

A1067-19

North Dakota Durum

Variety Trial Results for 2019 and Selection Guide

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Durum was planted on 720,000 acres in North Dakota in 2019, down 3.5% from 2018. The average yield was 42 bushels per acre (bu/a), up slightly from 2018. The most commonly grown varieties in 2019 and the percent of the acreage they occupied were Joppa (30), Divide (21), Alkabo (8), Carpio (6), VT Peak (6) and Mountrail (5).

Durum varieties are tested each year at multiple sites throughout North Dakota. The relative performance of these varieties is presented in table form. Variety performance data are used to provide recommendations to producers. Some varieties may not be included in the tables due to insufficient testing or lack of seed availability, or they offer no yield or disease advantage over similar varieties. Yield is reported at 13.5% moisture, while protein content is reported at 12% moisture.

The agronomic data presented in this publication are from replicated research plots using experimental designs that enable the use of statistical analysis. These analyses enable the reader to determine, at a predetermined level of confidence, if the differences observed among varieties are significant or if they might be due to error inherent in the experimental process.

The LSD (least significant difference) numbers beneath the columns in tables are derived from these statistical analyses and only apply to the numbers in the column in which they appear. If the difference between two varieties exceeds the LSD value, it means that with 95% or 90% confidence (LSD probability 0.05 or 0.10), the higher-yielding variety has a significant yield advantage. When the difference between two varieties is less than the LSD value, no significant difference occurs between those two varieties under those growing conditions.

The abbreviation NS is used to indicate no significant difference for that trait among any of the varieties at the 95% or 90% level of confidence. The CV is a measure of variability in the trial. The CV stands for coefficient of variation and is expressed as a percentage. Large CVs mean a large amount of variation that could not be attributed to differences in the varieties.

Presentation of data for the entries tested does not imply approval or endorsement by the authors or agencies conducting the test. North Dakota State University approves the reproduction of any table in the publication only if no portion is deleted, appropriate footnotes are given and the order of the data is not rearranged. Additional data from county sites are available from each Research Extension Center at www.ag.ndsu.edu/varietytrials/durum. Use data from multiple locations and years when selecting a variety.

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Table 1. Descriptions and agronomic traits of durum wheat varieties grown in North Dakota, 2019.

	Agent or Origin ¹	Year Released	Height (inches) ²	Straw Strength ³	Days to Heading ⁴	Reaction to Disease ⁵				
						Stem Rust	Leaf Rust	Foliar Disease	Bact. Leaf Streak	Head Scab
AC Commander	Can.	2002	31	5	60	1	1	6	NA	NA
Alkabo	ND	2005	33	2	61	1	1	5	7	6
Alzada	WB	2004	28	6	59	1	1	8	NA	9
Ben	ND	1996	35	3	60	1	1	4	7	8
Carpio	ND	2012	34	5	63	1	1	5	6	5
CDC Verona	Can.	2010	32	4	61	1	1	4	NA	8
Divide	ND	2005	35	5	62	1	1	5	7	5
Grenora	ND	2005	32	5	60	1	1	5	7	6
Joppa	ND	2013	33	5	61	1	1	5	7	5
Lebsock	ND	1999	33	3	60	1	1	5	7	6
Maier	ND	1998	32	5	61	1	1	5	NA	8
Mountrail	ND	1998	34	5	62	1	1	5	7	8
ND Grano ⁶	ND	2017	34	5	63	1	1	NA	7	6
ND Riveland ⁶	ND	2017	34	4	61	1	1	NA	7	5
Pierce	ND	2001	32	5	61	1	1	6	7	8
Rugby	ND	1973	36	5	60	1	1	4	NA	8
Strongfield ⁶	Can.	2004	34	6	62	1	1	6	NA	8
Tioga	ND	2010	29	4	61	1	1	5	7	6
VT Peak	Viterra	2010	25	6	61	NA	NA	NA	NA	NA

¹Refers to agent or developer: Can. = Agriculture Canada, WB = Westbred, ND = North Dakota State University.

