

North Dakota Durum Wheat

Variety Trial Results for 2009 and Selection Guide

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Information contained in this publication is based on research conducted by the following North Dakota Agricultural Experiment Station scientists, plant breeders, cereal chemists and plant pathologists and authors.

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Durum was planted on 1.7 million acres in North Dakota in 2009, a similar acreage to 2008. Precipitation was generally abundant in the durum-growing areas of North Dakota in 2009, and yields were well above average. The most commonly grown varieties in 2009 were Divide, Lebsock, Mountrail and Pierce, occupying 20.6, 16.9, 16.9 and 9.4 percent of the acreage planted, respectively. Alkabo and Ben were the next most important 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. Additional data from county sites are available from each Research Extension Center at www.ag.ndsu.edu/variety/durum.html. Descriptions of the most commonly grown varieties in the region are included for informational purposes. Use data from multiple locations and years when selecting a variety.

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How to select a variety

Successful durum production depends on numerous factors, including selecting the right variety for a particular area. The information included in this publication is meant to aid in selecting that variety or group of varieties. Characteristics to consider in selecting varieties are yield potential in your area, test weight, straw strength, plant height, reaction to problematic diseases and maturity. Selecting varieties with good milling and pasta quality also is important to maintain market recognition.

Every growing season differs; therefore, when selecting a top-yielding variety, use data that summarize several years and locations. Choose the variety that, on average, performs the best at multiple locations near you and, if data are available, for several years.

Durum wheat varieties currently grown in North Dakota are described in the following tables. 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.

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 percent confidence (LSD probability 0.05) that the higher-yielding variety has a significant yield advantage. If the difference is less than the LSD value, the variety difference probably is due to environmental factors (for example, one plot may have been in an area of the experiment with better soil than the other). NS is used to indicate no significant difference for that trait among any of the varieties at the 95 percent level of probability. 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. Protein percent is expressed at 12 percent moisture.

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Table 1. North Dakota durum wheat variety descriptions, agronomic traits, 2009.

Variety	Agent or Origin ¹	Year Released	Chaff Color	Height	Straw Strength	Maturity	Reaction to Disease ²			
							Stem Rust	Leaf Rust	Foliar Disease	Scab
AC Avonlea	Can.	1997	White	Med.	Med.	Med.	R	R	MS	S
AC Commander	Can.	2002	White	S.dwf.	Med.	Med.	R	R	MS	NA
AC Melita	Can.	1995	White	Tall	Med.	Med.	R	NA	NA	S
AC Morse	Can.	1996	White	S.dwf.	Strong	Med.	R	R	M	NA
AC Napoleon	Can.	2001	White	S.dwf.	Med.	Med.	R	R	S	NA
AC Navigator	Can.	1999	White	S.dwf.	Weak	Med.	R	R	M	S
AC Pathfinder	Can.	1999	White	Med.	Weak	Med.	R	R	M	S
Alkabo	ND	2005	White	Med.	V.strong	Med.	R	R	M	MS
Alzada	WB	2004	White	S.dwf.	Strong	Early	R	R	S	VS
Belzer	ND	1997	White	Tall	Med.	Late	R	R	M	MR
Ben	ND	1996	White	Med.	Strong	Med.	R	R	MR	S*
Cando	ND	1975	Tan	S.dwf.	V.strong	Med.	R	R	M	VS
DG Max	DGP	2008	White	Med.	Strong	Med.	R	MR	MR	MS
DG Star	DGP	2007	White	Med.	Strong	Early	R	R	M	NA
Dilse	ND	2002	White	Med.	Strong	Late	R	R	M	MS
Divide	ND	2005	White	Med.	Strong	Med.	R	R	M	MR
Dressler	AgriPro	1996	White	Tall	Med.	Med.	R	MR	NA	VS
Fjord	AgriPro	1986	White	Tall	Strong	M.early	R	R	M	S
Grande D'Oro	WB/DGP	2005	White	Med.	Strong	Med.	R	R	M	NA
Grenora	ND	2005	White	Med.	Strong	Med.	R	R	M	MS
Kari	AgriPro	1998	White	Med.	Strong	Med.	R	R	M	S
Kyle	Can.	1984	White	Tall	Weak	Med.	R	MR	M	NA
Laker	WB	1985	White	S.dwf.	Strong	Med.	R	MR	S	S
Lebsock	ND	1999	White	Med.	Strong	Med.	R	R	M	MS
Lloyd	ND	1983	White	S.dwf.	V.strong	Med.	R	MR	S	VS
Maier	ND	1998	White	Med.	Strong	M.late	R	R	M	S*
Medora	Can.	1983	White	Tall	Strong	M.early	R	R	MS	VS
Monroe	ND	1985	White	Tall	Med.	Early	R	R	M	VS
Mountrail	ND	1998	White	Med.	Strong	Late	R	R	M	S*
Munich	ND	1995	White	Med.	V.strong	Med.	R	R	MR	S*
Pierce	ND	2001	White	Med.	M.strong	Med.	R	R	MS	S
Plaza	ND	1999	White	S.dwf.	V.strong	Late	R	R	M	MS
Plenty	Can.	1990	White	Tall	Weak	Late	R	R	MR	MS
Primo D'Oro	WB/DGP	2004	White	Tall	Med.	M.early	R	R	MS	NA
Renville	ND	1988	White	Tall	Med.	Med.	R	R	M	S*
Rugby	ND	1973	Tan	Tall	Strong	M.early	R	R	MR	S*
Strongfield	Can.	2004	White	Med.	Med.	Med.	R	R	MS	NA
Vic	ND	1979	White	Tall	Med.	M.early	R	R	MR	S*
Voss	AgriPro	1994	White	S.dwf.	V.strong	Med.	R	MR	MS	S
Wales	Westbred	2008	White	Med.	M.strong	Med.	R	R	M	S*

