PROJECT TITLE: Evaluation of spring wheat, durum, barley, and oat varieties under minimum-till, continuous cropping conditions – 1999

PROJECT LEADER:
Joyce Eckhoff, Eastern Agricultural Research Center, 1501 N Central Ave, Sidney, MT 59270
phone: (406)482-2208 fax: (406)482-7336 e-mail: jeckhoff@sidney.ars.usda.gov

OBJECTIVE: To determine the best adapted varieties of spring wheat, durum, barley, and oats for production under continuous cropping conditions in eastern Montana.

MATERIALS AND METHODS: All trials were replicated three times. Plots were 20 feet long and four rows wide, with one foot between rows. At harvest, all rows were harvested with a plot combine for yield, test weight, and protein determinations. PREVIOUS CROPS: 1998 - spring wheat, 1997 - safflower, 1996 - small grain plots
SOIL TYPE: Williams clay loam
RESIDUAL SOIL N TO 2 FT: 62 lb/acre
RESIDUAL SOIL P TO 6 IN: 52 ppm
RESIDUAL SOIL K TO 6 IN: 497 ppm
APPLIED FERTILIZER: None
HERBICIDES: 1.5 pt/A Bronate applied 27 May
PRECIPITATION APR-SEP, 1999: 10.76 inches
PRECIPITATION APR-SEP, AVE (51 yr): 10.83 inches
PRECIPITATION OCT 1998 – SEP 1999: 17.84 inches
PRECIPITATION OCT – SEP, AVE (51 yr): 13.95 inches

COMMENTS:
Soil was very wet at planting, resulting in some problem with mud plugging the openers on the planter. Affected plots were noted. Weather was cool and wet through June, cool in July, and hot in August, resulting in very good dryland yields.

Planting and harvest dates were

Crop	Planting date	Harvest date
Spring wheat	16 April	4 August
Durum	16 April	4 August
Barley	16 April	29 July
Oats	16 April	2 August

RESULTS:
Spring wheat: Eighteen lines and varieties of spring wheat were tested under dryland recrop conditions (Table 1). AgriPro varieties Norpro and Ivan, and Minnesota variety McVey yielded the most. Average yield was 53.1 bu/acre. Five-year summaries for yield, test weight, height, and protein content are shown in Tables 2 through 5.

Durum: Twenty-six durum varieties were tested under dryland recrop conditions (Table 6). Mountrail, AC Morse, and Renville yielded most. Average yield was 53.8 bu/acre. Five-year summaries for yield, test weight, height, and protein content are shown in Tables 7 through 10.

Barley: Sixteen barley lines and varieties were tested under dryland recrop conditions (Table 11). Valier, Montana line MTLB13, and Hector yielded the most. Average yield was 90.1 bu/acre. Five-year summaries for yield, test weight, height, and protein content are shown in Tables 12 through 15.

Oats: Sixteen oat varieties were tested under dryland recrop conditions (Table 16). ABSP9-2, Monida, and Prairie yielded the most. Average yield was 119.2 bu/acre. Five-year summaries for yield, test weight, height, and protein content are shown in Tables 17 through 20.

SUMMARY: The experiments reported under this project are all of the replicated small plot type. The three-year crop rotation is 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 not a severe problem in 1999.

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.
Planting date: 16 April 1999 Harvest date: 4 August 1999

Variety	Days to heading [1]	Height, inches	Protein content	Test wt, lb/bu	Yield bu/acre[2]
Norpro	66	28	14.0	62.0	62.6 a
McVey	67	30	11.7	60.2	62.3 a
Ivan	67	28	11.9	62.3	60.8 a
Argent*	67	31	14.5	62.0	54.9 a
Parshall	66	34	15.1	63.0	54.6 a
MTHW9701*	65	28	12.2	61.3	54.4 a
Grandin	66	31	14.0	60.8	54.4 a
Hagar	68	29	14.0	61.0	53.9 a
Reeder	66	29	14.8	61.2	53.3
377S*	66	30	11.5	60.8	52.2
Newana	68	29	11.8	60.5	50.9
Ernest	66	34	14.4	62.2	50.5
9420*	65	28	10.8	61.2	50.2
Amidon	67	36	13.0	60.5	50.1
Scholar	67	35	13.0	61.7	49.8
Conan	67	30	11.6	61.5	48.2
McNeal	67	30	11.7	59.7	47.2
Lew	68	34	12.9	61.7	45.9
mean	66.6	30.8	12.9	61.3	53.1
probability	<0.001	<0.001	<0.001	<0.001	<0.001
CV (S/mean)	0.4	5.1	7.7	1.0	7.0
$LSD_{0.05}$	1.1	2.6	1.7	1.0	6.2

