RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2019

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

http://www.sarc.montana.edu/

PROJECT TITLE:

2019 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 Scientist, SARC, Huntley
Phil L. Bruckner, Winter Wheat Breeder, PSPP, Bozeman
James E. Berg, Winter Wheat Research Associate, PSPP, Bozeman

PROJECT PERSONNEL:

Shane Leland, General Farm Operations Manager, SARC, Huntley
Janna Rozett, Research Assistant III, SARC, Huntley
Callie Cooley, Yellowstone County Extension, Billings
Melissa Ashley, Rosebud/Treasure County Extension, Forsyth
Lee Schmelzer, Stillwater County Extension, Columbus
Molly Hammond, Big Horn County Extension, Hardin

COOPERATORS:

Mike Brown, Fly Creek (Hardin) and Fort Smith
Cavin Steiger, Hysham
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 2019 off-station winter wheat trials were established under irrigation at Huntley and under dryland conditions near Molt; Fort Smith, Hardin, Hysham, and Rapelje under no-till, chemical fallow conditions (Fig. 1). Each trial contained 25 winter wheat cultivars (15 commercial, 10 experimental), and was planted using a partially-balanced lattice design under dryland and irrigated conditions with three replications. 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). Dryland test plots consisted of a 16-foot, 4-row plot with 15-inch row spacing. Irrigated test plots consisted of a 16-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.

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 (2018-19) and three year (2017-19) yield averages are provided for cultivars tested during previous years. Test weight (pounds per bushel) and grain

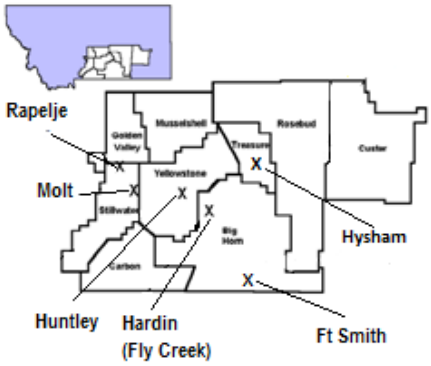

Figure1. 2019 off-station winter wheat trial locations in south central Montana.

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. 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 1 through 4).

RESULTS:

The 2019 winter wheat test sites had below average rain or snow accumulation during winter months except in February. However, precipitation during the months of September and October provided some soil moisture for winter wheat planting and emergence but resulted in relatively poor stand at Rapelje and Fort Smith sites. Above-average precipitation from April through August provided favorable environmental conditions during early growth and grain filling period that enhanced winter wheat grain yield. In August widespread thunderstorm and severe hail storm occurred near Huntley and Molt that resulted in 100 percent crop loss. These storms also delayed harvesting at other winter wheat trial sites in south central Montana.

Average yield under dryland conditions at Rapelje in 2019 averaged 77 bu/a (Table 1), about 43 bu/a less than the winter wheat yield observed at this site in 2018 mainly due to poor stand establishment. Grain yield ranged from 66 bu/a for 'SY Monument' to 87 bu/a for 'Northern'. Twelve other entries produced yield that was statistically equal to the yield of highest yielding cultivar. Test weight was good and averaged 63.3 lb/bu. All entries produced test weight over 60 bu/ac at this site. Grain protein was good and averaged 12.5 percent and ranged from 11.4 percent to 14.6 percent. Two year average yield for winter wheat varieties tested at Rapelje during 2018 and 2019 was 99 bu/a. Three-year average yield 2017 through 2019 was 85 bu/a.

