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North Dakota
Hard Winter Wheat

Variety Trial Results for 2018 and Selection Guide

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During the 2017-18 growing season, 90,000 acres of winter wheat were planted and 70,000 acres were harvested. The state's winter wheat yield this season was estimated at 40 bushels per acre (bu/a), which was up slightly from last year's yield of 37 bu/a. Yield potential was reduced this year due to the unusually warm weather in late May and early June.

Jerry was the most popular variety in 2017-18, occupying 13 percent of the acres planted. Decade, Peregrine and SY Wolf followed Jerry in popularity, with 11, 10 and 10 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 and quality 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 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. 2018 North Dakota hard winter wheat variety description and agronomic traits.

			Reaction to Disease[1]								
Variety	Agent or Origin[2]	Year	Stripe Rust	Leaf Rust	Stem Rust	Scab	Tan Spot	Days to Heading[3]	Straw Strength[4]	Height[5] (inches)	Winter[6] Hardiness
AAC Gateway	A.Can.	2012	2	4	1	6	7	0	2	25	3
AAC Goldrush	**A.Can.**	**2017**	**2**	**1**	**3**	**3**	**6**	**1**	**2**	**25**	**2**
AAC Wildfire	A.Can.	2015	2	6	5	4	NA	2	3	25	2
Accipiter	CDC	2008	2	6	1	8	8	1	5	25	2
Broadview	A.Can.	2008	4	1	1	8	NA	0	5	24	4
CDC Chase	CDC	2013	1	1	1	6	NA	1	5	25	4
Decade	MT/ND	2010	8	9	1	9	4	-1	3	25	2
Emerson	A.Can.	2011	1	6	1	3	5	0	2	25	3
Ideal	SD	2011	4	1	3	8	4	-1	4	25	5
Jerry	ND	2001	8	3	1	8	8	0	5	26	3
Keldin	WB	2011	2	3	3	5	3	1	3	25	3
Loma	MT	2016	1	NA	1	8	NA	2	4	23	3
Lyman	SD	2008	4	1	1	3	6	-2	6	25	5
Moats	CDC	2010	1	1	1	3	7	1	5	27	2
Northern	MT	2015	1	8	1	8	6	1	4	24	6
Oahe	SD	2016	2	3	6	NA	NA	-1	5	25	3
Overland	NE	2006	3	2	3	8	4	-2	5	24	5
Peregrine	CDC	2008	1	3	1	6	6	1	5	28	2
Redfield	SD	2013	4	6	8	3	NA	-2	5	23	5
SY Monument	Agripro	2014	3	3	NA	6	NA	-2	3	22	4
SY Sunrise	Agripro	2015	3	NA	NA	6	NA	-2	3	20	5
SY Wolf	Agripro	2010	3	3	1	6	1	-2	3	23	6
Thompson	**SD**	**2017**	**5**	**3**	**3**	**3**	**NA**	**-1**	**3**	**26**	**NA**
WB-Matlock	WB	2010	6	6	1	6	NA	0	5	25	2
WB4462	WB	2016	7	3	NA	8	6	-2	4	23	3

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

[2]A.Can. = Agriculture and Agri-Food Canada; 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.

[3]Days to heading relative to Jerry.

[4]Straw strength: 1 = strongest, 9 = weakest. Based on field observations in 2018 only.

[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.

Table 2. Analytical milling and baking characteristics of selected varieties evaluated at Carrington and Dickinson Research Extension Centers in 2017.

