RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2015

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. 152108 and 152209).

PROJECT LEADERS: Kenneth D. Kephart, Agronomist, SARC, Huntley
Kelli Maxwell, Research Associate, SARC, Huntley

PROJECT PERSONNEL: Jamie Sherman, Assistant Professor and Barley Breeder, PSPP, Bozeman
Elizabeth Elmore, Research Associate, Bozeman

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 2015 dryland and irrigated intrastate spring barley trials had 49 entries and were planted using an 7 x 7 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 6-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 by near-infrared spectroscopy for each entry from all replications, 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. Heading date was noted when 50% of the heads in a plot had extended beyond the flag leaf. Heading and maturity dates were recorded in Julian days (number of days from January 1) for statistical purposes. Corresponding calendar dates also are presented.

RESULTS and SUMMARY:

Dryland Trial (Exp. 152108)

Agronomic performance of the spring barley cultivars and experimental lines tested during 2015 under dryland conditions near Huntley is presented in Table 1. Dryland barley yields ranged from 109 bu/ac for 'MT124555' to 51 bu/a for 'MT124134'. Only the experimental line 'MT124073' produced yields statistically equal to the yield of MT124555 under dryland conditions. Grain yield among the malt- and feed-type commercial entries under dryland conditions varied from 94 bu/a for 'AC Metcalfe' to 75 bu/a for 'Craft'. The entries 'Moravian 115', 'Champion', 'Hockett', 'Haxby' and 'Conrad' produced yields ranging from 93 to 87 bu/a, all statistically equal to the yield of AC Metcalfe. Grain yield among the forage-type entries varied from 88 bu/a for 'Lavina' to 63 bu/a for 'Haybet'. Grain test weight of the 49 entries averaged 52.2 lb/bu. MT124555 had the highest test weight at 54.2 lb/bu. All of the 49 entries in the dryland barley trial produced test weights heavier than

48.0 lb/bu. Barley protein averaged 11.1 percent and ranged from 13.4 percent for 'MT124001' to 9.5 percent for Haxby. All but two of the 49 entries in the dryland barley trial produced grain possessing more than 90 percent plump kernels. Two-year dryland spring barley yields averaged 83 bu/a for 2014-2015, with Champion having the highest average yield of 89 bu/a. Three-year dryland spring barley yields at this location averaged 80.0 bu/ac for 2013-2015 production years. Champion produced the highest yield averaged across the last three years, averaging 88 bu/a. Only Haxby (averaging 84 bu/a) produced yields equal to the three-year average of the highest yielding entry, Champion.

Irrigated Trial (Exp. 152209)

Agronomic performance of the spring barley cultivars and experimental lines tested during 2015 under irrigated conditions near Huntley is presented in Table 2. Irrigated barley yields ranged from 120 bu/a for 'MT124148' to 86 bu/a for MT124134. Grain yield among the malt- and feed-type commercial entries under irrigated conditions varied from 114 bu/a for Craft to 86 bu/a for 'Harrington'. Haxby (110 bu/a), Champion (110 bu/a), Merit (108 bu/a) and Hockett (105 bu/a) produced irrigated yields statistically equal to the yield of Craft. Grain yield among the forage-type entries varied from 103 bu/a for Lavina to 76 bu/a for Haybet. Test weights averaged 52.0 lb/bu and all but two of the 49 entries produced test weights greater than 48.0 lb/bu. Plump barley for the irrigated trial averaged 96 percent. Barley protein averaged 10.8 percent and ranged from 13.9 percent for Haybet to 9.1 percent for 'MT124601'.

FUTURE PLANS:

On-station dryland and irrigated intrastate barley evaluations will continue in 2016 at the Southern Agricultural Research Center.

Table 1. Agronomic evaluation of 49 entries tested in the Intrastate Spring Barley Performance Trial conducted at Huntley under dryland conditions in 2015. MSU Southern Agricultural Research Center. Exp 210815.