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

²R = resistant; MR = moderately resistant (slow rusters); M = intermediate; MS = moderately susceptible; S = susceptible; VS = very susceptible; Foliar Disease = reaction to tan spot and septoria leaf spot complex. Letter ratings for head blight (scab) based on visual head symptoms. * Indicates yields and/or quality often have been higher than would be expected based on visual symptoms. NA = Not adequately tested.

Table 2. North Dakota durum wheat variety quality descriptions, milling and processing data averaged for five years (2004-2008) in drill strip trials.

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 Navigator	59.7	96	43	468	14.9	78	9.0	6.6	good
Alkabo	60.7	90	46	400	14.5	62	9.1	6.0	good
Ben	60.6	94	52	391	15.1	62	8.6	6.2	average
Dilse	60.1	95	41	384	15.6	59	9.0	6.8	excellent
Divide	59.8	93	45	429	15.0	80	8.9	6.4	good
Grande D'Oro	60.5	91	43	395	15.0	51	8.7	6.1	average
Grenora	59.5	95	47	435	14.7	73	9.0	6.1	good
Lebsock	61.0	93	46	410	14.6	50	8.8	5.9	good
Maier	60.2	95	44	412	15.3	67	9.0	6.8	excellent
Mountrail	59.6	93	39	410	14.8	32	8.5	5.7	average
Pierce	60.6	95	39	410	14.8	76	9.1	6.3	excellent
Plaza	59.6	90	39	427	14.3	60	8.7	5.7	average
Primo D'Oro	60.9	93	44	385	14.8	52	9.1	6.2	good
Rugby	60.1	94	41	385	15.1	12	8.7	4.8	⁵
Average	60.2	93	44	410	14.9	58	8.9	6.1	

Table 3. North Dakota durum wheat variety quality descriptions, milling and processing data for 2008 at all locations in the drill strip trials.

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	60.3	84	39	553	15.9	94	9.1	6.6	good
AC Napoleon	58.6	94	43	453	15.8	57	9.1	6.4	average
AC Navigator	59.5	98	38	543	15.7	80	8.9	6.6	good
Alkabo	60.0	88	42	441	14.9	59	9.1	6.0	good
Alzada ⁶	58.0	97	49	493	15.1	94	9.0	6.5	good
DG Star	58.7	94	36	367	15.6	91	8.9	6.3	good
Ben	60.1	94	47	410	15.7	60	8.7	6.1	good
Dilse	59.4	96	34	412	16.4	62	9.1	6.9	excellent
Divide	59.6	90	42	452	15.4	80	9.0	6.3	good
Grande D'Oro	60.1	94	37	436	16.4	52	8.6	6.6	average
Grenora	59.2	93	43	446	15.1	76	9.1	6.1	good
Lebsock	60.4	92	37	426	15.2	51	8.7	6.0	average
Maier	59.4	94	35	435	16.0	68	9.0	6.0	excellent
Mountrail	58.6	90	32	450	15.6	32	8.6	6.0	average
Pierce	59.9	96	32	454	15.7	72	9.1	6.5	excellent
Rugby	59.6	92	31	410	15.6	9	8.8	5.2	⁵
Strongfield	59.2	95	39	427	16.4	77	8.6	6.6	good
Average	59.4	93	39	448	15.7	66	8.9	6.3	

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

²Gluten index is unitless. Numbers <15=very weak and >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.

