

**PROJECT TITLE:** Off-station durum variety evaluations in Montana – 2011 (4W2756)

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**Personnel:**

Site/County	Producers	CES/AES cooperators
Flaxville, Daniels	Jeff Mohn	Nicole Winkler, CES
Circle, McCone	Victor Wagner	Ken Nelson, CES
Poplar, Roosevelt	Mark Swank	Ann Ronning, CES
Nashua, Valley	Bill Lauckner	Shelley Mills, CES
Wibaux, Wibaux	David Maus	Dave Bertelsen, CES
Turner, Blaine	Max Cederberg	Peggy Lamb, NARC
Loring, Phillips	Pete Lumsden and John Fiansaas	Peggy Lamb, NARC

**OBJECTIVE:** To evaluate varieties of durum under dryland conditions at various sites in Montana.

**RESULTS:** The site in Wibaux County was not planted because of severe flooding. The site in Daniels County was not harvested because of poor stand. Summaries of yields, test weights, protein contents, NIR hardness, heights and sawfly damage across sites in eastern Montana are shown in Tables 1-6. Mountrail yielded most across sites (Table 1). Alkabo had greatest test weight across sites (Table 2). MT04340 had greatest protein content across sites (Table 3). MT05183 had greatest NIR hardness value across sites (Table 4). Tioga was tallest and MT04340 shortest across sites (Table 5). Alkabo had greatest percent sawfly cutting and MT04340 had the least percent sawfly cutting across sites (Table 6).

**Circle, McCone County:** Performances and relative values of yield, test weight, protein, and NIR hardness of durum varieties grown at Circle are shown in Tables 7-11. Three lines and varieties yielded significantly less than the check variety, Mountrail.

**Nashua, Valley County:** Performances and relative values of yield, test weight, protein and NIR hardness of durum varieties grown at Nashua are shown in Tables 12-16. Six lines and varieties yielded significantly less than the check variety, Mountrail.

**Poplar, Roosevelt County:** Performances and relative values of yield, test weight, protein and NIR hardness of durum varieties grown at Poplar are shown in Tables 17-21. The check variety, Mountrail, yielded significantly more than all other varieties.

**Turner, Blaine County:** Performance and relative values of yield, test weight, protein and sawfly damage of durum varieties grown at Turner are shown in Tables 22-26. No lines yielded significantly more or less than the check variety, Mountrail.

**Loring, Phillips County:** Performance of yield, test weight, protein and sawfly damage of durum varieties grown at Loring are shown in Table 27. No lines yielded significantly more or less than the check variety, Mountrail.

**SUMMARY:** Off-station yield trials are conducted at several sites in northern and eastern Montana. All experiments reported under this project are of the replicated small plot type. These trials provide important information about performance of experimental lines and varieties from Montana, other states, and private companies. Regional durum producers make decisions on what varieties to grow based on data from these trials.

**FUNDING SUMMARY:** Expenditure information to be provided by OSP. No other grants support this project.

**MWBC FY2012 GRANT SUBMISSION PLANS:** It is planned to submit this project for funding consideration in the next fiscal year.

Table 1. Summary of durum yields in bu/acre at five off-station sites in eastern Montana, 2011.

Variety	Circle, dryland recrop	Nashua, dryland fallow	Poplar, dryland fallow	Turner, dryland recrop	Loring dryland recrop	average
Alkabo	43.8	43.1	57.5	23.9	29.7	39.6
Pierce	41.4	41.4	55.3	26.1	29.5	38.7
Tioga	46.4	36.1	52.8	26.7	29.9	38.4
Grenora	42.4	40.9	50.3	26.6	27.6	37.6
Strongfield	46.7	42.9	50.4	25.5	30.6	39.2
Divide	42.9	42.3	57.7	25.2	27.9	39.2
Alzada	36.0	36.6	50.4	24.4	28.5	35.2
Mountrail	43.2	<b>45.3</b>	<b>72.3</b>	26.8	28.4	<b>43.2</b>
Belfield	33.7	38.3	54.2	26.2	27.1	35.9
Westhope	<b>47.4</b>	38.4	54.2	25.9	29.7	39.1
MT03012	36.3	38.5	52.5	24.8	31.0	36.6
MT04174	38.0	41.9	59.5	26.5	<b>31.3</b>	39.4
MT04340	40.8	37.1	51.6	<b>28.2</b>	30.0	37.5
MT05166	44.8	42.1	59.1	26.0	29.8	40.4
MT05183	44.9	44.2	60.2	27.8	30.0	41.4
site average	40.5	39.1	53.59	25.0	28.3	37.3
probability	<0.001	<0.001	<0.001	<0.001	<0.001	
CV (S/Mean)	9.093	9.5	11.58	8.4	9.0	
CV(SE/Mean)	5.25	5.5	6.686	4.9	5.2	
LSD 0.05	6.1	6.2	10.35	3.5	4.2	

Table 2. Summary of durum test weights in lb/bu at five sites in eastern Montana, 2011.

