RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2008

The Annual Report of the Investigations at and Administration of the Southern Agricultural Research Center, Huntley, Montana

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PROJECT TITLE:

Off-Station Spring Barley Variety Performance Trials in South Central Montana. This research is partially supported by the Montana Wheat and Barley Committee.

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OBJECTIVES:

To provide growers in south central Montana with a reliable, unbiased, up-to-date source of information that will permit valid comparisons among improved spring barley varieties. This information should help spring barley producers in south central Montana select varieties best suited to their particular area and growing conditions.

METHODS:

The 2008 off-station spring barley trials were conducted under dryland conditions near Huntley, Molt and Broadview, and under flood irrigation near Fromberg and Hysham, Montana (Fig. 1). Twenty spring barley entries comprised of 16 commercial cultivars and 4 experimental lines, representing both feed and malt type cultivars, were grown at all locations.

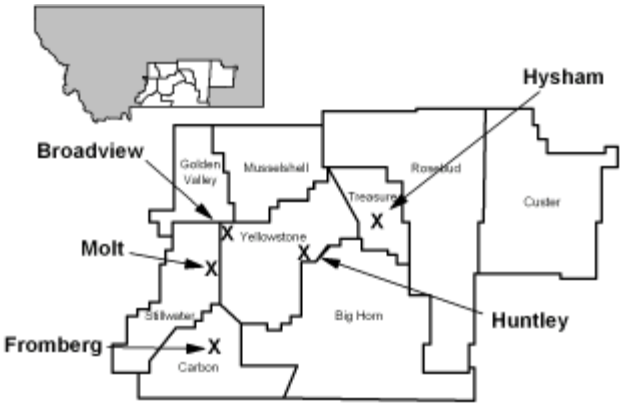

Figure 1. 2008 off-station spring barley trial locations in south central Montana.

All studies were planted using a randomized complete block design with three replications. All entries were seeded at approximately 0.5 million seeds per acre (~12 seed per foot^2) under dryland conditions and 0.9 million seeds per acre (~22 seed per foot^2) under irrigation. Actual seeding rates were calculated from

the thousand kernel weight determined for the seed lot of each cultivar (Table 1), and varied from 34 to 60 pounds per acre for the dryland sites and from 58 to 103 pounds per acre under irrigation. Seeding rates were not adjusted for germination. Dryland test plots consisted of a 15-foot, 4-row plot with 14-inch row spacing. Irrigated test plots consisted of a 15-foot, 7-row plot with 6-inch row spacing. All rows of each test plot were trimmed 36 inches and harvested using an experimental-plot combine. Recorded grain yields were adjusted to 13% grain moisture content, and are reported in bushels per acre based on a 48 pound standard bushel weight. Test weight (lb/bu, pounds per bushel) and grain moisture content (%, percent) were obtained for each plot using a Dickey-john™ GAC 2100 grain analyzer. Grain protein (%, percent) was estimated using near infrared spectroscopy and is reported on a 100% dry matter basis. Plant height was measured in inches from the soil surface to the top of the head, excluding the awns if present. Lodging severity, where observed, was recorded on a 0 to 9 scale representing no lodging to all stems lying flat on the ground, respectively. Percent plump and thin kernels were determined by measuring the amount of a ~100 gram sub-sample retained above a 6-64" slotted screen and passing through a 5½-64" slotted screen, respectively, following 30 oscillations on a Strand™ sizer shaker.

Table 1. Adjusted seeding rates used to establish 20 spring barley cultivars tested at five off-station sites in south central Montana during 2008.

Cultivar	Thousand Kernel Weight	Seeds per Pound	1/ Dryland Seeding Rate		2/ Irrigated Seeding Rate	
			per plot	per acre	per plot	per acre
	grams	#	grams	pounds	grams	pounds
Baronesse	42.6	10,669	36.5	50	54.1	86
Boulder	46.1	9,843	39.6	54	58.6	94
Champion	49.3	9,207	42.3	58	62.7	100
Conrad	40.6	11,196	34.8	48	51.5	82
Craft	40.4	11,241	34.7	47	51.3	82
Drummond	38.0	11,940	32.6	45	48.3	77
Eslick	38.3	11,849	32.9	45	48.7	78
Harrington	37.5	12,104	32.2	44	47.7	76
Haxby	46.3	9,815	39.7	54	58.8	94
Hockett	50.6	8,971	43.4	60	64.3	103
Legacy	30.2	15,027	25.9	36	38.4	61
Merit	28.6	15,872	24.5	34	36.4	58
Metcalfe	38.8	11,704	33.3	46	49.3	79
Stellar	32.2	14,119	27.6	38	40.9	65
Tradition	36.0	12,621	30.9	42	45.7	73
Xena	43.7	10,397	37.5	51	55.5	89
MT960101	41.7	10,896	35.8	49	53.0	85
MT010158	43.9	10,333	37.7	52	55.8	89
MT020155	43.4	10,469	37.2	51	55.1	88
MT020204	40.0	11,350	34.3	47	50.8	81

1/ Equivalent to 0.5 million seeds per acre (12 seeds per foot^2) on a mass basis.
2/ Equivalent to 0.9 million seeds per acre (21 seeds per foot^2) on a mass basis.