Check variety is McNeal with an average yield of 47.2 bu/acre.
* hard white wheat

[1] Heading date is number of days from planting
[2] a indicates significantly greater yield than check variety, McNeal, at a 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	1995	1996	1997	1998	1999	Ave	as % of McNeal
Norpro	--	--	--	--	62.6	62.6	132.6
McVey	--	--	--	--	62.3	62.3	132.0
MTHW9701	--	--	--	--	54.4	54.4	115.3
Reeder	--	--	--	42.6	53.3	48.0	112.0
377S	--	--	--	--	52.2	52.2	110.6
Ivan	--	--	--	33.4	60.8	47.1	110.0
Scholar	--	14.0	32.2	37.7	49.8	33.4	109.0
Parshall	--	--	--	35.4	54.6	45.0	105.1
Argent	--	--	--	33.6	54.9	44.3	103.4
Hagar	--	--	--	33.7	53.9	43.8	102.3
Conan	--	--	--	--	48.2	48.2	102.1
McNeal	32.8	11.8	25.3	38.4	47.2	31.1	100.0
Amidon	23.4	13.1	30.8	37.3	50.1	30.9	99.5
Newana	35.1	12.5	22.0	31.1	50.9	30.3	97.5
Grandin	29.0	9.7	19.4	31.9	54.4	28.9	92.9
Ernest	24.2	12.1	24.0	32.8	50.5	28.7	92.3
MTHW9420	--	--	13.4	36.0	50.2	33.2	89.8
Lew	26.4	8.8	19.3	31.7	45.9	26.4	85.0

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	1995	1996	1997	1998	1999	Ave	as % of McNeal
Scholar	--	60.3	59.7	59.3	61.7	60.3	104.8
Parshall	--	--	--	58.7	63.0	60.9	104.1
Norpro	--	--	--	--	62.0	62.0	103.9
Ernest	61.2	59.8	58.3	58.2	62.2	59.9	103.3
Conan	--	--	--	--	61.5	61.5	103.0
Lew	61.8	57.9	59.2	57.7	61.7	59.7	102.8
MTHW9701	--	--	--	--	61.3	61.3	102.7
Argent	--	--	--	57.3	62.0	59.7	102.1
Newana	61.3	59.4	59.7	54.8	60.5	59.1	101.9
Amidon	59.8	59.4	58.8	57.2	60.5	59.1	101.9
377S	--	--	--	--	60.8	60.8	101.8
Ivan	--	--	--	56.5	62.3	59.4	101.6
Grandin	61.5	57.0	59.3	55.8	60.8	58.9	101.4
Reeder	--	--	--	57.0	61.2	59.1	101.1
Hagar	--	--	--	56.8	61.0	58.9	100.8
McVey	--	--	--	--	60.2	60.2	100.8
MTHW9420	--	--	59.2	55.0	61.2	58.5	100.6
McNeal	60.3	55.6	57.4	57.2	59.7	58.0	100.0

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

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

Cultivar	1995	1996	1997	1998	1999	Ave	as % of McNeal
Amidon	19	27	21	33	36	27	113.3
Ernest	21	23	21	33	34	26	110.0
Scholar	--	22	21	31	35	27	107.9
Lew	21	23	17	34	34	26	107.5
Parshall	--	--	--	32	34	33	106.5
Grandin	20	25	17	30	31	25	102.5
McNeal	19	21	18	32	30	24	100.0
Argent	--	--	--	31	31	31	100.0
McVey	--	--	--	--	30	30	100.0
377S	--	--	--	--	30	30	100.0
Conan	--	--	--	--	30	30	100.0
Newana	20	24	16	28	29	23	97.5
Reeder	--	--	--	30	29	30	95.2
Hagar	--	--	--	29	29	29	93.5
Norpro	--	--	--	--	28	28	93.3
MTHW9701	--	--	--	--	28	28	93.3
MTHW9420	--	--	16	27	28	24	88.8
Ivan	--	--	--	27	28	28	88.7

