The MONTANA STATE UNIVERSITY
MONTANA AGRICULTURAL EXPERIMENT STATION

RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2017

Annual Report of the Investigations at and Administration of the
Southern Agricultural Research Center, Huntley, Montana
http://www.sarc.montana.edu/

PROJECT TITLE:

2017 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.

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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 2017 off-station winter wheat trials were established under irrigation at Huntley and under dryland conditions near Molt under conventional summer fallow conditions; near Fort Smith, Hardin, Hysham, and Rapelje under no-till, chemical fallow conditions (Fig. 1). Each trial contained 25 winter wheat cultivars (17 commercial, 9 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. Information pertaining to the traits and characteristics of the winter wheat entries are provided in Table 1.

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 (2016-17) and three year (2015-17) yield averages are provided for cultivars tested during previous years. Test weight (pounds per bushel) and grain

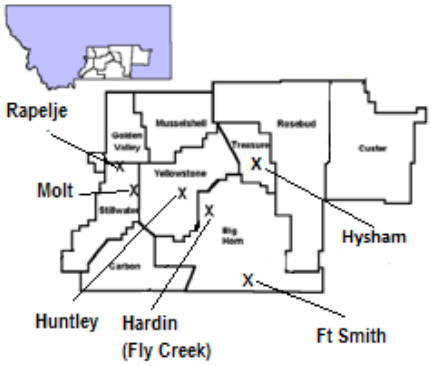

Figure1. 2017 off-station winter wheat trial locations in south central Montana.

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 2 through 7).

RESULTS:

The 2017 winter wheat test sites had below average rain or snow accumulation during winter months except in November and January. Precipitation during the months of September and October provided adequate soil moisture for winter wheat planting and emergence. Below-average precipitation from May through July resulted in late season drought stress at all test sites. Moreover, temperature was 1 – 6 ^{0}F above-average through-out the winter wheat growing season. Late season drought stress coupled with above average temperature in 2017 growing season resulted in accelerated barley growth and resulted in early maturity and harvest.

Irrigated winter wheat trial was established at Huntley in 2017. Winter wheat stand was excellent that resulted in above average yield at this location. This location has the highest grain yield among all location in 2017, averaging 103 bu/ac (Table 2. Yields ranged from 83 bu/a for experimental line 'MTF1435' to 133 bu/a for experimental line 'MT1465'. Five other entries produced yield that was statistically equal to the yield of highest yielding cultivar. Test weight values were good under irrigated conditions, averaging 62.8 lb/bu. All entries possessed test weight values higher than of 60 lb/bu. Grain protein content averaged 11.9 percent and ranged from 10.8 to 13.7 percent. Two- (2016-17) and three-year (2015-2017) average yield for winter wheat varieties tested at Huntley was 101 and 92 bu/a respectively. 'Keldin' was the highest yielding cultivar over the last two years, while Yellowstone was the highest yielding cultivar over the past three years.

Average yield under dryland conditions at Rapelje in 2017 was 59 bu/a (Table 3), about 5 bushels per acre higher than winter wheat yield observed at this site in 2016. Grain yield ranged from 52.2 bu/a for cultivar 'WB-Quake' to 65 bu/a for 'MT1265'. Nine other entries produced yield that was statistically equal to the yield of highest yielding cultivar. 'Northern' and Keldin was the highest yielding commercial cultivars with 64 bu/a yield. Test weight was good and averaged 63.5 lb/bu. All entries produced test weight over 60 bu/ac at this site. Grain protein was low and averaged 8.3 percent and ranged from 8.0 percent to 8.7 percent. Two-year average yield for winter wheat varieties tested at Rapelje during 2016 and 2017 was 56 bu/a. Three-year average yield from 2015 through 2017 was 62 bu/a. Experimental line MT1265 was the highest yielding entry over the past three years at Repelje, closely followed by commercial cultivar Yellowstone.

Winter wheat yield under dryland condition at Hardin during 2017 was relatively low and averaged only 36 bu/a (Table 4). Late season drought stress and sawfly damaged mainly attributed to lower winter wheat yield at this site. Yield ranged from 27 bu/a for 'MT1488' to 45 bu/a for Keldin. Test weight averaged 60.8 lb/bu. All entries at Hardin produced test weight of 60 lb/bu except 'CDC Falcon'. Grain protein content averaged 14.0 percent. Protein content ranged from 11.9 percent for 'SY Monument' to 15.0 percent for 'Bearpaw'. Two-year average yield for winter wheat varieties tested during 2016 and 2017 was 40 bu/a. Three-year average yield for winter wheat varieties tested from 2015 to 2017 was 47 bu/a. Averaged over the past two years Keldin was the highest yielding cultivars at Hardin.

