MONTANA STATE UNIVERSITY
MONTANA AGRICULTURAL EXPERIMENT STATION

RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2016

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

PROJECT TITLE: Dryland and Irrigated Intrastate Spring Barley Yield Performance Trials near Huntley, Montana. (Exps. 162108 and 162209).

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OBJECTIVES: To evaluate the agronomic performance of experimental barley lines and existing barley varieties under dryland and irrigated conditions. Also, to provide barley growers in south central Montana with a reliable, unbiased, up-to-date source of information that will permit valid comparisons among new experimental lines and existing barley varieties. This information should help barley producers select varieties best suited to their particular area and growing conditions.

METHODS: The 2016 dryland and irrigated Intrastate spring barley trials had 49 entries and were planted using a 7 x 7 partially-balanced lattice design with three replications. 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 7-inch row spacing. All rows of each test plot in both trials were trimmed 36 inches and were harvested using an experimental-plot combine. Recorded grain yields were adjusted to 13% grain moisture content and are reported in bushels per acre (bu/ac) based on a 48-pound standard bushel weight. Test weight (pounds per bushel, lb/bu) and percent grain moisture content were obtained for each plot using a Dickey-john GAC 2100 grain analyzer. Percent plump and thin kernels were determined by measuring the amount of a 100-gram subsample retained above a 6/64" slotted screen and passing through a 5½/64" slotted screen, respectively, following 30 oscillations on a sieve shaker. Grain protein (%) was determined for each entry from all replications. Grain protein 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. Heading date was noted when 50% of the heads in a plot had extended out of the flag leaf. Heading dates were recorded in Julian days (number of days from January 1) for statistical purposes. Corresponding calendar dates also are presented.

RESULTS and SUMMARY: Unusually warm and dry conditions prevailed during the preceding fall and winter months at Huntley. Although conditions remained warmer than average during March, April and May of 2016, precipitation also was above average during those months. June growing conditions were much warmer than normal with less than average precipitation.

The 2016 dryland trial produced slightly higher yields than the previous year, while the average percent grain protein increased more than 35% over the previous year. The average yield for the irrigated trial was slightly less than the previous year, and the average percent grain protein was almost the same as the previous year.

Dryland Trial (162108)

Agronomic performance of the spring barley cultivars and experimental lines tested during 2016 under dryland conditions near Huntley is presented in Table 1. Dryland barley yields ranged from 71.0 bu/ac for 'ME08053-050' to 116.4 bu/ac for 'Odyssey'. There were no entries that produced yields statistically equal to the highest yielding entry. Test weights averaged 51.5 lb/bu, and 'Haxby' had the highest test weight at 53.5 lb/bu. All of the 49 entries in the dryland barley trial produced test weights greater than or equal to 48.0 lb/bu. Barley protein averaged 15.0 percent. Two-year dryland spring barley yields averaged 83.3 bu/ac for 2015-2016, with 'MT124016' having the highest yield of 94.5 bu/ac. Three-year dryland spring barley yields averaged 82.7 bu/ac for 2014-2016, and 'Champion' produced the highest yield of 92.1 bu/ac averaged across the last three years. There were no significant differences in the yields averaged across the last two or three years.

Irrigated Trial (162209)

Agronomic performance of the spring barley cultivars and experimental lines tested during 2016 under irrigated conditions near Huntley is presented in Table 2. Irrigated intrastate barley yields ranged from 63.3 bu/ac for '10WA-117.24' to 128.3 bu/ac for 'Overture'. 'LCS Genie', 'ABI Growler', 'Odyssey', 'SY Sirish', and '08ARS028-20' produced yields statistically equal to the highest yielding entry. Test weights averaged 52.3 lb/bu, and all of the 49 entries produced test weights greater than or equal to 48.0 lb/bu. Barley protein averaged 10.9 percent and ranged from 9.8 for 'Odyssey' to 12.5 for 'ME08053-050'. Two-year irrigated spring barley yields averaged 95.5 bu/ac, and 'MT124016' produced the highest yield averaged across the last two years. 'Champion', 'Haxby', 'AC Metcalfe', and eight experimental lines produced yields statistically equal to the highest yielding entry.

FUTURE PLANS:

On-station dryland and irrigated Intrastate barley evaluations will continue in 2017 at the Southern Agricultural Research Center.

Table 1. 2016 Dryland Spring Barley Intrastate Nursery. MSU Southern Ag Research Center, Huntley, MT.