²Plant height was obtained from the average of six variety trials in 2018.

³Straw Strength = 1-9 scale, with 1 the strongest and 9 the weakest. Based on recent data. These values may change as more data become available.

⁴Days to Heading = the number of days from planting to head emergence from the boot. Averaged from several locations in 2018.

⁵Disease reaction scores from 1-9, with 1 = resistant and 9 = very susceptible. NA = Not adequately tested. Foliar Disease = reaction to tan spot and septoria leaf spot complex.

⁶Low cadmium accumulating variety.

Table 2. Durum wheat variety quality descriptions, milling and processing data averaged for five years (2014-2018) from drill strips (32 locations/year).

Variety	Test Weight (lb/bu)	Vitreous Kernels (%)	Large Kernels (%)	Falling Number (sec)	Wheat Protein ¹ (%)	Gluten Index ²	Pasta Color ³ (1-12)	Spaghetti Firmness (g-cm)	Overall Quality ⁴
Alkabo	61.4	80	56	400	13.6	44	8.7	3.8	good
Alzada	59.6	87	66	475	14.1	84	8.3	4.2	good
Carpio	61.4	77	63	456	13.6	91	8.6	4.0	good
Divide	61.0	84	56	447	13.8	71	8.4	3.9	good
Joppa	61.3	83	48	428	13.3	81	8.8	3.9	good
Maier	60.8	87	53	413	14.3	52	8.4	4.1	good
Mountrail	60.7	87	48	435	13.8	20	8.1	3.7	fair
ND Grano ⁵	61.6	83	50	461	13.8	64	8.9	4.0	good
ND Riveland ⁵	61.3	88	60	442	13.8	79	8.7	4.0	good
Strongfield	60.6	85	57	436	14.3	63	8.2	4.0	good
Tioga	60.9	83	61	401	13.7	73	8.4	4.0	good
Average	61.0	84	56	436	13.8	66	8.5	4.0	

For all numbered footnotes, refer to bottom of Table 3.

Table 3. Durum wheat variety quality descriptions, milling and processing data for 2018 at all locations from drill strips.

Variety	Test Weight (lb/bu)	Vitreous Kernels (%)	Large Kernels (%)	Falling Number (sec)	Wheat Protein ¹ (%)	Gluten Index ²	Pasta Color ³ (1-12)	Spaghetti Firmness (g-cm)	Overall Quality ⁴
Alkabo	62.1	87	67	478	14.1	22	7.9	4.0	good
Alzada	60.5	90	72	519	15.1	64	7.3	4.5	good
Carpio	62.4	83	74	532	14.2	79	7.6	4.1	good
Divide	61.9	87	68	540	14.5	50	7.5	3.8	good
Joppa	62.3	90	63	514	13.9	62	8.0	3.8	good
Maier	61.4	93	59	521	15.2	32	7.7	4.1	good
Mountrail	61.6	90	60	494	14.6	11	7.2	3.8	fair
ND Grano ⁵	62.6	88	66	533	14.3	43	8.2	3.9	good
ND Riveland ⁵	62.1	93	71	503	14.1	57	7.9	4.0	good
Strongfield	62.0	88	69	528	15.1	46	7.3	4.2	good
Tioga	62.0	89	72	498	14.3	48	7.5	4.1	good
Average	61.9	89	67	515	14.5	47	7.6	4.0	

¹Wheat protein is reported on a 12 percent moisture basis.

²Gluten index is unitless. Numbers less than 15 = very weak and greater than 80 = very strong gluten proteins.

³Pasta Color Score: Higher number indicates better color, with 8.5+ typically considered good.

⁴Overall Quality is determined based on agronomic, milling and spaghetti processing performance.

⁵Low cadmium accumulating variety.

Table 4. Yield of durum wheat varieties at six Research Extension Centers in North Dakota, 2017-2019.

