

PROJECT TITLE: Small grain variety testing under 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 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 MT 8849. Average yield was 77.8 bu/acre. Relative yields, test weights, plant heights, and protein contents over five years are shown in Tables 2 through 5.

Durum

Twelve durum varieties were tested under dryland recrop conditions (Table 6). Lloyd was the highest yielding. Average yield was 82.9 bu/acre. Relative yields, test weights, plant heights, and protein contents over five years are shown in Tables 7 through 10.

Barley

Fifteen barley varieties and lines were tested under dryland recrop conditions (Table 11). The highest yielding was Stark, and the average yield was 84.9 bu/acre. Relative yields, test weights, plant heights, and protein contents over five years are shown in Tables 12 through 15.

The three-year crop rotation in this study is small grain, small grain yield trial plots, and safflower. Gallatin barley was grown in the area that will be planted to the small grain plots in 1993. The Gallatin yielded 94.25 bu/acre and had a test weight of 53.5 bu/acre. Protein content was 12.6%.

Oats

Sixteen varieties of oats were tested under dryland recrop conditions (Table 16). Calibre yielded the most. Average grain yield was 144.9 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.

Soil tests in the spring of 1992 indicated 48 lb N/acre of residual soil N. Fertilizer N was applied on 13 April 1992 in the form of 28-0-0 (liquid) at a rate of 27.5 lb N/acre. The small grain plots were planted on April 24. Soil moisture was good and temperatures were above normal for six weeks before planting, providing very good conditions for germination and emergence. These conditions along with high rainfall and low temperatures experienced during the growing season resulted in unusually high grain yields.

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 nursery conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1992

Date Seeded: April 16, 1992

Date Harvested: August 13, 1992

Size of Plot: 40 Sq. Ft.¹

Variety	C.I number or pedigree	Average Days to Heading ²	Average Height Inches	Average Protein Content Percent	Average Test Weight Lbs/Bu	Average Yield Bu/Acre
OWENS	CI 17904	63	29	13.1	63.3	95.2aa
PENAWAWA	WA 6920	64	27	11.8	63.7	94.3aa
MT 8849	RS6880/MT7819	64	30	15.2	61.5	93.6aa
RAMBO	C982-324	64	30	14.5	62.7	86.6a
GLENMAN	PI483235	65	31	13.7	61.7	85.6
LEW	CI 17429	65	33	15.4	63.2	84.3
STOA	ND 582	63	31	16.0	62.3	81.1
GUS	ND 618	63	29	16.5	62.2	80.7
GRANDIN	ND 626	63	31	16.2	63.3	80.7
NEWANA	CI 17430	64	29	14.0	63.0	79.2
AMIDON	ND 606	64	33	15.4	60.5	77.6
LEN	CI 17790	64	30	15.6	62.8	75.8
HI-LINE	MT 8402	61	28	15.9	63.5	75.2
OLAF	CI 15930	64	30	15.9	62.0	74.5
WESTBRED 926	WPB 926	60	27	15.2	62.8	71.5x
LANCER	CANLANC	63	35	16.8	62.7	71.0x
CUTLESS	NDCUT	63	30	16.5	62.7	68.0xx
KLASIC	PI486139	59	21	14.5	63.2	66.8xx
PONDERA	CI 17828	62	29	14.7	63.3	64.8xx
FORTUNA	CI 13596	63	34	17.3	60.5	49.8xx
Means		63	30	15.2	62.5	77.8
F-Value		24.76**	13.79**	22.73**	7.90**	22.72**
SE of the mean		0.30	0.81	0.28	0.33	2.32
LSD (0.05)		0.86	2.32	0.81	0.93	6.63
LSD 0.01						8.88
CV (S/mean)		0.31	4.71	3.21	0.90	5.16
CV (SE/mean)		0.18	2.72	1.85	0.52	2.98

** Indicates a significant difference of probability at less than 0.01.

aa Indicates a significantly greater yield than check Newana at 0.01 level of significance.

a Indicates a significantly greater yield than check Newana at 0.05 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.

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Table 1. Agronomic data obtained from a dryland recrop spring wheat yield trial nursery conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1992

1 4 row plots, rows 10 ft. long and 1.0 ft. apart. At harvest, four 10 ft. samples were taken from each row for yield, test weight and protein determinations.

2 Heading dates are number of days from planting.

Newana is the check variety for this nursery with an average yield of 79.17 bu/acre.