Average yield under dryland conditions at Molt was 59 bu/a (Table 5) about 6 bu/ac higher than last year. Yield ranged from 50 bu/a for WB-Quake to 76 bu/a for 'SY Wolf'. MT1265 produced yield that was statistically equal to the yield of SY Wolf. Test weight averaged 62.4 lb/bu and ranged from 59.9 to 64.8 lb/bu. Grain protein content averaged only 9.6 percent. Two-year average yield for winter wheat varieties tested at Molt during 2016 and 2017 was 56 bu/a, while three-year average yield during 2015 to 2017 was 62 bu/a.

Average yield under dryland conditions at Hysham was 55 bu/a (Table 6) about 19 bu/ac higher than last year. Yield ranged from 49 bu/a for 'MTF1432' to 64 bu/a for Yellowstone. Nine other entries produced yield that was statistically equal to the yield of highest yielding cultivar. Test weight averaged 62.3 lb/bu. All entries had test weight above 60 bu/a. Grain protein content averaged 12.2 percent and ranged from 11.0 percent to 13.7 percent. Two-year average yield for winter wheat varieties tested at Hysham during 2016 and 2017 was 44 bu/a, while three-year average yield from 2015 to 2017 was 46 bu/a. Yellowstone was the highest yielding entry over the past two- and tree-years at Hysham.

SUMMARY:

In 2017 adequate soil moisture at planting time resulted in good winter wheat stand. However, water stress during grain filling period resulted in yield loss at all dryland locations. Drought stress coupled with above-average temperature accelerated wheat growth and resulted in early maturity and harvest. Grain production at dryland test sites ranged from 36 bu/a at Hardin to 59 bu/a at Molt and Repelje (Table 7). SY Wolf was the highest yielding cultivar under dryland conditions, producing 58 bu/a. Montana experimental line MT1265 was not only the top yielding entry under irrigated conditions yielding 133 bu/a but also had the highest yield of 71 bu/a across all six test locations in 2017 (Table 7). Since 2015, experiments representing 15 location-years of testing have uniformly tested cultivars at several dryland locations in south central Montana (Table 9). Yellowstone and Experimental line MT1265 were the highest yielding entries averaged over the past two- and three-years respectively across all dryland locations.

Table 1. Selected characteristics and traits of 25 commercial and experimental winter wheat cultivars performance tested at six off-station sites in south central Montana during 2017.

