



RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2010

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

<http://www.sarc.montana.edu/annualreport/2010/>

-
- PROJECT TITLE:** 2010 Off-Station Winter Wheat Variety Performance Trials in South Central Montana. This research is partially supported by Montana farmers through the Montana Wheat and Barley Committee.
- PROJECT LEADERS:** Kent A. McVay, Cropping System Specialist, SARC, Huntley
Qasim A. Khan, Research Associate, SARC, Huntley
Phil L. Bruckner, Winter Wheat Breeder, PSPP, Bozeman
James E. Berg, Winter Wheat Research Associate, PSPP, Bozeman
- PROJECT PERSONNEL:** Tom A. Fischer, Research Specialist and Farm Foreman, SARC, Huntley
Steve Lackman, Yellowstone County Extension, Billings
Lee Smelzer, Stillwater County Extension, Columbus
Byron Hould, Rosebud-Treasure County Extension, Forsyth
Matthew McClellan, Big Horn County Extension, Hardin
- COOPERATORS:** Todd Tibbets, Forsyth
Mike Brown, Fly Creek (Hardin)
Ellis Murdock, Lodge Grass
Dave Kelsey, Molt
Gary Broyles, Rapelje
- OBJECTIVES:** To provide wheat growers in south central Montana with a reliable, unbiased and up-to-date source of information that will permit valid comparisons among improved winter wheat varieties. This information should help winter wheat producers in south central Montana select varieties best suited to their particular area and growing conditions.
- METHODS:** The 2010 off-station winter wheat trials were established under dryland conditions near Molt under conventional summer fallow conditions; near Forsyth, Hardin, Lodge Grass and Rapelje under no-till, chemical fallow conditions; and under no-till, irrigated conditions at Huntley (Fig. 1). Each dryland trial contained 25 winter wheat cultivars (18 commercial, 7 experimental), and was planted using a partially-balanced lattice design with three replications. The irrigated trial near Huntley contained 28 winter wheat cultivars (19 commercial, 9 experimental) arranged in a randomized complete block design replicated three times. All entries were seeded at approximately 1 million seeds per acre under dryland conditions (~60 lb/a) and 1.5 million seeds per acre under irrigation (~90 lb/a). Actual seeding rates were calculated from the thousand kernel weight determined for the seed lot of each cultivar (Table 1), and varied from 78 to 107 pounds per acre for the dryland sites and from 116 to 161 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 7-inch row spacing. All rows of each harvested test plot were trimmed 36 inches and harvested using a plot combine. Information pertaining to the traits and characteristics of the 28 winter wheat entries are provided in Table 2.
- Recorded grain yields were adjusted to 13% grain moisture content, and are reported in bushels per acre based on a 60 pound standard bushel weight. Two year (2009-10) and three year (2008-10) yield averages are provided for cultivars tested during previous years. Test weight (pounds per bushel) and grain

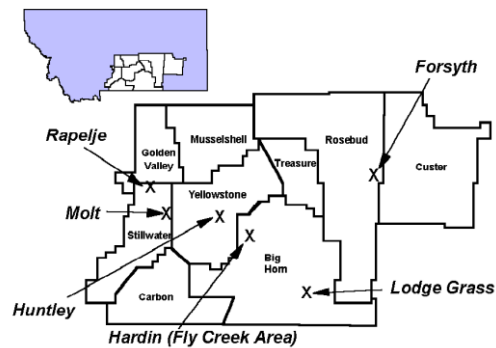


Figure 1. 2010 off-station winter wheat trial locations in south central Montana.

moisture content (percent) were obtained for each plot using a Dickey-john™ GAC 2100 grain analyzer. Grain protein content (percent) was determined by near-infrared reflectance for each harvested sample, and adjusted to 12% grain moisture content. Plant height was measured in inches from the soil surface to the top of the head, excluding the awns if present. Lodging of all cultivars was noted at the irrigated Huntley location during 2010, and recorded on a 0 to 9 scale representing no lodging to all stems lying flat on the ground, respectively. Heading also was noted at Huntley when 50% of the heads in a plot had extended above the flag leaf collar. Heading dates were recorded in Julian days (number of days from January 1) for statistical purposes. Corresponding calendar dates also are presented. Information pertaining to the specific cultural management of each study site is listed at the bottom of their respective data table (Tables 3 through 8).

RESULTS:

Surface soil moisture conditions were good to excellent at all six of the winter wheat test locations planted in the fall of 2009. The 2010 winter wheat test sites had above average moisture during winter months, with above average rain or snow accumulating in October, January and February. Below average precipitation occurred during March and April, while above average precipitation occurred May through August. This higher than normal precipitation coupled with cooler than normal temperatures during May and July delayed crop development and maturity boosting winter wheat yield at the dryland sites. All sites were harvested in August of 2010. Overall, winter wheat yields were average to above average. Test weight values were average to below average. Grain protein content fluctuated greatly from site-to-site in 2010, but on average was comparable to the protein content measured in the trials harvested last year.

Average winter wheat yield under irrigated condition at Huntley during 2010 was 92 bu/a (Table 3), slightly higher than last year yield at this site. Lodging was low in most entries. Except for 'Neeley', most of the entries showed marginal or no lodging under irrigated condition at Huntley. Yields ranged from 69 bu/a for 'Norris' to 119 bu/a for 'Jagalene'. The yield was not significantly different among the entries. Similar to last year, test weight values were light under irrigated conditions at Huntley in 2010, averaging only 57.9 lb/bu. None of the 28 entries possessed test weight values heavier than 60 lb/bu. Grain protein content was low and averaged only 9.8 percent. Protein content ranged from 8.5 percent for Jagalene to 11.3 percent for Bynum. Two-year average yield for winter wheat varieties tested during 2009 and 2010 averaged 92 bu/a. Three-year average yield for winter wheat varieties tested during 2008 to 2010 averaged 107 bu/a with the experimental line 'UT9743-42' and commercial cultivar Jagalene producing the highest average grain yield at 118 bu/a. Nine other commercial entries namely: 'Carter', 'CDC Falcon', 'Decade', 'Ledger', 'Moreland', 'Norris', 'Promontory', 'Wahoo' and 'Yellowstone' have produced yields statistically equal

to the yield of UT9743-42 and Jagalene under irrigation at this site for the past three years.

