

RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2011

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

- 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 2011 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 14 commercial cultivars and 6 experimental lines, representing both feed and malt types, were grown at all locations.

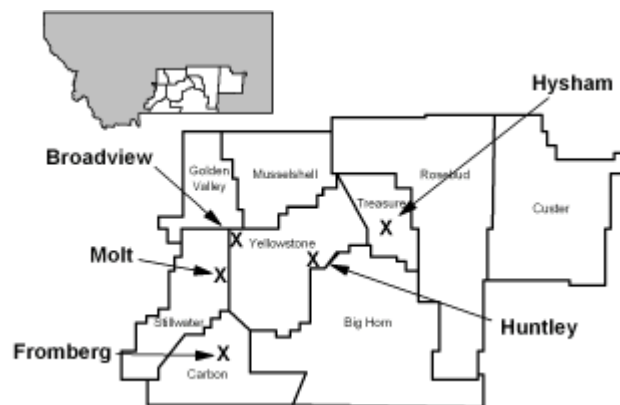


Figure 1. 2011 off-station spring barley trial locations in south central Montana.

All studies were planted using a randomized complete block design with three replications. All entries were seeded at approximately 0.6 million seeds per acre

(~14 seed per foot²) under dryland conditions and 1.0 million seeds per acre (~24 seed per foot²) under irrigation.

Dryland and irrigated test plots consisted of a 15-foot, 7-row plot with 7-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 12% moisture 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 (0) to all stems lying flat on the ground (9). 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.

RESULTS:

The 2011 spring barley test sites had near average moisture during winter months except in November with above average precipitation. Above-average precipitation occurred during April, May and July. Above average rainfall in April delayed planting at some sites. Unusually high rainfall in May (7.59 inches) resulted in higher disease incidence and nutrient deficiency due to N leaching deeper into the soil profile. Over time plants recovered as nutrients became available when the roots reached deeper with plant development. At some sites, late planting and above average precipitation during May slowed crop early development thus exposing the crop to higher temperatures during boot to heading growth stage which caused reduction in spring barley yield particularly at the dryland sites. Harvest was delayed at most sites this year.

The dryland spring barley yield at the Huntley location averaged 70 bu/a in 2011 (Table 1), 33 bu/a less than the trial harvested in 2010. Yields ranged from 52 bu/a for 'Moravian 115' to 75 bu/a for experimental line 'MT061035'. The highest yielding commercial cultivar was 'Craft', averaging 74 bu/a. Six other commercial spring barley cultivars 'Gallatin', 'Goldeneye', 'Haxby', 'Hockett', 'Moravian 69', and 'Tradition', and two experimental entries 'MT020155' and 'MT070175' produced yields from 67 to 72 bu/a, statistically equal to the yields of 'MT061035' at this location. Average test weight was relatively low with an average of 44.9 lb/bu, with all entries except 'Baronesse', and 'Haxby' having test weight values lower than 48 lb/bu. Grain protein levels were high and averaged 15.3 percent. Protein content ranged from 14.4 percent to 16.9 percent. Most spring barley cultivars tested produced a much lower proportion of plump kernels representing an average of only 38 percent of the harvested grain. The measured level of thin kernels was high, ranged from 15.9 to 63.2 percent. Three-year average yield for barley cultivars tested during 2009, 2010 and 2011 at Huntley was 79 bu/a. The feed-cultivar 'Baronesse' and the malt-cultivar 'Geraldine' have been the highest yielding entries at this location averaged over the past three years.

The 2011 spring barley trial at Molt under dryland condition suffered due to late planting and poor early growth resulted in marginal grain yield which averaged only 13 bu/a (Table 2), lowest among all locations tested in 2011. Barley cultivars were not significantly different for grain yield. Spring barley test weights at Molt averaged 50.5 lb/bu. Only six of the 20 entries averaged test weight values heavier than 48 lb/bu. Grain protein content averaged 11.6 percent and ranged from 10.1 percent for 'Pinnacle' to 14.7 percent for 'Tradition'. Plump and thin kernels averaged 75.5 and 8.3 percent, respectively. 'Moravian 115' had the highest percent plump kernels in the harvested grain with 91.8 percent plump

kernels. Two-year and three-year average yield for barley cultivars tested during 2009 to 2011 at Molt was not significantly different.