RESULTS:

The 2008 spring barley test sites were dry over-winter, with very little rain or snow accumulating during November, December and January. Soil temperatures were cool during the planting period in March, emergence and subsequent crop development was delayed during most of the spring growth period. Spring barley stands appeared fairly uniform at all sites before the middle of May. Spring rains produced average to below average precipitation levels until the last week of May. Cooler than normal temperatures that delayed crop development appeared to help avoid drought-related stresses in the crop. Above normal precipitation occurred during a period from the last week of May through early June, resulting in 4 to 6 inches of rainfall at most test sites. Moderate temperatures occurred during mid June and continued through July delaying maturation of the crop. Fusarium head blight (*aka*, Scab) was not

evident in any of the trials. Post-heading moisture stress dampened the performance of spring cultivars tested under dryland conditions near Molt.

The dryland spring barley yield near Huntley was very good in 2008, averaging 89 bu/a (Table 2). Yields ranged from 74 bu/a for 'Drummond' to 105 bu/a for 'Xena'. Five commercial spring barley cultivars including 'Baronesse', 'Boulder', 'Champion', 'Conrad', 'Eslick', and one experimental lines, 'MT010158', produced yields from 93 to 104 bu/a statistically equal to the yield of Xena at this location. Average test weight was 50.5 lb/bu, with most entries having test weight values heavier than 48 lb/bu. Only 'Merit' spring barley appeared to possess an unusually light test weight at 43.7 lb/bu. Grain protein levels averaged 13.0 percent and varied from 12.1 percent for Xena to 14.1 percent for Merit. Most spring barley cultivars tested produced more than 80 percent plump kernels in the harvested grain. Exceptions were 'Legacy' (79%), Merit (60%) and the experimental line 'MT960101' (43%). Only Merit and MT960101 produced more than 10 percent thin kernels in the harvested grain.

The 2008 spring barley trial at Molt produced an average yield of 23 bu/a (Table 3). Grain yields at Molt ranged from 18 bu/a for Merit to 30 bu/a for Boulder. No statistical differences in yield were detected between the 20 spring barley cultivars tested in 2008. Average test weight was 45.3 pounds per bushel, 4 lb/bu lighter than test weight values measured at Molt the previous year. Only Haxby produced a test weight heavier than 48 lb/bu, measuring 49.2 lb/bu. Grain protein content averaged 14.3 percent and ranged from 13.3 to 15.7 percent. Plump and thin kernels averaged 66 and 13 percent, respectively. Two-year average yield for barley varieties tested during 2007 and 2008 at Molt averaged 20 bu/a. Three-year average yield for barley varieties tested during 2006, 2007 and 2008 in Molt averaged 17 bu/a. The feed cultivar Boulder has been the highest yielding entry at this location for the past three years.

Dryland spring barley yields at Broadview averaged 26 bu/a, and varied from 15 bu/a for Merit to 37 bu/a for Boulder (Table 4). Haxby spring barley averaged 35 bu/a, and was the only entry tested at Broadview that equaled the yield of Boulder. Barley test weights at the Broadview location were the lightest measured among the three dryland sites harvested in 2008, averaging 42.8 lb/bu. Grain protein levels were high, averaging 16.2 percent Grain protein varied from 15.2 percent for Hockett to 17.8 percent for Harrington. The percentage of plump kernels in the harvested grain only averaged 35 percent. Percentage of thin kernels was high, averaging 32 percent.

The average spring barley yield at Fromberg in 2008 was 120 bu/a and ranged from 106 bu/a for 'AC Metcalfe' to 129 bu/a for Drummond (Table 5). Twelve other commercial and experimental entries (Baronesse, Boulder, Champion, Conrad, 'Eslick', Legacy, 'Stellar', 'Tradition', Xena, MT010158, 'MT020155' and 'MT020204') produced yields that ranged from 120 to 128 bu/a, statistically equal to that of the highest yielding entry. Average test weight across all entries tested at Fromberg for 2008 was 50.6 lb/bu. Grain protein averaged 13.4 percent and ranged from 12.8 to 14.2 percent. Mean percent plump and thin kernels were 85.5 and 6.6 percent, respectively. Lodging was much less severe at the Fromberg in 2008 than had been observed the prior years. Two-year average yield for spring barley varieties tested during 2007 and 2008 at Fromberg averaged 111 bu/a. Three-year average yield for spring barley varieties tested during 2006 to 2008 averaged 113 bu/a.

Average spring barley yields under irrigated condition at Hysham were 76 bu/a (Table 6) in 2008. Spring barley yields ranged from 7 bu/a for Stellar to 119 bu/a for Baronesse. The yields of most spring barley cultivars were adversely affected by the combination of severe lodging and feeding damage by deer at this location. Only Boulder, Merit and MT960101 managed to produce more than 100 bu/a, equaling the yield of Baronesse. Average test weight across all entries tested at Hysham for 2008 was 51.3 lb/bu. Grain protein averaged 14.3 percent

and ranged from 12.5 to 15.4 percent. Mean percent plump and thin kernels were 88.0 and 5.2 percent, respectively.

