lb/bu)	Kernel protein	Disease resistance <sup>d</sup>					PVP <sup>f</sup>	Wis. cert.
				(head date)						Leaf rust	Stem rust	Sep-toria	Smut	BYDV <sup>e</sup>		
<b>Recommended varieties</b>																
Dane	Wisconsin	1990	yellow	6-16	37	med	37	med	I	I	S	R	I	yes	yes	
Drumlin	Wisconsin	2003	yellow	6-24	39	weak	39	med	R	I	-	R	R	yes	yes	
Esker	Wisconsin	2004	yellow	6-20	38	med	38	med	R	I	-	R	I	yes	yes	
Gem	Wisconsin	1996	yellow	6-22	40	med	38	med	I	R	-	I	R	yes	yes	
Kame	Wisconsin	2005	yellow	6-19	37	strong	37	med	R	I	-	R	I	yes	yes	
Moraine	Wisconsin	2001	yellow	6-19	40	weak	38	med	R	-	-	R	I	yes	yes	
Richard	Minnesota	2000	yellow	6-22	43	strong	37	med	R	R	-	R	I	yes	yes	
Vista	Wisconsin	1999	yellow	6-24	42	med	37	low	R	R	-	R	I	yes	yes	
Winona	Minnesota	2005	yellow	6-17	39	strong	39	med	R	-	-	R	I	no	no	
<b>Other varieties</b>																
Belle	Wisconsin	1995	yellow	late	med	strong	med	low	R	I	I	R	I	yes	yes	
Blaze	Illinois	1997	tan	med	med	strong	high	-	S	S	-	-	R	yes	no	
Jim	Minnesota	1996	yellow	med	med	med	med	med	I	I	-	-	R	no	yes	
Leonard	Minnesota	2003	yellow	med	tall	med	med	med	R	I	-	R	R	yes	no	
Ogle	Illinois	1981	yellow	early	med	strong	high	low	S	S	S	S	I	no	yes	
Prairie	Wisconsin	1992	tan	med	med	med	med	low	S	I	R	I	R	yes	no	
Sesqui	Minnesota	2001	yellow	late	tall	med	high	med	I	-	-	R	I	yes	no	
Troy	S. Dakota	1991	white	med	med	med	high	med	I	R	-	R	I	no	no	
Wabasha	Minnesota	2001	white	early	tall	med	high	med	R	-	-	R	R	yes	yes	

<sup>a</sup> Maturity (month-day) as indicated by heading date in 17 Wisconsin tests conducted 2004–2006.

Varieties with generalized ratings indicate the following: early = before June 25, med = June 25–28, late = after June 28.

<sup>b</sup> Height (inches) at maturity in 20 Wisconsin tests conducted 2004–2006.

Varieties with generalized ratings indicate the following: short = <33 inches, med = 33–40 inches, tall = >40 inches.

<sup>c</sup> Test weight (pounds/bushel) in 20 Wisconsin tests conducted 2004–2006.

Varieties with generalized ratings indicate the following: low = <33 lb/bu, med = 33–35 lb/bu, high = >35 lb/bu.

<sup>d</sup> Disease resistance: R = resistant or moderately resistant, I = intermediate or some tolerance, S = moderately susceptible or susceptible.

<sup>e</sup> BYDV=Barley yellow dwarf virus or red leaf disease.

<sup>f</sup> PVP=Plant Variety Protection. A "yes" indicates that these varieties cannot be reproduced and sold as seed by variety name without certification.

- = information not available.