Dryland spring barley yields at Broadview were also affected by late planting and averaged only 31 bu/a. Yields varied from 24.5 to 42 bu/a (Table 3). The cultivars were not significantly different for grain yield at this location. Average test weight was 49.5 lb/bu. All entries, except 'Gallatin', 'Goldeneye' and 'Moravian 69', produced test weight values heavier than 48 lb/bu. Grain protein content averaged 14.0 percent and ranged from 12.3 percent for 'Craft' to 15.8 percent for 'Moravian 69'. The percentage of plump kernels was 80.2 percent in the harvested grain. 'Moravian 115' was the only entry which produced more than 90 percent plump kernels. Percentage of thin kernels averaged 6.7 percent. Two-year and three-year average yield for barley varieties tested during 2009 to 2011 at Broadview did not differ significantly.

The average spring barley yield at Fromberg in 2011 was 119 bu/a and ranged from 100 bu/a for 'AC Metcalfe' to 142 bu/a for the feed-type 'Craft' (Table 5). 'Moravian 69' was the highest yielding malt barley. Three experimental entries produced yields that ranged from 125 to 138 bu/a, statistically equal to the yields of 'AC Metcalfe' at this location. Average test weight was 49.2 lb/bu. All entries, except four tested at Fromberg in 2011 produced test weight more than 48 lb/bu. Grain protein averaged 12.3 percent and ranged from 10.9 percent for 'Craft' to 13.4 percent for 'Conrad' and 'Tradition'. The average percentage of plump kernels was 85.7 percent in the harvested grain. 'AC Metcalfe', 'Pinnacle' and 'MT070175' were the only entries that produced more than 90 percent plump kernels. Percentage of thin kernels averaged 7.3 percent. Lodging was obvious at Fromberg for most of the entries, averaging a lodging score of 4.2 out of 9. Lodging score varied from 0.3 for 'MT070175' to 7.3 for 'Gallatin'. Two-year and three-year average yield for barley varieties tested during 2009 to 2011 at Broadview did not differ significantly.

Average spring barley yields under irrigated condition at Hysham were 104 bu/a (Table 5) in 2011. Lodging was evident at Hysham in 2011 which caused yield variation of some entries across replications. Spring barley yields ranged from 86 bu/a to 110 bu/a but the entries were not significantly different for grain yield. Average test weight was 48.3 lb/bu. All commercial entries, except four cultivars, tested at Hysham produced 48 lb/bu or more test weight. Grain protein averaged 13.3 percent and ranged from 12.2 to 14.1 percent. Barley quality was average compared to previous years where mean percent plump and thin kernels were 84.7 and 7.2 percent, respectively. No statistical difference in two-year and three-year averaged yield has been observed for spring barley entries tested at Hysham.

SUMMARY:

The 2011 growing season had higher than normal precipitation during spring which caused delayed planting at most locations. Delayed planting coupled with continued heavy precipitation in May slowed spring barley early growth and delayed plant maturity and harvest. These factors ultimately adversely affected the spring barley grain yield particularly at dryland sites. Averaged across all locations for 2011, the grain yield was not different among cultivars (Tables 6 and 7). Averaged across all dryland locations the commercial cultivar 'Goldeneye' was the highest yielding cultivar. For the past three years 'Baronesse' has been the highest yielding commercial barley grown under dryland conditions averaging 56 and 54 bu/a respectively (Table 9). Under irrigated condition malt barley cultivar 'Moravian 115' from Miller-Coors was the top performer and for the past two years averaged 117 bu/a (Table 8).

