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

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

RESULTS:

Spring wheat

Twenty-one varieties of spring wheat were tested under dryland recrop conditions (Table 1). Soft white wheats Owens and Penewawa yielded the most. The highest yielding hard red spring wheat was McNeal. Average yield was 31.8 bu/acre. Relative yields, test weights, plant heights, and protein contents over five years are shown in Tables 2 through 5.

Durum

Thirteen durum varieties were tested under dryland recrop conditions (Table 6).. Canadian varieties Plenty and Kyle yielded the most. Average yield was 30.9 bu/acre. Relative yields, test weights, plant heights, and protein contents over five years are shown in Tables 7 through 10.

Barley

Eighteen barley varieties and lines were tested under dryland recrop conditions (Table 11). The highest yielding was Montana line MT851195 followed by Stark. The average yield was 37.1 bu/acre. Relative yields, test weights, plant heights, and protein contents over five years are shown in Tables 12 through 15.

Oats

Twenty-one varieties of oats were tested under dryland recrop conditions (Table 16). Idaho line 90AB1322 yielded the most, followed by Rio Grande. Average grain yield was 64.7 bu/acre. Relative yields, test weights, plant heights, and protein contents over five years 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 nursery plots, and safflower. Bromoxynil at a rate of 1 pt/acre with 2,4-D at a rate of .5 pt/acre is used for broadleaf weed control in the spring wheat 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 nursery plots. However, volunteer small grain has been a problem in nursery plots, and was a problem in 1994.

Soil tests in the fall of 1993 indicated little residual soil N in the top two feet of soil, although large amounts of N were detected at three and four feet. Fertilizer N was applied on 10 November 1993 in the form of 28-0-0 (liquid) at a rate of 30 lb N/acre, so that sufficient N would be available for the seedling plants. The small grain plots were planted on 12 April 1994. Soil moisture was good at planting, and above normal precipitation fell in May and June. July was dry and warm. These conditions resulted in sufficient moisture during the growing season with good conditions during grain fill and harvest.

FUTURE PLANS

New varieties will continue to be tested under continuous cropping conditions to identify those which will perform best under these conditions.

Table 1 Agronomic data obtained from a dryland recrop spring wheat yield trial conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1994.

Date Seeded: April 12, 1994 Date Harvested: August 2, 1994 Plot Size: 60 Sq. Ft.[1/]

Variety	Average Days to Heading[2/]	Average Height Inches	Average Protein Content %	Average Test Wt. Lbs/Bu	Average Yield Bu/Acre
Penawawa	64	25	12.2	59.3	38.3 aa
Owens	65	26	12.2	58.3	36.4 aa
McNeal	68	28	13.6	58.5	36.3 aa
Kulm	62	28	15.6	60.7	36.1 aa
Rambo	68	26	13.1	60.3	33.4
Lew	69	31	14.1	58.3	33.2
Westbred 926	61	25	13.7	59.2	33.1
Hi-Line	65	27	14.2	60.3	32.7
ND 677	66	31	14.7	60.5	32.3
Newana	69	25	12.8	58.8	31.7
Glenman	67	28	13.1	58.2	31.5
Grandin	65	26	14.8	58.2	31.2
Stoa	66	29	14.5	58.8	31.1
Pondera	65	28	13.6	60.0	30.9
Klasic	60	19	14.0	61.5	30.4
Cutless	67	28	14.6	59.5	29.9
Len	67	27	13.9	59.0	29.1
Lancer	67	31	14.6	59.5	29.0
Amidon	67	30	14.2	58.3	28.3 x
Fortuna	66	30	13.7	60.0	28.2 x
Border	63	25	14.5	59.2	25.4 xx
Mean	66	27	13.9	59.4	31.8
F-Value	16.30	14.32	7.62	3.50	7.79
SE of the mean	0.59	0.74	0.31	0.50	1.13
LSD (0.05)	1.68	2.12	0.89	1.44	3.22
LSD (0.01)	--	--	--	--	4.31
CV (SE/Mean)	0.90	2.72	2.24	0.85	3.54
CV (s/Mean)	1.56	4.71	3.87	1.47	6.13

(Continued)

Table 1 (Continued) Agronomic data obtained from a dryland recrop spring wheat yield trial conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1994.

1/ 3 row plots, rows 20 ft. long and 1.0 ft. apart. At harvest the entire plot was taken for yield, test weight, and protein determinations.

2/ Heading date is the number of days from planting date.

Newana is the check variety with an average yield of 31.7 Bu/Acre.

aa Indicates a significantly greater yield than check Newana at the 0.01 level of significance.
x Indicates a significantly lower yield than check Newana at the 0.05 level of significance.
xx Indicates a significantly lower yield than check Newana at the 0.01 level of significance.