SUMMARY:

Averaged across all locations for 2008, the past two and the past three years, Boulder has been the highest yielding barley grown under both dryland and irrigation conditions averaging 81, 79 and 86 bu/a, respectively (Table 8). Conrad, Eslick, Harrington, Hockett, Xena and MT960101 have produced yields equal to those of Boulder for the past three years in these environments.

FUTURE PLANS:

Off-station spring barley variety performance trials will continue in 2009 at the Broadview, Molt, Huntley, Hysham and Fromberg locations.

The authors of this article wish to thank the farmer-cooperators involved who provided land and other resources for these trials, and the Montana Wheat and Barley Committee for continued financial support of this research project.

Table 2. Performance of 20 spring barley cultivars and experimental lines tested under dryland conditions near Huntley, Montana during 2008. Cultivars listed alphabetically. (Exp. 083690).

Cultivar	1/ Grain Yield	Test Weight	Grain Moisture	2/ Grain Protein	Plump Kernels	Thin Kernels	Plant Height	Heading Date Julian	Heading Date Calendar
	bu/a	lb/bu	%	%	%	%	inches		
Commercial									
AC Metcalfe	83.8	50.0	9.5	13.4	89.9	4.0	35.5	170.3	Jun 18
Baronesse	**98.3***	49.9	9.6	12.8	82.6	6.4	35.5	173.7	Jun 21
Boulder	**104.1***	53.1	9.6	13.2	92.5	2.6	36.4	172.7	Jun 20
Champion	**97.8***	53.5	9.9	12.5	93.4	2.0	37.0	170.7	Jun 18
Conrad	**93.6***	50.3	9.6	13.2	90.1	4.1	33.6	174.0	Jun 22
Craft	87.1	53.0	9.7	12.8	94.1	2.0	36.3	170.7	Jun 18
Drummond	74.5	50.3	9.5	12.9	85.5	4.6	40.3	169.0	Jun 17
Eslick	**100.9***	50.8	9.6	12.7	82.8	6.6	34.1	173.7	Jun 21
Harrington	80.5	49.2	9.6	12.8	89.0	5.1	34.4	173.0	Jun 21
Haxby	84.5	53.9	10.0	12.3	87.0	4.0	37.1	171.7	Jun 19
Hockett	91.6	53.2	9.8	12.5	97.9	1.0	35.0	170.3	Jun 18
Legacy	85.7	48.1	9.2	13.1	79.2	6.8	36.1	167.7	Jun 15
Merit	78.4	43.7	9.0	14.1	60.7	19.0	32.1	174.3	Jun 22
Stellar	79.8	47.9	9.3	12.8	79.8	6.5	34.0	165.7	Jun 13
Tradition	87.4	49.8	9.3	13.2	85.9	3.4	37.8	170.7	Jun 18
Xena	**105.3****	50.8	9.7	12.1	82.4	4.8	34.3	172.7	Jun 20
Experimental									
MT960101	77.0	47.1	9.5	13.5	43.4	32.0	32.3	175.0	Jun 23
MT010158	**101.5***	52.5	9.7	13.5	95.2	1.7	34.5	171.7	Jun 19
MT020155	85.0	50.9	9.4	13.2	87.1	5.2	36.6	170.0	Jun 18
MT020204	91.2	52.3	10.0	12.9	87.2	5.8	36.8	170.7	Jun 18
Average	89.4	50.5	9.6	13.0	84.3	6.4	35.5	171.4	Jun 19
PLSD (p=0.05)	12.6	1.2	0.3	ns	6.7	3.1	2.3	1.2	
CV%	8.5	1.4	1.6	6.0	4.8	29.4	4.0	0.4	

1/ Yields are based on a 48 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Grain protein values adjusted to a 100 percent dry matter basis.
** Indicates highest yielding cultivar within a column.
* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).
ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Huntley Dryland Spring Barley (Exp. 083690)

Planted:	March 14, 2008
Harvested:	August 15, 2008
Fertility:	50-20-10, 100 lb/a, preplant, November 14, 2007
Herbicide:	Curtail, 32 oz/a + Harmony Extra, 0.5 oz/a + R-11, 6 oz/a + AMS, 2 lb/a, May 16, 2008
Insecticide:	none applied
Previous Crop:	summer fallow
Precipitation:	7.56 inches

Table 3. Performance of 20 spring barley cultivars and experimental lines tested under dryland conditions near Molt, Montana during 2008. Cultivars listed alphabetically. (Exp. 083691).