⁵Rugby has weak gluten, but is desired for crimped pastas such as ravioli and bow-ties, but not for spaghetti..

⁶Alzada has a disease resistance package that is best suited for western ND (drier growing conditions).

Table 4. Yield of durum varieties at two locations in eastern North Dakota, 2007-2009.

Variety	<u>Carrington</u>		<u>Langdon</u>		<u>Average</u>	
	2009	3 Yr.	2009	3 Yr.	2009	3 Yr.
	------(bu/a)-----					
AC Commander	60.6	50.2	61.2	65.4	60.9	57.8
AC Napoleon	62.0	50.7	84.5	76.9	73.3	63.8
AC Navigator	61.7	52.2	58.4	62.1	60.1	57.2
Alkabo	67.0	57.4	87.9	81.6	77.5	69.5
Alzada	58.6	52.5	44.2	52.2	51.4	52.4
Ben	65.1	54.4	84.1	76.0	74.6	65.2
DG Max	66.0	--	77.5	--	71.8	--
DG Star	56.9	50.3	66.7	65.3	61.8	57.8
Dilse	69.0	57.4	80.4	76.4	74.7	66.9
Divide	63.7	55.6	--	--	--	--
Grande D'Oro	65.1	52.2	87.5	78.5	76.3	65.4
Grenora	57.7	52.3	95.8	83.2	76.8	67.8
Lebsock	63.0	54.3	96.2	84.4	79.6	69.4
Maier	65.4	56.4	78.9	75.8	72.2	66.1
Mountrail	68.2	53.1	89.1	80.6	78.7	66.9
Pierce	53.9	49.2	84.6	75.1	69.3	62.2
Strongfield	63.2	47.3	74.9	71.3	69.1	59.3
Wales	67.9	--	78.3	--	73.1	--
Westhope	65.7	--	70.9	--	68.3	--
Mean	63.1	52.8	77.1	73.6	70.5	63.2
CV %	9.8	--	7.6	--	--	--
LSD 0.05	8.7	--	8.5	--	--	--

Table 5. Yield of durum varieties at four locations in western North Dakota, 2007-2009.

Variety	<u>Dickinson</u>		<u>Hettinger</u>		<u>Minot</u>		<u>Williston</u>		<u>Average</u>	
	2009	3 Yr.	2009	3 Yr.	2009	3 Yr.	2009	3 Yr.	2009	3 Yr.
	------(bu/a)-----									
AC Commander	93.3	55.7	51.7	46.7	89.9	66.7	36.6	37.8	67.9	51.7
AC Napoleon	82.6	47.8	46.2	35.3	82.1	56.2	35.5	35.2	61.6	43.6
AC Navigator	83.9	48.3	52.6	42.4	87.9	64.2	32.6	34.2	64.3	47.3
Alkabo	75.0	45.1	52.0	39.9	82.8	71.0	38.2	39.4	62.0	48.9
Alzada	69.4	--	39.4	39.7	76.3	57.8	36.0	35.7	55.3	--
Ben	75.6	44.6	48.0	38.8	70.6	59.9	35.1	35.4	57.3	44.7
CDC Verona	87.0	--	--	--	76.6	--	36.4	--	--	--
DG Max	87.2	--	50.6	--	81.7	--	35.6	--	63.8	--
DG Star	80.4	--	43.6	39.4	78.9	58.5	33.6	34.4	59.1	--
Dilse	84.4	48.3	49.8	38.6	90.9	67.5	32.9	33.0	64.5	46.9
Divide	87.1	49.4	46.9	36.0	90.3	71.6	36.3	37.0	65.2	48.5
Grand D'Oro	--	--	50.0	--	86.1	67.1	36.2	35.5	--	--
Grenora	89.6	50.4	48.4	39.5	72.9	65.5	36.4	38.7	61.8	48.5
Lebsock	77.9	46.3	51.1	--	69.8	61.2	34.4	34.9	58.3	--
Maier	85.3	48.4	52.3	41.3	76.4	66.2	32.9	34.4	61.7	47.6
Mountrail	92.2	50.4	50.7	37.4	88.5	72.7	40.7	39.1	68.0	49.9
Pierce	87.7	50.6	46.7	36.8	87.1	66.0	34.1	33.6	63.9	46.8
Strongfield	78.0	45.9	43.0	--	81.9	66.1	35.3	34.8	59.6	--
Wales	92.7	--	48.1	--	71.8	--	35.4	--	62.0	--
Westhope	--	--	49.6	--	87.1	--	36.4	--	---	--
Mean	83.9	48.6	48.5	39.4	81.5	64.9	35.5	35.8	62.1	47.7
CV %	7.5	--	7.2	--	11.6	--	5.5	--	--	--
LSD 0.05	8.9	--	4.9	--	15.2	--	2.7	--	--	--

Table 6. Protein at 12 percent moisture of durum varieties at five locations in North Dakota, 2009.