Previous crop: Barley Soil type: Williams Loam

Residual soil P: 53 lbs/acre to 6 inches.

Residual soil N: 0 - 1 ft. 6 lbs/a. 2 - 3 ft. 111 lbs/a.
1 - 2 ft. 5 lbs/a. 3 - 4 ft. 241 lbs/a.

Fertilizer: 30 lbs/a of N as 28-0-0 liquid nitrogen was applied on November 10, 1993.

Insecticide: None

Herbicide: .25 oz/a Harmony was applied June 6, 1994.

Depth of Moisture at planting time: 24 inches

Precipitation for average crop year = 13.61 inches. Precipitation for 1994 crop year = 12.10 in. Crop year considered to be from October 1, 1993 through September 30, 1994.

Precipitation for April 1 - August 31 period during 1994 = 8.98 inches. Average precipitation for same period = 9.39 inches.

Table 2. Relative yielding abilities of spring wheat varieties as compared to Newana when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Newana
McNeal	3	--	--	93.6	38.2	36.3	56.0	119.1
Kulm	1	--	--	--	--	36.1	36.1	113.9
Lew	5	22.9	17.7	84.3	30.0	33.2	37.6	106.9
Westbred Rambo	5	21.6	18.4	86.6	28.0	33.4	37.6	106.8
Glenman	5	24.4	18.5	85.6	27.6	31.5	37.5	106.6
Grandin	5	21.3	18.4	80.7	29.1	31.2	36.1	102.7
Amidon	5	24.6	16.6	77.6	33.6	28.3	36.1	102.7
Stoa	5	22.1	18.1	81.1	27.9	31.1	36.1	102.4
ND 677	1	--	--	--	--	32.3	32.3	101.9
Hi-Line	5	21.2	17.3	75.2	30.8	32.7	35.4	100.7
Gus	4	18.7	16.8	80.7	28.2	--	36.1	100.1
Newana	5	17.7	17.1	79.2	30.3	31.7	35.2	100.0
Len	5	23.4	19.2	75.8	27.3	29.1	35.0	99.3
Pondera	5	25.8	16.3	64.8	33.6	30.9	34.3	97.4
Lancer	5	21.7	17.5	71.0	26.9	29.0	33.2	94.4
Westbred 926	5	22.5	14.5	71.5	24.2	33.1	33.2	94.2
Olaf	4	22.9	15.6	74.5	22.7	--	33.9	94.0
Cutless	5	21.9	15.1	68.0	24.0	29.9	31.8	90.3
Klasic	3	--	--	66.8	25.1	30.4	40.8	86.6
Border	1	--	--	--	--	25.4	25.4	80.1
Fortuna	5	23.7	18.0	49.8	20.2	28.2	28.0	79.5

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, Newana.

Table 3. Relative test weights of spring wheat varieties as compared to Newana when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Newana
Kulm	1	--	--	--	--	60.7	60.7	103.2
ND 677	1	--	--	--	--	60.5	60.5	102.9
Pondera	5	59.9	59.3	63.3	56.2	60.0	59.7	101.6
Klasic	3	--	--	63.2	54.3	61.5	59.7	101.4
Hi-Line	5	58.3	58.9	63.5	56.5	60.3	59.5	101.2
Westbred Rambo	5	59.9	59.4	62.3	54.5	60.3	59.3	100.8
Border	1	--	--	--	--	59.2	59.2	100.7
Grandin	5	57.7	59.7	63.3	56.0	58.2	59.0	100.3
Lew	5	59.9	57.8	63.2	55.3	58.3	58.9	100.2
Cutless	5	59.6	59.1	62.8	53.5	59.5	58.9	100.2
Lancer	5	59.0	57.7	62.7	55.3	59.5	58.8	100.1
Newana	5	58.6	58.9	63.0	54.7	58.8	58.8	100.0
McNeal	3	--	--	61.5	56.5	58.5	58.8	100.0
Westbred 926	5	58.8	59.0	62.8	54.0	59.2	58.8	99.9
Olaf	4	58.6	59.1	62.0	54.7	--	58.6	99.7
Len	5	58.0	58.4	62.8	54.0	59.0	58.4	99.4
Gus	4	58.6	58.8	62.2	53.5	--	58.3	99.1
Stoa	5	58.9	58.0	62.3	53.2	58.8	58.2	99.0
Fortuna	5	59.3	58.3	60.5	52.8	60.0	58.2	98.9
Amidon	5	59.0	57.1	60.5	53.7	58.3	57.7	98.2
Glenman	5	59.0	57.4	61.7	50.7	58.2	57.4	97.6

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, Newana.

