

North Dakota Durum Wheat

Variety Trial Results for 2015 and Selection Guide

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Durum was planted on 1.1 million acres in North Dakota in 2015, up slightly from the 820,000 acres planted in 2014. The average yield is estimated at 36 bushels per acre, down slightly from last year. The most commonly grown varieties in 2015 and the percent of the acreage they occupied were Divide (29.5), Alkabo (20.9), Tioga (10.1), Mountrail (7.6), Lebsock (4.9), Grenora (4.3) and Carpio (2.2).

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 percent moisture, while protein content is reported at 12 percent 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 reliable 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 percent 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 percent 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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Fargo, North Dakota 58108

November 2015

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Table 1. Descriptions and agronomic traits of durum wheat varieties grown in North Dakota, 2015.

Variety	Agent or Origin ¹	Year Released	Height (inches)	Straw Strength ²	Days to Heading ³	Reaction to Disease ⁴				
						Stem Rust	Leaf Rust	Foliar Disease	Bact. Leaf Streak	Head Scab
AC Commander	Can.	2002	32	5	68	R	R	MS	NA	NA
AC Napoleon	Can.	2001	40	5	68	R	R	S	NA	NA
AC Navigator	Can.	1999	32	5	66	R	R	M	NA	S
Alkabo	ND	2005	36	2	67	R	R	M	MS	MS
Alzada ⁵	WB	2004	30	6	63	R	R	S	NA	VS
Belzer	ND	1997	39	5	66	R	R	M	NA	MR
Ben	ND	1996	39	3	67	R	R	MR	MS	S ⁶
Carpio	ND	2012	37	5	69	R	R	M	MS/S	M
CDC Verona	Can.	2010	38	4	69	R	R	MR	NA	S
DG Max	DGP	2008	38	5	66	R	MR	MR	NA	MS
DG Star	DGP	2007	37	4	64	R	R	M	NA	NA
Dilse	ND	2002	37	5	68	R	R	M	M	MS
Divide	ND	2005	38	5	68	R	R	M	MS/S	MR
Grande D'Oro	WB/DGP	2005	37	4	68	R	R	M	NA	NA
Grenora	ND	2005	35	5	67	R	R	M	MS/S	MS
Joppa	ND	2013	39	5	68	R	R	M	MS	MS
Kyle	Can.	1984	39	7	68	R	MR	M	NA	NA
Lebsock	ND	1999	37	3	67	R	R	M	MS	MS
Maier	ND	1998	37	5	67	R	R	M	NA	S ⁶
Mountrail	ND	1998	37	5	68	R	R	M	MS	S ⁶
MS-Dart⁷	Meridian	2015	37	5	68	NA	NA	NA	NA	NA
Pierce	ND	2001	38	5	67	R	R	MS	MS	S
Plaza	ND	1999	29	7	68	R	R	M	NA	MS
Rugby	ND	1973	38	5	64	R	R	MR	NA	S ⁶
Silver	MT	2012	31	5	62	NA	NA	NA	NA	NA
Strongfield	Can.	2004	37	6	68	R	R	MS	NA	S
Tioga	ND	2010	39	4	68	R	R	M	MS	MS
VT Peak	Viterra	2010	37	6	68	NA	NA	NA	NA	NA
Wales	WB	2008	36	3	67	R	R	M	NA	S ⁶
WB-Belfield	WB	2011	30	2	62	R	R	S	NA	S
Westhope	WB	2009	36	3	67	R	R	MS	NA	S

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

²Straw 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.

³Days to Heading = the number of days from planting to head emergence from the boot. Averaged from several locations and years.

⁴R = resistant; MR = moderately resistant; M = intermediate; MS = moderately susceptible; S = susceptible; VS = very susceptible; NA = Not adequately tested. Foliar Disease = reaction to tan spot and septoria leaf spot complex.

⁵Alzada has a disease-resistance package that makes it more adapted to drier growing conditions (for example, western North Dakota).

⁶Indicates yields and/or quality often have been higher than would be expected based on visual symptoms. NA = Not adequately tested.

⁷Bold indicates newly released in 2015.

Table 2. Durum wheat variety quality descriptions, milling and processing data averaged for five years (2009-2014) from drill strips (33 locations/year).

Variety	Test Weight	Vitreous Kernels	Large Kernels	Falling Number	Wheat Protein ¹	Gluten Index ²	Pasta Color ³	Spaghetti Firmness	Overall Quality ⁴
	(lb/bu)	(%)	(%)	(sec)	(%)		(1-12)	(g-cm)	
AC Commander	59.5	94	52	477	14.0	90	9.0	5.7	Good
AC Navigator	60.0	95	50	462	14.3	69	8.8	5.8	Good
Alkabo	60.8	88	51	385	13.8	51	8.9	5.1	Good
Alzada ⁵	59.1	93	62	451	14.2	90	8.5	5.7	Good
Carpio	60.9	83	58	433	13.8	92	8.9	5.5	Good
Divide	60.5	89	52	428	14.1	76	8.7	5.2	Good
Grenora	60.1	93	51	404	13.8	67	8.8	5.4	Good
Joppa	60.5	88	44	391	13.5	84	9.1	5.1	Good
Lebsock ⁶	60.3	93	42	411	14.5	42	8.5	5.5	Good
Maier	60.0	93	46	380	14.7	55	8.7	5.5	Good
Mountrail	59.7	91	42	396	14.0	22	8.2	4.7	Average
Pierce	60.7	95	42	391	14.2	63	8.7	5.4	Good
Strongfield	60.1	89	52	406	14.7	67	8.6	5.5	Good
Tioga	60.5	89	57	389	13.8	77	8.6	5.4	Good
Average	60.2	91	50	415	14.1	68	8.7	5.4	