Table 1. Adjusted seeding rates used to establish 28 commercial and experimental winter wheat cultivars tested at off-station sites in south central Montana during 2010.

1/ Cultivar	Thousand Kernel Weight grams	Seeds per Pound #	2/ Dryland Seeding Rate		3/ Irrigated Seeding Rate	
			per plot grams	per acre pounds	per plot grams	per acre pounds
<u>Commercial</u>						
Accipiter	37.0	12,276	59.4	85.2	89.1	127.9
Bynum	37.3	12,176	59.9	85.9	89.9	128.9
Carter	33.9	13,393	54.5	78.1	81.7	117.2
CDC Falcon	36.8	12,349	59.1	84.7	88.6	127.1
Curlew	41.1	11,059	66.0	94.6	99.0	141.9
Decade	38.0	11,958	61.0	87.5	91.5	131.2
Genou	37.5	12,122	60.2	86.3	90.3	129.5
Hyalite	36.0	12,621	57.8	82.9	86.7	124.4
Jagalene	42.4	10,696	68.2	97.8	102.3	146.7
Jerry	34.2	13,293	54.9	78.7	82.3	118.1
Ledger	43.4	10,460	69.7	100.0	104.6	150.0
Moreland	33.5	13,556	-	-	80.7	115.8
Neeley	44.9	10,106	72.2	103.5	108.3	155.3
Norris	41.8	10,869	67.1	96.3	100.7	144.4
Promontory	44.6	10,188	71.6	102.7	107.4	154.1
Pryor	38.6	11,750	62.1	89.1	93.1	133.6
Rampart	36.8	12,340	59.1	84.8	88.7	127.2
Wahoo	40.8	11,114	65.6	94.1	98.5	141.2
Yellowstone	43.1	10,533	69.3	99.3	103.9	149.0
<u>Experimental</u>						
ID0621	36.7	12,367	-	-	88.5	126.9
MT06103	44.4	10,224	71.4	102.3	107.0	153.5
MTS0532	39.5	11,504	63.4	91.0	95.1	136.4
MTS0705	41.4	10,969	66.5	95.4	99.8	143.1
MTS0713	46.6	9,743	74.9	107.4	112.3	161.1
MTS0721	37.6	12,085	60.4	86.6	90.6	129.9
MTS0826	38.1	11,904	61.3	87.9	91.9	131.9
MTS0832	35.5	12,803	57.0	81.7	85.5	122.6
UT9743-42	36.1	12,394	-	-	86.9	124.6

1/ All seed lots treated with 1.0 fl oz of Dividend XL/cwt, and 1.5 fl oz of Gaucho 600/cwt.

2/ Equivalent to 1 million seeds per acre on a mass basis.

3/ Equivalent to 1.5 million seeds per acre on a mass basis.

Average yield under dryland conditions at Rapelje in 2010 was 52 bu/a (Table 4), about 10 bushels per acre less than winter wheat yields observed at this site in 2009. Yields ranged from 41 bu/a for CDC Falcon and 'Genou' to 62 bu/a for experimental line 'MTS0826'. The highest yielding commercial entry was Wahoo at 61 bu/a. Thirteen other entries produced yields statistically equal with that of MTS0826. Average test weight was 58.7 lb/bu, with only five entries producing test weights heavier than 60 lb/bu. Grain protein content was higher compared to previous year at this location in 2010, averaging 14.4 percent. Grain protein ranged from 12 percent for Promontory to 16 percent for Genou and 'MTS0713'. Two-year average yield for winter wheat varieties tested at Rapelje during 2009 and 2010 averaged 57 bu/a. Three-year average yield from 2008 through 2010 averaged 62 bu/a. 'Pryor' was the top yielding entry for the past two and three years averaging nearly 72 bu/a. The commercial entry Yellowstone produced averaged yield of 66 bu/a in the past 2 years and 71 bu/a three the past three years at this location that was statistically equal to Pryor.

Average yield of the 25 winter wheat cultivars tested at Forsyth in 2010 was 63 bu/a (Table 5), 26 bushels per acre more than winter wheat entries harvested at Forsyth in 2009. Yields ranged from 52 bu/a for the experimental entry MTS0826 to 84 bu/a for commercial entry Decade. Three other entries including Curlew, Jagalene and 'MT06103' produced yield from 72 to 76 bu/a statistically equal to the yield of Decade. Average test weight was 56.0 lb/bu, with no entry possessing test weight values heavier than 60 lb/bu. Grain protein content averaged 12.9 percent and ranged from 11 percent for Jagalene and Wahoo to 14 percent for CDC Falcon and MTS. Protein content was higher compared to last year and 13 entries produced grain with protein content 13 % or higher. Two year average yield (2009-2010) was 51 bu/a and three year (2008-2010) average yield was 50 bu/a at Forsyth. Decade was the highest yielding entry based on the average yield in the past two and past three years. Experimental line MT06103 was the only entry that produced average yield of 60 bu/a equal to Decade in the past two year. 'Curlew', Jagalene, Wahoo and Yellowstone produced yield, from 52 to 54 bu/a, equal to the yield produced by Decade in the past three years at this location.

Agronomic performance of the winter wheat cultivars tested under dryland conditions near Lodge Grass during 2010 is presented in Table 6. Winter wheat grown in this region of south central Montana frequently suffers from the occurrence of dwarf bunt (*aka*, dwarf smut, TCK smut, *Tilletia controversa* Kuhn), but this disease was not evident during the 2010 season. Averaged yield at Lodge Grass location was 65 bu/a, 30 bu/a more than average yields observed at this location in 2009. Yields ranged from 57 bu/a for Pryor to 77 bu/a for Wahoo. Only two other entries, namely Decade with 75 bu/a and 'MTS0721' with 73 bu/a, produced yields which were statistically equal to the yield of Wahoo. Average test weight was 60.4 lb/bu and ranged from 58.5 for Pryor to 62.3 for Promontory. Fourteen entries possessed test weight values heavier than 60 lb/bu. Grain protein content averaged 11.0 percent. Grain protein content ranged from 9.6 percent for Wahoo to 12.8 percent for 'Bynum'. No difference in yield was detected for winter wheat cultivars tested the past two or three years at the Lodge Grass site.

