

A1067-24 (December 2024)

North Dakota Durum Wheat

Variety Trial Results for 2024 and Selection Guide

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Durum was planted on 1.1 million acres in North Dakota in 2024, up from 905,000 acres seeded in 2023. The average yield was 47 bushels per acre (bu/a), up substantially from 37 bu/a last year. The 2024 growing season started off with good soil moisture and a long, cool spring that was ideal for small grain vegetative growth in May and June. The weather turned dry in July across western North Dakota, and a period of extremely hot temperatures in late July and early August likely reduced what may have been even higher yields due to heat and drought stress during early grain fill. On July 24 and 25, maximum daily air temperatures of 98 and 106 degrees, 98 degrees and 104 degrees, and 105 degrees and 107 degrees Fahrenheit were recorded at North Dakota Agricultural Weather Network stations in Dickinson, Hettinger and Williston, respectively.

The top five durum varieties in 2024 and the percent of the acreage they occupied according to survey data were ND Riveland (44.0%), AAC Stronghold (9.1%), Joppa (6.9%), ND Stanley (4.9%) and AAC Cabri (4.1%). ND Riveland, ND Stanley and Joppa are releases from the NDSU durum breeding program. AAC Stronghold and AAC Cabri are Agriculture and Agri-Food Canada (SeCan) varieties.

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 trials 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 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 90% confidence

(LSD probability 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 at that location.

The abbreviation NS is used to indicate no significant difference for that trait among any of the varieties at the 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 (> 10%) mean a large amount of variation in the trial could not be attributed to differences among 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 or online at <https://vt.ag.ndsu.edu/>. 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, 2024.

	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
AAC Spitfire	Can.	2017	35	4	62	NA	NA	NA	NA	NA
AAC Stronghold ⁷	Can.	2016	36	3	64	NA	NA	NA	NA	NA
Alkabo	ND	2005	37	2	61	1	1	5	7	6
Carpio	ND	2012	37	6	63	1	1	5	6	5
CDC Defy	Can.	2019	39	3	61	NA	NA	NA	NA	NA
Divide	ND	2005	38	4	62	1	1	5	7	5
Joppa	ND	2013	37	4	61	1	1	5	7	5
Maier	ND	1998	36	3	61	1	1	5	NA	8
Mountrail	ND	1998	38	4	62	1	1	5	7	8
MT Blackbeard⁶	MT	2022	38	4	65	1	1	5	NA	6
ND Grano ⁶	ND	2017	37	5	62	1	1	8	7	6
ND Riveland ⁶	ND	2017	40	4	62	1	1	5	6	5
ND Stanley ⁶	ND	2021	37	3	62	1	1	5	6	5
Strongfield ⁶	Can.	2004	37	5	62	1	1	6	NA	8
TCG Bright	21st Cent Gen	2022	36	NA	61	NA	NA	NA	NA	NA

¹Refers to agent or developer: Can. = Agriculture and Agri-Food Canada, ND = North Dakota State University. MT = Montana State University.
21st Cent Gen = Twenty-first Century Genetics (TCG)

Bold varieties are those recently released or new to NDSU testing, so data are limited and rating values may change.

²Plant height was obtained from the average of six locations in 2024.

³Straw Strength = 1-9 scale, with 1 the strongest and 9 the weakest. Ratings based on recent data, 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 five locations in 2024.

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.

⁷Solid stem variety to reduce wheat stem sawfly damage.

Table 2. Yield of durum wheat varieties at six Research Extension Centers in North Dakota, 2022-2024.