Variety	Circle, dryland recrop	Nashua, dryland fallow	Poplar, dryland fallow	Turner, dryland recrop	Loring dryland recrop	average
Alkabo	<b>62.5</b>	<b>62.0</b>	<b>61.5</b>	<b>62.7</b>	<b>62.5</b>	<b>62.2</b>
Pierce	62.0	61.5	<b>61.5</b>	62.1	62.2	61.9
Tioga	61.5	60.0	60.5	62.2	62.0	61.2
Grenora	61.5	59.0	59.5	61.3	61.3	60.5
Strongfield	62.0	59.5	<b>61.5</b>	60.9	61.5	61.1
Divide	61.5	60.0	60.0	61.6	61.7	61.0
Alzada	60.5	58.5	59.0	61.3	61.4	60.1
Mountrail	61.5	59.0	60.5	61.2	60.9	60.6
Belfield	61.0	59.5	59.0	61.4	61.3	60.5
Westhope	61.5	61.0	61.0	61.3	61.4	61.2
MT03012	61.0	60.0	58.5	61.0	60.1	60.1
MT04174	61.0	59.5	58.5	61.2	60.6	60.2
MT04340	59.5	57.0	55.0	60.6	60.5	58.5
MT05166	61.5	59.5	61.0	61.5	61.9	61.1
MT05183	61.0	59.0	58.0	62.2	62.3	60.5
site average	61.2	59.7	59.6	61.4	61.4	60.7
				<0.001	<0.001	
				0.6	0.9	
				0.3	0.5	
				0.6	0.9	

Table 3. Summary of durum percent protein at five sites in eastern Montana, 2011.

Variety	Circle, dryland recrop	Nashua, dryland fallow	Poplar, dryland fallow	Turner, dryland recrop	Loring dryland recrop	average
Alkabo	12.15	13.27	13.98	11.4	11.4	12.44
Pierce	13.13	13.52	13.89	12.1	11.9	12.91
Tioga	12.62	14.87	14.06	11.0	12.1	12.93
Grenora	12.94	15.25	13.54	12.5	11.9	13.22
Strongfield	13.05	15.42	14.35	13.1	12.6	13.70
Divide	12.57	14.38	14.19	13.0	11.6	13.15
Alzada	13.34	14.62	13.86	13.0	11.8	13.32
Mountrail	13.31	14.69	14.28	11.7	11.7	13.14
Belfield	13.10	14.68	14.94	13.2	12.7	13.72
Westhope	12.68	15.28	14.97	12.9	12.4	13.65
MT03012	13.07	14.74	14.86	<b>13.4</b>	12.9	13.80
MT04174	<b>13.48</b>	15.24	14.79	12.8	12.8	13.82
MT04340	13.21	<b>15.50</b>	<b>15.72</b>	12.9	<b>13.1</b>	<b>14.09</b>
MT05166	12.94	14.80	14.88	12.5	11.7	13.36
MT05183	13.33	14.74	15.34	11.8	12.4	13.52
site average	12.99	14.71	14.54	12.5	12.2	13.39

Table 4. Summary of durum percent NIR hardness at three sites in eastern Montana, 2011.

Variety	Circle, dryland recrop	Nashua, dryland fallow	Poplar, dryland fallow	average
Alkabo	75.9	82.7	69.5	76.1
Pierce	81.0	87.3	77.3	81.8
Tioga	79.6	87.4	74.9	80.6
Grenora	83.6	87.9	69.0	80.2
Strongfield	87.1	<b>92.3</b>	78.6	86.0
Divide	80.4	88.7	77.9	82.3
Alzada	87.8	83.9	74.6	82.1
Mountrail	<b>94.8</b>	86.5	77.7	86.3
Belfield	93.0	82.0	75.0	83.3
Westhope	80.6	88.6	<b>83.8</b>	84.3
MT03012	84.5	87.1	79.4	83.7
MT04174	82.1	91.3	79.8	84.4
MT04340	88.7	83.6	76.2	82.8
MT05166	84.0	89.7	76.6	83.4
MT05183	87.7	88.1	83.7	<b>86.5</b>
site average	84.9	87.4	77.4	83.2

Table 5. Summary of durum heights in cm at five off-station sites in eastern Montana, 2011.

Variety	Circle, dryland recrop	Nashua, dryland fallow	Poplar, dryland fallow*	Turner, dryland recrop	Loring dryland recrop	average
Alkabo	70.3	83.3	93.3	58.3	54.6	72.0
Pierce	73.0	88.3	98.3	58.5	62.5	76.1
Tioga	76.7	91.0	97.7	61.1	64.3	78.1
Grenora	67.0	77.7	81.7	56.7	54.9	67.6
Strongfield	72.3	84.0	89.7	62.2	60.1	73.6
Divide	67.7	87.0	82.7	62.0	60.2	71.9
Alzada	62.7	67.3	71.0	56.3	55.3	62.5
Mountrail	61.3	80.0	93.0	57.6	51.7	68.7
Belfield	58.0	64.3	81.0	58.8	52.9	63.0
Westhope	75.3	87.3	89.3	58.5	59.0	73.9
MT03012	62.7	64.3	72.0	53.7	50.6	60.7
MT04174	61.7	65.3	81.0	53.4	57.9	63.9
MT04340	58.0	62.0	71.7	54.9	47.0	58.7
MT05166	64.7	68.7	80.0	58.2	53.9	65.1
MT05183	62.0	66.0	69.3	55.9	52.7	61.2
site average	65.1	74.6	81.92	57.3	55.5	66.9
probability	<0.001	<0.001	<0.001	0.002	<0.001	
CV (S/Mean)	6.099	6.8	10.52	5.2	6.1	
CV(SE/Mean)	3.521	4.0	6.071	3.0	3.5	
LSD 0.05	6.622	8.5	14.36	5.0	5.7	

Table 6. Summary of percent durum sawfly damage at two off-station sites in eastern Montana, 2010.