Agronomic performance data of winter wheat cultivars tested based on one replication only under dryland conditions near Hardin during 2010 is presented in Table 7. Winter wheat trial data at this location was lost due to a harvesting error. One replicate was saved. This location was not harvested in 2008 due to post-emergence herbicide injury resulting from a Roundup® application to a substantial portion of the trial. Thus only one year (2009) data is available from the last three years trial.

Average yield under dryland conditions at Molt in 2010 was 74 bu/a (Table 8), substantially higher (more than double) than the winter wheat yield observed at Molt in 2009. Molt has the highest yield among all the dryland locations in 2010. Winter wheat yields at Molt ranged from 65 bu/a for Jerry to 82 bu/a for Curlew and Decade. Fourteen other entries at Molt location produced yield from 73 to 81 bu/a statistically equal to the yield of Curlew and Decade. Average test weight was 62.2 lb/bu, with all of the entries having a test weight value heavier than 60 lb/bu. Grain protein content averaged 10.7 percent. Protein content ranged from 9.2 percent for Wahoo to 12.6 percent for Bynum. No difference in yield was detected for winter wheat cultivars averaged for the past two or three years at the Molt site.

SUMMARY:

Significant differences in yield among cultivars tested in 2010 were obtained under dryland conditions but not under irrigated conditions (Tables 9, 10 and 11). Decade produced the highest yield of 79 bu/a, averaged across all five of the test locations harvested in 2010 (Table 9). Decade was also the highest yielding cultivar across all dryland location producing average yield of 73 bu/a in 2010.

Since 2008, experiments representing 16 location-years of testing have uniformly tested 17 cultivars at several dryland and irrigated sites in south central Montana (Table 10). Averaged across three years under both dryland and irrigated conditions, Pryor and Yellowstone hard red winter wheat have been the highest yielding cultivar averaging over 85 bu/a. Wahoo has been the highest yielding cultivar tested over the past three years, averaging 64 bu/a, when comparing only dryland environments tested in south central Montana since 2008 (Table 11). Seven other entries including Decade, Prior and Yellowstone have produced three year average yields, from 59 to 63 bu/a, under dryland conditions equal to that of Wahoo.

Table 2. Selected characteristics and traits of 19 commercial winter wheat cultivars performance tested at six off-station sites in south central Montana during 2010.

Cultivar	1/ Origin	Year of Release	2/ Market Class	3/ PVP Yes/No	4/ Maturity	5/ Coleoptile Length	Chaff Color	6/ Winter Survival 1-5	7/ Straw Strength	Solid Stem Type Yes/No	8/ Disease Resistance				9/ Quality		10/ Clearfield Type Yes/No
											Leaf Rust	Stem Rust	Stripe Rust	Dwarf Bunt	Milling 1-5	Baking 1-5	
Accipiter	CDC	2008	HRW	N	M-L	S	White	5	S	N	MS	MS	VS	S	2	3	N
Bynum§	MSU	2006	HRW	Y	E	L	Brown	2	S	Y	MS	M	R	S	4	4	Y
Carter	WestBred	2006	HRW	Y	M	S	White	3	S	Y	MR	MS	MR	S	4	4	N
CDC Falcon§	CDC	1999	HRW	Y	M-L	M	White	4	MS	N	R	R	MS	S	3	3	N
Curlew	USU	2008	HRW	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decade	MSU	2010	HRW	Y	M	M	White	4	S	N	MS	R	R	S	3	4	N
Genou	MSU	2004	HRW	Y	M	L	White	2	MS	Y	MR	S	MS	S	4	4	N
Hyalite§	MSU	2006	HW	Y	E	S	White	3	S	N	S	R	S	S	3	3	Y
Jagalene	AgriPro	2002	HRW	Y	E	M	White	2	S	N	MS	MR	R	S	3	3	N
Jerry	NDSU	2001	HRW	N	M-L	M	White	5	M	N	-	R	MR	S	3	3	N
Ledger	WestBred	2005	HRW	Y	E	M	White	2	W	Y	S	S	MR	S	4	3	N
Moreland	UI	2002	HRW	Y	E	M	Brown	3	S	N	R	-	S	S	3	4	N
Neeley	UI	1980	HRW	N	M	M	White	3	MS	N	MR	S	S	S	3	3	N
Norris§	MSU	2005	HRW	Y	E	M	Brown	3	S	N	MS	S	MS	S	3	3	Y
Promontory	USU	1990	HRW	N	E	M	Brown	2	MS	N	S	S	MR	R	5	4	N
Pryor	WestBred	2002	HRW	Y	M-L	M	White	3	S	N	S	S	S	S	3	3	N
Rampart	MSU	1996	HRW	N	M	L	Brown	2	M	Y	S	MR	R	S	4	4	N
Wahoo	UNL	2000	HRW	Y	E	M	White	3	S	N	MR	R	MS	S	3	2	N
Yellowstone	MSU	2005	HRW	Y	M	S	White	4	MS	N	MS	MS	R	S	3	4	N

1/AgriPro=AgriPro Seeds Inc. Berthoud, Colorado; CDC=Crop Development Centre, University of Saskatchewan; MSU=Montana State University; NDSU=North Dakota State University; UI=University of Idaho; UNL=University of Nebraska-Lincoln; USU=Utah State University; WestBred=WestBred LLC, Bozeman, Montana.

2/ HRW=hard red winter wheat market class; HW=hard white wheat market class.

