RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2020

ANNUAL REPORT OF THE INVESTIGATIONS AT AND ADMINISTRATION OF THE
SOUTHERN AGRICULTURAL RESEARCH CENTER, HUNTLEY, MONTANA

SARC Website

PROJECT TITLE: 2020 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 2020 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 (17 commercial, 8 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 (2019-20) and three year (2018-20) yield averages are provided for cultivars tested during previous years. Test weight (pounds per bushel) and grain

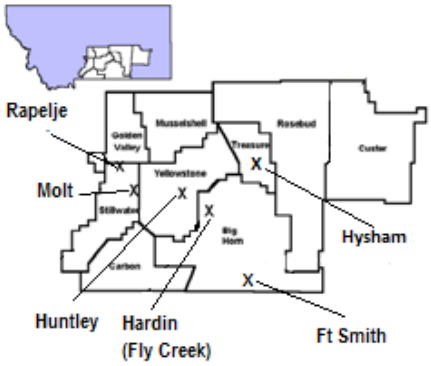

Figure 1. 2020 off-station winter wheat trial locations in south central Montana.

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 2020 winter wheat test sites had below average rain or snow accumulation during winter months except in November. However, precipitation during the months of September and October provided good soil moisture for winter wheat planting and emergence. Below average precipitation was observed throughout the 2020 winter wheat growing season except in June. Rainfall in June (4.75 inches) provided much of the moisture need during grain filling period. In August widespread thunderstorm and hail storm damaged winter wheat at Hysham and Fort Smith and these locations were not harvested.

Irrigated winter wheat trial had good stand establishment. Lodging was moderate with an average score of 3.4 on 0-9 scale. Grain yield averaged 116 bu/ac and ranged from 94 bu/a for 'Judee' to 157 bu/a for 'Kelden' (Table 1). Cultivar 'LCS Jet' produced yield that was statistically equal to the yield of highest yielding cultivar. Test weight values under irrigated conditions, averaged only 59.5 lb/bu. Test weight ranged from 56.2 lb/bu for 'SY Clearstone' to 63.5 lb/bu for 'Brawl CLP'. Grain protein content was averaging 13.1 percent with 'Bobcat' and 'Warhorse exhibiting highest protein content. Two- (2018 and 2020) and three-year (2017-18, 2020) average yield for winter wheat varieties tested at Huntley was 111 and 107 bu/a respectively. 'Keldin' was the highest yielding cultivar averaged over the last two- and three years.

Average yield under dryland conditions at Rapelje in 2020 averaged 55 bu/a (Table 2), about 22 bu/a less than the winter wheat yield observed at this site in 2019 mainly due to poor stand establishment. Grain yield ranged from 66 bu/a for 'SY Monument' to 69 bu/a for 'LCS Jet'. Eight other entries produced yield that was statistically equal to the yield of highest yielding cultivar. Test weight was good and averaged 62.5 lb/bu. All entries produced test weight over 60 bu/ac at this site. Grain protein was good and averaged 13.1 percent and ranged from 11.6 percent to 14.7 percent. Two year average yield for winter wheat varieties tested at Rapelje during 2019 and 2020 was 66 bu/a. Three-year average yield 2018 through 2020 was 84 bu/a.

Winter wheat yield under dryland condition at Hardin during 2020 was relatively lower than the previous years and averaged 69 bu/a (Table 3). Drought stress contributed to lower yield at this and other dryland locations. Yield ranged from 56 bu/a for experimental line 'MTCL1737' to 78 bu/a for 'MT1793'. 'SY Monument'

was the highest yielding cultivar at Hardin yielding 77 bu/a. Test weight averaged 61.6 lb/bu and all entries at this location had test weight of 60 lb/bu or greater. Grain protein content averaged 12.5 percent and ranged from 11.3 to 13.3 percent. Two-year average yield for winter wheat varieties tested during 2019 and 2020 was 74 bu/a. Three-year average yield for winter wheat varieties tested from 2018 to 2020 was 83 bu/a. 'Keldin' was the highest yielding cultivar averaged over the past three years at Hardin.

