

PROJECT TITLE: Evaluation of durum varieties under dryland fallow and dryland recrop conditions at six off-station sites – 2013 (4W4145)

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Personnel:

Site/County	Producers	CES/AES cooperators
Flaxville, Daniels	David Roos	Bobbie Roos, 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 Flansaas	Peggy Lamb, NARC

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

METHODS:

County	previous crop	planting date	harvest date
Valley, dryland	fallow	May 23	September 5
Roosevelt, dryland	fallow	May 22	September 17
Wibaux, dryland	spring wheat	June 7	not harvested
Daniels, dryland	spring wheat	May 22	September 17
Turner, dryland	fallow	May 8	September 5
Loring, dryland	fallow	May 8	September 4

RESULTS: The site in Wibaux County was not harvested because of poor stands. Summaries of yields, test weights, protein contents, heights and sawfly damage across sites in eastern Montana are shown in Tables 1-5. Experimental line MT06584 yielded most across sites (Table 1). Experimental line MT5157 had greatest test weight across sites (Table 2). Strongfield had greatest protein content across sites (Table 3). Tioga was tallest and Normanno was shortest across sites (Table 4). Alkabo had greatest percent sawfly cutting and MT05157 had the least percent sawfly cutting across sites (Table 5).

Flaxville, Daniels County: Performances of durum varieties grown at Flaxville under dryland recrop conditions are shown in Table 6. No entries yielded significantly differently from the check variety, Mountrail. This was the first year at this site, so there are no relative tables across years.

Nashua, Valley County: Performances and relative values of yield, test weight, and protein of durum varieties grown at Nashua are shown in Tables 7-10. No entries yielded significantly differently from the check variety, Mountrail.

Poplar, Roosevelt County: Performances and relative values of yield, test weight, and protein of durum varieties grown at Poplar are shown in Tables 11-14. Four varieties yielded significantly less than the check variety, Mountrail.

Turner, Blaine County: Performances and relative values of yield, test weight, protein and sawfly damage due to cutting of durum varieties grown at Turner are shown in Tables 15-19. One experimental line yielded significantly more than the check variety, Mountrail.

Loring, Phillips County: Performances and relative values of yield, test weight, protein and sawfly damage due to cutting of durum varieties grown at Loring are shown in Table 20-24. Three lines and varieties yielded significantly more 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 FY2014 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, 2013.

Variety	Flaxville, dryland recrop	Nashua, dryland fallow	Poplar, dryland fallow	Loring, dryland fallow	Turner, dryland fallow	average
Mountrail	23.8	49.1	73.9	44.9	49.5	48.2
Alkabo	21.8	48.7	70.1	50.0	48.9	47.9
Carpio	22.2	49.2	73.3	47.8	56.1	49.7
Tioga	25.3	48.0	74.3	46.2	54.1	49.6
Grenora	23.8	40.0	73.6	43.4	53.2	46.8
Divide	22.1	42.8	60.6	42.5	50.5	43.7
Alzada	22.0	45.3	58.9	52.7	47.4	45.2
Strongfield	23.9	43.1	67.2	44.4	54.3	46.6
Normanno	18.2	44.7	65.1	45.3	50.9	44.9
Silver	19.0	51.6	60.0	45.2	45.7	44.3
MT06584	24.5	52.5	70.7	48.3	52.9	49.8
MT05157	23.6	37.5	70.5	47.0	50.2	45.8
MT06578	22.2	47.3	70.2	48.2	53.0	48.2
MT07707	20.5	38.2	68.9	50.3	60.6	47.7
site average	22.4	45.6	68.4	46.9	52.0	47.0
probability	0.525	0.251	0.002	0.010	0.011	
CV (S/Mean)	16.3	15.62	7.0	6.2	7.5	
LSD 0.05	6.1	11.95	8.0	4.9	6.6	

Table 2. Summary of durum test weights in lb/bu at five sites in eastern Montana, 2013.