3/ Indicates a cultivar is protected under the Federal Plant Variety Protection Act of 1970 and amended in 1995.

4/ E=early maturity, M=medium maturity, L=late maturity.

5/ L=long coleoptile length, M=medium coleoptile length, S=short coleoptile length.

6/ Winter survival rated from 1 to 5 where 1=poor and 5=best winter survival, respectively, based on years of observations at Sidney, Moccasin and Williston.

7/ S=strong straw strength, MS=moderately strong straw strength, M=medium straw strength, MW=moderately weak straw strength, W=weak straw strength.

8/ R=resistant, MR=moderately resistant, MS=moderately susceptible, S=susceptible, VS=very susceptible.

9/ Milling and baking quality rated from 1 to 5 where 1=poor and 5=superior quality, respectively.

10/ Signifies a cultivar possessing the Clearfield trait imparting tolerance to products containing imazamox herbicide.

§ 'Bynum', 'CDC Falcon', 'Hyalite', and 'Norris' licensed for sale on an exclusive basis by WestBred LLC, Bozeman, Montana.

Table 3. Performance of 28 commercial and experimental winter wheat cultivars tested under no-till, irrigated conditions near Huntley, Montana during 2010. Cultivars listed alphabetically. (Exp. 103880).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height	3/ Lodging	Heading Date	
	2010	2009-10	2008-10						Julian	Calendar
	----- bushels per acre -----			lb/bu	%	%	inches	0-9		
<u>Commercial</u>										
Accipiter	93.2	95.9		58.0	10.7	10.1	42.9	0.0	165.7	Jun 13
Bynum	90.7	88.2	99.5	58.1	10.4	11.3	46.1	0.3	160.0	Jun 8
Carter	104.1	93.6	107.3*	57.9	10.7	9.6	38.9	0.0	162.0	Jun 10
CDC Falcon	82.0	87.8	105.6*	55.4	11.1	10.7	40.1	0.0	162.3	Jun 10
Curlew	87.1	85.5	102.1	57.8	10.6	10.0	44.0	0.0	164.3	Jun 12
Decade	104.3	99.4	111.6*	57.5	10.4	9.6	45.3	0.0	162.3	Jun 10
Genou	92.9	86.5	103.0	59.9	10.8	9.2	43.9	2.0	164.3	Jun 12
Hyalite	77.4	85.7	102.1	56.4	10.2	10.8	45.1	0.0	161.3	Jun 9
ID0621	90.8	95.0		57.6	10.6	9.5	38.8	0.0	164.7	Jun 12
Jagalene	118.9	107.9	118.2**	59.6	10.8	8.5	45.0	0.0	159.7	Jun 7
Jerry	90.4	83.4		58.6	11.1	8.9	52.5	0.0	164.3	Jun 12
Ledger	94.7	94.3	107.7*	57.5	10.6	9.4	41.8	0.0	162.3	Jun 10
Moreland	104.1	100.5	113.2*	55.3	9.8	9.6	36.7	0.0	161.7	Jun 9
Neeley	88.8	85.8	96.2	58.2	10.6	9.3	45.4	4.3	165.7	Jun 13
Norris	69.1	88.7	103.1*	56.9	10.6	10.4	44.8	0.0	159.3	Jun 7
Promontory	86.9	89.0	104.9*	57.2	10.2	9.9	41.0	0.0	162.3	Jun 10
Pryor	82.4	82.1	99.6	56.1	10.4	9.5	37.7	0.0	164.3	Jun 12
Rampart	87.0	90.5	102.9	59.5	10.6	10.5	44.1	2.7	162.0	Jun 10
Wahoo	113.3	97.6	107.8*	57.8	10.9	8.8	42.8	0.7	159.7	Jun 7
Yellowstone	104.6	99.0	115.7*	57.9	10.3	9.5	42.8	0.0	165.0	Jun 13
<u>Experimental</u>										
MT06103	85.0	91.2		59.0	10.6	11.0	43.0	1.3	161.3	Jun 9
MTS0532	93.3	92.2	106.7*	59.7	11.0	9.0	41.5	0.0	163.7	Jun 11
MTS0705	75.2			59.5	10.9	10.3	45.8	1.3	165.0	Jun 13
MTS0713	92.3	86.8		58.2	10.8	9.4	42.1	0.0	162.7	Jun 10
MTS0721	103.9			58.4	10.5	9.5	41.5	0.0	162.0	Jun 10
MTS0826	73.5			58.1	10.5	10.9	44.5	0.7	165.7	Jun 13
MTS0832	91.0			58.8	10.5	9.6	48.0	1.3	165.7	Jun 13
UT9743-42	108.1	109.6	118.2**	56.2	10.3	9.3	37.9	0.0	162.7	Jun 10
Average	92.3	92.3	106.6	57.9	10.6	9.8	43.0	0.5	162.9	Jun 10
PLSD (p=0.05)	ns	ns	15.1	3.0	0.4	1.4	3.2	1.8	1.3	
CV%	18.9	15.6	12.2	3.2	2.6	9.1	4.6	214.9	0.5	

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13 percent moisture content.

2/ Grain protein values adjusted to 12 percent grain moisture content.

3/ Lodging severity scores of 0 to 9 represent no lodging to all stems flat on the ground, respectively.

ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

** 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).

* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).

Table 3 continued.

Huntley Irrigated Winter Wheat (Exp. 103880)

Planted: October 16, 2009 Harvested: August 19, 2010
Fertility: 120-45-0, Sept. 14, 2009
Herbicide: Pre-Pare, 0.3 oz/a; Roundup RT3, 12 oz/a; AMS, 2 lb/a, Oct. 2, 2009
Previous crop: spring barley
Irrigation: profile flooded Aug. 26, 2009 and May 18, 2010
Precipitation: 11.8 inches.