Table 4 . Relative heights of spring wheat varieties as compared to Newana when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Newana
ND 677	1	--	--	--	--	31	31.0	124.0
Lancer	5	25	29	35	29	31	29.8	119.2
Lew	5	24	25	33	29	31	28.4	113.6
Fortuna	5	24	23	34	30	30	28.2	112.8
Amidon	5	24	25	33	28	30	28.0	112.0
Kulm	1	--	--	--	--	28	28.0	112.0
Stoa	5	23	26	31	29	29	27.6	110.4
McNeal	3	--	--	30	28	28	28.7	108.9
Grandin	5	26	24	31	28	26	27.0	108.0
Glenman	5	23	24	31	28	28	26.8	107.2
Len	5	24	24	30	27	27	26.4	105.6
Pondera	5	24	23	29	27	28	26.2	104.8
Cutless	5	24	21	30	27	28	26.0	104.0
Olaf	4	22	25	30	27	--	26.0	104.0
Newana	5	24	22	29	25	25	25.0	100.0
Hi-Line	5	21	24	28	25	27	25.0	100.0
Westbred Rambo	5	22	22	30	25	26	25.0	100.0
Border	1	--	--	--	--	25	25.0	100.0
Westbred 926	5	21	24	27	25	25	24.4	97.6
Gus	4	20	22	29	26	--	24.2	97.0
Klasic	3	--	--	21	24	19	21.3	81.0

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, Newana.

Table 5 . Relative protein contents of spring wheat varieties as compared to Newana when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Newana
Kulm	1	--	--	--	--	15.6	15.6	121.9
ND 677	1	--	--	--	--	14.7	14.7	114.8
Border	1	--	--	--	--	14.5	14.5	113.3
Lancer	5	17.3	18.2	16.8	17.8	14.6	16.9	110.6
Gus	4	17.8	17.8	16.5	18.1	--	17.6	110.0
Cutless	5	17.2	17.9	16.5	17.8	14.6	16.8	109.7
Stoa	5	17.4	17.5	16.0	17.3	14.5	16.5	108.0
Grandin	5	17.7	17.0	16.2	16.9	14.8	16.5	107.8
Hi-Line	5	17.6	18.1	15.9	16.7	14.2	16.5	107.7
McNeal	3	--	--	15.2	16.7	13.6	15.2	107.1
Olaf	4	17.2	17.7	15.9	16.9	--	16.9	106.1
Westbred 926	5	18.0	17.7	15.2	16.6	13.7	16.2	106.0
Lew	5	17.0	17.5	15.4	17.2	14.1	16.2	106.0
Klasic	3	--	--	14.5	16.5	14.0	15.0	105.9
Fortuna	5	16.1	17.4	17.3	16.5	13.7	16.2	105.7
Len	5	16.9	17.4	15.6	17.1	13.8	16.2	105.5
Pondera	5	17.4	18.2	14.7	16.8	13.6	16.1	105.4
Amidon	5	16.4	17.3	15.4	16.6	14.2	16.0	104.3
Westbred Rambo	5	16.7	17.5	14.5	16.1	13.1	15.6	101.7
Glenman	5	16.5	17.3	13.7	16.3	13.1	15.4	100.4
Newana	5	16.4	17.7	14.0	15.7	12.8	15.3	100.0

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, Newana.

Table 6 Agronomic data obtained from a dryland recrop durum wheat yield trial conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1994.

Date Seeded: April 12, 1994 Date Harvested: August 2, 1994 Plot Size: 60 Sq. Ft.1/

Variety	Average Days to Heading2/	Average Height Inches	Average Protein Content %	Average Test Wt. Lbs/Bu	Average Yield Bu/Acre
Plenty	65	32	15.5	58.3	36.0 aa
Kyle	68	35	15.2	58.5	35.1 aa
Medora	66	31	15.0	60.3	32.7
Cando	67	26	15.1	60.3	32.6
Vic	64	30	15.8	59.5	31.9
Ward	63	29	15.8	60.2	31.3
Renville	67	31	14.9	57.8	31.0
Stockholm	69	25	14.2	60.0	30.6
Crosby	65	30	15.4	57.3	30.4
Sceptre	69	29	14.7	56.7	29.2
Monroe	63	27	14.8	58.8	28.9
Laker	70	29	13.8	57.5	28.3 x
Lloyd	70	25	15.0	54.3	23.1 xx
Mean	67	29	15.0	58.4	30.9
F-Value	16.19	10.77	4.67	20.00	13.38
SE of the mean	0.61	0.88	0.27	0.39	0.89
LSD (0.05)	1.79	2.56	0.80	1.14	2.59
LSD (0.01)	--	--	--	--	3.51
CV (SE/Mean)	0.92	3.01	1.82	0.67	2.88
CV (s/Mean)	1.59	5.22	3.16	1.15	4.98

(Continued)

Table 6 (Continued) Agronomic data obtained from a dryland recrop durum wheat yield trial conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1994.