Table 1. Performance of 20 spring barley cultivars and experimental lines tested under dryland conditions near Huntley, Montana during 2011. Cultivars listed alphabetically. (Exp. 113690).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain	Plump Kernels	Thin Kernels	Plant Height	Heading date	
	2011	2010-2011	2009-2011			Protein				Julian	Calendar
	- bushels/acre -			- lb/bu -	- % -	- % -	- % -	- % -	- inches		
Commercial											
AC Metcalfe	63.8	80.6	76.5*	44.6	9.4	16.1	36.8	29.4	37.2	176.0	25-Jun
Baronesse	65.8	87.5	84.3*	48.5	9.9	15.2	42.7	26.4	38.8	175.0	24-Jun
Conrad	62.9	82.3	79.4*	44.0	9.6	16.2	43.6	27.1	35.3	178.3	27-Jun
Craft	74.2*	83.5	76.8*	43.7	9.7	16.3	23.2	43.3	33.1	178.0	27-Jun
Gallatin	68.4*	85.1	78.6*	47.1	9.5	15.0	39.2	26.5	37.3	175.3	24-Jun
Geraldine	65.4	87.8	84.4**	43.1	9.3	15.9	13.5	57.5	34.3	180.3	29-Jun
Goldeneye	72.0*	89.5	83.3*	44.6	9.3	14.9	31.8	37.0	37.7	174.7	23-Jun
Harrington	61.3	79.5	75.2	42.9	9.1	15.1	40.8	30.9	36.7	179.0	28-Jun
Haxby	67.7*	78.3		49.3	9.7	14.6	33.1	26.2	35.0	176.0	25-Jun
Hockett	66.6*	84.5	81.2*	47.4	9.7	15.0	52.5	22.3	36.2	175.0	24-Jun
Moravian 115	52.4	74.9		36.8	9.0	16.8	30.6	36.4	25.7	182.0	1-Jul
Moravian 69	66.8*	85.1		39.1	9.1	16.9	12.4	63.2	29.0	182.0	1-Jul
Pinnacle	61.1	80.1	71.7	46.0	9.7	14.5	61.0	18.2	36.2	174.7	23-Jun
Tradition	67.4*			45.1	9.3	15.0	30.1	35.1	38.4	175.7	24-Jun
Experimental											
MT010158	61.7	76.5	73.5	46.5	9.7	15.3	60.9	15.9	35.4	177.0	26-Jun
MT010160	62.2	79.5		46.0	9.5	14.4	51.9	22.3	34.4	178.7	27-Jun
MT020155	73.9*	89.0	82.5*	47.4	9.3	14.8	48.1	22.3	37.9	174.0	23-Jun
MT020162	63.3			45.4	9.8	15.2	35.9	32.4	33.7	180.0	29-Jun
MT061035	74.9**			44.9	9.2	15.1	35.8	30.6	34.4	178.7	27-Jun
MT070175	66.7*			46.3	9.7	14.5	48.6	25.9	37.0	176.0	25-Jun
Average	65.9	82.7	79.0	44.9	9.5	15.3	38.6	31.5	35.2	177.3	
PLSD (p=0.05)	8.3	ns	8.0	1.9	0.5	1.1	12.6	9.1	2.8	1.2	
CV%	7.6	10.8	10.3	2.5	0.3	4.4	19.8	17.6	4.8	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 12% moisture 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. 113690)

Planted: April 12, 2011
Harvested: August 20, 2011
Fertility: 75-40-0, preplant, April 6, 2011
Herbicide: n/a
Previous Crop: chemical fallow
Precipitation: 8.77 inches

Table 2. Performance of 20 spring barley cultivars and experimental lines tested under dryland conditions near Molt, Montana during 2011. Cultivars listed alphabetically. (Exp. 113691).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain	Plump Kernels	Thin Kernels	Plant Height
	2011	2010-2011	2009-2011			Protein			
----- bushels/acre -----			- lb/bu -	- % -	- % -	- % -	- % -	- inches -	
<u>Commercial</u>									
AC Metcalfe	15.9	32.1	29.9	51.5	9.5	12.0	78.2	6.6	15.6
Baronesse	10.9	35.4	35.1	51.1	9.1	11.2	82.6	5.7	15.1
Conrad	15.9	38.0	37.4	49.3	9.2	11.3	81.4	5.7	14.6
Craft	12.2	31.7	28.9	51.2	9.4	10.9	78.8	6.1	12.3
Gallatin	12.1	34.7	32.1	50.8	9.0	11.6	74.1	9.2	14.3
Geraldine	10.2	34.7	31.6	51.4	9.3	12.1	64.4	12.7	11.5
Goldeneye	13.5	33.0	33.8	49.2	8.4	13.7	65.1	13.3	13.8
Harrington	14.6	28.3	25.5	49.8	9.3	11.0	76.7	7.5	15.6
Haxby	12.0	36.4		52.5	9.2	11.9	76.5	7.9	14.8
Hockett	12.2	28.0	28.9	51.0	9.2	11.9	82.4	6.0	15.6
Moravian 115	11.9	31.5		49.6	9.0	11.5	91.8	2.9	13.0
Moravian 69	15.9	35.6		49.4	8.8	10.3	64.1	12.2	12.9
Pinnacle	11.0	32.4	34.8	50.6	9.2	10.1	86.7	4.7	15.0
Tradition	6.9			48.3	8.1	14.7	64.7	12.6	12.7
<u>Experimental</u>									
MT010158	14.5	37.0	34.1	51.7	9.2	12.7	67.6	12.4	16.1
MT010160	14.4	34.5		51.1	9.4	11.8	69.6	9.1	14.2
MT020155	17.0	38.1	34.9	48.8	8.8	11.1	74.2	8.8	15.2
MT020162	13.0			51.1	9.5	10.6	67.6	10.3	15.7
MT061035	17.3			50.5	9.3	10.9	79.0	6.5	13.0
MT070175	12.6			50.8	9.0	10.3	84.8	5.6	16.4
Average	13.2	33.8	32.2	50.5	9.1	11.6	75.5	8.3	14.4
PLSD (p=0.05)	ns	ns	ns	1.6	0.4	0.9	8.8	4.5	2.4
CV%	25.9	23.0	25.9	1.9	2.5	4.5	7.1	32.9	10.1