Winter wheat yield under dryland condition at Hardin during 2019 was relatively lower than the previous years and averaged 80 bu/a (Table 2). Drought stress at planting contributed to lower yield at this location. Yield ranged from 69 bu/a for 'MTCS 1601' to 96 bu/a for 'Keldin'. Test weight averaged 59.8 lb/bu. Test weight ranged from 58.1 to 61.3 lb/bu. Grain protein content averaged 12.7 percent. Protein content ranged from 11.5 percent for 'Byrd CLP' to 13.7 percent for 'Decade'. Two-year average yield for winter wheat varieties tested during 2018 and 2019 was 89 bu/a. Three-year average yield for winter wheat varieties tested from 2017 to 2019 was 73 bu/a. Keldin was the highest yielding cultivar averaged over the past two and three years at Hardin.

Average yield under dryland conditions at Fort Smith was 81 bu/a (Table 3). Yield ranged from 61 bu/a for 'Brawl CLP' to 94 bu/a for experimental line 'MT 1642'.

Two other entries produced yield that was statistically equal to the yield of highest yielding entry. Northern was the highest yielding commercial cultivar producing 92 bu/a. Test weight was excellent and averaged 63.6 lb/bu. All entries had a test weight greater than 60 lb/bu. Grain protein content averaged 12.2 percent and ranged from 11.5 percent to 13.1 percent. Two-year average yield for winter wheat varieties tested at Fort Smith was 81 bu/a.

Average yield under dryland conditions at Hysham was 49 bu/a (Table 4). Yield ranged from 44 bu/a for 'Brawl CPL' and MTCS 1601 to 60 bu/a for 'SY Clearstone'. Four other cultivars produced yield that was statistically equal to the yield of the highest yielding cultivars. Test weight averaged 58.9 lb/bu and ranged from 56.3 to 60.3 lb/bu. Grain protein content averaged 7.6 percent. Two-year average yield for winter wheat varieties tested at Hysham was 52 bu/a, while three-year average yield was 47 bu/a. Yellowstone was the highest yielding cultivar averaged over the past three years producing 54 bu/a.

SUMMARY:

Below-average precipitation at winter wheat planting time, during September – October, resulted in poor stand at some location that resulted in lower yield. However, above-average precipitation from April to August provided much needed soil moisture during early growth and grain filling period that enhanced winter wheat grain yield. In August widespread thunderstorm and severe hail storm occurred near Huntley and Molt that resulted in 100 percent crop loss. Grain production at dryland test sites ranged from 49 bu/a at Hysham to 81 bu/a at Fort Smith (Table 5). Keldin was the highest yielding cultivar under dryland conditions, producing 78 bu/a (Table 6). Since 2016, in experiments representing 11 location-years in southcentral Montana, Keldin was the highest yielding cultivar producing 89 and 75 bu/a over the past two- and three-years respectively across all dryland locations (Table 6).

Table 1. Performance of 25 commercial and experimental winter wheat cultivars tested under no-till, dryland conditions near Rapelje, Montana during 2019. Cultivars listed alphabetically. (Exp. 193881).