		Grain Yield[1/]			Test	Grain	Grain[2/]	Plump	Thin	Plant	Heading Date		Maturity Date	
Cultivar	Pedigree	2015	2014-15	2013-15	Weight	Moisture	Protein	Kernels	Kernels	Height	Julian	Calendar	Julian	Calendar
		---------- bushels/acre ----------			lb/bu	%	%	%	%	inches				
MT124001	MT010158/MT070175	91.0			52.6	12.8	13.4	97.1	0.9	35.9	163.0	Jun 12	195.5	Jul 14
MT124007	MT010158/MT070175	80.3			52.1	11.3	11.6	98.0	0.9	35.7	163.0	Jun 12	192.3	Jul 11
MT124008	MT010158/MT070175	85.6			51.9	12.7	11.8	96.8	1.2	34.2	164.3	Jun 13	196.8	Jul 15
MT124015	MT010158/MT070175	84.0			51.8	11.0	10.7	96.9	0.9	34.0	163.0	Jun 12	190.6	Jul 9
MT124016	MT010158/MT070175	86.9			52.0	11.2	9.7	96.9	0.9	30.3	165.0	Jun 14	190.3	Jul 9
MT124018	MT010158/MT070175	80.3			52.4	11.3	11.5	97.0	0.9	32.5	161.3	Jun 10	191.3	Jul 10
MT124025	MT010158/MT070175	90.8	86.3		52.4	12.7	11.7	96.7	1.2	34.6	164.3	Jun 13	193.9	Jul 12
MT124026	MT010158/MT070175	84.9	84.0		52.5	11.4	10.7	97.2	0.9	34.6	163.0	Jun 12	191.8	Jul 10
MT124069	MT010158/MT070175	90.2			52.1	10.9	10.5	96.4	1.5	34.9	164.0	Jun 13	191.4	Jul 10
MT124071	MT010158/MT070175	76.3			50.6	11.4	10.1	95.4	1.5	30.9	161.7	Jun 10	193.5	Jul 12
MT124073	MT010158/MT070175	**98.8***			52.1	10.9	11.1	95.8	1.2	37.0	163.0	Jun 12	192.3	Jul 11
MT124112	Hockett/MT070174	81.2			52.2	12.0	9.9	98.5	0.6	31.9	160.3	Jun 9	194.6	Jul 13
MT124113	Hockett/MT070174	53.5			51.8	13.2	10.6	97.8	0.6	32.4	159.0	Jun 8	196.5	Jul 15
MT124118	Hockett/MT070174	94.0			52.1	11.6	12.2	97.6	0.9	34.3	161.3	Jun 10	192.0	Jul 11
MT124127	Hockett/MT070174	77.8			53.2	11.7	11.8	97.9	0.6	33.7	161.7	Jun 10	189.9	Jul 8
MT124128	Hockett/MT070174	54.1			53.0	12.6	10.5	98.8	0.3	31.2	159.3	Jun 8	192.6	Jul 11
MT124134	Hockett/MT070174	51.4			53.0	12.0	10.2	98.8	0.6	32.5	159.0	Jun 8	195.0	Jul 14
MT124148	Craft/MT070174	95.0			53.0	11.6	10.4	94.7	1.5	32.9	164.7	Jun 13	193.4	Jul 12
MT124361	MT020204/MT070175	89.5			53.6	11.5	12.6	97.4	0.9	34.4	161.7	Jun 10	191.3	Jul 10
MT124370	MT020204/MT070175	89.1			53.0	11.4	10.1	96.4	1.2	29.8	164.3	Jun 13	194.0	Jul 13
MT124380	MT020204/MT070175	85.8			52.7	10.8	10.0	95.1	1.8	30.7	161.0	Jun 10	191.6	Jul 10
MT124454	MT010158/MT070176	82.3			53.4	10.7	11.2	98.0	0.6	31.8	162.0	Jun 11	190.7	Jul 9
MT124457	MT010158/MT070176	82.3			52.7	11.4	11.3	98.2	0.9	33.8	161.7	Jun 10	191.4	Jul 10
MT124555	MT040073/MT040075	**108.9****			54.2	11.1	12.1	97.2	0.9	36.5	163.0	Jun 12	193.2	Jul 12
MT124601	MT020204/MT070175	85.2			53.4	12.3	10.8	94.7	2.1	36.2	163.0	Jun 12	197.3	Jul 16
MT124645	MT010158/MT070176	81.8			52.1	11.9	10.0	95.8	1.5	35.9	163.7	Jun 12	196.4	Jul 15
MT124663	Hockett/MT070174	69.0			51.4	12.8	10.2	97.8	0.6	31.3	160.7	Jun 9	195.5	Jul 14
MT124673	Hockett/MT070174	80.6			52.4	14.6	11.8	97.0	0.9	32.2	161.3	Jun 10	197.5	Jul 16
MT124677	Hockett/MT070174	72.2			52.7	11.7	9.8	97.6	0.9	28.5	160.3	Jun 9	196.3	Jul 15
MT124716	MT010158/MT070175	78.8			52.2	11.2	12.6	96.8	1.2	30.7	163.0	Jun 12	190.1	Jul 9
MT124728	MT010158/MT070175	57.4	73.9		51.9	11.8	10.4	95.3	1.2	27.6	163.7	Jun 12	190.9	Jul 9
MT124027	MT010158/MT070175	86.6	83.9		51.3	10.7	10.7	94.1	1.9	33.2	162.7	Jun 11	190.5	Jul 9
Champion	Baronesse/Camas	90.3	89.4	**87.5****	53.9	11.1	11.0	96.0	1.1	34.2	162.0	Jun 11	191.0	Jul 10
Craft	Klages/Baronesse	74.9	76.9	75.2	52.7	10.9	10.0	97.0	0.9	33.4	161.7	Jun 10	192.1	Jul 11
Merit	Manley//S74234/Summit	78.5			51.3	11.1	11.1	97.0	0.9	31.4	163.0	Jun 12	191.6	Jul 10
Harrington	Klages/Gazelle/Betzes/Centennial	78.1	76.8	74.8	52.3	11.0	12.9	96.0	0.9	34.2	163.0	Jun 12	191.7	Jul 10
Haxby	Gallatin/Bellona//Clark/Lamont	88.4	87.1	**83.6***	53.1	11.0	9.5	95.3	0.9	32.9	161.3	Jun 10	189.0	Jul 8
Haybet	Betzes*7/Strip Tease	62.7			49.7	11.0	11.8	74.7	6.3	39.0	161.3	Jun 10	189.1	Jul 8
Hockett	ND7593/Bearpaw	88.5	84.8	80.2	54.0	11.1	10.6	98.5	0.6	33.1	162.0	Jun 11	189.9	Jul 8