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 12% moisture 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. 113691)

Planted:	May 3, 2011
Harvested:	September 6, 2011
Fertility:	46-0-0, 60 lb/a, June 15, 2011
Herbicide:	none applied
Previous Crop:	fallow
Precipitation:	n/a

Table 3. Performance of 20 spring barley cultivars and experimental lines tested under dryland conditions near Broadview, Montana during 2011. Cultivars listed alphabetically. (Exp. 113692).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plump Kernels	Thin Kernels	Plant Height
	2011	2010-2011	2009-2011						
	----- bushels/acre -----			- lb/bu -	- % -	- % -	- % -	- % -	- inches -
<u>Commercial</u>									
AC Metcalfe	33.9	39.4	35.5	50.9	9.9	14.8	84.9	5.2	26.8
Baronesse	31.8	45.3	41.6	50.5	9.7	13.6	88.8	3.5	24.5
Conrad	30.3	46.3	39.5	48.7	9.7	15.5	79.9	6.9	22.3
Craft	28.7	35.9	32.6	49.9	9.7	12.3	80.5	5.6	21.3
Gallatin	34.3	41.1	36.0	47.8	9.3	13.9	78.3	8.1	24.8
Geraldine	29.6	41.5	36.7	49.5	9.6	14.2	68.2	11.5	21.8
Goldeneye	37.2	43.7	36.9	47.6	9.2	13.8	71.6	10.6	24.1
Harrington	25.7	35.3	31.6	48.9	9.5	14.7	82.4	5.7	26.1
Haxby	25.7	33.2		51.4	9.7	13.9	73.2	9.5	21.7
Hockett	24.5	32.2	28.7	50.7	9.8	13.6	89.5	3.4	25.1
Moravian 115	28.5	42.4		48.4	9.7	13.9	90.9	3.3	19.3
Moravian 69	32.2	45.1		47.4	6.2	15.8	70.3	10.7	21.4
Pinnacle	30.0	37.8	31.1	50.0	9.2	13.0	85.2	5.9	23.2
Tradition	39.6			50.1	9.1	13.7	81.2	3.8	25.2
<u>Experimental</u>									
MT010158	27.3	42.0	38.4	50.1	9.6	14.8	77.6	6.8	21.4
MT010160	27.3	40.6		50.0	9.8	14.8	82.0	5.7	25.2
MT020155	35.3	36.7	35.1	48.2	8.8	14.4	75.4	8.5	23.5
MT020162	26.4			50.4	9.8	13.6	73.8	8.7	23.4
MT061035	41.7			48.9	9.6	13.5	82.2	5.2	20.7
MT070175	31.7			50.3	9.8	13.4	87.2	4.4	24.7
Average	31.1	39.9	35.3	49.5	9.4	14.0	80.2	6.7	23.3
PLSD (p=0.05)	ns	ns	ns	1.9	2.1	1.3	11.1	4.4	2.8
CV%	22.9	24.9	24.9	2.4	13.8	5.4	8.4	39.7	7.2

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 12% moisture 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. 113692)

Planted:	April 28, 2011
Harvested:	August 31, 2011
Fertility:	n/a
Herbicide:	5 oz Turret LD6, + 3 oz Clarity; Roundup RT3, 22 oz./a, April 27, 2011
Previous Crop:	summer fallow
Precipitation:	n/a