Cultivar	Grain Yield 1/ 2008	Grain Yield 1/ 2007-2008	Grain Yield 1/ 2006-2008	Test Weight	Grain Moisture	Grain Protein 2/	Plump Kernels	Thin Kernels	Plant Height
	----------	bushels/acre	----------	lb/bu	%	%	%	%	inches
Commercial									
AC Metcalfe	19.7	18.4	13.8	45.9	10.5	13.7	79.2	6.9	19.3
Baronesse	23.1			44.5	10.7	14.3	70.7	11.7	18.6
Boulder	30.0	26.9	**24.0****	46.8	10.7	14.5	74.0	9.0	21.0
Champion	27.0			47.5	11.1	13.9	72.2	9.3	19.5
Conrad	24.8	25.5	**21.8***	46.5	10.7	14.5	85.3	5.5	18.4
Craft	21.7	22.3	**19.6***	47.4	10.4	15.1	81.8	7.0	22.7
Drummond	22.8	14.7	13.4	44.0	10.1	14.1	55.1	20.7	23.4
Eslick	25.5	25.0	**22.8***	44.0	10.7	14.4	65.9	13.3	19.0
Harrington	23.3	25.1	**20.7***	42.3	10.5	14.5	76.0	10.3	20.5
Haxby	26.0	22.9	**21.6***	49.2	10.7	13.3	65.9	12.2	19.4
Hockett	22.1	20.3	**17.1***	45.7	10.6	14.8	68.0	13.7	20.6
Legacy	19.1	15.2	15.1	43.4	10.3	13.9	47.7	24.6	21.3
Merit	18.6	22.1	**18.0***	43.1	10.1	15.0	62.3	16.4	20.4
Stellar	19.4	11.3	11.6	43.5	10.3	14.2	68.3	13.7	20.3
Tradition	22.8	14.7	13.4	44.9	10.2	14.4	48.8	21.0	19.6
Xena	23.1	18.7	**16.9***	44.9	10.2	13.8	62.8	13.0	20.8
Experimental									
MT960101	25.9	21.8	**18.1***	45.5	10.8	14.0	49.8	25.1	18.4
MT010158	26.5			45.6	10.9	15.7	57.4	18.4	19.8
MT020155	27.6			45.2	10.2	13.7	74.5	10.1	19.6
MT020204	25.6			46.3	11.1	14.6	62.4	15.8	20.9
Average	23.7	20.3	17.9	45.3	10.5	14.3	66.4	13.9	20.2
PLSD (p=0.05)	ns	ns	7.5	3.2	ns	ns	ns	ns	2.2
CV%	17.9	43.5	43.2	4.3	3.9	7.3	23.6	61.0	6.7

1/ Yields are based on a 48 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Grain protein values adjusted to a 100 percent dry matter basis.
** Indicates highest yielding cultivar within a column.
* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).
ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Molt Dryland Spring Barley (Exp. 083691)

Planted:	April 8, 2008
Harvested:	August 15, 2008
Fertility:	11-52-00, 50 lb/a in-furrow at planting
Herbicide:	2,4-D
Insecticide:	none applied
Previous Crop:	spring barley
Precipitation:	n/a

Table 4. Performance of 20 spring barley cultivars and experimental lines tested under dryland conditions near Broadview, Montana during 2008. Cultivars listed alphabetically. (Exp. 083692).

Cultivar	1/ Grain Yield	Test Weight	Grain Moisture	2/ Grain Protein	Plump Kernels	Thin Kernels	Plant Height
	bu/a	lb/bu	%	%	%	%	inches
Commercial							
AC Metcalfe	25.3	42.0	7.9	17.3	39.4	32.3	24.2
Baronesse	26.8	43.6	7.9	15.3	34.8	33.2	22.0
Boulder	**37.6****	45.2	7.8	15.5	45.9	22.5	22.0
Champion	30.7	46.1	8.2	15.6	24.3	37.3	23.7
Conrad	24.1	43.5	7.7	17.2	47.1	22.8	23.5
Craft	26.3	45.6	7.9	15.8	52.3	20.6	21.4
Drummond	27.2	39.3	7.1	16.4	27.5	42.1	25.5
Eslick	22.5	42.3	7.4	15.9	21.1	38.0	22.4
Harrington	24.3	40.0	7.1	17.8	31.9	35.4	21.4
Haxby	**35.4***	45.5	7.8	15.4	31.8	29.5	22.7
Hockett	27.7	45.2	8.0	15.2	50.0	20.8	23.8
Legacy	24.3	39.7	7.1	17.0	21.1	52.5	24.7
Merit	15.2	39.4	7.7	16.2	37.7	34.3	19.1
Stellar	25.5	41.5	7.2	16.4	42.9	29.4	23.8
Tradition	24.0	39.6	6.5	16.9	27.5	41.3	22.7
Xena	22.3	42.4	7.7	15.8	19.8	42.5	22.1
Experimental							
MT960101	24.3	42.7	7.2	17.3	20.7	45.6	21.0
MT010158	27.1	45.6	7.9	15.4	47.4	22.0	21.0
MT020155	20.4	41.1	7.0	15.8	52.0	21.4	21.5
MT020204	30.8	44.9	8.1	15.8	36.5	31.2	23.2
Average	26.1	42.8	7.6	16.2	35.6	32.7	22.6
PLSD (p=0.05)	6.0	3.6	0.6	1.6	17.7	12.4	ns
CV%	14.0	5.1	4.7	5.9	30.0	22.9	9.6

1/ Yields are based on a 48 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Grain protein values adjusted to a 100 percent dry matter basis.
** Indicates highest yielding cultivar within a column.
* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).
ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Broadview Dryland Spring Barley (Exp. 083692)

Planted:	April 23, 2008
Harvested:	August 20, 2008
Fertility:	11-52-00, 100 lb/a in-furrow at planting
Herbicide:	Roundup RT3, 12 oz/a, April 22, 2008
Insecticide:	none applied
Previous Crop:	summer fallow
Precipitation:	n/a

Table 5. Performance of 20 spring barley cultivars and experimental lines tested under irrigated conditions near Fromberg, Montana during 2008. Cultivars listed alphabetically. (Exp. 083794).

