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North Dakota Hard Winter Wheat

Variety Trial Results for 2014 and Selection Guide

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During the 2013-14 growing season, 800,000 acres of winter wheat were planted, but only 560,000 acres were harvested. Nonetheless, this represents the largest area ever harvested in North Dakota. Although conditions were very favorable for planting in the fall, significant winterkill occurred due to poor snow cover and very cold winter temperatures. Furthermore, much of the winter wheat had been planted on ground that had not been planted to a crop in the spring. Therefore, the lack of crop residue was a predisposing factor to the lack of snow cover and increased winterkill. The state's winter wheat yield this season was estimated at 44 bushels per acre (bu/a), which is up from last year's yield of 43 bu/a.

Generally, rainfall was adequate for the crop, but Fusarium head blight (scab) was problematic in many regions of the state, causing elevated levels of DON (vomitoxin) and reducing yields.

Jerry was the most popular variety in 2013-14, occupying 26 percent of the acres planted. Decade, WB Matlock, Overland and SY Wolf followed Jerry in popularity with 18, 7, 6 and 4 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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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 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 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. 2014 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				
AAC Gateway	A.Can.	2012	R	MR/MS	R	MS	0	3	30	3
Accipiter	CDC	2008	NA	MS	R	S	-2	4	36	2
Alice[7]	SD	2006	NA	S	MR	S	-4	5	33	5
Art	Agripro	2008	R	R	R	MS	-6	4	33	8
Boomer	WB	2009	MS	MR	R	S	-2	4	34	3
Broadview	A.Can.	2008	MS	R	R	S/VS	-2	5	32	4
Carter	WB	2010	S	NA	NA	S	-2	4	32	6
CDC Falcon	WB	2000	MS	MS	NA	S	-2	5	34	4
Darrell	SD	2006	NA	S	R	MS	-4	4	35	6
Decade	MT/ND	2010	S	VS	R	VS	-4	4	35	2
Emerson	A.Can.	2011	R	MS	R	MR	-2	4	33	3
Flourish	A.Can.	2010	MR	MS	MS	S	-4	5	35	2
Freeman	ARS-NE	2013	MR/S	MR/MS	MR/MS	MS	-5	4	33	6
Hawken	Agripro	2007	S	MR	MR	S	-5	4	28	7
Ideal	SD	2011	NA	R	MR	S	-3	5	33	5
Jagalene	Agripro	2002	MS	S	MR	VS	-4	4	33	6
Jerry	ND	2001	MR	MR	R	S	0	4	37	3
Lyman	SD	2008	MS	R	R	MR	-4	7	35	5
McGill	ARS-NE	2010	MS	MS	MR	MS	-5	4	36	4
Millennium	NE/SD	1999	MR	MR	MR	S	-4	4	37	6
Moats	A.Can.	2010	NA	R	R	MR	0	5	38	2
Overland	NE	2006	MR	MR/R	MR	S	-4	4	35	5
Peregrine	CDC	2008	R	MR	R	MS	+1	4	39	2
Radiant[8]	A.Can.	2001	R	S	S	S	+1	2	36	2
Robidoux	ARS-NE	2010	MR	MS	MR	S	-3	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	-4	4	32	5
SY Wolf	Agripro	2010	MS	MR	R	MS	-4	4	33	6
WB Grainfield	WB	2013	MS	MS	NA	S	-5	6	33	6
WB Matlock	WB	2010	MS	MS	R	MS	+1	4	36	2
Wesley	NE/SD/WY	2000	MR	MS	R	S	-5	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]A.Can. = Agriculture and Agri-Food Canada; CDC = Crop Development Centre, University of Saskatchewan; 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 environments, 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]White wheat.
[8]Curl mite resistant.

Table 2. Analytical milling and baking data from field plot variety trials in 2013.