Cultivar	1/ Origin	Year of Release	2/ Market Class	3/ PVP	4/ Maturity	5/ Coleoptile Length	Chaff Color	6/ Winter Survival	7/ Straw Strength	Solid Stem Type	8/ Disease Resistance				9/ Quality		10/ Clearfield Type
											Leaf Rust	Stem Rust	Stripe Rust	Dwarf Bunt	Milling	Baking	
				Yes/No				1-5		Yes/No					1-5	1-5	Yes/No
Commercial																	
Bearpaw	MSU	2011	HRW	Y	M	M	White	2	M	Y	S	R	S	S	4	3	N
Brawl CL PLUS	Colorado	2011	HRW	Y	E	L	White	2	S	N	-	-	S	S	3	3	Y
CDC Falcon	CDC	1999	HRW	Y	M	S	White	4	S	N	R	R	S	S	3	3	N
Decade	MSU	2010	HRW	Y	M	M	White	4	S	N	MS	R	S	S	3	4	N
Judee	MSU	2011	HRW	Y	M	M	White	2	S	Y	S	S	R	S	3	4	N
Keldin	WestBred	2011	HRW	Y	M	S	White	2	S	N	-	-	R	S	3	3	N
Loma	MSU	2016	HRW	Y	M-L	S	White	4	M	Y	-	R	R	S	4	4	N
Northern	MSU	2015	HRW	Y	M	S	White	3	S	N	-	R	R	S	3	3	N
SY Clearstone§	Syngenta	2012	HRW	Y	M	S	White	2	S	N	-	MR	R	S	3	3	Y
SY Monument	Syngenta	2014	HRW	Y	M	M	White	3	S	N	-	-	R	S	3	3	N
SY Wolf	Syngenta	2010	HRW	Y	M	M	White	2	S	N	-	R	R	S	3	2	N
Warhorse	MSU	2014	HRW	Y	M	M	White	3	S	Y	MR	R	R	S	3	3	N
WB Quake	WestBred	2011	HRW	Y	M	S	White	3	S	Y	R	MR	R	S	4	3	N
Yellowstone	MSU	2005	HRW	Y	M	S	White	4	MS	N	MS	S	R	S	3	4	N
Experimental																	
MT1265	MSU	-	HRW		M-L	S	White	3	MS	N	-	MR	R	S	3	4	N
MT1348	MSU	no	HRW		M	S	White	3	MW	N	-	S	R	S	3	3	N
MT1444	MSU	no	HRW		M	S	White	3	S	N	-	MS	R	S	2	3	N
MT1465	MSU	pending	HRW		M	M	White	3	S	N	-	MS	R	S	3	3	N
MT1471	MSU	no	HRW		M	S	White	2	S	N	-	MS/MR	R	S	3	4	N
MT1488	MSU	no	HRW		M-L	M	White	3	S	N	-	MS/MR	R	S	3	3	N
MTF1432	MSU	pending	HRW F		L	M	White	2	MS	N	-	S	R	S	3	3	N
MTF1435	MSU	pending	HRW F		L	L	White	3	MS	N	-	S	R	S	3	3	N
MTS1573	MSU	no	HRW		M	M	White	3	MS	Y	-	S	R	S	3	3	N
MTS1588	MSU	-	HRW		M	M	White	2	S	Y	-	MS	R	S	3	3	N
MTW1491	MSU	-	HWW		M	S	White	3	MS	N	-	S	R	S	3	3	N

1/ CDC=Crop Development Centre, University of Saskatchewan; MSU=Montana State University; Syngenta (AgriPro) Crop Protection AG; WestBred=WestBred/Monsanto.
2/ HRW=hard red winter wheat market class, HWW = hard white winter, F = forage.
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.
§ 'SY Clearstone', licensed for sale on an exclusive basis by Syngenta.

Table 2. Performance of 25 commercial and experimental winter wheat cultivars tested under no-till, irrigated conditions near Huntley, Montana during 2017. Cultivars listed alphabetically. (Exp. 173880).

	1/ Grain Yield			Test	Grain	2/ Grain	Plant	Lodging	Heading Date	
Cultivar	2017	2016-17	2015-17	Weight	Moisture	Protein	Height	Index	Julian	Calendar
	---------- bushels/acre ----------			lb/bu	%	%	inches	0-9		
Commercial										
Bearpaw	99.5	88.2	82.7	61.9	8.4	11.0	44.6	3.1	150.4	30-May
Brawl CLP	100.0			64.7	8.9	12.7	43.4	0.8	146.6	26-May
CDC Falcon	106.0	**103.7***	**98.7***	63.7	8.8	11.5	40.8	0.8	150.5	30-May
Decade	90.7	97.1	87.7	61.2	8.3	11.7	42.8	3.6	153.3	2-Jun
Judee	95.0	88.0	80.9	64.2	8.8	12.2	42.0	4.6	151.5	31-May
Keldin	**111.6***	**116.7****		61.8	8.4	12.6	45.3	4.8	152.5	1-Jun
Loma	106.2	**106.4***		62.5	8.7	12.0	44.5	4.1	153.4	2-Jun
Northern	104.6	**108.6***	**102.7***	62.0	7.9	11.8	44.0	4.4	152.9	1-Jun
SY Clearstone	102.4	100.5	98.6	62.5	8.4	11.6	44.8	5.6	151.6	31-May
SY Monument	106.3			63.0	8.4	11.5	45.1	3.5	149.6	29-May
SY Wolf	104.1	102.9		63.2	8.5	12.4	43.4	4.3	149.5	29-May
Warhorse	100.7	99.2	92.6	63.2	8.0	13.0	44.0	3.4	152.7	1-Jun
WB-Quake	88.7	84.8	80.7	61.4	8.2	12.7	43.4	6.3	152.6	1-Jun
Yellowstone	**116.9***	**115.6***	**108.6****	63.0	8.6	11.4	44.6	3.5	152.1	1-Jun
Experimental										
MT1265	104.9	**108.0***		62.0	8.4	11.5	47.1	5.0	152.5	1-Jun
MT1348	101.8	97.5		62.1	8.6	12.0	44.9	5.9	150.3	30-May
MT1444	**109.2***			62.8	8.5	10.8	43.4	4.5	151.3	31-May
MT1465	**133.1****			64.6	8.7	11.3	42.8	0.1	152.1	1-Jun
MT1471	105.5			63.7	8.3	12.7	44.2	3.5	152.0	1-Jun
MT1488	97.2			62.2	8.6	11.8	43.2	3.6	154.4	3-Jun
MTF1432	97.1			61.4	8.1	11.8	46.2	5.2	155.2	4-Jun
MTF1435	83.4			62.4	8.3	12.1	43.2	5.4	154.7	3-Jun
MTS1573	85.2			62.1	8.5	13.7	40.9	4.2	152.4	1-Jun
MTS1588	**117.8***			64.3	9.1	11.5	42.2	0.4	152.4	1-Jun
MTW1491	**113.6***			63.5	9.0	11.3	44.8	1.7	151.5	31-May
Average	103.3	101.2	92.6	62.8	8.5	11.9	43.8	3.7	151.9	1-Jun
PLSD (p=0.05)	13.9	13.3	9.9	1.6	0.4	1.0	ns	2.4	1.0	
CV%	7.5	9.4	10.7	1.4	2.7	4.6	6.2	35.9	0.4	
Lattice RE% ^	123	100	100	136	106	123	100	157	128	