Cultivar	Grain Yield 1/ 2008	Grain Yield 1/ 2007-2008	Grain Yield 1/ 2006-2008	Test Weight	Grain Moisture	Grain Protein 2/	Plump Kernels	Thin Kernels	Plant Height	Lodging 3/
	----------	bushels/acre	----------	- lb/bu -	- % -	- % -	- % -	- % -	- inches -	0-9
Commercial										
AC Metcalfe	106.8	106.4	105.8	50.8	10.0	13.9	87.7	5.3	39.8	0.7
Baronesse	**123.9***			50.5	10.1	13.2	82.6	8.0	38.2	0.3
Boulder	**128.9***	129.4	128.2	52.6	9.9	13.3	92.4	3.6	42.8	0.0
Champion	**123.8***			52.3	10.1	13.0	86.5	5.7	39.0	0.0
Conrad	**124.3***	118.5	121.5	50.5	10.0	13.7	88.8	5.5	36.2	0.3
Craft	109.5	84.2	98.7	51.5	10.1	13.5	87.3	5.7	39.2	1.3
Drummond	**129.0****	108.7	113.5	49.9	9.6	13.3	90.7	3.4	39.0	0.0
Eslick	**125.5***	127.6	121.2	51.5	9.9	13.3	82.2	8.4	37.5	0.3
Harrington	110.6	108.6	109.9	48.8	10.0	13.5	81.6	8.7	38.0	1.7
Haxby	116.2	102.9	108.1	52.6	10.0	13.7	83.2	8.1	36.8	1.7
Hockett (MT9910189)	117.1	110.1	111.1	51.9	10.0	13.3	85.8	7.3	36.9	2.7
Legacy	**126.5***	114.3	115.1	48.7	9.5	12.8	85.5	5.0	41.4	0.3
Merit	111.0	103.1	105.6	47.1	9.8	13.2	80.8	8.8	38.8	0.0
Stellar	**120.2***	105.4	104.3	48.5	9.3	12.8	91.6	3.5	38.8	0.0
Tradition	**127.6***	116.3	119.0	49.3	9.4	13.6	89.0	4.6	39.2	0.0
Xena	**126.7***	127.4	120.7	50.2	10.0	13.3	79.4	10.1	37.4	0.0
Experimental										
MT960101	109.7	109.6	111.6	49.9	10.1	13.5	73.4	13.5	37.5	0.0
MT010158	**120.0***			51.0	10.0	13.3	88.0	5.5	38.0	0.0
MT020155	**125.3***			51.2	9.9	13.3	86.6	5.2	38.8	0.0
MT020204	**123.3***			52.2	10.2	14.2	86.3	6.1	37.9	3.3
Average	120.3	111.5	113.0	50.6	9.9	13.4	85.5	6.6	38.5	0.6
PLSD (p=0.05)	9.6	ns	ns	1.2	0.3	ns	5.5	3.4	1.8	ns
CV%	4.8	18.2	18.3	1.4	2.1	3.5	3.9	31.1	2.9	210.5

1/ Yields are based on 48 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Grain protein values adjusted to a 100 percent dry matter basis.
3/ Lodging severity scores of 0 to 9 represent no lodging to all stems flat on the ground, respectively.
** Indicates highest yielding cultivar within a column.
* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).
ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Fromberg Irrigated Spring Barley (Exp. 083794)

Planted:	March 10, 2008
Harvested:	August 14, 2008
Fertility:	40 N – 60 P_2O_5, preplant; 46-0-0, 217 lb/a, March 26, 2008
Herbicide:	n/a
Previous Crop:	sugar beets
Irrigation:	flood
Precipitation:	n/a

Table 6. Performance of 20 spring barley cultivars and experimental lines tested under irrigated conditions near Hysham, Montana during 2008. Cultivars listed alphabetically. (Exp. 083795).