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

Table 3. Durum wheat variety quality descriptions, milling and processing data for 2014 at seven locations in the drill strips.

Variety	Test Weight	Vitreous Kernels	Large Kernels	Falling Number	Wheat Protein ¹	Gluten Index ²	Pasta Color ³	Spaghetti Firmness	Overall Quality ⁴
	(lb/bu)	(%)	(%)	(sec)	(%)		(1-12)	(g-cm)	
AC Commander	60.1	88	73	354	12.4	87	8.5	4.0	Good
AC Navigator	60.7	89	69	347	12.9	60	8.4	4.0	Good
Alkabo	60.9	74	68	266	12.7	38	8.4	3.4	Average
Alzada ⁵	59.5	86	81	330	12.7	82	7.9	3.7	Average
Carpio	60.9	65	72	335	12.1	91	8.4	3.6	Good
Divide	60.7	76	67	320	12.4	70	8.4	3.4	Good
Grenora	60.4	87	64	282	12.8	66	8.4	3.9	Good
Joppa	60.9	72	60	270	12.0	77	8.6	3.4	Good
Maier	60.7	85	66	253	13.0	41	8.3	3.6	Good
Mountrail	60.7	77	61	297	12.4	4	7.7	3.2	Fair
Pierce	61.2	90	59	281	12.8	51	8.2	3.5	Good
Strongfield	60.0	77	73	254	12.6	56	7.8	3.5	Average
Tioga	59.9	78	66	274	12.8	72	8.1	3.8	Good
Average	60.5	80	68	297	12.6	61	8.2	3.6	

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.

⁵Alzada has good quality when grown in environments where it is adapted. Low test weight can affect quality in some environments.

⁶Average of 30 drill strips instead of 33 for other varieties in Table 1. Average of four locations instead of seven for other varieties in Table 2.

Table 4. Yield of durum wheat varieties at six Research Extension Centers in North Dakota, 2013-2015.

Variety	<u>Carrington</u>		<u>Langdon</u>		<u>Dickinson</u>		<u>Hettinger</u>		<u>Minot</u>		<u>Williston*</u>		<u>Average</u>	
	2015	3 Yr.	2015	3 Yr.	2015	3 Yr.	2015	3 Yr.	2015	3 Yr.	2015	3 Yr.	2015	3 Yr.
	------(bu/a)-----													
AC Commander	44.3	53.7	58.7	80.5	63.5	57.2	59.7	57.7	71.0	64.8	24.7	36.4	53.7	58.4
AC Navigator	43.6	53.4	52.0	74.9	61.4	54.8	56.2	54.5	52.3	54.1	27.4	35.5	48.8	54.5
Alkabo	41.6	54.7	70.0	84.2	68.2	60.8	70.0	67.7	80.8	71.2	28.1	36.7	59.8	62.6
Alzada	41.9	52.5	60.7	71.2	59.6	50.5	41.7	44.5	46.4	52.8	26.5	34.1	46.1	50.9
Ben	46.1	53.3	71.8	80.6	68.1	58.8	60.5	62.2	70.7	66.6	23.7	35.2	56.8	59.5
Carpio	52.4	59.6	84.8	89.7	67.4	59.4	71.6	67.5	74.3	69.1	29.9	36.3	63.4	63.6
CDC Verona	50.8	56.9	69.8	83.0	59.0	56.4	66.5	67.1	62.1	61.5	28.7	32.9	56.2	59.6
Divide	48.6	54.9	77.5	85.2	73.7	63.8	82.6	73.1	77.3	68.3	27.2	35.0	64.5	63.4
Grenora	50.9	59.1	76.6	86.8	75.0	62.7	76.3	65.7	74.0	67.9	32.2	37.3	64.2	63.3
Joppa	46.1	58.1	82.1	90.0	69.1	63.5	78.8	71.9	77.3	69.6	26.8	39.9	63.4	65.5
Lebsock	47.2	58.0	72.3	80.4	68.2	57.7	60.6	60.6	77.4	68.8	24.0	32.5	58.3	59.7
Maier	39.6	54.6	73.7	82.5	72.0	61.3	59.3	56.0	72.8	65.9	--	--	--	--
Mountrail	50.5	58.2	80.3	90.0	68.4	65.4	76.6	71.7	78.1	70.0	28.2	37.0	63.7	65.4
MS-Dart	51.0	--	--	--	--	--	73.5	--	64.1	--	--	--	--	--
Pierce	46.8	55.4	73.1	85.4	71.4	59.1	55.3	55.6	79.4	69.0	26.0	36.4	58.7	60.2
Rugby	40.8	52.0	66.1	75.3	66.3	56.5	59.3	61.8	63.9	62.6	22.1	32.0	53.1	56.7
Silver	36.2	--	--	--	--	--	--	--	--	--	22.9	--	--	--
Strongfield	46.6	51.1	64.9	84.1	63.9	57.9	70.7	66.3	65.5	63.3	25.3	33.7	56.2	59.4
Tioga	45.6	57.6	75.5	84.8	74.7	63.5	81.5	73.7	73.3	69.2	28.5	39.8	63.2	64.8
VT Peak	48.8	55.7	75.3	84.3	--	--	79.2	74.3	73.4	67.8	29.9	38.7	--	--
Mean	46.0	55.5	71.4	82.9	67.6	59.4	67.4	64.0	70.2	65.7	26.8	35.8	58.2	60.6
CV %	10.4	--	7.5	--	6.3	--	6.2	--	9.0	--	18.7	--	--	--
LSD 0.05	8.1	--	7.6	--	6.1	--	6.4	--	10.3	--	7.1	--	--	--
LSD 0.10	6.8	--	6.4	--	5.1	--	5.3	--	8.8	--	6.0	--	--	--