Variety	Turner, dryland recrop	Loring dryland recrop	average
Alkabo	46.7	23.3	35.0
Pierce	33.3	25.0	29.2
Tioga	23.3	25.0	24.2
Grenora	38.3	20.0	29.2
Strongfield	10.0	8.3	9.2
Divide	16.7	13.3	15.0
Alzada	15.0	10.0	12.5
Mountrail	31.7	20.0	25.8
Belfield	25.0	15.0	20.0
Westhope	13.3	11.7	12.5
MT03012	18.3	15.0	16.7
MT04174	16.7	15.0	15.8
MT04340	5.3	<b>5.3</b>	<b>5.3</b>
MT05166	<b>5.0</b>	7.0	6.0
MT05183	10.0	8.3	9.2
site average	19.4	13.9	16.6
probability	<0.001	<0.001	
CV (S/Mean)	35.2	31.3	
CV(SE/Mean)	20.3	18.1	
LSD 0.05	11.4	7.3	

Table 7. Performance of durum grown under dryland continuous cropping conditions at Circle, MT. Previous crop was spring wheat. Planted: May 4, 2011 Harvested: September 15, 2011  
Cooperator: Victor Wagner

Variety	height, inches	grain protein	NIR hardness	test weight	yield, bu/acre	
Westhope	75.3	12.68	80.6	61.5	47.4	
Strongfield	72.3	13.05	87.1	62.0	46.7	
Tioga	76.7	12.62	79.6	61.5	46.4	
MT05183	62.0	13.33	87.7	61.0	44.9	
MT05166	64.7	12.94	84.0	61.5	44.8	
Alkabo	70.3	12.15	75.9	62.5	43.8	
Mountrail	61.3	13.31	94.8	61.5	43.2	
Divide	67.7	12.57	80.4	61.5	42.9	
Grenora	67.0	12.94	83.6	61.5	42.4	
Pierce	73.0	13.13	81.0	62.0	41.4	
MT04340	58.0	13.21	88.7	59.5	40.8	
MT04174	61.7	13.48	82.1	61.0	38.0	
MT03012	62.7	13.07	84.5	61.0	36.3	x
Alzada	62.7	13.34	87.8	60.5	36.0	x
Belfield	58.0	13.10	93.0	61.0	33.7	x
average	65.1	12.99	84.9	61.2	40.5	
probability	<0.001				<0.001	
CV (S/Mean)	6.099				9.093	
CV(SE/Mean)	3.521				5.25	
LSD 0.05	6.622				6.1	

x indicates significantly lower yield than check variety, Mountrail, at p=0.05

Table 8. Relative yielding abilities of durum varieties compared to Mountrail when grown under dryland conditions in McCone County in cooperation with CES.

Variety	2006	2008	2009	2010	2011	average	As % of Mountrail
Normanno	--	--	32.8	10.9	--	21.9	112.3
Strongfield	12.9	11.3	29.0	13.9	46.7	22.8	111.0
Westhope	--	--	--	--	47.4	47.4	109.7
Alkabo	13.1	12.0	26.1	15.6	43.8	22.1	107.9
Grenora	13.2	13.3	29.5	9.7	42.4	21.6	105.5
Tioga	--	--	--	13.8	46.4	30.1	104.9
MT05183	--	--	--	--	44.9	44.9	103.9
MT05166	--	--	--	--	44.8	44.8	103.7
Pierce	12.0	10.8	27.2	14.4	41.4	21.2	103.2
Divide	11.7	9.8	26.5	13.7	42.9	20.9	102.0
Mountrail	11.2	9.2	24.7	14.2	43.2	20.5	100.0
MT03012	13.7	11.9	24.7	10.9	36.3	19.5	95.1
MT04174	--	10.7	29.9	7.9	38.0	21.6	94.7
MT04340	--	--	--	--	40.8	40.8	94.4
Alzada	13.7	11.5	24.5	10.7	36.0	19.3	94.0
Belfield	--	--	--	--	33.7	33.7	78.0

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 9. Relative test weights of durum varieties as compared to Mountrail when grown under dryland conditions in McCone County in cooperation with CES.

