PROJECT TITLE: Evaluation of spring wheat, durum, and barley varieties under minimum-till, continuous cropping conditions – 2006

PROJECT LEADER:
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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.

RESULTS:
Soil type: Williams clay loam
Previous crops: 2005 - spring wheat, 2004 - safflower, 2003 - small grain plots
Residual soil N to 3 ft: 80 lb N/ac
Residual soil P to 6 in: 63 ppm
Applied fertilizer: 30 lb N/ac applied as liquid 28-0-0
Herbicides: 1.5 pt/ac Bronate applied May 25
Precipitation April – August, 2006: 9.62 inches
Ave (58 yr) precipitation April – August: 9.45 inches
Precipitation September 2005 – August 2006: 13.77 inches
Ave (58 yr) precipitation September – August: 13.85 inches

Spring wheat: Eighteen lines and varieties of spring wheat were tested under dryland recrop conditions (Table 1). Freyr yielded significantly more than the check variety, McNeal. Trooper, Scholar and Dapps yielded significantly lower than the check variety, McNeal. Average yield was 34.8 bu/acre. Five-year summaries for yield, test weight, height, and protein content are shown in Tables 2 through 5.

Durum: Fourteen durum varieties were tested under dryland recrop conditions (Table 6). Strongfield, Pierce and Plaza yielded significantly less than the check variety, Mountrail. Average yield was 31.1 bu/acre. Five-year summaries for yield, test weight, height, and protein content are shown in Tables 7 through 10.

Barley: Twenty barley lines and varieties were tested under dryland recrop conditions (Table 11). Hays, Conrad, Geraldine and Merit yielded significantly less than the check variety, Haxby. Average yield was 52.2 bu/acre. Five-year summaries for yield, test weight, height, and protein content are shown in Tables 12 through 15.

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. Bromoxynil at a rate of 1.5 pt/acre is used for broadleaf weed control in the small grain, and trifluralin at a rate of 1.5 pt/acre is used in the safflower. This weed control and crop rotation have been effective in controlling weeds in the yield trial plots, but volunteer small grain has been a problem in some years, although was not a severe problem in 2006.

FUTURE PLANS: New varieties will continue to be tested under continuous cropping conditions to identify those which will perform best under these conditions. Closer cooperation with the Williston Research Center will allow testing of experimental lines from North Dakota as well as from Montana, so that when those lines are released as varieties, information will be available as to their performance under continuous cropping conditions.

Table 1. Agronomic data obtained from a dryland recrop spring wheat yield trial conducted at the Eastern Agricultural Research Center, Sidney, MT, 2006.
Planted: April 28 Harvested: July 29

entry	heading, days from planting	height, in	protein content	test wt, lb/bu	yield, bu/ac	
Freyr	52.7	29.7	13.56	60.0	40.1	a
Howard	52.7	28.2	13.79	57.7	37.7	
Vida	54.0	27.0	15.32	57.2	37.6	
Waikea	50.7	26.8	14.22	55.7	37.0	
Steele ND	52.7	28.5	13.67	58.7	36.7	
Norpro	52.3	26.0	14.76	58.3	36.5	
Agawam	50.3	26.5	12.03	61.5	35.8	
Reeder	53.7	26.2	15.13	58.0	35.7	
Choteau	53.0	26.2	13.30	59.5	35.2	
Outlook	55.3	28.5	15.00	55.5	35.2	
McNeal	55.3	26.4	13.53	56.0	35.0	
Knudson	52.3	27.2	14.63	58.0	34.9	
Glenn	51.3	29.7	15.54	59.8	34.1	
Hanna	52.7	32.8	14.32	58.5	32.5	
Granite	55.3	26.5	15.05	60.2	32.3	
Trooper	50.7	27.2	13.46	60.3	31.1	x
Scholar	55.0	31.0	16.16	58.3	30.1	x
Dapps	54.0	31.1	14.96	57.8	29.1	x
mean	53.0	28.1	14.36	58.4	34.8	
Probability	<0.001	<0.001	<0.001	<0.001	<0.001	
CV (S/mean)	1.2	6.5	6.1	1.4	5.8	
CV (SE/mean)	0.7	3.7	3.5	0.8	3.3	
LSD 0.05	1.0	7.7	1.46	1.4	3.3	