Cultivar	Pedigree	Grain Yield[1/] 2015	2014-15	2013-15	Test Weight	Grain Moisture	Grain[2/] Protein	Plump Kernels	Thin Kernels	Plant Height	Heading Date Julian	Heading Date Calendar	Maturity Date Julian	Maturity Date Calendar
		---------- bushels/acre ----------			lb/bu	%	%	%	%	inches				
Lavina	Haybet/Baronesse	87.8			49.2	10.9	11.8	78.5	8.3	34.3	162.7	Jun 11	189.9	Jul 8
Conrad	B1215/2B88-5336	87.0	80.4	76.7	52.1	12.7	12.8	96.1	1.5	32.5	163.7	Jun 12	192.6	Jul 11
Stockford	Baronesse/BZ591-57	77.2			50.5	10.9	10.5	96.2	1.3	36.9	161.7	Jun 10	194.3	Jul 13
AC Metcalfe	AC Oxbow/Manley	93.7	85.0		52.9	11.0	11.9	96.9	0.9	35.4	162.3	Jun 11	192.0	Jul 11
Moravian 115		93.0			50.1	10.7	12.8	94.5	1.9	25.8	166.7	Jun 15	195.0	Jul 14
09/668/24		94.2			52.4	11.4	11.9	96.4	1.2	29.5	164.3	Jun 13	196.0	Jul 15
08032-156		90.1			51.2	11.3	10.5	96.9	0.9	26.9	165.3	Jun 14	190.2	Jul 9
08042-077		87.1			52.0	10.8	10.8	97.2	0.9	35.3	163.7	Jun 12	193.0	Jul 12
08053-050		90.8			51.8	11.6	11.3	97.9	0.9	32.5	163.7	Jun 12	190.3	Jul 9
07030-034		86.1	85.7		52.1	11.5	11.3	97.8	0.9	32.8	165.0	Jun 14	189.7	Jul 8
Average		82.7	82.8	79.7	52.2	11.6	11.1	96.0	1.3	33.0	162.6	Jun 12	192.6	Jul 11
PLSD (0.05)		12.0	ns	6.2	1.6	1.2	1.2	3.0	1.2	2.5	10.6	-	3.4	-
CV%		8.4	16.0	7.4	1.9	6.6	6.0	1.9	57.8	4.4	4.0	-	1.0	-
Lattice RE% [/3]		144	-	-	101	100	166	101	102	122	100	-	109	-

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.

ns denotes no difference between entries within a column based on Fisher's Protected LSD at the 0.05 probability level.

Planting Date: April 2, 2015

Harvest Date: July 21, 2015

Table 2. Agronomic evaluation of 49 entries tested in the Intrastate Spring Barley Performance Trial conducted at Huntley under irrigated conditions in 2015. MSU Southern Agricultural Research Center. Exp 220915.