	1/ Grain Yield			Test	Grain	2/ Grain	Plant
Cultivar	2019	2018-19	2017-19	Weight	Moisture	Protein	Height
	---------- bushels/acre ----------			lb/bu	%	%	inches
Commercial							
AAC Wildfire	69.0			63.6	10.7	12.1	36.0
Brawl CLP	66.6	91.3	79.3	64.4	10.8	14.6	31.9
Byrd CLP	**78.2***			62.9	10.9	11.4	35.2
Decade	**81.0***	94.8	82.8	63.7	10.8	13.0	35.3
FourOsix	**78.4***	99.4	85.5	63.7	10.7	12.5	33.9
Judee	71.6	87.4	78.1	64.2	10.7	13.0	31.8
Keldin	**85.9***	103.2	89.8	63.8	10.9	12.3	33.7
LCS Jet	**78.2***	102.3		61.0	10.3	11.6	30.1
Loma	**78.0***	99.4	84.4	63.0	11.0	12.1	33.1
Northern	**87.3****	110.0	93.9	63.1	10.6	12.1	35.7
Ray	76.2	96.9	83.2	61.8	10.5	12.5	41.3
SY Clearstone	**81.1***	98.3	85.5	62.4	10.6	12.0	37.5
SY Monument	66.4	104.5	88.5	62.6	10.5	12.0	31.8
Warhorse	76.2	96.9	82.3	63.1	10.5	13.4	32.9
Yellowstone	**84.1***	100.7	86.3	62.8	10.8	12.4	36.1
Experimental							
MT1564	74.6	101.0		63.9	11.0	13.1	32.7
MT1642	**78.6***	102.0		62.6	10.7	12.4	35.2
MT1683	**79.1***			62.8	10.7	12.6	36.1
MT1747	74.8			65.2	10.9	12.5	31.6
MT1750	**80.5***			65.4	10.9	12.1	30.8
MT1782	71.6			64.4	10.8	13.3	33.1
MTCL1732	77.1			62.3	10.5	12.2	31.9
MTCS1601	75.2	100.5		63.9	10.9	12.6	33.6
MTS1588	**77.6***	98.8	85.5	63.6	11.0	12.1	31.8
MTW1491	76.1	95.9	84.8	63.5	11.0	12.0	36.4
Average	76.9	99.1	85.0	63.3	10.8	12.5	34.0
PLSD (p=0.05)	10.1	ns	ns	0.7	0.1	0.5	2.2
CV%	7.3	7.7	7.5	0.6	0.8	2.2	4.0
Lattice RE% ^	131	100	100	100	100	123	100

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. 193881)

Planted:	October 08, 2018
Harvested:	August 23, 2019
Fertility:	11-52-00, 70 lb/a in-furrow at planting
Herbicide:	n/a
Previous crop:	Spring dry pea

Table 2. Performance of 25 commercial and experimental winter wheat cultivars tested under no-till, dryland conditions near Hardin, Montana during 2019. Cultivars listed alphabetically. (Exp. 193884).

Cultivar	Grain Yield 1/ 2019	Grain Yield 1/ 2018-19	Grain Yield 1/ 2017-19	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height
	---------- bushels/acre ----------			lb/bu	%	%	inches
Commercial							
AAC Wildfire	81.0			59.9	12.7	13.1	37.5
Brawl CLP	75.6	86.9	70.7	60.1	12.7	12.0	34.6
Byrd CLP	77.9			59.4	13.0	11.5	36.5
Decade	83.9	95.3	74.7	59.9	13.2	13.7	36.4
FourOsix	77.4	90.0	75.8	58.9	12.5	12.5	33.2
Judee	73.5	89.9	70.7	61.2	12.8	13.0	34.0
Keldin	**95.9****	**104.2****	**84.3****	60.2	12.7	11.8	34.5
LCS Jet	76.0	93.6		58.1	12.3	12.4	30.6
Loma	77.4	90.0	72.1	59.3	12.9	13.1	33.2
Northern	72.3	89.3	70.3	60.4	13.1	13.4	33.5
Ray	79.5	84.2	69.1	58.8	12.8	13.1	42.0
SY Clearstone	80.3	88.2	72.7	58.9	12.9	12.9	36.6
SY Monument	81.1	92.2	76.0	58.6	12.9	11.8	35.3
Warhorse	81.6	92.2	73.6	60.7	13.1	13.3	34.5
Yellowstone	76.2	86.0	70.7	59.3	12.9	12.8	36.5
Experimental							
MT1564	74.8	86.4		59.4	13.0	12.6	34.8
MT1642	74.4	87.5		59.7	12.8	13.4	33.9
MT1683	81.4			59.2	12.8	12.6	37.1
MT1747	87.1			60.7	12.9	12.3	32.9
MT1750	**88.7***			61.3	12.5	12.8	31.5
MT1782	**91.2***			60.5	13.0	12.7	36.0
MTCL1732	81.7			58.3	12.6	12.2	31.6
MTCS1601	68.7	81.7		60.8	13.1	12.8	32.9
MTS1588	73.8	84.5	67.8	60.4	13.0	12.5	31.1
MTW1491	78.3	87.0	69.5	60.5	12.9	12.4	34.9
Average	79.6	89.4	72.7	59.8	12.8	12.7	34.6
PLSD (p=0.05)	8.4	6.5	7.2	0.5	0.4	0.5	2.1
CV%	6.0	8.1	7.3	0.5	2.0	2.4	3.7
Lattice RE% ^	111	100	100	100	100	107	100

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).