Table 4. Performance of 25 commercial and experimental winter wheat cultivars tested under no-till, dryland conditions near Rapelje, Montana during 2010. Cultivars listed alphabetically. (Exp. 103881).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein		Plant Height
	2010	2009-10	2008-10			%	%	
	----- bushels/acre -----			lb/bu	%	%	inches	
<u>Commercial</u>								
Accipiter	51.9*	57.0		58.6	10.0	13.7	32.8	
Bynum	44.4	49.5	52.0	60.3	9.5	15.0	34.9	
Carter	45.5	51.7	54.4	60.4	10.0	14.0	29.3	
CDC Falcon	41.4	45.5	55.4	56.9	9.8	13.7	29.7	
Curlew	46.5	54.7	58.8	54.2	9.5	15.3	37.3	
Decade	52.5*	62.4	71.0*	59.2	10.1	14.3	31.8	
Genou	40.8	51.9	55.5	56.5	9.8	15.7	35.3	
Hyalite	52.9*	55.8	61.7*	59.2	10.0	15.3	34.5	
Jagalene	53.2*	57.4	62.0*	61.4	10.2	14.0	31.0	
Jerry	46.8	51.1		58.7	10.1	14.0	34.3	
Ledger	48.5	51.5	58.5	57.8	9.7	14.0	32.5	
Neeley	47.8	54.5	62.0*	57.9	9.8	14.3	33.9	
Norris	52.9*	62.3	68.9*	59.1	9.6	14.0	32.3	
Promontory	51.6*	57.8	63.3*	61.4	10.4	12.0	33.7	
Pryor	58.4*	71.9**	71.5**	59.1	9.8	13.3	31.4	
Rampart	52.3*	52.5	52.2	58.6	9.7	15.3	36.0	
Wahoo	60.7*	62.0	68.9*	59.0	10.0	13.0	32.3	
Yellowstone	59.4*	65.6*	71.1*	58.9	10.0	14.0	34.3	
<u>Experimental</u>								
MT06103	58.5*	66.6*		58.5	9.8	15.3	34.4	
MTS0532	51.1*	57.2	60.7	58.5	9.9	14.7	31.2	
MTS0705	52.5*			59.3	9.9	15.0	35.3	
MTS0713	48.9	55.3		55.5	9.8	16.0	31.6	
MTS0721	58.8*			59.2	9.7	15.0	33.7	
MTS0826	62.0**			60.3	9.8	14.7	33.9	
MTS0832	50.1			58.0	10.0	14.7	31.8	
Average	51.6	56.9	61.6	58.7	9.9	14.4	33.2	
PLSD (p=0.05)	11.2	9.4	10.0	2.8	ns	1.8	2.5	
CV%	13.2	14.9	13.0	2.9	2.8	7.7	4.6	

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13 percent moisture content.

2 Grain protein values adjusted to 12 percent grain moisture content.

ns Indicates no significant difference between cultivars within a column of data based on Fisher's protected LSD (p=0.05).

** 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).

Rapelje Dryland Winter Wheat (Exp. 103881)

Planted:	October 3, 2009
Harvested:	August 6, 2010
Fertility:	11-52-00, 100 lb/a in-furrow at planting; 105 lb/a as 46-0-0, May 18, 2010
Herbicide:	Glean, 0.25 oz/a, pre-plant
Previous crop:	chemical fallow

Table 5. Performance of 25 commercial and experimental winter wheat cultivars tested under no-till, dryland conditions near Forsyth, Montana during 2010. Cultivars listed alphabetically. (Exp. 103882).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain	Plant Height
	2010	2009-10	2008-10			Protein	
	----- bushels/acre -----			lb/bu	%	%	inches
<u>Commercial</u>							
Accipiter	57.8	46.6		55.3	10.4	12.4	39.1
Bynum	53.9	42.7	42.1	58.0	10.3	13.4	41.9
Carter	65.6	51.5	50.6	55.9	10.3	12.9	34.8
CDC Falcon	62.1	49.5	48.6	52.8	10.0	14.0	35.3
Curlew	72.4*	55.5	53.0*	54.1	10.1	12.5	42.5
Decade	84.0**	64.3**	59.3**	56.1	10.7	12.7	40.8
Genou	57.9	48.5	46.7	55.3	10.4	13.5	44.0
Hyalite	70.0	51.8	47.6	57.1	10.8	12.5	43.6
Jagalene	73.2*	56.2	52.3*	58.3	10.7	11.2	37.5
Jerry	59.5	48.3		55.6	10.6	12.7	43.4
Ledger	61.4	50.1	47.7	54.6	9.7	13.7	37.7
Neeley	60.3	50.2	49.1	56.4	10.6	12.5	43.0
Norris	59.9	48.4	49.8	56.2	10.2	12.6	43.3
Promontory	58.0	49.4	48.6	57.9	10.7	11.7	38.7
Pryor	67.3	53.2	51.3	53.1	9.7	13.3	36.4
Rampart	55.1	44.3	44.8	57.5	10.6	13.0	41.6
Wahoo	59.8	52.1	54.1*	55.4	10.5	11.2	39.6
Yellowstone	67.1	53.5	51.6*	55.4	10.4	11.7	40.7
<u>Experimental</u>							
MT06103	75.5*	60.4*		58.1	10.5	13.6	41.6
MTS0532	62.7	47.9	47.7	55.9	10.2	13.5	38.3
MTS0705	61.5			58.0	10.3	14.2	44.4
MTS0713	57.2	46.2		53.8	10.2	13.8	37.3
MTS0721	64.1			55.8	10.2	13.3	38.7
MTS0826	51.8			57.2	10.3	13.3	40.7
MTS0832	58.2			55.6	10.7	13.1	41.6
Average	63.1	51.0	49.7	56.0	10.4	12.9	40.3
PLSD (p=0.05)	11.9	7.8	7.9	2.4	0.6	ns	3.6
CV%	11.5	13.4	12.8	2.6	3.6	10.6	5.4

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13 percent moisture content.

2/ Grain protein values adjusted to 12 percent grain moisture content.

ns Indicates no significant difference between cultivars within a column of data based on Fisher's protected LSD (p=0.05).

