

**PROJECT TITLE:** Evaluation of spring wheat, durum, and barley varieties under minimum-till, continuous cropping conditions – 2009 (4W2756)

**PRINCIPAL INVESTIGATOR:**

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**OBJECTIVE:** To determine the best adapted varieties of spring wheat, durum, and barley for production under no-till continuous cropping conditions in eastern Montana.

**Methods:**

Soil type: Williams clay loam  
Previous crops: 2008 - spring wheat, 2007- safflower, 2006 - small grain plots  
Herbicides: Brox M, 1.5 pt/ac, applied June 15

Precipitation April – August, 2009: 8.87 in  
Ave (60 yr) precipitation April – August: 9.41 in  
Precipitation September 2008 – August 2009: 13.93 in  
Ave (60 yr) precipitation September – August: 13.82 in

**Comments:**

It was generally a cool summer. Soil moisture was good at planting, but conditions were very dry in May and June. Rain started in early July, causing secondary tillering.

Experiment	Planting date	Harvest date	Plot size
recrop spring wheat	Apr 20	Aug 12	100 ft <sup>2</sup> , entire plot harvested.
recrop durum	Apr 20	Aug 12	100 ft <sup>2</sup> , entire plot harvested.
recrop barley	not planted – mechanical malfunction		

**RESULTS:**

**Spring wheat:** Twenty lines and varieties of spring wheat were tested under dryland recrop conditions (Table 1). Thirteen varieties yielded significantly less than the check variety, Vida. Five-year summaries for yield, test weight, height, and protein content are shown in Tables 2 through 5.

**Durum:** Fifteen durum lines and varieties were tested under dryland recrop conditions (Table 6). One variety yielded significantly less than the check variety, Mountrail. Five-year summaries for yield, test weight, height, protein content, and hard vitreous amber color are shown in Tables 7 through 11.

**Barley:** Barley plots were not planted properly because of mechanical malfunction of plot seeder.

**SUMMARY:** The experiments reported under this project are all of the replicated small plot type. The three-year crop rotation is commercial small grain, small grain yield trials, safflower.

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

**MWBC FY2011 GRANT SUBMISSION PLANS:** It is planned to submit this project for funding consideration in the next fiscal year.

Table 1. Agronomic data obtained from a dryland recrop spring wheat yield trial conducted at the Eastern Agricultural Research Center, Sidney, MT.

entry	heading*	height, cm	grain protein, %	test wt, lb/bu	yield, bu/ac	
Vida	61.7	46.7	17.75	61.7	29.8	
Faller	62.7	45.3	15.99	61.5	27.8	
O'Neal	62.3	46.0	16.35	62.5	27.6	
20%Choteau+80%Reeder	61.0	45.7	18.45	62.0	26.2	
20%Choteau+80%Vida	61.3	46.0	17.56	62.2	25.9	
Barlow	60.0	50.3	17.87	63.5	24.7	
McNeal	62.3	47.3	17.18	60.0	24.5	
Volt	62.7	43.0	16.68	63.5	23.4	x
Granger	60.7	42.7	17.08	61.7	22.7	x
Briggs	58.3	47.7	18.16	61.7	22.5	x
Reeder	61.0	39.7	19.20	61.3	21.9	x
Outlook	62.3	43.7	18.38	60.3	21.7	x
AP604CL	59.0	43.7	17.56	63.5	21.6	x
20%Choteau+80%Conan	60.0	42.7	17.79	62.2	20.4	x
Jedd	60.0	40.3	17.16	63.3	20.2	x
Choteau	60.0	41.3	17.69	61.5	20.0	x
Kelby	58.3	46.0	18.57	61.7	17.6	x
Kuntz	61.7	40.3	17.62	62.0	17.2	x
NDSW0449	62.7	43.0	18.20	60.7	16.1	x
Corbin	61.0	40.0	19.08	61.0	12.6	x
mean	61.0	44.1	17.72	61.9	22.2	
Probability	<0.001	0.106	0.006	<0.001	<0.001	
CV (S/mean)	1.4	9.1	5.1	0.9	15.0	
CV (SE/mean)	0.8	5.3	2.9	0.5	8.7	
LSD 0.05	1.4	6.6	1.49	0.9	5.5	

\*days from planting

x indicates significantly lower yield than check variety, McNeal, at probability of <0.05