Average yield under dryland conditions at Molt was 84 bu/a (Table 4). Yield ranged from 73 bu/a for 'AAC Wildfire' to 101 bu/a for 'Keldin'. Test weight averaged 60.5 lb/bu. Test weight ranged from 57.9 lb/bu for 'LCS Jet' to 63.2 lb/bu for 'Brawl CLP'. Grain protein content averaged 12.5 percent and ranged from 11.5 percent to 13.3 percent. Two-year (2018 and 2020) and three-year (2017-2018, 2020) averaged yield for winter wheat varieties tested at Molt was 71 bu/a and 66 bu/a respectively. 'Keldin' and 'LCS Jet' were the highest yielding cultivars at this location averaged over the past two-year.

SUMMARY:

Below-average precipitation during winter months and throughout the 2020 growing season, except in June, resulted in poor stand at some location and drought stress that dryland locations resulted in lower yield. Above-average precipitation in June (4.75 inches) provided much needed soil moisture during grain filling period. Summer thunderstorm and hail storm near Fort Smith and Hysham resulted in crop loss at those location. Grain production at dryland test sites averaged 69 bu/a and ranged from 55 bu/a at Rapelje to 84 bu/a at Molt (Table 5). 'Keldin' was the highest yielding cultivar (95 bu/a) averaged across all locations tested in 2020 growing season (Table 5 and 6). Since 2017, in experiments representing 13 location-years in southcentral Montana, 'Keldin' was the highest yielding cultivar producing 87 and 97 bu/a over the past two- and three-years respectively across all dryland and irrigated locations (Tables 6).

Table 1. Performance of 25 commercial and experimental winter wheat cultivars tested under no-till, irrigated conditions near Huntley, Montana during 2020. Yield is expressed as bu/a; test weight as lbs/a; moisture, protein as %; height as inches. Cultivars listed alphabetically. (Exp. 203880).

Cultivar	Yield[1] 2020	Yield 2018-20	Yield 2017-20	Test Weight	Grain Moisture	Grain[2] Protein	Plant Height	Lodging	Heading Date
Commercial									
AAC Wildfire	111.4	-	-	59.0	10.2	13.6	38.8	3.7	10-Jun
Bobcat	107.8	105.8	107.9	58.6	10.4	14.2	36.2	3.0	8-Jun
Brawl CLP	124.8	121.2	114.5	63.5	10.5	12.6	34.1	1.5	1-Jun
Byrd CLP	121.2	-	-	58.8	11.0	12.2	38.3	4.7	5-Jun
Decade	113.5	109.5	103.8	60.7	11.6	13.0	38.3	1.2	7-Jun
Flathead	122.4	111.4		61.5	10.9	12.6	36.6	2.4	1-Jun
FourOsix	122.7	104.0	112.7	60.3	11.7	13.0	37.1	1.7	8-Jun
Judee	93.8	90.0	91.7	59.3	10.9	13.2	37.8	4.2	8-Jun
Keldin	**157.1**	**142.1**	**132.3**	61.4	11.0	12.3	37.9	3.0	8-Jun
LCS Jet	**144.7**	**140.0**	-	59.6	10.7	12.3	34.0	0.0	6-Jun
Loma	96.9	92.4	97.7	59.0	10.4	13.3	36.7	3.4	10-Jun
Northern	119.1	112.0	110.0	59.7	10.1	13.0	37.8	4.1	8-Jun
Ray	94.5	100.0	97.8	56.2	10.6	14.0	42.3	4.4	10-Jun
SY Clearstone	97.4	98.7	99.3	56.6	10.8	13.4	39.6	5.7	7-Jun
SY Monument	127.1	121.3	116.1	59.4	10.6	12.6	36.0	2.5	6-Jun
Warhorse	114.6	109.2	107.6	60.1	10.5	14.1	38.6	4.4	8-Jun
Yellowstone	101.6	98.8	105.4	56.6	10.1	13.4	39.2	4.0	7-Jun
Experimental									
MT1683	103.9	-	-	57.4	10.1	13.4	39.1	4.5	7-Jun
MT1745	114.5	-	-	59.7	10.5	12.7	37.7	2.9	7-Jun
MT1746	134.0	-	-	62.3	11.0	12.6	35.4	3.0	8-Jun
MT1793	127.2	-	-	60.0	10.5	13.1	35.8	4.1	6-Jun
MTCL1732	120.3	-	-	59.6	10.4	12.6	34.6	3.8	7-Jun
MTCL1737	109.7	-	-	57.4	11.0	13.2	34.9	4.4	9-Jun
MTCS1601	118.3	111.4	-	61.9	10.2	13.3	37.7	3.9	7-Jun
MTS18149	105.3	-	-	59.0	11.4	13.4	35.3	3.2	10-Jun
Average	116.2	110.5	107.4	59.5	10.7	13.1	37.2	3.4	160
PLSD (p=0.05)	12.2	17.4	8.5	1.9	1.1	0.5	2.4	2.8	2.0
CV%	6.4	7.9	19.2	1.9	5.8	2.0	3.9	46.1	0.8
Lattice RE% [4/]	100	100	100	100	115	116	100	123	100