		Grain Yield[1/]			Test	Grain	Grain[2/]	Plump	Thin	Plant	Heading Date		Maturity Date	
Cultivar	Pedigree	2015	2014-15	2013-15	Weight	Moisture	Protein	Kernels	Kernels	Height	Julian	Calendar	Julian	Calendar
		---------- bushels/acre ----------			lb/bu	%	%	%	%	inches				
MT124001	MT010158/MT070175	89.8			51.7	14.5	10.4	97.9	0.6	36.3	161.7	Jun 10	195.1	Jul 14
MT124007	MT010158/MT070175	98.4			52.7	13.3	10.5	97.3	0.9	39.1	161.7	Jun 10	195.2	Jul 14
MT124008	MT010158/MT070175	92.8			51.4	14.5	10.7	96.3	1.2	36.9	162.0	Jun 11	193.6	Jul 12
MT124015	MT010158/MT070175	**109.5***			52.3	11.5	10.6	96.8	0.9	39.0	162.3	Jun 11	190.6	Jul 9
MT124016	MT010158/MT070175	**114.8***			51.6	11.8	10.7	96.8	1.0	36.4	162.0	Jun 11	192.5	Jul 11
MT124018	MT010158/MT070175	87.7			51.3	12.3	11.3	97.2	1.0	36.8	160.7	Jun 9	190.3	Jul 9
MT124025	MT010158/MT070175	100.2			51.3	14.6	9.7	97.5	0.9	37.1	162.3	Jun 11	194.8	Jul 13
MT124026	MT010158/MT070175	93.6			51.6	14.2	9.9	97.8	0.9	38.3	185.7	Jul 4	194.0	Jul 13
MT124069	MT010158/MT070175	101.7			51.2	12.2	9.6	96.0	1.8	39.2	163.0	Jun 12	193.2	Jul 12
MT124071	MT010158/MT070175	108.5			51.0	12.3	11.0	96.6	1.3	36.9	161.0	Jun 10	196.6	Jul 15
MT124073	MT010158/MT070175	**109.5***			51.9	12.1	10.0	95.8	1.5	41.4	162.3	Jun 11	190.5	Jul 9
MT124112	Hockett/MT070174	104.9			52.7	12.4	10.8	98.3	0.9	35.7	160.3	Jun 9	196.8	Jul 15
MT124113	Hockett/MT070174	90.9			52.0	14.2	11.9	97.0	0.9	38.0	160.3	Jun 9	195.6	Jul 14
MT124118	Hockett/MT070174	106.8			53.7	11.7	9.9	98.1	0.6	36.7	162.0	Jun 11	190.4	Jul 9
MT124127	Hockett/MT070174	98.5			54.3	11.5	11.7	99.1	0.0	35.1	161.7	Jun 10	189.9	Jul 8
MT124128	Hockett/MT070174	89.6			53.6	12.7	11.6	98.8	0.3	37.0	159.0	Jun 8	193.0	Jul 12
MT124134	Hockett/MT070174	85.8			53.4	12.8	11.7	98.5	0.6	36.9	159.0	Jun 8	194.7	Jul 13
MT124148	Craft/MT070174	**119.7****			53.3	12.6	10.7	93.4	2.1	37.6	161.7	Jun 10	198.1	Jul 17
MT124361	MT020204/MT070175	92.8			53.1	11.8	11.1	97.5	0.9	40.4	160.3	Jun 9	191.9	Jul 10
MT124370	MT020204/MT070175	**117.0***			53.1	12.2	10.5	95.8	1.8	35.0	162.3	Jun 11	193.0	Jul 12
MT124380	MT020204/MT070175	100.8			52.6	12.1	10.0	96.3	1.2	33.6	161.7	Jun 10	190.9	Jul 9
MT124454	MT010158/MT070176	104.7			53.9	11.6	10.3	98.2	0.9	39.2	160.3	Jun 9	190.3	Jul 9
MT124457	MT010158/MT070176	107.6			54.0	11.6	11.2	97.9	0.9	37.7	160.0	Jun 9	190.4	Jul 9
MT124555	MT040073/MT040075	**110.0***			53.8	11.9	9.9	96.8	1.2	37.1	162.3	Jun 11	190.6	Jul 9
MT124601	MT020204/MT070175	86.3			51.8	15.7	9.1	95.4	1.8	36.6	166.0	Jun 15	200.8	Jul 19
MT124645	MT010158/MT070176	102.4			52.9	11.4	9.9	99.1	0.0	37.4	160.7	Jun 9	189.7	Jul 8
MT124663	Hockett/MT070174	99.8			51.7	14.0	11.6	98.2	0.9	37.6	160.0	Jun 9	198.4	Jul 17
MT124673	Hockett/MT070174	88.4			53.2	12.6	10.8	98.3	0.6	39.3	160.0	Jun 9	191.4	Jul 10
MT124677	Hockett/MT070174	98.0			53.3	13.4	11.2	97.9	0.9	33.1	161.3	Jun 10	198.4	Jul 17
MT124716	MT010158/MT070175	100.3			52.2	11.8	11.2	97.2	0.6	36.9	162.3	Jun 11	192.7	Jul 11
MT124728	MT010158/MT070175	103.9			51.9	12.2	12.1	97.2	0.6	35.5	162.0	Jun 11	192.7	Jul 11
MT124027	MT010158/MT070175	106.3			51.9	12.3	9.4	97.5	0.6	38.5	162.0	Jun 11	191.9	Jul 10
Champion	Baronesse/Camas	**110.3***			53.2	12.1	11.1	96.1	0.9	40.3	161.3	Jun 10	194.7	Jul 13
Craft	Klages/Baronesse	**114.2***			53.6	11.8	12.1	95.7	1.8	41.5	166.0	Jun 15	193.2	Jul 12
Merit	Manley//S74234/Summit	107.5			50.5	12.4	12.4	91.4	3.2	37.4	215.7	Aug 3	195.8	Jul 14
Harrington	Klages/Gazelle/Betzes/Centennial	85.9			51.5	12.7	11.3	93.5	2.2	36.5	162.7	Jun 11	195.7	Jul 14
Haxby	Gallatin/Bellona//Clark/Lamont	**110.3***			54.4	11.6	10.6	96.5	1.2	36.7	161.0	Jun 10	190.0	Jul 9
Haybet	Betzes*7/Strip Tease	75.6			46.7	11.5	13.9	55.2	17.8	41.3	161.0	Jun 10	189.7	Jul 8
Hockett	ND7593/Bearpaw	105.0			53.7	11.8	11.2	97.9	0.9	35.9	162.0	Jun 11	191.0	Jul 10

