

# 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, and disease resistance. Disease ratings are performed by the Department of Agronomy for oats and barley. Winterhardiness should be taken into account when selecting a winter wheat variety, and 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).

The following tables describe small grain varieties and give performance data for the past 3 years in Wisconsin. Remember, variety performance is greatly



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	110	Sept. 23	Aug. 6
Arlington (barley, oat)	P. Ehrhardt, J. Albertson	silt loam	6.0	50	April 8	Aug. 19
Chilton (wheat)	Kolbe Seeds, M. Glewen	red clay	7.5	110	Sept. 24	July 28
Chilton (barley, oat)	Kolbe Seeds, M. Glewen	red clay	12.0	75	April 29	Aug. 23
Janesville	Rock Co. Farm, J. Stute	silt loam	7.5	60	Sept. 22	July 27
Lancaster (barley)	T. Wood	silt loam	7.5	0*	April 13	Aug. 2
Madison	R. Duerst, J. Mochon	silt loam	6.0	0*	April 13	Aug. 3
Marshfield	M. Bertram	silt loam	6.0	30*	April 29	Aug. 12
Racine	Henderson Seeds	silt loam	7.5	60	Oct. 6	July 26
Spooner (wheat)	P. Holman	sandy loam	8.0	100	Sept. 25	Aug. 15
Spooner (barley, oat)	P. Holman	sandy loam	8.0	66	April 15	Aug. 20
Sturgeon Bay	R. Weidman	silt loam	12.0	48	May 3	Aug. 16

\*Nitrogen credited from previous alfalfa or soybean.

influenced by weather, thus it is important to review previous growing seasons.

## Winter hardiness evaluation

Forty-six winter wheat varieties were evaluated for winter hardiness in 2004. All varieties were planted at the Spooner Research Station on September 25, 2003 and counted in April 2004. Table 10 summarizes the percent stand survival and production variables.

## Growing conditions

**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.

**2003 Season.** Growing conditions in 2003 were excellent for winter wheat and other small grains in Wisconsin. Surprising to many, winter survival was adequate despite the cold and open winter conditions. A cool spring helped small grains tiller while the dry summer minimized the incidence of most fungal and bacterial diseases common to small grains. Grain yield and test weights were well above historical averages throughout the state.

The record yield average set for Wisconsin in 2003 was 68.3 bushels per acre, a 12% increase over 2002. The number of harvested wheat acres increased slightly to 180,000 acres. Winter and spring wheat accounted for 175,000 and 5,000 acres respectively.

Oat yields averaged 67 bushels to the acre. The increase of 7 bushels per acre over 2002 production was mostly offset by a reduction in the total acreage planted to oats (down by 50,000 acres). The state fell from second to fourth place ranking in the nation.

Barley yields were 55 bushels per acre, up 10 bushels per acre over last year. Total barley production in Wisconsin increased from 1.8 to 1.93 million bushels. Acreage was reduced to 55,000 acres planted and 35,000 harvested as grain.

**2002 Season.** Growing conditions in 2002 were fair to good for winter wheat and spring-planted grains. Winter survival of wheat was excellent due to adequate snow cover and moderate temperatures. Exceptionally cool conditions in May slowed plant growth and drier conditions during July reduced yield at many locations, especially in southern Wisconsin.

Wisconsin moved from a third place ranking in oat production to second place, behind Minnesota. A jump in the number of harvested acres moved the total production from 12.5 million bushels last year to 15.0 million bushels this year. There were 250,000 acres of oats harvested with yields dropping 4 bushels to 60 bushels per acre.

Increased acreage was planted to wheat in 2002, allowing total production to show an increase despite a lower yield. There were 177,000 acres harvested for grain with a yield of 60.9 bushels per acre, declining 3.2 bushels from 2001. Of the total acres, winter wheat accounted for 170,000 acres harvested for grain. Winter wheat production was 10.5 million bushels with an average yield of 62 bushels per acre.

Barley acreage in Wisconsin increased from last year, but was still lower than 2 years ago. Farmers harvested 40,000 acres for grain. Yields fell 7 bushels from 2001 and 19 bushels per acre from 2000.

*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, and Esker 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. They are available at your county Extension office or online at [soybean.uwex.edu/library/grain/](http://soybean.uwex.edu/library/grain/).

