

North Dakota Hard Winter Wheat

Variety Trial Results for 2016 and Selection Guide

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During the 2015-16 growing season, 140,000 acres of winter wheat were planted and 130,000 acres were harvested. The state's winter wheat yield this season was estimated at 54 bushels per acre (bu/a), which is up significantly from last year's yield of 51 bu/a. Generally, conditions were favorable for winter wheat development and yield. Diseases were not as damaging as in past years in most regions of the state.

Jerry was the most popular variety in 2015-16, occupying 15 percent of the acres planted. Decade, WB Matlock, SY Wolf, Wesley, Emerson and Ideal followed Jerry in popularity, with 13, 9, 8, 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.

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 phosphorous levels are known to be low. While important, the contribution of phosphorus to overwinter survival is secondary to varietal hardiness.

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.

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Table 1. 2016 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	MR/MS	R	MS	0	3	30	3
Accipiter	CDC	2008	R/MR	MS	R	S	0	4	36	2
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	MR/MS	R	R	S/VS	-2	5	32	4
Carter	WB	2010	S	NA	NA	S	-2	4	32	6
CDC Chase	CDC	2013	R	R	R	MS	-2	6	37	4
CDC Falcon	WB	2000	R	MS	NA	S	-2	5	34	4
Colter	MT	2013	MR	S	R	S	-1	3	36	5
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	R/MR	MS	MS	S	-4	5	35	2
Hawken	Agripro	2007	S	MR	MR	S	-5	4	28	7
Ideal	SD	2011	MR/MS	R	MR	S	-3	5	33	5
Jerry	ND	2001	S	MR	R	S	0	4	37	3
Loma	MT	2016	R	NA	R	S	0	2	34	3
Lyman	SD	2008	MR/MS	R	R	MR	-4	7	35	5
McGill	ARS-NE	2010	MS	MS	MR	MS	-5	4	36	4
Moats	A.Can.	2010	R	R	R	MR	0	5	38	2
Northern	MT	2015	R	S	R	S	+1	NA	35	6
Overland	NE	2006	MR	MR/R	MR	S	-4	4	35	5
Peregrine	CDC	2008	R	MR	R	MS	+1	4	39	2
Radiant ⁷	A.Can.	2001	R	S	S	S	+1	2	36	2
Redfield	SD	2013	MR/MS	MS	S	MR	-3	R	33	5
Ruth	NE	2016	MS	MS	MR	MS	-3	3	32	5
Smoky Hill	WB	2007	S	R	R	S	0	5	35	7
Striker	WB	2009	MS	MR	R	S	-4	4	32	5
SY Monument	Agripro	2014	MR	MR	NA	MS	-1	4	32	4
SY Sunrise	Agripro	2015	MR	NA	NA	MS	-4	5	31	5
SY Wolf	Agripro	2010	MR	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
WB4614	WB	2013	R	NA	NA	S	0	5	35	3
Wesley	NE/SD/WY	2000	MR	MS	R	S	-5	5	32	6
Yellowstone	MT	2005	R	S	S	VS	+2	6	33	5

¹R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; VS = very susceptible; NA = not available.

²A.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.

³Days to heading relative to Jerry.

⁴Straw strength = 1 to 9 scale, with 1 strongest and 9 weakest. These ratings may change as additional data become available.

⁵Based on the average of several environments, and should be used for comparing varieties. The environment can impact the height of varieties.

⁶Relative winter hardiness rating: 1 = excellent, 10 = very poor. These values are subject to change as additional information becomes available.

⁷Curl mite resistant.

Table 2. Analytical milling and baking characteristics of selected varieties evaluated across five localities (Carrington, Dickinson, Hettinger, Minot and Williston) in 2015.

