

North Dakota Durum Wheat

Variety Trial Results for 2014 and Selection Guide

Joel Ransom, Elias Elias, Maricelis Acevedo, Tim Friesen, Zhaohui Liu and Frank Manthey (NDSU Main Station); John Rickertsen (Hettinger Research Extension Center); Eric Eriksmoen (North Central Research Extension Center, Minot); Bryan Hanson (Langdon Research Extension Center); Gautam Pradhan (Williston Research Extension Center); Blaine Schatz and Mike Ostlie (Carrington Research Extension Center)

Durum was planted on 820,000 acres in North Dakota in 2014, up slightly from the 790,000 acres planted in 2013. Average yield is estimated at 38 bushels per acre, about the same as last year. The most commonly grown varieties in 2014 and the percent of the acreage they occupied were Divide (37), Alkabo (16.2), Mountrail (12.9), Tioga (9.7), Lebsock (7.5) and Grenora (3.4).

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 content.

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 90 percent 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 under those growing conditions.

NS is used to indicate no significant difference for that trait among any of the varieties at the 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.

NDSU EXTENSION
SERVICE

NDSU NORTH DAKOTA AGRICULTURAL
EXPERIMENT STATION

Fargo, North Dakota

November 2014

List of Tables

- Table 1. Descriptions and agronomic traits of durum wheat varieties grown in North Dakota, 2014.
 Table 2. Durum wheat variety quality descriptions, milling and processing data averaged for five years (2008-2013) from **drill strips (33 locations/year)**.
 Table 3. Durum wheat variety quality descriptions, milling and processing data for 2013 at all locations in the drill strips.
 Table 4. Yield of durum varieties at six Research Extension Centers (RECs) in North Dakota, 2012-2014.
 Table 5. Test weight (six RECs) and protein (five RECs) of durum varieties in North Dakota, 2014.

Table 1. Descriptions and agronomic traits of durum wheat varieties grown in North Dakota, 2014.

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
CDC Verona	Can.	2010	38	4	69	R	R	MR	NA	S
Carpio	ND	2012	37	5	69	R	R	M	MS/S	M
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
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
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.

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 (western North Dakota).

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

Table 2. Durum wheat variety quality descriptions, milling and processing data averaged for five years (2009-2013) 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	96	52	497	14.3	92	9.2	5.9	Good
AC Navigator	59.9	97	49	484	14.5	74	9.0	6.0	Good
Alkabo	61.0	90	50	410	14.0	56	9.0	5.4	Good
Alzada ⁵	59.1	95	60	465	14.6	93	8.7	6.0	Good
Carpio	60.9	88	58	455	14.0	93	9.1	5.7	Good
Divide	60.5	92	50	458	14.4	79	8.8	5.5	Good
Grenora	60.2	95	51	438	14.1	69	9.0	5.6	Good
Joppa	60.4	93	42	416	13.8	87	9.2	5.4	Good
Lebsock ⁶	60.8	93	46	428	14.4	48	8.6	5.5	Good
Maier	60.1	96	45	409	15.0	60	8.7	5.9	Good
Mountrail	59.7	94	42	416	14.3	29	8.4	5.0	Average
Pierce	60.8	96	42	422	14.4	68	8.8	5.7	Good
Strongfield	60.2	93	51	426	15.1	70	8.8	5.8	Good
Tioga	60.7	92	57	401	14.1	80	8.8	5.7	Good
Average	60.3	94	50	438	14.4	71	8.9	5.7	

For numbered footnotes, refer to bottom of Table 3.

Table 3. Durum wheat variety quality descriptions, milling and processing data for 2013 at all 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	62.1	95	68	527	13.3	88	9.2	4.9	Good
AC Navigator	62.6	96	67	533	13.6	64	9.1	4.8	Good
Alkabo	63.2	93	62	437	13.3	49	9.2	4.5	Average
Alzada ⁵	61.8	93	74	491	13.5	91	8.6	5.0	Good
Carpio	62.9	90	69	502	13.2	93	9.2	4.9	Good
Divide	62.6	94	59	473	13.5	81	9.1	4.5	Good
Grenora	62.4	97	60	459	13.4	69	9.1	4.7	Good
Joppa	63.0	95	55	432	13.0	86	9.4	4.5	Good
Lebsock ⁶	62.9	96	52	494	13.8	48	9.0	5.3	Good
Maier	62.8	96	59	440	14.3	54	9.0	5.2	Good
Mountrail	62.3	97	53	433	13.4	28	8.5	4.3	Average
Pierce	63.1	97	53	430	13.6	63	8.9	4.8	Good
Strongfield	62.5	95	61	453	14.2	58	9.1	5.1	Good
Tioga	63.0	94	64	453	12.9	80	9.1	4.8	Good
Average	62.7	95	61	468	13.5	68	9.0	4.8	

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 varieties at six Research Extension Centers (RECs) in North Dakota, 2012-2014.

