A1196-13

North Dakota Hard Winter Wheat

Variety Trial Results for 2013 and Selection Guide

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During the 2012-13 growing season, 220,000 acres were planted to winter wheat, with 205,000 acres harvested. The area harvested was down substantially from last year's record area harvested of 700,000 acres. The state's winter wheat yield this season was estimated at 43 bushels per acre (bu/a), which also is down from last year's yield of 55 bu/a. Establishing winter wheat was problematic due to dry conditions in the fall of 2012, which not only impacted the area planted, but increased winter injury because the seedlings going into the winter were small and stressed.

Due to relatively dry conditions during grain filling, little disease pressure occurred. However, we received isolated reports of damage due to scab, but generally the crop was of good quality.

Jerry was the most popular variety in 2012-13, occupying 32 percent of the acres planted. Decade, Hawken, Wesley and Overland followed Jerry in popularity with 11, 6, 6 and 5 percent of the acreage, respectively.

Characteristics of hard red winter wheat varieties adapted for production in North Dakota are described in Table 1. Information on the agronomic performance of selected varieties is summarized in subsequent tables. Yields are expressed on 13 percent moisture. Successful winter wheat production depends on numerous production practices, including selecting the right variety for a particular area. The information included in this publication is meant to help growers choose that variety or group of varieties.

Characteristics to consider when selecting a variety are winter hardiness, yield potential in your area, test weight, protein content when grown with proper fertility, straw strength, plant height, reaction to important diseases and maturity. The recommended seeding dates for winter wheat are Sept. 1-15 north of North Dakota Highway 200 and Sept. 15-30 in southern regions. Planting after the recommended dates reduces winter survival and grain yield. Planting prior to the recommended date may deplete soil moisture reserves unnecessarily. It also increases the risk of wheat streak mosaic virus and may reduce winter survival.

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NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION
Fargo, North Dakota 58108

December 2013

Winter wheat should be seeded at a rate of 1 million to 1.2 million viable seeds per acre, or about 80 to 100 pounds per acre. Higher seeding rates should be used for late seeding or poor seedbed conditions. Producers should consider only the most winter-hardy varieties available when growing winter wheat in North Dakota. Relative ratings for winter hardiness are found in Table 1.

Phosphorus (P) aids overwinter survival by stimulating root growth and fall tillering. The secondary root system that develops during tillering is essential for a healthy, deep-rooted plant capable of withstanding stress. If winter wheat is planted on bare soil, an application of phosphorus is recommended, particularly if soil P levels are known to be low. While important, the contribution of phosphorus to overwinter survival is secondary to varietal hardiness. For more production information, see NDSU Extension Service publication EB33, "Winter Wheat Production in North Dakota" *(www.ag.ndsu.edu/pubs/plantsci/smgrains/eb33w.htm).*

Data from several years and locations should be used when selecting varieties. The idea that data from a single location nearest your farm will indicate which variety will perform the best for you next year is incorrect. You should select varieties that, on average, perform the best at multiple trial locations near your farm across several years.

List of Tables

Table 1. 2013 North Dakota hard winter wheat variety description and agronomic traits.

