

North Dakota

Hard Winter Wheat

Variety Trial Results for 2017 and Selection Guide

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During the 2016-17 growing season, 65,000 acres of winter wheat were planted and 40,000 acres were harvested. The state's winter wheat yield this season was estimated at 38 bushels per acre (bu/a), which was down significantly from last year's yield of 48 bu/a. Drought, winter injury and stripe rust were factors constraining yields this year.

WB-Matlock was the most popular variety in 2016-17, occupying 12 percent of the acres planted. SY Wolf, Decade, Jerry and Colter followed WB-Matlock in popularity, with 11, 7, 6 and 6 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 basis.

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 winter 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 winter 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. 2017 North Dakota hard winter wheat variety description and agronomic traits.

Variety	Agent or Origin ²	Year	Reaction to Disease ¹				Tan Spot	Days to Heading ³	Straw ⁴ Strength	Height ⁵ (inches)	Winter ⁶ Hardiness
			Stripe Rust	Leaf Rust	Stem Rust	Scab					
AAC Gateway	A.Can.	2012	2	4	1	6	7	0	3	30	3
Accipiter	CDC	2008	2	6	1	8	8	0	4	36	2
Art	Agripro	2008	1	1	1	6	3	-6	4	33	8
Boomer	WB	2009	6	3	1	8	6	-2	4	34	3
Broadview	A.Can.	2008	4	1	1	8	NA	-2	5	32	4
Carter	WB	2010	8	NA	NA	8	NA	-2	4	32	6
CDC Chase	CDC	2013	1	1	1	6	NA	-2	6	37	4
Colter	MT	2013	3	8	1	8	9	-1	3	36	5
Decade	MT/ND	2010	8	9	1	9	4	-4	4	35	2
Emerson	A.Can.	2011	1	6	1	3	5	-2	4	33	3
Flourish	A.Can.	2010	2	6	6	8	7	-4	5	35	2
Hawken	Agripro	2007	8	3	3	8	4	-5	4	28	7
Ideal	SD	2011	4	1	3	8	4	-3	5	33	5
Jerry	ND	2001	8	3	1	8	8	0	4	37	3
Keldin	WB	2011	2	NA	NA	NA	NA	-2	4	36	3
Loma	MT	2016	1	NA	1	8	NA	0	2	34	3
Lyman	SD	2008	4	1	1	3	6	-4	7	35	5
McGill	ARS-NE	2010	6	6	3	6	8	-5	4	36	4
Moats	A.Can.	2010	1	1	1	3	7	0	5	38	2
Northern	MT	2015	1	8	1	8	6	+1	NA	35	6
Oahe	SD	2016	2	3	6	NA	NA	-3	6	37	3
Overland	NE	2006	3	2	3	8	4	-4	4	35	5
Peregrine	CDC	2008	1	3	1	6	6	+1	4	39	2
Redfield	SD	2013	4	6	8	3	NA	-3	4	33	5
Ruth	NE	2016	6	6	3	6	NA	-3	3	35	5
Smoky Hill	WB	2007	8	1	1	8	NA	0	5	35	7
Striker	WB	2009	6	3	1	8	NA	-4	4	32	5
SY Monument	Agripro	2014	3	3	NA	6	NA	-1	4	32	4
SY Sunrise	Agripro	2015	3	NA	NA	6	NA	-4	5	31	5
SY Wolf	Agripro	2010	3	3	1	6	1	-4	4	33	6
WB-Grainfield	WB	2013	6	6	NA	8	6	-5	6	33	6
WB-Matlock	WB	2010	6	6	1	6	NA	+1	4	36	2
WB4614	WB	2013	1	NA	NA	8	NA	0	5	35	3

¹Disease reaction scores from 1-9, with 1 = resistant and 9 = very susceptible, NA = not available.

²A.Can. = Agriculture and Agri-Food Canada; ARS = USDA Agricultural Research Service; CDC = Crop Development Centre, University of Saskatchewan; MT = Montana State University; NE = University of Nebraska; ND = North Dakota State University; SD = South Dakota State University; WB = WestBred. **Bold** varieties are those recently released, so data are limited and rating values may change.