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	1995	1996	1997	1998	1999	Ave	as % of McNeal
Parshall	--	--	--	15.8	15.1	15.5	119.8
Norpro	--	--	--	--	14.0	14.0	119.7
Argent	--	--	--	15.7	14.5	15.1	117.1
Reeder	--	--	--	15.2	14.8	15.0	116.3
Hagar	--	--	--	15.1	14.0	14.6	112.8
Ernest	16.9	18.1	15.8	15.4	14.4	16.1	104.9
MTHW9701	--	--	--	--	12.2	12.2	104.3
Grandin	16.2	17.0	16.1	15.3	14.0	15.7	102.3
Lew	15.6	18.7	15.9	15.4	12.9	15.7	102.2
Scholar	--	17.3	15.7	14.9	13.0	15.2	101.3
McNeal	16.7	17.8	16.5	14.1	11.7	15.4	100.0
McVey	--	--	--	--	11.7	11.7	100.0
MTHW9420	--	--	16.3	14.9	10.8	14.0	99.3
Conan	--	--	--	--	11.6	11.6	99.1
377S	--	--	--	--	11.5	11.5	98.3
Amidon	16.4	16.6	14.9	14.2	13.0	15.0	97.8
Ivan	--	--	--	13.3	11.9	12.6	97.7
Newana	15.7	17.0	15.2	14.3	11.8	14.8	96.4

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 6. Agronomic data obtained from a dryland recrop durum yield trial conducted at the Eastern Agricultural Research Center, Sidney, MT.
Planting date: 16 April 1999 Harvest date: 4 August 1999

Variety	Days to heading [1]	Height, inches	Protein content	Test wt, lb/bu	Yield bu/acre[2]	
Mountrail	68	36	14.8	57.7	61.2	
AC Morse	64	29	15.2	57.8	58.7	
Renville	67	36	15.4	58.4	58.1	
McNeal	68	30	13.0	56.3	57.7	
Maier	67	31	15.5	59.2	57.2	
Utopia	63	25	13.8	57.5	57.2	
Plenty	68	38	15.3	58.1	56.5	
Lloyd	68	27	14.4	56.5	56.2	
Plaza	68	27	14.2	58.3	55.4	
Sceptre	67	32	15.0	57.0	55.2	
Kari	66	33	14.9	58.5	54.9	
Kyle	68	38	15.6	57.9	54.7	
Ben	66	35	15.4	58.2	54.6	
AC Melita	66	33	15.2	58.2	53.7	
Crosby	66	35	15.9	58.1	53.6	
Ward	66	36	15.5	58.8	52.5	x
PH894401	63	25	14.2	60.3	52.0	x
Voss	67	25	14.2	58.3	52.0	x
Laker	68	30	13.4	59.0	51.7	x
Lebsock	67	32	15.5	59.5	51.4	x
Munich	66	28	15.6	58.5	50.4	x
Medora	66	34	15.4	58.5	49.9	x
Belzer	68	36	15.0	56.1	49.7	x
Command	65	25	14.1	60.2	49.0	x
Vic	66	36	15.3	58.6	48.4	x
Monroe	62	33	15.5	58.7	48.2	x
mean	66.3	31.7	14.9	58.2	53.8	
probability	>0.001	>0.001	>0.001	>0.001	>0.001	
CV (S/mean)	0.4	4.8	3.3	0.9	5.9	
$LSD_{0.05}$	1.0	2.5	0.8	0.8	5.2	

Check variety is Renville with an average yield of 58.1 bu/acre.