Check variety is McNeal with an average yield of 35.0 bu/acre.
a indicates significantly greater yield than check variety, McNeal, at probability of <0.05
x indicates significantly lower yield than check variety, McNeal, at probability of <0.05

Table 2. Relative yields of spring wheat varieties as compared to McNeal when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Vida	--	--	29.5	40.6	37.6	35.9	113.6
Freyr	--	--	24.4	39.6	40.1	34.7	109.8
Outlook	19.0	37.7	30.1	37.0	35.2	31.8	109.3
Reeder	20.7	35.2	25.0	41.5	35.7	31.6	108.7
Howard	--	--	--	--	37.7	37.7	107.7
SteeleND	--	32.7	28.1	37.8	36.7	33.8	106.7
Knudson	--	--	--	39.6	34.9	37.3	106.0
Waikea	--	--	--	--	37.0	37.0	105.7
Norpro	--	--	19.8	42.8	36.5	33.0	104.5
Agawam	--	--	--	--	35.8	35.8	102.3
McNeal	18.7	32.0	24.5	35.3	35.0	29.1	100.0
Granite	--	32.4	23.1	37.6	32.3	31.4	98.9
Hanna	--	--	29.0	31.3	32.5	30.9	97.9
Choteau	16.7	31.1	24.2	34.8	35.2	28.4	97.6
Scholar	19.0	34.0	23.1	35.6	30.1	28.4	97.5
Glenn	--	--	--	32.0	34.1	33.1	94.0
Trooper	--	--	--	29.9	31.1	30.5	86.8
Dapps	--	--	18.1	30.0	29.1	25.7	81.4

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 as compared to McNeal when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Agawam	--	--	--	--	61.5	61.5	109.8
Granite	--	61.3	60.7	61.8	60.2	61.0	106.6
Glenn	--	--	--	63.3	59.8	61.6	106.3
Freyr	--	--	60.8	62.3	60.0	61.0	106.1
Trooper	--	--	--	60.5	60.3	60.4	104.3
Hanna	--	--	60.8	60.7	58.5	60.0	104.3
Scholar	59.0	59.5	59.3	61.2	58.3	59.5	104.0
Reeder	57.5	59.0	60.0	61.8	58.0	59.3	103.6
SteeleND	--	57.5	60.2	60.2	58.7	59.2	103.4
Norpro	--	--	60.5	59.2	58.3	59.3	103.1
Howard	--	--	--	--	57.7	57.7	103.0
Dapps	--	--	59.2	60.3	57.8	59.1	102.7
Vida	--	--	59.5	60.5	57.2	59.1	102.7
Knudson	--	--	--	60.8	58.0	59.4	102.6
Choteau	55.3	58.7	59.8	60.0	59.5	58.7	102.6
McNeal	57.0	56.3	56.8	59.8	56.0	57.2	100.0
Outlook	56.3	56.8	57.8	59.0	55.5	57.1	99.8
Waikea	--	--	--	--	55.7	55.7	99.5

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 inches as compared to McNeal when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Hanna	--	--	29	30	33	30.7	121.1
Dapps	--	--	26	30	31	29.0	114.5
Glenn	--	--	--	28	30	29.0	113.7
Freyr	--	--	26	29	30	28.3	111.8
Scholar	23	35	23	28	31	28.0	109.4
Howard	--	--	--	--	28	28.0	107.7
SteeleND	--	33	26	28	28	28.8	107.5
Knudson	--	--	--	27	27	27.0	105.9
Waikea	--	--	--	--	27	27.0	103.8
Outlook	21	30	26	26	28	26.2	102.3
Trooper	--	--	--	25	27	26.0	102.0
McNeal	21	31	25	25	26	25.6	100.0
Agawam	--	--	--	--	26	26.0	100.0
Reeder	22	28	23	26	26	25.0	97.7
Norpro	--	--	22	26	26	24.7	97.4
Vida	--	--	22	25	27	24.7	97.4
Granite	--	28	22	26	26	25.5	95.3
Choteau	18	28	23	24	26	23.8	93.0