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.
Table 2 continued.
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).

Huntley Irrigated Winter Wheat (Exp. 173880)

Planted:	September 30, 2016
Harvested:	July 31, 2017
Fertility:	100 N lbs/acre in fall 2016 as 46-0-0
Herbicide:	RT3 24 oz. /a pre plant fall 2016.
Previous crop:	spring barley
Irrigation:	sprinkler
Precipitation:	14.64 inches.

Table 3. Performance of 25 commercial and experimental winter wheat cultivars tested under no-till, dryland conditions near Rapelje, Montana during 2017. Cultivars listed alphabetically. (Exp. 173881).

	1/ Grain Yield			Test	Grain	2/ Grain	Plant
Cultivar	2017	2016-17	2015-17	Weight	Moisture	Protein	Height
	---------- bushels/acre ----------			lb/bu	%	%	inches
Commercial							
Bearpaw	57.1	53.5	59.1	64.1	8.2	8.1	28.9
Brawl CLP	55.4			66.1	8.2	9.6	29.3
CDC Falcon	57.9	51.3	**60.2***	64.0	8.4	8.3	29.5
Decade	59.3	54.8	59.0	64.5	8.4	9.1	31.1
Judee	58.4	55.1	58.6	64.9	8.5	8.7	30.8
Keldin	**63.6***	59.1		64.2	8.5	7.9	32.9
Loma	54.9	59.5	**63.2***	63.6	8.7	8.5	29.1
Northern	**64.2***	57.9	**63.5***	63.4	8.3	8.4	30.6
SY Clearstone	**60.9***	60.4	**65.0***	62.0	8.3	7.7	32.3
SY Monument	56.2			61.9	8.0	7.6	28.7
SY Wolf	**61.6***	60.5	**66.4***	65.0	8.6	8.3	28.2
Warhorse	53.5	54.2	**59.5***	63.6	8.2	8.5	28.7
WB-Quake	52.2	48.6	55.1	63.9	8.3	8.2	29.8
Yellowstone	58.5	58.4	**67.7***	62.6	8.3	7.9	32.3
Experimental							
MT1265	**64.6****	58.1	**68.2****	61.2	8.3	7.7	32.7
MT1348	**60.5***	58.8		64.1	8.2	8.2	29.8
MT1444	**61.4***			62.5	8.3	8.1	31.2
MT1465	58.8			62.9	8.2	7.9	29.3
MT1471	**60.4***			65.2	8.2	9.0	31.0
MT1488	54.1			64.1	8.6	9.2	28.1
MTF1432	59.1			60.8	8.2	8.0	37.4
MTF1435	58.0			61.9	8.0	8.2	38.6
MTS1573	**61.7***			64.5	8.6	8.9	29.3
MTS1588	56.5			64.8	8.5	8.5	28.7
MTW1491	**61.9***			62.8	8.5	7.9	32.5
Average	58.8	56.4	62.1	63.5	8.3	8.3	30.8
PLSD (p=0.05)	4.8	ns	8.8	0.7	0.2	0.4	2.0
CV%	4.5	8.1	8.3	0.6	1.2	3.3	3.9
Lattice RE% ^	148	100	100	103	113	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 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. 173881)