Variety	Agent or Origin[2]	Year	Reaction to Disease[1]				Maturity[3]	Straw[4] Strength	Height[5] (inches)	Winter[6] Hardiness
			Stripe Rust	Leaf Rust	Stem Rust	Scab				
AC Broadview	Can.	2011	MS	R	R	S/VS	0	5	36	4
AC Radiant[7]	Can.	2005	R	S	S	S	+1	2	36	2
Accipiter	W.Ag	2008	NA	MS	R	S	0	4	36	2
Alice[8]	SD	2006	NA	S	MR	S	-3	5	33	5
Art	Agripro	2008	R	R	R	MS	-4	4	33	8
Boomer	WB	2009	MS	MR	R	S	0	4	34	3
Carter	WB	2010	S	NA	NA	S	0	4	32	6
CDC Buteo	WB	2004	NA	MS	NA	S	0	6	36	2
CDC Falcon	WB	2000	MS	MS	NA	S	0	5	34	4
Darrell	SD	2006	NA	S	R	MS	-2	4	35	6
Decade	MT/ND	2010	S	VS	R	VS	-2	4	35	2
Expedition	SD	2002	MS	MS	R	S	-3	4	34	4
Flourish	Can.	2011	MR	MS	MS	S	0	5	35	2
Freeman	ARS-NE	2013	MR/S	MR/S	MR/MS	MS	-3	4	33	6
Hawken	Agripro	2007	S	MR	MR	S	-3	4	28	7
Ideal	SD	2011	NA	R	MR	S	-1	5	33	5
Jagalene	Agripro	2002	MS	S	MR	VS	-2	4	33	6
Jerry	ND	2001	MR	MR	R	S	0	4	37	3
Lyman	SD	2008	MS	R	R	MR	-2	7	35	5
Mace	ARS-NE	2008	NA	MS	R	MS	0	4	33	5
McGill	ARS-NE	2010	MS	MS	MR	MS	-3	4	36	4
Millennium	NE/SD	1999	MR	MR	MR	S	-2	4	37	6
Moats	Can.	2011	NA	R	R	MR	0	5	38	2
Overland	NE	2006	MR	MR/R	MR	S	-2	4	35	5
Peregrine	W.Ag	2008	R	MR	R	MS	+1	4	39	2
Ransom	ND	1998	NA	MR	MR	S	+1	6	37	3
Robidoux	ARS-NE	2010	MR	MS	MR	S	-1	4	34	6
Roughrider	ND	1975	NA	S	R	MS	0	5	42	2
Smoky Hill	WB	2007	S	R	R	S	0	5	35	7
Striker	WB	2009	MS	MR	R	S	-2	4	32	5
Sunrise[9]	Can.	2011	R	MR	MR	S	0	6	36	3
SY Wolf	Agripro	2010	MS	MR	R	MS	-2	4	33	6
WB Grainfield	WB	2013	MS	MS	NA	S	-3	6	33	6
WB Matlock	WB	2010	MS	MS	R	MS	+1	4	36	2
Wesley	NE/SD/WY	2000	MR	MS	R	S	-3	5	32	6
Yellowstone	MT	2005	R	S	S	VS	+2	6	33	5

[1]R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; VS = very susceptible; NA = not available.
[2]Can. = Canada; W.Ag = Western Ag; WB = WestBred; SD = South Dakota State University; MT = Montana State University; ND = North Dakota State University; ARS = USDA Agricultural Research Service; NE = University of Nebraska; WY = Wyoming.
[3]Days to heading relative to Jerry.
[4]Straw strength = 1 to 9 scale, with 1 strongest and 9 weakest. These ratings may change as additional data become available.
[5]Based on the average of several locations in 2011, and should be used for comparing varieties. The environment can impact the height of varieties.
[6]Relative winter hardiness rating: 1 = excellent, 10 = very poor. These values are subject to change as additional information becomes available.
[7]Curl mite resistant.
[8]White wheat.
[9]Soft red winter wheat.

Table 2. Analytical milling and baking data from field plot variety trials in 2012.