	Kernel				Flour				Farinograph				Loaf			
	Test Weight (lb/bu)	1000-KW (gram)	Hardness (score)	Falling Number (seconds)	Protein 12 MB (%)	Flour Extraction (%)	Protein (%)	Gluten Index	Flour Ash (%)	Abs %	Peak Time (min)	Stab (min)	MTI (BU)	Loaf Volume (cc)	Crumb Structure (1-10) ¹	Crumb color (1-10) ¹
AAC Gateway	62.0	34.1	69.2	386	12.8	69.8	12.1	93	0.5	57.2	7.9	15.1	20.2	1,030	7.2	8.0
Accipiter	61.7	30.6	69.2	390	11.5	65.6	10.6	95	0.51	56.2	4.8	10.4	24.4	950	7.4	7.6
Broadview	60.9	32.7	59.8	406	11.3	64.4	10.5	76	0.5	56.7	4.4	5.6	42.0	906	6.9	7.5
CDC Chase	62.4	33.7	69.4	371	12.0	67.9	11.0	91	0.48	57.1	5.5	16.1	25.8	939	7.0	7.0
CDC Falcon	60.8	31.4	61.8	416	11.9	64.8	11.1	97	0.51	55.4	4.0	11.8	20.0	966	7.6	7.5
Colter	58.7	33.9	69.8	385	12.0	67.9	11.2	97	0.51	56.8	9.7	15.8	24.0	956	7.6	6.9
Decade	61.4	33.0	68.6	385	12.3	67.5	11.3	98	0.49	57.0	15.2	24.0	17.8	960	7.4	7.2
Emerson	62.6	30.7	64.6	341	12.8	68.9	11.8	97	0.49	55.8	15.3	23.2	17.0	1,043	6.8	7.7
Flourish	60.1	34.7	62.6	379	12.4	66.8	11.6	95	0.5	57.6	6.2	14.4	24.4	1,051	7.0	7.4
Ideal	61.6	33.9	65.4	308	11.5	67.5	10.5	98	0.49	56.6	4.6	13.1	31.4	933	7.0	6.6
Jerry	60.5	36.7	59.8	404	11.8	68.2	11.0	89	0.5	56.9	4.9	9.8	32.4	942	7.2	6.9
Lyman	61.5	37.9	74.0	378	12.4	67.9	11.4	80	0.5	57.9	5.8	10.9	26.8	929	6.8	6.2
MT1078	61.6	32.9	78.8	394	12.2	66.3	11.3	93	0.51	56.9	10.3	17.1	16.8	989	7.2	7.4
Moats	58.4	33.6	80.8	401	12.1	64.9	11.3	99	0.52	59.2	10.0	19.7	12.8	1,012	6.6	6.8
Northern	61.0	32.4	83.0	426	12.3	67.7	11.6	85	0.53	60.5	5.2	8.9	27.6	995	6.4	7.3
Overland	61.8	35.4	67.0	388	11.8	67.1	10.7	77	0.5	57.6	3.8	5.5	40.6	859	6.2	6.1
Peregrine	61.7	33.3	76.2	361	11.5	69.8	10.4	94	0.49	56.4	4.5	11.0	28.6	888	6.6	6.4
Redfield	61.8	34.0	63.0	392	12.1	66.0	11.3	93	0.5	56.9	15.0	22.3	20.4	1,017	6.8	7.7
SY Wolf	62.1	35.2	74.2	365	12.0	66.7	11.1	83	0.5	58.0	6.4	11.0	23.4	942	7.2	6.2
WB Matlock	62.1	34.6	65.4	392	12.0	66.9	11.2	86	0.52	58.1	8.3	12.6	22.4	916	6.8	6.3
WB4614	61.0	31.7	73.2	384	12.3	66.3	11.3	86	0.5	58.2	5.2	9.0	26.6	989	6.6	6.0
Mean	61.2	33.6	69.3	383	12.0	67.1	11.2	91	0.5	57.3	7.5	13.7	25.0	962	7.0	7.0
LSD (5%)	1.2	2	3.7	47	0.5	2.4	0.5	8	0.01	1	7.9	8.9	10.1	64	0.9	0.8

¹Scale 1-10, with 1 being low and 10 being superior.