Cultivar	Pedigree	Grain Yield[1/]			Test Weight	Grain Moisture	Grain[2/] Protein	Plump Kernels	Thin Kernels	Plant Height	Heading Date		Maturity Date	
		2015	2014-15	2013-15							Julian	Calendar	Julian	Calendar
		---------- bushels/acre ----------			lb/bu	%	%	%	%	inches				
Lavina	Haybet/Baronesse	103.0			47.7	11.7	11.6	77.8	9.6	40.3	161.7	Jun 10	191.5	Jul 10
Conrad	B1215/2B88-5336	102.4			51.7	13.9	11.4	96.3	1.5	37.5	163.3	Jun 12	194.8	Jul 13
Stockford	Baronesse/BZ591-57	92.9			48.7	11.8	11.8	94.1	1.7	41.7	161.7	Jun 10	195.3	Jul 14
AC Metcalfe	AC Oxbow/Manley	102.8			52.6	11.7	10.8	96.1	1.5	39.5	162.3	Jun 11	190.0	Jul 9
Moravian 115		97.6			48.9	13.4	9.4	93.2	2.7	28.0	163.7	Jun 12	199.1	Jul 18
09/668/24		99.9			51.8	13.1	9.5	97.2	1.2	29.4	163.0	Jun 12	199.5	Jul 18
08032-156		**119.2***			50.5	11.4	10.8	97.0	1.3	30.5	161.7	Jun 10	194.4	Jul 13
08042-077		92.9			51.0	14.5	10.5	97.1	1.3	39.8	162.0	Jun 11	194.1	Jul 13
08053-050		106.0			51.0	11.1	10.6	98.2	0.6	35.4	161.0	Jun 10	190.4	Jul 9
07030-034		106.2			51.1	11.3	11.0	96.3	1.2	37.2	162.7	Jun 11	189.7	Jul 8
Average		101.1			52.0	12.5	10.8	95.6	1.7	37.2	163.3	Jun 12	193.4	Jul 12
PLSD (0.05)		10.9			0.8	1.0	0.8	2.8	1.6	3.6	ns	-	3.7	-
CV%		6.3			0.9	4.9	4.5	1.8	61.0	5.9	9.0	-	1.1	-
Lattice RE%[3/]		117.3			104.4	100.4	126.8	97.4	97.5	97.4	100.0	-	105.6	-

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 percent 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.

ns denotes no difference between entries within a column based on Fisher's Protected LSD at the 0.05 probability level.

Planting Date: March 30, 2015

Harvest Date: July 24, 2015