**OAT**

Variety	Mean	Southern			Northern			
		Arlington	Lancaster	Madison	Chilton	Spooner	Sturgeon Bay	Marshfield
<b>2006 YIELDS</b>								
— 2006 yields (bu/a) —								
<b>Early maturing</b>								
Dane	98	134	50	122	36	57*	158	130*
Kame	104	163*	61*	142*	52	67*	138	103
Moraine	100	119	63*	142*	51	62*	144	119
Winona	103	152	57	131*	52	62*	151	114
<b>Midseason</b>								
Esker	116*	159*	76*	140*	57*	63*	178*	137*
Gem	105	146	64*	135*	47	58*	165*	118
Ogle	105	138	67*	159*	55*	62*	154	102
Richard	90	128	56	111	56*	54*	145	77
<b>Mid- to late-season</b>								
Drumlin	114*	145	65*	145*	70*	65*	189*	117
Vista	102	128	68*	150*	55*	58*	169*	85
Mean	104	141	63	138	53	61	159	110
LSD (0.05) <sup>a</sup>	8	10	18	33	16	16	30	17
<b>HISTORIC YIELDS</b>								
— 2004–2006 —      2005, 2006      — 2004–2006 —								
<b>Early maturing</b>								
Dane	99	133	56	124	62*	65	118	118*
Kame	105	151*	59	137*	64	79*	115	112
Moraine	100	132	58	130	64	67	115	118*
Winona	103	137	54	132	65*	81*	116	116
<b>Midseason</b>								
Esker	114*	150*	78*	145*	70*	82*	131*	126*
Gem	103	134	67*	137*	60	70	126	114
Ogle	105	131	79*	137*	67*	85*	121	108
Richard	89	123	53	116	62	62	104	92
<b>Mid- to late-season</b>								
Drumlin	115*	149*	74*	146*	73*	86*	140*	125*
Vista	103	135	73*	137*	66*	70	127*	100
Mean	104	138	65	134	65	75	121	113
LSD (0.05) <sup>a</sup>	4	6	12	12	8	9	13	9

\*Varieties not significantly different from the highest yielding variety in the trial.

<sup>a</sup>The LSD (least significant difference) figures listed under the yield columns are a statistical measure of variation within the trial. If the difference in yield of two varieties is equal to or greater than LSD, the yields are significantly different. If the difference is less than the LSD, the yield difference may have been due to environmental factors.

Table 4. Forage dry matter yield of spring oat varieties harvested at late boot/early heading

**OAT**

Variety	Yield (t/a)			Harvest date (June)	Crude protein (%)	RFQ <sup>a</sup>	Yield (t/a)	Harvest date (June)
	Madison	Arlington	Mean					
	2006			2003–2005		2004–2006		
Belle	1.86*	2.47*	2.17*	15	11.0	119.4*	2.16	17
Dane	1.44	1.43	1.43	8	12.4*	113.3	1.61	10
Drumlin	1.53	2.24	1.89	14	12.0	113.3	2.02	15
Esker	1.92*	1.77	1.84	12	12.4*	114.3	1.83	13
Forage Plus	2.03*	2.76*	2.40*	24	10.4	111.6	2.67	25
Gem	1.71*	2.31	2.01	14	11.8	113.7	1.97	15
Kame	1.36	1.59	1.47	12	12.7*	118.8*	1.67	13
Moraine	1.26	1.67	1.46	11	12.3*	118.4*	1.67	13
Ogle	1.37	1.58	1.48	12	12.3*	116.3	1.70	14
Richard	1.38	2.03	1.70	14	12.0	120.0*	1.81	15
Vista	1.63	2.31	1.97	16	11.1	110.6	2.14	17
LSD (0.05)	0.35	0.40	0.27		0.63	3.65	0.13	

\*Varieties not significantly different from highest yielding variety in the trial.

<sup>a</sup>RFQ = Relative feed quality. Relative feed quality can be used to make comparisons among varieties listed in this table, but should not be used to compare with other crops such as alfalfa.