Variety	Carrington		Langdon		Dickinson		Hettinger		Minot		Williston		Average	
	2024	3 Yr.	2024	3 Yr.	2024	3 Yr.	2024	3 Yr.	2024	3 Yr.	2024	3 Yr.	2024	3 Yr.
	------(bu/a)-----													
AAC Spitfire	--	--	--	--	--	--	--	--	46.4	52.9	58.0	--	52.2	--
AAC Stronghold	--	--	--	--	59.3	--	50.1	63.8	46.5	52.9	--	--	52.0	--
Alkabo	66.2	54.3	82.6	74.6	58.7	43.1	55.6	68.3	55.0	56.8	66.6	44.1	64.1	56.9
Carpio	--	--	81.2	76.3	60.2	43.4	57.1	68.8	49.0	55.4	62.4	42.3	62.0	57.2
CDC Defy	67.0	59.0	--	--	62.5	--	58.8	71.5	54.1	56.0	66.4	--	61.8	62.2
Divide	67.3	56.4	79.5	72.5	61.5	41.9	54.2	65.8	40.9	45.2	59.4	37.8	60.5	53.3
Joppa	68.7	55.3	82.4	78.7	59.7	40.1	58.0	71.1	54.0	52.0	71.0	42.5	65.6	56.6
Maier	60.6	51.9	79.5	70.0	63.7	41.8	55.1	64.7	43.8	44.1	58.9	38.2	60.3	51.8
Mountrail	65.5	56.6	85.7	81.8	65.8	45.1	55.8	68.6	52.5	55.4	58.7	40.8	64.0	58.1
MT Blackbeard	--	--	--	--	60.5	--	57.1	--	--	--	58.9	--	58.8	--
ND Grano	65.5	56.5	88.9	79.8	61.0	43.3	56.3	67.9	58.2	57.4	63.6	42.0	65.6	57.8
ND Riveland	71.7	58.0	88.1	77.7	58.5	40.7	51.4	65.3	53.4	56.3	66.7	43.7	65.0	56.9
ND Stanley	67.0	54.3	83.6	79.0	61.5	43.2	58.7	68.9	53.8	59.4	63.3	40.5	64.7	57.6
Strongfield	57.9	54.4	71.7	69.1	57.7	38.3	56.4	66.6	34.4	47.5	60.3	40.8	56.4	52.8
TCG Bright	--	--	--	--	--	--	--	--	47.7	51.9	67.6	--	57.7	--
Mean	65.3	55.7	82.8	76.0	61.0	42.1	55.7	68.3	48.5	53.1	63.0	41.3	61.3	56.5
CV %	3.2	--	5.4	--	5.5	--	6.5	--	7.7	--	10.7	--	5.7	--
LSD 0.10	1.5	--	5.2	--	3.1	--	3.3	--	5.1	--	8.7	--	3.4	--

Table 3. Test weight and protein of durum wheat varieties at six Research Extension Centers in North Dakota, 2024.

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	%
AAC Spitfire	--	--	--	--	--	--	--	--	57.3	14.6	59.1	18.3	58.2	16.5
AAC Stronghold	--	--	--	--	58.0	16.1	56.7	13.2	59.0	14.1	--	--	57.9	14.5
Alkabo	57.6	12.0	62.4	11.8	59.2	14.9	57.2	11.8	59.3	13.5	61.3	15.6	59.5	13.3
Carpio	58.3	12.5	63.1	11.5	58.1	15.6	56.5	12.1	58.5	14.1	60.6	17.1	59.2	13.8
CDC Defy	57.8	12.5	--	--	58.3	16.0	57.7	12.3	58.0	13.1	60.6	17.2	58.5	14.2
Divide	57.6	12.0	62.0	12.1	58.2	15.8	56.4	12.9	58.5	14.3	61.0	16.9	58.9	14.0
Joppa	57.0	11.8	61.2	11.3	57.9	15.0	57.0	11.6	58.9	13.9	60.7	16.2	58.8	13.3
Maier	57.9	12.9	61.9	12.4	58.2	16.2	57.2	12.4	58.3	15.5	60.0	17.3	58.9	14.5
Mountrail	55.3	12.0	61.1	11.3	58.6	14.6	57.2	11.6	59.0	13.8	60.0	17.2	58.5	13.4
MT Blackbeard	--	--	--	--	58.4	15.6	56.7	12.3	--	--	59.4	17.4	58.2	15.1
ND Grano	57.4	12.2	62.6	12.0	58.7	15.6	57.1	12.1	57.9	14.2	61.1	16.7	59.1	13.8
ND Riveland	58.6	12.3	62.5	12.0	56.8	15.8	56.2	13.0	58.7	13.4	59.5	17.2	58.7	14.0
ND Stanley	58.0	12.3	63.5	12.0	59.1	15.7	57.5	13.2	59.6	13.1	60.9	17.5	59.8	14.0
Strongfield	55.8	12.8	61.5	12.8	57.5	16.8	56.8	12.4	58.2	14.1	61.5	17.2	58.6	14.4
TCG Bright	--	--	--	--	--	--	--	--	58.4	13.8	61.9	16.6	60.2	15.2
Mean	58.0	12.2	62.3	11.9	58.4	15.7	56.9	12.5	58.9	14.0	60.3	17.3	58.9	14.3
CV %	0.6	1.9	0.9	3.3	0.8	3.0	1.1	6.2	2.0	6.1	1.7	4.4	1.1	3.0
LSD 0.10	0.2	0.2	0.7	0.5	0.4	0.4	0.6	0.7	1.6	1.1	1.4	1.0	0.6	0.4