Cultivar	1/ Grain Yield	Test Weight	Grain Moisture	2/ Grain Protein	Plump Kernels	Thin Kernels	Plant Height	3/ Lodging
	bu/a	lb/bu	%	%	%	%	inches	0-9
Commercial								
AC Metcalfe	93.6	51.9	11.5	14.4	90.2	3.9	42.4	5.0
Baronesse	**119.2****	53.0	10.9	13.3	91.0	4.1	40.8	2.7
Boulder	**104.7***	53.4	10.9	14.6	92.9	3.4	43.3	4.3
Champion	96.7	52.8	11.3	14.0	90.8	4.3	44.2	4.7
Conrad	99.1	51.0	11.2	15.4	90.7	4.5	40.2	5.7
Craft	56.2	52.9	11.3	14.8	94.4	2.4	43.5	3.0
Drummond	9.3	48.3	11.9	14.4	84.7	6.8	44.4	2.3
Eslick	80.8	50.0	11.1	14.8	82.1	8.9	41.9	7.0
Harrington	94.9	50.1	10.9	14.7	74.5	4.0	42.9	6.0
Haxby	63.0	51.7	11.0	14.3	89.4	5.2	43.0	6.0
Hockett	98.3	51.7	11.3	14.4	88.1	5.7	40.1	7.7
Legacy	38.4	47.5	10.9	14.3	76.8	10.1	44.7	4.7
Merit	**103.1***	50.8	10.9	12.5	92.1	3.4	41.7	3.0
Stellar	7.2	49.5	11.6	14.3	91.7	4.3	44.4	0.3
Tradition	15.3	49.8	10.8	14.3	89.8	4.0	43.0	2.3
Xena	98.3	52.6	10.9	13.6	91.9	3.9	42.9	3.7
Experimental								
MT960101	**102.4***	51.5	11.2	13.8	86.8	6.8	41.7	4.7
MT010158	60.4	52.9	11.2	14.2	92.8	3.0	41.8	2.0
MT020155	91.8	50.9	11.0	14.7	81.4	9.7	42.9	4.7
MT020204	93.3	53.1	11.2	14.3	88.3	4.9	41.1	6.7
Average	76.3	51.3	11.2	14.3	88.0	5.2	42.5	4.3
PLSD (p=0.05)	19.9	1.4	ns	0.9	ns	4.0	2.2	2.4
CV%	15.8	1.7	3.9	3.7	7.9	46.1	3.2	34.2

1/ Yields are based on 48 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Grain protein values adjusted to a 100 percent dry matter basis.
3/ Lodging severity scores of 0 to 9 represent no lodging to all stems flat on the ground, respectively.
** Indicates highest yielding cultivar within a column.
* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).
ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Hysham Irrigated Spring Barley (Exp. 083795)

Planted:	March 10, 2008
Harvested:	August 12, 2008
Fertility:	80 N-60 P_2O_5-10 K_2O, PPI; 46-0-0, 217 lb/a, POST, March 25, 2008
Herbicide:	Bronate Advanced, 14 oz/a + Starane Ultra, 5 oz/a +Axial, 8.2 oz/a, POST
Previous Crop:	sugar beets
Irrigation:	flood
Precipitation:	n/a

Table 7. Grain yield[1/] of 20 spring barley cultivars tested at five locations in south central Montana during 2008. Varieties listed by declining five-location average yield.

	Dryland				Irrigated			Five Location Average
	Huntley	Molt	Broadview	Ave.	Fromberg	Hysham	Ave.	
	bushels/acre							
Boulder	**104.1***	30.0	**37.6****	**57.2****	**128.9***	**104.7***	116.8	81.1
Baronesse	**98.3***	23.1	26.8	**49.4***	**123.9***	**119.2****	121.6	78.3
Champion	**97.8***	27.0	30.7	**51.8***	**123.8***	96.7	110.3	75.2
Xena	**105.3****	23.1	22.3	**50.2***	**126.7***	98.3	112.5	75.1
Conrad	**93.6***	24.8	24.1	47.5	**124.3***	99.1	111.7	73.2
MT020204	91.2	25.6	30.8	**49.2***	**123.3***	93.3	108.3	72.9
Hockett	91.6	22.1	27.7	47.1	117.1	98.3	107.7	71.4
Eslick	**100.9***	25.5	22.5	**49.7***	**125.5***	80.8	103.2	71.1
MT020155	85.0	27.6	20.4	44.3	**125.3***	91.8	108.5	70.0
MT960101	77.0	25.9	24.3	42.4	109.7	**102.4***	106.0	67.8
MT010158	**101.5***	26.5	27.1	**51.7***	**120.0***	60.4	90.2	67.1
Harrington	80.5	23.3	24.3	42.7	110.6	94.9	102.8	66.7
AC Metcalfe	83.8	19.7	25.3	42.9	106.8	93.6	100.2	65.8
Merit	78.4	18.6	15.2	37.4	111.0	**103.1***	107.1	65.2
Haxby	84.5	26.0	**35.4***	**48.6***	116.2	63.0	89.6	65.0
Craft	87.1	21.7	26.3	45.0	109.5	56.2	82.8	60.2
Legacy	85.7	19.1	24.3	43.1	**126.5***	38.4	82.5	58.8
Tradition	87.4	22.8	24.0	44.7	**127.6***	15.3	71.5	55.4
Drummond	74.5	22.8	27.2	41.5	**129.0****	9.3	69.2	52.6
Stellar	79.8	19.4	25.5	41.6	**120.2***	7.2	63.7	50.4
Average	89.4	23.7	26.1	46.4	120.3	76.3	98.3	67.2
PLSD (p=0.05)	12.6	ns	6.0	8.9	9.6	19.9	ns	ns
CV%	8.5	17.9	14.0	20.0	4.8	15.8	45.8	40.9

1/ Yields are based on 48 pound standard bushel weight and adjusted to 13.0 percent moisture content.
** Indicates highest yielding cultivar within a column.
* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).
ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Table 8. Performance of 20 spring barley cultivars and experimental lines tested under dryland and irrigated conditions at five locations in south central Montana during 2008. Cultivars listed alphabetically.