[1] Heading date is number of days from planting
[2] x indicates significantly lower yield than check variety, Renville, at a probability of <0.05

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

Cultivar	1995	1996	1997	1998	1999	Ave	as % of Renville
Mountrail	--	--	--	33.7	61.2	47.5	102.3
AC Morse	--	--	--	35.8	58.7	47.3	101.8
Kyle	28.6	15.5	31.7	33.0	54.7	32.7	100.1
Renville	35.4	13.8	21.3	34.7	58.1	32.7	100.0
Plaza	--	--	--	36.1	55.4	45.8	98.6
Maier	--	--	--	34.2	57.2	45.7	98.5
Utopia	--	--	--	--	57.2	57.2	98.5
Ben	--	14.6	23.0	33.4	54.6	31.4	98.2
Sceptre	36.1	--	--	--	55.2	45.7	97.6
Plenty	30.2	13.7	25.7	33.0	56.5	31.8	97.4
Crosby	37.4	13.0	--	--	53.7	34.7	97.0
AC Melita	--	--	--	34.2	53.7	44.0	94.7
Laker	31.5	15.1	23.4	--	51.7	30.4	94.6
Voss	33.4	13.1	22.2	33.0	52.0	30.7	94.1
Lloyd	33.2	13.5	20.4	30.1	56.2	30.7	93.9
Vic	35.8	12.6	25.4	30.6	48.4	30.6	93.6
Kari	--	--	--	31.4	54.9	43.2	93.0
Munich	32.3	13.8	21.6	32.8	50.4	30.2	92.4
Ward	28.9	14.5	22.5	--	52.5	29.6	92.1
Medora	29.7	13.5	24.6	--	49.9	29.4	91.5
Monroe	34.3	14.2	15.7	33.9	48.2	29.3	89.6
Lebsock	--	--	--	--	51.4	51.4	88.5
Belzer	--	--	--	29.2	49.7	39.5	85.0
Command	--	--	--	--	49.0	49.0	84.3

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 8. Relative test weights of durum varieties as compared to Renville when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	1995	1996	1997	1998	1999	Ave	as % of Renville
Command	--	--	--	--	60.2	60.2	103.1
Lebsock	--	--	--	--	59.5	59.5	101.9
Laker	61.7	61.2	59.3	--	59.0	60.3	100.8
Ward	60.5	60.8	60.2	--	58.8	60.1	100.4
Voss	62.3	61.5	60.0	58.7	58.3	60.2	100.4
Medora	61.5	61.1	59.1	--	58.5	60.1	100.4
Ben	--	61.7	59.9	59.2	58.2	59.8	100.3
Renville	61.3	60.0	59.6	60.3	58.4	59.9	100.0
Maier	--	--	--	59.2	59.3	59.3	99.8
Vic	61.2	59.4	59.2	60.2	58.6	59.7	99.7
Munich	61.2	59.7	59.7	58.3	58.5	59.5	99.3
Monroe	60.3	59.7	59.9	58.8	58.7	59.5	99.3
Kyle	61.0	60.6	58.7	59.0	57.9	59.4	99.2
Crosby	61.2	58.7	--	--	58.1	59.3	99.1
Plenty	61.2	59.7	58.3	58.8	58.1	59.2	98.8
Utopia	--	--	--	--	57.5	57.5	98.5
Kari	--	--	--	58.3	58.5	58.4	98.4
Lloyd	62.0	59.7	59.4	57.2	56.5	59.0	98.4
Sceptre	60.7	--	--	--	57.0	58.9	98.3
AC Morse	--	--	--	58.8	57.8	58.3	98.2
AC Melita	--	--	--	58.2	58.2	58.2	98.1
Plaza	--	--	--	57.7	58.3	58.0	97.7
Mountrail	--	--	--	58.0	57.7	57.9	97.5
Belzer	--	--	--	56.8	56.1	56.5	95.1