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.

Table 2. Analytical milling and baking characteristics of selected varieties evaluated across five localities (Hettinger, Langdon, Minot, Prosper and Williston) in 2016.

	Kernel			Flour				Farinograph				Loaf				
	Test Weight (lb/bu)	1,000-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	59.9	29.4	59.6	410	13.2	67.5	12.4	96.0	0.51	57.5	10.4	19.0	17.8	990	7.0	7.9
Accipiter	59.7	25.6	66.0	419	13.2	63.8	11.6	98.4	0.53	57.2	14.6	23.2	9.8	921	7.2	7.4
Broadview	58.6	27.0	52.8	406	12.6	67.0	11.6	73.4	0.52	58.1	5.0	6.9	36.8	913	7.0	7.6
CDC Chase	61.2	29.9	62.4	420	12.9	68.1	11.8	95.0	0.49	57.6	12.0	24.6	12.4	960	7.0	7.5
Colter	57.1	31.2	67.4	419	12.4	63.1	11.7	98.8	0.52	58.0	16.1	26.9	18.0	960	7.4	7.0
Decade	58.6	29.3	63.6	379	12.6	65.3	11.7	99.0	0.52	57.9	19.0	24.5	27.6	941	6.8	7.5
Emerson	60.5	26.1	57.0	371	12.8	68.5	12.2	99.6	0.51	55.9	16.3	24.7	17.2	991	7.4	7.6
Flourish	58.9	31.6	55.4	369	13.0	67.6	12.1	97.0	0.53	58.6	9.8	19.5	15.0	1,004	7.6	7.6
Ideal	59.2	29.5	61.0	384	12.1	67.2	11.1	99.2	0.51	57.4	20.0	24.7	20.0	925	6.6	7.3
Jerry	58.2	32.4	56.4	393	12.3	68.2	11.4	92.8	0.52	57.5	12.5	22.4	15.8	943	7.0	7.0
Loma	57.6	26.6	68.6	356	12.5	67.6	11.7	98.6	0.52	57.8	16.7	24.7	16.6	1,012	7.6	5.8
Lyman	60.1	34.2	68.0	406	12.4	67.5	11.8	85.4	0.50	58.6	7.7	16.4	21.2	932	7.0	7.0
Moats	60.4	29.2	71.6	442	13.1	65.4	12.0	98.0	0.51	57.6	13.8	28.8	15.2	1,024	7.6	7.8
Northern	58.6	29.4	74.6	411	12.9	65.8	11.7	83.0	0.53	60.6	11.6	16.7	22.0	1,004	7.0	7.4
Overland	60.0	32.6	63.2	425	11.7	64.8	11.1	80.0	0.50	58.5	4.6	6.0	44.4	889	6.8	7.1
Peregrine	60.9	30.0	71.0	399	12.4	66.9	10.8	96.2	0.50	56.3	12.3	25.0	16.0	890	6.8	7.1
Redfield	60.1	31.6	55.6	423	12.3	66.0	11.7	96.6	0.52	58.1	14.3	23.8	20.8	1,012	7.4	8.2
Ruth	59.5	29.6	64.2	414	12.0	65.3	11.6	93.2	0.51	57.7	9.6	18.3	21.8	948	7.0	7.3
SY Monument	58.5	33.1	59.4	372	12.0	66.1	10.8	91.6	0.49	56.8	17.8	24.0	35.0	810	6.0	6.4
SY Sunrise	59.7	33.0	58.0	405	12.0	65.0	11.2	93.4	0.50	58.1	15.7	24.6	16.0	923	6.8	6.9
SY Wolf	60.5	31.5	66.0	371	11.7	66.6	11.2	82.8	0.50	58.2	10.5	14.5	21.4	941	7.2	7.0
WB-Matlock	59.8	29.8	61.6	401	12.3	67.4	11.6	90.0	0.52	58.8	13.2	18.2	27.0	935	7.4	6.8
WB4614	56.6	33.5	24.6	251	12.5	54.1	11.3	67.4	0.49	55.0	4.6	5.4	56.2	897	6.8	6.6
Mean	59.3	30.3	61.2	393.3	12.5	65.9	11.6	91.5	0.5	57.7	12.5	20.1	22.8	946	7.1	7.2
LSD (5%)	1.4	2.0	8.3	50	0.9	4.0	0.7	8.8	0.02	1.5	10.1	10.8	12.5	89	1.0	0.7

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

Table 3. Yield of winter wheat varieties grown at three locations in western North Dakota in 2017, with three-year averages (2015-17).