Previous crop: Spring wheat

Residual soil N: 48 lb/acre to 2 ft.

Applied fertilizer: 27.5 lb N/acre as 28-0-0 (liquid) on 13 April 1992.

Herbicide: 1.5 pints per acre Bronate applied May 29.

Insecticide: None

Precipitation for average crop year = 13.64 inches. Precipitation for 1991-1992 crop year = 21.86 inches. Crop year considered to be from September 1, through harvest, 1992.

Precipitation for April 1 - July 31 during 1992 = 11.53 inches. Average precipitation for same period = 7.79 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 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average yield bu/acre	yield as % of Newana
MT 8849	1	---	---	---	---	93.6	93.6	118.2
Glenman	5	24.4	6.8	24.4	18.5	85.6	31.9	113.3
Westbred Rambo	5	28.2	4.1	21.6	18.4	86.6	31.8	112.7
Lew	5	23.3	5.6	22.9	17.7	84.3	30.8	109.1
Grandin	5	17.7	11.2	21.3	18.4	80.7	29.9	105.9
Stoa	5	21.0	6.7	22.1	18.1	81.1	29.8	105.7
Len	5	20.1	8.8	23.4	19.2	75.8	29.5	104.5
Gus	4	---	9.2	18.7	16.8	80.7	31.4	104.3
Amidon	5	17.2	8.0	24.6	16.6	77.6	28.8	102.1
HiLine	4	---	7.6	21.2	17.3	75.2	30.3	100.9
Newana	5	20.8	6.2	17.7	17.1	79.2	28.2	100.0
Olaf	4	---	6.4	22.9	15.6	74.5	29.8	99.3
Lancer	5	20.1	6.6	21.7	17.5	71.0	27.4	97.1
Pondera	5	20.5	7.3	25.8	16.3	64.8	26.9	95.5
Westbred 926	3	---	---	22.5	14.5	71.5	36.2	95.2
Cutless	4	---	5.8	21.9	15.1	68.0	27.7	92.2
PN 2375	1	---	---	---	15.2	---	15.2	88.9
Klasic	1	---	---	---	---	66.8	66.8	84.3
Fortuna	5	10.3	7.3	23.7	18.0	49.8	21.8	77.4

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, Newana.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

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 1987-1992 period.

Variety	number of years	1986	1987	1989	1990	1991	average test weight lb/bu	test weight as % of Newana
PN 2375	1	--	--	--	60.1	--	60.1	102.0
Klasic	1	--	--	--	--	63.2	63.2	100.3
Pondera	5	61.5	58.4	59.9	59.3	63.3	60.5	100.1
Westbred 926	3	--	--	58.8	59.0	62.8	60.2	100.1
Newana	5	62.5	59.1	58.6	58.9	63.0	60.4	100.0
Westbred Rambo	5	62.5	57.4	59.9	59.4	62.3	60.3	99.8
Cutless	4	--	57.1	59.6	59.1	62.8	59.6	99.6
HiLine	4	--	57.4	58.3	58.9	63.5	59.5	99.4
Grandin	5	63.5	55.8	57.7	59.7	63.3	60.0	99.3
Olaf	4	--	58.1	58.6	59.1	62.0	59.4	99.2
Lancer	5	61.5	58.9	59.0	57.7	62.7	60.0	99.2
Lew	5	61.0	57.2	59.9	57.8	63.2	59.8	99.0
Stoa	5	61.5	57.8	58.9	58.0	62.3	59.7	98.8
Fortuna	5	60.6	58.3	59.3	58.3	60.5	59.4	98.3
Amidon	5	61.5	58.5	59.0	57.1	60.5	59.3	98.2
Gus	4	--	55.6	58.6	58.8	62.2	58.8	98.2
MT 8849	1	--	--	--	--	61.5	61.5	97.6
Len	5	60.5	54.4	58.0	58.4	62.8	58.8	97.4
Glenman	5	60.0	55.3	59.0	57.4	61.7	58.7	97.1

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, Newana.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