Table 2. Relative yielding abilities of spring wheat varieties in bu/ac as compared to Vida when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2005	2006	2007	2008	2009	Ave	as % of Vida
O'Neal	--	--	--	8.7	27.6	18.2	100.6
Vida	40.6	37.6	38.1	6.3	29.8	30.5	100.0
Reeder	41.5	35.7	35.9	7.9	21.9	28.6	93.8
Outlook	37.0	35.2	40.4	6.5	21.7	28.2	92.4
Faller	--	--	--	4.9	27.8	16.4	90.6
20% Choteau 80% Reeder	--	--	--	--	26.2	26.2	87.9
Volt	--	--	--	8.0	23.4	15.7	87.0
20% Choteau 80% Vida	--	--	--	--	25.9	25.9	86.9
McNeal	35.3	35.0	28.2	8.4	24.5	26.3	86.2
Choteau	34.8	35.2	29.5	7.7	20.0	25.4	83.5
Barlow	--	--	--	--	24.7	24.7	82.9
Briggs	--	--	--	7.2	22.5	14.9	82.3
Granger	--	--	--	6.7	22.7	14.7	81.4
Jedd	--	--	--	8.5	20.2	14.4	79.5
AP604CL	--	--	--	--	21.6	21.6	72.5
20% Choteau 80% Conan	--	--	--	--	20.4	20.4	68.5
Kuntz	--	--	--	7.2	17.2	12.2	67.6
Kelby	--	--	--	6.7	17.6	12.2	67.3
NDSW0449	--	--	--	--	16.1	16.1	54.0
Corbin	--	--	--	6.7	12.6	9.7	53.5

NOTE: Average yields 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 3. Relative test weights of spring wheat varieties in lb/bu as compared to Vida when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2005	2006	2007	2008	2009	Ave	as % of Vida
Jedd	--	--	--	59.3	63.3	61.3	104.2
Barlow	--	--	--	--	63.5	63.5	102.9
AP604CL	--	--	--	--	63.5	63.5	102.9
Kelby	--	--	--	58.8	61.7	60.3	102.4
Volt	--	--	--	56.0	63.5	59.8	101.5
Choteau	60.0	59.5	62.8	56.8	61.5	60.1	101.1
O'Neal	--	--	--	56.3	62.5	59.4	100.9
Reeder	61.8	58.0	62.0	57.0	61.3	60.0	100.9
20% Choteau 80% Vida	--	--	--	--	62.2	62.2	100.8
20% Choteau 80% Conan	--	--	--	--	62.2	62.2	100.8
20% Choteau 80% Reeder	--	--	--	--	62.0	62.0	100.5
Briggs	--	--	--	56.5	61.7	59.1	100.4
Kuntz	--	--	--	56.2	62.0	59.1	100.4
Vida	60.5	57.2	62.0	56.0	61.7	59.5	100.0
Corbin	--	--	--	56.5	61.0	58.8	99.8
Granger	--	--	--	54.8	61.7	58.3	99.0
NDSW0449	--	--	--	--	60.7	60.7	98.4
McNeal	59.8	56.0	61.2	51.7	60.0	57.7	97.1
Outlook	59.0	55.5	60.5	52.0	60.3	57.5	96.6
Faller	--	--	--	52.2	61.5	56.9	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 only to the check variety.

Table 4. Relative heights of spring wheat varieties in cm as compared to Vida when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2005	2006	2007	2008	2009	Ave	as % of Vida
Barlow	--	--	--	--	50	50.0	106.4
Briggs	--	--	--	51	48	49.5	104.2
O'Neal	--	--	--	51	46	48.5	102.1
Vida	64	69	76	48	47	60.8	100.0
Outlook	66	71	76	46	44	60.6	99.7
McNeal	64	66	74	51	47	60.4	99.3
Kelby	--	--	--	48	46	47.0	98.9
20% Choteau 80% Reeder	--	--	--	--	46	46.0	97.9
20% Choteau 80% Vida	--	--	--	--	46	46.0	97.9
Granger	--	--	--	48	43	45.5	95.8
Reeder	66	66	71	46	40	57.8	95.1
Volt	--	--	--	46	43	44.5	93.7
AP604CL	--	--	--	--	44	44.0	93.6
Choteau	61	66	71	43	41	56.4	92.8
20% Choteau 80% Conan	--	--	--	--	43	43.0	91.5
NDSW0449	--	--	--	--	43	43.0	91.5
Kuntz	--	--	--	46	40	43.0	90.5
Corbin	--	--	--	46	40	43.0	90.5
Faller	--	--	--	41	45	43.0	90.5
Jedd	--	--	--	41	40	40.5	85.3