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13 percent moisture content. Two and three year average based on 2017, 2018, and 2020.

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.
Bold Indicates highest yielding cultivar within a column.
Bold 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. 203880)

Planted:	September 26, 2019
Harvested:	August 3, 2020
Fertility:	100 N lbs/acre in fall 2019 as 46-0-0
Herbicide:	RT3 24 oz. /a pre plant fall 2019.
Previous crop:	drypea
Irrigation:	5 inches total addition through impact sprinkler. Applied 6/3, 6/22, and 7/20
Precipitation:	10.75 inches (Oct. – July)

Table 2. Performance of 25 commercial and experimental winter wheat cultivars tested under no-till, dryland conditions near Rapelje, Montana during 2020. Yield is expressed as bu/a; test weight as lbs/a; moisture, protein as %; height as inches. Cultivars listed alphabetically. (Exp. 203881).

Cultivar	Yield[1] 2020	Yield 2019-20	Yield 2018-20	Test Weight	Grain Moisture	Grain[2] Protein	Plant Height
Commercial							
AAC Wildfire	54.9	61.3	-	62.2	8.6	12.6	31.4
Bobcat	**61.1**	65.0	82.5	63.0	8.8	12.2	26.0
Brawl CLP	48.4	57.8	77.0	63.9	8.6	14.4	27.2
Byrd CLP	50.2	64.9	-	63.0	8.6	12.6	29.4
Decade	46.8	63.5	78.8	62.0	8.4	14.7	28.2
Flathead	45.4	56.3	82.1	63.3	8.6	14.2	26.9
FourOsix	**61.6**	69.0	86.8	62.7	8.4	13.1	27.7
Judee	51.0	60.2	75.3	62.7	8.5	14.5	28.2
Keldin	49.9	66.6	85.4	62.2	8.5	13.3	25.9
LCS Jet	**68.9**	73.6	91.2	60.8	8.3	11.6	24.5
Loma	48.9	64.5	82.6	62.1	8.6	14.0	25.9
Northern	55.5	72.3	91.8	62.4	8.5	13.3	27.3
Ray	54.1	65.2	82.6	61.5	8.3	12.7	33.1
SY Clearstone	56.3	66.9	84.3	61.8	8.5	13.2	30.1
SY Monument	43.4	56.7	84.1	61.7	8.2	13.6	24.3
Warhorse	56.0	64.7	83.3	62.4	8.4	13.3	28.0
Yellowstone	54.9	68.7	85.4	61.5	8.5	13.5	28.2
Experimental							
MT1683	**65.0**	71.1	-	62.5	8.7	11.9	30.1
MT1745	**59.8**	-	-	63.2	8.6	12.3	29.0
MT1746	**57.9**	-	-	64.0	8.7	12.7	25.6
MT1793	48.3	-	-	62.1	8.2	14.5	27.0
MTCL1732	**65.7**	71.1	-	62.7	8.5	11.8	27.8
MTCL1737	**65.9**	-	-	62.4	8.4	11.7	26.9
MTCS1601	**65.7**	71.7	88.9	63.7	9.0	11.7	29.9
MTS18149	46.2	-	-	61.8	8.5	13.9	24.5
Average	55.3	65.6	83.9	62.5	8.5	13.1	27.7
PLSD (p=0.05)	12.0	ns	ns	0.9	0.3	1.4	3.0
CV%	13.2	10.8	8.6	0.9	2.3	6.5	6.6
Lattice RE% [3]	100	100	100	100	100	100	101