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 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average height inches	height as % of Newana
Lancer	5	24	15	25	29	35	25.6	116.4
Lew	5	24	16	24	25	33	24.4	110.9
Grandin	5	20	19	26	24	31	24.0	109.1
Amidon	5	20	16	24	25	33	23.6	107.3
Fortuna	5	20	16	24	23	34	23.4	106.4
Stoa	5	21	15	23	26	31	23.2	105.5
PN 2375	1	--	--	--	23	--	23.0	104.5
Glenman	5	21	15	23	24	31	22.8	103.6
MT 8849	1	--	--	--	--	30	30.0	103.4
Len	5	19	15	24	24	30	22.4	101.8
Newana	5	20	15	24	22	29	22.0	100.0
Olaf	4	--	13	22	25	30	22.5	100.0
Pondera	5	18	16	24	23	29	22.0	100.0
Cutless	4	--	14	24	21	30	22.2	98.9
HiLine	4	--	15	21	24	28	22.0	97.8
Westbred 926	3	--	--	21	24	27	24.0	96.0
Gus	4	--	15	20	22	29	21.5	95.6
Westbred Rambo	5	17	12	22	22	30	20.6	93.6
Klasic	1	--	--	--	--	--	21.0	72.4

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.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

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 1987-1992 period.

Variety	number of years	1986	1987	1989	1990	1991	average protein percent	protein as % of Newana
Gus	4	--	20.5	17.8	17.8	16.5	18.2	108.8
MT 8849	1	--	--	--	--	15.2	15.2	108.6
HiLine	4	--	20.1	17.6	18.1	15.9	17.9	107.5
Cutless	4	--	20.0	17.2	17.9	16.5	17.9	107.3
Westbred 926	3	--	--	18.0	17.7	15.2	17.0	105.8
Lancer	5	17.4	19.0	17.3	18.2	16.8	17.7	105.5
Pondera	5	17.6	20.4	17.4	18.2	14.7	17.7	105.0
Grandin	5	17.6	19.7	17.7	17.0	16.2	17.6	104.9
Olaf	4	--	19.0	17.2	17.7	15.9	17.5	104.6
Stoa	5	17.6	19.4	17.4	17.5	16.0	17.6	104.5
Fortuna	5	18.2	18.9	16.1	17.4	17.3	17.6	104.5
Len	5	17.2	20.5	16.9	17.4	15.6	17.5	104.2
Klasic	1	--	--	--	--	14.5	14.5	103.6
Amidon	5	18.3	19.0	16.4	17.3	15.4	17.3	102.7
Lew	5	16.3	20.0	17.0	17.5	15.4	17.2	102.5
Westbred Rambo	5	17.2	18.5	16.7	17.5	14.5	16.9	100.4
Newana	5	17.4	18.6	16.4	17.7	14.0	16.8	100.0
Glenman	5	15.9	19.7	16.5	17.3	13.7	16.6	98.8
PN 2375	1	--	--	--	17.2	--	17.2	97.2

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.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

Table 6. Characteristics of recrop durum wheat varieties yield trial tested under dryland conditions at the Eastern Agricultural Research Center, Sidney, Montana, 1992.

Date Seeded: April 17, 1992

Date Harvested: August 13, 1992

Size of Plot: 40 Sq. Ft.¹

Variety	C.I number or pedigree	Average Days to Heading ²	Average Height Inches	Average Grain Protein	Average Test Weight Lbs/Bu	Average Yield Bu/Acre
LLOYD	PI476211	64	26	13.2	62.3	97.2aa
LAKER	WPBLAKER	64	29	15.0	62.8	93.4aa
RENVILLE	PI510696	64	32	16.2	62.5	92.0aa
STOCKHOLM	STOCK000	63	27	15.0	64.0	89.5aa
SCEPTRE	DT 380	64	29	15.3	63.2	86.8aa
CANDO	CI 17438	64	25	14.8	64.5	83.3a
CROSBY	CI 17282	63	33	16.3	63.2	80.9
MEDORA	DT 433	63	33	16.4	63.3	80.1
VIC	CI 17789	63	33	15.5	62.8	79.7
WARD	PI 15892	63	32	15.5	63.0	76.6
MONROE	PI478289	63	31	16.3	62.8	73.0
ROLETTE	PI 15326	62	33	17.4	63.0	62.2xx
Means		62	30	15.6	63.1	82.9
F-Value		5.03**	5.54**	3.63**	2.90*	26.96**
SE of the mean		0.36	1.20	0.56	0.35	1.88
LSD (0.05)		1.06	3.53	1.63	1.04	5.50
LSD 0.01						7.48
CV (S/mean)		0.37	6.92	6.18	0.97	3.92
CV (SE/mean)		0.21	3.99	3.57	0.56	2.26

* Indicates a significant difference at probability less than 0.05.