Variety	Flaxville, dryland recrop	Nashua, dryland fallow	Poplar, dryland fallow	Loring, dryland fallow	Turner, dryland fallow	average
Mountrail	59.0	61.5	61.0	61.2	63.5	61.3
Alkabo	60.0	62.0	61.5	62.4	64.9	62.2
Carpio	59.0	60.5	62.0	62.1	64.0	61.5
Tioga	59.5	61.0	61.5	61.9	64.7	61.7
Grenora	61.5	61.0	60.5	60.5	64.2	61.5
Divide	58.5	60.5	60.0	62.0	64.3	61.1
Alzada	58.5	60.5	59.5	60.7	63.5	60.5
Strongfield	60.0	62.5	61.0	62.0	64.1	61.9
Normanno	56.5	59.5	58.5	59.6	63.1	59.4
Silver	56.7	62.0	60.0	61.6	63.9	60.8
MT06584	59.0	59.5	59.5	59.4	64.6	60.4
MT05157	59.0	63.0	63.0	64.5	66.1	63.1
MT06578	59.0	60.0	59.0	60.0	64.3	60.5
MT07707	55.5	59.0	56.0	60.1	63.4	58.8
site average	58.7	60.9	60.2	61.3	64.2	61.1
probability				<.0001	<.0001	
CV (S/Mean)				1.4	0.6	
LSD 0.05				1.5	0.6	

Table 3. Summary of durum percent protein at five sites in eastern Montana, 2013.

Variety	Flaxville, dryland recrop	Nashua, dryland fallow	Poplar, dryland fallow	Loring, dryland fallow	Turner, dryland fallow	average
Mountrail	10.03	14.10	13.64	16.1	15.5	13.88
Alkabo	10.02	13.69	13.56	15.5	14.9	13.54
Carpio	10.31	13.20	13.26	15.9	14.3	13.39
Tioga	10.05	12.63	13.82	16.5	15.1	13.63
Grenora	10.26	11.86	13.10	16.6	15.2	13.39
Divide	10.36	13.54	14.37	16.7	15.1	14.01
Alzada	10.23	13.03	13.41	16.1	15.1	13.57
Strongfield	11.48	14.67	14.44	16.4	15.8	14.56
Normanno	12.13	14.15	13.76	16.5	14.9	14.29
Silver	12.24	14.16	12.73	16.6	16.1	14.35
MT06584	10.72	13.30	13.17	16.6	14.0	13.57
MT05157	10.86	12.99	12.57	15.4	14.5	13.26
MT06578	10.53	12.91	13.31	16.5	14.3	13.50
MT07707	10.22	12.21	12.50	15.3	14.0	12.85
site average	10.68	13.32	13.40	16.2	14.90	13.70

Table 4. Summary of durum heights in inches at five off-station sites in eastern Montana, 2013.

Variety	Flaxville, dryland recrop	Nashua, dryland fallow	Poplar, dryland fallow	Loring, dryland fallow	Turner, dryland fallow	average
Mountrail	24.0	31.5	36.0	29.9	28.9	30.1
Alkabo	24.0	32.3	37.1	30.7	27.4	30.3
Carpio	25.6	30.8	37.5	31.2	29.6	30.9
Tioga	26.1	32.9	38.2	33.9	31.0	32.4
Grenora	22.9	30.8	32.0	28.9	25.9	28.1
Divide	24.3	32.2	40.0	32.1	29.5	31.6
Alzada	22.7	26.7	29.4	27.1	25.4	26.3
Strongfield	25.1	32.9	35.3	30.5	27.3	30.2
Normanno	20.1	24.9	29.6	23.3	24.8	24.5
Silver	21.8	27.2	30.7	26.6	24.4	26.1
MT06584	22.0	26.8	28.3	24.4	24.4	25.2
MT05157	21.9	26.8	29.9	24.9	24.0	25.5
MT06578	21.5	26.5	28.7	24.3	25.1	25.2
MT07707	22.1	25.2	27.4	25.1	23.5	24.7
site average	23.2	29.1	32.9	28.1	26.5	27.9
probability	<0.001	<0.001	<0.001	<.0001	<.0001	
CV (S/Mean)	6.1	4.521	3.8	6.9	5.1	
LSD 0.05	2.4	2.209	2.1	3.3	2.3	

Table 5. Summary of percent cutting by sawfly at two off-station sites in eastern Montana, 2013.