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.
Bold Indicates highest yielding cultivar within a column.
Bold Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).
ns: Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Rapelje Dryland Winter Wheat (Exp. 203881)

Planted:	October 08, 2019
Harvested:	August 10, 2020
Fertility:	11-52-00, 70 lb/a in-furrow at planting
Herbicide:	n/a
Previous crop:	Spring dry pea

Table 3. Performance of 25 commercial and experimental winter wheat cultivars tested under no-till, dryland conditions near Hardin, Montana during 2020. Yield is expressed as bu/a; test weight as lbs/a; moisture, protein as %; height as inches. Cultivars listed alphabetically. (Exp. 203884).

Cultivar	Yield[1] 2020	Yield 2019-20	Yield 2018-20	Test Weight	Grain Moisture	Grain[2] Protein	Plant Height
Commercial							
AAC Wildfire	62.7	71.5	-	62.0	9.5	12.5	33.0
Bobcat	68.7	72.2	80.6	61.6	9.5	13.0	28.8
Brawl CLP	**76.7**	76.1	83.1	62.7	9.5	12.8	33.7
Byrd CLP	70.2	74.2	-	61.2	9.6	11.4	32.1
Decade	70.2	77.1	87.3	61.6	9.4	13.3	29.3
Flathead	70.3	72.3	80.0	62.1	9.7	12.8	33.0
FourOsix	**71.0**	75.0	84.0	61.2	9.2	12.6	30.0
Judee	66.5	70.3	82.0	62.4	9.5	12.2	30.3
Keldin	**74.6**	84.8	**94.5**	62.0	9.4	11.9	29.4
LCS Jet	70.9	75.0	86.5	59.6	8.9	12.4	28.4
Loma	63.2	69.6	81.1	62.0	9.6	13.2	30.4
Northern	**71.6**	72.5	83.3	62.8	9.4	13.1	31.2
Ray	66.9	72.6	78.8	61.3	9.3	11.9	35.1
SY Clearstone	64.1	72.1	79.9	61.2	9.4	12.7	34.4
SY Monument	**76.5**	78.5	86.9	60.8	9.3	11.3	30.6
Warhorse	61.6	72.1	82.2	62.4	9.4	13.2	31.3
Yellowstone	68.1	72.5	80.2	61.2	9.4	12.3	32.3
Experimental							
MT1683	**71.0**	76.1	-	60.6	9.3	12.4	34.6
MT1745	68.1	-	-	61.2	9.3	12.6	29.8
MT1746	**73.9**	-	-	62.4	9.4	11.7	27.3
MT1793	**77.5**	-	-	61.4	9.5	12.6	31.1
MTCL1732	**71.4**	76.5	-	60.4	9.2	12.2	29.2
MTCL1737	56.2	-	-	61.2	9.0	13.3	29.8
MTCS1601	68.8	67.5	76.9	62.1	9.6	12.8	30.1
MTS18149	62.3	-	-	62.5	9.6	12.6	28.6
Average	68.9	73.9	83.0	61.6	9.4	12.5	31.0
PLSD (p=0.05)	6.5	ns	7.0	0.5	0.2	0.7	2.1
CV%	5.3	6.3	6.2	0.5	1.2	3.2	3.7
Lattice RE% [3]	114	100	100	113	100	109	119