Variety	2006	2008	2009	2010	2011	average	As % of Mountrail
Pierce	59.7	61.8	60.0	61.5	62.0	61.0	101.4
Strongfield	59.0	61.3	60.2	62.0	62.0	60.9	101.3
Alkabo	59.7	61.0	59.2	62.0	62.5	60.9	101.2
Divide	59.2	61.3	59.0	61.5	61.5	60.5	100.6
Alzada	59.7	60.0	60.5	61.0	60.5	60.3	100.3
Mountrail	58.0	60.2	59.5	61.5	61.5	60.1	100.0
Westhope	--	--	--	--	61.5	61.5	100.0
MT05166	--	--	--	--	61.5	61.5	100.0
Tioga	--	--	--	61.0	61.5	61.3	99.6
MT03012	59.7	60.0	58.3	60.0	61.0	59.8	99.4
Grenora	58.5	60.3	58.2	60.5	61.5	59.8	99.4
Normanno	--	--	58.7	61.5	--	60.1	99.3
MT05183	--	--	--	--	61.0	61.0	99.2
Belfield	--	--	--	--	61.0	61.0	99.2
MT04174	--	60.8	58.3	60.5	61.0	60.2	99.1
MT04340	--	--	--	--	59.5	59.5	96.7

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 10. Relative protein contents of durum varieties as compared to Mountrail when grown under dryland conditions in McCone County in cooperation with CES.

Variety	2006	2008	2009	2010	2011	average	As % of Mountrail
Normanno	--	--	12.3	12.7	--	12.5	103.7
MT04174	--	13.4	11.9	14.2	13.5	13.3	103.7
MT03012	14.6	13.6	12.5	14.2	13.1	13.6	103.3
Pierce	14.6	13.5	12.8	13.2	13.1	13.4	102.1
Mountrail	14.7	13.7	11.9	12.2	13.3	13.2	100.0
MT05183	--	--	--	--	13.3	13.3	100.0
Grenora	14.3	13.3	12.2	13.0	12.9	13.1	99.8
Alkabo	14.8	13.2	12.4	13.0	12.2	13.1	99.7
Strongfield	15.1	13.8	11.0	12.6	13.0	13.1	99.5
MT04340	--	--	--	--	13.2	13.2	99.2
Tioga	--	--	--	12.6	12.6	12.6	98.8
Belfield	--	--	--	--	13.1	13.1	98.5
Divide	14.6	13.0	12.0	11.7	12.6	12.8	97.1
MT05166	--	--	--	--	12.9	12.9	97.0
Alzada	13.7	12.3	11.4	12.8	13.3	12.7	96.5
Westhope	--	--	--	--	12.7	12.7	95.5

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.

Table 11. Relative NIR hardness of durum varieties as compared to Mountrail when grown under dryland conditions in McCone County in cooperation with CES.

Cultivar	2006	2008	2009	2010	2011	Ave	as % of Mountrail
Normanno	--	--	50	65	--	57.5	122.3
MT03012	79	70	55	65	84	70.6	106.3
Alzada	79	63	55	60	88	69.0	103.9
Pierce	80	76	44	56	81	67.4	101.5
Strongfield	86	70	41	52	87	67.2	101.2
Mountrail	74	69	50	44	95	66.4	100.0
MT04174	--	71	40	62	82	63.8	98.8
Belfield	--	--	--	--	93	93.0	97.9
Grenora	72	64	49	56	84	65.0	97.9
MT04340	--	--	--	--	89	89.0	93.7
MT05183	--	--	--	--	88	88.0	92.6
Tioga	--	--	--	47	80	63.5	91.4
Alkabo	80	58	34	48	76	59.2	89.2
MT05166	--	--	--	--	84	84.0	88.4
Divide	76	63	39	27	80	57.0	85.8
Westhope	--	--	--	--	81	81.0	85.3

NOTE: Average NIR hardness in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 12. Performance of durum grown under dryland fallow conditions at Nashua, MT.  
 Planted: May 7, 2011    Harvested: August 25, 2011    Cooperator: Bill Lauckner

Variety	height, inches	grain protein, %	NIR hardness	Test wt, lb/bu	Yield, bu/acre	
Mountrail	80.0	14.69	86.5	59.0	45.3	
MT05183	66.0	14.74	88.1	59.0	44.2	
Alkabo	83.3	13.27	82.7	62.0	43.1	
Strongfield	84.0	15.42	92.3	59.5	42.9	
Divide	87.0	14.38	88.7	60.0	42.3	
MT05166	68.7	14.80	89.7	59.5	42.1	
MT04174	65.3	15.24	91.3	59.5	41.9	
Pierce	88.3	13.52	87.3	61.5	41.4	
Grenora	77.7	15.25	87.9	59.0	40.9	
MT03012	64.3	14.74	87.1	60.0	38.5	x
Westhope	87.3	15.28	88.6	61.0	38.4	x
Belfield	64.3	14.68	82.0	59.5	38.3	x
MT04340	62.0	15.50	83.6	57.0	37.1	x
Alzada	67.3	14.62	83.9	58.5	36.6	x
Tioga	91.0	14.87	87.4	60.0	36.1	x
average	74.6	14.71	87.4	59.7	39.1	
probability	<0.001				<0.001	
CV (S/Mean)	6.8				9.5	
CV(SE/Mean)	4.0				5.5	
LSD 0.05	8.5				6.2	

x indicates significantly lower yield than check variety, Mountrail, at  $p = 0.05$

Table 13. Relative yielding abilities of durum varieties as compared to Mountrail when grown under dryland conditions in Valley County in cooperation with CES.