*Pest Management in Wisconsin Field Crops (A3646)*—updated annually

*The Wisconsin Certified Seed Directory*

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

**OAT**

Variety	Origin	Year released	Kernel color	Maturity <sup>a</sup>		Lodging	Test wt <sup>c</sup> (lb/bu)	Kernel protein	Disease resistance <sup>d</sup>						PVP <sup>f</sup>	Wis. cert.
				(head date)	Ht <sup>b</sup> (in.)				Leaf rust	Stem rust	Sep-toria	Smut	BYDV <sup>e</sup>			
<b>Recommended varieties</b>																
Dane	Wisconsin	1990	yellow	6-22	38	med	36	med	I	I	S	R	I	yes	yes	
Drumlin	Wisconsin	2003	yellow	6-29	40	weak	37	med	R	I	—	R	R	yes	yes	
Esker	Wisconsin	2004	yellow	6-26	39	med	37	med	R	I	—	R	I	yes	yes	
Gem	Wisconsin	1996	yellow	6-27	41	med	37	med	R	R	—	I	R	yes	yes	
Leonard	Minnesota	2003	yellow	7-1	42	weak	35	med	R	I	—	R	R	yes	no	
Moraine	Wisconsin	2001	yellow	6-25	42	med	37	med	R	—	—	R	I	yes	yes	
Richard	Minnesota	2000	yellow	6-27	44	strong	36	med	R	R	—	R	I	yes	yes	
Sesqui	Minnesota	2001	yellow	7-1	41	med	37	med	I	—	—	R	I	yes	no	
Vista	Wisconsin	1999	yellow	6-29	43	med	35	low	R	R	—	R	I	yes	yes	
Wabasha	Minnesota	2001	white	6-28	41	med	37	med	R	—	—	R	I	yes	yes	
<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	
Horicon	Wisconsin	1989	tan	med	med	med	med	med	I	I	S	R	I	yes	no	
Jim	Minnesota	1996	yellow	med	med	med	med	med	I	I	—	—	R	no	yes	
Ogle	Illinois	1981	yellow	med	med	med	med	low	S	S	S	S	R	no	yes	
Prairie	Wisconsin	1992	tan	med	med	med	med	low	S	I	R	I	R	yes	no	
Troy	S. Dakota	1991	white	med	med	med	high	med	I	R	—	R	I	no	no	

<sup>a</sup> Maturity (month-day) as indicated by heading date in 16 Wisconsin tests conducted 2002–2004. 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 19 Wisconsin tests conducted 2002–2004. 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 19 Wisconsin tests conducted 2002–2004. 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.

Variety	Mean	Southern			Northern			
		Arlington	Lancaster	Madison	Chilton	Spooner	Sturgeon Bay	Marshfield
<b>2004 YIELDS</b>								
2004 yields (bu/a)								
<b>Early maturing</b>								
Dane	112	144	—	119	102*	72	125	107
Jim	108	123	—	120	95*	76	122	110
Moraine	115	155*	—	126	96*	75	118	121
<b>Midseason</b>								
Esker	128*	160*	—	145*	101*	96*	136*	130*
Gem	111	132	—	122	86	84	125	114
Ogle	115	130	—	115	94*	99*	131*	118
Richard	106	128	—	125	93*	78	99	114
Wabasha	111	130	—	122	75	89	140*	111
<b>Mid- to late-season</b>								
Drumlin	133*	162*	—	135*	104*	109*	149*	137*
Vista	116	145	—	126	91*	93	120	120
<b>Late maturing</b>								
Belle	111	149	—	117	104*	86	107	102
Leonard	112	128	—	121	87	94	130*	114
Sesqui	114	123	—	111	93*	96*	138*	121
Mean	115	139	—	123	94	88	126	117
LSD (0.05) <sup>a</sup>	6	9	—	13	13	14	21	15

Variety	2002-'04		2002-'03	2002-'04		2002, 2004		2002-'04	
	Mean	SE	Mean	Mean	SE	Mean	SE	Mean	SE
<b>HISTORIC YIELDS</b>									
<b>Early maturing</b>									
Dane	111		166	116	129	100	67	95	93
Jim	109		156	119	132	94	64	96	88
Moraine	111		164	116	135	96	68	92	95
<b>Midseason</b>									
Esker	127*		179*	137*	153*	104*	77	118*	110*
Gem	113		155	116	134	91	75	108	99
Ogle	117		156	129	130	95	78	119*	101
Richard	113		157	131	135	98	73	93	97
Wabasha	113		154	122	131	89	75	110	99
<b>Mid- to late-season</b>									
Drumlin	129*		172	143*	143	109*	91*	124*	111*
Vista	114		150	136*	136	92	79	101	102
<b>Late maturing</b>									
Belle	114		161	132	137	101	70	99	87
Sesqui	115		151	126	128	96	79	108	107*
Mean	116		160	127	135	97	75	105	99
LSD (0.05) <sup>a</sup>	3		5	10	7	6	9	10	7

