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 Hulless Spring Barley Trials near Huntley, Montana. (Exps. 162508 and 162509).

PROJECT LEADERS: Kenneth D. Kephart, Agronomist, SARC, Huntley

PROJECT PERSONNEL: Jamie Sherman, Assistant Professor Plant Breeding, Bozeman
Kelli S. Maxwell, Research Associate Agronomy, SARC, Huntley
David May, Research Associate Agronomy, SARC, Huntley
Tom A. Fischer, Research Specialist and Farm Foreman, SARC, Huntley
Janna Kransky, Research Associate III, SARC, Huntley

OBJECTIVES: To evaluate the agronomic performance of experimental barley lines and existing barley varieties under dryland 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 Hulless spring barley trials both had 16 entries and were planted using a 4 x 4 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. Average dryland yields in 2016 decreased almost 70% from the previous year, and average percent protein increased more than 73% over the previous year. Average irrigated yields in 2016 decreased much more moderately (almost 11%), and average percent protein was nearly the same as compared to the previous year.

Dryland Hulless Spring Barley Trial (Exp. 162508)

Agronomic performance of the hulless spring barley cultivars and experimental lines tested during 2016 under dryland conditions near Huntley is presented in Table 1. Dryland barley yields ranged from 414 lb/ac for 'MT110009' to 1571 bu/ac for 'Prowashonupana'. Three entries had yields from 1225 to 1484 lb/ac, which were statistically equal to that of the highest yielding entry. Test weights averaged 57.9 lb/bu, and 'Purple Prairie' had the highest test weight at 63.5 lb/bu. Barley protein averaged 18.4 percent and ranged from 16.1 for 'Purple Prairie' to 20.3 for 'Prowashonupana'.

Irrigated Hulless Spring Barley Trial (Exp. 162509)

Agronomic performance of the hulless spring barley cultivars and experimental lines tested during 2016 under irrigated conditions near Huntley is presented in Table 2. Irrigated barley yields averaged 3243 lb/ac and ranged from 1833 lb/ac for 'PPB-TS2' to 4386 lb/ac for 'X05013-T1'. One experimental lines had an average yield of 4292 lb/ac, which was statistically equal to the highest yielding entry. Test weights averaged 59.2 lb/bu and ranged from 48.7 lb/bu for 'Prowashonupana' to 63.0 lb/bu for 'PPB-TS2'. Protein average 11.4 percent and ranged from 9.2 percent for 'MT110139' to 13.8 percent for 'Purple Prairie'.

FUTURE PLANS:

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

Table 1. 2016 Dryland Hulless Spring Barley Trial. MSU Southern Ag Research Center, Huntley, MT.

Cultivar	Grain[1/] Yield	Test Weight	Grain Moisture	Grain[2/] Protein	Plant Height	Heading Date Julian	Heading Date Calendar
	- lb/a -	- lb/bu -	- % -	- % -	- inches -		
09WA-265.12	**1,225***	58.2	11.0	18.0	27.4	172.7	Jun 21
MT110008	1,173	58.1	11.5	19.0	33.1	157.6	Jun 6
MT110009	414	55.3	11.3	20.2	29.6	167.1	Jun 16
MT110016	1,032	59.7	11.5	18.8	31.5	167.2	Jun 16
MT110061	1,057	58.1	11.5	18.5	28.1	167.9	Jun 16
MT110065	1,017	58.1	11.2	18.0	29.4	175.1	Jun 24
MT110066	1,164	58.2	11.5	18.1	29.4	167.6	Jun 16
MT110097	1,072	55.6	11.0	18.8	30.1	157.5	Jun 6
MT110139	630	60.3	11.8	16.5	32.4	164.7	Jun 13
MT110141	1,018	59.6	11.4	17.6	32.0	164.6	Jun 13
PPB-TS2	643	60.4	11.6	18.4	29.5	155.3	Jun 4
Prowashonupana	**1,571****	48.2	10.0	20.3	27.4	157.8	Jun 6
Purple Prairie	939	63.5	12.2	16.1	28.2	152.0	Jun 1
X05013-T1	**1,300***	59.5	11.2	18.6	28.1	170.0	Jun 19
X0626-T229	1,028	54.8	10.8	19.3	27.4	163.3	Jun 12
X07G30-T131	**1,484***	58.6	11.0	18.1	30.4	170.7	Jun 19
Average	1,048	57.9	11.3	18.4	29.6	164.4	Jun 13
PLSD (p=0.05)	362	2.3	0.5	1.0	1.9	5.0	
CV%	19.2	2.4	2.5	2.8	3.5	1.6	
Lattice RE%	109	104	86	136	111	149	

1/ Grain yields in pounds per acre 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.

Planting Date: March 10, 2016

Harvest Date: July 14, 2016

Table 2. 2016 Irrigated Hulless Spring Barley Trial. MSU Southern Ag Research Center, Huntley, MT.

Cultivar	Grain[1/] Yield	Test Weight	Grain Moisture	Grain[2/] Protein	Plant Height	Heading Date	
						Julian	Calendar
	- lb/a -	- lb/bu -	- % -	- % -	- inches -		
09WA-265.12	**4,292***	61.4	10.2	9.4	38.6	158.3	Jun 7
MT110008	3,663	59.8	10.2	10.3	35.7	157.0	Jun 6
MT110009	3,637	59.5	10.2	10.2	39.4	160.7	Jun 9
MT110016	3,737	60.2	10.2	10.2	37.0	157.0	Jun 6
MT110061	2,858	59.1	9.8	12.0	36.6	157.0	Jun 6
MT110065	3,298	59.3	9.9	11.0	38.1	161.0	Jun 10
MT110066	2,961	59.2	9.9	11.6	35.8	157.0	Jun 6
MT110097	3,124	56.1	9.3	13.3	37.2	151.7	May 31
MT110139	2,570	62.5	10.5	9.2	42.6	155.0	Jun 4
MT110141	2,460	60.1	9.9	13.1	38.9	157.0	Jun 6
PPB-TS2	1,833	63.0	10.2	13.0	35.5	154.0	Jun 3
Prowashonupana	3,921	48.7	8.0	12.7	33.8	152.7	Jun 1
Purple Prairie	1,883	60.8	10.0	13.8	29.4	150.0	May 30
X05013-T1	**4,386****	60.5	9.7	11.1	37.2	157.0	Jun 6
X0626-T229	3,465	57.7	9.5	11.8	34.5	156.3	Jun 5
X07G30-T131	3,800	59.9	9.6	10.4	37.2	159.7	Jun 8
Average	3,243	59.2	9.8	11.4	36.7	156.3	Jun 5
PLSD (p=0.05)	392	1.1	0.4	0.7	1.9	1.6	
CV%	7.2	1.1	2.4	3.3	2.9	0.6	
Lattice RE%	101	81	93	120	113	100	

1/ Grain yields in pounds per acre 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.

Planting Date: March 8, 2016

Harvest Date: August 3, 2016