** 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).

Forsyth Dryland Winter Wheat (Exp. 103882)

Planted: October 2, 2009
 Harvested: August 11, 2010
 Fertility: 11-52-00, 100 lb/a in-furrow at planting; 100 lb N/a AS 46-0-0 in fall
 Herbicide: 2.25 oz/a Everest, fall 2009
 Previous crop: chemical fallow,.

Table 6. Performance of 25 commercial and experimental winter wheat cultivars tested under no-till, dryland conditions near Lodge Grass, Montana during 2010. Cultivars listed alphabetically. (Exp. 103883).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein		Plant Height
	2010	2009-10	2008-10			Protein	Plant	
	----- bushels/acre -----			lb/bu	%	%	inches	
<u>Commercial</u>								
Accipiter	63.9	52.9		59.8	14.4	10.7	35.0	
Bynum	66.2	49.3	48.4	61.6	14.2	12.8	42.4	
Carter	61.7	40.4	49.4	59.6	14.7	10.6	31.2	
CDC Falcon	58.6	46.6	53.2	59.5	14.5	11.1	29.9	
Curlew	65.3	51.5	58.8	60.5	14.7	11.0	39.9	
Decade	75.0*	51.8	56.0	60.4	15.2	10.8	33.5	
Genou	57.5	44.8	49.5	60.4	15.0	10.7	39.8	
Hyalite	67.9	52.5	53.0	61.8	14.6	11.3	36.1	
Jagalene	69.1	52.7	55.0	62.0	14.6	10.5	34.5	
Jerry	58.7	43.8		59.8	14.8	11.6	37.5	
Ledger	59.9	53.0	58.7	60.0	14.4	11.2	31.5	
Neeley	65.2	52.9	61.3	59.9	15.2	10.2	37.7	
Norris	69.0	55.7	58.2	61.8	13.8	10.8	42.5	
Promontory	65.6	51.0	56.2	62.3	14.3	10.1	35.7	
Pryor	56.6	43.4	55.8	58.5	14.4	11.0	32.5	
Rampart	59.0	39.7	48.3	60.3	14.8	11.5	39.0	
Wahoo	77.4**	58.6	63.7	59.6	14.3	9.6	35.2	
Yellowstone	63.8	46.9	53.7	59.3	15.2	10.4	34.9	
<u>Experimental</u>								
MT06103	69.6	55.1		61.9	14.5	11.6	38.3	
MTS0532	65.0	54.2	60.1	60.6	14.3	11.7	35.0	
MTS0705	60.0			61.6	15.1	12.0	43.3	
MTS0713	62.0	48.8		59.9	14.5	11.4	33.1	
MTS0721	72.9*			60.8	14.4	11.2	34.0	
MTS0826	65.1			59.1	16.4	11.4	39.8	
MTS0832	67.8			59.3	15.9	10.6	37.5	
Average	64.9	49.8	55.2	60.4	14.7	11.0	36.4	
PLSD (p=0.05)	7.0	ns	ns	1.3	0.6	0.8	2.5	
CV%	6.0	12.7	11.9	1.2	2.5	4.2	4.2	

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13 percent moisture content.

2 Grain protein values adjusted to 12 percent grain moisture content.

ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

** 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).

Lodge Grass Dryland Winter Wheat (Exp. 103883)

Planted:	October 2, 2009
Harvested:	August 5, 2010
Fertility:	11-52-0, 100 lb/a, at planting; 100 lb n/a as 46-0-0 in fall; 42 lb N/a as 46-0-0, May 21, 2010
Herbicide:	n/a
Previous crop:	chemical fallow

Table 7. Performance of 25 commercial and experimental winter wheat cultivars (one replication only) tested under no-till, dryland conditions near Hardin, Montana during 2010. Cultivars listed alphabetically. (Exp. 103884).

Cultivar	1/ Grain Yield	Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	bushels/acre	lb/bu	%	%	inches
<u>Commercial</u>					
Accipiter	64.3	61.9	10.1	10.9	37.8
Bynum	64.4	63.2	10.2	9.3	40.2
Carter	89.2	62.7	10.4	11.4	36.2
CDC Falcon	90.9	64.0	10.2	9.3	35.4
Curlew	74.6	63.5	10.4	9.7	39.8
Decade	84.1	63.3	10.4	9.7	45.7
Genou	86.5	62.2	10.5	9.2	40.2
Hyalite	53.6	62.0	10.6	11.2	44.1
Jagalene	71.5	61.7	10.6	10.5	39.4
Jerry	76.4	62.8	10.1	11.0	39.0
Ledger	69.8	63.6	10.1	8.5	43.3
Neeley	56.8	62.1	10.2	9.8	44.5
Norris	57.3	61.8	10.2	11.2	31.1
Promontory	59.8	61.8	10.1	11.1	44.1
Pryor	91.3	61.3	10.3	7.8	39.0
Rampart	74.5	62.9	10.3	10.0	42.5
Wahoo	54.7	60.7	10.0	12.1	37.4
Yellowstone	68.7	62.9	10.2	9.8	42.1
<u>Experimental</u>					
MT06103	63.7	64.2	10.3	9.1	42.5
MTS0532	79.8	64.3	10.5	8.6	45.3
MTS0705	66.3	62.2	10.7	7.1	36.2
MTS0713	57.9	63.2	10.7	9.2	35.0
MTS0721	79.7	63.7	10.4	9.1	35.4
MTS0826	79.3	62.2	10.1	10.2	43.3
MTS0832	68.8	62.8	10.4	8.4	35.0
Average	71.4	62.7	10.3	9.8	39.8
PLSD (p=0.05)					
CV%					

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13 percent moisture content.