Variety	Carrington	Dickinson	Hettinger	Minot	Williston	Average
	------(%)-----					
AC Commander	14.1	13.4	14.1	14.2	15.1	14.2
AC Napoleon	14.6	13.6	14.1	14.7	15.3	14.5
AC Navigator	13.5	13.0	14.0	13.9	15.2	13.9
Alkabo	13.6	13.4	13.2	14.0	14.3	13.7
Alzada	14.1	13.4	14.3	14.3	14.3	14.1
Ben	14.0	14.1	13.9	14.5	15.3	14.4
CDC Verona	--	13.3	--	14.3	15.5	--
DG Max	13.9	13.5	13.8	13.9	15.0	14.0
DG Star	13.8	13.8	13.6	14.3	14.9	14.1
Dilse	14.7	14.1	14.3	15.6	16.3	15.0
Divide	14.3	13.6	12.7	14.6	14.9	14.4
Grande D'Oro	13.6	--	14.1	13.6	14.6	--
Grenora	13.9	12.9	12.6	13.5	14.9	13.6
Lebsock	13.9	13.4	13.2	13.9	14.7	13.8
Maier	13.9	14.3	14.3	14.9	16.1	14.7
Mountrail	13.9	12.7	14.0	13.7	14.9	13.8
Pierce	13.9	13.3	13.5	14.7	14.8	14.0
Strongfield	14.8	13.9	13.5	15.0	16.0	14.6
Wales	13.8	13.1	13.3	13.1	14.1	13.5
Westhope	14.0	--	15.2	14.4	14.0	--
Mean	14.0	13.5	13.8	14.3	15.0	14.1
CV %	3.6	4.3	--	3.9	1.5	--
LSD 0.05	0.7	1.2	--	0.9	0.4	--

Table 7. Test weight of durum varieties at six locations in North Dakota, 2009.

Variety	Carrington	Dickinson	Hettinger	Langdon	Minot	Williston	Average
	------(lb/bu)-----						
AC Commander	58.9	60.0	55.7	53.8	58.0	62.0	58.1
AC Napoleon	59.2	59.6	55.1	56.1	57.3	61.6	58.2
AC Navigator	60.3	62.1	57.7	56.5	59.1	62.4	59.7
Alkabo	61.4	61.6	56.6	60.2	59.0	63.4	60.4
Alzada	60.0	59.8	54.0	50.4	59.6	62.6	57.7
Ben	61.9	61.4	58.3	59.5	59.8	63.2	60.7
CDC Verona	--	62.2	--	--	59.7	62.2	--
DG Max	61.4	62.7	57.5	58.6	59.7	62.6	60.4
DG Star	60.0	60.2	54.2	57.0	59.6	61.9	58.8
Dilse	61.2	62.4	56.6	59.4	58.8	62.1	60.1
Divide	60.3	61.5	56.0	--	59.3	62.0	--
Grande D'Oro	61.0	--	55.5	60.5	60.1	62.9	--
Grenora	60.0	61.2	55.2	58.7	59.1	62.6	59.5
Lebsock	61.7	61.9	57.6	60.5	60.2	63.6	60.9
Maier	61.2	62.0	57.0	58.2	59.2	62.5	60.0
Mountrail	60.2	62.1	54.9	59.3	59.0	62.1	59.6
Pierce	61.5	62.5	58.6	59.7	59.5	63.0	60.8
Strongfield	60.6	61.6	53.9	58.0	58.3	61.4	59.0
Wales	61.1	61.7	56.4	56.6	59.2	62.2	59.5
Westhope	60.9	--	57.2	56.5	59.2	62.6	--
Mean	60.7	61.5	56.2	57.8	59.2	62.4	59.6
CV %	0.8	1.2	2.4	2.0	1.1	0.4	--
LSD 0.05	0.7	1.0	1.9	1.7	1.0	0.5	--

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