

A1067-22

# North Dakota Durum Wheat

## *Variety Trial Results for 2022 and Selection Guide*

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Durum was planted on 950,000 acres in North Dakota in 2022, up 8% from 2021. The average yield was 41 bushels per acre (bu/a), up from 24 last year. Low 2021 yields were the result of widespread and severe drought. The 2022 growing season was marked by late planting following late spring blizzards and rain. The most commonly grown varieties in 2022 and the percent of the acreage they occupied were ND Riveland (38.9%), Joppa (15.2%), Divide (9.8%), Alkabo (8.1%), ND Grano (3.2%), VT Peak (2.9%) and Carpio (2.3%).

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 <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, 2022.**

	Agent or Origin <sup>1</sup>	Year Released	Height (inches) <sup>2</sup>	Straw Strength <sup>3</sup>	Days to Heading <sup>4</sup>	Reaction to Disease <sup>5</sup>				
						Stem Rust	Leaf Rust	Foliar Disease	Bact. Leaf Streak	Head Scab
<b>AAC Spitfire</b>	<b>Can.</b>	<b>2014</b>	<b>35</b>	<b>4</b>	<b>51</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>
<b>AAC Stronghold</b>	<b>Can.</b>	<b>2016</b>	<b>36</b>	<b>3</b>	<b>52</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>
Alkabo	ND	2005	37	2	52	1	1	5	7	6
Carpio	ND	2012	38	5	54	1	1	5	6	5
CDC Defy	Can.	2019	38	3	51	NA	NA	NA	NA	NA
<b>CDC Vantta</b>	<b>Can.</b>	<b>2021</b>	<b>32</b>	<b>3</b>	<b>58</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>
Divide	ND	2005	39	5	55	1	1	5	7	5
Joppa	ND	2013	38	5	52	1	1	5	7	5
Maier	ND	1998	36	4	53	1	1	5	NA	8
Mountrail	ND	1998	38	5	53	1	1	5	7	8
ND Grano <sup>6</sup>	ND	2017	37	5	52	1	1	8	7	6
ND Riveland <sup>6</sup>	ND	2017	38	4	53	1	1	5	6	5
<b>ND Stanley<sup>6</sup></b>	<b>ND</b>	<b>2021</b>	<b>37</b>	<b>4</b>	<b>53</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>6</b>	<b>5</b>
Rugby	ND	1973	40	5	53	1	1	4	NA	8
Strongfield <sup>6</sup>	Can.	2004	36	6	52	1	1	6	NA	8
Tioga	ND	2010	41	5	53	1	1	5	7	6

<sup>1</sup>Refers to agent or developer: Can. = Agriculture Canada, ND = North Dakota State University. Bold varieties are those recently released, so data are limited and rating values may change.

<sup>2</sup>Plant height was obtained from the average of four locations in 2022.

<sup>3</sup>Straw 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.

<sup>4</sup>Days to Heading = the number of days from planting to head emergence from the boot. Averaged from three locations in 2022.

<sup>5</sup>Disease 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.

<sup>6</sup>Low cadmium accumulating variety.