	Grain Yield[1/]			Test	Grain	Grain[2/]	Plump	Thin	Plant	Heading Date	
Cultivar	2016	2015-16	2014-16	Weight	Moisture	Protein	Kernels	Kernels	Height	Julian	Calendar
	---------- bushels/acre ----------										
		-		lb/bu	%	%	%	%	inches		
08ARS012-79	79.9			51.1	13.5	14.9	93.2	2.6	38.9	156.7	Jun 5
08ARS028-20	104.9			50.1	12.7	15.1	90.9	3.2	36.0	160.7	Jun 9
08ARS116-91	93.0			52.2	11.9	15.1	92.7	2.5	37.5	155.7	Jun 4
08MT-15	101.5			52.7	12.1	15.9	93.0	2.0	33.2	159.0	Jun 8
08MT-19	82.7			51.3	12.1	15.9	90.2	3.9	39.9	158.3	Jun 7
08MT-63	94.4			52.0	12.4	15.3	88.0	4.7	38.8	157.0	Jun 6
08MT-95	85.9			51.7	12.8	15.7	90.1	4.5	42.8	157.0	Jun 6
10WA-117.17	89.2			50.8	12.6	15.2	91.2	3.0	38.6	157.7	Jun 6
10WA-117.24	66.0			48.7	12.1	17.4	89.2	4.3	41.3	157.7	Jun 6
11WA-107.43	95.0			52.4	13.6	15.0	90.6	4.1	37.7	157.0	Jun 6
AAC Synergy	85.2			51.5	12.6	15.7	94.9	1.9	38.3	157.7	Jun 6
ABI Balster	99.5			50.8	12.2	14.7	91.5	3.0	36.7	160.0	Jun 9
ABI Growler	103.7			49.9	12.1	13.8	93.8	2.3	34.6	158.3	Jun 7
AC Metcalfe	79.8	86.8	83.3	51.9	12.1	16.7	91.1	3.4	39.6	156.3	Jun 5
CDC Copeland	98.2			51.7	12.2	15.2	94.7	2.0	37.1	158.3	Jun 7
Champion	97.3	94.4	92.1	52.8	13.2	15.3	92.2	2.9	38.6	156.7	Jun 5
Harrington	86.9	83.7	80.1	51.2	12.4	16.0	93.8	1.9	38.3	158.3	Jun 7
Haxby	74.4	80.6	82.9	53.5	11.9	15.8	91.3	3.5	41.3	156.7	Jun 5
Hockett	71.6	80.3	80.4	52.0	12.3	15.9	91.4	3.8	38.7	157.0	Jun 6
LCS Genie	100.5			52.3	13.3	14.1	87.2	4.4	31.5	164.7	Jun 13
LCS Vespa	102.0			52.0	11.9	15.5	90.4	3.0	31.8	166.0	Jun 15
ME08032-156	105.8			51.9	12.7	14.8	88.7	3.5	32.9	158.3	Jun 7
ME08053-050	71.0			50.3	12.6	16.9	94.2	2.5	40.2	157.0	Jun 6
MT090182	90.3			51.4	13.1	13.8	91.4	3.0	37.2	159.0	Jun 8
MT090190	84.1			51.6	13.3	13.5	90.4	3.7	37.1	159.7	Jun 8
MT090193	92.7			51.4	12.8	14.0	93.2	2.5	37.7	159.0	Jun 8
MT100120	90.3			51.8	14.9	13.0	94.2	2.1	39.5	158.3	Jun 7
MT100126	89.5			51.2	14.7	13.4	93.6	2.4	37.3	158.3	Jun 7
MT124016	98.1	94.5		51.7	12.4	14.5	92.5	2.6	38.3	157.0	Jun 6
MT124069	93.2	90.9		51.1	13.6	14.3	93.2	2.1	37.4	163.0	Jun 12
MT124073	92.4	94.1		51.8	12.5	14.0	90.5	2.8	39.6	157.7	Jun 6