Table 4. Performance of 20 spring barley cultivars and experimental lines tested under irrigated conditions near Fromberg, Montana during 2011. Cultivars listed alphabetically. (Exp. 113794).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plump Kernels	Thin Kernels	Plant Height	3/ Lodging
	2011	2010-2011	2009-2011			- lb/bu -				- % -
	----- bushels/acre -----									
<u>Commercial</u>										
AC Metcalfe	100.0	109.1	109.6	49.1	11.5	13.0	91.2	5.2	45.4	4.3
Baronesse [†]	<i>140.4</i>			<i>51.7</i>	<i>11.1</i>	<i>13.1</i>	<i>91.4</i>	<i>4.4</i>	<i>41.3</i>	<i>4.0</i>
Conrad	115.3	111.1	112.6	48.5	11.6	13.4	80.3	11.2	37.3	5.3
Craft	142.4 **	120.1	113.9	49.5	10.7	10.9	85.6	7.5	37.8	4.3
Gallatin	114.7	105.0	106.9	50.5	11.2	13.2	81.7	9.0	42.0	7.3
Geraldine	<i>131.8</i>			<i>50.0</i>	<i>10.6</i>	<i>12.6</i>	<i>77.2</i>	<i>12.6</i>	<i>41.7</i>	<i>5.0</i>
Goldeneye	101.4	97.4	108.1	47.8	11.4	12.7	82.6	8.7	42.3	6.0
Harrington	<i>93.5</i>			<i>44.9</i>	<i>10.9</i>	<i>13.9</i>	<i>67.2</i>	<i>18.7</i>	<i>42.5</i>	<i>9.0</i>
Haxby	123.2	106.4		51.4	11.6	12.1	84.9	8.5	38.6	3.3
Hockett [^]	<i>96.5</i>			<i>51.5</i>	<i>11.3</i>	<i>12.9</i>	<i>88.4</i>	<i>6.5</i>	<i>39.4</i>	<i>6.0</i>
Moravian 115	121.9	128.1		44.5	11.0	11.7	83.0	8.7	33.2	1.0
Moravian 69	136.1 *	128.5		46.4	11.8	11.7	74.7	12.5	32.9	1.7
Pinnacle	114.2	106.6	108.0	50.2	11.7	11.2	97.2	1.1	41.6	3.3
Tradition	105.9			47.7	10.6	13.4	83.0	8.3	43.6	6.7
<u>Experimental</u>										
MT010158	129.0 *	120.4	119.9	50.2	11.4	12.6	87.7	6.3	38.3	2.3
MT010160	119.0	111.6		50.7	11.4	12.4	88.8	4.7	41.6	6.0
MT020155	108.6	103.9	106.3	49.1	11.7	12.9	83.8	9.1	42.9	6.7
MT020162	125.1 *			49.9	11.2	12.5	86.4	6.6	41.1	3.3
MT061035	122.7			49.4	11.4	11.5	86.5	6.2	39.2	5.7
MT070175	137.6 *			51.9	11.6	11.1	94.4	2.9	41.5	0.3
Average	119.8	112.4	110.6	49.2	11.4	12.3	85.7	7.3	40.0	4.2
PLSD (p=0.05)	18.6	ns	ns	1.3	0.7	1.2	5.9	3.4	2.8	4.0
CV%	9.3	18.5	18.5	1.5	3.7	5.6	4.1	28.3	4.2	57.4

[†] Entries name with bold font were excluded from statistical analysis as only one replication data was available due to harvesting error.

1/ Yields are based on 48 pound standard bushel weight and adjusted to 13.0 percent moisture content.

2/ Grain protein values adjusted to 12% moisture 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. 113794)

Planted: March 21,, 2011
Harvested: August 10, 2011
Fertility: 100 lb N/a preplant; 67 lb/a 11-52-0 at planting; 120 lb N/a top dress in May, 2011
Herbicide: n/a
Previous Crop: corn
Irrigation: flood