**Table 2. Yield of durum wheat varieties at five Research Extension Centers in North Dakota, 2020-2022**

Variety	<u>Carrington</u>		<u>Langdon</u>		<u>Hettinger</u>		<u>Minot</u>		<u>Williston</u>		<u>Average</u>	
	2022	3 Yr.	2022	3 Yr.	2022	3 Yr.	2022	3 Yr.	2022	3 Yr.	2022	3 Yr.
	------(bu/a)-----											
AAC Spitfire	53.0	--	--	--	71.0	--	72.5	--	--	--	61.4	--
AAC Stronghold	47.9	--	--	--	64.5	--	80.2	--	--	--	60.1	--
Alkabo	47.6	42.2	77.9	68.7	72.3	40.0	72.4	59.0	32.8	25.5	60.6	47.1
Carpio	57.7	47.8	81.1	69.4	71.9	38.6	81.7	65.0	37.3	28.4	65.9	49.8
CDC Defy	52.9	--	82.3	--	72.1	--	78.9	--	--	--	64.2	--
CDC Vantta	40.7	--	58.0	--	61.1	--	50.5	--	--	--	45.2	--
Divide	48.1	41.8	74.9	67.9	68.1	37.2	69.0	60.0	30.4	25.1	58.1	46.4
Joppa	51.8	44.5	86.2	68.5	75.3	40.9	73.1	62.5	29.7	24.3	63.2	48.1
Maier	51.1	41.1	68.2	56.6	71.2	40.0	63.5	56.5	30.6	22.5	56.9	43.3
Mountrail	56.2	48.6	86.3	68.4	72.7	41.0	78.6	68.0	35.8	25.9	65.9	50.4
ND Grano	52.5	46.0	83.9	69.6	71.2	40.1	83.2	67.0	34.3	25.4	65.0	49.6
ND Riveland	47.6	46.7	80.8	68.4	69.2	40.6	77.7	60.6	37.6	27.5	62.6	48.8
ND Stanley	45.8	45.0	85.5	72.4	73.9	42.7	83.8	68.6	29.8	--	63.7	--
Rugby	43.4	45.2	69.1	57.5	70.5	39.7	63.9	52.0	--	--	54.4	--
Strongfield	55.2	47.5	71.1	59.6	68.9	38.6	75.7	62.5	30.7	23.9	60.3	46.4
Tioga	49.9	43.6	80.7	68.3	63.5	37.3	78.5	64.0	--	--	60.8	--
Mean	50.1	45.0	77.6	66.3	69.8	39.7	74.4	62.1	32.9	25.4	62.7	47.8
CV %	14.0	--	6.4	--	3.7	--	6.2	--	9.0	--	6.9	--
LSD 0.05	10.2	--	7.1	--	3.1	--	7.5	--	4.7	--	5.5	--
LSD 0.10	8.5	--	5.9	--	2.4	--	6.3	--	4.0	--	4.6	--

**Table 3. Test weight and protein of durum wheat varieties at five Research Extension Centers in North Dakota, 2022.**

Variety	<u>Carrington</u>		<u>Langdon</u>		<u>Hettinger</u>		<u>Minot</u>		<u>Williston</u>		<u>Average</u>	
	Test		Test		Test		Test		Test		Test	
	Wt.	Protein	Wt.	Protein	Wt.	Protein	Wt.	Protein	Wt.	Protein	Wt.	Protein
	lb/bu	%	lb/bu	%	lb/bu	%	lb/bu	%	lb/bu	%	lb/bu	%
AAC Spitfire	61.0	13.8	--	--	62.5	12.3	57.5	14.5	--	--	59.7	13.7
AAC Stronghold	61.7	15.1	--	--	62.7	12.9	59.1	13.7	--	--	60.6	14.0
Alkabo	62.4	14.6	60.6	12.9	63.5	11.6	59.4	13.3	59.7	13.9	61.1	13.3
Carpio	62.2	14.2	62.7	12.3	63.0	11.6	60.2	13.5	59.2	14.2	61.5	13.2
CDC Defy	62.5	14.6	60.8	13.1	63.8	11.9	60.2	12.9	--	--	61.4	13.3
CDC Vantta	59.0	15.1	56.1	14.3	61.7	12.6	57.1	15.7	--	--	58.0	14.7
Divide	61.8	13.9	61.1	12.6	63.1	11.9	58.7	13.0	58.8	14.0	60.7	13.1
Joppa	63.1	13.0	61.1	12.5	63.1	11.3	58.3	13.3	59.7	13.9	61.1	12.8
Maier	62.3	14.5	59.8	13.7	63.3	12.7	57.2	14.7	59.6	14.6	60.4	14.0
Mountrail	61.9	14.4	60.5	12.6	62.9	10.8	58.0	13.8	58.4	14.2	60.3	13.2
ND Grano	63.2	13.6	61.9	12.9	63.7	12.2	60.2	13.5	59.5	14.5	61.7	13.4
ND Riveland	62.2	14.4	61.6	12.5	62.8	11.4	59.5	13.1	58.6	13.8	60.9	13.0
ND Stanley	62.4	15.1	62.7	12.8	63.8	12.0	60.7	13.3	59.9	14.8	61.9	13.6
Rugby	62.3	14.0	61.1	12.9	63.7	11.9	58.4	14.6	--	--	60.9	13.6
Strongfield	62.7	14.0	58.7	15.0	63.1	12.3	59.4	13.8	59.4	14.5	60.7	13.9
Tioga	62.1	13.9	62.1	12.5	62.8	12.1	59.1	13.9	--	--	61.1	13.3
Mean	62.2	14.2	61.3	12.9	63.1	12.0	59.0	13.6	59.2	14.1	61.0	13.4
CV %	0.9	5.3	1.6	4.2	5.4	5.4	1.5	5.6	0.5	2.8	1.2	3.6
LSD 0.05	0.8	1.1	1.4	0.8	0.7	0.7	1.5	1.2	0.4	0.6	0.9	0.6
LSD 0.10	0.6	0.9	1.2	0.6	0.6	0.6	1.2	1.0	0.4	0.5	0.8	0.5