Planted:	September, 2016
Harvested:	July 24, 2017
Fertility:	11-52-00, 70 lb/a in-furrow at planting
Herbicide:	n/a
Previous crop:	Dry pea

Table 4. Performance of 25 commercial and experimental winter wheat cultivars tested under no-till, dryland conditions near Hardin, Montana during 2017. Cultivars listed alphabetically. (Exp. 173884).

Cultivar	Grain Yield 1/ 2017	Grain Yield 1/ 2016-17	Grain Yield 1/ 2015-17	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height
	---------- bushels/acre ----------			lb/bu	%	%	inches
Commercial							
Bearpaw	29.8	31.8	43.5	60.2	9.9	15.0	28.0
Brawl CLP	**38.7***			62.3	9.6	13.7	32.3
CDC Falcon	21.7	34.1	44.1	58.5	9.8	14.0	27.7
Decade	34.3	**38.3***	44.7	60.9	10.0	13.7	29.9
Judee	32.3	32.6	42.2	60.8	10.1	14.9	28.0
Keldin	**44.5****	**47.9****		61.6	10.2	12.6	30.9
Loma	37.4	**44.0***	50.0	60.5	9.9	14.7	28.7
Northern	32.7	35.5	45.9	60.6	9.5	14.9	28.8
SY Clearstone	**41.3***	**45.2***	51.6	60.4	9.6	14.6	31.7
SY Monument	**43.0***			60.8	9.8	11.9	32.6
SY Wolf	**39.4***	**41.6***	48.0	62.8	10.0	13.4	29.2
Warhorse	36.7	34.2	43.6	61.2	9.9	14.6	28.7
WB-Quake	35.8	35.6	44.2	60.5	10.0	14.5	28.0
Yellowstone	**40.5***	**44.8***	49.9	60.8	9.8	14.0	32.1
Experimental							
MT1265	**42.0***	**46.2***	53.1	60.5	9.7	14.7	31.0
MT1348	30.9	**41.0***		60.3	9.6	13.9	31.5
MT1444	38.1			61.3	9.8	13.9	30.3
MT1465	**44.4***			61.0	10.0	14.1	29.7
MT1471	**40.7***			59.6	9.5	14.9	30.1
MT1488	26.8			61.1	9.8	13.6	29.0
MTF1432	36.1			60.4	9.4	14.5	32.7
MTF1435	37.2			61.5	9.5	13.8	37.9
MTS1573	37.2			61.4	10.4	12.9	30.0
MTS1588	34.4			60.5	10.2	14.5	26.4
MTW1491	33.7			61.3	9.9	13.7	31.5
Average	36.4	39.5	46.7	60.8	9.8	14	30.3
PLSD (p=0.05)	5.9	11.2	ns	0.6	0.2	0.7	2.3
CV%	9.2	10.6	11.8	0.6	1.3	2.6	4.3
Lattice RE% ^	115	100	100	154	114	148	111

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. 173884)

Planted:	September 30, 2016
Harvested:	July 19, 2017
Fertility:	100 lb N/a as 46-0-0 in fall 2016; 70 lb/a 11-52-0 at planting
Pesticide:	n/a
Previous crop:	Sunflower