2 Grain protein values adjusted to 12 percent grain moisture content.

Hardin Dryland Winter Wheat (Exp. 103884)

Planted:	September 29, 2009
Harvested:	August 5, 2010
Fertility:	11-52-00, 100 lb/a at planting; 100 lb N/a as 46-0-0 in fall
Herbicide:	unknown
Previous crop:	chemical fallow

Table 8. Performance of 25 commercial and experimental winter wheat cultivars tested under conventional, dryland conditions near Molt, Montana during 2010. Cultivars listed alphabetically. (Exp. 103885).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	2010	2009-10	2008-10				
	----- bushels/acre -----			lb/bu	%	%	inches
<u>Commercial</u>							
Accipiter	73.7*	56.1		61.9	10.5	9.7	32.2
Bynum	66.1	50.6	48.0	62.5	10.0	12.6	33.7
Carter	70.2	50.9	50.8	61.6	10.3	11.7	27.6
CDC Falcon	73.1	52.3	54.1	61.2	10.0	11.5	30.3
Curlew	81.6*	57.7	55.6	62.3	10.6	10.7	33.3
Decade	81.7**	56.3	58.1	62.5	10.4	10.9	32.2
Genou	74.3*	60.9	58.2	62.3	10.7	11.5	35.2
Hyalite	76.3*	51.3	49.9	63.3	10.1	10.8	32.8
Jagalene	73.9*	53.4	51.1	62.8	10.6	10.8	29.7
Jerry	64.8	47.2		61.5	10.5	10.5	35.7
Ledger	81.3*	62.0	60.3	62.0	10.0	11.3	29.1
Neeley	71.3	57.2	58.5	61.8	10.4	9.8	33.2
Norris	73.2*	55.0	58.4	62.9	10.2	9.7	33.3
Promontory	76.7*	58.4	57.4	63.0	10.6	9.9	32.2
Pryor	72.5	58.2	58.9	61.5	10.3	11.6	30.3
Rampart	69.5	53.5	49.8	61.8	10.2	11.4	32.7
Wahoo	75.5*	59.4	60.0	61.4	10.1	9.2	31.5
Yellowstone	76.8*	56.9	58.1	61.8	11.1	9.8	31.5
<u>Experimental</u>							
MT06103	79.6*	60.6		62.7	10.5	10.5	30.6
MTS0532	76.5*	58.7	54.9	62.1	10.3	11.0	30.1
MTS0705	76.5*			63.7	10.6	10.1	34.4
MTS0713	74.1*	56.6		62.2	10.5	10.8	33.1
MTS0721	75.7*			62.0	9.8	12.0	30.7
MTS0826	71.5			62.3	10.2	10.3	31.5
MTS0832	67.1			61.6	10.9	9.8	31.9
Average	74.1	55.9	55.4	62.2	10.4	10.7	31.9
PLSD (p=0.05)	8.5	ns	ns	1.3	0.6	1.7	2.7
CV%	6.6	9.7	8.7	1.2	3.5	9.8	5.1

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13 percent moisture content.

2 Grain protein values adjusted to 12 percent grain moisture content.

ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

** 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).

Molt Dryland Winter Wheat (Exp. 103885)

Planted: October 16, 2009

Harvested: August 6, 2010

Fertility: 11-52-00, 100 lb/a in furrow at planting; 65 lb/a 11-52-00 in fall;
12 lb N/a as 46-0-0, May 19; 100 lb N/a as 46-0-0, May 23, 2010

Herbicide: n/a

Previous crop: summer fallow

Table 9. Grain yield^{1/} of 28 commercial and experimental winter wheat cultivars tested at six locations in south central Montana during 2010. Varieties listed by declining average yield across all locations.

Cultivar	Lodge						Huntley No-Till Irrigated	All Locations Average
	Rapelje No-Till Dryland	Forsyth No-Till Dryland	Grass No-Till Dryland	Hardin No-Till Dryland	Molt Conv. Dryland	Dryland Locations Average		
----- bushels/acre -----								
Decade	52.5*	84.0**	75.0*	84.1	81.7**	73.2**	104.3	79.4**
Jagalene	53.2*	73.2*	69.1	71.5	73.9*	68.2*	118.9	78.3*
Wahoo	60.7*	59.8	77.4**	54.7	75.5*	68.4*	113.3	77.4*
MTS0721	58.8*	64.1	72.9*	79.7	75.7*	67.7*	103.9	74.9*
Yellowstone	59.4*	67.1	63.8	68.7	76.8*	66.5	104.6	74.1*
MT06103	58.5*	75.5*	69.6	63.7	79.6*	70.9*	85.0	73.7*
Curlew	46.5	72.4*	65.3	74.6	81.6*	65.9	87.1	70.1
Carter	45.5	65.6	61.7	89.2	70.2	61.2	104.1	69.8
MTS0532	51.1*	62.7	65.0	79.8	76.5*	63.5	93.3	69.5
Hyalite	52.9*	70.0	67.9	53.6	76.3*	67.0*	77.4	69.0
Accipiter	51.9*	57.8	63.9	64.3	73.7*	62.3	93.2	68.5
Ledger	48.5	61.4	59.9	69.8	81.3*	62.0	94.7	68.5
Promontory	51.6*	58.0	65.6	59.8	76.7*	63.5	86.9	68.2
Pryor	58.4*	67.3	56.6	91.3	72.5	64.1	82.4	67.7
Neeley	47.8	60.3	65.2	56.8	71.3	61.8	88.8	67.2
MTS0713	48.9	57.2	62.0	57.9	74.1*	60.3	92.3	66.7
MTS0832	50.1	58.2	67.8	68.8	67.1	60.4	91.0	66.5
MTS0705	52.5*	61.5	60.0	66.3	76.5*	62.7	75.2	65.2
MTS0826	62.0**	51.8	65.1	79.3	71.5	63.0	73.5	65.1
Norris	52.9*	59.9	69.0	57.3	73.2*	63.6	69.1	64.7
Genou	40.8	57.9	57.5	86.5	74.3*	57.6	92.9	64.6
Rampart	52.3*	55.1	59.0	74.5	69.5	58.8	87.0	64.5
Jerry	46.8	59.5	58.7	76.4	64.8	57.5	90.4	64.1
Bynum	44.4	53.9	66.2	64.4	66.1	57.0	90.7	63.8
CDC Falcon [§]	41.4	62.1	58.6	90.9	73.1	58.6	82.0	63.2
ID0621 [§]	--	--	--	--	--	--	90.8	--
Moreland [§]	--	--	--	--	--	--	104.1	--
UT9743-42	--	--	--	--	--	--	108.1	--
Average	51.6	63.1	64.9	71.4	74.1	63.4	92.3	69.0
PLSD (p=0.05)	11.2	11.9	7.0		8.5	6.5	ns	8.1
CV%	13.2	11.5	6.0		6.6	12.6	18.9	16.3

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.