1/ 3 row plots, rows 20 ft. long and 1.0 ft. apart. At harvest the entire plot was taken for yield, test weight, and protein determinations.

2/ Heading date is the number of days from planting date.

Ward is the check variety with an average yield of 31.3 Bu/Acre.

aa Indicates a significantly greater yield than check Ward at the 0.01 level of significance.
x Indicates a significantly lower yield than check Ward at the 0.05 level of significance.
xx Indicates a significantly lower yield than check Ward at the 0.01 level of significance.

Previous crop: Barley Soil type: Williams Loam

Residual soil P: 53 lbs/acre to 6 inches.

Residual soil N: 0 - 1 ft. 6 lbs/a. 2 - 3 ft. 111 lbs/a.
1 - 2 ft. 5 lbs/a. 3 - 4 ft. 241 lbs/a.

Fertilizer: 30 lbs/a of N as 28-0-0 liquid nitrogen was applied on November 10, 1993.

Insecticide: None

Herbicide: .25 oz/a Harmony was applied June 6, 1994.

Depth of Moisture at planting time: 24 inches

Precipitation for average crop year = 13.61 inches. Precipitation for 1994 crop year = 12.10 in. Crop year considered to be from October 1, 1993 through September 30, 1994.

Precipitation for April 1 - August 31 period during 1994 = 8.98 inches. Average precipitation for same period = 9.39 inches.

Table 7. Relative yielding abilities of durum varieties as compared to Ward when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Ward
Plenty	2	--	--	--	27.7	36.0	31.8	117.3
Kyle	1	--	--	--	--	35.1	35.1	112.1
Renville	5	12.1	12.7	92.0	22.1	31.0	34.0	107.7
Sceptre	5	12.0	13.3	86.8	27.4	29.2	33.7	107.0
Stockholm	4	14.3	--	89.4	18.0	30.6	38.1	105.0
Lloyd	5	8.0	11.5	97.2	20.7	23.1	32.1	101.8
Westbred Laker	5	9.4	8.9	93.4	19.0	28.2	31.8	100.8
Ward	5	14.2	12.6	76.6	23.0	31.3	31.5	100.0
Crosby	5	8.3	13.3	80.9	23.3	30.4	31.2	99.0
Medora	5	8.8	13.8	80.1	20.2	32.6	31.1	98.6
Cando	5	4.7	8.9	83.3	25.5	32.6	31.0	98.3
Vic	5	10.8	10.3	79.7	21.9	31.9	30.9	98.0
Monroe	5	11.7	12.7	73.0	24.4	28.9	30.1	95.6

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, Ward.

Table 8. Relative test weights of durum varieties as compared to Ward when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Ward
Cando	5	58.5	58.6	64.5	55.7	60.3	59.5	101.3
Stockholm	4	60.3	--	64.0	54.5	60.0	59.7	101.2
Vic	5	59.9	58.9	62.8	53.8	59.5	59.0	100.3
Westbred Laker	5	61.7	59.8	62.8	52.9	57.5	58.9	100.3
Medora	5	59.2	57.8	63.3	54.1	60.3	58.9	100.3
Renville	5	59.6	59.3	62.5	55.4	57.8	58.9	100.2
Ward	5	58.5	57.9	63.0	54.3	60.2	58.8	100.0
Monroe	5	57.1	57.8	62.8	55.3	58.8	58.4	99.3
Sceptre	5	59.2	57.9	63.2	54.7	56.7	58.3	99.3
Crosby	5	58.7	57.8	63.2	54.2	57.3	58.2	99.1
Plenty	2	--	--	--	54.5	58.3	56.4	98.5
Kyle	1	--	--	--	--	58.5	58.5	97.2
Lloyd	5	59.0	55.9	62.3	53.7	54.3	57.0	97.0

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, Ward.

Table 9. Relative heights of durum varieties as compared to Ward when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Ward
Kyle	1	--	--	--	--	35	35.0	120.7
Plenty	2	--	--	--	29	32	30.5	105.2
Ward	5	23	24	32	29	29	27.4	100.0
Medora	5	21	22	33	30	31	27.4	100.0
Vic	5	22	23	33	29	30	27.4	100.0
Renville	5	22	24	32	29	30	27.4	100.0
Crosby	5	23	22	33	28	30	27.2	99.3
Monroe	5	22	23	31	29	27	26.4	96.4
Westbred Laker	5	21	22	29	27	29	25.6	93.4
Sceptre	5	21	21	29	27	29	25.4	92.7
Stockholm	4	21	--	27	25	25	24.5	86.7
Lloyd	5	20	21	26	25	25	23.4	85.4
Cando	5	19	21	25	24	26	23.0	83.9

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, Ward.