Variety	Loring, dryland fallow	Turner, dryland fallow	average
Mountrail	7.0	3.7	5.3
Alkabo	8.3	7.0	7.7
Carpio	2.3	3.7	3.0
Tioga	8.3	2.0	5.2
Grenora	6.7	3.7	5.2
Divide	5.0	0.7	2.8
Alzada	1.0	2.3	1.7
Strongfield	0.7	0.3	0.5
Normanno	0.3	0.7	0.5
Silver	3.7	2.3	3.0
MT06584	0.7	0.0	0.3
MT05157	0.0	0.0	0.0
MT06578	0.3	0.7	0.5
MT07707	0.0	0.7	0.3
average	3.2	2	2.6

Table 6. Performance of durum grown under dryland recrop conditions at Flaxville, MT. Previous crop was spring wheat.

Planted: May 22, 2013 Harvested: September 17, 2013 Cooperator: Dave Roos

variety	height, in	test wt, lb/bu	grain protein, %	yield, bu/ac
Tioga	26.1	59.5	10.05	25.3
MT06584	22.0	59.0	10.72	24.5
Strongfield	25.1	60.0	11.48	23.9
Grenora	22.9	61.5	10.26	23.8
Mountrail	24.0	59.0	10.03	23.8
MT05157	21.9	59.0	10.86	23.6
Carpio	25.6	59.0	10.31	22.2
MT06578	21.5	59.0	10.53	22.2
Divide	24.3	58.5	10.36	22.1
Alzada	22.7	58.5	10.23	22.0
Alkabo	24.0	60.0	10.02	21.8
MT07707	22.1	55.5	10.22	20.5
Silver	21.8	56.7	12.24	19.0
Normanno	20.1	56.5	12.13	18.2
site average	23.2	58.7	10.68	22.4
probability	<0.001			0.525
CV (S/Mean)	6.1			16.3
CV(SE/Mean)	3.5			9.4
LSD 0.05	2.4			6.1

Table 7. Performance of durum grown under dryland fallow conditions at Nashua, MT. Planted: May 23, 2013 Harvested: September 5, 2013 Cooperator: Bill Lauckner

Variety	height, in	test wt, lb/bu	grain protein, %	yield, bu/ac
MT06584	26.8	59.5	13.30	52.5
Silver	27.2	62.0	14.16	51.6
Carpio	30.83	60.5	13.20	49.2
Mountrail	31.5	61.5	14.10	49.1
Alkabo	32.3	62.0	13.69	48.7
Tioga	32.93	61.0	12.63	48.0
MT06578	26.53	60.0	12.91	47.3
Alzada	26.67	60.5	13.03	45.3
Normanno	24.93	59.5	14.15	44.7
Strongfield	32.93	62.5	14.67	43.1
Divide	32.17	60.5	13.54	42.8
Grenora	30.83	61.0	11.86	40.0
MT07707	25.2	59.0	12.21	38.2
MT05157	26.77	63.0	12.99	37.5
average	29.1	60.9	13.3	45.6
probability	<0.001			0.251
CV (S/Mean)	4.521			15.62
CV(SE/Mean)	2.61			9.02
LSD 0.05	2.209			12.0