Variety	Test Weight	1,000 KW	Hard-ness	Falling Number	Protein 12 MB	Flour Extraction	Wet Gluten	Flour Ash	Farinograph				Loaf Volume
									Abs	Peak Time	Stab	MTI	
	(lb/bu)	(gram)	(score)	(seconds)	(%)	(%)	(%)	(%)	(%)	(min.)	(min.)	BU	(cc)
Accipiter	61.2	27.4	70.9	418	12.3	69.9	28.9	0.55	54.9	6.3	9.4	28	883
Art	61.7	29.3	70.2	382	13.2	69.0	33.1	0.54	56.1	6.1	7.8	32	812
Boomer	59.2	29.5	71.1	412	12.9	60.3	31.7	0.54	56.8	5.1	8.0	28	860
Broadview	60.1	27.7	63.6	394	12.5	71.0	35.8	0.54	56.4	4.4	4.6	45	782
Decade	60.3	34.2	71.8	386	13.2	70.6	31.6	0.53	56.6	6.7	17.9	15	898
Emerson	61.3	28.4	68.8	337	13.3	72.6	30.8	0.52	54.1	8.9	19.3	13	885
Expedition	59.3	33.5	65.7	383	12.6	70.3	30.5	0.50	54.6	5.9	14.8	22	842
Falcon	60.3	27.7	63.3	408	12.7	69.1	30.5	0.53	54.6	6.7	10.4	27	883
Flourish	59.5	32.3	67.4	377	12.8	70.4	31.1	0.53	55.9	6.2	10.8	27	912
Ideal	61.9	32.2	74.0	387	12.1	72.6	27.1	0.52	54.8	5.3	14.9	19	870
Jerry	60.5	34.1	64.9	405	12.8	72.4	32.0	0.52	55.9	6.0	7.4	37	833
Lyman	60.1	35.3	72.9	375	13.5	72.1	34.7	0.53	57.8	5.8	7.1	39	903
McGill	58.8	30.8	72.8	385	12.8	70.7	31.4	0.51	57.5	6.6	8.2	33	820
Moats	61.2	29.8	83.0	406	12.8	71.7	29.5	0.53	55.8	7.1	11.8	27	873
Overland	61.4	33.3	73.5	411	13.1	71.5	34.6	0.53	56.9	3.8	3.9	54	750
Peregrine	61.7	31.3	79.7	343	11.8	73.0	27.5	0.52	54.6	4.7	10.2	25	783
Robidoux	60.1	28.9	72.1	398	12.3	69.1	28.3	0.51	54.5	5.1	11.4	23	860
Sunrise	59.5	29.9	30.6	347	11.7	60.0	27.4	0.46	50.6	4.7	7.0	45	755
SY Wolf	61.5	32.4	71.9	307	12.4	70.9	28.9	0.51	55.5	7.5	10.4	28	868
WB-Grainfield	60.0	30.3	69.4	378	12.8	72.4	30.9	0.53	56.2	6.5	7.6	37	815
WB-Matlock	61.4	31.0	72.1	381	13.0	71.0	31.7	0.53	56.8	5.9	8.8	33	808
Wesley	60.8	34.4	70.7	384	13.1	72.2	33.3	0.5	56.3	7.2	11.5	24	903
LSD 0.05	1.4	2.9	12.6	33	0.8	4.7	4.0	0.0	1.8	1.6	4.4	10.8	58

Table 3. Yield of winter wheat varieties grown at three locations in western North Dakota in 2014, with three-year averages (2012-14).

	Dickinson		Hettinger		Minot			Avg. Western N.D.	
Variety	No Fung.[1]	3-Yr. Avg.	No Fung.[1]	3-Yr. Avg.	No Fung.	Fung.	3-Yr. Avg.[2]	No Fung.	3-Yr. Avg.
	(bu/a)								
AAC Gateway	91.2	--	87.9	--	50.4	59.0	--	76.5	--
Accipiter	102.8	76.0	81.2	74.6	56.9	68.9	89.6	80.3	80.1
Art	87.6	70.0	83.6	72.6	48.9	58.7	81.3	73.4	74.6
Broadview	104.1	79.7	84.9	--	55.7	72.5	89.5	81.6	--
CDC Falcon	99.7	78.0	85.2	--	59.5	63.1	86.4	81.5	--
Decade	102.2	82.6	102.9	82.2	47.3	69.8	86.0	84.1	83.6
Emerson	93.1	--	94.9	--	57.7	65.8	--	81.9	--
Flourish	99.5	--	88.8	--	49.5	64.8	--	79.3	--
Freeman	84.7	--	93.6	--	56.2	62.5	--	78.2	--
Ideal	96.2	76.7	95.8	79.6	63.8	68.4	90.0	85.3	82.1
Jerry	99.9	76.5	84.5	76.4	64.6	64.3	84.8	83.0	79.2
Lyman	87.0	73.1	91.0	79.0	63.6	68.2	83.6	80.5	78.6
McGill	91.1	68.9	85.8	--	51.0	74.3	78.1	76.0	--
Moats	87.8	--	85.6	--	51.8	64.7	--	75.1	--
Overland	94.4	77.8	91.6	81.9	55.7	61.1	78.8	80.6	79.5
Peregrine	96.5	74.5	96.2	70.5	64.2	69.7	87.6	85.6	77.5
Robidoux	88.8	66.8	71.5	--	47.7	66.5	78.5	69.3	--
SY Wolf	96.5	78.1	95.7	--	48.0	62.8	81.4	80.1	--
WB Grainfield	88.1	--	88.1	--	48.7	55.7	--	75.0	--
WB Matlock	100.6	78.5	86.6	--	57.8	73.9	86.9	81.7	--
Mean	94.9	75.5	88.0	77.1	55.0	65.7	84.6	79.4	79.4
CV (%)	9.4	--	5.6	--	11.1	11.6	--	--	--
LSD 0.10	10.6	--	5.8	--	8.2	10.3	--	--	--