Table 3. Yield of winter wheat varieties grown at four locations in western North Dakota in 2016, with three-year averages (2014-16).

Variety	<u>Dickinson</u>		<u>Hettinger</u>		<u>Minot</u>		<u>Williston</u>		<u>Avg. Western N.D.</u>	
	2016	3-Yr. Avg.	2016	3-Yr. Avg.	2016	3-Yr. Avg.	2016	3-Yr. Avg.	2016	2-/3-Yr. Avg.
	----- (bu/a) -----									
AAC Gateway	32.0	64.9	64.1	77.1	83.7	--	39.6	--	54.9	--
Accipiter	37.8	74.8	56.1	71.6	79.2	88.0	43.2	44.3	54.1	69.7
Broadview	37.2	72.1	58.4	71.7	85.6	91.0	43.0	48.6	56.1	70.9
CDC Chase	35.1	--	56.3	--	82.1	--	45.4	--	54.7	--
Colter	45.4	75.3	69.2	--	65.5	--	50.3	--	57.6	--
Decade	34.0	67.5	58.0	80.7	82.0	87.9	47.8	41.6	55.5	69.4
Emerson	31.7	68.2	63.0	81.6	82.2	--	37.8	--	53.7	--
Flourish	33.7	68.4	68.4	77.7	78.2	85.3	40.1	33.9	55.1	66.3
Ideal	40.3	64.0	57.3	78.0	84.0	89.3	42.6	40.9	56.1	68.1
Jerry	28.9	64.9	51.9	69.8	84.9	84.2	42.0	48.7	51.9	66.9
Loma	31.6	--	69.7	--	95.2	--	42.3	--	59.7	--
Lyman	35.6	66.1	64.9	78.8	81.5	84.2	46.2	42.2	57.1	67.8
Moats	31.8	62.3	60.7	72.3	79.3	86.9	43.8	48.4	53.9	67.5
Northern	36.5	--	68.3	--	84.6	--	42.7	--	58.0	--
Overland	31.7	67.8	72.4	83.4	68.3	77.4	45.4	40.2	54.5	67.2
Peregrine	37.9	71.2	63.1	80.0	83.5	89.0	48.7	44.1	58.3	71.1
Redfield	33.9	--	60.2	75.5	75.0	85.7	46.2	--	53.8	--
Ruth	27.6	--	63.2	--	75.8	--	35.4	--	50.5	--
SY Monument	48.7	--	69.1	--	85.4	--	50.3	--	63.4	--
SY Sunrise	38.7	--	80.2	--	68.2	--	43.4	--	57.6	--
SY Wolf	44.7	72.7	69.0	87.2	77.1	83.9	50.8	38.1	60.4	70.5
WB-Matlock	40.2	72.0	55.7	72.5	85.7	90.5	42.2	42.8	56.0	69.5
WB4614	38.6	--	71.8	--	73.9	--	40.0	--	56.1	--
Mean	34.4	68.8	61.2	77.2	77.9	86.4	42.8	42.8	56.0	68.7
CV (%)	16.5	--	7.7	--	5.3	--	11.2	--	--	--
LSD 0.05	9.3	--	6.7	--	5.9	--	6.7	--	--	--
LSD 0.10	7.7	--	5.6	--	4.9	--	5.6	--	--	--

Table 4. Yield of winter wheat varieties grown at three locations in eastern North Dakota in 2016, with three-year averages (2014-16).