MT124112	71.8	77.7		50.9	13.1	13.7	93.1	3.1	38.6	156.7	Jun 5
MT124118	75.5	81.7		51.5	12.8	15.9	91.4	3.6	40.1	157.0	Jun 6
MT124243	99.9			51.4	13.4	13.6	92.7	2.8	39.8	157.7	Jun 6
MT124411	77.7			51.4	13.7	15.7	93.6	2.4	39.6	157.3	Jun 6
MT124454	77.8	79.6		52.0	12.8	16.0	93.1	2.8	39.8	156.7	Jun 5
MT124457	74.0	77.8		52.8	12.2	15.5	92.7	2.7	39.8	156.7	Jun 5
MT124555	84.7	96.8		53.0	12.8	15.0	93.5	2.8	37.1	159.7	Jun 8
MT124582	73.8			51.3	13.4	16.4	93.4	3.0	40.1	156.7	Jun 5
MT124645	86.6	81.8		51.8	12.2	14.9	93.9	2.2	37.6	157.7	Jun 6
MT124663	70.8	70.2		49.9	14.9	14.5	91.6	3.7	38.1	157.0	Jun 6
MT124673	73.3	75.5		48.9	15.0	14.5	93.0	2.8	37.5	156.7	Jun 5
MT124688	89.1			52.2	13.2	14.6	93.4	2.6	39.6	157.0	Jun 6
MT124716	83.1	81.2		51.2	12.1	15.0	88.1	3.5	36.8	157.7	Jun 6
MT124728	84.3	72.7	77.3	51.2	12.2	15.4	88.4	3.7	37.8	157.0	Jun 6
Odyssey	**116.4****			51.1	14.3	14.0	95.8	1.6	31.5	164.0	Jun 13
Overture	102.4			51.9	12.8	14.0	93.5	2.6	31.6	165.0	Jun 14
SY Sirish	107.6			53.0	12.5	14.6	94.8	1.6	30.8	159.7	Jun 8
Westminster	94.9			51.6	12.9	15.8	95.0	1.7	35.3	162.0	Jun 11
Average	88.6	83.3	82.7	51.5	12.9	15.0	92.1	2.9	37.6	158.5	Jun 7
PLSD (p=0.05)	7.8	ns	ns	1.1	1.4	0.7	3.5	1.5	2.0	2.3	
CV%	5.4	17.0	20.6	1.3	6.6	3.0	2.3	32.6	3.3	0.9	
Lattice RE%	99	-	-	91	101	100	100	97	98	93	

1/ Grain yields are based on a 48-pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry within a column.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Planting Date: March 9, 2016

Harvest Date: July 14, 2016

Table 2. 2016 Irrigated Spring Barley Intrastate Nursery. MSU Southern Agricultural Research Center, Huntley, MT

Cultivar	Grain Yield[1/]		Test Weight	Grain Moisture	Grain Protein[2/]	Plump Kernels	Thin Kernels	Plant Height	Heading Date	
	2016	2015-16							Julian	Calendar
	----- bushels/acre ---									
	--		lb/bu	%	%	%	%	inches		
08ARS012-79	89.3		52.4	9.2	10.7	92.5	2.3	36.7	156.3	Jun 5
08ARS028-20	**117.2***		52.3	9.3	10.6	95.1	1.5	35.0	157.0	Jun 6
08ARS116-91	100.2		52.3	9.4	10.2	91.3	2.6	35.7	154.7	Jun 3
08MT-15	100.6		53.7	9.3	11.5	96.0	1.1	32.5	161.0	Jun 10
08MT-19	96.8		52.9	9.4	10.7	94.5	1.9	38.6	157.7	Jun 6
08MT-63	101.5		52.7	9.4	11.2	89.0	3.8	40.3	157.0	Jun 6
08MT-95	85.6		52.3	9.2	11.1	91.7	3.1	41.8	156.3	Jun 5
10WA-117.17	89.3		52.1	9.2	11.3	91.3	2.8	38.3	157.0	Jun 6
10WA-117.24	63.3		50.4	9.0	12.2	93.6	2.3	39.5	157.0	Jun 6
11WA-107.43	98.8		52.9	9.5	11.8	92.1	2.7	36.2	157.0	Jun 6
AAC Synergy	82.7		51.6	9.2	11.0	96.6	1.3	38.9	158.3	Jun 7
ABI Balster	105.0		50.6	9.2	10.7	92.8	2.3	35.6	157.0	Jun 6
ABI Growler	**117.6***		50.6	9.1	10.3	92.9	2.3	35.9	157.0	Jun 6
AC Metcalfe	86.1	**95.7***	53.1	9.2	11.4	94.1	1.7	40.6	156.7	Jun 5
CDC Copeland	100.1		53.2	9.2	11.0	95.6	1.7	37.4	161.0	Jun 10
Champion	95.3	**101.9***	53.5	9.3	10.8	91.7	2.2	37.1	157.0	Jun 6
Harrington	92.5	89.2	52.8	9.3	11.2	94.6	1.7	37.3	157.0	Jun 6
Haxby	77.6	**92.9***	54.5	9.3	11.7	94.1	1.5	37.6	157.0	Jun 6
Hockett	74.7	90.7	52.4	9.1	11.5	92.6	3.0	36.8	157.0	Jun 6
LCS Genie	**122.3***		52.1	9.1	10.1	92.9	2.5	31.9	159.7	Jun 8
LCS Vespa	111.4		52.1	9.5	10.7	94.4	1.9	29.7	161.0	Jun 10
ME08032-156	109.5		52.1	9.1	11.4	94.9	1.6	31.0	158.3	Jun 7
ME08053-050	90.1		51.5	9.1	12.5	95.8	1.5	37.1	157.0	Jun 6
MT090182	97.5		52.5	9.2	10.3	92.6	2.4	38.7	157.0	Jun 6
MT090190	98.3		52.6	9.3	9.9	93.9	2.1	38.1	157.0	Jun 6
MT090193	98.0		51.7	9.0	10.2	93.9	1.9	38.9	158.3	Jun 7
MT100120	98.6		52.8	9.2	10.2	94.1	1.9	39.5	158.3	Jun 7
MT100126	98.9		52.3	9.2	9.9	93.8	2.1	37.9	161.0	Jun 10
MT124016	101.2	**106.8****	52.1	9.5	10.5	91.5	2.6	36.9	156.0	Jun 5
MT124069	97.0	**99.3***	51.5	9.1	10.2	94.3	1.8	37.3	161.0	Jun 10
MT124073	94.2	**101.2***	52.0	9.1	10.7	92.7	2.4	39.9	158.3	Jun 7