\*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	Crude protein (%)	RFV <sup>a</sup>	Yield (t/a)	Harvest date
	Madison	Arlington	Mean					
	2004				2002-'03		2002-'04	
Belle	2.17	2.66	2.42	6-20	10.5	83.4	2.54	6-23
Dane	2.15	1.99	2.07	6-13	12.4*	85.6	2.01	6-15
Drumlin	2.11	2.35	2.23	6-18	11.9	81.8	2.38	6-21
Esker	2.03	2.07	2.05	6-15	12.3*	83.6	2.17	6-19
ForagePlus	3.11*	3.18*	3.15*	6-29	11.1	80.8	3.25*	6-30
Gem	2.25	2.19	2.22	6-17	12.5*	84.4	2.24	6-20
Jim	2.05	1.98	2.01	6-14	12.5*	88.3*	2.08	6-17
Leonard	2.51	2.59	2.55	6-22	—	—	—	—
Moraine	2.03	2.05	2.04	6-15	12.7*	89.7*	2.09	6-19
Ogle	2.15	2.10	2.13	6-17	11.9	84.8	2.22	6-20
Richard	2.22	2.03	2.13	6-17	12.6*	87.0	2.31	6-20
Sesqui	2.43	2.67	2.55	6-20	11.7	81.6	2.53	6-23
Vista	2.51	2.58	2.55	6-18	11.1	81.2	2.59	6-18
Wabasha	2.29	2.38	2.34	6-18	11.5	82.4	2.47	6-21
LSD (0.05)	0.31	0.20	0.18		0.6	1.9	0.09	

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

<sup>a</sup>RFV= Relative feed value. Relative feed values 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	6-20	35	med	47	—	R	S	—	R	yes	no
Hazen	N. Dakota	1984	Smooth	feed	6-21	36	med	47	S	R	S	I	R	no	yes
Kewaunee	Wisconsin	1997	Smooth	feed	6-21	36	med	46	R	R	—	R	R	yes	yes
Lacey	Minnesota	2000	Smooth	malt	6-21	35	med	48	—	R	S	—	R	yes	no
Robust	Minnesota	1983	Smooth	malt	6-21	37	med	47	S	I	S	S	R	yes	yes
Stander	Minnesota	1993	Smooth	feed	6-21	34	strong	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	—	med	med	med	high	R	R	S	S	R	yes	no

<sup>a</sup>Maturity (month-day) as indicated by heading date in 20 Wisconsin tests conducted 2002–2004. 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 2002–2004. 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 20 Wisconsin tests conducted 2002–2004. 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>2004 YIELDS</b>		2004 yields (bu/a)						
Drummond	74*	74	62*	67	51*	74*	74*	114*
Hazen	67	76*	53	74*	47	75*	68*	87
Kewaunee	70	83*	58	75*	49*	84*	65*	89
Lacey	71*	77*	68*	71*	57*	74*	73*	85
MNBrite	62	73	53	78*	55*	55	55	74
Robust	61	65	52	63	48*	62	59	82
Stander	68	74	60	71*	54*	67	68*	90
Mean	68	75	58	71	52	70	66	89
LSD (0.05) <sup>a</sup>	3	7	8	8	9	12	10	11
<b>HISTORIC YIELDS</b>		2002-'04			2002, 2004		2002-'04	
Drummond	75	101*	66*	83	71*	63*	55*	81*
Hazen	75	103*	64*	89*	66	66*	53*	75
Kewaunee	78*	110*	68*	91*	70*	68*	54*	76*
Lacey	76*	108*	69*	89*	74*	60	54*	69
MNBrite	68	97	56	87*	62	55	47	64
Robust	67	91	58	81	64	55	46	67
Stander	74	103*	68*	88*	70*	59	53*	72
Mean	73	102	64	87	68	61	52	72
LSD (0.05) <sup>a</sup>	2	10	5	5	4	5	6	5

\*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	Crude protein %	RFV <sup>a</sup>	Yield (t/a)	Harvest date
	Madison	Arlington	Mean					
	2004			2002-'03		2002-'04		
Hazen	1.72*	1.84*	1.78*	6-9	13.1	85.3	1.90*	6-14
Kewaunee	1.83*	1.65*	1.74*	6-9	13.2	86.3	1.89*	6-13
Lacey	1.79*	1.60	1.66*	6-9	13.4	84.6	1.78	6-13
Royal	1.55*	1.61	1.58	6-9	15.9*	96.2*	1.48	6-13
LSD (0.05) <sup>b</sup>	0.31	0.20	0.18		0.6	1.9	0.09	

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

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

<sup>b</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.