Variety	<u>Dickinson</u>		<u>Hettinger</u>		<u>Minot</u>		<u>Avg. Western N.D.</u>	
	2017	3-Yr. Avg.	2017	3-Yr. Avg.	2017	3-Yr. Avg.	2017	3-Yr. Avg.
	------(bu/a)-----							
AAC Gateway	48.3	50.6	76.5	73.3	54.3	65.7	59.7	63.2
Accipiter	53.8	58.5	72.5	68.7	67.0	71.7	64.4	66.3
Broadview	54.3	55.5	81.6	70.6	59.8	72.6	65.2	66.2
CDC Chase	56.4	55.9	81.3	73.8	84.6	--	74.1	--
Decade	59.1	53.1	76.2	71.8	59.7	70.5	65.0	65.1
Emerson	52.5	54.7	70.6	73.5	53.9	67.3	59.0	65.2
Flourish	54.7	53.5	80.7	75.0	80.6	74.5	72.0	67.7
Ideal	52.1	49.3	88.2	75.4	74.9	75.8	71.7	66.8
Jerry	58.4	51.0	76.1	66.7	57.9	69.0	64.1	62.2
Keldin	59.9	--	101.2	--	79.7	--	80.3	--
Loma	45.2	--	71.5	--	62.8	--	59.8	--
Lyman	54.7	55.3	84.2	76.5	64.2	71.3	67.7	67.7
Moats	57.6	52.2	80.2	70.5	63.6	69.2	67.1	64.0
Northern	51.5	56.4	78.9	77.1	54.6	--	61.7	--
Oahe	54.5	--	83.1	--	77.3	--	71.6	--
Overland	58.2	55.8	91.7	83.5	57.6	62.3	69.2	67.2
Peregrine	58.6	58.5	81.1	74.9	89.8	81.0	76.5	71.5
Redfield	53.3	52.4	79.2	72.6	64.6	67.4	65.7	64.1
Ruth	53.5	--	91.0	--	78.1	--	74.2	--
SY Monument	62.0	--	99.6	--	84.1	--	81.9	--
SY Sunrise	60.2	--	85.6	--	55.0	--	66.9	--
SY Wolf	57.9	59.9	93.9	86.6	87.3	75.7	79.7	74.1
WB-Matlock	60.9	58.8	71.1	67.3	67.7	75.8	66.6	67.3
WB4614	56.2	54.2	71.3	73.7	72.0	--	66.5	--
Mean	55.2	54.8	81.8	74.0	69.1	71.3	68.7	66.7
CV (%)	9.0	--	9.4	--	7.9	--	10.2	6.0
LSD 0.05	7.0	--	10.8	--	8.9	--	11.3	6.4
LSD 0.10	5.9	--	9.1	--	7.4	--	9.5	5.4

Table 4. Yield of winter wheat varieties grown at three locations in eastern North Dakota in 2017, with three-year averages (2015-17).