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.
Bold Indicates highest yielding cultivar within a column.
Bold Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).
ns: Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Hardin Dryland Winter Wheat (Exp. 203884)

Planted:	September 25, 2019
Harvested:	August 03. 2020
Fertility:	100 lb N/a as 46-0-0 in fall 2018; 70 lb/a 11-52-0 at planting
Pesticide:	n/a
Previous crop:	Sunflower

Table 4. Performance of 25 commercial and experimental winter wheat cultivars tested under conventional, dryland conditions at Molt, Montana during 2020. Yield is expressed as bu/a; test weight as lbs/a; moisture, protein as %; height as inches. Cultivars listed alphabetically. (Exp. 203885).

Cultivar	Yield[1] 2020	Yield 2019-20	Yield 2018-20	Test Weight	Grain Moisture	Grain[2] Protein	Plant Height
Commercial							
AAC Wildfire	73.2	-	-	58.6	7.8	13.2	34.2
Bobcat	73.8	60.1	58.3	60.3	8.6	12.7	31.7
Brawl CLP	82.1	63.2	63.7	63.2	8.6	11.8	32.1
Byrd CLP	87.8	-	-	60.8	8.6	11.8	35.4
Decade	82.8	**75.3**	69.0	60.6	8.3	12.9	35.4
Flathead	91.9	**72.2**	-	62.2	8.7	11.9	34.0
FourOsix	87.2	**71.4**	66.9	60.2	8.2	12.5	33.7
Judee	75.7	63.0	59.0	61.0	8.4	13.3	33.1
Keldin	**100.9**	**82.2**	73.2	61.4	8.5	12.4	33.6
LCS Jet	91.9	**82.0**	-	57.9	7.9	11.6	30.3
Loma	77.3	66.2	61.5	60.2	8.3	12.8	34.6
Northern	91.0	**78.8**	71.6	60.2	8.2	13.0	32.9
Ray	86.6	**71.6**	65.8	58.7	8.1	12.7	37.7
SY Clearstone	85.1	68.2	64.9	59.1	8.4	13.0	36.4
SY Monument	93.2	**76.5**	71.6	61.7	8.5	11.5	33.7
Warhorse	79.7	**69.7**	64.3	61.1	8.4	13.2	33.2
Yellowstone	80.6	68.1	66.6	59.7	8.1	12.7	35.2
Experimental							
MT1683	84.9	-	-	60.2	8.4	11.6	35.8
MT1745	84.5	-	-	61.3	8.3	12.0	34.5
MT1746	82.6	-	-	62.9	8.6	12.5	30.6
MT1793	84.6	-	-	61.2	8.4	13.2	32.3
MTCL1732	80.3	-	-	59.8	8.2	11.8	32.6
MTCL1737	78.2	-	-	60.3	8.1	12.1	29.7
MTCS1601	73.7	62.7	-	61.6	8.5	11.8	32.9
MTS18149	78.9	-	-	59.4	8.4	13.3	31.5
Average	83.5	70.7	65.9	60.5	8.3	12.5	33.5
PLSD (p=0.05)	7.2	13.9	ns	1.5	0.3	1.0	2.3
CV%	4.8	6.3	8.3	1.5	2.0	4.3	3.9
Lattice RE% [3]	133	100	100	102	100	113	108

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13 percent moisture content. Two and Three year average based on 2017, 2018, and 2020.

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.

Bold Indicates highest yielding cultivar within a column.

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

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

Hysham Dryland Winter Wheat (Exp. 203885)

Planted:	October 08, 2019
Harvested:	August 10, 2020
Fertility:	11-52-0 applied at planting; 100 lb/a as 46-0-0 in spring.
Herbicide:	n/a
Previous crop:	Fallow

Table 5. Grain yield of 25 commercial and experimental winter wheat cultivars tested at four locations in south central Montana during 2020. Yield is expressed as bu/a. Varieties listed by declining average yield across all locations.