Table 10. Relative protein contents of durum varieties as compared to Ward when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Ward
Renville	5	20.4	21.2	16.2	16.0	14.9	17.7	102.4
Crosby	5	20.4	19.9	16.3	16.6	15.4	17.7	102.3
Medora	5	20.7	20.1	16.4	16.1	15.0	17.7	102.0
Monroe	5	20.5	19.2	16.3	16.6	14.8	17.5	100.9
Ward	5	19.5	19.8	15.5	16.0	15.8	17.3	100.0
Sceptre	5	20.3	20.1	15.3	16.0	14.7	17.3	99.8
Vic	5	19.1	19.7	15.5	15.5	15.8	17.1	98.8
Kyle	1	--	--	--	--	15.5	15.5	98.1
Cando	5	18.9	20.6	14.8	15.2	15.1	16.9	97.7
Plenty	2	--	--	--	15.4	15.5	15.4	97.2
Westbred Laker	5	18.4	19.6	15.0	15.5	13.8	16.5	95.0
Lloyd	5	19.0	20.4	13.2	14.6	15.0	16.4	94.9
Stockholm	4	17.9	--	15.0	15.5	14.2	15.6	93.7

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, Ward.

Table 11 Agronomic data obtained from a dryland recrop spring barley yield trial conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1994.

Date Seeded: April 12, 1994 Date Harvested: July 28, 1994 Plot Size: 60 Sq. Ft.[1/]

Variety	Average Days to Heading[2/]	Average Height Inches	Average Protein Content %	Average Test Wt. Lbs/Bu	Average Yield Bu/Acre
MT851195	67	22	12.2	47.8	44.8 aa
Stark	64	24	11.0	50.2	42.0 a
Hector	69	23	12.6	48.2	41.5
Lewis	69	22	12.5	48.3	40.7
MT886610	67	23	12.5	48.3	39.6
MT889106	62	22	11.8	49.7	39.3
MT890008	71	21	11.9	45.8	39.1
Baronesse	68	20	13.3	48.0	39.0
Bowman	63	22	12.0	49.8	38.8
MT861596	68	22	12.6	49.0	37.5
Gallatin	67	22	12.2	48.0	36.9
Steptoe	60	21	11.4	41.5	36.9
Piroline	66	22	13.3	49.0	36.7
MT860756	68	21	12.2	47.0	35.7
MT140523	68	22	12.6	48.1	35.3
Harrington	70	21	12.5	47.0	31.7 x
Colter	61	21	11.2	42.2	28.9 xx
Medallion	69	20	12.9	42.8	24.1 xx
Mean	67	22	12.3	47.3	37.1
F-Value	34.66	1.61	6.98	47.79	8.23
SE of the mean	0.54	0.76	0.24	0.37	1.71
LSD (0.05)	1.55	NS	0.69	1.07	4.91
LSD (0.01)	--	--	--	--	6.44
CV (SE/Mean)	0.81	3.48	1.96	0.79	4.60
CV (s/Mean)	1.41	6.02	3.39	1.37	7.97

NS indicates no significant difference among varieties at any level.

(Continued)

Table 11 (Continued) Agronomic data obtained from a dryland recrop spring barley yield trial conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1994.

1/ 3 row plots, rows 20 ft. long and 1.0 ft. apart. At harvest the entire plot was taken for yield, test weight, and protein determinations.

2/ Heading date is the number of days from planting date.

Gallatin is the check variety with an average yield of 36.9 Bu/Acre.

aa Indicates a significantly greater yield than check Gallatin at the 0.01 level of significance.
a Indicates a significantly greater yield than check Gallatin at the 0.05 level of significance.
x Indicates a significantly lower yield than check Gallatin at the 0.05 level of significance.
xx Indicates a significantly lower yield than check Gallatin at the 0.01 level of significance.

Previous crop: Barley Soil type: Williams Loam

Residual soil P: 53 lbs/acre to 6 inches.

Residual soil N: 0 - 1 ft. 6 lbs/a. 2 - 3 ft. 111 lbs/a.
1 - 2 ft. 5 lbs/a. 3 - 4 ft. 241 lbs/a.

Fertilizer: 30 lbs/a of N as 28-0-0 liquid nitrogen was applied on November 10, 1993.

Insecticide: None

Herbicide: .25 oz/a Harmony was applied June 6, 1994.

Depth of Moisture at planting time: 24 inches

Precipitation for average crop year = 13.61 inches. Precipitation for 1994 crop year = 12.10 in. Crop year considered to be from October 1, 1993 through September 30, 1994.

Precipitation for April 1 - August 31 period during 1994 = 8.98 inches. Average precipitation for same period = 9.39 inches.