Table 5. Performance of 20 spring barley cultivars and experimental lines tested under irrigated conditions near Hysham, Montana during 2011. Cultivars listed alphabetically. (Exp. 113795).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain	Plump Kernels	Thin Kernels	Plant Height	3/ Lodging
	2011	2010-2011	2009-2011			Protein				- lb/bu -
	----- bushels/acre -----									
<u>Commercial</u>										
AC Metcalfe	103.0	85.6	91.6	47.7	10.2	13.3	86.6	5.3	36.9	2.7
Baronesse	110.0	98.0	104.2	49.2	10.4	13.7	86.2	7.2	39.4	4.3
Conrad	104.2	91.5	98.2	49.3	10.4	12.8	79.8	6.7	35.6	5.3
Craft	101.3	91.9	94.1	47.0	10.3	14.0	79.0	11.6	35.2	3.7
Gallatin	111.0	89.6	94.4	48.7	10.5	13.4	86.4	7.1	38.3	5.7
Geraldine	99.5	89.0	100.5	46.6	10.1	13.8	64.5	21.6	33.5	6.0
Goldeneye	108.7	93.5	84.0	48.7	10.3	13.2	89.5	5.0	36.1	1.3
Harrington	101.5	95.3	97.8	46.9	10.0	13.7	82.7	9.7	38.1	4.3
Haxby	109.2	93.1		50.7	10.6	12.5	95.8	1.7	33.5	3.3
Hockett	115.7	97.1	99.1	49.9	8.9	14.1	77.7	12.3	37.0	6.0
Moravian 115	105.8	105.8		45.6	10.1	13.5	82.7	8.5	27.7	1.0
Moravian 69	106.2	102.5		49.9	10.7	12.2	94.1	2.2	29.4	1.0
Pinnacle	99.2	83.8	88.1	48.1	10.2	14.0	84.2	7.5	36.6	2.3
Tradition	113.4			49.2	10.2	13.2	74.2	5.7	37.3	4.7
<u>Experimental</u>										
MT010158	98.5	87.0	95.9	48.0	10.2	13.6	92.9	3.1	35.2	3.3
MT010160	97.5	82.9		48.9	10.4	13.5	91.6	4.3	35.2	2.7
MT020155	109.7	87.1	96.1	46.0	10.0	13.7	81.0	9.2	38.7	6.0
MT020162	86.9			50.3	10.6	12.5	94.7	2.3	35.6	4.0
MT061035	106.9			47.4	10.5	12.7	83.1	7.9	33.2	2.3
MT070175	100.1			47.0	10.3	13.0	87.0	5.7	37.4	1.0
Average	104.4	92.1	95.3	48.3	10.3	13.3	84.7	7.2	35.5	3.5
PLSD (p=0.05)	ns	ns	ns	ns	0.7	ns	15.5	9.0	3.2	ns
CV%	11.8	16.3	19.0	5.0	4.4	16.1	11.1	75.1	5.4	73.8

1/ Yields are based on 48 pound standard bushel weight and adjusted to 13.0 percent moisture content.

2/ Grain protein values adjusted to 12 percent moisture 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. 113795)

Planted: April 29, 2011

Harvested: August 15, 2011

Fertility: 60 lb N/a preplant, 67 lb/a 11-52-0 at planting; 140 lb N/a top dress, May, 2011

Previous Crop: sugarbeets

Irrigation: flood

Precipitation: n/a

n/a

Table 6. Grain yield^{1/} of 20 spring barley cultivars tested at five locations in south central Montana during 2011. Varieties listed by declining five-location average yield.

Cultivar	Dryland				Irrigated			Five Location Average
	Huntley	Molt	Broadview	Ave.	Fromberg	Hysham	Ave.	
	----- bushels/acre -----							
MT061035	74.9**	17.3	41.7	44.6**	122.7	106.9	114.8	72.7
Craft	74.2*	12.2	28.7	38.4	142.4**	101.3	121.8	71.8
Moravian 69	66.8*	15.9	32.2	38.3	136.1*	106.2	121.2	71.4
MT070175	66.7*	12.6	31.7	37.0	137.6*	100.1	118.9	69.7
MT020155	73.9*	17.0	35.3	42.0*	108.6	109.7	109.2	68.9
Gallatin	68.4*	12.1	34.3	38.2	114.7	111.0	112.9	68.1
Haxby	67.7*	12.0	25.7	35.1	123.2	109.2	116.2	67.5
Goldeneye	72.0*	13.5	37.2	40.9*	101.4	108.7	105.1	66.6
Tradition	67.4*	6.9	39.6	38.0	105.9	113.4	109.6	66.6
MT010158	61.7	14.5	27.3	34.5	129.0*	98.5	113.8	66.2
Conrad	62.9	15.9	30.3	36.4	115.3	104.2	109.8	65.7
Moravian 115	52.4	11.9	28.5	30.9	121.9	105.8	113.8	64.1
MT010160	62.2	14.4	27.3	34.7	119.0	97.5	108.2	64.1
AC Metcalfe	63.8	15.9	33.9	37.8	100.0	103.0	101.5	63.3
Pinnacle	61.1	11.0	30.0	34.0	114.2	99.2	106.7	63.1
MT020162	63.3	13.0	26.4	34.2	125.1*	86.9	106.0	62.9
Baronesse	65.8	10.9	31.8	36.1	<i>140.4</i>	110.0	--	--
Harrington	61.3	14.6	25.7	33.9	<i>93.5</i>	101.5	--	--
Geraldine	65.4	10.2	29.6	35.1	<i>131.8</i>	99.5	--	--
Hockett	66.6*	12.2	24.5	34.4	<i>96.5</i>	115.7	--	--
Average	65.9	13.2	31.1	36.7	119.8	104.4	111.8	67.1
PLSD (p=0.05)	8.3	ns	ns	6.1	18.6	ns	ns	ns
CV%	7.6	25.9	22.9	17.3	9.3	11.8	17.8	18.9