Variety	Test Weight	1,000 KW	Hard-Ness	Falling Number	Protein 12 MB	Flour Extraction	Wet Gluten	Flour Ash	Mixograph Peak Time	Mixograph Peak Height	Farinograph Abs	Farinograph Peak Time	Farinograph Stab	Farinograph MTI	Loaf Volume
	(lb/bu)	(gram)	(score)	(seconds)	(%)	(%)	(%)	(%)	(min.)	(%)	(%)	(min.)	(min.)	BU	(cc)
Boomer	58.5	29.2	68.1	475	11.0	70.6	26.7	0.52	3.8	55.6	55.5	4.3	8.5	30.4	867
Carter	60.0	25.9	78.1	478	11.6	71.0	25.3	0.48	5.4	62.4	56.5	10.6	23.1	19.6	879
Decade	60.3	29.7	68.5	462	11.6	70.4	27.5	0.46	4.9	61.2	56.0	9.1	16.1	31.2	880
Hawken	60.3	30.8	74.2	466	11.7	70.6	28.7	0.49	4.5	59.2	55.8	10.0	25.3	18.0	923
Ideal	60.3	29.9	66.7	430	10.7	71.5	23.4	0.50	5.5	52.4	54.2	12.4	21.1	29.2	868
Jerry	58.9	31.4	67.6	469	11.4	71.5	27.9	0.52	4.4	57.6	55.1	3.9	14.0	23.0	857
McGill	60.5	31.8	69.7	427	10.8	70.7	26.6	0.51	3.4	59.6	56.4	5.7	8.2	34.0	867
Overland	60.3	31.1	69.8	483	11.3	71.4	29.3	0.52	3.0	55.2	55.6	4.0	6.6	40.2	812
Robidoux	59.8	29.9	67.7	455	11.0	70.3	25.5	0.52	4.6	51.0	54.0	5.3	13.5	28.4	899
SY Wolf	60.8	31.3	77.4	437	11.0	70.6	25.3	0.54	4.7	53.8	56.5	5.8	9.1	23.2	865
WB Matlock	60.9	31.3	67.6	458	11.0	71.3	27.3	0.49	4.0	56.2	56.2	5.1	8.8	30.0	852
Wesley	59.8	34.8	68.5	459	12.0	71.6	29.9	0.50	4.1	63.2	56.5	7.5	14.3	19.0	977
LSD 0.05	1.0	2.7	6.1	36	0.6	1.7	2.6	0.04	0.9	4.9	1.2	6.4	10.6	16.5	69

Table 3. Yield of winter wheat varieties grown at three locations in western North Dakota in 2013, with three-year averages (2011-13).

Variety	Williston No Fung.[1]	Williston Fung.	Williston 3-Yr. Avg.	Dickinson No Fung.	Dickinson 3-Yr. Avg.	Minot No Fung.	Minot Fung.	Minot 3-Yr. Avg.	Avg. Western N.D. No Fung.	Avg. Western N.D. Fung.	Avg. Western N.D. 3-Yr. Avg.
	(bu/a)										
AC Broadview	48.3	30.4	--	64.8	--	98.9	115.0	--	70.7	72.7	--
Accipiter	39.5	49.1	57.1	65.0	55.3	93.0	115.9	83.9	65.8	82.5	65.4
Art	14.2	23.8	48.3	61.9	62.5	98.9	107.8	79.9	58.3	65.8	63.6
Boomer	39.8	48.6	57.4	60.8	54.7	90.5	116.3	85.1	63.7	82.5	65.7
CDC Falcon	28.1	37.0	54.7	66.1	61.0	93.7	116.6	83.1	62.6	76.8	66.3
Decade	29.3	30.9	54.2	75.6	64.8	109.1	112.0	89.4	71.3	71.5	69.5
Expedition	32.3	31.5	--	58.5	--	90.3	106.7	76.7	60.4	69.1	--
Flourish	28.9	34.5	--	68.0	--	100.7	112.9	--	65.9	73.7	--
Freeman	33.8	18.6	--	65.1	--	--	--	--	--	--	--
Ideal	33.9	19.4	54.6	71.1	60.2	104.9	115.4	86.3	70.0	67.4	67.0
Jerry	48.7	36.5	54.9	63.5	56.2	90.5	103.4	80.2	67.6	70.0	63.8
Lyman	30.7	41.0	52.1	64.5	62.7	98.5	102.9	79.4	64.6	72.0	64.7
McGill	21.3	18.8	--	55.5	--	84.1	99.0	--	53.6	58.9	--
Moats	55.5	41.5	--	66.1	--	96.8	116.8	--	72.8	79.2	--
Overland	29.5	26.3	55.6	63.5	63.1	98.8	102.9	78.5	63.9	64.6	65.7
Peregrine	40.3	28.2	55.3	72.0	56.5	97.2	101.2	80.4	69.8	64.7	64.1
Robidoux	20.7	20.9	--	45.3	--	79.2	104.8	--	48.4	62.9	--
Sunrise	52.2	47.3	--	74.5	--	93.4	110.8	--	73.4	79.1	--
SY Wolf	25.0	32.8	55.2	72.0	66.6	94.7	111.7	83.3	63.9	72.3	68.4
WB Grainfield	25.6	18.2	--	50.0	--	101.4	102.8	--	59.0	60.5	--
WB Matlock	38.5	33.1	52.9	64.3	54.5	92.4	111.8	81.6	65.1	72.5	63.0
Wesley	24.1	28.5	48.9	63.1	54.2	96.8	107.9	80.1	61.3	68.2	61.1
Mean	33.6	31.7	53.9	64.6	59.4	95.9	108.7	82.0	63.7	68.4	65.2
CV (%)	23.1		--	10.1	--	6.8		--	--	--	--
LSD 0.10	12.1[2]		--	7.7	--	9.4		--	--	--	--