Cultivar	Grain Yield 1/ 2008	Grain Yield 1/ 2007-2008	Grain Yield 1/ 2006-2008	Test Weight	Grain Moisture	Grain Protein 2/	Plump Kernels	Thin Kernels	Plant Height
	----------	bushels/acre	----------	lb/bu	%	%	%	%	inches
Commercial									
AC Metcalfe	65.8	**64.6***	69.9	48.1	9.9	14.5	77.3	10.5	32.3
Baronesse	78.3			48.3	9.9	13.8	72.3	12.7	31.0
Boulder	81.1	**79.8****	**86.1****	50.2	9.8	14.2	79.5	8.2	33.1
Champion	75.2			50.4	10.1	13.8	73.4	11.7	32.7
Conrad	73.2	**72.1***	**80.0***	48.3	9.9	14.8	80.4	8.5	30.4
Craft	60.2	54.7	59.5	50.1	9.9	14.4	82.0	7.5	32.6
Drummond	52.6	51.1	53.2	46.4	9.6	14.2	68.7	15.5	34.5
Eslick	71.1	**72.8***	**76.6***	47.7	9.7	14.2	66.8	15.1	31.0
Harrington	66.7	**66.7***	**73.5***	46.1	9.6	14.6	70.6	12.7	31.5
Haxby	65.0	62.1	60.6	50.6	9.9	13.8	71.5	11.8	31.8
Hockett (MT9910189)	71.4	**68.3***	**75.4***	49.5	9.9	14.1	78.0	9.7	31.3
Legacy	58.8	58.2	62.0	45.5	9.4	14.2	62.1	19.8	33.6
Merit	65.2	**63.9***	69.3	44.8	9.5	14.2	66.7	16.4	30.4
Stellar	50.4	49.4	54.8	46.2	9.5	14.1	74.9	11.5	32.3
Tradition	55.4	55.5	59.9	46.7	9.2	14.5	68.2	14.9	32.4
Xena	75.1	**74.0***	**80.3***	48.2	9.7	13.7	67.3	14.9	31.5
Experimental									
MT960101	67.8	**66.6***	**74.0***	47.4	9.8	14.4	54.8	24.6	30.2
MT010158	67.1			49.5	9.9	14.4	76.1	10.1	31.0
MT020155	70.0			47.9	9.5	14.1	76.3	10.3	31.9
MT020204	72.9			49.8	10.1	14.3	72.2	12.8	32.0
Average	67.2	64.0	69.0	48.1	9.7	14.2	72.0	13.0	31.9
PLSD (p=0.05)	ns	16.2	16.1	1.4	0.3	0.7	9.5	6.1	1.5
CV%	40.9	41.3	45.6	3.9	4.4	6.7	18.2	65.0	6.5
Location-Years	5	7	10	5	5	5	5	5	5

1/ Yields are based on 48 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Grain protein values adjusted to a 100 percent dry matter basis.
** Indicates highest yielding cultivar within a column.
* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).
ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Table 9. Performance of 20 spring barley cultivars and experimental lines tested under irrigated conditions at two locations in south central Montana during 2008. Cultivars listed alphabetically.