[1]No fungicide application.
[2]Average includes fungicide and nonfungicide data when available

Table 4. Yield of winter wheat varieties grown at five locations in eastern North Dakota in 2014, with three-year averages (2012-14).

Variety	Carrington			Wishek			Langdon			Prosper			Forman			Avg. Eastern N.D.		
	No Fung.	Fung.	3-Yr. Avg.	No Fung.	Fung.	3-Yr. Avg.	No Fung.	Fung.	3-Yr. Avg.[3]	No Fung.	Fung.	3-Yr. Avg.[3]	No Fung.	Fung.	3-Yr. Avg.[3]	No Fung.	Fung.	3-Yr. Avg.
	(bu/a)																	
AAC Gateway	64.8	70.8	--	59.7	77.1	--	71.9	70.7	--	38.4	57.0	--	36.5	40.6	--	54.3	63.2	--
Accipiter	75.0	84.7	58.7	50.8	67.6	40.1	67.8	74.2	80.9	38.2	59.8	57.6	39.0	52.1	46.6	54.2	67.7	56.8
Art	65.0	71.2	54.7	53.8	62.2	43.3	63.8	71.0	71.8	28.5	47.3	54.9	33.3	48.2	52.5	48.9	60.0	55.4
Broadview	76.9	84.4	58.4	57.2	69.7	46.6	69.1	77.7	78.0	39.7	51.3	57.5	37.5	51.3	55.1	56.1	66.9	59.1
CDC Falcon	75.0	82.7	59.2	53.3	60.1	43.1	64.9	75.7	79.5	39.6	67.1	--	37.3	53.9	--	54.0	67.9	--
Decade	73.8	79.4	55.9	67.2	80.6	52.5	66.9	73.1	76.2	43.2	58.1	59.6	34.4	40.1	52.5	57.1	66.3	59.3
Emerson	73.4	77.7	--	60.0	65.5	--	72.0	76.3	--	48.7	59.4	--	53.1	58.7	--	61.4	67.5	--
Flourish	65.1	75.6	--	52.8	65.5	--	67.0	69.1	--	38.7	58.3	--	31.0	41.3	--	50.9	62.0	--
Freeman	74.0	81.3	--	55.2	57.5	--	68.0	75.6	--	42.3	51.3	--	42.9	56.8	--	56.5	64.5	--
Ideal	79.1	94.2	58.3	64.0	83.0	48.3	66.1	67.5	76.3	50.9	66.0	68.1	45.0	53.1	54.8	61.0	72.8	61.2
Jerry	75.2	80.1	60.4	50.0	58.9	46.5	68.3	71.6	76.6	44.6	62.2	63.2	44.2	56.3	52.7	56.5	65.8	59.9
Lyman	67.4	71.5	55.0	57.1	56.1	45.9	66.5	72.4	78.5	47.4	56.9	61.6	50.6	52.2	55.3	57.8	61.8	59.3
McGill	61.8	69.9	52.6	49.3	57.9	41.5	58.0	68.8	74.8	31.6	53.0	55.1	36.0	45.3	53.5	47.3	59.0	55.5
Moats	66.7	73.6	--	53.0	62.8	--	71.4	75.0	--	41.3	65.0	--	37.2	50.0	--	53.9	65.3	--
Overland	74.0	80.9	57.4	58.4	74.4	45.7	66.6	69.4	77.5	37.3	64.1	65.0	45.2	60.5	57.7	56.3	69.9	60.7
Peregrine	77.5	84.6	60.5	68.6	80.2	49.9	74.5	76.4	78.7	49.5	67.1	57.9	39.1	49.8	50.4	61.8	71.6	59.5
Robidoux	53.5	64.7	51.1	33.5	34.6	37.8	50.6	52.6	70.8	31.7	59.7	62.0	30.0	43.6	51.3	39.9	51.0	54.6
SY Wolf	72.3	74.7	54.9	59.9	69.2	44.3	62.8	71.7	73.4	39.9	50.9	56.4	35.3	41.4	52.7	54.0	61.6	56.3
WB Grainfield	70.2	72.7	--	44.7	48.6	45.0	49.8	52.2	--	30.5	45.1	--	27.7	42.1	--	44.6	52.1	--
WB Matlock	72.7	80.4	58.6	43.9	43.6	--	67.5	75.8	80.6	37.9	58.7	62.6	46.3	59.3	56.1	53.7	63.6	--
Mean	70.7	77.8	56.8	54.6	63.7	45.0	65.6	70.7	76.7	40.0	57.9	60.1	39.1	49.8	53.2	54.0	64.0	58.1
CV (%)	11.5		--	22.3		--	4.6		--	13.1		--	8.7		--	--	--	--
LSD 0.10	5.5		--	8.2		--	5.3		--	8.7		--	5.2		--	--	--	--