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

Cultivar	2009	2010	2011	2012	2013	average	as % of Mountrail
MT06584	--	--	--	23.2	52.5	37.9	112.3
Alkabo	26.4	24.1	43.1	20.9	48.7	32.6	101.9
Silver	25.0	21.8	38.5	25.7	51.6	32.5	101.6
Normanno	29.9	16.8	--	25.1	44.7	29.1	101.5
Carpio	--	--	--	--	49.2	49.2	100.2
Mountrail	26.0	21.4	45.3	18.3	49.1	32.0	100.0
Alzada	31.0	19.6	36.6	25.4	45.3	31.6	98.6
Strongfield	30.3	19.7	42.9	20.8	43.1	31.4	97.9
MT06578	--	--	--	--	47.3	47.3	96.3
Grenora	26.7	20.4	40.9	25.8	40.0	30.8	96.1
Divide	26.1	15.6	42.3	22.0	42.8	29.8	92.9
Tioga	--	21.1	36.1	19.1	48.0	31.1	92.7
MT07707	--	--	--	--	38.2	38.2	77.8
MT05157	--	--	--	--	37.5	37.5	76.4

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

Cultivar	2009	2010	2011	2012	2013	average	as % of Mountrail
MT05157	--	--	--	--	63.0	63.0	102.4
Alkabo	60.0	57.0	62.0	58.5	62.0	59.9	101.6
Strongfield	60.5	55.5	59.5	58.5	62.5	59.3	100.6
Tioga	--	56.0	60.0	58.5	61.0	58.9	100.2
Divide	59.8	56.0	60.0	59.0	60.5	59.1	100.2
Silver	59.8	54.5	60.0	59.0	62.0	59.1	100.2
Mountrail	59.7	56.0	59.0	58.5	61.5	58.9	100.0
Normanno	59.7	55.5	--	58.5	59.5	58.3	98.9
Grenora	59.0	55.0	59.0	57.5	61.0	58.3	98.9
Alzada	60.0	54.0	58.5	58.0	60.5	58.2	98.7
Carpio	--	--	--	--	60.5	60.5	98.4
MT06584	--	--	--	58.5	59.5	59.0	98.3
MT06578	--	--	--	--	60.0	60.0	97.6
MT07707	--	--	--	--	59.0	59.0	95.9

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

Cultivar	2009	2010	2011	2012	2013	average	as % of Mountrail
Strongfield	14.1	14.7	15.4	15.0	14.7	14.8	103.5
Silver	14.0	14.8	14.7	14.2	14.2	14.4	100.7
Mountrail	14.4	14.3	14.7	13.9	14.1	14.3	100.0
Tioga	--	14.9	14.9	14.5	12.6	14.2	99.8
Grenora	14.8	15.0	15.2	14.2	11.9	14.2	99.6
Divide	14.6	14.1	14.4	14.0	13.5	14.1	98.9
Alkabo	14.1	14.6	13.3	14.5	13.7	14.0	98.3
Normanno	13.8	14.2	--	13.1	14.2	13.8	97.5
MT06584	--	--	--	14.0	13.3	13.7	97.5
Alzada	13.7	14.2	14.6	13.5	13.0	13.8	96.6
Carpio	--	--	--	--	13.2	13.2	93.6
MT05157	--	--	--	--	13.0	13.0	92.2
MT06578	--	--	--	--	12.9	12.9	91.5
MT07707	--	--	--	--	12.2	12.2	86.5

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. Performance of durum grown under dryland fallow conditions at Poplar, MT.
 Planted: May 22, 2013 Harvested: Sept 17, 2013 Cooperator: Mark Swank

Variety	height, in	lodging index	test wt, lb/bu	protein percent	yield, bu/ac
Tioga	38.2	4.2	61.5	13.82	74.3
Moutrail	36.0	2.7	61.0	13.64	73.9
Grenora	32.0	6.0	60.5	13.10	73.6
Carpio	37.5	3.7	62.0	13.26	73.3
MT06584	28.3	5.0	59.5	13.17	70.7
MT05157	29.9	0.7	63.0	12.57	70.5
MT06578	28.7	4.5	59.0	13.31	70.2
Alkabo	37.1	2.3	61.5	13.56	70.1
MT07707	27.4	1.7	56.0	12.50	68.9
Strongfield	35.3	3.2	61.0	14.44	67.2
Normanno	29.6	4.0	58.5	13.76	65.1 x
Divide	40.0	3.2	60.0	14.37	60.6 x
Silver	30.7	4.2	60.0	12.73	60.0 x
Alzada	29.4	6.5	59.5	13.41	58.9 x
Average	32.9	3.7	60.2	13.40	68.4
probability	<0.001	<0.001			0.002
CV (S/Mean)	3.8	29.8			7.0
CV (SE/Mean)	2.2	17.2			4.0
LSD 0.05	2.1	1.8			8.0

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

Table 12. Relative yields of durum varieties as compared to Mountrail when grown under dryland conditions in Roosevelt County in cooperation with CES.