Table 5. Performance of 25 commercial and experimental winter wheat cultivars tested under conventional, dryland conditions near Molt, Montana during 2017. Cultivars listed alphabetically. (Exp. 173885).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	2017	2016-17	2015-17				
	---------- bushels/acre ----------			lb/bu	%	%	inches
Commercial							
Bearpaw	55.3	54.4	62.2	62.2	9.2	10.1	32.2
Brawl CLP	62.9			64.8	9.5	10.6	32.0
CDC Falcon	57.3	52.4	60.9	62.7	9.4	9.4	29.7
Decade	55.3	54.7	60.1	62.9	9.5	9.4	32.7
Judee	53.4	49.2	59.2	63.4	9.4	9.3	31.5
Keldin	57.7	57.9		62.8	9.6	9.3	30.6
Loma	53.1	55.4	60.4	61.4	9.8	10.0	32.7
Northern	56.8	54.9	63.3	62.2	9.9	9.6	31.0
SY Clearstone	59.4	56.4	59.9	61.7	9.6	9.0	34.9
SY Monument	63.6			61.3	9.1	8.7	32.9
SY Wolf	**76.2****	64.6	68.8	64.5	9.8	9.5	30.3
Warhorse	51.9	50.7	58.4	62.2	9.5	10.3	32.9
WB-Quake	50.0	45.9	55.5	62.3	9.0	9.8	32.7
Yellowstone	65.3	60.1	64.9	62.1	9.8	9.4	34.5
Experimental							
MT1265	**68.1***	60.7	67.2	62.0	9.9	8.9	36.2
MT1348	65.5	59.6		62.9	9.5	8.8	32.9
MT1444	61.3			62.2	9.9	9.5	33.7
MT1465	65.7			62.6	9.6	8.9	32.2
MT1471	60.8			62.2	9.2	10.5	32.5
MT1488	55.7			61.7	9.9	10.0	30.4
MTF1432	54.2			59.9	10.1	9.6	38.2
MTF1435	53.2			61.3	9.4	9.4	40.2
MTS1573	55.5			63.5	9.8	9.4	31.8
MTS1588	59.7			63.7	9.9	9.6	30.2
MTW1491	59.8			62.5	10.2	9.0	33.7
Average	59.1	55.5	61.7	62.4	9.6	9.5	32.9
PLSD (p=0.05)	9.9	ns	ns	0.9	0.5	0.6	2.5
CV%	9.3	11.1	9.2	0.8	3.0	3.3	4.7
Lattice RE% ^	129	100	100	119	113	172	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).

Molt Dryland Winter Wheat (Exp. 17885)

Planted:	October 1, 2016
Harvested:	July 21, 2017
Fertility:	100 lb/a as 46-0-0 in spring.
Herbicide:	n/a
Previous crop:	Dry Pea

Table 6. Performance of 25 commercial and experimental winter wheat cultivars tested under conventional, dryland conditions near Hysham, Montana during 2016. Cultivars listed alphabetically. (Exp. 163882).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	2017	2016-17	2015-17				
	---------- bushels/acre ----------			lb/bu	%	%	inches
Commercial							
Bearpaw	51.1	41.7	45.3	62.5	8.0	12.0	32.0
Brawl CLP	**55.8***			63.6	8.1	12.2	34.2
CDC Falcon	49.1	42.7	43.9	61.0	7.7	12.8	30.4
Decade	48.9	**45.5***	46.9	61.1	7.9	12.8	34.3
Judee	48.9	35.6	39.4	62.0	7.9	12.6	32.1
Keldin	54.9	**47.7***		62.8	8.1	11.8	32.6
Loma	54.7	43.1	44.8	61.5	8.0	12.0	28.5
Northern	53.6	43.8	**47.6***	61.6	7.9	13.2	31.2
SY Clearstone	**56.7***	**50.4***	**50.0***	62.0	8.2	12.1	34.9
SY Monument	**59.9***			60.8	7.6	11.0	33.6
SY Wolf	**56.5***	41.5	44.5	64.3	8.2	11.1	31.9
Warhorse	54.4	43.8	46.2	62.1	7.9	13.7	30.2
WB-Quake	48.6	38.4	41.7	62.5	7.8	11.7	30.3
Yellowstone	**63.8****	**53.4****	**53.8****	62.7	8.1	11.5	32.5
Experimental							
MT1265	**59.7***	**50.2***	**50.3***	62.3	8.1	12.1	34.3
MT1348	53.7	44.5		61.3	7.8	12.2	35.1
MT1444	53.8			62.8	8.1	12.1	33.2
MT1465	53.9			62.8	7.8	12.4	31.1
MT1471	48.6			62.6	7.9	12.8	31.6
MT1488	**59.1***			62.9	8.3	12.7	30.4
MTF1432	48.5			61.4	8.4	13.0	33.7
MTF1435	**56.3***			63.0	8.3	11.9	40.4
MTS1573	**61.6***			63.2	8.2	11.6	32.2
MTS1588	53.1			62.5	8.1	12.7	29.9
MTW1491	**63.0***			62.6	8.1	11.7	32.1
Average	54.7	44.4	46.2	62.3	8.0	12.2	32.5
PLSD (p=0.05)	8.1	8.7	6.8	1.0	0.3	1.0	1.9
CV%	8.2	12.9	11.4	0.9	2.1	5.2	3.2
Lattice RE% ^	137	100	100	102	111	101	172

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. 173882)

Planted:	September 28, 2016
Harvested:	July 11, 2017
Fertility:	11-52-0 applied at planting; 100 lb/a as 46-0-0 in spring.
Herbicide:	n/a
Previous crop:	Chemical fallow

Table 7. Grain yield[1/] of 25 commercial and experimental winter wheat cultivars tested at six locations in south central Montana during 2016. Varieties listed by declining average yield across all locations.