Table 5. Barley variety descriptions

**BARLEY**

Variety	Origin	Year released	Awns	Quality	Maturity <sup>a</sup> (head date)	Ht <sup>b</sup> (in.)	Lodging <sup>c</sup> (%)	Test wt <sup>d</sup> (lb/bu)	Disease resistance <sup>e</sup>						Wis cert.
									Leaf rust	Stem rust	Loose smut	Powd. mildew	Spot blotch	PVP <sup>f</sup>	
<b>Recommended varieties</b>															
Drummond	N. Dakota	2001	Smooth	malt	6-15	34	med	47	—	R	S	—	R	yes	no
Hazen	N. Dakota	1984	Smooth	feed	6-15	35	med	46	S	R	S	I	R	no	yes
Kewaunee	Wisconsin	1997	Smooth	feed	6-15	36	med	46	R	R	—	R	R	yes	yes
Lacey	Minnesota	2000	Smooth	malt	6-15	34	med	48	—	R	S	—	R	yes	no
Robust	Minnesota	1983	Smooth	malt	6-15	37	med	47	S	I	S	S	R	yes	yes
Stander	Minnesota	1993	Smooth	feed	6-15	34	med	47	—	R	S	S	R	yes	no
<b>Other varieties</b>															
Bounty	Canada	1989	Smooth	feed	med	med	med	med	I	I	S	R	S	yes	yes
Chilton	Wisconsin	1990	Smooth	feed	med	med	med	high	R	R	—	R	R	yes	no
Excel	Minnesota	1990	Smooth	malt	early	med	med	med	S	R	S	S	R	yes	no
MNBrite	Minnesota	1998	Smooth	—	early	med	med	med	R	R	S	S	R	yes	no

<sup>a</sup>Maturity (month-day) as indicated by heading date in 18 Wisconsin tests conducted 2004–2006. Varieties with generalized ratings indicate the following: early = before June 21, med = June 21–25, late = after June 25.

<sup>b</sup>Height (inches) at maturity in 20 Wisconsin tests conducted 2004–2006. Varieties with generalized ratings were included in other tests and indicate the following: short = <30 inches, med = 30–36 inches, tall = >36 inches.

<sup>c</sup>Lodging: strong = <15%, med = 15–35%, weak = >35%.

<sup>d</sup>Test weight (pounds/bushel) in 19 Wisconsin tests conducted 2004–2006. Varieties with generalized ratings were included in other tests and indicate the following: low = <42 lb/bu, med = 42–46 lb/bu, high = >46 lb/bu.

<sup>e</sup>Disease resistance: R = resistant or moderately resistant, I = intermediate or some tolerance, S = moderately susceptible or susceptible.

<sup>f</sup>PVP = Plant Variety Protection. A “yes” indicates that these varieties cannot be reproduced and sold as seed by variety name without certification.

— = Information not available.

**BARLEY**

Table 6. Barley variety grain yield comparisons in Wisconsin

Variety	Mean	Southern			Northern			
		Arlington	Lancaster	Madison	Chilton	Marshfield	Spooner	Sturgeon Bay
<b>2006 YIELDS</b>		2006 yields (bu/a)						
Drummond	63*	89	34	84*	-	66*	31*	72*
Hazen	61	96	43*	85*	-	56*	33*	56
Kewaunee	65*	99*	40	87*	-	70*	35*	59
Lacey	64*	94	44*	84*	-	64*	33*	66*
MNBrite	47	74	29	53	-	51	29	49
Robust	62*	100*	34	85*	-	59*	38*	57
Stander	67*	107*	57*	79*	-	62*	33*	61*
Mean	61	94	40	80	-	61	33	60
LSD (0.05) <sup>a</sup>	5	10	15	19	-	15	8	12
<b>HISTORIC YIELDS</b>		2004–2006			2004	2004–2006		
Drummond	69*	82	55	78*	51*	64*	60*	81
Hazen	66	87	52	76*	47	63*	61*	65
Kewaunee	69*	92*	55	82*	49*	70*	56	66
Lacey	70*	88*	62*	77*	57*	65*	63*	69
MNBrite	55	74	41	62	55*	50	48	56
Robust	62	84	46	75*	48*	57	53	63
Stander	68*	89*	64*	76*	54*	60	57*	68
Mean	66	85	54	75	52	61	57	67
LSD (0.05) <sup>a</sup>	3	4	7	7	9	7	6	6

\*Varieties not significantly different from highest yielding variety in the trial.

<sup>a</sup>The LSD (least significant difference) figures listed under the yield columns are a statistical measure of variation within the trial. If the difference in yield of two varieties is equal to or greater than the LSD, then the yields are significantly different. If the difference is less than the LSD, then the yield difference may have been due to environmental factors.