Cultivar	Grain Yield 1/ 2008	Grain Yield 1/ 2007-2008	Grain Yield 1/ 2006-2008	Test Weight	Grain Moisture	Grain Protein 2/	Plump Kernels	Thin Kernels	Plant Height	Lodging 3/
	----------	bushels/acre	----------	- lb/bu -	- % -	- % -	- % -	- % -	- inches -	0-9
Commercial										
AC Metcalfe	100.2	102.1	**109.7***	51.4	10.8	14.1	88.9	4.6	41.1	2.8
Baronesse	121.6			51.7	10.5	13.2	86.8	6.1	39.5	1.5
Boulder	116.8	121.1	**129.4****	53.0	10.4	13.9	92.6	3.5	43.0	2.2
Champion	110.3			52.5	10.7	13.5	88.7	5.0	41.6	2.3
Conrad	111.7	112.0	**123.5***	50.7	10.6	14.5	89.8	5.0	38.2	3.0
Craft	82.8	74.9	84.5	52.2	10.7	14.1	90.9	4.1	41.3	2.2
Drummond	69.2	75.6	78.0	49.1	10.8	13.9	87.7	5.1	41.7	1.2
Eslick	103.2	112.0	**114.8***	50.7	10.5	14.0	82.2	8.7	39.7	3.7
Harrington	102.8	104.0	**113.7***	49.4	10.5	14.1	78.1	6.3	40.5	3.8
Haxby	89.6	89.6	84.3	52.2	10.5	14.0	86.3	6.7	39.9	3.8
Hockett	107.7	106.2	**116.7***	51.8	10.7	13.9	87.0	6.5	38.5	5.2
Legacy	82.5	89.0	92.9	48.1	10.2	13.6	81.2	7.6	43.0	2.5
Merit	107.1	103.1	**109.1***	49.0	10.4	12.9	86.4	6.1	40.3	1.5
Stellar	63.7	72.6	81.6	49.0	10.4	13.5	91.7	3.9	41.6	0.2
Tradition	71.5	82.7	89.5	49.6	10.1	13.9	89.4	4.3	41.1	1.2
Xena	112.5	117.7	**124.9***	51.4	10.5	13.4	85.7	7.0	40.1	1.8
Experimental										
MT960101	106.0	107.2	**116.9***	50.7	10.7	13.7	80.1	10.2	39.6	2.3
MT010158	90.2			51.9	10.6	13.8	90.4	4.3	39.9	1.0
MT020155	108.5			51.1	10.5	14.0	84.0	7.5	40.9	2.3
MT020204	108.3			52.7	10.7	14.3	87.3	5.5	39.5	5.0
Average	98.3	98.0	104.6	50.9	10.5	13.8	86.8	5.9	40.5	2.5
PLSD (p=0.05)	ns	ns	30.0	2.1	ns	ns	ns	ns	1.9	2.2
CV%	45.8	39.2	39.2	3.4	4.6	5.4	8.8	67.7	4.0	73.3
Location-Years	2	3	5	2	2	2	2	2	2	2

1/ Yields are based on 48 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Grain protein values adjusted to a 100 percent dry matter basis.
3/ Lodging severity scores of 0 to 9 represent no lodging to all stems flat on the ground, respectively.
** Indicates highest yielding cultivar within a column.
* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).
ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Table 10. Performance of 20 spring barley cultivars and experimental lines tested under dryland conditions at three locations in south central Montana during 2008. Cultivars listed alphabetically.

Cultivar	Grain Yield 1/ 2008	Grain Yield 1/ 2007-2008	Grain Yield 1/ 2006-2008	Test Weight	Grain Moisture	Grain Protein 2/	Plump Kernels	Thin Kernels	Plant Height
	----------	bushels/acre	----------	lb/bu	%	%	%	%	inches
Commercial									
AC Metcalfe	42.9	36.5	30.1	46.0	9.3	14.8	69.5	14.4	26.4
Baronesse	**49.4***			46.0	9.4	14.1	62.7	17.1	25.4
Boulder	**57.2****	**48.9****	**42.7****	48.4	9.4	14.4	70.8	11.4	26.5
Champion	**51.8***			49.0	9.7	14.0	63.3	16.2	26.7
Conrad	47.5	**42.2***	**36.6***	46.7	9.3	15.0	74.1	10.8	25.1
Craft	45.0	39.5	34.4	48.7	9.3	14.6	76.1	9.9	26.8
Drummond	41.5	32.8	28.4	44.5	8.9	14.5	56.1	22.4	29.7
Eslick	**49.7***	**43.4***	**38.4***	45.7	9.2	14.3	56.6	19.3	25.2
Harrington	42.7	38.8	33.4	43.8	9.1	15.0	65.6	16.9	25.4
Haxby	**48.6***	**41.4***	**37.0***	49.5	9.5	13.7	61.6	15.2	26.4
Hockett (MT9910189)	47.1	40.0	34.1	48.0	9.5	14.2	72.0	11.9	26.5
Legacy	43.1	35.1	31.1	43.7	8.9	14.7	49.3	28.0	27.4
Merit	37.4	34.4	29.5	42.1	9.0	15.1	53.6	23.2	23.9
Stellar	41.6	32.0	28.0	44.3	8.9	14.4	63.7	16.5	26.0
Tradition	44.7	35.2	30.3	44.8	8.6	14.8	54.1	21.9	26.7
Xena	**50.2***	**41.3***	35.6	46.1	9.2	13.9	55.0	20.1	25.8
Experimental									
MT960101	42.4	36.2	31.1	45.1	9.1	14.9	38.0	34.2	23.9
MT010158	**51.7***			47.9	9.5	14.9	66.6	14.0	25.1
MT020155	44.3			45.7	8.9	14.2	71.2	12.2	25.9
MT020204	**49.2***			47.8	9.7	14.4	62.0	17.6	27.0
Average	46.4	38.5	33.4	46.2	9.2	14.5	62.1	17.7	26.1
PLSD (p=0.05)	8.9	8.6	6.9	1.9	0.4	ns	13.4	8.8	2.0
CV%	20.0	27.3	28.4	4.3	4.2	6.9	22.6	52.3	7.9
Location-Years	3	4	5	3	3	3	3	3	3

1/ Yields are based on a 48 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Grain protein values adjusted to a 100 percent dry matter basis.
** Indicates highest yielding cultivar within a column.
* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).
ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).