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 7. Performance of 20 spring barley cultivars and experimental lines tested under dryland and irrigated conditions at five locations in south central Montana during 2010. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain	Plump Kernels	Thin Kernels	Plant Height
	2011	2010-2011	2009-2011			Protein			
	----- bushels/acre -----			- lb/bu -	- % -	- % -	- % -	- % -	- inches -
<u>Commercial</u>									
AC Metcalfe	63.3	69.4	65.6	48.8	10.1	13.9	75.5	10.4	32.4
Conrad	65.7	73.8	70.4	48.0	10.1	13.8	73.0	11.5	29
Craft	71.8	72.6	66.9	48.3	10.0	12.9	69.4	14.8	27.9
Gallatin	68.1	71.1	66.7	49.0	9.9	13.4	71.9	12.0	31.3
Goldeneye	66.6	71.4	64.9	47.6	9.7	13.6	68.1	14.9	30.8
Haxby	67.5	69.5		51.1	10.2	13.0	72.7	10.8	28.7
Moravian 115	64.1	76.5		45.0	9.7	13.5	75.8	12.0	23.8
Moravian 69	71.4	79.3		46.4	9.3	13.4	63.1	20.2	25.1
Pinnacle	63.1	68.1	63.6	49.0	10.0	12.5	82.9	7.5	30.5
Tradition	66.6			48.1	9.5	14.0	66.6	13.1	31.4
<u>Experimental</u>									
MT010158	66.2	72.6	69.0	49.3	10.0	13.8	77.3	8.9	29.3
MT010160	64.1	69.8		49.3	10.1	13.4	76.8	9.2	30.1
MT020155	68.9	71.0	68.1	47.9	9.7	13.4	72.5	11.6	31.7
MT020162	62.9			49.4	10.2	12.9	71.7	12.1	29.9
MT061035	72.7			48.2	10.0	12.7	73.3	11.3	28.1
MT070175	69.7			49.3	10.1	12.4	80.4	8.9	31.4
Average	67.1	72.1	66.9	48.4	9.9	13.3	73.2	11.8	29.5
PLSD (p=0.05)	ns	ns	ns	1.8	ns	1.1	9.3	ns	2.1
CV%	18.9	19.3	19.9	5.2	8.0	11.1	17.5	77.9	9.5
Location Years	5	10	15	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 12% moisture 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 8. Performance of 20 spring barley cultivars and experimental lines tested under irrigated conditions at two locations in south central Montana during 2011. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein		Plump Kernels	Thin Kernels	Plant Height	3/ Lodging
	2011	2010-2011	2009-2011			- % -	- % -				
	----- bushels/acre -----			- lb/bu -	- % -	- % -	- % -	- % -	- inches -	0-9	
<u>Commercial</u>											
AC Metcalfe	101.5	97.3	100.6	48.4	10.9	13.2	88.9	5.3	41.1	3.5	
Conrad	109.8	101.3	105.4	48.9	11.0	13.1	80.0	8.9	36.4	5.3	
Craft	121.8	106.0*	104.0	48.3	10.5	12.5	82.3	9.5	36.5	4.0	
Gallatin	112.9	97.3	100.6	49.6	10.8	13.3	84.0	8.0	40.2	6.5	
Goldeneye	105.1	95.4	96.0	48.2	10.9	12.9	86.1	6.9	39.2	3.7	
Haxby	116.2	99.7		51.1	11.1	12.3	90.4	5.1	36	3.3	
Moravian 115	113.8	117.0**		45.0	10.5	12.6	82.8	8.6	30.4	1.0	
Moravian 69	121.2	115.5*		48.2	11.3	11.9	84.4	7.4	31.2	1.3	