Hardin Dryland Winter Wheat (Exp. 193884)

Planted:	October 06, 2018
Harvested:	August 13. 2019
Fertility:	100 lb N/a as 46-0-0 in fall 2017; 70 lb/a 11-52-0 at planting
Pesticide:	n/a
Previous crop:	Sunflower

Table 3. Performance of 25 commercial and experimental winter wheat cultivars tested under conventional, dryland conditions near Fort Smith, Montana during 2019. Cultivars listed alphabetically. (Exp. 193886).

Cultivar	Grain Yield 1/ 2019	Grain Yield 1/ 2018 -19	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height
	---- bushels/acre ----		lb/bu	%	%	inches
Commercial						
AAC Wildfire	84.7		64.0	11.2	11.6	36.7
Brawl CLP	60.9	56.1	64.4	11.2	14.2	32.9
Byrd CLP	**89.0***		64.1	11.3	11.5	34.7
Decade	78.4	**82.3***	63.9	11.2	12.5	34.7
FourOsix	84.1	74.7	63.8	11.2	12.0	34.2
Judee	80.5	78.4	64.6	11.1	12.8	34.9
Keldin	83.4	**92.1***	64.3	11.3	11.6	33.1
LCS Jet	81.4	**84.9***	61.0	10.8	11.5	30.8
Loma	85.4	**86.4***	63.5	11.4	11.7	35.3
Northern	**91.5***	**90.0***	63.7	11.1	12.0	34.4
Ray	74.6	76.7	61.7	11.1	12.0	40.0
SY Clearstone	81.2	**90.6***	62.8	11.0	11.9	36.7
SY Monument	66.2	69.2	62.9	10.9	12.1	30.5
Warhorse	81.0	**83.4***	63.5	10.8	12.5	33.3
Yellowstone	79.5	**81.9***	63.3	11.1	12.0	36.1
Experimental						
MT1564	78.0	73.2	63.5	11.1	13.1	32.8
MT1642	**94.4****	**94.1****	63.2	11.2	12.0	35.5
MT1683	81.2		63.0	11.1	11.5	37.0
MT1747	75.1		64.9	11.2	12.3	31.2
MT1750	84.6		65.2	11.0	11.8	30.5
MT1782	78.3		64.5	10.9	13.1	35.1
MTCL1732	83.1		63.3	10.8	12.4	31.7
MTCS1601	73.9	**85.4***	64.3	11.3	12.5	33.4
MTS1588	78.5	**85.2***	64.3	11.5	12.0	30.9
MTW1491	83.3	79.6	63.3	11.4	12.2	36.4
Average	80.5	81.3	63.6	11.1	12.2	34.1
PLSD (p=0.05)	8.9	12.4	0.5	0.3	0.9	2.2
CV%	5.4	9.4	0.4	1.5	1.5	2.6
Lattice RE% ^	260	100	107	100	114	155

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).

Fort Smith Dryland Winter Wheat (Exp. 193886)

Planted:	October 6, 2018
Harvested:	August 14, 2019
Fertility:	11-52-0 applied at planting; 100 lb/a as 46-0-0 in spring.
Herbicide:	n/a
Previous crop:	Chemical fallow

Table 4. Performance of 25 commercial and experimental winter wheat cultivars tested under conventional, dryland conditions near Hysham, Montana during 2019. Cultivars listed alphabetically. (Exp. 193882).