Variety	<u>Carrington</u>		<u>Langdon</u>		<u>Dickinson</u>		<u>Hettinger</u>		<u>Minot</u>		<u>Williston</u>		<u>Average</u>	
	2014	3 Yr.	2014	3 Yr.	2014	3 Yr.	2014	3 Yr.	2014	3 Yr.	2014	3 Yr.	2014	3 Yr.
	------(bu/a)-----													
AC Commander	63.2	52.9	88.1	84.7	72.5	56.5	69.7	62.1	58.8	52.3	37.4	41.2	65.0	58.3
AC Navigator	63.2	51.5	84.3	78.9	68.4	51.6	65.1	60.2	54.2	44.7	37.4	38.2	62.1	54.2
Alkabo	72.6	57.5	85.3	86.0	74.3	55.7	82.6	66.0	76.0	59.4	35.5	39.1	71.1	60.6
Alzada	65.8	51.2	79.9	71.2	56.7	47.1	56.8	53.8	53.0	46.5	36.2	38.0	58.1	51.3
Ben	63.1	51.9	79.7	81.4	71.5	56.0	73.0	62.9	68.7	56.0	35.1	38.1	65.2	57.7
CDC Verona	65.6	55.1	75.9	82.9	70.7	54.1	79.1	63.5	58.1	53.4	27.8	33.3	62.9	57.1
Carpio	67.9	57.9	79.2	87.7	67.0	55.8	80.5	65.1	68.5	60.3	35.6	37.1	66.5	60.7
Divide	64.9	54.4	83.9	84.3	77.3	58.9	81.6	64.5	66.8	57.3	34.9	37.3	68.2	59.5
Grenora	71.8	58.0	85.6	86.8	78.1	58.1	68.1	59.7	65.8	57.9	31.1	37.6	66.8	59.7
Joppa	71.0	58.8	86.3	87.6	80.4	59.6	85.7	67.9	66.1	60.2	37.4	41.9	71.2	62.7
Lebsock	71.8	56.9	79.4	82.7	72.6	56.5	71.8	61.6	69.5	57.1	31.1	34.9	66.0	58.3
Maier	71.1	56.9	82.6	82.1	75.5	57.4	66.3	57.8	62.4	58.1	33.8	40.0	65.3	58.7
Mountrail	71.0	55.6	86.7	88.8	83.2	62.3	83.3	64.1	70.5	57.7	34.6	38.3	71.6	61.1
Pierce	65.0	55.2	82.2	86.8	74.3	54.9	64.3	58.1	63.4	60.0	32.0	38.6	63.5	58.9
Rugby	67.3	54.0	73.7	75.5	70.5	52.4	74.9	62.2	61.9	55.2	33.1	36.0	63.6	55.9
Strongfield	55.3	50.6	85.4	86.7	72.2	55.0	75.7	64.8	65.8	55.1	31.2	36.9	64.3	58.2
Tioga	71.7	58.4	83.5	85.5	78.3	57.3	79.8	68.0	66.3	59.6	41.2	40.7	70.1	61.6
VT Peak	65.5	--	80.6	88.8	--	--	80.4	--	69.6	--	33.9	41.3	--	--
Mean	67.1	55.1	82.4	83.8	73.1	55.8	74.4	62.5	64.7	55.9	34.4	38.3	66.0	58.5
CV %	9.1	--	4.2	--	6.9	--	4.5	--	6.0	--	11.1	--	--	--
LSD 0.10	7.1	--	4.1	--	6.2	--	4.1	--	4.6	--	4.4	--	--	--

Table 5. Test weight (six RECs) and protein (five RECs) of durum varieties in North Dakota, 2014.