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 as compared to McNeal when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Dapps	--	--	18.0	16.7	15.0	16.6	115.3
Vida	--	--	16.8	16.2	15.3	16.1	112.1
Granite	--	18.4	16.2	16.7	15.0	16.6	110.7
Reeder	15.4	17.6	17.2	16.5	15.1	16.4	110.1
Norpro	--	--	16.9	15.3	14.8	15.7	109.0
Scholar	15.4	17.2	16.2	15.0	16.2	16.0	107.7
Glenn	--	--	--	15.6	15.5	15.6	106.1
Waikea	--	--	--	--	14.2	14.2	105.2
Freyr	--	--	15.9	14.7	13.6	14.7	102.6
Howard	--	--	--	--	13.8	13.8	102.2
Knudson	--	--	--	15.3	14.6	15.0	102.0
Outlook	14.6	16.1	14.4	15.3	15.0	15.1	101.5
Hanna	--	--	15.5	13.8	14.3	14.5	101.2
Choteau	14.6	16.4	15.0	15.6	13.3	15.0	100.8
SteeleND	--	16.4	14.7	15.4	13.7	15.1	100.5
McNeal	14.4	16.8	13.8	15.8	13.5	14.9	100.0
Trooper	--	--	--	15.2	13.5	14.4	98.0
Agawam	--	--	--	--	12.0	12.0	88.9

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, 2006.
Planted: April 28 Harvested: July 29

entry	heading, days from planting	height, cm	percent protein	HVAC	semolina color	test wt, lb/bu	yield, bu/ac	
Alkabo	55.3	27.8	14.07	74.9	30.1	59.2	33.4	
Alzada	52.0	26.5	13.81	75.1	30.8	58.3	32.4	
MT02525	52.3	23.5	13.88	71.1	30.1	59.3	32.3	
Mountrail	55.7	28.9	15.00	76.4	32.2	57.8	32.0	
Divide	55.3	27.7	14.02	66.1	30.3	58.7	31.9	
Avonlea	53.0	28.3	14.97	84.0	30.7	57.5	31.7	
MT03012	52.0	24.5	15.19	84.7	29.4	58.0	31.4	
MT02DH55	54.0	28.3	14.70	73.9	30.2	56.8	31.4	
Kyle	57.7	32.7	14.66	75.9	29.2	58.0	30.9	
Grenora	53.3	26.5	14.63	76.2	30.7	57.0	30.6	
Dilse	55.3	28.2	14.13	79.8	31.2	59.7	30.4	
Strongfield	55.7	28.1	14.24	80.1	30.8	58.8	29.3	x
Pierce	54.3	29.4	14.53	78.5	30.3	59.0	29.1	x
Plaza	55.7	27.2	14.70	70.2	30.4	57.3	28.4	x
mean	54.4	27.7	14.47	76.2	30.5	58.3	31.1	
probability	<0.001	<0.001	0.737	<0.001	0.030	0.142	0.012	
CV (S/mean)	1.1	3.9	6.2	5.1	2.8	2.1	4.7	
CV (SE/mean)	0.6	2.2	3.6	3.0	1.6	1.2	2.7	
LSD 0.05	1.0	4.6	1.52	6.5	1.4	2.0	2.4	

Mountrail is the check variety with an average yield on 32.0 bu/ac
x indicates significantly lower yield than check variety, Mountrail, at probability <0.05