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

Cultivar	1995	1996	1997	1998	1999	Ave	as % of Renville
Kyle	31.0	24.0	21.0	35.0	38.0	29.8	108.0
Plenty	27.0	28.0	19.0	34.0	38.0	29.2	105.8
Vic	28.0	26.0	21.0	32.0	36.0	28.6	103.6
Renville	28.0	24.0	17.0	33.0	36.0	27.6	100.0
Medora	28.0	25.0	18.0	--	34.0	26.3	100.0
Ward	27.0	24.0	17.0	--	36.0	26.0	99.0
Belzer	--	--	--	31.0	36.0	33.5	97.1
Mountrail	--	--	--	30.0	36.0	33.0	95.7
Ben	--	23.0	17.0	30.0	35.0	26.3	95.5
Monroe	26.0	24.0	17.0	31.0	33.0	26.2	94.9
AC Melita	--	--	--	31.0	33.0	32.0	92.8
Laker	26.0	23.0	16.0	--	30.0	23.8	90.5
Kari	--	--	--	29.0	33.0	31.0	89.9
Lebsock	--	--	--	--	32.0	32.0	88.9
Sceptre	24.0	--	--	--	32.0	28.0	87.5
Maier	--	--	--	29.0	31.0	30.0	87.0
Crosby	22.0	19.0	--	--	35.0	25.3	86.4
Munich	25.0	21.0	14.0	28.0	28.0	23.2	84.1
AC Morse	--	--	--	28.0	29.0	28.5	82.6
Voss	24.0	20.0	15.0	25.0	25.0	21.8	79.0
Lloyd	22.0	19.0	16.0	24.0	27.0	21.6	78.3
Plaza	--	--	--	27.0	27.0	27.0	78.3
Command	--	--	--	--	25.0	25.0	69.4
Utopia	--	--	--	--	24.0	24.0	66.7

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 Renville when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	1995	1996	1997	1998	1999	Ave	as % of Renville
Maier	--	--	--	16.4	15.5	16.0	104.2
Kyle	19.5	19.7	15.0	15.7	15.6	17.1	103.3
Kari	--	--	--	16.2	14.9	15.6	101.6
Belzer	--	--	--	15.8	15.0	15.4	100.7
AC Melita	--	--	--	15.6	15.2	15.4	100.7
Lebsock	--	--	--	--	15.5	15.5	100.6
AC Morse	--	--	--	15.5	15.2	15.4	100.3
Renville	17.1	19.7	15.4	15.2	15.4	16.6	100.0
Ben	--	19.1	15.2	16.0	15.4	16.4	100.0
Munich	16.5	19.5	15.2	15.8	15.6	16.5	99.8
Mountrail	--	--	--	15.6	14.8	15.2	99.3
Plenty	17.1	18.8	15.3	15.7	15.3	16.4	99.3
Medora	16.8	19.5	15.2	--	15.4	16.7	99.0
Vic	16.6	19.7	15.1	15.2	15.3	16.4	98.9
Sceptre	16.7	--	--	--	15.0	15.9	97.5
Monroe	16.2	17.8	15.5	15.5	15.5	16.1	97.2
Ward	17.2	18.4	14.6	--	15.5	16.4	97.2
Plaza	--	--	--	15.5	14.2	14.9	97.1
Lloyd	15.3	18.8	15.2	15.5	14.1	15.8	95.3
Crosby	14.7	19.0	--	--	15.9	16.5	95.0
Voss	15.8	18.3	14.6	15.2	14.2	15.6	94.3
Command	--	--	--	--	14.1	14.1	91.6
Laker	15.2	18.2	13.9	--	13.4	15.2	89.8
Utopia	--	--	--	--	13.8	13.8	89.6

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.
Planting date: 16 April 1999 Harvest date: 29 July 1999

Variety	Days to heading [1]	Height, inches	Protein content	Test wt, lb/bu	Yield bu/acre[2]	
Valier	69	31	11.8	48.9	97.9	a
MTLB 13	68	28	11.7	48.2	97.5	a
Hector	66	29	11.7	49.3	97.1	a
MT960228	68	30	11.3	48.1	94.1	a
Harrington	68	29	11.7	46.4	93.3	a
Lewis	66	28	11.8	49.8	93.0	
MT920073	66	30	11.4	49.3	92.8	
MTLB 5	69	30	11.5	49.9	92.0	
Chinook	67	32	12.2	48.6	89.6	
MTLB 6	67	29	11.8	50.0	89.5	
Xena	69	29	10.8	48.0	88.7	
Baronesse	69	28	12.0	48.8	87.3	
MT950186	66	28	10.9	50.8	87.1	
Gallatin	67	31	11.8	48.7	85.2	
Bowman	62	29	11.7	49.0	81.9	
Stark	63	31	11.9	48.5	73.9	x
mean	67.0	29.4	11.6	48.9	90.1	
probability	>0.01	NS	>0.01	>0.01	>0.01	
CV (S/mean)	0.5	5.8	3.3	1.1	5.3	
$LSD_{0.05}$	1.4	NS	0.6	0.9	8.0	

Check variety is Gallatin with an average yield of 85.2 bu/acre.