Cultivar	Grain Yield 1/ 2019	2018-19	2017-19	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height
	---------- bushels/acre ----------			lb/bu	%	%	inches
Commercial							
AAC Wildfire	51.6			60.0	11.0	7.5	29.0
Brawl CLP	44.0	50.0		59.1	10.8	8.6	27.1
Byrd CLP	**55.4***			57.7	10.9	6.8	28.7
Decade	49.1	47.3	45.9	58.7	10.9	7.7	28.8
FourOsix	48.7	53.9		57.7	10.7	7.1	28.2
Judee	49.1	48.9	40.2	60.3	11.0	7.9	29.5
Keldin	50.3	52.0	**48.2***	59.0	11.2	7.5	30.5
LCS Jet	49.0			56.3	10.2	7.5	24.0
Loma	48.5	51.5	45.7	60.3	11.4	8.3	26.7
Northern	51.7	53.7	46.6	59.8	10.7	7.7	28.2
Ray	46.3	49.4		59.2	11.1	7.7	32.5
SY Clearstone	**59.7****	58.0	**53.0***	58.8	10.9	7.2	30.3
SY Monument	43.2	52.1		57.3	10.8	7.2	28.0
Warhorse	49.0	50.3	45.3	59.0	10.8	7.8	27.8
Yellowstone	**54.7***	59.3	**54.2****	58.8	11.0	7.2	30.8
Experimental							
MT1564	47.5			58.8	11.5	7.3	29.7
MT1642	**54.0***			60.1	11.0	8.3	29.8
MT1683	49.2			59.0	10.9	7.6	31.3
MT1747	46.7			59.6	10.8	7.9	27.0
MT1750	46.3			59.7	10.9	7.6	26.4
MT1782	45.1			59.6	11.0	8.1	27.8
MTCL1732	**57.2***			57.7	10.8	7.4	27.4
MTCS1601	43.7			58.8	11.1	7.6	27.6
MTS1588	48.5	50.1		59.5	11.3	8.1	25.8
MTW1491	46.6	55.6		57.8	11.4	7.1	30.1
Average	49.4	52.3	47.4	58.9	11.0	7.6	28.5
PLSD (p=0.05)	6.1	ns	7.1	0.4	0.3	0.5	1.4
CV%	6.9	10.8	11.9	0.4	1.7	4.2	3.0
Lattice RE% ^	132	100	100	100	100	100	100

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).

Hysham Dryland Winter Wheat (Exp. 193882)

Planted:	October 6, 2018
Harvested:	August 22, 2019
Fertility:	11-52-0 applied at planting; 100 lb/a as 46-0-0 in spring.
Herbicide:	n/a
Previous crop:	Spring dry pea

Table 5. Grain yield[1/] of 25 commercial and experimental winter wheat cultivars tested at four locations in south central Montana during 2019. Varieties listed by declining average yield across all locations.