Variety	<u>Wishek</u>		<u>Langdon</u>		<u>Prosper</u>		<u>Avg. Eastern N.D.</u>	
	2016	3-Yr. Avg.	2016	3-Yr. Avg.	2016	3-Yr. Avg.	2016	3-Yr. Avg.
	------(bu/a)-----							
AAC Gateway	59.5	53.2	88.4	79.4	74.1	50.4	74.0	61.0
Accipiter	64.8	52.3	75.1	74.1	58.9	43.9	66.3	56.8
Broadview	69.2	56.5	86.5	80.1	70.2	49.8	75.3	62.1
CDC Chase	72.3	--	89.9	--	85.7	--	82.6	--
Colter	66.8	--	73.3	--	58.6	--	66.2	--
Decade	75.9	61.0	73.5	77.0	68.8	49.7	72.7	62.6
Emerson	56.9	55.1	85.8	82.4	70.2	57.0	71.0	64.8
Flourish	67.6	52.6	89.9	77.9	64.2	46.6	73.9	59.0
Ideal	82.4	65.0	74.2	73.9	75.3	54.3	77.3	64.4
Jerry	59.3	48.5	64.7	70.6	68.8	49.0	64.3	56.0
Loma	55.2	--	75.6	--	61.1	--	64.0	--
Lyman	65.4	59.2	80.6	79.1	78.6	54.1	74.9	64.1
Moats	65.7	54.0	82.7	78.3	66.0	48.9	71.5	60.4
Northern	69.0	--	92.5	--	76.2	--	79.2	--
Overland	78.8	65.4	87.5	82.2	81.0	53.0	82.4	66.9
Peregrine	66.8	65.2	81.0	78.5	74.0	57.7	73.9	67.1
Redfield	72.6	--	84.0	--	67.5	--	74.7	--
Ruth	74.1	--	81.2	--	57.5	--	70.9	--
SY Monument	84.4	--	98.3	--	81.0	--	87.9	--
SY Sunrise	87.2	--	99.9	--	61.8	--	83.0	--
SY Wolf	89.8	73.0	92.0	82.5	81.2	55.7	87.7	70.4
WB-Matlock	70.1	--	73.3	73.0	74.3	50.5	72.6	--
WB4614	68.3	--	87.9	--	65.8	--	74.0	--
Mean	70.4	58.1	83.4	77.8	70.5	51.5	74.8	62.6
CV (%)	13.8	--	8.6	--	11.1	--	--	--
LSD 0.05	13.3	--	11.3	--	11.0	--	--	--
LSD 0.10	11.1	--	9.5	--	9.2	--	--	--

Table 5. Test weight of winter wheat varieties grown at seven locations in North Dakota in 2016.

Variety	Dickinson	Hettinger	Minot	Williston	Wishek	Langdon	Prosper	Average
	----- (lb/bu) -----							
AAC Gateway	59.8	59.4	60.3	59.1	56.0	56.5	57.5	59.8
Accipiter	58.0	56.3	61.1	58.0	57.5	56.3	56.4	59.0
Broadview	58.0	56.1	59.9	57.2	55.4	56.8	57.1	58.6
CDC Chase	59.0	59.9	60.5	59.5	58.0	59.9	59.4	60.9
Colter	60.3	55.5	57.8	57.1	53.8	50.9	52.9	56.8
Decade	58.5	56.9	60.7	58.2	55.4	54.2	56.3	58.6
Emerson	57.0	59.7	60.7	58.9	55.8	59.3	58.1	59.9
Flourish	57.8	56.0	60.0	57.5	56.2	57.4	55.6	58.6
Ideal	61.5	57.6	60.4	57.8	56.9	56.2	57.4	59.6
Jerry	56.8	57.3	59.1	56.3	54.9	56.0	57.3	58.2
Loma	56.5	55.4	60.0	57.9	52.2	52.9	53.4	56.8
Lyman	60.3	59.4	60.4	58.0	56.7	58.1	59.1	60.2
Moats	57.3	58.9	60.6	57.9	57.2	59.8	57.7	59.9
Northern	54.8	55.5	59.8	58.2	53.0	54.0	55.7	57.2
Overland	59.5	59.9	59.9	57.6	57.0	58.1	58.4	60.0
Peregrine	58.8	59.7	60.7	59.2	57.7	58.8	58.6	60.5
Redfield	59.0	57.8	60.2	58.9	56.5	58.0	57.8	59.7
Ruth	59.8	58.4	60.3	57.9	56.8	56.9	57.3	58.2
SY Monument	57.5	57.7	60.0	57.2	56.2	56.5	56.7	58.7
SY Sunrise	59.8	59.4	61.0	57.9	57.5	57.3	57.7	60.0
SY Wolf	60.5	59.7	61.3	58.9	58.2	58.7	57.3	60.6
WB-Matlock	59.3	58.9	60.4	57.2	56.7	57.1	59.0	59.7
WB4614	55.8	55.7	57.8	55.7	52.3	52.6	51.0	55.7
Mean	58.5	57.9	60.1	57.8	56.0	56.6	56.9	59.0
CV (%)	2.2	1.6	0.8	0.6	1.2	1.9	1.6	--
LSD 0.05	2.7	1.3	0.7	0.5	0.9	1.8	1.3	--
LSD 0.10	2.2	1.1	0.6	0.4	0.8	1.5	1.0	--