Cultivar	2006	2008	2009	2010	2011	Ave	As % of Mountrail
MT04174	--	19.2	26.1	27.0	41.9	28.6	103.9
Strongfield	33.5	14.9	30.3	19.7	42.9	28.3	100.9
Mountrail	30.1	17.2	26.0	21.4	45.3	28.0	100.0
Alkabo	28.5	16.2	26.4	24.1	43.1	27.7	98.8
Normanno	--	--	29.9	16.8	--	23.4	98.5
MT05183	--	--	--	--	44.2	44.2	97.6
Pierce	32.1	16.3	28.6	17.4	41.4	27.2	97.0
Grenora	32.2	15.4	26.7	20.4	40.9	27.1	96.9
Alzada	27.5	20.0	31.0	19.6	36.6	26.9	96.2
MT03012	28.8	19.1	25.0	21.8	38.5	26.6	95.1
MT05166	--	--	--	--	42.1	42.1	92.9
Divide	29.1	16.3	26.1	15.6	42.3	25.9	92.4
Tioga	--	--	--	21.1	36.1	28.6	85.8
Westhope	--	--	--	--	38.4	38.4	84.8
Belfield	--	--	--	--	38.3	38.3	84.5
MT04340	--	--	--	--	37.1	37.1	81.9

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 14. Relative test weights of durum varieties as compared to Mountrail when grown under dryland conditions in Valley County in cooperation with CES.

Cultivar	2006	2008	2009	2010	2011	Ave	As % of Mountrail
Westhope	--	--	--	--	61.0	61.0	103.4
Alkabo	60.0	58.8	60.0	57.0	62.0	59.6	102.5
Pierce	60.3	58.5	60.2	56.5	61.5	59.4	102.2
Divide	60.0	58.0	59.8	56.0	60.0	58.8	101.1
Tioga	--	--	--	56.0	60.0	58.0	100.9
MT05166	--	--	--	--	59.5	59.5	100.8
Belfield	--	--	--	--	59.5	59.5	100.8
Strongfield	60.0	57.0	60.5	55.5	59.5	58.5	100.7
MT04174	--	56.5	59.8	56.5	59.5	58.1	100.5
Mountrail	59.3	56.5	59.7	56.0	59.0	58.1	100.0
MT05183	--	--	--	--	59.0	59.0	100.0
MT03012	59.7	56.3	59.8	54.5	60.0	58.1	99.9
Grenora	59.8	56.8	59.0	55.0	59.0	57.9	99.7
Normanno	--	--	59.7	55.5	--	57.6	99.6
Alzada	59.0	56.5	60.0	54.0	58.5	57.6	99.1
MT04340	--	--	--	--	57.0	57.0	96.6

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 15. Relative protein contents of durum varieties as compared to Mountrail when grown under dryland conditions in Valley County in cooperation with CES.

Cultivar	2006	2008	2009	2010	2011	Ave	As % of Mountrail
MT04340	--	--	--	--	15.5	15.5	105.4
Westhope	--	--	--	--	15.3	15.3	104.1
Tioga	--	--	--	14.9	14.9	14.9	102.8
Strongfield	13.6	16.8	14.1	14.7	15.4	14.9	102.6
Grenora	13.2	15.9	14.8	15.0	15.2	14.8	101.9
MT03012	14.1	15.7	14.0	14.8	14.7	14.7	100.8
MT05166	--	--	--	--	14.8	14.8	100.7
Mountrail	12.9	16.4	14.4	14.3	14.7	14.5	100.0
MT05183	--	--	--	--	14.7	14.7	100.0
Belfield	--	--	--	--	14.7	14.7	100.0
Pierce	14.0	16.2	14.4	14.5	13.5	14.5	99.9
MT04174	--	15.8	14.4	14.0	15.2	14.9	99.3
Divide	12.4	15.6	14.6	14.1	14.4	14.2	97.8
Alkabo	13.2	15.8	14.1	14.6	13.3	14.2	97.7
Normanno	--	--	13.8	14.2	--	14.0	97.6
Alzada	12.7	15.3	13.7	14.2	14.6	14.1	97.0

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.

Table 16. Relative NIR hardness of durum varieties as compared to Mountrail when grown under dryland conditions in Valley County in cooperation with CES.

Cultivar	2006	2008	2009	2010	2011	Ave	as % of Mountrail
MT03012	71	76	80	72	87	77.2	108.1
Strongfield	68	76	76	69	92	76.2	106.7
Pierce	66	79	76	71	87	75.8	106.2
MT05166	--	--	--	--	90	90.0	104.7
MT04174	--	78	78	76	91	80.8	103.9
Westhope	--	--	--	--	89	89.0	103.5
Tioga	--	--	--	76	87	81.5	102.5
MT05183	--	--	--	--	88	88.0	102.3
Grenora	53	74	73	74	88	72.4	101.4
Normanno	--	--	78	75	--	76.5	101.3
Alzada	60	70	84	62	84	72.0	100.8
Mountrail	46	74	78	73	86	71.4	100.0
MT04340	--	--	--	--	84	84.0	97.7
Belfield	--	--	--	--	82	82.0	95.3
Alkabo	49	74	66	62	83	66.8	93.6
Divide	33	70	72	65	89	65.8	92.2

NOTE: Average NIR hardness in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 17. Performance of durum grown under dryland fallow conditions at Poplar, MT.  
 Planted: May 6, 2011 Harvested: August 29, 2011 Cooperator: Mark Swank