Table 8. Winter rye variety descriptions

**RYE**

Variety	Origin	Year released	Seed color	Maturity	Height	Straw strength	Test weight	Leaf rust resistance <sup>a</sup>	PVP <sup>b</sup>	Wis. certified
Hancock	Wisconsin	1979	tan	med	tall	good	high	R	no	yes
Spooner	Wisconsin	1993	tan	med	tall	v. good	high	R	yes	yes
Frederick	S. Dakota	1984	tan	med	tall	poor	high	S	no	no

<sup>a</sup>Leaf rust resistance: R = resistant or moderately resistant, I = intermediate or some tolerance, S = moderately susceptible or susceptible.

<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>				PVP <sup>e</sup>	Wis cert.	
									BYDV <sup>d</sup>	Leaf rust	Stem rust	Powd. mildew			
Cardinal	Ohio	1986	soft red	N	med	med	med	excel	—	R	—	I	—	Y	Y
Glacier	Wisconsin	1991	soft red	N	med	med	med	excel	R	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

<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.

<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.

— = information not available.

Table 10. Performance of winter wheat varieties in Wisconsin (2003–2004)

**WHEAT**

Brand	Variety	Type <sup>a</sup>	2004 means				2004 yields <sup>d</sup>				2-year <sup>e</sup> mean yield	Winter survival test, Spooner, WI			
			Yield (bu/a)	TW <sup>b</sup> (lb/bu)	Scab <sup>c</sup> (%)	Ht. (in.)	ARL	JAN	RAC	CHL		WS <sup>f</sup> (%)	Yield (bu/a)	TW <sup>b</sup> (lb/bu)	Ht. (in.)
Public	Cardinal	SR	76.7	54.7	23	41	70.8	53.8	87.5	94.6	87.5	100	44.1	51.7	36
	Glacier	SR	70.0	54.4	24	42	64.2	56.8	73.2	86.0	80.1	100	44.4	51.5	40*
	Hopewell	SR	73.0	54.5	43	39	55.2	74.2*	80.5	82.0	86.5	86	49.9	51.3	33
	Kaskaskia	SR	73.2	55.1	40	41	71.9	61.9	68.9	90.3	89.6	53	40.0	54.6*	35
AgriPro	Benton	SR	78.8	54.3	25	36	68.2	66.5	86.4	94.2	90.4	100	64.0*	52.5	32
	Douglas	SR	61.2	49.6	45	39	50.5	57.5	71.1	65.7	80.0	100	53.3	53.2	33
Diener	D 498 WB	SR	79.8	55.5	21	41	79.1*	71.1	82.6	86.3		100	53.7	55.9	37
	D 500 W	SR	75.9	54.2	28	40	65.2	63.4	78.3	96.5*	88.0	100	56.9	52.6	38*
	D 502 W	SR	76.8	53.9	38	38	64.6	67.0	80.5	95.3*	89.0	100	63.8*	52.6	36
	DXW 41	SR	85.2*	56.9	29	37	74.4*	80.5*	87.9	98.0*		100	58.2	56.7*	35
Growmark	FS 450	SR	74.5	54.1	29	40	69.2	59.7	78.1	91.3	87.6	100	52.0	53.2	34
	FS 652	SR	71.9	52.9	35	36	52.6	73.8*	82.8	78.4	84.8	100	45.4	50.6	32
	EX 634	SR	75.2	54.1	28	39	66.4	65.4	76.4	92.6		100	60.0*	51.4	37
	EX 8302	SR	83.8*	55.6	25	38	75.5*	75.6*	81.0	102.9*		100	65.2*	54.0	34
	EX 8309	SR	85.2*	56.7	16	38	76.3*	79.7*	92.6*	92.2		100	59.4	53.8	34
Jung	5804	SR	87.5*	57.3	29	38	74.2*	78.5*	94.6*	102.7*		100	61.3*	54.1	33
	5880	SR	77.3	53.4	37	39	67.0	65.6	85.6	91.1	88.5	86	61.5*	52.7	34

(continued)

Table 10. Performance of winter wheat varieties in Wisconsin (2003–2004)—*continued*