Table 12. Relative yielding abilities of barley varieties as compared to Gallatin when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Gallatin
Baronesse	4	--	27.6	87.3	52.6	39.0	51.6	109.5
Lewis	5	26.1	30.5	93.3	41.1	40.7	46.3	108.9
Hector	5	21.6	28.6	89.1	40.0	41.5	44.2	103.8
Gallatin	5	24.3	25.7	86.0	39.9	36.9	42.6	100.0
MT 140523	5	24.4	25.8	86.2	39.8	35.3	42.3	99.4
Piroline	5	22.9	25.2	82.3	42.4	36.7	41.9	98.4
Steptoe	5	22.5	27.3	82.5	36.0	36.9	41.0	96.4
MT 860756	3	--	--	75.4	45.4	35.7	52.3	96.1
Stark	5	22.2	20.2	95.3	23.7	42.0	40.7	95.6
Harrington	5	15.1	20.3	84.5	42.9	31.7	38.9	91.4
Bowman	5	21.4	26.6	81.2	21.7	38.8	37.9	89.1
Colter	2	--	--	--	31.9	28.9	30.4	79.2
Medallion	1	--	--	--	--	24.1	24.1	65.3

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, Gallatin.

Table 13. Relative test weights of barley varieties as compared to Gallatin when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Gallatin
Stark	5	50.2	50.9	53.2	47.0	50.2	50.3	101.9
Lewis	5	49.1	50.4	53.5	47.7	48.3	49.8	100.9
MT 860756	3	--	--	54.3	47.0	47.0	49.4	100.2
Bowman	5	49.0	50.2	52.8	45.7	49.3	49.4	100.1
Hector	5	48.0	51.3	53.0	46.3	48.2	49.4	100.1
Gallatin	5	48.6	50.1	53.3	46.7	48.0	49.3	100.0
Piroline	5	48.2	48.1	53.7	47.5	49.0	49.3	99.9
MT 140523	5	47.7	50.4	53.8	46.3	48.1	49.3	99.8
Baronesse	4	--	47.5	53.5	47.0	48.0	49.0	98.9
Harrington	5	46.9	46.0	52.5	45.7	47.0	47.6	96.5
Steptoe	5	41.9	47.1	48.2	42.8	41.5	44.3	89.8
Medallion	1	--	--	--	--	42.8	42.8	89.2
Colter	2	--	--	--	40.7	42.2	41.4	87.5

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

Table 14. Relative heights of barley varieties as compared to Gallatin when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Gallatin
Hector	5	18	24	28	26	23	23.8	103.5
Stark	5	20	23	27	25	23	23.6	102.6
Piroline	5	17	22	28	28	22	23.4	101.7
Gallatin	5	18	21	28	26	22	23.0	100.0
Bowman	5	19	20	28	24	22	22.6	98.3
Lewis	5	18	22	26	24	22	22.4	97.4
MT 140523	5	18	20	28	24	22	22.4	97.4
Colter	2	--	--	--	25	21	23.0	95.8
Harrington	5	16	22	26	24	21	21.8	94.8
Steptoe	5	18	19	26	25	21	21.8	94.8
MT 860756	3	--	--	26	24	21	23.7	93.4
Medallion	1	--	--	--	--	20	20.0	90.9
Baronesse	4	--	19	24	23	20	21.5	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 heights only to the check variety, Gallatin.

Table 15. Relative protein contents of barley varieties as compared to Gallatin when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Gallatin
Piroline	5	17.0	15.8	13.3	14.8	13.3	14.8	108.0
Medallion	1	--	--	--	--	12.9	12.9	105.7
MT 140523	5	17.6	15.2	12.5	14.0	12.6	14.4	104.7
Harrington	5	17.5	15.2	12.4	13.5	12.5	14.2	103.5
Hector	5	17.1	14.8	12.4	13.6	12.6	14.1	102.6
Bowman	5	17.3	14.2	13.0	13.8	12.0	14.1	102.3
Lewis	5	17.1	14.6	12.3	13.6	12.5	14.0	102.0
Baronesse	4	--	15.5	12.7	13.1	13.3	13.6	101.9
Gallatin	5	15.1	15.1	12.5	13.8	12.2	13.7	100.0
MT 860756	3	--	--	12.6	13.7	12.2	12.8	100.0
Stark	5	16.1	14.4	12.6	13.4	11.0	13.5	98.3
Steptoe	5	15.9	13.3	12.4	12.9	11.4	13.2	95.9
Colter	2	--	--	--	12.3	11.2	11.8	90.4

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

Table 16 Agronomic data obtained from a dryland recrop spring oat yield trial conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1994.