** Indicates a significant difference at probability less than 0.01.

a Indicates a significantly greater yield than check Ward at the 0.05 level of significance.

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

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

¹ 4 row plots, rows 10 ft. long and 1.0 ft. apart. At harvest, four 10 ft. samples were taken from each row for yield, test weight, and protein determinations.

² Heading dates are number of days from planting.

Ward is the check variety for this nursery with an average yield of 76.63 bu/acre.

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Table 6 (Continued) Characteristics of recrop durum wheat varieties yield trial tested under dryland conditions at the Eastern Agricultural Research Center, Sidney, Montana, 1992.

Previous crop: Spring wheat.

Residual soil N: 48 lb/acre to 2 ft.

Applied fertilizer: 27.5 lb N/acre as 28-0-0 (liquid) applied 13 April 1992.

Herbicide: 1.5 pints per acre Bronate applied May 29. Insecticide: None

Precipitation for average crop year = 13.64 inches. Precipitation for 1991-1992 crop year = 21.86 inches. Crop year considered to be from September 1, 1991 through harvest 1992.

Precipitation for April - July 31 period during 1992 = 11.53 inches. Average precipitation for same period = 7.79 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 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average yield bu/acre	yield as % of Ward
Westbred Laker	5	35.6	3.5	9.4	8.9	93.4	30.2	113.4
Renville	4	--	3.7	12.1	12.7	92.0	30.1	111.8
Sceptre	5	28.2	5.4	12.0	13.3	86.8	29.1	109.5
Lloyd	5	23.2	5.0	8.0	11.5	97.2	29.0	108.9
Stockholm	4	20.3	4.4	14.3	--	89.4	32.1	106.6
Vic	4	28.8	5.2	10.8	10.3	79.7	27.0	101.4
Ward	5	25.2	4.4	14.2	12.6	76.6	26.6	100.0
Crosby	5	19.7	6.2	8.3	13.3	80.9	25.7	96.5
Medora	5	18.8	4.0	8.8	13.8	80.1	25.1	94.4
Monroe	5	20.4	6.5	11.7	12.7	73.0	24.9	93.5
Cando	5	9.3	0.9	4.7	8.9	83.3	21.4	80.5
Rolette	5	10.0	5.7	7.6	10.2	62.2	19.1	72.0

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, Ward.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

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 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average test weight lb/bu	test weight as % of Ward
Stockholm	4	63.3	57.9	60.3	--	64.0	61.4	101.7
Vic	5	63.6	58.4	59.9	58.9	62.8	60.7	101.5
Westbred Laker	5	62.5	56.7	61.7	59.8	62.8	60.7	101.4
Rolette	5	61.4	59.3	59.9	59.8	63.0	60.7	101.4
Cando	4	63.0	***	58.5	58.6	64.5	61.2	101.0
Medora	5	62.4	57.7	59.2	57.8	63.3	60.1	100.4
Sceptre	5	62.7	57.3	59.2	57.9	63.2	60.1	100.4
Ward	5	62.8	57.0	58.5	57.9	63.0	59.8	100.0
Renville	4	--	54.7	59.6	59.3	62.5	59.0	99.9
Crosby	5	62.5	56.6	58.7	57.8	63.2	59.8	99.9
Monroe	5	61.5	57.1	57.1	57.8	62.8	59.3	99.0
Lloyd	5	62.6	56.5	59.0	55.9	62.3	59.3	99.0

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.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

***indicates insufficient sample for test weight measurement

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 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average height inches	height as % of Ward
Ward	5	20	17	23	24	32	23.2	100.0
Rolette	5	19	18	22	23	33	23.0	99.1
Medora	5	20	18	21	22	33	22.8	98.3
Crosby	5	19	17	23	22	33	22.8	98.3
Vic	5	19	16	22	23	33	22.6	97.4
Renville	4	—	15	22	24	32	23.3	96.9
Monroe	5	18	16	22	23	31	22.0	94.8
Westbred Laker	5	20	16	21	22	29	21.6	93.1
Sceptre	5	18	15	21	21	29	20.8	89.7
Stockholm	4	17	14	21	—	27	19.8	85.9
Lloyd	5	16	14	20	21	26	19.4	83.6
Cando	5	17	11	19	21	25	18.6	80.2

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.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