Variety	height, cm	grain protein, %	NIR hardness	test wt, lb/bu	yield, bu/ac	
Mountrail	93.0	14.28	77.7	60.5	72.3	
MT05183	69.3	15.34	83.7	58.0	60.2	x
MT04174	81.0	14.79	79.8	58.5	59.5	x
MT05166	80.0	14.88	76.6	61.0	59.1	x
Divide	82.7	14.19	77.9	60.0	57.7	x
Alkabo	93.3	13.98	69.5	61.5	57.5	x
Pierce	98.3	13.89	77.3	61.5	55.3	x
Belfield	81.0	14.94	75.0	59.0	54.2	x
Westhope	89.3	14.97	83.8	61.0	54.2	x
Tioga	97.7	14.06	74.9	60.5	52.8	x
MT03012	72.0	14.86	79.4	58.5	52.5	x
MT04340	71.7	15.72	76.2	55.0	51.6	x
Alzada	71.0	13.86	74.6	59.0	50.4	x
Strongfield	89.7	14.35	78.6	61.5	50.4	x
Grenora	81.7	13.54	69.0	59.5	50.3	x
Average	81.92	14.54	77.4	59.6	53.59	
probability	<0.001				<0.001	
CV (S/Mean)	10.52				11.58	
CV(SE/Mean)	6.071				6.686	
LSD 0.05	14.36				10.35	

x indicates significantly lower yield than check variety, Mountrail, at  $p = 0.05$

Table 18. Relative yields of durum varieties as compared to Mountrail when grown under dryland conditions in Roosevelt County in cooperation with CES.

Cultivar	2005	2006	2009	2010	2011	Ave	as % of Mountrail
Mountrail	41.2	21.7	52.6	36.5	72.3	44.9	100.0
Normanno	--	--	50.7	37.5	--	44.1	99.0
Alkabo	41.0	22.5	51.4	35.9	57.5	41.7	92.9
MT04174	--	--	48.0	40.5	59.5	49.3	91.7
Grenora	37.9	21.1	62.3	34.0	50.3	41.1	91.7
Strongfield	--	21.1	60.9	33.5	50.4	41.5	90.6
MT03012	--	21.8	51.2	40.0	52.5	41.4	90.4
Divide	37.2	21.4	57.4	27.8	57.7	40.3	89.8
Alzada	42.1	25.4	49.0	32.8	50.4	39.9	89.0
Pierce	38.4	20.8	54.2	26.0	55.3	38.9	86.8
MT05183	--	--	--	--	60.2	60.2	83.3
MT05166	--	--	--	--	59.1	59.1	81.7
Belfield	--	--	--	--	54.2	54.2	75.0
Westhope	--	--	--	--	54.2	54.2	75.0
Tioga	--	--	--	27.7	52.8	40.3	74.0
MT04340	--	--	--	--	51.6	51.6	71.4

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 19. Relative test weights of durum varieties as compared to Mountrail when grown under dryland conditions in Roosevelt County in cooperation with CES.

Cultivar	2005	2006	2009	2010	2011	Ave	as % of Mountrail
Alkabo	60.2	53.0	62.5	57.5	61.5	58.9	101.4
Pierce	59.3	52.5	63.2	57.0	61.5	58.7	101.0
Divide	60.3	53.3	62.7	57.0	60.0	58.7	101.0
MT05166	--	--	--	--	61.0	61.0	100.8
Westhope	--	--	--	--	61.0	61.0	100.8
MT03012	--	53.3	61.7	57.5	58.5	57.8	100.2
Mountrail	60.0	51.2	61.8	57.0	60.5	58.1	100.0
Strongfield	--	50.7	62.2	56.0	61.5	57.6	100.0
Alzada	58.0	53.2	62.2	57.0	59.0	57.9	99.6
Tioga	--	--	--	56.5	60.5	58.5	99.6
MT04174	--	--	61.7	57.5	58.5	59.2	99.1
Grenora	59.3	51.0	61.3	55.0	59.5	57.2	98.5
Normanno	--	--	60.7	56.0	--	58.4	98.2
Belfield	--	--	--	--	59.0	59.0	97.5
MT05183	--	--	--	--	58.0	58.0	95.9
MT04340	--	--	--	--	55.0	55.0	90.9

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 20. Relative proteins of durum varieties as compared to Mountrail when grown under dryland conditions in Roosevelt County in cooperation with CES.

Cultivar	2005	2006	2009	2010	2011	Ave	as % of Mountrail
MT04340	--	--	--	--	15.7	15.7	109.8
MT05183	--	--	--	--	15.3	15.3	107.0
Westhope	--	--	--	--	15.0	15.0	104.9
MT05166	--	--	--	--	14.9	14.9	104.2
Belfield	--	--	--	--	14.9	14.9	104.2
Strongfield	--	19.6	10.8	15.4	14.4	15.1	103.3
MT04174	--	--	11.3	14.3	14.8	13.5	102.8
Tioga	--	--	--	15.1	14.1	14.6	101.4
Alkabo	15.1	19.4	11.0	14.8	14.0	14.9	100.3
Mountrail	15.8	19.0	10.5	14.5	14.3	14.8	100.0
Normanno	--	--	10.6	14.4	--	12.5	100.0
Pierce	15.8	18.7	11.0	14.5	13.9	14.8	99.7
MT03012	--	17.7	11.2	14.1	14.9	14.5	99.3
Grenora	15.3	18.0	11.1	14.6	13.5	14.5	97.8
Divide	15.1	17.9	10.3	14.7	14.2	14.4	97.4
Alzada	14.4	17.0	11.1	14.3	13.9	14.1	95.4

NOTE: Average proteins in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.