Cultivar	2009	2010	2011	2012	2013	average	as % of Mountrail
Mountrail	52.6	36.5	72.3	32.2	73.4	53.4	100.0
Carpio	--	--	--	--	73.3	73.3	99.9
Normanno	50.7	37.5	--	38.2	65.1	47.9	98.4
Grenora	62.3	34.0	50.3	38.7	73.6	51.8	97.0
MT05157	--	--	--	--	70.5	70.5	96.0
MT06578	--	--	--	--	70.2	70.2	95.6
Alkabo	51.4	35.9	57.5	38.6	70.1	50.7	94.9
MT07707	--	--	--	--	68.9	68.9	93.9
MT06584	--	--	--	28.2	70.7	49.5	93.7
Strongfield	60.9	33.5	50.4	32.3	67.2	48.9	91.5
Divide	57.4	27.8	57.7	38.8	60.6	48.5	90.7
Silver	51.2	40.0	52.5	37.6	60.0	48.3	90.4
Tioga	--	27.7	52.8	36.1	74.3	47.7	89.0
Alzada	49.0	32.8	50.4	36.4	58.9	45.5	85.2

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

Cultivar	2009	2010	2011	2012	2013	average	as % of Mountrail
MT05157	--	--	--	--	63.0	63.0	103.3
Alkabo	62.5	57.5	61.5	58.5	61.5	60.3	101.8
Carpio	--	--	--	--	62.0	62.0	101.6
Tioga	--	56.5	60.5	57.0	61.5	58.9	100.4
Divide	62.7	57.0	60.0	57.5	60.0	59.4	100.3
Strongfield	62.2	56.0	61.5	56.0	61.0	59.3	100.1
Mountrail	61.8	57.0	60.5	56.0	61.0	59.3	100.0
Alzada	62.2	57.0	59.0	55.5	59.5	58.6	99.0
Grenora	61.3	55.0	59.5	56.5	60.5	58.6	98.8
Silver	61.7	57.5	58.5	55.0	60.0	58.5	98.8
Normanno	60.7	56.0	--	55.5	58.5	57.7	97.8
MT06578	--	--	--	--	59.0	59.0	96.7
MT06584	--	--	--	52.0	59.5	55.8	95.3
MT07707	--	--	--	--	56.0	56.0	91.8

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

Cultivar	2009	2010	2011	2012	2013	average	as % of Mountrail
MT06584	--	--	--	20.5	13.2	16.9	108.7
Strongfield	10.8	15.4	14.4	18.9	14.4	14.8	105.1
Tioga	--	15.1	14.1	18.0	13.8	15.3	102.0
Normanno	10.6	14.4	--	18.0	13.8	14.2	101.4
Silver	11.2	14.1	14.9	18.1	12.7	14.2	101.0
Divide	10.3	14.7	14.2	17.4	14.4	14.2	101.0
Mountrail	10.5	14.5	14.3	17.4	13.6	14.1	100.0
Alkabo	11.0	14.8	14.0	16.3	13.6	13.9	99.1
Grenora	11.1	14.6	13.5	17.2	13.1	13.9	98.9
Alzada	11.1	14.3	13.9	16.7	13.4	13.9	98.7
Carpio	--	--	--	--	13.3	13.3	97.8
MT06578	--	--	--	--	13.3	13.3	97.8
MT05157	--	--	--	--	12.6	12.6	92.6
MT07707	--	--	--	--	12.5	12.5	91.9