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 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average protein percent	protein as % of Ward
Renville	4	--	22.1	20.4	21.2	16.2	20.0	105.7
Rolette	5	20.5	21.1	20.6	20.2	17.4	20.0	104.2
Medora	5	20.8	20.9	20.7	20.1	16.4	19.8	103.2
Sceptre	5	21.0	21.6	20.3	20.1	15.3	19.7	102.6
Crosby	5	19.7	21.6	20.4	19.9	16.3	19.6	102.2
Monroe	5	19.1	21.3	20.5	19.2	16.3	19.3	100.6
Ward	5	20.2	20.8	19.5	19.8	15.5	19.2	100.0
Cando	5	20.4	19.6	18.9	20.6	14.8	18.9	98.4
Vic	5	19.7	20.1	19.1	19.7	15.5	18.8	98.2
Lloyd	5	19.4	20.4	19.0	20.4	13.2	18.5	96.5
Stockholm	4	19.2	20.2	17.9	--	15.0	18.1	95.1
Westbred Laker	5	17.6	20.0	18.4	19.6	15.0	18.1	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, Ward.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

Table 11 Agronomic data obtained from a dryland recrop spring barley yield trial nursery conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1992

Date Seeded: April 17, 1992

Date Harvested: August 10, 1992

Size of Plot: 40 Sq. Ft.¹

Variety	C.I. number or pedigree	Average Days to Heading ²	Average Height Inches	Average Protein Content Percent	Average Test Weight Lbs/Bu	Average Yield Bu/Acre
STARK	ND 9866	63	27	12.6	53.2	95.3
LEWIS	15856	62	26	12.3	53.5	93.3
HECTOR	CI 15514	63	28	12.4	53.0	89.1
BARONESSE	NS 78054	63	24	12.7	53.5	87.3
MT81161	Lewis//Kgs/Smt	63	28	13.2	52.0	86.4
MT140523	Hector/Klages	60	28	12.5	53.8	86.2
GALLATIN	PI491534	62	28	12.5	53.3	86.0
HARRINGTON	SK 76333	63	26	12.4	52.5	84.5
BEARPAW	PI531228	64	26	12.2	51.8	83.7
CLARK	CI 15857	64	28	12.2	53.3	82.9
STEPTOE	CI 15229	59	26	12.4	48.2	82.5
PIROLINE	CI 9558	62	28	13.3	53.7	82.3
BOWMAN	PI483237	60	28	13.0	52.8	81.2
EXCEL	MN 52	60	25	12.9	50.8	78.0x
MT860756	Gallatin/Bellona	62	26	12.6	54.3	75.4x
Means		62	27	12.6	52.7	84.9
F-Value		19.35**	2.17*	2.55*	19.70**	2.66*
SE of the mean		0.33	0.95	0.22	0.34	3.18
LSD (0.05)		0.96	2.75	0.62	1.00	9.22
CV (S/mean)		0.34	6.15	2.95	1.13	6.49
CV (SE/mean)		0.19	3.55	1.70	0.65	3.75

* Indicates a significant difference at probability less than 0.05.

** Indicates a significant difference at probability less than 0.01.

x Indicates a significantly lower yield than check Bowman at the 0.05 level of significance.

¹ 4 row plots, rows 10 ft. long and 1.0 ft. apart. At harvest, a 10 ft. sample was taken from each center row for yield, test weight, and protein determinations.

² Heading dates are number of days from planting.

Bowman is the check variety for this nursery with an average yield of 81.20 bu/acre.

Previous crop: Spring wheat. Residual Soil N: 48 lb/acre to 2 ft.

Applied fertilizer: 27.5 lb N/acre as 28-0-0 (liquid) applied 13 April 1992.

Herbicide: 1.5 pints Bronate applied May 29. Insecticide: None

Precipitation for the average crop year = 13.64 inches. Precipitation for 1991-1992 crop year = 21.86 inches. Crop year is considered to be from September 1, 1991 through harvest 1992.

Precipitation for April 1 - July 31 period during 1992 = 11.53 inches. Average precipitation for same period = 7.79 inches.