MT124112	77.1	89.9	51.3	9.1	10.8	93.2	2.2	36.2	154.0	Jun 3
MT124118	89.7	**99.7***	53.0	9.4	11.9	92.7	2.4	37.6	156.7	Jun 5
MT124243	112.4		52.2	9.3	10.3	93.4	2.4	39.4	157.0	Jun 6
MT124411	87.8		52.3	9.2	10.9	91.0	3.3	39.0	156.7	Jun 5
MT124454	87.1	**96.2***	52.9	9.1	11.6	94.1	2.0	38.6	156.7	Jun 5
MT124457	86.3	**98.4***	53.2	9.0	12.3	93.7	2.2	38.8	156.3	Jun 5
MT124555	102.2	**106.3***	53.4	9.5	10.4	93.9	2.4	37.4	158.3	Jun 7
MT124582	81.0		52.8	9.3	12.3	93.7	2.0	37.3	156.0	Jun 5
MT124645	90.9	**97.3***	52.2	9.1	10.5	93.3	2.4	36.9	157.0	Jun 6
MT124663	67.3	82.8	51.8	9.3	11.2	94.9	1.8	36.2	155.7	Jun 4
MT124673	74.6	81.5	52.5	9.3	11.2	92.0	2.5	34.7	153.7	Jun 2
MT124688	103.0		52.9	8.9	10.5	92.6	2.7	38.7	158.3	Jun 7
MT124716	91.6	**96.3***	51.8	9.0	11.3	90.9	2.5	36.5	157.0	Jun 6
MT124728	86.3	**93.7***	52.2	9.2	11.2	91.5	2.6	36.4	157.0	Jun 6
Odyssey	**120.5***		50.7	9.1	9.8	94.1	1.9	30.7	161.0	Jun 10
Overture	**128.3****		51.1	8.9	10.1	93.3	2.3	31.9	161.0	Jun 10
SY Sirish	**119.8***		51.6	9.0	10.5	94.8	1.7	31.3	161.0	Jun 10
Westminster	101.9		51.2	9.2	10.7	96.0	1.6	33.3	161.0	Jun 10
Average	95.9	95.5	52.3	9.2	10.9	93.4	2.2	36.7	157.7	Jun 6
PLSD (p=0.05)	11.7	14.8	0.8	0.3	0.9	2.2	1.1	1.9	1.8	
CV%	7.5	12.7	0.9	1.9	5.2	1.5	29.6	3.1	0.7	
Lattice RE%	89	-	100	92	93	101	102	95	103	

1/ Grain yields are based on a 48-pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry within a column.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Planting Date: March 9, 2016

Harvest Date: August 4, 2016