[1] Heading date is number of days from planting
[2] a indicates significantly greater yield than check variety, Gallatin, at a probability of <0.05
x indicates significantly lower yield than check variety, Gallatin, at a probability of <0.05

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

Cultivar	1995	1996	1997	1998	1999	Ave	as % of Gallatin
MTLB 13	--	--	--	--	97.5	97.5	114.4
MT960228	--	--	--	--	94.1	94.1	110.4
MT920073	--	--	--	61.7	92.8	77.3	106.9
Valier	--	--	--	53.7	97.9	75.8	104.9
Xena	--	--	--	--	88.7	88.7	104.1
Hector	57.7	18.8	44.0	58.4	97.1	55.2	102.3
MTLB 5	--	--	--	54.9	92.0	73.5	101.7
MTLB 6	--	--	--	55.7	89.5	72.6	100.5
Gallatin	62.9	15.9	46.4	59.3	85.2	53.9	100.0
Lewis	59.9	16.4	42.3	58.1	93.0	53.9	100.0
Chinook	57.5	17.2	39.9	62.8	89.6	53.4	99.0
Harrington	57.2	15.8	45.0	52.6	93.3	52.8	97.8
Baronesse	55.0	18.5	48.1	49.7	87.3	51.7	95.9
Bowman	57.9	23.2	39.0	53.5	81.9	51.1	94.7
Stark	61.0	19.6	38.1	55.8	73.9	49.7	92.1
MT950186	--	--	--	--	50.8	50.8	59.6

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

Cultivar	1995	1996	1997	1998	1999	Ave	as % of Gallatin
MT950186	--	--	--	--	50.8	50.8	104.3
MTLB 6	--	--	--	51.5	50.0	50.8	102.6
MTLB 5	--	--	--	51.3	49.9	50.6	102.3
Bowman	50.5	49.8	50.0	50.5	49.0	50.0	101.7
Stark	50.2	48.1	50.5	51.8	48.5	49.8	101.4
Lewis	50.2	48.2	50.0	50.8	49.8	49.8	101.3
MT920073	--	--	--	50.3	49.3	49.8	100.7
Valier	--	--	--	50.5	48.9	49.7	100.5
Gallatin	50.3	46.2	50.3	50.2	48.7	49.1	100.0
Hector	50.0	46.5	50.2	49.7	49.3	49.1	100.0
Baronesse	49.3	47.4	49.5	48.7	48.8	48.7	99.2
MTLB 13	--	--	--	--	48.2	48.2	99.0
MT960228	--	--	--	--	48.1	48.1	98.8
Chinook	50.0	47.1	48.3	48.5	48.6	48.5	98.7
Xena	--	--	--	--	48.0	48.0	98.6
Harrington	49.2	46.2	47.5	46.2	46.4	47.1	95.8

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

Cultivar	1995	1996	1997	1998	1999	Ave	as % of Gallatin
Gallatin	22.0	19.0	18.0	28.0	31.0	23.6	100.0
Hector	20.0	20.0	19.0	29.0	29.0	23.4	99.2
Stark	20.0	19.0	17.0	30.0	31.0	23.4	99.2
MT960228	--	--	--	--	30.0	30.0	96.8
Valier	--	--	--	26.0	31.0	28.5	96.6
Chinook	19.0	17.0	17.0	27.0	32.0	22.4	94.9
MT920073	--	--	--	26.0	30.0	28.0	94.9
Bowman	19.0	19.0	17.0	27.0	29.0	22.2	94.1
Xena	--	--	--	--	29.0	29.0	93.5
MTLB 6	--	--	--	26.0	29.0	27.5	93.2
MTLB 5	--	--	--	25.0	30.0	27.5	93.2
Lewis	17.0	18.0	19.0	27.0	28.0	21.8	92.4
Harrington	19.0	18.0	18.0	25.0	29.0	21.8	92.4
MTLB 13	--	--	--	--	28.0	28.0	90.3
MT950186	--	--	--	--	28.0	28.0	90.3
Baronesse	17.0	17.0	18.0	23.0	28.0	20.6	87.3