Cultivar	Rapelje No-Till Dryland	Hysham No-Till Dryland	Hardin No-Till Dryland	Molt No-Till Dryland	Dryland Locations Average	Huntley Min.Till Irrigated	All Locations Average
				bushels/acre			
MT1465	58.8	53.9	**44.4***	65.7	**56.5***	**133.1****	**71.4****
Yellowstone	58.5	**63.8****	**40.5***	65.3	**56.0***	**116.9***	**68.5***
SY Wolf	**61.6***	**56.5***	**39.4***	**76.2****	**57.8****	104.1	**67.9***
MT1265	**64.6****	**59.7***	**42.0***	**68.1***	**57.4***	104.9	**66.9***
MTW1491	**61.9***	**63.0***	33.7	59.8	**56.0***	**113.6***	**66.5***
Keldin	**63.6***	54.9	**44.5****	57.7	**54.5***	**111.6***	**66.1***
SY Monument	56.2	**59.9***	**43.0***	63.6	**55.5***	106.3	**65.6***
MT1444	**61.4***	53.8	38.1	61.3	**54.8***	**109.2***	**65.5***
MTS1588	56.5	53.1	34.4	59.7	**51.8***	**117.8***	**64.5***
MT1471	**60.4***	48.6	**40.7***	60.8	**53.2***	105.5	63.9
SY Clearstone	**60.9***	**56.7***	**41.3***	59.4	**54.4***	102.4	63.6
MT1348	**60.5***	53.7	30.9	65.5	**52.9***	101.8	63.0
Brawl CLP	55.4	**55.8***	**38.7***	62.9	**53.2***	100.0	62.7
Northern	**64.2***	53.6	32.7	56.8	51.7	104.6	62.5
Loma	54.9	54.7	37.4	53.1	48.7	106.2	60.6
MTS1573	**61.7***	**61.6***	37.2	55.5	**54.6***	85.2	60.3
Warhorse	53.5	54.4	36.7	51.9	48.9	100.7	60.0
CDC Falcon	57.9	49.1	21.7	57.3	48.2	106.0	59.4
MTF1432	59.1	48.5	36.1	54.2	49.7	97.1	59.3
MT1488	54.1	**59.1***	26.8	55.7	48.3	97.2	58.8
Bearpaw	57.1	51.1	29.8	55.3	48.8	99.5	58.4
Decade	59.3	48.9	34.3	55.3	49.1	90.7	57.7
Judee	58.4	48.9	32.3	53.4	47.7	95.0	57.2
MTF1435	58.0	**56.3***	37.2	53.2	50.4	83.4	56.3
WB-Quake	52.2	48.6	35.8	50.0	46.6	88.7	54.9
Average	58.8	54.7	36.4	59.1	52.3	103.3	62.5
PLSD (p=0.05)	4.8	8.1	5.9	9.9	6.1	13.9	7.2
CV%	4.5	8.2	9.2	9.3	9.8	7.5	9.9