**BARLEY**

Table 7. Forage dry matter yield of barley varieties harvested at late boot/early heading

Variety	Yield (t/a)			Harvest date (June)	Crude protein (%)	RFQ <sup>a</sup>	Yield (t/a)	Harvest date (June)
	Madison	Arlington	Mean					
		2006			2003–2005		2004–2006	
Hazen	1.48*	1.26	1.37	9	12.4	115.1	1.61	9
Kewaunee	1.69*	1.78*	1.73*	7	12.4	114.5	1.75	9
Lacey	1.42*	1.66*	1.54*	6	12.9	115.9	1.58	9
Royal	1.30	1.17	1.24	9	14.9	126.9	1.42	10
LSD (0.05)	0.35	0.40	0.27		0.63	3.65	0.13	

\*Varieties not significantly different from highest yielding variety in the trial.

<sup>a</sup>RFQ=Relative feed quality. Relative feed quality can be used to make comparisons among varieties, but should not be used to compare with other crops such as alfalfa.

**RYE**

Table 8. Winter rye variety descriptions

Variety	Origin	Year released	Seed color	Maturity	Height	Straw strength	Test wt.	Leaf rust resistance <sup>a</sup>	PVP <sup>b</sup>	Wis. certified
Aroostook	NY	1981	brown/tan	early	tall	poor	low	—	no	no
Dacold	ND	1989	bluish-green	late	med	good	low	—	no	no
Hancock	WI	1979	tan	med	tall	good	high	R	no	yes
Spooner	WI	1993	tan	med	tall	v. good	high	R	yes	yes
Rymin	MN	1973	greenish-gray	med-late	med	good	high	—	no	no

<sup>a</sup>Leaf rust resistance: R = resistant or moderately resistant, — = information not available.

<sup>b</sup>PVP = Plant Variety Protection. A “yes” indicates that these varieties cannot be reproduced and sold as seed by variety name without certification.

Table 9. Winter wheat public variety descriptions

**WHEAT**

Variety	Origin	Year released	Type	Awns	Ht. <sup>a</sup>	Stem strength	Test wt. <sup>b</sup>	Winter hardiness	Disease resistance <sup>c</sup>				Wis PVP <sup>e</sup> cert.		
									BYDV <sup>d</sup>	Leaf rust	Stem rust	Powd. mildew		Scab	
Cardinal	Ohio	1986	soft red	N	med	med	med	excel	—	R	—	I	—	Y	Y
Hopewell	Ohio	1995	soft red	N	med	strong	med	excel	—	S	—	I	S	Y	Y
Kaskaskia	Illinois	1998	soft red	Y	med	med	med	good	—	I	S	S	R	Y	Y
Truman	Missouri	2003	soft red	N	tall	med	high	good	S	I	I	S	R	Y	Y

<sup>a</sup>Height at maturity: short = <38 inches, med = 38–42 inches, tall = > 42 inches.

<sup>b</sup>Test weight: low = <53 lb/bu, med = 53–56 lb/bu, high = >56 lb/bu.

<sup>c</sup>Disease resistance: R = resistant or moderately resistant, I = intermediate or some tolerance, S = moderately susceptible or susceptible, — = information not available.

<sup>d</sup>BYDV = barley yellow dwarf virus.

<sup>e</sup>PVP = Plant Variety Protection. A “yes” indicates that these varieties cannot be reproduced and sold as seed by variety name without certification.