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 Gallatin when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	1995	1996	1997	1998	1999	Ave	as % of Gallatin
MTLB 6	--	--	--	11.5	11.8	11.7	105.4
Chinook	12.9	15.3	12.7	11.3	12.2	12.9	103.2
Baronesse	13.6	15.4	12.3	11.0	12.0	12.9	103.0
Valier	--	--	--	10.9	11.8	11.4	102.7
Lewis	12.8	14.9	12.9	11.1	11.8	12.7	101.8
MT920073	--	--	--	11.0	11.4	11.2	101.4
Hector	13.0	14.8	12.3	11.3	11.7	12.6	101.1
Harrington	13.0	15.1	12.5	10.8	11.7	12.6	101.1
MTLB 5	--	--	--	10.8	11.5	11.2	100.9
Gallatin	12.7	15.1	12.5	10.3	11.8	12.5	100.0
MTLB 13	--	--	--	--	11.7	11.7	99.2
Bowman	12.6	12.9	12.5	11.3	11.7	12.2	97.8
Stark	12.4	13.1	12.4	10.4	11.9	12.0	96.5
MT960228	--	--	--	--	11.3	11.3	95.8
MT950186	--	--	--	--	10.9	10.9	92.4
Xena	--	--	--	--	10.8	10.8	91.5

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 16. Agronomic data obtained from a dryland recrop oat yield trial conducted at the Eastern Agricultural Research Center, Sidney, MT, 1995.
Planting date: 21 April 1998 Harvest date: 31 July 1998

Variety	Days to heading [1]	Height, inches	Protein content	Test wt, lb/bu	Yield bu/acre[2]	
ABSP9-2	68	32	11.8	38.5	136.2	a
Monida	70	35	12.2	36.0	136.2	a
Prairie	65	31	11.4	35.0	132.8	
Whitestone	69	33	11.6	36.8	132.7	
ABSP19-9	70	31	12.5	36.5	129.6	
Rio Grande	67	29	13.0	36.0	128.7	
Celsia	70	34	11.1	35.8	128.0	
87AB5125	69	29	11.1	37.7	128.0	
Otana	68	38	11.7	38.5	127.2	
ND860416	68	34	12.5	37.7	127.0	
90AB1322	68	27	12.8	36.5	124.9	
Powell	70	28	12.6	34.0	123.4	
Ajay	69	25	12.8	35.3	112.8	x
88AB3073	70	31	15.0	43.3	85.2	x
86AB1616	71	31	14.3	38.5	81.2	x
Paul	70	38	15.1	43.2	73.2	x
mean	68.9	31.6	12.6	37.5	119.2	
probability	<0.001	<0.001	<0.01	<0.001	<0.001	
CV (S/mean)	0.3	4.8	8.8	2.1	4.0	
$LSD_{0.05}$	1.0	2.6	1.8	1.3	7.9	

Check variety is Otana with an average yield of 127.2 bu/acre.

[1] Heading date is number of days from planting
[2] a indicates significantly greater yield than check variety, Otana, at a probability of <0.05
x indicates significantly lower yield than check variety, Otana, at a probability of <0.05

Table 17. Relative yields of oat varieties compared to Otana when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	1995	1996	1997	1998	1999	Ave	as % of Otana
Monida	91.6	37.2	93.5	95.9	136.2	90.9	102.0
ABSP19-9	--	--	--	--	129.6	129.6	101.9
Otana	86.7	44.3	83.5	103.8	127.2	89.1	100.0
Whitestone	91.3	31.5	87.5	97.7	132.7	88.1	98.9
87AB5125	--	--	88.8	91.0	128.0	102.6	97.9
ABSP 9-2	--	--	74.9	93.4	136.2	101.5	96.8
Celcia	--	--	92.7	81.9	128.0	100.9	96.2
Prairie	--	--	74.2	94.2	132.8	100.4	95.8
Rio Grande	80.6	41.0	72.5	102.9	128.7	85.1	95.6
ND860416	--	29.8	85.1	98.1	127.0	85.0	94.8
Powell	82.1	41.8	77.7	88.1	123.4	82.6	92.7
90AB1322	88.4	30.3	83.6	85.6	124.9	82.6	92.7
Ajay	80.1	38.5	70.4	82.0	112.8	76.8	86.2
Paul	48.0	23.2	--	--	73.2	48.1	55.9