§ Tested under irrigated conditions at Huntley only in 2010.

ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

** 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).

Table 10. Performance of 25 commercial and experimental winter wheat cultivars tested under dryland and irrigated conditions at 5 locations in south central Montana during 2010. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	2010	2009-10	2008-10				
	----- lb/bu -----			lb/bu	%	%	inches
<u>Commercial</u>							
Accipiter	68.5	61.7		58.8	11.2	11.3	36.4
Bynum	63.8	56.8	63.0	60.1	10.9	13.0	39.8
Carter	69.8	58.7	75.9	59.1	11.2	11.7	32.4
CDC Falcon	63.2	57.5	81.4*	57.2	11.1	12.2	33.1
Curlew	70.1	61.0	80.1*	57.7	11.1	11.9	39.4
Decade	79.4**	67.3*	82.9*	59.2	11.4	11.7	36.7
Genou	64.6	57.9	73.8	58.9	11.3	12.1	39.6
Hyalite	69.0	60.4	72.7	59.6	11.1	12.2	38.4
Jagalene	78.3*	66.8*	75.2	60.8	11.4	11.0	35.5
Jerry	64.1	55.6		58.8	11.4	11.5	40.7
Ledger	68.5	62.3*	80.9*	58.3	10.9	11.9	34.5
Neeley	67.2	59.5	82.3*	58.9	11.3	11.2	38.6
Norris	64.7	63.1*	81.1*	59.4	10.9	11.5	39.3
Promontory	68.2	61.3	80.0*	60.4	11.2	10.7	36.3
Pryor	67.7	61.7	85.5**	57.6	10.9	11.7	33.7
Rampart	64.5	56.2	70.5	59.5	11.2	12.4	38.7
Wahoo	77.4*	66.6*	84.0*	58.7	11.2	10.4	36.3
Yellowstone	74.1*	64.3*	85.3*	58.6	11.4	11.1	36.8
<u>Experimental</u>							
MT06103	73.7*	67.4**		60.1	11.2	12.4	37.6
MTS0532	69.5	62.9*	79.0*	59.3	11.2	12.0	35.2
MTS0705	65.2			60.4	11.4	12.3	40.6
MTS0713	66.7	59.0		58.0	11.2	12.3	35.4
MTS0721	74.9*			59.2	10.9	12.2	35.7
MTS0826	65.1			59.4	11.4	12.1	38.1
MTS0832	66.5			58.6	11.6	11.5	38.2
Average	69.0	61.3	78.4	59.1	11.2	11.8	37.1
PLSD (p=0.05)	8.1	5.4	8.2	1.2	0.4	0.8	2.0
CV%	13.5	18.1	14.4	2.9	4.8	8.8	7.6
Location-Years	5	11	16	5	5	5	5

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.

2/ Grain protein values adjusted to 12 percent grain 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).

Table 11. Performance of 25 commercial and experimental winter wheat cultivars tested under dryland conditions only at 4 locations in south central Montana during 2010. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	2010	2009-10	2008-10				
	----- lb/bu -----			lb/bu	%	%	inches
<u>Commercial</u>							
Accipiter	62.3	54.1		59.0	11.3	11.6	34.8
Bynum	57.0	49.8	49.3	60.6	11.0	13.5	38.2
Carter	61.2	50.9	54.1	59.4	11.3	12.3	30.7
CDC Falcon	58.6	50.7	55.5	57.6	11.1	12.6	31.3
Curlew	65.9	55.6	58.9	57.7	11.2	12.4	38.3
Decade	73.2**	60.2*	63.1*	59.6	11.6	12.2	34.5
Genou	57.6	51.6	53.7	58.6	11.5	12.8	38.5
Hyalite	67.0*	54.8	55.5	60.4	11.4	12.5	36.7
Jagalene	68.2*	57.7*	58.2	61.1	11.5	11.6	33.2
Jerry	57.5	49.4		58.9	11.5	12.2	37.7
Ledger	62.0	55.2	59.0*	58.5	11.0	12.5	32.7
Neeley	61.8	53.6	59.8*	59.0	11.5	11.7	36.9
Norris	63.6	57.4*	60.8*	60.0	10.9	11.8	37.9
Promontory	63.5	55.2	58.4	61.2	11.5	10.9	35.1
Pryor	64.1	57.2*	62.1*	58.0	11.1	12.3	32.6
Rampart	58.8	48.6	51.0	59.6	11.4	12.8	37.3
Wahoo	68.4*	59.8*	63.8**	58.9	11.2	10.8	34.6
Yellowstone	66.5	56.6	60.6*	58.8	11.7	11.5	35.3
<u>Experimental</u>							
MT06103	70.9*	62.1**		60.3	11.3	12.8	36.2
MTS0532	63.5	56.5	59.0*	59.2	11.2	12.7	33.7
MTS0705	62.7			60.6	11.5	12.8	39.4
MTS0713	60.3	52.8		57.9	11.3	13.0	33.8
MTS0721	67.7*			59.4	11.1	12.8	34.3
MTS0826	63.0			59.7	11.7	12.4	36.5
MTS0832	60.4			58.6	11.9	12.0	35.7
Average	63.4	54.8	57.8	59.3	11.3	12.3	35.4
PLSD (p=0.05)	6.5	5.1	4.8	1.3	0.4	0.8	2.1
CV%	12.6	17.3	18.6	2.7	4.7	8.0	7.3
Location-Years	4	9	13	4	4	4	4

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.

2/ Grain protein values adjusted to 12 percent grain 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).