Date Seeded: April 12, 1994 Date Harvested: August 1, 1994 Plot Size: 60 Sq. Ft.[1/]

Variety	Average Days to Heading[2/]	Average Height Inches	Average Protein Content %	Average Test Wt. Lbs/Bu	Average Yield Bu/Acre
90AB1322	66	25	12.5	34.6	78.8
Rio Grande	64	27	12.9	35.8	78.1
Ogle	63	28	12.8	39.7	72.1
Newdak	63	28	13.0	39.1	71.5
Settler	61	29	13.8	42.5	71.2
Troy	65	31	13.9	40.9	69.2
Robert	67	29	12.6	38.6	69.1
Park	66	32	13.7	38.0	66.3
Whitestone	67	30	12.2	40.2	66.1
Monida	68	31	12.6	35.7	64.4
Border	68	28	13.2	35.7	63.3
Otana	67	34	12.9	41.3	62.9
Ajay	65	23	13.4	36.3	62.6
Cayuse	64	27	12.5	36.0	61.6
Riel	66	31	13.6	41.4	60.9
Derby	68	34	12.3	39.5	60.6
Appaloosa	67	27	13.3	34.9	60.2
Rodney	66	33	13.9	39.4	57.2
Valley	66	29	13.5	41.5	57.2
Calibre	68	32	13.0	38.4	55.0
Paul	68	32	15.4	45.5	49.5
Mean	66	30	13.2	38.8	64.7
F-Value	24.12	10.53	5.09	9.79	1.46
SE of the mean	0.40	0.92	0.32	0.91	6.05
LSD (0.05)	1.14	2.62	0.92	2.61	NS
CV (SE/Mean)	0.61	3.11	2.44	2.35	9.36
CV (s/Mean)	1.05	5.39	4.22	4.08	16.21

NS indicates no significant difference among varieties.

(Continued)

Table 16 (Continued) Agronomic data obtained from a dryland recrop spring oat yield trial conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1994.

1/ 3 row plots, rows 20 ft. long and 1.0 ft. apart. At harvest the middle row was taken for yield, test weight, and protein determinations.

2/ Heading date is the number of days from planting date.

Otana is the check variety with an average yield of 62.9 Bu/Acre.

Previous crop: Barley Soil type: Williams Loam

Residual soil P: 53 lbs/acre to 6 inches.

Residual soil N: 0 - 1 ft. 6 lbs/a. 2 - 3 ft. 111 lbs/a.
1 - 2 ft. 5 lbs/a. 3 - 4 ft. 241 lbs/a.

Fertilizer: 30 lbs/a of N as 28-0-0 liquid nitrogen was applied on November 10, 1993.

Insecticide: None

Herbicide: .25 oz/a Harmony was applied June 6, 1994.

Depth of Moisture at planting time: 24 inches

Precipitation for average crop year = 13.61 inches. Precipitation for 1994 crop year = 12.10 in. Crop year considered to be from October 1, 1993 through September 30, 1994.

Precipitation for April 1 - August 31 period during 1994 = 8.98 inches. Average precipitation for same period = 9.39 inches.

Table 17. Relative yielding abilities of oat varieties as compared to Otana when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Otana
Troy	2	--	--	--	109.0	69.2	89.1	111.9
Rio Grande	3	--	--	140.8	124.8	78.1	114.6	110.7
Monida	5	23.2	32.1	159.8	126.0	64.4	81.1	109.7
Cayuse	5	18.3	38.5	142.6	139.8	61.6	80.2	108.4
Appaloosa	5	23.6	31.3	155.6	128.6	60.2	79.9	108.0
Border	5	25.9	32.7	151.0	121.8	63.3	78.9	106.7
Settler	2	--	--	--	98.2	71.2	84.7	106.4
Whitestone	1	--	--	--	--	66.1	66.1	105.1
Newdak	3	--	--	151.0	99.0	71.5	107.2	103.5
Ogle	5	26.9	27.3	140.9	109.2	72.1	75.3	101.8
Ajay	3	--	--	131.6	119.9	62.6	104.7	101.1
Derby	3	--	--	159.0	93.8	60.6	104.5	100.9
Otana	5	27.9	31.3	151.4	96.3	62.9	74.0	100.0
Robert	5	15.1	29.1	146.3	98.6	69.1	71.6	96.9
Riel	5	21.6	30.4	139.7	104.3	60.9	71.4	96.5
Calibre	5	17.0	30.0	165.7	88.6	55.0	71.3	96.3
Valley	4	--	29.9	122.5	110.0	57.2	79.9	93.5
Park	5	17.8	26.6	132.9	95.0	66.3	67.7	91.6
Rodney	2	16.8	--	--	--	57.2	37.0	81.5
Paul	1	--	--	--	--	49.5	49.5	78.7

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, Otana.