Variety	<u>Carrington</u>			<u>Langdon</u>		<u>Wishek</u>		<u>Avg. Eastern N.D.</u>	
	2017 No Fung.	2017 Fung.	3-Yr. Avg. ¹	2017 ²	3-Yr. Avg.	2017	3-Yr. Avg.	2017	3-Yr. Avg.
	------(bu/a)-----								
AAC Gateway	45.9	40.9	53.9	59.1	73.8	26.5	38.4	42.2	55.4
Accipiter	48.2	54.6	62.8	42.7	63.6	24.8	36.2	40.7	54.2
Broadview	41.6	38.4	61.0	25.2	62.6	24.7	40.8	29.4	54.8
CDC Chase	42.7	53.7	--	96.1	93.0	31.9	38.7	60.6	--
Decade	26.6	31.5	56.4	27.9	61.9	26.3	38.3	28.6	52.2
Emerson	34.4	38.0	57.4	89.8	86.9	24.7	37.7	50.8	60.7
Flourish	33.1	42.3	54.9	74.5	79.7	26.6	36.9	47.8	57.2
Ideal	38.2	31.0	58.0	16.3	56.9	27.2	40.1	24.8	51.7
Jerry	43.5	45.8	61.9	16.6	52.3	20.1	36.1	27.5	50.1
Keldin	55.8	60.4	--	83.9	--	44.6	--	63.0	--
Loma	35.0	36.9	--	72.3	--	26.8	--	45.3	--
Lyman	9.9	34.9	52.9	35.0	66.6	26.2	37.5	32.0	52.3
Moats	45.5	49.2	59.4	96.3	85.4	28.3	38.6	57.9	61.1
Northern	44.1	47.3	--	83.0	--	31.8	43.5	54.0	--
Oahe	39.8	35.3	--	105.1	--	42.7	--	61.0	--
Overland	31.4	39.6	56.5	44.1	73.8	31.2	38.1	38.3	56.1
Peregrine	47.9	42.9	62.2	79.5	79.6	30.1	41.0	50.8	60.9
Redfield	42.5	55.1	--	53.1	68.6	34.4	40.2	47.5	--
Ruth	35.1	35.1	--	85.4	--	36.6	--	35.9	--
SY Monument	43.9	30.8	--	80.7	--	46.2	--	52.6	--
SY Sunrise	37.7	37.7	--	86.2	--	34.2	--	52.7	--
SY Wolf	44.2	50.1	59.8	66.9	80.9	39.7	44.5	52.2	61.7
WB-Matlock	60.3	50.7	61.9	19.7	54.3	26.1	40.0	32.2	52.1
WB4614	33.8	38.7	--	57.4	--	38.6	45.8	44.9	--
Mean	40.0	42.5	58.5	62.6	71.2	31.1	39.6	44.7	55.8
CV (%)	18.7	18.7	--	9.8	--	19.7	--	32.9	13.6
LSD 0.05	8.9	8.9	--	8.7	--	8.6	--	20.3	12.2
LSD 0.10	7.3	7.3	--	7.2	--	7.2	--	17.0	10.2

¹Three-year average is for 2014, 2015 and 2017 as 2016 trial experienced significant hail; average is for fungicide application.

²Low yields of some varieties were due to stripe rust damage. These plots were not sprayed with a fungicide, and the lower-yielding varieties could be due to the lack of genetic resistance to this disease.

Table 5. Test weight of winter wheat varieties grown at six locations in North Dakota in 2017.