NOTE: Average heights 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 5. Relative protein contents of spring wheat varieties in percent as compared to Vida when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2005	2006	2007	2008	2009	Ave	as % of Vida
Corbin	--	--	--	17.1	19.1	18.1	107.7
Kelby	--	--	--	16.6	18.6	17.6	104.8
Reeder	16.5	15.1	15.7	17.1	19.2	16.7	104.4
20% Choteau 80% Reeder	--	--	--	--	18.4	18.4	103.4
NDSW0449	--	--	--	--	18.2	18.2	102.2
Barlow	--	--	--	--	17.9	17.9	100.6
Vida	16.2	15.3	15.0	15.8	17.8	16.0	100.0
20% Choteau 80% Conan	--	--	--	--	17.8	17.8	100.0
Briggs	--	--	--	15.3	18.2	16.8	99.7
20% Choteau 80% Vida	--	--	--	--	17.6	17.6	98.9
AP604CL	--	--	--	--	17.6	17.6	98.9
Kuntz	--	--	--	15.5	17.6	16.6	98.5
Outlook	15.3	15.0	14.1	14.8	18.4	15.5	96.9
Volt	--	--	--	15.8	16.7	16.3	96.7
Granger	--	--	--	15.4	17.1	16.3	96.7
Faller	--	--	--	15.8	16.0	15.9	94.6
Jedd	--	--	--	14.5	17.2	15.9	94.3
Choteau	15.6	13.3	12.4	15.4	17.7	14.9	92.9
O'Neal	--	--	--	14.8	16.4	15.6	92.9
McNeal	15.8	13.5	11.3	15.1	17.2	14.6	91.0

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

Table 6. Agronomic data obtained from a dryland recrop durum yield trial conducted at the Eastern Agricultural Research Center, Sidney, MT.

entry	heading*	height, cm	grain protein, %	HVAC	test wt, lb/bu	yield, bu/ac
MT03012	57.7	47.0	13.63	102.0	61.2	38.8
Mountrail	63.3	48.3	14.88	103.3	60.8	38.2
Divide	63.0	52.7	14.54	105.3	61.5	37.9
Strongfield	63.7	49.0	15.68	105.3	60.7	36.5
Cimmyt#11	60.3	49.3	12.25	89.4	60.3	35.0
Alkabo	62.3	47.3	14.79	103.9	61.0	31.5
MT04174	57.7	44.0	15.03	104.4	61.3	31.2
Normanno	60.3	40.3	14.74	93.6	60.2	31.1
Cimmyt#5	60.7	38.0	13.87	93.9	60.8	31.0
Alzada	58.0	45.0	15.26	98.6	60.3	29.6
Cimmyt#8	62.7	43.0	14.03	90.2	60.5	28.0
Dilse	62.0	48.3	16.14	98.3	60.0	27.8
MT01649	58.7	38.0	15.20	103.6	60.3	26.2
Grenora	60.0	45.0	15.39	103.6	60.5	24.9
Pierce	63.0	51.0	16.57	102.9	60.3	20.6 x
mean	60.9	45.8	14.80	99.9	60.7	31.2
probability	<0.001	0.001	<0.001	<0.001	0.489	0.288
CV (S/mean)	1.6	8.4	4.2	209	1.3	16.3
CV (SE/mean)	0.9	4.9	2.4	1.7	0.7	9.2
LSD 0.05	1.6	6.5	1.04	4.8	1.3	13.7

\* days from planting

x indicates significantly lower yield than check variety, Mountrail, at probability <0.05

Table 7. Relative yields of durum varieties in bu/ac as compared to Mountrail when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2005	2006	2007	2008	2009	Ave	as % of Mountrail
Alkabo	36.4	33.4	48.5	8.5	31.5	31.7	105.5
Mountrail	29.7	32.0	43.6	6.5	38.2	30.0	100.0
Divide	31.8	31.9	38.8	7.3	37.9	29.5	98.5
Alzada	33.7	32.4	39.9	7.9	29.6	28.7	95.7
MT03012	--	31.4	36.4	6.9	38.8	28.4	94.3
Grenora	37.2	30.6	41.4	5.8	24.9	28.0	93.3
Cimmyt#11	--	--	--	5.4	35.0	20.2	90.4
Cimmyt#5	--	--	--	7.8	31.0	19.4	86.8
Pierce	31.3	29.1	40.2	6.5	20.6	25.5	85.1
Strongfield	--	29.3	28.7	6.6	36.5	25.3	84.0
MT04174	--	--	--	5.7	31.2	18.5	82.6
Normanno	--	--	--	--	31.1	31.1	81.4
Cimmyt#8	--	--	--	8.0	28.0	18.0	80.5
Dilse	--	--	--	5.4	27.8	16.6	74.3
MT01649	--	--	--	--	26.2	26.2	68.6