Table 10. Performance of winter wheat varieties in Wisconsin (2005–2006)

**WHEAT**

Variety	Entry	Class <sup>a</sup>	— 2006 means —				Arlington		Janesville		Racine		Chilton		2-yr mean yield (bu/a)
			Yield (bu/a)	TW <sup>b</sup> (lb/bu)	Ht. (in.)	Lodge <sup>c</sup>	Yield (bu/a)	TW <sup>b</sup> (lb/bu)	Yield (bu/a)	TW <sup>b</sup> (lb/bu)	Yield (bu/a)	TW <sup>b</sup> (lb/bu)			
Public	Cardinal	SR	84	56.2	40	2	59	52.7	85	58.1	96	56.0	97	57.8	79
	Hopewell	SR	90	55.6	38	2	54	51.4	95	58.3	97	55.4	113*	57.2	81
	Kaskaskia	SR	95*	58.0	41	3	76	56.0	100*	60.2	109*	57.5	96	58.1	86*
	Truman	SR	91	57.9	38	3	75	56.6	96	59.5	83	56.1	108	59.2	80
Diener	D 490 W	SR	99*	56.8	38	3	91*	55.1	94	58.3	101	56.2	110	57.4	
	D 495 W	SR	92	58.1	38	3	66	55.8	96	60.6	97	57.1	108	59.0	81
	D 510 W	SR	91	57.3	40	3	62	54.6	98	58.8	96	57.2	107	58.7	
	XW 48	SR	90	56.9	39	3	60	53.5	90	59.6	96	56.8	113*	57.7	83
Gristmill	Excel 211	SR	90	57.5	41	2	65	55.2	95	59.9	104	56.6	96	58.1	80
	Excel 333	SR	95*	56.5	39	3	74	54.2	98	58.5	100	56.5	108	57.0	82
	Excel 352 TW	SR	88	57.1	40	3	61	54.0	85	59.5	98	57.2	108	57.8	81
	Excel 361	SR	92	59.2	40	2	77	58.0	86	60.4	100	58.3	105	60.3	
	Excel 399	SR	97*	56.8	40	2	73	54.1	98	58.5	106*	56.9	110	57.7	84
	Excel 410TW	SR	99*	57.6	40	2	77	55.1	103*	59.4	102	57.5	112*	58.5	
	Excel 442	SR	92	55.7	40	3	68	53.5	95	57.1	103	55.4	101	56.7	
FS Seeds	GM 305	SR	96*	57.9	38	2	74	55.4	88	59.8	101	57.3	121*	59.3	
	FS 634	SR	93	56.9	40	2	69	54.4	100*	59.1	98	56.5	106	57.5	80
	FS 637	SR	99*	57.0	38	2	82*	56.2	99*	58.8	100	55.6	113*	57.6	
	FS 645	SR	95*	58.2	40	3	65	55.8	96	60.1	108*	57.6	111*	59.1	
	FS 657	SR	80	56.2	41	4	45	52.8	91	59.0	89	55.8	94	57.3	
	FS 8309	SR	91	56.9	37	2	64	54.5	93	58.9	99	56.3	108	57.9	80
Jung	5988	SR	95*	57.1	41	3	67	55.0	95	58.4	95	56.5	122*	58.6	
	5804	SR	95*	58.0	38	3	73	56.4	92	59.8	97	56.4	118*	59.6	80
Kaltenberg	KW 48	SR	82	54.1	40	4	56	47.1	78	56.8	102	56.5	93	56.2	71
	KW 51	SR	95*	57.9	38	3	74	56.0	98	60.0	90	56.9	118*	59.0	85*
	KW 53	SR	96*	56.8	38	3	79	54.5	97	58.9	104	56.1	104	57.6	81
	KW 55	SR	99*	57.3	40	3	85*	54.9	106*	58.6	92	56.9	112*	58.9	85*
	KW 58	SR	90	57.1	40	2	70	53.5	94	59.2	103	57.4	92	58.3	82
	KW 59	SR	87	55.6	41	4	63	52.5	97	58.3	91	55.2	97	56.5	
	KW 60	SR	96*	57.1	40	2	71	55.4	94	58.7	101	56.6	117*	57.9	

(continued)

Table 10. Performance of winter wheat varieties in Wisconsin (2005–2006)— *continued*