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 18. Relative test weights of oat varieties as compared to Otana when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	1995	1996	1997	1998	1999	Ave	as % of Otana
Paul	45.3	43.7	--	--	43.2	44.1	119.2
Otana	38.8	33.6	32.8	33.0	38.5	35.3	100.0
ABSP 9-2	--	--	31.5	31.3	38.5	33.8	97.1
ND860416	--	31.3	32.5	31.2	37.7	33.2	96.2
ABSP19-9	--	--	--	--	36.5	36.5	94.8
87AB5125	--	--	30.7	29.8	37.7	32.7	94.2
Ajay	38.3	31.3	31.0	30.0	35.3	33.2	93.9
Whitestone	37.0	29.8	31.5	30.3	36.8	33.1	93.6
Rio Grande	38.3	29.5	30.8	30.5	36.0	33.0	93.4
Monida	38.5	30.2	31.8	28.2	36.0	32.9	93.2
90AB1322	39.5	28.4	29.7	28.5	36.5	32.5	92.0
Prairie	--	--	30.2	30.0	35.0	31.7	91.3
Celcia	--	--	29.5	29.7	35.8	31.7	91.1
Powell	37.0	27.1	29.7	28.0	34.0	31.2	88.2

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 19. Relative heights of oat varieties as compared to Otana when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	1995	1996	1997	1998	1999	Ave	as % of Otana
Otana	30.0	27.0	27.0	35.0	38.0	31.4	100.0
ND860416	--	24.0	28.0	34.0	34.0	30.0	94.5
Celcia	--	--	28.0	31.0	34.0	31.0	93.0
Paul	28.0	22.0	--	--	38.0	29.3	92.6
Monida	26.0	20.0	27.0	32.0	35.0	28.0	89.2
Prairie	--	--	24.0	29.0	31.0	28.0	84.0
Whitestone	24.0	21.0	23.0	28.0	33.0	25.8	82.2
ABSP 9-2	--	--	23.0	28.0	31.0	27.3	82.0
ABSP19-9	--	--	--	--	31.0	31.0	81.6
Rio Grande	23.0	20.0	20.0	29.0	29.0	24.2	77.1
87AB5125	--	--	22.0	25.0	28.0	25.0	75.0
Powell	22.0	18.0	20.0	27.0	28.0	23.0	73.2
90AB1322	20.0	18.0	21.0	25.0	27.0	22.2	70.7
Ajay	18.0	14.0	19.0	23.0	25.0	19.8	63.1

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 20. Relative protein contents of oat varieties as compared to Otana when grown under dryland continuous cropping at the EARC, Sidney, Montana.

Cultivar	1995	1996	1997	1998	1999	Ave	as % of Otana
Paul	17.6	16.7	--	--	15.1	16.5	146.2
Ajay	13.8	10.7	13.6	12.4	12.8	12.7	109.9
ABSP19-9	--	--	--	--	12.5	12.5	106.8
Rio Grande	13.0	10.9	13.2	11.2	13.0	12.3	106.4
90AB1322	12.8	10.3	12.4	11.4	12.8	11.9	103.6
Powell	12.0	10.5	12.7	11.4	12.6	11.8	102.8
ND860416	--	9.6	12.3	11.0	12.5	11.4	101.3
Otana	12.8	9.3	12.7	11.1	11.7	11.5	100.0
Monida	12.6	9.4	11.7	11.1	12.2	11.4	99.0
ABSP 9-2	--	--	11.8	11.3	11.8	11.6	98.3
Prairie	--	--	12.9	10.6	11.4	11.6	98.3
Whitestone	12.3	9.9	11.7	10.8	11.6	11.3	97.7
87AB5125	--	--	12.1	11.2	11.1	11.5	96.9
Celcia	--	--	11.6	11.0	11.1	11.2	94.9

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