See Table 4 for footnotes.

Table 4. Yield of winter wheat varieties grown at five locations in eastern North Dakota in 2013, with three-year averages (2011-13).

Variety	Carrington		Wishek		Langdon			Prosper			Forman			Avg. Eastern N.D.		
	No Fung.[1]	3-Yr. Avg.	No Fung.	3-Yr. Avg.	No Fung.	Fung.	3-Yr. Avg.	No Fung.	Fung.	3-Yr. Avg.	No Fung.	Fung.	3-Yr. Avg.	No Fung.	Fung.	3-Yr. Avg.
	(bu/a)															
AC Broadview	56.2	48.9	31.0	--	80.1	91.3	--	43.3	51.9	47.6	36.8	47.7	42.3	49.5	63.6	--
Accipiter	63.4	45.6	32.3	28.6	97.7	106.5	77.9	51.4	66.5	59.0	37.9	39.9	38.9	56.5	71.0	50.0
Art	39.3	48.2	21.9	31.6	73.7	79.6	72.1	41.7	45.8	43.8	31.9	42.9	37.4	41.7	56.1	46.6
Boomer	63.0	51.2	29.8	31.9	112.7	102.2	81.8	45.7	58.0	51.9	37.4	47.7	42.6	57.7	69.3	51.9
CDC Falcon	57.5	50.8	30.5	31.0	92.0	100.5	79.6	50.6	57.7	54.2	35.9	41.5	38.7	53.3	66.6	50.9
Decade	54.6	46.9	32.3	38.7	83.1	85.2	75.7	43.4	56.6	50.0	43.0	45.9	44.5	51.3	62.6	51.2
Expedition	49.8	--	32.5	--	91.2	96.1	72.2	--	--	--	--	--	--	--	--	--
Flourish	63.9	--	33.2	--	92.0	103.7	--	49.6	48.5	49.1	31.3	45.4	38.4	54.0	65.9	--
Freeman	--	--	--	--	--	--	--	52.5	50.2	51.4	--	--	--	--	--	--
Ideal	54.9	47.1	35.3	33.7	88.9	95.6	78.0	56.3	64.9	60.6	34.4	42.5	38.5	54.0	67.7	51.6
Jerry	61.9	49.9	38.1	35.1	91.7	95.9	76.3	50.8	69.0	59.9	36.5	50.1	43.3	55.8	71.7	52.9
Lyman	53.4	49.5	37.0	32.3	97.0	99.2	76.1	54.9	47.7	51.3	33.3	45.2	39.3	55.1	64.0	49.7
McGill	39.8	--	26.8	--	87.6	86.9	--	38.0	55.2	46.6	35.7	39.4	37.6	45.6	60.5	--
Moats	54.9	--	35.4	--	90.5	99.6	--	45.8	57.0	51.4	30.2	38.0	34.1	51.4	64.9	--
Overland	50.7	51.8	35.1	33.1	88.6	91.8	75.6	50.4	62.3	56.4	25.0	49.7	37.4	50.0	67.9	50.9
Peregrine	54.2	49.6	35.8	35.7	85.8	85.6	77.4	56.1	52.6	54.4	37.0	51.0	44.0	53.8	63.1	52.2
Robidoux	44.1	--	25.6	--	76.3	94.0	74.0	36.3	55.4	45.9	23.5	44.8	34.2	41.2	64.7	--
Sunrise	58.0	--	30.4	--	85.7	91.2	--	45.9	55.5	50.7	35.0	42.0	38.5	51.0	62.9	--
SY Wolf	50.1	--	30.3	34.9	81.9	82.1	71.3	27.7	39.2	33.5	31.3	39.2	35.3	44.3	53.5	--
WB Grainfield	38.6	--	24.2	--	84.6	79.3	--	41.7	51.2	46.5	31.8	39.9	35.9	44.2	56.8	--
WB Matlock	55.7	48.5	29.6	35.6	93.4	102.6	76.4	47.4	61.6	54.5	27.6	50.7	39.2	50.7	71.6	50.8
Wesley	47.7	47.6	28.3	31.8	72.9	78.3	66.0	--	--	--	--	--	--	--	--	--
Mean	52.9	48.9	31.2	33.4	87.4	92.4	75.3	46.5	55.3	50.9	33.4	44.4	39.0	50.6	64.4	50.8
CV (%)	20.7	--	25.2	--	7.3		--	19.8		--	19.8		--	--	--	--
LSD 0.10	5.5	--	4.8	--	9.3[2]		--	NS		--	NS		--	--	--	--