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

Cultivar	2002	2003	2004	2005	2006	Ave	as % of Mountrail
Alkabo	--	--	--	36.4	33.4	34.9	113.1
Grenora	--	--	--	37.2	30.6	33.9	109.9
AC Avonlea	24.2	31.7	19.7	33.1	31.7	28.1	108.4
Alzada	--	--	--	33.7	32.4	33.1	107.1
Dilse	22.2	32.9	16.0	33.5	30.4	27.0	104.2
Divide	--	--	--	31.8	31.9	31.9	103.2
Plaza	22.2	29.7	17.0	34.3	28.4	26.3	101.6
MT02525	--	--	--	--	32.3	32.3	100.9
Mountrail	21.3	31.1	15.4	29.7	32.0	25.9	100.0
Pierce	21.4	30.0	17.4	31.3	29.1	25.8	99.8
MT03012	--	--	--	--	31.4	31.4	98.1
MT02DH55	--	--	--	--	31.4	31.4	98.1
Kyle	21.6	32.7	8.4	31.5	30.9	25.0	96.6
Strongfield	--	--	--	--	29.3	29.3	91.6

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 as compared to Mountrail when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of Mountrail
Alkabo	--	--	--	61.2	59.2	60.2	104.0
Dilse	57.8	61.2	58.5	61.0	59.7	59.6	103.1
MT02525	--	--	--	--	59.3	59.3	102.6
Pierce	57.0	60.0	59.0	60.8	59.0	59.2	102.3
Alzada	--	--	--	59.7	58.3	59.0	101.9
Divide	--	--	--	59.2	58.7	59.0	101.8
Strongfield	--	--	--	--	58.8	58.8	101.7
Kyle	59.3	60.2	56.5	59.8	58.0	58.8	101.6
Plaza	58.2	59.2	58.9	60.2	57.3	58.8	101.6
AC Avonlea	58.8	59.2	57.8	59.7	57.5	58.6	101.3
MT03012	--	--	--	--	58.0	58.0	100.3
Mountrail	56.5	58.7	58.1	58.0	57.8	57.8	100.0
Grenora	--	--	--	58.8	57.0	57.9	100.0
MT02DH55	--	--	--	--	56.8	56.8	98.3

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	2002	2003	2004	2005	2006	Ave	as % of Mountrail
Kyle	23	34	30	29	33	29.8	118.3
AC Avonlea	22	32	26	31	28	27.8	110.3
Pierce	21	28	24	29	29	26.2	104.0
Divide	--	--	--	29	28	28.5	103.6
Dilse	19	30	22	28	28	25.4	100.8
Mountrail	20	29	22	26	29	25.2	100.0
Alkabo	--	--	--	27	28	27.5	100.0
MT02DH55	--	--	--	--	28	28.0	96.6
Strongfield	--	--	--	--	28	28.0	96.6
Grenora	--	--	--	26	26	26.0	94.5
Alzada	--	--	--	26	26	26.0	94.5
Plaza	18	25	21	24	27	23.0	91.3
MT02525	--	--	--	--	24	24.0	82.8
MT03012	--	--	--	--	24	24.0	82.8

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 as compared to Mountrail when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of Mountrail
MT03012	--	--	--	--	15.2	15.2	101.3
Mountrail	16.3	17.2	16.9	17.8	15.0	16.6	100.0
MT02DH55	--	--	--	--	14.7	14.7	98.0
Kyle	16.5	16.4	16.8	17.0	14.7	16.3	97.8
AC Avonlea	15.4	17.3	16.9	16.7	15.0	16.3	97.7
Dilse	16.6	16.4	16.9	16.4	14.1	16.1	96.6
Pierce	16.6	17.1	16.1	15.9	14.5	16.0	96.4
Strongfield	--	--	--	--	14.2	14.2	94.7
Divide	--	--	--	17.0	14.0	15.5	94.5
Plaza	15.6	16.1	15.9	16.1	14.7	15.7	94.2
MT02525	--	--	--	--	13.9	13.9	92.7
Grenora	--	--	--	15.4	14.6	15.0	91.5
Alzada	--	--	--	15.1	13.8	14.5	88.1
Alkabo	--	--	--	13.8	14.1	14.0	85.1