Cultivar	Dryland Rapelje Yield[1]	Dryland Hardin Yield	Dryland Molt Yield	Dryland Average Yield	Irrigated Huntley Yield	Overall Average Yield
Keldin	49.9	**74.6**	**100.9**	75.3	**157.1**	**95.8**
LCS Jet	**68.9**	70.9	91.9	77.5	**144.7**	**94.3**
MT1746	**57.9**	**73.9**	82.6	71.0	134.0	**86.8**
FourOsix	**61.6**	**71.0**	87.2	73.4	122.7	**85.7**
SY Monument	43.4	**76.5**	93.2	71.0	127.1	**85.0**
MT1793	48.3	**77.5**	84.6	70.1	127.2	**84.4**
MTCL1732	**65.7**	**71.4**	80.3	71.9	120.3	**84.0**
Northern	55.5	**71.6**	91.0	71.7	119.1	83.6
Flathead	45.4	70.3	91.9	69.8	122.4	83.0
Brawl CLP	48.4	**76.7**	82.1	68.8	124.8	82.8
Byrd CLP	50.2	70.2	87.8	69.6	121.2	82.5
MT1745	**59.8**	68.1	84.5	71.3	114.5	82.1
MTCS1601	**65.7**	68.8	73.7	69.1	118.3	81.4
MT1683	**65.0**	**71.0**	84.9	73.7	103.9	81.2
Bobcat	**61.1**	68.7	73.8	68.4	107.8	78.2
Decade	46.8	70.2	82.8	66.1	113.5	78.0
Warhorse	56.0	61.6	79.7	65.6	114.6	77.9
MTCL1737	**65.9**	56.2	78.2	66.3	109.7	77.1
Yellowstone	54.9	68.1	80.6	68.8	101.6	77.0
Ray	54.1	66.9	86.6	69.7	94.5	75.9
AAC Wildfire	54.9	62.7	73.2	63.9	111.4	75.8
SY Clearstone	56.3	64.1	85.1	67.9	97.4	75.2
MTS18149	46.2	62.3	78.9	62.8	105.3	73.5
Loma	48.9	63.2	77.3	63.2	96.9	71.7
Judee	51.0	66.5	75.7	64.0	93.8	71.5
Average	55.3	68.9	83.5	69.2	116.2	81.0
PLSD (p=0.05)	12.0	6.5	7.2	ns	12.2	11.9
CV%	13.2	5.3	4.8	8.2	6.4	7.6

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

Bold Indicates highest yielding cultivar within a column.

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

ns: Indicates no significant difference between cultivars 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 three locations in south central Montana during 2020. Yield is expressed as bu/a; test weight as lbs/a; moisture, protein as %; height as inches. Cultivars listed alphabetically.