Table 21. Relative NIR hardness of durum varieties as compared to Mountrail when grown under dryland conditions in Roosevelt County in cooperation with CES.

Cultivar	2005	2006	2009	2010	2011	Ave	as % of Mountrail
MT05183	--	--	--	--	84	84.0	107.7
Westhope	--	--	--	--	84	84.0	107.7
Strongfield	--	78	94	87	79	84.5	103.4
Pierce	93	76	92	82	77	84.0	100.7
MT03012	--	81	91	78	79	82.3	100.6
Mountrail	90	73	90	86	78	83.4	100.0
Tioga	--	--	--	89	75	82.0	100.0
MT04174	--	--	90	82	80	84.0	99.2
Alzada	88	72	94	84	75	82.6	99.0
Normanno	--	--	88	86	--	87.0	98.9
MT05166	--	--	--	--	77	77.0	98.7
Grenora	90	74	89	86	69	81.6	97.8
MT04340	--	--	--	--	76	76.0	97.4
Alkabo	91	75	90	77	70	80.6	96.6
Divide	92	72	83	78	78	80.6	96.6
Belfield	--	--	--	--	75	75.0	96.2

NOTE: Average NIR hardness in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 22. Performance of durum grown under dryland conditions at Turner, MT.  
 Planted: May 12, 2011      Harvested: August 25, 2011    Cooperator: Max Cederberg

Variety	Height, inches	sawfly rating	grain protein, %	Test weight	Yield, bu/acre
MT04340	21.6	5.3	12.9	60.6	28.2
MT05183	22.0	10.0	11.8	62.2	27.8
Mountrail	22.7	31.7	11.7	61.2	26.8
Tioga	24.0	23.3	11.0	62.2	26.7
Grenora	22.3	38.3	12.5	61.3	26.6
MT04174	21.0	16.7	12.8	61.2	26.5
Belfield	23.2	25.0	13.2	61.4	26.2
Pierce	23.1	33.3	12.1	62.1	26.1
MT05166	22.9	5.0	12.5	61.5	26.0
Westhope	23.0	13.3	12.9	61.3	25.9
Strongfield	24.5	10.0	13.1	60.9	25.5
Divide	24.4	16.7	13.0	61.6	25.2
MT03012	21.1	18.3	13.4	61.0	24.8
Alzada	22.2	15.0	13.0	61.3	24.4
Alkabo	23.0	46.7	11.4	62.7	23.9
average	22.6	19.4	12.5	61.4	25.0
probability	0.002	<0.001		<0.001	<0.001
CV (S/Mean)	5.3	35.2		0.6	8.4
CV(SE/Mean)	3.0	20.3		0.3	4.9
LSD 0.05	2.0	11.4		0.6	3.5

Table 23. Relative yielding abilities of durum varieties as compared to Mountrail when grown under dryland conditions at Turner, MT.

Cultivar	2007	2008	2009	2010	2011	Ave	as % of Mountrail
Normanno	--	--	40.9	33.1	--	37.0	145.7
Strongfield	24.0	19.4	36.5	27.0	25.5	26.5	114.9
Grenora	25.6	15.4	35.4	24.9	26.6	25.6	111.0
MT04174	--	15.3	31.9	28.6	26.5	25.6	110.1
MT03012	24.3	16.5	33.0	26.2	24.8	25.0	108.3
Alzada	25.2	17.1	29.1	28.1	24.4	24.8	107.6
MT04340	--	--	--	--	28.2	28.2	105.2
MT05183	--	--	--	--	27.8	27.8	103.7
Mountrail	22.3	15.3	35.4	15.4	26.8	23.0	100.0
Belfield	--	--	--	--	26.2	26.2	97.8
MT05166	--	--	--	--	26.0	26.0	97.0
Westhope	--	--	--	--	25.9	25.9	96.6
Alkabo	22.5	14.8	31.9	17.3	23.9	22.1	95.8
Pierce	20.0	14.8	32.9	15.5	26.1	21.9	94.9
Divide	20.0	17.2	29.9	14.6	25.2	21.4	92.8
Tioga	--	--	--	9.4	26.7	18.1	85.5

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 24. Relative test weights of durum varieties as compared to Mountrail when grown under dryland conditions Turner, MT.