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 8. Performance of 25 commercial and experimental winter wheat cultivars tested under dryland and irrigated conditions at six locations in south central Montana during 2017. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	2017	2016-17	2015-17				
	---------- lb/bu ----------			lb/bu	%	%	inches
Commercial							
Bearpaw	58.4	52.7	55.7	62.2	8.7	11.2	33.3
Brawl CLP	62.7			64.3	8.8	11.8	34.1
CDC Falcon	59.4	55.2	57.3	61.9	8.8	11.3	31.6
Decade	57.7	57.7	57.8	62.2	8.9	11.3	33.9
Judee	57.2	51.2	53.2	62.9	8.9	11.7	33.0
Keldin	**66.1***	**65.4****		62.5	8.9	10.9	34.3
Loma	60.6	60.5	60.6	61.9	9.0	11.4	32.6
Northern	62.5	58.2	60.2	62.1	8.7	11.5	33.1
SY Clearstone	63.6	**61.2***	**61.7***	61.6	8.8	11.0	35.9
SY Monument	**65.6***			61.6	8.6	10.1	34.7
SY Wolf	**67.9***	60.5	61.1	64.2	9.0	10.9	32.5
Warhorse	60.0	55.8	57.3	62.6	8.7	11.9	32.8
WB-Quake	54.9	49.3	52.1	62.1	8.7	11.4	33.1
Yellowstone	**68.5***	**65.1***	**65.2****	62.4	8.9	10.7	35.2
Experimental							
MT1265	**66.9***	**63.6***	**64.9***	61.6	8.9	11.0	36.4
MT1348	63.0	59.9		62.3	8.8	10.9	34.7
MT1444	**65.5***			62.3	8.9	10.9	34.4
MT1465	**71.4****			62.7	8.9	11.0	33.0
MT1471	63.9			62.7	8.6	11.9	33.9
MT1488	58.8			62.4	9.0	11.5	32.1
MTF1432	59.3			60.8	8.8	11.5	37.6
MTF1435	56.3			62.0	8.7	11.1	40.1
MTS1573	60.3			62.8	9.1	11.3	33.0
MTS1588	**64.5***			63.2	9.2	11.4	31.5
MTW1491	**66.5***			62.5	9.1	10.7	35.1
Average	62.5	58.3	58.9	62.4	8.9	11.2	34.1
PLSD (p=0.05)	7.2	4.5	3.7	1.0	0.3	0.7	1.7
CV%	9.9	12.1	11.8	1.1	2.5	4.6	5.2
Location x Year	5	11	15	5	5	5	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.
** 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 9. Performance of 25 commercial and experimental winter wheat cultivars tested under dryland conditions at four locations in south central Montana during 2017. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	2017	2016-17	2015-17	lb/bu	%	%	inches
	---------- lb/bu ----------						
Commercial							
Bearpaw	48.8	45.4	53.5	62.2	8.8	11.3	30.4
Brawl CLP	**53.2***			64.3	8.8	11.5	31.7
CDC Falcon	48.2	45.1	53.1	61.6	8.8	11.2	29.3
Decade	49.1	48.3	51.8	62.4	9.0	11.3	31.7
Judee	47.7	43.1	50.6	62.7	9.0	11.5	30.7
Keldin	**54.5***	**53.2***		62.7	9.1	10.5	31.6
Loma	48.7	**50.5***	55.7	61.8	9.1	11.3	29.6
Northern	51.7	48.0	55.8	62.0	8.9	11.5	30.4
SY Clearstone	**54.4***	**53.1***	**58.3***	61.5	8.9	10.9	33.6
SY Monument	**55.5***			61.2	8.7	9.8	32.1
SY Wolf	**57.8****	**52.1***	**57.9***	64.2	9.2	10.5	29.7
Warhorse	48.9	45.7	52.6	62.3	8.9	11.7	30.0
WB-Quake	46.6	42.1	50.5	62.2	8.8	11.1	30.5
Yellowstone	**56.0***	**54.2****	**60.1***	62.1	9.0	10.6	32.8
Experimental							
MT1265	**57.4***	**53.8***	**60.6****	61.5	9.0	10.9	33.7
MT1348	**52.9***	**51.0***		62.2	8.8	10.8	32.1
MT1444	**54.8***			62.3	9.0	10.9	32.2
MT1465	**56.5***			62.3	8.9	10.9	30.6
MT1471	**53.2***			62.4	8.7	11.7	31.3
MT1488	48.3			62.4	9.1	11.5	29.3
MTF1432	49.7			60.6	9.0	11.3	35.5
MTF1435	50.4			61.9	8.8	10.8	39.3
MTS1573	**54.6***			63.1	9.2	10.8	31.0
MTS1588	**51.8***			62.9	9.2	11.3	28.8
MTW1491	**56.0***			62.3	9.2	10.6	32.7
Average	52.3	49.0	55.0	62.3	9.0	11.0	31.6
PLSD (p=0.05)	6.1	4.5	3.4	1.1	0.3	0.7	1.6
CV%	9.8	10.7	10.5	0.8	2.4	4.3	4.5
Location x Year	4	8	12	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).