**Table 4. Durum wheat variety quality descriptions, milling and processing data averaged for five years (2017-2021) from drill strips (32 locations/years).**

Variety	Test Weight	Vitreous Kernels	Large Kernels	Falling Number	Wheat Protein <sup>1</sup>	Gluten Index <sup>2</sup>	Pasta Color <sup>3</sup>	Spaghetti Firmness <sup>4</sup>	Overall Quality <sup>5</sup>
	(lb/bu)	(%)	(%)	(sec)	(%)		(1-12)	(g-cm)	
Alkabo	61.3	82	57	416	14.3	49	8.0	3.9	good
Carpio	61.4	80	66	500	14.5	91	8.2	4.1	good
Divide	61.0	86	58	498	14.5	75	7.7	3.9	good
Joppa	61.4	87	51	491	14.3	82	8.4	4.0	good
Maier	60.7	89	53	455	15.5	55	7.8	4.1	good
Mountrail	60.4	90	47	471	14.7	25	7.4	3.7	fair
ND Grano	61.5	85	56	491	14.8	66	8.2	4.0	good
ND Riveland	61.0	88	62	501	14.7	81	8.1	4.0	good
ND Stanley	61.9	82	61	498	14.9	73	8.0	3.9	good
Strongfield	60.7	89	60	499	15.4	67	7.7	4.2	good
Tioga	61.0	85	65	430	14.7	73	7.6	4.2	good
Average	61.1	86	58	477	14.8	67	7.9	4.0	

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

**Table 5. Durum wheat variety quality descriptions, milling and processing data for 2021 at all locations from drill strips.**

Variety	Test Weight	Vitreous Kernels	Large Kernels	Falling Number	Wheat Protein <sup>1</sup>	Gluten Index <sup>2</sup>	Pasta Color <sup>3</sup>	Spaghetti Firmness <sup>4</sup>	Overall Quality <sup>5</sup>
	(lb/bu)	(%)	(%)	(sec)	(%)		(1-12)	(g-cm)	
Alkabo	61.4	83	44	517	15.2	56	NA	NA	good
Carpio	60.5	82	53	609	15.9	90	NA	NA	good
Divide	61.0	87	43	620	14.1	74	NA	NA	fair
Joppa	61.4	89	40	663	15.9	81	NA	NA	good
Maier	61.1	91	44	599	16.7	54	NA	NA	good
Mountrail	60.1	89	31	595	16.1	28	NA	NA	fair
ND Grano	61.7	88	47	634	16.4	68	NA	NA	good
ND Riveland	61.1	92	54	700	15.6	84	NA	NA	good
ND Stanley	61.8	84	51	743	16.0	79	NA	NA	good
Strongfield	61.1	93	58	665	16.6	72	NA	NA	good
Tioga	61.3	91	50	567	16.0	75	NA	NA	good
Average	61.1	88	47	628	15.9	69			

<sup>1</sup>Wheat protein is reported on a 12% moisture basis.

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

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

<sup>4</sup>Work required to cut through a strand of spaghetti.

<sup>5</sup>Overall Quality is determined based on agronomic, milling and spaghetti processing performance.



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