	Kernel						Flour					Farinograph				Loaf		
	Test Weight	1,000 KWT	Hard-ness	Whole Wheat Ash	Whole Wheat Protein 12 MB	Falling Number	Flour Protein 14 MB	Flour Ash 14 MB	Milling Extraction	Wet Gluten	Gluten Index	Abs	Peak Time	Stab	MTI	Loaf Volume	Crumb Structure	Crumb Color
	(lb/bu)	(gram)	(score)	(%)	(%)	(seconds)	(%)	(%)	(%)	(%)		(%)	(min)	(min)	(BU)	(cc)	(1-10)[1]	(1-10)[1]
AC Gateway	61.8	32.3	69	1.36	15.5	445	14.4	0.48	71.3	41.3	84	62.2	8.5	11.2	24	1,013	7	9
Accipiter	61.0	30.1	71	1.44	13.8	454	13.2	0.50	69.0	35.5	90	61.1	6.4	20.1	13	1,050	8	7
Broadview	60.3	33.8	60	1.37	14.3	464	13.5	0.47	67.2	55.0	52	61.2	4.5	4.4	50	948	6	8
CDC Chase	62.4	31.5	72	1.36	13.7	404	12.7	0.46	68.4	33.2	96	60.0	8.9	15.8	17	980	6	7
Decade	60.9	30.3	70	1.50	15.5	439	13.7	0.56	68.0	36.0	95	62.5	10.7	17.7	21	1,030	7	9
Emerson	61.3	27.3	63	1.41	15.4	435	14.2	0.48	66.5	38.4	91	59.7	10.6	16.3	13	1,080	7	8
Ideal	61.1	31.8	71	1.32	14.4	437	13.4	0.49	68.0	34.5	96	61.7	13.4	19.5	14	1,020	7	8
Jerry	59.7	33.5	65	1.34	15.1	480	13.7	0.48	68.6	37.9	84	62.2	7.4	11.9	20	958	7	7
Keldin	61.3	39.4	68	1.38	14.1	469	13.0	0.50	67.4	35.6	79	61.7	7.4	14.4	21	940	7	7
Loma	59.0	32.3	73	1.31	15.6	428	14.4	0.47	67.6	40.4	86	62.6	10.3	15.1	15	1,100	8	7
Lyman	60.3	34.2	72	1.29	16.1	417	14.6	0.49	68.5	42.9	65	64.2	7.1	8.1	30	1,010	7	7
Moats	60.5	31.2	79	1.37	14.3	440	13.7	0.48	68.1	35.9	90	61.2	8.7	15.7	15	1,055	7	7
Northern	61.5	33.5	81	1.35	15.0	527	14.0	0.50	68.1	38.6	76	65.2	7.6	7.9	37	983	7	8
Oahe	61.2	33.9	73	1.26	14.2	471	13.2	0.50	68.4	41.5	62	66.0	4.6	4.0	58	890	6	7
Overland	60.4	31.9	71	1.24	15.0	506	13.8	0.50	66.1	45.3	60	64.2	5.3	4.9	55	860	6	7
Peregrine	61.7	31.3	80	1.39	13.5	433	12.8	0.48	66.8	33.7	92	61.5	9.5	14.6	20	938	7	7
Redfield	61.9	34.3	63	1.47	14.3	448	13.3	0.50	68.5	35.7	87	61.6	9.3	14.7	25	1,018	7	8
SY Monument	61.1	32.6	80	1.28	13.4	444	12.6	0.48	68.4	28.0	99	61.5	13.9	29.9	14	835	7	7
SY Sunrise	61.5	33.6	66	1.24	14.7	484	13.0	0.48	64.7	38.2	69	62.3	6.1	8.2	29	860	7	7
SY Wolf	62.4	32.5	77	1.23	14.5	396	13.3	0.48	68.2	37.4	62	62.5	7.3	6.8	33	940	7	7
WB-Matlock	61.4	31.2	71	1.41	15.4	433	14.0	0.50	68.3	39.8	74	62.5	7.7	9.5	26	963	8	7
MEAN	61.0	32.5	71	1.35	14.7	453	13.6	0.49	67.7	39.0	79	62.4	8.1	12.3	27	967	6.7	7.5
LSD 5%	2.9	3.3	7	0.26	2.9	41	1.9	0.08	3.5	10.6	13	2.6	4.8	8.4	18	149	1	1

[1]Scale 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 2018, with two/three-year averages (2016-18).