Table 12. Relative yielding abilities of barley varieties as compared to Hector when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average yield bu/acre	yield as % of Hector
Hector	5	30.2	20.2	21.6	28.6	89.1	37.9	100.0
Lewis	5	20.8	18.3	26.1	30.5	93.3	37.8	99.6
Stark	3	--	--	22.2	20.2	95.3	45.9	98.9
Baronesse	2	--	--	--	27.6	87.3	57.4	97.6
MT 140523	4	--	19.0	24.4	25.8	86.2	38.8	97.4
MT 81161	1	--	--	--	--	86.4	86.4	97.0
Steptoe	5	27.2	24.2	22.5	27.3	82.5	36.7	96.8
Gallatin	5	27.0	17.8	24.3	25.7	86.0	36.2	95.3
Bowman	5	25.3	2.8	21.4	26.6	81.2	35.3	92.9
Clark	5	23.0	17.9	27.7	23.1	82.9	34.9	92.0
Piroline	5	23.5	17.2	22.9	25.2	82.3	34.2	90.2
Excel	2	--	--	--	22.3	78.0	50.2	85.2
MT 860756	1	--	--	--	--	75.4	75.4	84.6
Bearpaw	5	23.1	8.7	18.0	22.9	83.7	31.3	82.4
Harrington	5	21.3	7.5	15.1	20.3	84.5	29.7	78.4

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, Hector.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

Table 13. Relative test weights of barley varieties as compared to Hector when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average test weight lb/bu	test weight as % of Hector
MT 860756	1	--	--	--	--	54.3	54.3	102.5
Stark	3	--	--	50.2	50.9	53.2	51.4	101.3
Lewis	5	51.5	47.5	49.1	50.4	53.5	50.4	101.1
Gallatin	5	52.0	46.0	48.6	50.1	53.3	50.0	100.3
Hector	5	51.5	45.5	48.0	51.3	53.0	49.9	100.0
MT 140523	4	--	44.5	47.7	50.4	53.8	49.1	99.3
Clark	5	50.5	44.0	47.2	50.2	53.3	49.0	98.4
MT 81161	1	--	--	--	--	52.0	52.0	98.1
Piroline	5	50.5	43.0	48.2	48.1	53.7	48.7	97.7
Bowman	5	42.0	48.0	49.0	50.2	52.8	48.4	97.1
Baronesse	2	--	--	--	47.5	53.5	50.5	96.8
Bearpaw	5	49.5	45.5	47.7	46.1	51.8	48.1	96.5
Harrington	5	50.0	45.2	46.9	46.0	52.5	48.1	96.5
Excel	2	--	--	--	47.8	50.8	49.3	94.5
Steptoe	5	48.5	39.0	41.9	47.1	48.2	44.9	90.1

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, Hector.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

Table 14. Relative heights of barley varieties as compared to Hector when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average height inches	height as % of Hector
Hector	5	18	20	18	24	28	21.6	100.0
Stark	3	--	--	20	23	27	23.3	100.0
MT 81161	1	--	--	--	--	28	28.0	100.0
Bowman	5	17	19	19	20	28	20.6	95.4
Gallatin	5	18	17	18	21	28	20.4	94.4
Piroline	5	17	17	17	22	28	20.2	93.5
MT 860756	1	--	--	--	--	26	26.0	92.9
Lewis	5	17	17	18	22	26	20.0	92.6
MT 140523	4	--	16	18	20	28	20.5	91.1
Clark	5	16	17	17	19	28	19.4	89.8
Steptoe	5	15	19	18	19	26	19.4	89.8
Bearpaw	5	17	15	16	21	26	19.0	88.0
Harrington	5	15	15	16	22	26	18.8	87.0
Baronesse	2	--	--	--	19	24	22.5	82.7
Excel	2	--	--	--	18	25	22.5	82.7

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, Hector.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

Table 15. Relative protein contents of barley varieties as compared to Hector when grown under continuous cropping conditions at the Eastern Agricultural Research Center, Sidney, Montana, during the 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average protein percent	protein as % of Hector
MT 81161	1	--	--	--	--	13.2	13.2	106.5
Piroline	5	17.3	20.6	17.0	15.8	13.3	16.8	105.7
Baronesse	2	--	--	--	15.5	12.7	14.1	103.7
Harrington	5	16.1	20.5	17.5	15.2	12.4	16.3	102.8
MT 140523	4	--	20.6	17.6	15.2	12.5	16.5	102.3
Bearpaw	5	15.8	21.4	16.7	15.1	12.2	16.2	102.1
MT 860756	1	--	--	--	--	12.6	12.6	101.6
Lewis	5	16.1	20.4	17.1	14.6	12.3	16.1	101.3
Excel	2	--	--	--	14.5	12.9	13.7	100.7
Clark	5	16.1	20.5	16.0	15.1	12.2	16.0	100.5
Hector	5	15.1	20.1	17.1	14.8	12.4	15.9	100.0
Gallatin	5	16.1	20.5	15.1	15.1	12.5	15.9	99.7
Stark	3	--	--	16.1	14.4	12.6	14.4	97.3
Bowman	5	14.4	17.6	17.3	14.2	13.0	15.3	96.2
Steptoe	5	12.5	14.2	15.9	13.3	12.4	13.7	85.9

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, Hector.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

Table 16 Agronomic data obtained from a dryland recrop oat variety yield trial conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1992.