Table 18. Relative test weights of oat varieties as compared to Otana when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Otana
Paul	1	--	--	--	--	45.5	45.5	110.2
Settler	2	--	--	--	37.7	42.5	40.1	103.5
Riel	5	35.0	35.7	38.0	35.3	41.4	37.1	100.2
Otana	5	34.0	36.4	37.2	36.2	41.3	37.0	100.0
Troy	2	--	--	--	36.0	40.9	38.4	99.2
Valley	4	--	34.4	38.0	35.3	41.5	37.3	98.7
Whitestone	1	--	--	--	--	40.2	40.2	97.3
Derby	3	--	--	34.5	35.2	39.5	36.4	95.2
Newdak	3	--	--	35.3	34.3	39.1	36.2	94.8
Rodney	2	31.0	--	--	--	39.4	35.2	93.5
Robert	5	29.0	34.4	35.3	35.3	38.6	34.5	93.2
Ogle	5	31.5	34.0	33.3	33.5	39.7	34.4	92.9
Rio Grande	3	--	--	34.2	35.3	35.8	35.1	91.8
Border	5	29.0	30.9	32.2	32.7	35.7	33.7	91.1
Calibre	5	29.5	31.7	35.2	33.2	38.4	33.6	90.8
Monida	5	29.0	30.1	34.5	35.0	35.7	32.9	88.8
Ajay	3	--	--	32.3	33.3	36.3	34.0	88.8
Cayuse	5	28.5	29.8	34.5	34.0	36.0	32.6	88.0
Park	5	28.0	30.4	33.8	31.7	38.0	32.4	87.5
Appaloosa	5	27.5	30.2	33.2	31.8	34.9	31.5	85.1

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, Otana.

Table 19. Relative heights of oat varieties as compared to Otana when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Otana
Otana	5	21	25	38	37	34	31.0	100.0
Derby	3	--	--	36	38	34	36.0	99.1
Calibre	5	20	26	38	37	32	30.6	98.7
Park	5	19	26	37	36	32	30.0	96.8
Rodney	2	20	--	--	--	33	26.5	96.4
Troy	2	--	--	--	36	31	33.5	94.4
Riel	5	19	26	36	34	31	29.2	94.2
Paul	1	--	--	--	--	32	32.0	94.1
Monida	5	19	24	36	35	31	29.0	93.5
Robert	5	19	27	35	34	29	28.8	92.9
Whitestone	1	--	--	--	--	30	30.0	88.2
Cayuse	5	17	26	33	33	27	27.2	87.7
Newdak	3	--	--	32	34	28	31.3	86.2
Border	5	17	22	33	33	28	26.6	85.8
Valley	4	--	24	31	31	29	28.8	85.8
Appaloosa	5	18	23	32	32	27	26.4	85.2
Ogle	5	19	23	30	31	28	26.2	84.5
Settler	2	--	--	--	30	28	29.0	81.7
Rio Grande	3	--	--	28	30	26	28.0	77.1
Ajay	3	--	--	24	26	23	24.3	67.0

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, Otana.

Table 20. Relative protein contents of oat varieties as compared to Otana when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1990-1994 period.

Cultivar	# of Years	1990	1991	1992	1993	1994	Ave	as % of Otana
Paul	1	--	--	--	--	15.4	15.4	119.4
Settler	2	--	--	--	14.5	13.8	14.2	108.4
Park	5	14.4	15.3	13.0	13.6	13.7	14.0	104.3
Ajay	3	--	--	12.9	13.6	13.4	13.3	104.2
Troy	2	--	--	--	13.3	13.9	13.6	104.2
Valley	4	--	14.6	12.7	13.9	13.5	13.7	103.4
Riel	5	14.4	14.6	12.4	14.2	13.6	13.8	103.1
Rodney	2	13.8	--	--	--	13.9	13.8	102.2
Newdak	3	--	--	12.4	13.7	13.0	13.0	102.1
Rio Grande	3	--	--	13.0	12.8	12.9	12.9	101.0
Border	5	14.0	14.5	12.7	12.9	13.2	13.5	100.3
Calibre	5	14.1	14.3	12.6	13.3	13.0	13.5	100.3
Otana	5	14.2	14.6	12.2	13.2	12.9	13.4	100.0
Robert	5	13.8	14.7	13.0	12.9	12.6	13.4	99.9
Appaloosa	5	14.0	14.4	12.1	12.3	13.3	13.2	98.5
Ogle	5	13.9	14.1	12.2	13.0	12.8	13.2	98.4
Derby	3	--	--	12.3	12.7	12.3	12.4	97.4
Cayuse	5	13.8	14.1	11.8	12.4	12.5	12.9	96.3
Monida	5	13.5	14.3	11.9	12.2	12.6	12.9	96.1
Whitestone	1	--	--	--	--	12.2	12.2	94.6

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