[1]No fungicide application.
[2]LSD values are for comparing varieties within a fungicide treatment or fungicide treatment within a variety.

Table 5. Test weight of winter wheat varieties grown at eight locations in North Dakota in 2013.

Variety	Williston		Dickinson	Minot		Carrington	Wishek	Langdon		Prosper		Forman		Average	
	No Fung.[1]	Fung.	No Fung.	No Fung.	Fung.	No. Fung.	No Fung.	No Fung.	Fung.	No Fung.	Fung.	No Fung.	Fung.	No Fung.	Fung.
	(lb/bu)														
AC Broadview	57.0	57.7	58.7	60.5	60.5	58.6	57.5	58.2	59.0	52.3	55.3	54.8	56.8	57.2	57.9
Accipiter	58.9	59.4	58.8	60.2	61.5	60.1	58.4	60.1	61.1	54.9	57.9	58.5	58.7	58.7	59.7
Art	58.8	58.8	63.3	60.8	62.3	61.4	58.0	61.1	61.9	54.5	56.9	53.0	57.2	58.9	59.4
Boomer	56.8	57.7	58.1	59.9	61.0	59.7	57.6	60.6	61.7	54.1	57.0	55.3	55.2	57.8	58.5
CDC Falcon	58.0	58.5	59.3	59.3	61.3	60.3	57.2	60.8	61.9	54.8	56.4	54.6	57.8	58.0	59.2
Decade	58.8	58.9	60.6	59.9	61.6	59.0	58.8	60.4	59.0	52.5	56.4	52.8	55.0	57.9	58.2
Expedition	58.6	58.5	60.9	60.4	61.4	60.7	58.9	60.9	61.7	--	--	--	--	--	--
Flourish	56.8	57.4	58.2	60.0	60.9	59.1	56.6	60.4	61.3	53.2	55.9	55.2	57.8	57.4	58.7
Freeman	55.4	55.9	59.2	--	--	--	--	--	--	52.8	55.6	--	--	--	--
Ideal	58.0	58.6	62.4	61.1	61.3	60.2	59.7	61.8	61.7	55.8	58.0	55.1	57.5	59.3	59.4
Jerry	56.5	57.7	60.9	60.0	61.5	60.1	58.4	59.7	60.9	55.9	58.5	56.8	57.3	58.5	59.2
Lyman	58.0	58.1	64.0	62.0	61.6	61.0	59.1	60.8	61.0	56.9	57.4	55.7	57.9	59.7	59.2
McGill	57.6	58.4	59.7	59.6	61.1	59.7	57.8	61.4	61.1	52.4	56.3	54.8	56.9	57.9	58.8
Moats	58.2	58.0	56.2	61.7	62.2	59.2	58.4	61.3	61.8	55.0	58.0	57.2	57.3	58.4	59.5
Overland	58.1	57.9	63.6	60.7	61.0	60.8	59.6	61.4	61.3	55.7	57.9	54.7	57.5	59.3	59.1
Peregrine	58.3	59.4	63.0	62.2	61.8	61.0	59.7	60.7	61.1	58.4	58.6	58.0	56.9	60.2	59.6
Robidoux	58.6	58.8	59.9	58.6	61.0	60.3	57.5	61.0	62.1	54.7	56.6	53.2	54.2	58.0	58.5
Sunrise	56.4	57.4	59.9	57.6	58.7	57.8	56.0	58.5	58.6	49.7	52.3	54.2	56.3	56.3	56.7
SY Wolf	57.9	58.4	57.6	60.6	61.6	60.8	58.5	60.8	59.5	55.8	57.3	52.3	54.3	58.0	58.2
WB Grainfield	57.9	58.9	60.8	60.6	60.8	60.5	57.9	60.4	61.0	54.2	55.3	52.7	56.0	58.1	58.4
WB Matlock	57.9	58.1	60.5	61.3	62.1	60.8	59.2	61.3	61.7	57.3	58.8	57.4	58.7	59.5	59.9
Wesley	58.2	58.2	59.4	59.5	60.8	60.3	58.2	59.9	60.5	--	--	--	--	--	--
Mean	57.8	58.2	60.2	60.3	61.2	60.1	58.2	60.5	60.9	54.7	56.9	55.1	56.9	58.4	58.8
CV (%)	0.8		3.9	0.9		2.1	9.1	1.4		2.3		2.3		--	--
LSD 0.10	0.8		2.8	0.75		0.8	0.6	1.2		NS		NS		--	--