Cultivar	Rapelje No-Till Dryland	Fort Smith No-Till Dryland	Hardin No-Till Dryland	Hysham No-Till Dryland	Dryland Locations Average
Keldin	**85.9***	83.4	**95.9****	50.3	**78.1****
Northern	**87.3****	**91.5***	72.3	51.7	**76.6***
MT1642	**78.6***	**94.4****	74.4	**54.0***	**76.5***
SY Clearstone	**81.1***	81.2	80.3	**59.7****	**75.8***
Byrd CLP	**78.2***	**89.0***	77.9	**55.4***	**75.7***
MTCL1732	77.1	83.1	81.7	**57.2***	**75.7***
MT1750	**80.5***	84.6	**88.7***	46.3	**74.4***
Yellowstone	**84.1***	79.5	76.2	**54.7***	**72.8***
Decade	**81.0***	78.4	83.9	49.1	**72.5***
Loma	**78.0***	85.4	77.4	48.5	**72.1***
MT1683	**79.1***	81.2	81.4	49.2	**71.9***
MT1782	71.6	78.3	**91.2***	45.1	**71.9***
Warhorse	76.2	81.0	81.6	49.0	**71.3***
AAC Wildfire	69.0	84.7	81.0	51.6	**70.9***
MT1747	74.8	75.1	87.1	46.7	**73.0**
LCS Jet	**78.2***	81.4	76.0	49.0	70.7
MTW1491	76.1	83.3	78.3	46.6	70.4
FourOsix	**78.4***	84.1	77.4	48.7	70.3
Ray	76.2	74.6	79.5	46.3	68.8
MTS1588	**77.6***	78.5	73.8	48.5	68.7
MT1564	74.6	78.0	74.8	47.5	68.6
Judee	71.6	80.5	73.5	49.1	68.1
MTCS1601	75.2	73.9	68.7	43.7	67.1
SY Monument	66.4	66.2	81.1	43.2	66.7
Brawl CLP	66.6	60.9	75.6	44.0	61.5
Average	76.9	80.5	79.6	49.4	71.6
PLSD (p=0.05)	10.1	8.9	8.4	6.1	7.4
CV%	7.3	5.4	6.0	6.9	9.1

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

Table 6. Performance of 25 commercial and experimental winter wheat cultivars tested under dryland conditions at four locations in south central Montana during 2019. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	2019	2018-19	2017-19				
	---------- lb/bu ----------			lb/bu	%	%	inches
Commercial							
AAC Wildfire	**70.9***			61.8	11.4	11.0	24.8
Brawl CLP	61.5	69.7	62.6	62.0	11.4	12.3	22.5
Byrd CLP	**75.7***			61.0	11.5	10.3	24.1
Decade	**72.5***	**82.8***	68.3	61.5	11.5	11.7	24.2
FourOsix	70.3	79.2	**70.3***	61.0	11.3	11.1	22.8
Judee	68.1	76.5	64.2	62.6	11.4	11.7	22.8
Keldin	**78.1****	**88.9****	**74.5****	61.8	11.5	10.8	23.3
LCS Jet	70.7	**85.6***		59.1	10.9	10.8	20.5
Loma	**72.1***	82.2	67.7	61.5	11.7	11.3	22.6
Northern	**76.6***	**87.5***	**72.1***	61.8	11.4	11.3	23.5
Ray	68.8	77.2	66.0	60.4	11.4	11.3	28.0
SY Clearstone	**75.8***	**83.1***	**70.1***	60.7	11.4	11.0	25.2
SY Monument	66.7	79.4	**70.3***	60.3	11.3	10.8	22.6
Warhorse	**71.3***	81.7	68.0	61.6	11.3	11.7	22.9
Yellowstone	**72.8***	80.8	69.1	61.0	11.4	11.1	24.7
Experimental							
MT1564	68.6	77.1		61.4	11.7	11.5	23.0
MT1642	**76.5***	**84.1***		61.4	11.4	11.4	23.7
MT1683	**71.9***			61.0	11.4	11.2	25.0
MT1747	**73.0**			62.6	11.5	11.2	22.0
MT1750	**74.4***			62.9	11.3	11.1	21.1
MT1782	**71.9***			62.3	11.4	11.8	23.4
MTCL1732	**75.7***			60.4	11.2	11.1	21.8
MTCS1601	67.1	78.6		62.0	11.6	11.3	22.7
MTS1588	68.7	79.0	65.2	61.9	11.7	11.2	21.3
MTW1491	70.4	78.7	67.6	61.3	11.7	10.9	24.3
Average	71.6	80.7	68.3	61.4	11.4	11.2	23.3
PLSD (p=0.05)	7.4	6.3	4.4	0.8	0.2	0.6	1.6
CV%	9.1	8.2	8.5	0.5	1.6	3.6	4.3
Location x Year	4	8	11	4	4	4	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.
** 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).