Variety	Dickinson	Hettinger	Minot	Carrington	Langdon ¹	Wishek	Average
	------(lb/bu)-----						
AAC Gateway	58.4	62.7	60.9	61.8	53.6	59.5	59.5
Accipiter	56.4	60.8	61.9	62.4	51.8	59.2	58.8
Broadview	56.5	62.6	60.8	60.6	43.9	57.9	57.1
CDC Chase	57.7	62.9	61.5	62.7	60.3	60.0	60.9
Decade	58.8	62.5	61.7	60.2	45.5	59.1	58.0
Emerson	59.2	62.2	60.3	61.1	60.2	58.8	60.3
Flourish	56.4	62.0	61.6	61.2	54.9	59.1	59.2
Ideal	58.4	64.2	62.0	59.7	44.3	58.6	57.9
Jerry	56.6	62.0	60.1	60.1	46.7	57.8	57.2
Keldin	58.3	62.5	61.7	62.3	56.8	59.3	60.2
Loma	55.5	57.5	60.0	58.9	53.7	56.5	57.0
Lyman	60.7	63.0	61.2	57.6	47.3	58.6	58.1
Moats	56.4	61.8	60.8	62.3	60.6	58.5	60.1
Northern	59.8	60.7	60.7	61.5	55.0	58.9	59.4
Oahe	59.9	63.7	61.8	60.0	60.7	60.0	61.0
Overland	59.6	64.3	60.4	59.1	51.1	59.4	59.0
Peregrine	57.2	62.7	62.4	62.4	57.0	60.1	60.3
Redfield	59.2	63.3	61.4	61.6	50.7	58.9	59.2
Ruth	59.6	64.3	62.4	58.9	56.1	60.1	60.2
SY Monument	57.6	62.5	61.4	59.7	54.4	59.7	59.2
SY Sunrise	60.0	61.7	62.3	58.9	56.6	59.8	59.9
SY Wolf	60.1	63.4	62.1	61.2	53.3	60.4	60.1
WB-Matlock	58.0	62.0	61.0	59.9	47.3	59.0	57.9
WB4614	58.0	60.3	61.2	61.3	54.7	58.9	59.1
Mean	58.3	62.3	61.3	60.6	53.2	59.1	59.2
CV (%)	1.4	1.3	0.7	2.1	2.7	1.0	3.8
LSD 0.05	1.1	1.1	0.7	1.4	2.0	0.9	0.6
LSD 0.10	0.9	0.9	0.6	1.2	1.7	0.7	0.5

¹Low test weights for some cultivars at Langdon were associated with stripe rust damage or other diseases.

Table 6. Grain protein content of winter wheat varieties grown at six locations in North Dakota in 2017.

Variety	Dickinson	Hettinger	Minot	Carrington	Langdon	Wishek	Average
	------(%)-----						
AAC Gateway	15.0	13.1	13.9	14.4	12.3	13.8	13.8
Accipiter	13.5	12.5	12.4	13.0	11.2	11.8	12.4
Broadview	13.6	12.2	12.5	13.9	11.6	12.5	12.7
CDC Chase	13.2	12.1	12.8	13.4	12.1	12.4	12.7
Decade	14.2	12.9	13.6	15.7	12.2	13.2	13.6
Emerson	14.6	13.1	14.0	15.5	11.9	13.4	13.8
Flourish	14.7	12.9	13.9	14.8	11.5	12.6	13.4
Ideal	13.0	12.1	11.4	14.7	12.4	12.2	12.6
Jerry	13.8	12.6	13.2	14.8	12.9	13.0	13.4
Keldin	13.8	11.6	12.1	12.8	11.2	13.4	12.5
Loma	15.2	13.5	14.7	15.2	11.9	15.6	14.4
Lyman	14.1	13.5	13.9	17.7	12.7	13.0	14.2
Moats	14.2	12.8	12.8	13.3	12.3	12.8	13.0
Northern	14.5	12.9	13.4	14.3	11.6	14.5	13.5
Oahe	13.2	12.3	12.7	15.0	11.3	13.0	12.9
Overland	13.6	12.1	13.6	15.9	11.5	12.0	13.1
Peregrine	12.5	12.0	11.6	13.4	10.8	11.3	11.9
Redfield	13.6	13.0	12.9	14.0	12.2	13.2	13.2
Ruth	13.4	12.6	13.7	15.9	11.2	13.2	13.3
SY Monument	12.3	11.8	12.0	13.8	12.1	11.4	12.2
SY Sunrise	12.4	12.8	12.9	16.2	11.6	12.5	13.1
SY Wolf	13.6	12.6	13.2	14.8	12.5	11.2	13.0
WB-Matlock	14.0	13.2	13.0	14.4	12.9	12.7	13.4
WB4614	14.1	12.5	13.6	15.5	12.5	13.5	13.6
Mean	13.7	12.6	13.1	14.6	11.9	12.8	13.1
CV (%)	1.7	4.3	5.4	7.1	3.2	6.8	4.9
LSD 0.05	0.5	0.8	1.2	1.2	0.5	1.2	1.0
LSD 0.10	0.4	0.6	1.0	1.0	0.4	1.0	0.8

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