Date Seeded: April 27, 1992

Date Harvested: August 12, 1992

Size of Plot: 40 Sq. Ft.¹

Variety	C.I. number or pedigree	Average Heading Date ²	Average Height Inches	Protein Content Percent	Average Test Weight Lbs/Bu	Average Yield Bu/Acre
Calibre	OT 308	62	38	12.6	35.2	165.7
Monida	CI483126	59	36	11.9	34.5	159.8
Derby	Derby	58	36	12.3	34.5	159.0
Appaloosa	CI 9297	60	32	12.1	33.2	155.6
Otana	CI 9252	60	38	12.2	37.2	151.4
Border	CI467882	61	33	12.7	32.2	151.0
Newdak	Newdak	55	32	12.4	35.3	151.0
Robert	W 82056	60	35	13.0	35.3	146.3
Cayuse	CI 8263	58	33	11.8	34.5	142.6
Ogle	CI 9401	53	30	12.2	33.3	140.9
Rio Grande	81Ab5792	57	28	13.0	34.2	140.8
Riel	W 80474	58	36	12.4	38.0	139.7
Park	CI 6611	59	37	13.0	33.8	132.9
Agay	82Ab1142	58	24	12.9	32.3	131.6
Trucker	SD810109	57	35	13.2	38.5	127.3
Valley	ND820603	58	31	12.7	38.0	122.5
Mean		58	33	12.5	35.0	144.9
F-Value		29.91**	15.72**	2.29*	4.56**	1.70
SE of the mean		0.39	0.97	0.28	0.93	9.46
LSD (0.05)		1.13	2.81	0.81	2.69	NS
CV (S/mean)		0.38	5.05	3.89	4.61	11.31
CV (SE/mean)		0.22	2.92	2.25	2.66	6.53

No significant difference in yield among varieties was indicated.

Table 16 (continued) Agronomic data obtained from a dryland recrop oat variety yield trial conducted at the Eastern Agricultural Research Center, Sidney, Montana, 1992.

* Indicates a significant difference at probability less than 0.05.

** Indicates a significant difference at probability less than 0.01.

¹ 4 row plots, rows 10 ft. long and 1.0 ft. apart. At harvest, a 10 ft. sample was taken from each center row for yield, test weight, and protein determinations.

² Heading dates are number of days from planting.

Otana is the check variety for this nursery with an average yield of 151.44 bu/acre.

Previous crop: Spring wheat.

Residual Soil N: 48 lb/acre to 2 ft.

Applied fertilizer: 27.5 lb N/acre as 28-0-0 (liquid) applied 13 April 1992.

Herbicide: 1.5 pints Bronate applied May 29.

Insecticide: None

Precipitation for average crop year = 13.64 inches. Precipitation for 1991-1992 crop year = 21.86 inches. Crop year considered to be from September 1, through harvest 1992.

Precipitation for April 1 - July 31 period during 1992 = 11.53 inches. Average precipitation for same period = 7.79 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 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average yield bu/acre	yield as % of Otana
Derby	1	--	--	--	--	159.0	159.0	105.0
Monida	5	59.3	21.5	23.2	32.1	159.8	59.2	100.2
Otana	5	59.8	24.8	27.9	31.3	151.4	59.0	100.0
Appaloosa	5	58.4	26.2	23.6	31.3	155.6	59.0	100.0
Newdak	1	--	--	--	--	151.0	151.0	99.7
Cayuse	5	67.7	25.8	18.3	38.5	142.6	58.6	99.2
Border	5	55.2	23.6	25.9	32.7	151.0	57.7	97.7
Calibre	5	53.3	11.0	17.0	30.0	165.7	55.4	93.8
Rio Grande	1	--	--	--	--	140.8	140.8	93.0
Ogle	5	50.9	27.2	26.9	27.3	140.9	54.6	92.5
Robert	4	--	19.9	15.1	29.1	146.3	52.6	89.4
Agay	1	--	--	--	--	131.6	131.6	86.9
Riel	5	40.1	21.7	21.6	30.4	139.7	50.7	85.9
Valley	4	53.9	22.4	--	29.9	122.5	57.2	85.6
Park	5	54.6	16.3	17.8	26.6	132.9	49.6	84.1
Trucker	4	--	24.7	16.2	24.3	127.3	48.1	81.8