Pinnacle	106.7	95.2	98.0	49.2	11.0	12.6	90.7	4.3	39.1	2.8	
Tradition	109.6			48.5	10.4	13.3	78.6	7.0	40.4	5.7	
<u>Experimental</u>											
MT010158	113.8	103.7	107.9	49.1	10.8	13.1	90.3	4.7	36.7	2.8	
MT010160	108.2	97.3		49.8	10.9	13.0	90.2	4.5	38.4	4.3	
MT020155	109.2	95.5	101.2	47.5	10.8	13.3	82.4	9.1	40.8	6.3	
MT020162	106.0			50.1	10.9	12.5	90.6	4.5	38.3	3.7	
MT061035	114.8			48.4	10.9	12.1	84.8	7.0	36.2	4.0	
MT070175	118.9			49.4	10.9	12.0	90.7	4.3	39.4	0.7	
Average	111.8	101.8	101.7	48.7	10.9	12.7	86.1	6.6	37.5	3.7	
PLSD (p=0.05)	ns	12.2	ns	ns	ns	ns	ns	ns	2.6	2.4	
CV%	17.8	16.9	18.2	5.2	3.8	10.0	11.9	77.8	5.6	53.4	
Location Years	2	4	6	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 12% moisture 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 9. Performance of 20 spring barley cultivars and experimental lines tested under dryland conditions at three locations in south central Montana during 2011. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain	Plump Kernels	Thin Kernels	Plant Height
	2011	2010-2011	2009-2011			Protein			
	----- bushels/acre -----			- lb/bu -	- % -	- % -	- % -	- % -	- inches -
<u>Commercial</u>									
AC Metcalfe	37.8	50.7*	47.3	49.0	9.6	14.3	66.6	13.8	26.5
Baronesse	36.1	56.1**	53.7*	50.0	9.6	13.3	71.4	11.9	26.1
Conrad	36.4	55.5*	52.1*	47.4	9.5	14.3	68.3	13.2	24.0
Craft	38.4	50.4*	46.1	48.3	9.6	13.2	60.9	18.3	22.2
Gallatin	38.2	53.7*	48.9	48.6	9.3	13.5	63.9	14.6	25.5
Geraldine	35.1	54.7*	50.9*	48.0	9.4	14.1	48.7	27.3	22.5
Goldeneye	40.9*	55.4*	51.4*	47.1	9.0	14.1	56.2	20.3	25.2
Harrington	33.9	47.7	44.1	47.2	9.3	13.6	66.6	14.7	26.2
Haxby	35.1	49.3		51.1	9.6	13.5	60.9	14.5	23.8
Hockett	34.4	48.2	46.3	49.7	9.6	13.5	74.8	10.6	25.6
Moravian 115	30.9	49.6		44.9	9.2	14.1	71.1	14.2	19.3
Moravian 69	38.3	55.2		45.3	8.0	14.3	49.0	28.7	21.1
Pinnacle	34.0	50.1	45.9	48.9	9.4	12.5	77.6	9.6	24.8
Tradition	38.0			47.8	8.9	14.5	58.7	17.2	25.4
<u>Experimental</u>									
MT010158	34.5	51.8*	48.7	49.4	9.5	14.3	68.7	11.7	24.3
MT010160	34.7	51.5*		49.0	9.6	13.7	67.8	12.4	24.6
MT020155	42.0*	54.6*	50.8*	48.2	9.0	13.4	65.9	13.2	25.5
MT020162	34.2			48.9	9.7	13.2	59.1	17.2	24.3
MT061035	44.6**			48.1	9.4	13.1	65.7	14.1	22.7
MT070175	37.0			49.1	9.5	12.7	73.5	12.0	26.0
Average	36.7	52.2	48.8	48.3	9.3	13.7	64.8	15.5	24.3
PLSD (p=0.05)	6.1	5.8	4.6	2.6	0.7	ns	12.1	10.6	2.7
CV%	17.3	16.8	17.5	5.6	8.3	11.3	19.5	71.9	11.7
Location Years	3	6	9	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 12% moisture 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).