Variety	Dickinson		Hettinger		Minot		Williston		Avg. Western N.D.	
	2018	3-Yr. Avg.	2018	3-Yr. Avg.	2018	3-Yr. Avg.	2018	2-Yr. Avg.	2018	2-Yr./3-Yr. Avg.
	(bu/a)									
AAC Gateway	85.8	55.3	35.9	58.8	29.6	55.9	46.5	43.1	49.5	53.3
AAC Goldrush	89.9	--	32.7	--	31.4	--	49.0	--	50.7	--
AAC Wildfire	92.8	--	40.2	--	25.4	--	49.6	--	52.0	--
Accipiter	91.2	60.9	35.2	54.6	29.2	58.5	50.1	46.7	51.4	55.2
Broadview	89.7	60.4	36.7	58.9	25.8	57.1	51.0	47.0	50.8	55.9
CDC Chase	85.5	59.0	33.9	57.2	27.9	64.9	44.9	45.2	48.0	56.6
Decade	85.1	59.4	19.5	51.2	30.5	57.4	42.8	45.3	44.5	53.3
Emerson	83.1	55.8	30.6	54.7	25.0	53.7	42.0	39.9	45.2	51.0
Ideal	90.6	61.0	26.6	57.4	31.8	63.6	47.7	45.2	49.2	56.8
Jerry	84.6	57.3	29.7	52.6	25.7	56.2	48.3	45.2	47.1	52.8
Keldin	99.0	--	37.2	--	26.4	--	49.0	--	52.9	--
Loma	80.2	52.3	36.5	59.2	18.1	58.7	48.0	45.2	45.7	53.9
Lyman	80.7	57.0	27.3	58.8	31.3	59.0	46.7	46.5	46.5	55.3
Moats	91.5	60.3	29.5	56.8	24.7	55.9	47.2	45.5	48.2	54.6
Northern	85.2	57.7	33.7	60.3	21.6	53.6	46.8	44.8	46.8	54.1
Oahe	74.7	--	28.2	--	31.5	--	43.3	--	44.4	--
Overland	75.3	55.1	29.5	64.5	22.4	49.4	45.7	45.6	43.2	53.7
Peregrine	90.6	62.4	38.0	60.7	35.4	69.6	51.0	49.9	53.8	60.7
Redfield	86.4	57.9	24.7	54.7	30.8	56.8	46.9	46.6	47.2	54.0
SY Monument	76.2	62.3	27.6	65.4	30.4	66.6	46.6	48.5	45.2	60.7
SY Sunrise	64.1	54.3	20.4	62.1	18.8	47.3	48.5	46.0	38.0	52.4
SY Wolf	80.5	61.0	24.3	62.4	21.6	62.0	44.8	47.8	42.8	58.3
Thompson	84.4	--	33.0	--	33.1	---	47.3	--	49.5	--
WB-Matlock	82.9	61.3	33.8	53.5	24.8	59.4	47.2	44.7	47.2	54.7
WB4462	68.7	54.5	20.1	--	18.2	--	--	--	--	--
Mean	83.3	58.3	30.3	58.1	26.7	58.2	46.8	45.7	47.5	55.1
CV (%)	8.8	--	18.3	--	22.0	--	5.3	--	9.7	--
LSD 0.05	10.3	--	7.8	--	9.6	--	4.1	--	6.1	--
LSD 0.10	8.6	--	6.5	--	8.0	--	3.4	--	5.1	--

Table 4. Yield of winter wheat varieties grown at two locations in eastern North Dakota in 2018, with two/three-year averages (2016-18).

	Carrington		Prosper		Avg. Eastern N.D.	
Variety	2018	3-Yr. Avg.	2018 Fung.	2-Yr. Avg.	2018	2-Yr./3-Yr. Avg.
AAC Gateway	68.1	55.0	57.0	65.6	62.6	60.3
AAC Goldrush	63.0	--	62.0	--	62.5	--
AAC Wildfire	70.0	--	58.2	--	64.1	--
Accipiter	58.7	57.4	55.3	57.1	57.0	57.3
Broadview	68.0	--	56.7	63.5	62.4	--
CDC Chase	75.3	62.2	68.0	76.9	71.7	69.5
Decade	65.4	53.6	53.9	61.4	59.7	57.5
Emerson	66.0	55.0	67.5	68.9	66.8	61.9
Ideal	64.9	53.3	67.5	71.4	66.2	62.4
Jerry	68.2	59.5	68.8	68.8	68.5	64.2
Keldin	70.7	--	68.2	--	69.5	--
Loma	51.8	--	52.6	56.9	52.2	--
Lyman	74.8	55.4	63.9	71.3	69.4	63.3
Moats	70.2	60.6	65.2	65.6	67.7	63.1
Northern	63.7	--	60.4	68.3	62.1	--
Oahe	69.8	--	66.5	--	68.2	--
Overland	67.0	54.2	64.2	72.6	65.6	63.4
Peregrine	74.4	61.2	76.5	75.3	75.5	68.2
Redfield	74.1	62.8	60.5	64.0	67.3	63.4
SY Monument	64.9	--	49.8	65.4	57.4	--
SY Sunrise	67.8	--	55.8	58.8	61.8	--
SY Wolf	64.3	57.1	53.9	67.6	59.1	62.3
Thompson	69.2	--	68.1	--	68.7	--
WB-Matlock	73.6	62.3	57.2	65.8	65.4	64.0
WB4462	71.2	--	50.7	--	61.0	--
Mean	67.4	57.8	61.6	66.6	64.5	62.9
CV (%)	9.6	--	12.4	--	7.2	--
LSD 0.05	9.1	--	10.6	--	9.5	--
LSD 0.10	7.6	--	8.9	--	7.7	--

Table 5. Test weight of winter wheat varieties grown at six locations in North Dakota in 2018.