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 15. Performance of durum grown under dryland fallow conditions at Turner, MT.
 Planted: May 8, 2013 Harvested: Sep 5, 2013 Cooperator: Max Cederberg

Variety	Height, inches	sawfly rating	grain protein, %	test wt, lb/bu	Yield, bu/acre
MT07707	23.5	0.7	14.0	63.4	60.6 ^a
Carpio	29.6	3.7	14.3	64.0	56.1
Strongfield	27.3	0.3	15.8	64.1	54.3
Tioga	31.0	2.0	15.1	64.7	54.1
Grenora	25.9	3.7	15.2	64.2	53.2
MT06578	25.1	0.7	14.3	64.3	53.0
MT06584	24.4	0.0	14.0	64.6	52.9
Normanno	24.8	0.7	14.9	63.1	50.9
Divide	29.5	0.7	15.1	64.3	50.5
MT05157	24.0	0.0	14.5	66.1	50.2
Mountrail	28.9	3.7	15.5	63.5	49.5
Alkabo	27.4	7.0	14.9	64.9	48.9
Alzada	25.4	2.3	15.1	63.5	47.4
Silver	24.4	2.3	16.1	63.9	45.7
average	26.5	2.0	14.9	64.2	52.0
LSD (0.05)	2.3		0.5	0.6	6.6
C.V.%	5.1		2.1	0.6	7.5
probability	<.0001		<.0001	<.0001	0.0113

a indicates significantly greater yield than check variety, Mountrail at p=0.05

Table 16. Relative yielding abilities of durum varieties as compared to Mountrail when grown under dryland conditions at Turner, MT.

Cultivar	2009	2010	2011	2012	2013	average	as % of Mountrail
MT07707	--	--	--	--	60.6	60.6	122.4
Normanno	40.9	33.1	--	24.6	50.9	37.4	121.7
Carpio	--	--	--	--	56.1	56.1	113.3
Strongfield	36.5	27.0	25.5	24.1	54.3	33.5	111.9
MT06584	--	--	--	25.7	52.9	39.3	109.2
Grenora	35.4	24.9	26.6	22.4	53.2	32.5	108.6
MT06578	--	--	--	--	53.0	53.0	107.1
MT05157	--	--	--	--	50.2	50.2	101.4
Mountrail	35.4	15.4	26.8	22.5	49.5	29.9	100.0
Alzada	29.1	28.1	24.4	19.5	47.4	29.7	99.3
Silver	33.0	26.2	24.8	18.7	45.7	29.7	99.2
Tioga	--	9.4	26.7	21.9	54.1	28.0	98.2
Alkabo	31.9	17.3	23.9	24.3	48.9	29.3	97.8
Divide	29.9	14.6	25.2	20.4	50.5	28.1	94.0

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

Cultivar	2009	2010	2011	2012	2013	average	as % of Mountrail
MT05157	--	--	--	--	66.1	66.1	104.1
Alkabo	60.8	57.0	62.7	60.9	64.9	61.3	101.8
MT06584	--	--	--	60.6	64.6	62.6	101.3
MT06578	--	--	--	--	64.3	64.3	101.3
Carpio	--	--	--	--	64.0	64.0	100.8
Alzada	60.6	56.2	61.3	60.8	63.5	60.5	100.5
Divide	60.0	55.2	61.6	61.0	64.3	60.4	100.4
Grenora	60.6	55.6	61.3	60.1	64.2	60.4	100.3
Strongfield	59.9	56.0	60.9	60.6	64.1	60.3	100.2
Silver	60.1	55.4	61.0	60.7	63.9	60.2	100.0
Mountrail	60.2	56.0	61.2	60.1	63.5	60.2	100.0
MT07707	--	--	--	--	63.4	63.4	99.8
Tioga	--	52.9	62.2	60.4	64.7	60.1	99.8
Normanno	59.8	55.8	--	59.7	63.1	59.6	99.4