*Plots with 30 percent stress or higher were averaged from other plots within the same variety. Yields were adjusted to stands of 100 percent.

Table 5. Test weight and protein of durum wheat varieties at six Research Extension Centers in North Dakota, 2015.

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	58.1	14.3	57.7	13.4	54.4	15.9	56.3	13.7	58.9	14.1	58.5	19.7	57.3	15.2
AC Navigator	59.6	14.2	58.0	13.5	56.1	16.1	57.3	14.0	58.6	14.4	59.8	17.7	58.2	15.0
Alkabo	60.9	13.2	61.6	12.3	57.0	16.0	59.2	13.0	62.3	12.7	59.5	17.6	60.1	14.1
Alzada	59.0	14.9	57.6	13.7	54.8	16.3	53.9	14.1	57.9	14.4	58.4	18.1	56.9	15.3
Ben	61.6	13.8	61.7	12.9	56.8	16.3	58.0	13.6	61.3	13.8	59.2	19.8	59.8	15.0
Carpio	60.8	13.8	61.3	12.4	57.4	16.8	59.3	13.8	62.5	12.2	58.3	19.1	59.9	14.7
CDC Verona	59.5	14.8	59.8	14.2	53.9	17.8	57.2	14.5	59.0	15.3	58.8	19.9	58.0	16.1
Divide	60.5	14.5	61.0	13.6	56.9	17.0	59.5	13.2	61.8	13.8	59.1	17.5	59.8	14.9
Grenora	61.1	14.0	61.3	13.2	57.1	16.0	57.7	13.8	61.9	12.5	58.6	17.6	59.6	14.5
Joppa	60.9	13.6	61.3	12.2	55.7	16.3	58.1	12.7	61.8	13.0	59.1	19.6	59.5	14.6
Lebsock	61.8	13.7	61.7	13.2	56.1	16.4	58.7	14.0	62.5	14.1	58.7	18.3	59.9	15.0
Maier	60.2	13.1	61.5	13.9	56.2	16.9	57.6	14.7	61.5	14.9	--	--	--	--
Mountrail	60.6	13.4	60.7	12.0	54.7	16.5	57.4	13.1	61.2	12.5	58.0	18.0	58.8	14.3
MS-Dart	60.5	13.4	--	--	--	--	58.9	12.4	61.1	13.6	--	--	--	--
Pierce	61.7	13.2	61.9	12.7	57.1	16.2	57.8	13.5	62.3	13.3	58.9	18.7	60.0	14.6
Rugby	61.6	13.4	61.4	12.7	57.5	16.7	57.6	13.6	62.0	13.6	58.4	20.5	59.8	15.1
Silver	59.9	14.8	--	--	--	--	--	--	--	--	57.6	18.0	--	--
Strongfield	59.7	15.4	59.6	14.9	52.9	17.8	59.1	14.7	59.7	15.0	59.1	18.4	58.4	16.0
Tioga	60.8	14.5	61.5	13.0	57.4	16.2	59.0	13.6	61.6	13.8	59.2	16.6	59.9	14.6
VT Peak	61.9	14.0	62.5	13.1	--	--	60.5	13.1	62.6	13.3	59.4	19.1	--	--
Mean	60.5	14.0	60.7	13.2	56.0	16.5	58.1	13.6	61.1	13.7	58.8	18.6	59.2	14.9
CV %	0.8	3.2	1.0	3.8	2.0	2.3	0.9	3.2	1.1	5.0	1.0	7.2	--	--
LSD 0.05	0.7	0.6	0.9	0.7	1.6	0.8	0.7	0.6	1.1	1.1	0.8	1.9	--	--
LSD 0.10	0.6	0.5	0.7	0.6	1.3	0.6	0.6	0.5	0.9	0.9	0.7	1.6	--	--

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