Variety	<u>Carrington</u>		<u>Langdon</u>		<u>Dickinson</u>		<u>Hettinger</u>		<u>Minot</u>		<u>Williston</u>		<u>Average</u>	
	2019	3 Yr.	2019	3 Yr.	2019	3 Yr.	2019	3 Yr.	2019	3 Yr.	2019	3 Yr.	2019	3 Yr.
	------(bu/a)-----													
AC Commander	34.7	45.1	64.7	69.8	53.6	44.3	57.5	44.3	45.7	55.2	63.4	42.6	53.3	50.2
Alkabo	37.1	45.9	66.5	73.5	46.8	47.3	73.6	48.1	40.3	61.0	63.0	42.0	54.5	53.0
Alzada	22.3	38.4	59.4	57.2	50.2	41.2	48.2	39.3	35.3	51.5	54.2	39.0	44.9	44.4
Ben	33.5	45.3	67.5	71.9	52.7	47.4	60.3	42.4	49.1	61.9	63.0	39.5	54.3	51.4
Carpio	50.5	51.4	69.7	81.4	47.0	46.0	63.7	47.4	52.4	69.0	59.8	40.2	57.2	55.9
CDC Verona	43.8	50.0	67.2	73.7	49.7	47.9	67.7	46.6	44.5	57.4	65.4	40.7	56.4	52.7
Divide	45.7	52.3	68.4	78.8	49.7	48.4	70.8	46.1	56.7	65.6	63.6	41.2	59.1	55.4
Grenora	38.6	50.9	70.1	78.5	51.5	47.5	67.9	46.5	44.2	60.1	67.6	40.6	56.6	54.0
Joppa	45.5	53.2	74.9	82.5	51.0	50.3	66.2	45.5	46.0	70.1	61.4	41.5	57.5	57.2
Lebsock	40.7	48.9	69.8	73.5	53.9	48.3	64.8	45.3	41.6	63.4	--	--	55.8	53.4
Maier	36.0	47.9	68.9	74.2	47.7	45.9	62.7	44.0	43.0	59.9	65.4	41.4	54.0	52.2
Mountrail	36.0	47.5	67.9	77.5	52.1	50.9	66.9	47.8	55.3	68.9	67.6	41.7	57.6	55.7
ND Grano	39.8	53.6	69.8	76.7	53.9	50.4	68.5	46.3	50.9	71.9	63.7	39.7	57.8	56.4
ND Riveland	53.2	55.0	71.4	80.2	45.8	46.1	73.0	48.9	36.5	62.7	68.5	41.4	58.1	55.7
Pierce	39.4	48.8	69.5	80.2	47.2	45.5	69.6	45.5	41.7	58.5	61.6	39.5	54.8	53.0
Rugby	39.4	47.3	62.7	69.5	44.5	46.5	59.8	41.8	30.4	55.8	64.4	38.9	50.2	50.0
Strongfield	42.6	49.1	63.5	70.4	49.8	48.0	67.0	48.2	48.5	53.3	63.4	41.9	55.8	51.8
Tioga	44.2	53.0	69.4	79.4	52.1	49.4	64.5	43.5	47.3	58.7	66.1	43.9	57.3	54.6
VT Peak	48.0	52.1	72.4	77.0	50.5	46.9	72.4	49.7	47.9	69.1	64.3	41.7	59.3	56.1
Mean	42.9	49.3	70.2	74.9	51.1	47.3	67.6	46.1	44.6	61.8	64.7	41.0	56.8	53.4
CV %	8.1	--	5.6	--	9.3	--	7.6	--	13.2	--	9.8	--	7.5	5.6
LSD 0.05	4.8	--	5.5	--	6.6	--	7.2	--	9.5	--	10.2	--	5.0	3.4
LSD 0.10	4.0	--	4.6	--	5.6	--	6.1	--	8.0	--	8.6	--	4.1	2.9

Table 5. Test weight and protein of durum wheat varieties at six Research Extension Centers in North Dakota.