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. Agronomic data obtained from a dryland recrop barley yield trial conducted at the Eastern Agricultural Research Center, Sidney, MT.
Planted: April 28 Harvested: July 29

Variety	heading, days from planting	Height, in	Protein content	Test wt, lb/bu	Yield bu/acre	
Stellar	53.3	24.7	10.02	46.5	59.7	
Haxby	54.7	25.9	10.68	49.3	59.1	
MT970229	57.0	27.8	10.88	49.7	55.6	
Tradition	53.7	27.3	10.10	47.0	54.4	
Copeland	57.0	27.2	11.27	43.0	54.3	
Eslick	56.7	24.4	11.73	45.8	54.2	
Metcalfe	54.7	25.5	12.27	44.7	54.0	
Craft	54.0	27.3	12.00	48.8	53.9	
Xena	57.0	24.5	10.58	45.7	53.3	
Drummond	53.0	25.1	10.55	47.0	53.2	
Hockett	55.3	24.3	10.69	46.3	53.0	
Legacy	54.3	28.1	9.85	45.8	52.6	
Harrington	57.3	25.3	10.94	44.0	51.4	
Boulder	56.0	23.9	10.57	50.3	50.9	
Robust	53.7	27.8	10.67	46.3	50.8	
Kendall	57.3	25.3	11.65	44.8	50.4	
Hays	58.0	22.8	11.82	44.2	47.8	x
Conrad	56.0	24.1	11.93	45.0	47.6	x
Geraldine	56.7	23.1	11.35	46.2	44.9	x
Merit	57.0	24.1	11.00	42.8	42.6	x
mean	55.6	25.4	11.03	46.2	52.2	
probability	<0.001	0.003	0.073	<0.001	0.078	
CV (S/mean)	1.7	6.6	8.4	2.5	10.6	
CV (SE/mean)	1.0	3.8	4.8	1.4	6.1	
$LSD_{0.05}$	1.6	7.0	1.52	1.9	9.1	

Check variety is Haxby with an average yield of 59.1 bu/acre.
x indicates significantly lower yield than check variety, Haxby, at probability of <0.05

Table 12. Relative yields of barley varieties compared to Haxby when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of Haxby
Stellar	--	--	--	--	59.7	59.7	101.0
Haxby	35.4	51.8	31.8	52.6	59.1	46.1	100.0
Tradition	--	--	28.1	52.4	54.4	45.0	94.0
Metcalfe	--	--	23.9	53.4	54.0	43.8	91.5
Robust	--	--	--	51.4	50.8	51.1	91.5
Legacy	--	--	--	49.2	52.6	50.9	91.1
Xena	28.6	45.9	--	51.4	53.3	44.8	90.1
Hockett	--	--	27.9	48.1	53.0	43.0	89.9
Craft	29.5	52.2	27.5	42.8	53.9	41.2	89.3
Eslick	28.9	46.6	22.8	49.9	54.2	40.5	87.7
Kendall	--	--	--	47.2	50.4	48.8	87.4
Drummond	--	--	--	44.0	53.2	48.6	87.0
Boulder	--	--	--	45.7	50.9	48.3	86.5
Copeland	--	--	22.3	46.3	54.3	41.0	85.6
MT970229	27.6	48.6	25.2	40.4	55.6	39.5	85.6
Conrad	--	--	--	47.0	47.6	47.3	84.7
Harrington	27.1	44.1	19.2	46.8	51.4	37.7	81.8
Geraldine	23.5	46.8	--	44.1	44.9	39.8	80.1
Hays	--	45.8	27.2	32.5	47.8	38.3	78.5
Merit	--	--	--	44.4	42.6	43.5	77.9