Variety	<u>Carrington</u>		<u>Langdon</u>		<u>Dickinson</u>		<u>Hettinger</u>		<u>Minot</u>		<u>Williston</u>		<u>Average</u>	
	Test Wt.	Protein	Test Wt.	Protein	Test Wt.	Protein	Test Wt.	Protein	Test Wt.	Protein	Test Wt.	Protein	Test Wt.	Protein
AC Commander	61.6	12.1	60.7	14.0	56.1	14.0	56.7	12.5	58.4	12.5	60.9	13.8	59.1	13.0
AC Navigator	62.1	12.4	61.3	14.9	57.6	14.9	57.9	12.3	59.0	12.9	60.7	13.3	59.8	13.2
Alkabo	62.5	11.7	62.2	13.1	59.3	13.1	59.9	10.7	60.6	12.3	61.7	14.4	61.0	12.4
Alzada	62.0	12.6	57.7	13.8	56.7	13.8	56.4	12.5	58.4	13.3	61.6	13.3	58.8	13.1
Ben	62.1	12.8	62.8	14.1	58.3	14.1	60.1	12.0	60.0	13.5	61.4	15.2	60.8	13.5
CDC Verona	62.3	12.0	60.7	13.8	59.9	13.8	59.4	11.9	58.9	12.5	60.6	14.6	60.3	13.0
Carpio	62.6	11.4	60.6	13.5	61.1	13.5	59.9	11.5	61.2	12.1	61.6	15.0	61.2	12.7
Divide	62.2	11.3	61.4	12.7	59.4	12.7	60.3	10.6	60.2	12.6	61.2	15.2	60.8	12.5
Grenora	62.2	11.8	62.1	13.7	57.5	13.7	57.3	12.6	59.2	12.3	62.0	14.7	60.1	13.0
Joppa	61.6	11.2	61.9	12.3	59.6	12.3	60.7	10.9	60.6	12.4	61.7	14.1	61.0	12.2
Lebsock	62.8	11.6	62.6	13.0	59.0	13.0	60.3	11.7	60.7	12.1	61.4	13.9	61.1	12.5
Maier	62.5	11.5	62.0	13.5	59.2	13.5	58.5	13.0	59.2	13.0	60.7	14.1	60.4	13.0
Mountrail	62.2	10.7	61.8	13.1	58.8	13.1	60.1	11.0	59.9	12.2	60.0	13.9	60.5	12.2
Pierce	62.8	11.6	62.3	13.2	60.0	13.2	58.9	12.3	60.9	12.1	61.0	15.3	61.0	12.9
Rugby	62.0	12.9	62.1	13.5	59.5	13.5	60.3	11.3	59.8	13.6	61.9	15.1	60.9	13.3
Strongfield	61.6	12.0	60.6	13.7	56.1	13.7	58.9	12.8	58.5	13.2	61.0	13.8	59.5	13.1
Tioga	62.1	12.1	61.9	13.1	57.5	13.1	59.3	10.9	57.5	11.9	62.4	15.1	60.1	12.6
VT Peak	62.9	12.2	62.6	--	--	--	61.4	11.6	60.8	12.5	62.2	14.5	--	--
Mean	62.2	11.9	61.7	13.5	58.5	13.5	59.6	11.6	59.6	12.7	61.4	14.4	60.4	12.8
CV %	0.7	8.9	1.2	4.2	1.5	4.2	0.7	3.4	1.3	5.8	0.7	4.8	--	--
LSD 0.10	0.5	NS	0.9	1.0	0.8	0.8	0.5	0.5	0.9	1.0	0.5	0.8	--	--

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

NDSU encourages you to use and share this content, but please do so under the conditions of our Creative Commons license. You may copy, distribute, transmit and adapt this work as long as you give full attribution, don't use the work for commercial purposes and share your resulting work similarly. For more information, visit www.ag.ndsu.edu/agcomm/creative-commons.

North Dakota State University does not discriminate on the basis of age, color, disability, gender expression/identity, genetic information, marital status, national origin, public assistance status, sex, sexual orientation, status as a U.S. veteran, race or religion. Direct inquiries to the Vice President for Equity, Diversity and Global Outreach, 205 Old Main, (701) 231-7708.

County Commissions, NDSU and U.S. Department of Agriculture Cooperating. This publication will be made available in alternative formats for people with disabilities upon request, (701) 231-7881.