Variety	Dickinson	Hettinger	Minot	Williston	Carrington	Prosper	Average
	----------(lb/bu)----------						
AAC Gateway	62.3	59.2	57.6	59.3	61.3	57.0	59.5
AAC Goldrush	61.4	57.7	56.9	58.8	60.5	56.5	58.6
AAC Wildfire	61.3	58.9	53.8	58.7	59.1	57.0	58.1
Accipiter	61.6	59.9	57.9	58.2	60.5	55.9	59.0
Broadview	61.3	58.6	57.1	57.8	60.3	53.9	58.2
CDC Chase	62.3	58.9	59.0	58.9	60.9	57.6	59.6
Decade	61.4	55.6	58.2	57.5	59.6	54.9	57.9
Emerson	61.4	57.6	55.1	59.0	61.0	57.7	58.6
Ideal	62.8	57.5	57.0	58.2	60.8	56.0	58.7
Jerry	61.1	56.8	55.7	57.7	59.9	56.6	58.0
Keldin	61.5	57.4	56.9	58.5	60.5	56.2	58.5
Loma	58.3	58.3	51.6	57.5	56.2	53.4	55.9
Lyman	61.4	56.6	57.5	57.6	61.0	56.7	58.5
Moats	62.4	57.0	54.8	59.4	60.6	56.6	58.5
Northern	60.8	58.8	53.8	57.9	58.6	55.2	57.5
Oahe	60.5	54.9	58.2	58.6	61.3	56.8	58.4
Overland	61.0	57.5	57.3	58.1	60.7	56.3	58.5
Peregrine	61.9	59.4	57.6	59.5	61.4	58.1	59.7
Redfield	62.0	58.1	57.8	58.2	61.2	55.2	58.8
SY Monument	59.8	56.9	56.9	56.3	58.7	52.3	56.8
SY Sunrise	60.8	57.3	60.0	57.6	59.6	54.3	58.3
SY Wolf	59.0	54.6	57.1	58.8	59.7	54.5	57.3
Thompson	60.6	55.2	57.1	58.4	60.8	56.2	58.1
WB-Matlock	61.1	58.8	57.2	58.6	61.6	56.6	59.0
WB4462	61.8	55.8	56.9	--	61.1	54.6	--
Mean	61.1	57.4	56.8	58.2	60.2	55.9	58.3
CV (%)	1.6	2.3	2.6	0.6	1.6	1.9	1.9
LSD 0.05	1.4	1.9	2.4	0.6	1.3	1.5	1.3
LSD 0.10	1.2	1.5	2.0	0.5	1.1	1.3	1.1

Table 6. Grain protein content of winter wheat varieties grown at five locations in North Dakota in 2018.

Variety	Dickinson	Minot	Williston	Carrington	Prosper	Average
	----------(%)----------					
AAC Gateway	13.9	16.2	15.1	15.1	13.0	14.7
AAC Goldrush	13.9	14.3	14.9	15.4	13.0	14.3
AAC Wildfire	13.4	14.8	14.9	14.5	13.0	14.1
Accipiter	13.2	12.9	14.0	13.5	12.1	13.1
Broadview	12.7	14.2	13.2	13.5	12.0	13.1
CDC Chase	13.7	14.0	14.8	14.4	12.3	13.8
Decade	14.6	15.3	15.1	14.9	13.5	14.7
Emerson	14.6	15.2	16.4	16.0	13.2	15.1
Ideal	13.2	13.6	13.2	14.1	12.4	13.3
Jerry	13.7	14.2	14.5	14.3	12.5	13.8
Keldin	13.7	13.9	12.9	13.8	12.6	13.4
Loma	13.5	14.9	14.4	15.3	13.5	14.3
Lyman	14.5	13.5	14.5	14.7	12.4	13.9
Moats	13.3	13.9	14.7	14.5	12.7	13.8
Northern	13.2	13.9	14.7	14.6	13.0	13.9
Oahe	13.8	13.9	13.9	14.4	12.5	13.7
Overland	14.3	13.6	14.1	14.3	12.7	13.8
Peregrine	12.6	12.9	13.8	13.3	12.2	13.0
Redfield	14.2	14.2	14.3	14.0	12.8	13.9
SY Monument	14.1	13.1	13.2	13.5	12.8	13.3
SY Sunrise	13.6	13.4	13.0	13.9	12.0	13.2
SY Wolf	14.5	13.5	14.6	14.6	13.0	14.0
Thompson	14.0	13.9	13.9	14.4	11.8	13.6
WB-Matlock	14.7	14.1	14.8	14.4	13.0	14.2
WB4462	13.5	14.1	--	13.8	12.1	13.4
Mean	13.8	14.1	14.3	14.4	12.7	13.8
CV (%)	3.4	3.8	2.4	3.3	3.5	3.2
LSD 0.05	0.8	0.9	0.6	0.7	0.6	0.6
LSD 0.10	0.6	0.7	0.5	0.6	0.5	0.5

For more information on this and other topics, see www.ag.ndsu.edu

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