Table 4. Durum wheat variety quality descriptions, milling and processing data averaged for five years (2018-2022) from drill strips (32 locations/years).

Variety	Test Weight (lb/bu)	Vitreous Kernels (%)	1000 kernel wt (g)	Large Kernels (%)	Falling Number (sec)	Wheat Protein ¹ (%)	Gluten Index ²	Pasta Color ³ (1-12)	Spaghetti Firmness ⁴ (g-cm)	Overall Quality ⁵
Alkabo	61.5	84	43.4	58	441	14.2	48	8.0	3.8	good
Carpio	61.8	81	43.9	68	521	14.3	91	8.0	4.0	good
Divide	61.2	87	42.4	59	513	14.4	75	7.6	3.9	good
Joppa	61.7	89	42.9	53	504	14.2	81	8.4	3.8	good
Maier	61.0	91	41.0	54	477	15.4	52	7.8	4.0	good
Mountrail	60.7	91	40.1	49	485	14.7	25	7.3	3.6	fair
ND Grano	62.0	89	42.2	59	509	14.7	65	8.2	4.0	good
ND Riveland	61.5	92	44.4	63	528	14.5	81	7.9	3.9	good
ND Stanley	62.3	86	43.4	64	523	14.8	72	8.0	3.8	good
Strongfield	61.1	91	41.3	62	522	15.4	67	7.6	4.1	good
Average	61.5	88	42.5	59	502	14.7	66	7.9	3.9	

For all numbered footnotes, refer to bottom of Table 5.

Table 5. Durum wheat variety quality descriptions, milling and processing data for 2022 at all locations from drill strips.

Variety	Test Weight (lb/bu)	Vitreous Kernels (%)	1000 kernel wt (g)	Large Kernels (%)	Falling Number (sec)	Wheat Protein ¹ (%)	Gluten Index ²	Pasta Color ³ (1-12)	Spaghetti Firmness ⁴ (g-cm)	Overall Quality ⁵
Alkabo	61.6	87	37.2	49	506	14.0	58	8.4	3.9	good
Carpio	62.5	84	39.6	64	547	13.5	97	8.2	4.1	good
Divide	61.3	89	37.0	49	527	14.2	83	7.8	4.2	good
Joppa	62.1	91	38.7	45	521	13.7	93	8.4	3.7	good
Maier	61.3	93	36.5	47	510	15.0	59	8.2	4.1	good
Mountrail	61.1	94	36.0	44	538	14.1	39	7.8	3.7	fair
ND Grano	62.6	93	37.3	51	557	14.1	75	8.4	4.3	good
ND Riveland	61.9	93	39.3	56	567	13.8	91	8.2	4.1	good
ND Stanley	62.7	88	38.2	60	567	14.1	82	8.2	4.1	good
Strongfield	61.8	94	37.1	53	565	14.2	77	8.2	4.1	good
Average	61.9	91	37.7	52	541	14.1	75	8.2	4.0	

¹Wheat protein is reported on a 12% 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.

⁴Work required to cut through a strand of spaghetti.

⁵Overall Quality is determined based on agronomic, milling and spaghetti processing performance.

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1.3M-12-24