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

Cultivar	2009	2010	2011	2012	2013	average	as % of Mountrail
Strongfield	15.7	15.7	13.1	14.3	15.8	14.9	105.4
Silver	15.5	14.8	13.4	14.0	16.1	14.8	104.2
Divide	15.7	15.9	13.0	13.8	15.1	14.7	103.8
Alzada	15.9	14.0	13.0	13.8	15.1	14.4	101.4
Tioga	--	16.2	11.0	14.3	15.1	14.2	101.1
Mountrail	14.8	15.4	11.7	13.4	15.5	14.2	100.0
Grenora	14.7	14.8	12.5	13.3	15.2	14.1	99.6
Alkabo	15.2	14.5	11.4	13.4	14.9	13.9	98.0
Normanno	14.5	14.3	--	13.6	14.9	14.3	97.0
MT06584	--	--	--	13.2	14.0	13.6	94.1
MT05157	--	--	--	--	14.5	14.5	93.5
Carpio	--	--	--	--	14.3	14.3	92.3
MT06578	--	--	--	--	14.3	14.3	92.3
MT07707	--	--	--	--	14.0	14.0	90.3

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 19. Relative percent sawfly cutting of durum varieties as compared to Mountrail when grown under dryland conditions Turner, MT.

Cultivar	2009	2010	2011	2012	2013	average	as % of Mountrail
Alkabo	8.7	21.7	46.7	20.0	7.0	20.8	113.0
Grenora	15.0	25.0	38.3	21.7	3.7	20.7	112.6
Mountrail	8.3	21.7	31.7	26.7	3.7	18.4	100.0
Carpio	--	--	--	--	3.7	3.7	100.0
Tioga	--	21.7	23.3	26.7	2.0	18.4	87.9
Silver	5.7	18.3	18.3	18.3	2.3	12.6	68.3
Divide	5.0	18.3	16.7	13.3	0.7	10.8	58.6
Alzada	8.3	8.3	15.0	16.7	2.3	10.1	54.9
Strongfield	10.0	13.3	10.0	15.0	0.3	9.7	52.8
MT06584	--	--	--	10.0	0.0	5.0	32.9
MT06578	--	--	--	--	0.7	0.7	18.9
MT07707	--	--	--	--	0.7	0.7	18.9
Normanno	0.7	2.3	--	1.0	0.7	1.2	7.8
MT05157	--	--	--	--	0.0	0.0	0.0

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 20. Performance of durum grown under dryland fallow conditions at Loring, MT. Planted: May 8, 2013 Harvested: Sep 4 2013 Cooperators: Pete Lumsden and John Flansaas

Variety	Height, inches	sawfly rating	grain protein, %	test wt, lb/bu	Yield, bu/acre
Alzada	27.1	1.0	16.1	60.7	52.7 a
MT07707	25.1	0.0	15.3	60.1	50.3 a
Alkabo	30.7	8.3	15.5	62.4	50.0 a
MT06584	24.4	0.7	16.6	59.4	48.3
MT06578	24.3	0.3	16.5	60.0	48.2
Carpio	31.2	2.3	15.9	62.1	47.8
MT05157	24.9	0.0	15.4	64.5	47.0
Tioga	33.9	8.3	16.5	61.9	46.2
Normanno	23.3	0.3	16.5	59.6	45.3
Silver	26.6	3.7	16.6	61.6	45.2
Mountrail	29.9	7.0	16.1	61.2	44.9
Strongfield	30.5	0.7	16.4	62.0	44.4
Grenora	28.9	6.7	16.6	60.5	43.4
Divide	32.1	5.0	16.7	62.0	42.5
average	28.1	3.2	16.2	61.3	46.9
LSD (0.05)	3.3		0.8	1.5	4.9
C.V.%	6.9		3.1	1.4	6.2
probability	<.0001		0.013	<.0001	0.010

a indicates significantly greater yield than check variety, Mountrail at p=0.05

Table 21. Relative yielding abilities of durum varieties as compared to Mountrail when grown under dryland conditions at Loring, MT.