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 8. Relative test weights of durum varieties in lb/bu as compared to Mountrail when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2005	2006	2007	2008	2009	Ave	as % of Mountrail
Alkabo	61.2	59.2	63.2	58.7	61.0	60.7	103.4
Pierce	60.8	59.0	62.2	57.5	60.3	60.0	102.2
MT04174	--	--	--	56.2	61.3	58.8	101.6
Divide	59.2	58.7	62.2	56.5	61.5	59.6	101.6
Strongfield	--	58.8	62.2	56.2	60.7	59.5	101.1
MT03012	--	58.0	63.0	55.7	61.2	59.5	101.1
Alzada	59.7	58.3	61.2	56.7	60.3	59.2	101.0
Grenora	58.8	57.0	62.8	56.0	60.5	59.0	100.6
Cimmyt#8	--	--	--	55.2	60.5	57.9	100.1
Mountrail	58.0	57.8	62.0	54.8	60.8	58.7	100.0
Cimmyt#5	--	--	--	54.7	60.8	57.8	99.9
MT01649	--	--	--	--	60.3	60.3	99.2
Normanno	--	--	--	--	60.2	60.2	99.0
Dilse	--	--	--	53.7	60.0	56.9	98.4
Cimmyt#11	--	--	--	51.5	60.3	55.9	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 9. Relative heights of durum varieties in inches as compared to Mountrail when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2005	2006	2007	2008	2009	Ave	as % of Mountrail
Pierce	29	29	35	18	20	26.2	107.4
Divide	29	28	32	20	21	26.0	106.6
Alkabo	27	28	32	19	19	25.0	102.5
Mountrail	26	29	31	17	19	24.4	100.0
Cimmyt#11	--	--	--	17	19	18.0	100.0
Strongfield	--	28	29	19	19	23.8	99.0
Alzada	26	26	29	20	18	23.8	97.5
Cimmyt#8	--	--	--	18	17	17.5	97.2
MT04174	--	--	--	18	17	17.5	97.2
Dilse	--	--	--	16	19	17.5	97.2
Grenora	26	26	29	18	18	23.4	95.9
MT03012	--	24	26	16	18	21.0	87.5
Cimmyt#5	--	--	--	16	15	15.5	86.1
Normanno	--	--	--	--	16	16.0	84.2
MT01649	--	--	--	--	15	15.0	78.9

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

Table 10. Relative protein contents of durum varieties in percent as compared to Mountrail when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2005	2006	2007	2008	2009	Ave	as % of Mountrail
Dilse	--	--	--	16.0	16.1	16.1	104.9
MT01649	--	--	--	--	15.2	15.2	102.0
MT04174	--	--	--	15.8	15	15.4	100.7
Mountrail	17.8	15.0	13.6	15.7	14.9	15.4	100.0
Pierce	15.9	14.5	14.2	14.8	16.6	15.2	98.7
Normanno	--	--	--	--	14.7	14.7	98.7
Strongfield	--	14.2	12.6	15.5	15.7	14.5	98.0
MT03012	--	15.2	13.4	15.1	13.6	14.3	96.8
Divide	17.0	14.0	14.2	14.5	14.5	14.8	96.4
Grenora	15.4	14.6	13.5	14.9	15.4	14.8	95.8
Alzada	15.1	13.8	13.6	14.8	15.3	14.5	94.3
Cimmyt#8	--	--	--	14.5	14	14.3	93.1
Cimmyt#5	--	--	--	14.4	13.9	14.2	92.5
Cimmyt#11	--	--	--	15.9	12.2	14.1	91.8
Alkabo	13.8	14.1	13.9	13.8	14.8	14.1	91.4

NOTE: Average protein contents 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 11. Relative hard vitreous amber color of durum varieties in percent as compared to Mountrail when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2005	2006	2007	2008	2009	Ave	as % of Mountrail
MT03012	--	84.7	87.6	71.0	102.0	86.3	106.5
MT04174	--	--	--	75.4	104.4	89.9	106.0
Pierce	89.6	78.5	85.3	74.0	102.9	86.1	104.0
Alkabo	98.0	74.9	84.9	66.4	103.9	85.6	103.5
Grenora	92.5	76.2	82.8	72.1	103.6	85.4	103.3
Dilse	--	--	--	74.4	98.3	86.4	101.8
Alzada	86.4	75.1	85.7	72.4	98.6	83.6	101.1
Divide	92.7	66.1	84.5	66.9	105.3	83.1	100.5
MT01649	--	--	--	--	103.6	103.6	100.3
Mountrail	89.3	76.4	78.3	66.3	103.3	82.7	100.0
Strongfield	--	80.1	69.1	69.5	105.3	81.0	99.9
Normanno	--	--	--	--	93.6	93.6	90.6
Cimmyt#5	--	--	--	58.7	93.9	76.3	90.0
Cimmyt#8	--	--	--	50.5	90.2	70.4	83.0
Cimmyt#11	--	--	--	49.6	89.4	69.5	82.0

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