[1]No fungicide application.
[2]LSD values are for comparing varieties within a fungicide treatment or fungicide treatment within a variety.
[3]Average include fungicide and nonfungicide data when available.

Table 5. Test weight of winter wheat varieties grown at eight locations in North Dakota in 2014.

Variety	Dickinson		Hettinger		Minot		Carrington		Wishek		Langdon		Prosper		Forman		Average	
	No Fung[1].		No Fung.		No Fung.	Fung.	No. Fung.		No Fung.		No Fung.	Fung.	No Fung.	Fung.	No Fung.	Fung.	No Fung.	Fung.
	(lb/bu)																	
AAC Gateway	56.9		61.6		59.3	57.2	54.6		60.0		59.8	60.6	52.9	52.4	33.7	35.6	54.9	51.5
Accipiter	56.5		60.7		61.6	58.5	52.6		59.8		60.5	59.8	51.5	55.1	49.8	53.4	56.6	56.7
Art	57.1		62.1		59.9	57.7	57.4		62.6		58.1	58.9	48.8	52.6	51.5	55.3	57.2	56.1
Broadview	56.0		60.7		60.0	56.9	55.4		61.7		59.8	59.6	49.1	52.3	48.9	52.2	56.5	55.3
CDC Falcon	56.3		60.4		60.4	57.0	55.7		61.3		58.6	60.5	50.8	55.2	48.9	53.5	56.6	56.6
Decade	57.8		62.0		58.8	55.4	50.6		59.2		60.7	60.9	45.3	52.1	48.2	48.9	55.3	54.3
Emerson	58.0		62.4		60.3	59.5	57.7		62.0		59.9	59.9	54.2	54.8	55.1	55.8	58.7	57.5
Flourish	55.4		59.9		59.9	55.6	50.8		59.1		59.4	60.5	50.3	53.6	46.3	50.3	55.1	55.0
Freeman	53.9		60.3		59.2	56.1	56.5		60.9		60.7	61.2	48.4	52.5	51.3	52.7	56.4	55.6
Ideal	57.1		62.1		60.2	59.9	49.2		62.3		60.6	60.7	52.7	54.6	54.4	54.4	57.3	57.4
Jerry	57.0		61.5		60.4	60.1	58.7		60.9		59.0	60.2	53.2	55.5	54.2	54.0	58.1	57.5
Lyman	58.0		62.6		60.2	59.5	56.9		63.1		59.2	59.9	55.0	56.5	56.2	56.8	58.9	58.2
McGill	56.6		61.0		59.7	58.7	52.5		60.2		58.5	59.7	48.2	54.2	48.5	52.2	55.7	56.2
Moats	56.1		62.4		61.6	60.1	52.1		59.3		58.7	59.6	52.6	54.4	49.7	50.8	56.6	56.2
Overland	57.6		62.3		60.1	58.7	59.4		63.4		60.5	60.8	51.8	55.4	54.5	55.9	58.7	57.7
Peregrine	57.2		62.6		61.1	60.2	57.1		61.5		58.9	60.3	51.9	53.9	51.6	52.3	57.7	56.7
Robidoux	56.4		59.7		59.4	56.6	48.8		56.2		59.7	60.0	48.9	54.5	48.1	52.0	54.7	55.8
SY Wolf	56.9		60.6		57.9	55.9	51.5		61.0		59.5	61.1	49.9	50.9	50.8	51.4	56.0	54.8
WB Grainfield	57.4		61.4		60.2	55.5	57.1		59.4		60.1	60.5	48.5	51.7	44.8	50.5	56.1	54.6
WB Matlock	57.4		62.3		61.2	59.7	57.2		61.8		58.2	59.2	54.4	55.8	54.5	55.6	58.4	57.6
Mean	56.6		61.4		59.8	57.5	54.6		60.6		59.5	60.2	50.9	53.9	50.9	53.1	56.8	56.1
CV (%)	1.4		0.8		1.8		8.4		4.2		1.2		3.2		1.5		--	--
LSD 0.10	0.9		0.6		1.4		3.7		1.6		1.1		2.2		9.1		--	--