Cultivar	2007	2008	2009	2010	2011	Ave	as % of Mountrail
MT05183	--	--	--	--	62.2	62.2	101.6
Alkabo	57.5	57.4	60.8	57.0	62.7	59.1	101.5
Pierce	57.6	57.0	60.9	56.7	62.1	58.9	101.1
MT05166	--	--	--	--	61.5	61.5	100.5
Belfield	--	--	--	--	61.4	61.4	100.3
Alzada	56.1	57.4	60.6	56.2	61.3	58.3	100.2
Westhope	--	--	--	--	61.3	61.3	100.2
Mountrail	56.1	57.6	60.2	56.0	61.2	58.2	100.0
Divide	56.7	57.3	60.0	55.2	61.6	58.2	99.9
Strongfield	56.1	57.5	59.9	56.0	60.9	58.1	99.8
MT04174	--	57.2	60.1	55.8	61.2	58.6	99.7
Grenora	55.7	56.5	60.6	55.6	61.3	57.9	99.5
Normanno	--	--	59.8	55.8	--	57.8	99.5
MT03012	55.0	56.9	60.1	55.4	61.0	57.7	99.1
MT04340	--	--	--	--	60.6	60.6	99.0
Tioga	--	--	--	52.9	62.2	57.6	98.2

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 25. Relative protein contents of durum varieties as compared to Mountrail when grown under dryland conditions Turner, MT.

Cultivar	2007	2008	2009	2010	2011	Ave	as % of Mountrail
Belfield	--	--	--	--	13.2	13.2	112.8
MT04340	--	--	--	--	12.9	12.9	110.3
Westhope	--	--	--	--	12.9	12.9	110.3
MT05166	--	--	--	--	12.5	12.5	106.8
Strongfield	19.8	16.2	15.7	15.7	13.1	16.1	105.2
MT04174	--	15.8	15.7	15.4	12.8	14.9	103.8
Divide	18.2	15.6	15.7	15.9	13.0	15.7	102.5
MT03012	18.7	15.5	15.5	14.8	13.4	15.6	101.8
Pierce	18.3	16.1	15.4	15.7	12.1	15.5	101.4
MT05183	--	--	--	--	11.8	11.8	100.9
Tioga	--	--	--	16.2	11.0	13.6	100.4
Mountrail	19.0	15.6	14.8	15.4	11.7	15.3	100.0
Alzada	17.8	15.3	15.9	14.0	13.0	15.2	99.3
Grenora	17.4	15.4	14.7	14.8	12.5	15.0	97.8
Alkabo	17.8	15.0	15.2	14.5	11.4	14.8	96.6
Normanno	--	--	14.5	14.3	--	14.4	95.4

NOTE: Average proteins in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.

Table 26. Relative sawfly damage of durum varieties as compared to Mountrail when grown under dryland conditions Turner, MT.

Cultivar	2007	2008	2009	2010	2011	Ave	as % of Mountrail
Grenora	33.3	21.7	15.0	25.0	38.3	26.7	133.3
Alkabo	25.0	18.3	8.7	21.7	46.7	24.1	120.4
Pierce	21.7	26.7	11.7	23.3	33.3	23.3	116.7
Mountrail	25.0	13.3	8.3	21.7	31.7	20.0	100.0
Tioga	--	--	--	21.7	23.3	22.5	84.3
Belfield	--	--	--	--	25.0	25.0	78.9
MT03012	11.7	11.7	5.7	18.3	18.3	13.1	65.7
MT04174	--	4.0	8.7	18.3	16.7	11.9	63.6
Divide	13.3	8.3	5.0	18.3	16.7	12.3	61.6
Strongfield	10.0	10.0	10.0	13.3	10.0	10.7	53.3
Alzada	6.7	10.0	8.3	8.3	15.0	9.7	48.3
Westhope	--	--	--	--	13.3	13.3	42.0
MT05183	--	--	--	--	10.0	10.0	31.5
MT04340	--	--	--	--	5.3	5.3	16.7
MT05166	--	--	--	--	5.0	5.0	15.8
Normanno	--	--	0.7	2.3	--	1.5	10.0

NOTE: Average sawfly damage in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 27. Performance of durum grown under dryland conditions at Loring, MT.  
 Planted: May 6, 2011 Harvested: August 25, 2011 Cooperator: Pete Lumsden and John Fiansaas

Variety	Height, in	sawfly rating	grain protein, %	Test weight	Yield, bu/acre
MT04174	22.8	15.0	12.8	60.6	31.3
MT03012	19.9	15.0	12.9	60.1	31.0
Strongfield	23.7	8.3	12.6	61.5	30.6
MT04340	18.5	5.3	13.1	60.5	30.0
MT05183	20.7	8.3	12.4	62.3	30.0
Tioga	25.3	25.0	12.1	62.0	29.9
MT05166	21.2	7.0	11.7	61.9	29.8
Alkabo	21.5	23.3	11.4	62.5	29.7
Westhope	23.2	11.7	12.4	61.4	29.7
Pierce	24.6	25.0	11.9	62.2	29.5
Alzada	21.8	10.0	11.8	61.4	28.5
Mountrail	20.4	20.0	11.7	60.9	28.4
Divide	23.7	13.3	11.6	61.7	27.9
Grenora	21.6	20.0	11.9	61.3	27.6
Belfield	20.8	15.0	12.7	61.3	27.1
average	21.9	13.9	12.2	61.4	28.3
probability	<0.001	<0.001		<0.001	<0.001
CV (S/Mean)	6.1	31.3		0.9	9.0
CV(SE/Mean)	3.5	18.1		0.5	5.2
LSD 0.05	2.2	7.3		0.9	4.2