Variety	Entry	Class <sup>a</sup>	— 2006 means —				Arlington		Janesville		Racine		Chilton		2-yr mean yield (bu/a)
			Yield (bu/a)	TW <sup>b</sup> (lb/bu)	Ht. (in.)	Lodging <sup>c</sup>	Yield (bu/a)	TW <sup>b</sup> (lb/bu)	Yield (bu/a)	TW <sup>b</sup> (lb/bu)	Yield (bu/a)	TW <sup>b</sup> (lb/bu)	Yield (bu/a)	TW <sup>b</sup> (lb/bu)	
Pioneer	25R37	SR	94	57.9	36	3	82*	57.1	90	59.5	90	56.3	115*	58.6	79
	25R47	SR	101*	55.6	36	2	80*	52.8	100*	57.1	109*	55.3	114*	57.1	90*
	25R51	SR	98*	55.2	37	3	80*	52.6	90	57.6	115*	55.4	106	55.4	
	25R63	SR	98*	55.4	36	3	72	51.4	98	57.7	111*	55.6	109	57.0	
	25R78	SR	103*	57.1	35	2	88*	55.1	100*	59.0	103	56.0	122*	58.3	83
Pro Seed Genetics	Pro 200	SR	92	58.1	41	3	64	56.8	96	59.4	106*	57.7	100	58.6	85*
	Pro EX 210	SR	89	57.3	39	3	63	54.5	96	59.0	96	56.8	99	59.0	80
	Pro EX 220	SR	91	59.1	40	2	67	58.0	90	60.7	92	57.8	114*	59.8	85*
Seed-link	Carlisle	HR	88	59.0	36	2	66	56.1	85	60.6	91	58.7	108	60.6	80
	Harvard	HR	84	58.3	40	2	60	55.8	78	59.1	92	58.0	106	60.2	82
	Maxine	HR	85	58.4	39	3	63	55.8	83	59.8	90	58.4	105	59.8	77
	ACS 97003	HR	80	57.1	37	3	53	52.9	83	59.5	96	57.3	87	58.8	77
DynaGro	DG 403	SR	91	56.6	39	3	75	54.2	92	58.7	95	55.8	102	57.6	79
	DG 410	SR	96*	57.1	39	1	70	54.6	100*	58.7	101	56.7	111*	58.5	80
	DG 419	SR	90	57.2	40	2	62	54.9	99*	59.2	99	56.9	101	58.0	79
Public - exp	IL 99-15867	SR	93	56.8	37	3	78	54.5	95	58.4	81	55.8	117*	58.4	
	IL 00-1665	SR	97*	57.0	37	3	82*	55.8	87	57.5	103	56.8	114*	57.9	
	OH 708	SR	90	55.5	40	2	67	52.6	84	56.5	95	55.8	112*	57.1	
	OH 776	SR	85	57.5	39	3	50	54.6	85	59.4	104	57.3	99	58.7	
	P 981359C1-4-2-1-8	SR	93	59.6	42	2	67	57.6	97	61.0	97	59.0	109	60.7	79
	P 99608C1-1-3-4	SR	97*	56.9	38	2	82*	55.4	96	58.6	103	56.2	108	57.5	
	P 99840C4-8-4	SR	98*	58.6	37	2	79	56.3	94	60.4	94	58.3	124*	59.5	
VA 02W-513	SR	98*	58.5	33	2	70	56.2	100*	60.8	100	57.6	123*	59.5		
Mean			93	57.2	39	3	70	54.7	94	59.1	99	56.7	108	58.3	81
LSD (0.10) <sup>d</sup>			8	0.9	1	1	11	1.3	7	1.1	10	0.7	13	0.7	5

\* Varieties not significantly different (0.10 level) from the highest yielding cultivar.

<sup>a</sup> Class abbreviations: SR= soft red winter, HR= hard red winter.

<sup>b</sup> TW = test weight.

<sup>c</sup> Lodging rankings are based on the Belgian Lodging System. Values are rounded to whole numbers (0 = none, 9 = severe).

<sup>d</sup> The LSD (least significant difference) figures are a statistical measure of variation within the trial. If the differences between two varieties is equal to or greater than the LSD, then the values are significantly different. If the difference is less than the LSD, then the value difference may have been due to other factors.



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