Variety	<u>Carrington</u>		<u>Langdon</u>		<u>Dickinson</u>		<u>Hettinger</u>		<u>Minot</u>		<u>Williston</u>		<u>Average</u>	
	Test		Test		Test		Test		Test		Test		Test	
	Wt.	Protein	Wt.	Protein	Wt.	Protein	Wt.	Protein	Wt.	Protein	Wt.	Protein	Wt.	Protein
	lb/bu	%	lb/bu		lb/bu	%	lb/bu	%	lb/bu	%	lb/bu	%	lb/bu	%
AC Commander	49.4	16.2	58.8	15.6	60.5	15.6	56.8	14.4	60.0	15.1	61.6	17.2	57.9	15.7
Alkabo	51.3	15.1	60.2	15.2	60.6	15.2	57.6	13.5	61.1	14.9	62.5	16.1	58.9	14.9
Alzada	48.3	16.0	58.7	15.5	59.9	15.5	54.9	14.4	59.6	15.4	61.3	16.9	57.1	15.6
Ben	50.3	16.0	60.7	15.4	60.6	15.4	58.0	14.5	60.9	15.8	62.9	16.6	58.9	15.7
Carpio	53.7	14.8	61.1	15.8	60.1	15.8	57.5	13.6	62.3	13.8	62.1	16.5	59.5	14.9
CDC Verona	53.9	16.1	60.2	16.3	60.0	16.3	57.4	14.6	60.3	16.5	61.0	17.2	58.8	16.1
Divide	53.6	15.6	59.9	15.2	60.6	15.2	58.4	13.8	62.3	15.2	62.1	16.6	59.5	15.3
Grenora	51.5	15.8	59.1	14.9	59.8	14.9	56.9	14.2	59.4	15.3	61.4	15.8	58.0	15.2
Joppa	52.7	15.0	60.9	14.5	60.4	14.5	58.3	12.9	61.8	15.1	62.0	15.8	59.4	14.6
Lebsock	52.4	15.8	61.1	15.1	61.0	15.1	58.1	13.4	63.1	15.2	--	--	58.8	15.2
Maier	51.8	16.4	60.9	15.8	60.4	15.8	57.2	14.8	60.4	16.7	62.3	16.9	58.8	16.1
Mountrail	49.4	15.8	58.5	15.9	60.3	15.9	57.9	13.2	61.8	14.2	61.9	16.4	58.3	15.1
ND Grano	51.8	15.4	60.7	15.1	60.8	15.1	56.9	13.5	61.2	15.1	62.6	16.6	59.0	15.1
ND Riveland	54.7	14.8	60.3	15.7	60.6	15.7	58.2	13.4	61.3	16.0	61.7	16.6	59.5	15.3
Pierce	52.4	15.2	60.9	15.1	61.3	15.1	59.2	13.8	60.5	15.2	62.4	16.6	59.5	15.2
Rugby	52.0	15.2	60.3	16.0	60.4	16.0	57.7	14.1	59.6	17.6	62.3	16.3	58.7	15.8
Strongfield	50.5	17.3	60.1	16.8	59.8	16.8	56.9	14.5	61.2	16.6	61.9	17.4	58.4	16.5
Tioga	52.1	14.6	60.5	15.1	60.4	15.1	58.0	13.6	59.2	15.9	62.6	15.5	58.8	14.9
VT Peak	54.0	15.7	61.7	15.4	61.0	15.4	59.2	14.1	62.3	15.4	63.1	16.8	60.2	15.5
Mean	52.4	15.5	60.5	15.5	60.5	15.5	57.8	13.9	60.6	15.6	62.1	16.6	59.0	15.4
CV %	1.9	3.0	0.8	2.6	0.9	2.6	1.3	4.2	2.1	5.0	0.5	4.7	1.3	3.0
LSD 0.05	1.4	0.7	0.7	0.6	0.8	0.6	1.1	0.8	2.1	1.3	0.5	1.3	0.9	0.6
LSD 0.10	1.2	0.5	0.6	0.5	0.6	0.5	0.9	0.7	1.7	1.1	0.4	1.1	0.8	0.5

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