Brand	Variety	Type <sup>a</sup>	2004 means				2004 yields <sup>d</sup>				2-year <sup>e</sup> mean yield	Winter survival test, Spooner, WI			
			Yield (bu/a)	TW <sup>b</sup> (lb/bu)	Scab <sup>c</sup> (%)	Ht. (in.)	ARL	JAN	RAC	CHL		WS <sup>f</sup> (%)	Yield (bu/a)	TW <sup>b</sup> (lb/bu)	Ht. (in.)
Kaltenberg	KW 34	SR	78.5	54.6	31	41	69.1	64.2	78.9	102.0*	88.8	99	60.0*	51.0	36
	KW 38	SR	77.1	53.9	24	39	73.4	60.0	82.6	92.4	90.6	100	63.1*	54.3	37
	KW 39	SR	72.1	52.6	30	41	56.5	52.2	89.6*	90.0	85.6	96	56.5	51.9	36
	KW 43	SR	75.0	52.8	45	34	59.9	61.4	81.1	97.8*	88.0	99	56.1	51.8	28
	KW 44	SR	77.3	54.3	33	39	67.0	66.5	83.8	91.9	90.3	99	59.1	53.6	34
Pioneer	25R37	SR	76.0	55.2	25	37	65.8	75.5*	91.1*	77.0	89.3	100	55.6	52.9	32
	25R47	SR	84.2*	53.6	42	36	77.1*	58.9	92.8*	97.1*	97.5*	98	66.7*	52.2	31
	25R49	SR	69.4	54.6	30	35	55.8	55.9	76.1	76.3	83.4	100	50.7	52.3	31
	25R78	SR	84.6*	55.7	38	35	64.1	70.3	87.5	102.1*	94.2*	100	66.8*	54.2	31
Pro Seed Genetics	Pro 110	SR	73.9	55.6	41	35	61.4	69.7	74.2	86.2		99	43.9	55.0	29
	Pro 200	SR	75.5	56.2	22	40	70.7	60.7	80.7	89.9	86.1	100	50.9	53.3	34
Seed-link	ACS 51017	HR	74.2	54.2	46	38	59.7	61.7	81.0	94.5		100	47.0	53.7	31
	ACS 51030	HR	69.9	53.5	46	35	61.5	57.5	72.6	88.0	82.9	100	57.1	54.5*	29
	ACS 52026	HR	60.1	50.6	64	38	49.6	48.1	68.2	74.8		100	42.4	53.2	31
	ACS 52062	HR	78.4	55.2	20	35	74.9*	69.9	81.9	87.1	88.0	100	68.0*	53.2	32
	ACS 97003	HR	75.4	57.0	26	38	73.8	64.2	71.6	91.9		100	59.7	51.5	34
	ACS 98009	HR	71.5	55.0	33	45*	66.3	56.5	79.1	84.1	85.1	100	56.7	53.2	40*
Public - exp	ACS 98091	HR	74.5	55.9	53	37	60.6	64.4	80.0	93.0	87.4	100	54.6	53.5	33
	Harly	HR	70.9	58.3*	19	44*	59.1	58.7	85.7	80.0		94	64.8*	53.5	39*
	OH 669	SR	71.7	53.1	25	40	60.9	57.5	83.7	84.8	89.6	100	54.5	51.8	35
	OH 708	SR	74.8	53.8	29	42	62.7	64.1	81.7	90.9		100	57.3	50.8	39*
	Rodan	SR	69.9	53.1	42	39	53.8	58.8	76.9	90.3		100	45.4	51.5	35
	Sonny	SR	69.0	53.4	42	39	52.2	66.7	73.7	83.4		99	59.9*	51.1	33
	Tatoo	HR	61.0	51.2	51	42	52.3	55.5	72.6	63.6		99	53.1	52.8	36
Titan	HR	58.7	52.0	50	39	47.7	50.7	67.3	69.1	76.3	96	51.4	52.9	34	
	P981359C1	SR	80.6	59.7*	17	40	73.2	58.9	86.1	104.4*		100	52.0	55.6*	38*
Mean			74.7	54.5	33	39	64.0	63.7	80.8	88.9	87.2	98	55.0	52.8	34
LSD(0.10)			6.7	1.6	9	2	5.2	8.6	6.5	9.6	4.4	3	8.2	2.3	2

\* Varieties not significantly different (0.10 level) from the highest yielding variety in the trial.

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

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

<sup>c</sup> Scab disease or head blight is a rating of the percent of immature spikelets that are bleached.

<sup>d</sup> ARL=Arlington, JAN=Janesville, RAC=Racine, CHI=Chilton.

<sup>e</sup> Two-year mean yields are based on an 8-test mean from the four sites in 2003 and 2004.

Does not include the winter survival test site in Spooner.

<sup>f</sup> WS = winter survival, a rating of percent stand in late spring.



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