[1]No fungicide application.

Table 6. Grain protein content of winter wheat varieties grown at eight locations in North Dakota in 2014.

Variety	Dickinson	Hettinger	Minot	Carrington	Wishek	Langdon	Prosper	Forman	Average
	----------	----------	----------	----------	----------	(%) ----------	----------	----------	----------
AAC Gateway	13.0	12.0	13.2	12.8	12.9	12.7	14.1	15.1	13.2
Accipiter	12.4	10.9	11.9	11.5	11.5	10.8	12.6	12.6	11.8
Art	12.9	11.8	13.0	13.9	12.2	13.5	15.5	14.9	13.5
Broadview	11.9	10.8	12.2	11.9	11.9	12.1	13.4	12.8	12.1
CDC Falcon	11.2	10.9	12.1	11.8	12.0	11.6	13.3	13.2	12.0
Decade	12.1	12.3	13.1	13.6	12.7	13.5	15.1	15.4	13.5
Emerson	12.3	12.3	12.9	13.2	13.2	12.3	13.5	13.1	12.9
Flourish	12.1	11.0	12.4	12.6	11.8	12.5	13.2	13.8	12.4
Freeman	11.7	11.6	12.6	12.8	11.7	12.8	13.7	13.5	12.6
Ideal	11.6	11.1	12.7	12.4	11.3	11.5	13.7	13.3	12.2
Jerry	11.5	11.5	13.0	12.8	12.9	12.9	13.5	13.1	12.7
Lyman	13.1	12.6	13.8	14.4	13.3	13.6	14.3	13.6	13.6
McGill	11.7	10.8	12.2	12.4	12.0	12.3	14.1	13.6	12.4
Moats	12.9	11.3	12.4	12.4	11.7	12.7	13.5	13.7	12.6
Overland	12.4	11.6	12.8	13.2	11.7	13.0	13.9	13.2	12.7
Peregrine	12.1	10.7	12.0	11.6	11.1	11.9	13.3	12.5	11.9
Robidoux	11.2	11.3	12.6	12.4	12.6	12.6	14.4	14.1	12.7
SY Wolf	12.1	11.9	12.7	13.0	11.8	12.8	14.1	14.9	12.9
WB Grainfield	12.3	11.5	12.5	13.1	11.9	13.0	15.2	14.6	13.0
WB Matlock	12.1	11.6	13.2	12.8	13.3	12.9	13.7	13.6	12.9
Mean	12.1	11.5	12.7	12.7	12.2	12.6	13.9	13.7	12.7
CV (%)	4.7	2.0	4.3	5.6	6.6	2.9	4.2	3.7	--
LSD 0.10	0.8	0.3	1.0	0.3	0.5	0.7	0.8	0.7	--

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