[1]No fungicide application.

Table 6. Grain protein content of winter wheat varieties grown at eight locations in North Dakota in 2013.

Variety	Williston	Dickinson	Minot	Carrington	Wishek	Langdon	Prosper	Forman	Average
	----------(%)----------								
AC Broadview	10.9	11.7	12.0	12.9	12.9	11.6	15.3	14.3	12.7
Accipiter	10.7	11.8	11.6	12.8	12.8	11.5	14.2	13.8	12.4
Art	12.9	12.4	12.4	14.4	14.2	14.4	16.0	16.1	14.1
Boomer	11.8	12.5	12.7	13.2	13.1	11.7	15.0	14.6	13.1
CDC Falcon	11.0	12.2	12.0	12.9	12.7	11.8	14.4	14.4	12.7
Decade	13.1	12.4	13.0	14.7	13.7	13.8	15.7	16.0	14.1
Expedition	13.0	12.0	12.3	13.3	13.4	12.3	--	--	--
Flourish	11.5	12.5	12.3	13.4	13.4	12.0	14.5	14.2	13.0
Freeman	11.0	11.1	--	12.7	13.2	12.5	15.1	--	--
Ideal	12.1	11.4	12.4	12.7	12.8	12.5	14.9	14.4	12.9
Jerry	12.3	12.0	13.2	13.9	13.5	13.2	14.8	14.7	13.5
Lyman	13.4	13.0	13.8	14.4	13.8	14.1	15.4	15.2	14.1
McGill	11.6	11.7	12.6	13.8	13.0	12.4	14.3	14.7	13.0
Moats	11.2	11.7	12.6	12.9	13.2	12.0	15.2	14.5	12.9
Overland	12.1	11.7	12.8	13.9	12.9	13.2	14.6	14.9	13.3
Peregrine	10.8	11.1	11.9	12.5	12.7	11.4	14.3	13.9	12.3
Robidoux	11.9	12.1	12.3	12.8	13.0	12.0	14.8	15.0	13.0
Sunrise	9.9	11.5	11.4	12.5	13.1	10.8	15.0	14.0	12.3
SY Wolf	12.0	11.8	12.2	13.4	13.0	12.6	15.4	15.7	13.3
WB Grainfield	11.7	11.8	12.4	12.5	12.7	12.5	14.9	14.4	12.9
WB Matlock	13.3	12.6	13.0	13.7	13.2	12.4	15.1	14.7	13.5
Wesley	12.8	12.6	13.4	14.4	14.2	14.0	--	--	--
Mean	11.9	12.0	12.5	13.4	13.2	12.5	14.9	14.7	13.1
CV (%)	5.7	12.5	2.8	5.7	4.1	2.7	5.6	2.0	--
LSD 0.10	1.1	NS	0.5	0.3	0.4	0.5	0.8	0.2	--

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