Cultivar	2011	2012	2013	average	as % of Mountrail
MT07707	--	--	50.3	50.3	112.0
Alkabo	29.7	26.9	50.0	35.5	108.9
Alzada	28.5	24.0	52.7	35.1	107.7
MT06578	--	--	48.2	48.2	107.3
Carpio	--	--	47.8	47.8	106.5
MT05157	--	--	47.0	47.0	104.7
Tioga	29.9	26.2	46.2	34.1	104.6
Silver	31.0	25.8	45.2	34.0	104.3
MT06584	--	24.1	48.3	36.2	104.2
Strongfield	30.6	24.2	44.4	33.1	101.5
Mountrail	28.4	24.6	44.9	32.6	100.0
Grenora	27.6	25.7	43.4	32.2	98.8
Divide	27.9	24.1	42.5	31.5	96.6
Normanno	11.5	26.7	45.3	27.8	85.3

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 22. Relative test weights of durum varieties as compared to Mountrail when grown under dryland conditions Loring MT.

Cultivar	2011	2012	2013	average	as % of Mountrail
MT05157	--	--	64.5	64.5	105.4
Alkabo	62.5	60.7	62.4	61.9	102.5
Tioga	62.0	60.8	61.9	61.6	102.0
Divide	61.7	60.9	62.0	61.5	101.8
Strongfield	61.5	60.3	62.0	61.3	101.5
Carpio	--	--	62.1	62.1	101.5
Silver	61.1	60.4	61.6	61.0	101.0
Alzada	61.4	60.5	60.7	60.9	100.8
Mountrail	60.9	59.1	61.2	60.4	100.0
Grenora	61.3	59.5	60.5	60.4	100.0
MT06584	--	60.1	59.4	59.8	99.3
Normanno	60.3	59.3	59.6	59.7	98.8
MT07707	--	--	60.1	60.1	98.2
MT06578	--	--	60.0	60.0	98.0

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 23. Relative protein contents of durum varieties as compared to Mountrail when grown under dryland conditions Loring, MT.

Cultivar	2011	2012	2013	average	as % of Mountrail
Normanno	12.9	14.9	16.5	14.8	105.0
Silver	12.9	14.5	16.6	14.7	104.3
Tioga	12.1	15.2	16.5	14.6	103.5
Strongfield	12.6	14.7	16.4	14.6	103.5
MT06578	--	--	16.5	16.5	102.5
Grenora	11.9	14.6	16.6	14.4	102.1
Divide	11.6	14.9	16.7	14.4	102.1
MT06584	--	14.3	16.6	15.4	101.3
Mountrail	11.7	14.4	16.1	14.1	100.0
Alzada	11.8	14.2	16.1	14.0	99.3
Carpio	--	--	15.9	15.9	98.8
Alkabo	11.4	14.1	15.5	13.7	97.2
MT05157	--	--	15.4	15.4	95.7
MT07707	--	--	15.3	15.3	95.0

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 24. Relative percent sawfly cutting of durum varieties as compared to Mountrail when grown under dryland conditions Loring, MT.

Cultivar	2011	2012	2013	average	as % of Mountrail
Tioga	25.0	10.0	8.3	14.4	111.6
Alkabo	23.3	8.3	8.3	13.3	103.1
Mountrail	20.0	11.7	7.0	12.9	100.0
Grenora	20.0	8.3	6.7	11.7	90.7
Silver	15.0	3.7	3.7	7.5	58.1
Divide	13.3	3.7	5.0	7.3	56.6
Alzada	10.0	5.0	1.0	5.3	41.1
Carpio	--	--	2.3	2.3	32.9
Strongfield	8.3	3.7	0.7	4.2	32.6
MT06584	--	1.0	0.7	0.8	9.1
MT06578	--	--	0.3	0.3	4.3
Normanno	0.3	1.0	0.3	0.5	3.9
MT05157	--	--	0.0	0.0	0.0
MT07707	--	--	0.0	0.0	0.0

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.