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.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

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 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average test weight lb/bu	test weight as % of Otana
Trucker	4	--	35.0	35.6	37.8	38.5	36.7	108.3
Riel	5	38.5	33.5	35.0	35.7	38.0	36.1	104.7
Valley	4	37.0	30.0	--	34.4	38.0	34.8	100.6
Otana	5	37.0	28.0	34.0	36.4	37.2	34.5	100.0
Newdak	1	--	--	--	--	35.3	35.3	94.9
Ogle	5	34.0	29.0	31.5	34.0	33.3	32.4	93.7
Derby	1	--	--	--	--	34.5	34.5	92.7
Robert	4	--	26.5	29.0	34.4	35.3	31.3	92.3
Rio Grande	1	--	--	--	--	34.2	34.2	91.9
Calibre	5	39.0	21.0	29.5	31.7	35.2	31.3	90.6
Monida	5	36.0	25.5	29.0	30.1	34.5	31.0	89.9
Cayuse	5	34.0	24.5	28.5	29.8	34.5	30.3	87.7
Border	5	34.5	24.0	29.0	30.9	32.2	30.1	87.3
Park	5	34.0	24.5	28.0	30.4	33.8	30.1	87.3
Agay	1	--	--	--	--	32.3	32.3	86.8
Appaloosa	5	31.0	24.5	27.5	30.2	33.2	29.3	84.8

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, Otana.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

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 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average height inches	height as % of Otana
Trucker	4	--	35	21	25	35	29.0	111.5
Otana	5	26	20	21	25	38	26.0	100.0
Calibre	5	27	19	20	26	38	26.0	100.0
Riel	5	24	20	19	26	36	25.0	96.2
Park	5	24	18	19	26	37	24.8	95.4
Robert	4	--	18	19	27	35	24.8	95.2
Derby	1	--	--	--	--	36	36.0	94.7
Monida	5	23	17	19	24	36	23.8	91.5
Cayuse	5	24	16	17	26	33	23.2	89.2
Appaloosa	5	22	17	18	23	32	22.4	86.2
Ogle	5	21	18	19	23	30	22.2	85.4
Valley	4	21	17	--	24	31	23.3	85.3
Newdak	1	--	--	--	--	32	32.0	84.2
Border	5	21	16	17	22	33	21.8	83.8
Rio Grande	1	--	--	--	--	28	28.0	73.7
Agay	1	--	--	--	--	24	24.0	63.2

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.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.

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 1987-1992 period.

Variety	number of years	1987	1989	1990	1991	1992	average protein percent	protein as % of Otana
Trucker	4	--	17.4	15.1	15.6	13.2	15.3	108.5
Rio Grande	1	--	--	--	--	13.0	13.0	106.6
Agay	1	--	--	--	--	12.9	12.9	105.7
Park	5	15.5	16.2	14.4	15.3	13.0	14.9	103.6
Newdak	1	--	--	--	--	12.4	12.4	101.6
Riel	5	15.3	16.1	14.4	14.6	12.4	14.6	101.4
Derby	1	--	--	--	--	12.3	12.3	100.8
Border	5	15.5	15.6	14.0	14.5	12.7	14.5	100.7
Robert	4	--	15.4	13.8	14.7	13.0	14.2	100.7
Valley	4	14.8	15.8	--	14.6	12.7	14.5	100.5
Otana	5	15.3	15.5	14.2	14.6	12.2	14.4	100.0
Appaloosa	5	14.6	15.9	14.0	14.4	12.1	14.2	98.9
Ogle	5	14.7	15.6	13.9	14.1	12.2	14.1	98.2
Cayuse	5	14.1	15.4	13.8	14.1	11.8	13.8	96.4
Calibre	5	14.2	13.8	14.1	14.3	12.6	13.8	96.1
Monida	5	14.3	14.6	13.5	14.3	11.9	13.7	95.5

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, Otana.

NOTE: No continuous cropped nurseries were harvested in 1988 because of severe drought.