Table 6. Grain protein content of winter wheat varieties grown at seven locations in North Dakota in 2016.

Variety	Dickinson	Hettinger	Minot	Williston	Wishek	Langdon	Prosper	Average
AAC Gateway	14.5	14.7	13.3	13.3	14.5	11.3	12.3	13.4
Accipiter	13.9	13.9	11.7	12.5	13.6	10.5	11.9	12.6
Broadview	12.5	13.7	12.4	12.6	13.8	10.1	12.2	12.5
CDC Chase	14.3	14.6	11.7	13.0	13.8	11.6	11.9	13.0
Colter	11.5	14.3	12.9	12.3	14.1	11.2	12.1	12.6
Decade	14.4	13.8	14.4	12.9	14.3	10.6	12.4	13.3
Emerson	14.5	14.3	13.2	14.1	14.5	10.9	12.3	13.4
Flourish	13.7	14.4	13.3	13.4	13.9	11.3	12.1	13.2
Ideal	11.4	13.2	12.3	13.4	13.6	10.4	11.5	12.3
Jerry	13.6	13.7	12.8	12.8	14.7	10.7	12.1	12.9
Loma	14.9	14.4	12.9	12.9	15.7	10.9	12.6	13.5
Lyman	13.6	13.9	13.9	13.4	14.2	11.6	12.4	13.3
Moats	13.4	14.6	12.0	12.7	14.2	11.8	12.7	13.1
Northern	13.7	15.0	12.5	12.9	13.7	11.3	12.4	13.1
Overland	13.0	12.8	13.6	12.8	13.5	10.8	11.6	12.6
Peregrine	12.2	13.9	11.2	10.6	13.4	10.8	11.9	12.0
Redfield	13.4	14.2	13.4	11.9	14.0	11.1	12.4	12.9
Ruth	13.7	13.7	13.4	13.4	13.8	10.7	12.4	13.0
SY Monument	12.4	13.1	12.1	10.9	12.6	11.1	12.5	12.1
SY Sunrise	12.7	13.1	12.8	13.8	13.2	11.2	12.1	12.7
SY Wolf	12.2	13.8	13.3	11.6	13.2	11.3	12.7	12.6
WB-Matlock	13.1	13.5	13.0	12.9	15.1	10.9	11.9	12.9
WB4614	12.4	14.0	11.8	13.1	13.5	11.5	12.7	12.7
Mean	13.3	13.9	12.8	13.1	14.0	11.0	12.2	12.9
CV (%)	7.8	3.3	2.7	9.2	3.3	3.0	3.3	--
LSD 0.05	2.2	0.7	0.5	1.7	0.7	0.5	0.6	--
LSD 0.10	1.8	0.6	0.4	1.4	0.6	0.5	0.5	--

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County commissions, North Dakota State University and U.S. Department of Agriculture cooperating.

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