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 13. Relative test weights of barley varieties compared to Haxby when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of Haxby
Boulder	--	--	--	50.8	50.3	50.6	103.1
Haxby	47.3	49.5	50.5	48.8	49.3	49.1	100.0
MT970229	46.8	51.0	47.0	49.3	49.7	48.8	99.3
Craft	47.8	47.8	47.3	50.7	48.8	48.5	98.8
Geraldine	46.2	47.2	--	50.2	46.2	47.5	97.4
Xena	45.7	46.3	--	49.5	45.7	46.8	96.0
Drummond	--	--	--	47.2	47.0	47.1	96.0
Conrad	--	--	--	49.0	45.0	47.0	95.8
Hockett	--	--	46.8	48.2	46.3	47.1	95.1
Tradition	--	--	47.0	47.0	47.0	47.0	94.9
Legacy	--	--	--	47.2	45.8	46.5	94.8
Robust	--	--	--	46.7	46.3	46.5	94.8
Eslick	45.2	46.7	45.3	49.3	45.8	46.5	94.7
Metcalfe	--	--	46.3	49.3	44.7	46.8	94.4
Stellar	--	--	--	--	46.5	46.5	94.3
Kendall	--	--	--	47.0	44.8	45.9	93.6
Harrington	43.8	45.5	44.2	47.2	44.0	44.9	91.6
Merit	--	--	--	47.0	42.8	44.9	91.5
Hays	--	46.2	44.3	46.2	44.2	45.2	91.3
Copeland	--	--	44.0	47.2	43.0	44.7	90.3

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 heights of barley varieties in inches compared to Haxby when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of Haxby
Robust	--	--	--	31	28	29.5	109.3
Craft	22	26	20	29	27	24.8	106.0
Metcalfe	--	--	20	29	26	25.0	104.2
Copeland	--	--	20	28	27	25.0	104.2
Legacy	--	--	--	27	28	27.5	101.9
Tradition	--	--	20	26	27	24.3	101.4
Haxby	20	25	18	28	26	23.4	100.0
MT970229	19	23	18	27	28	23.0	98.3
Drummond	--	--	--	27	25	26.0	96.3
Stellar	--	--	--	--	25	25.0	96.2
Harrington	18	25	18	25	25	22.2	94.9
Xena	20	23	--	25	24	23.0	92.9
Kendall	--	--	--	25	25	25.0	92.6
Eslick	19	23	18	24	24	21.6	92.3
Hockett	--	--	17	25	24	22.0	91.7
Conrad	--	--	--	25	24	24.5	90.7
Boulder	--	--	--	25	24	24.5	90.7
Merit	--	--	--	24	24	24.0	88.9
Hays	--	21	17	23	23	21.0	86.6
Geraldine	16	21	--	24	23	21.0	84.8

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 15. Relative protein contents of barley varieties compared to Haxby when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of Haxby
Craft	15.7	12.2	13.5	11.0	12.0	12.9	111.8
Geraldine	16.6	12.3	--	11.1	11.4	12.9	111.3
Xena	14.2	13.3	--	13.2	10.6	12.8	111.0
MT970229	16.6	12.1	11.4	12.6	10.9	12.7	110.4
Robust	--	--	--	13.0	10.7	11.9	110.2
Eslick	14.5	12.3	12.8	12.0	11.7	12.7	109.9
Metcalfe	--	--	12.4	11.2	12.3	12.0	109.1
Hays	--	12.6	11.0	12.8	11.8	12.1	106.9
Tradition	--	--	12.8	11.9	10.1	11.6	105.8
Copeland	--	--	11.3	11.8	11.3	11.5	104.6
Harrington	13.8	12.5	12.8	10.2	10.9	12.0	104.5
Merit	--	--	--	11.4	11.0	11.2	104.2
Boulder	--	--	--	11.6	10.6	11.1	103.3
Kendall	--	--	--	10.6	11.6	11.1	103.3
Hockett	--	--	11.3	11.4	10.7	11.1	101.5
Conrad	--	--	--	9.9	11.9	10.9	101.4
Haxby	12.5	12.2	11.4	10.8	10.7	11.5	100.0
Drummond	--	--	--	10.9	10.6	10.8	100.0
Stellar	--	--	--	--	10.0	10.0	93.5
Legacy	--	--	--	10.0	9.8	9.9	92.1

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.