Cultivar	Yield[1] 2020	Yield 2019-20	Yield 2018-20	Test Weight	Grain Moisture	Grain[2] Protein	Plant Height
Commercial							
AAC Wildfire	63.9	67.9	-	61.0	8.6	12.7	32.9
Bobcat	68.4	67.3	80.7	61.7	9.0	12.6	28.9
Brawl CLP	68.8	64.6	76.1	63.3	8.9	13.1	30.9
Byrd CLP	69.6	**73.1**	-	61.7	8.9	11.9	32.2
Decade	66.1	69.8	81.8	61.4	8.7	13.6	31.0
Flathead	69.8	67.6	78.8	62.5	9.0	13.0	31.3
FourOsix	73.4	**71.6**	82.2	61.4	8.6	12.8	30.6
Judee	64.0	66.4	77.9	62.0	8.8	13.4	30.4
Keldin	75.3	**76.9**	**90.3**	61.9	8.8	12.5	29.7
LCS Jet	77.5	**73.6**	**87.7**	59.4	8.4	11.8	28.0
Loma	63.2	68.3	81.5	61.4	8.8	13.2	30.4
Northern	71.7	**74.5**	**86.0**	61.8	8.7	13.1	30.4
Ray	69.7	69.2	78.7	60.5	8.6	12.4	35.3
SY Clearstone	67.9	**72.4**	82.5	60.7	8.7	13.0	33.4
SY Monument	71.0	68.5	82.0	61.4	8.7	12.2	29.7
Warhorse	65.6	68.9	81.1	61.9	8.7	13.3	30.8
Yellowstone	68.8	**71.1**	81.9	60.8	8.7	12.8	32.0
Experimental							
MT1683	73.7	**72.7**	-	61.1	8.8	11.9	33.5
MT1745	71.3	-	-	61.9	8.7	12.3	31.0
MT1746	71.0	-	-	63.1	8.9	12.3	27.9
MT1793	70.1	-	-	61.6	8.7	13.5	30.2
MTCL1732	71.9	**74.0**	-	61.0	8.6	12.1	29.7
MTCL1737	66.3	-	-	61.3	8.5	12.4	28.7
MTCS1601	69.1	68.0	80.1	62.4	9.0	12.2	30.8
MTS18149	62.8	-	-	61.3	8.8	13.2	28.3
Average	69.2	70.3	81.8	61.5	8.7	12.7	30.7
PLSD (p=0.05)	ns	6.1	5.9	1.1	0.2	1.0	2.0
CV%	8.2	8.6	7.3	1.0	1.9	5.2	5.0
Location x	3	7	10	3	3	3	3

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.
Bold Indicates highest yielding cultivar within a column.
Bold Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).
ns: Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Table 7. Performance of 25 commercial and experimental winter wheat cultivars tested under dryland and irrigated conditions at four locations in south central Montana during 2020. Yield is expressed as bu/a; test weight as lbs/a; moisture, protein as %; height as inches. Cultivars listed alphabetically.

Cultivar	Yield[1] 2020	Yield 2019-20	Yield 2018-20	Test Weight	Grain Moisture	Grain[2] Protein	Plant Height
Commercial							
AAC Wildfire	75.8	73.4	-	60.5	9.0	13.0	34.4
Bobcat	78.2	72.4	83.2	60.9	9.4	13.0	30.7
Brawl CLP	82.8	72.1	80.0	63.3	9.3	13.0	31.7
Byrd CLP	82.5	79.1	-	60.9	9.4	12.0	33.7
Decade	78.0	75.2	86.1	61.2	9.4	13.4	32.8
Flathead	83.0	74.5	83.2	62.3	9.5	12.9	32.6
FourOsix	**85.7**	78.0	86.5	61.1	9.4	12.8	32.3
Judee	71.5	69.8	81.4	61.4	9.3	13.3	32.3
Keldin	**95.8**	**86.9**	**96.9**	61.8	9.3	12.4	31.7
LCS Jet	**94.3**	**82.5**	**92.9**	59.5	8.9	11.9	29.5
Loma	71.7	71.9	84.4	60.8	9.2	13.3	32.0
Northern	83.6	**80.1**	90.4	61.3	9.1	13.1	32.3
Ray	75.9	72.4	80.6	59.4	9.0	12.8	37.0
SY Clearstone	75.2	75.5	85.0	59.7	9.3	13.1	35.0
SY Monument	**85.0**	75.9	86.4	60.9	9.2	12.3	31.2
Warhorse	77.9	74.6	85.3	61.5	9.2	13.5	32.8
Yellowstone	77.0	74.9	84.1	59.8	9.0	13.0	33.8
Experimental							
MT1683	81.2	76.6	-	60.2	9.1	12.3	34.9
MT1745	82.1	-	-	61.4	9.2	12.4	32.6
MT1746	**86.8**	-	-	62.9	9.5	12.4	29.8
MT1793	**84.4**	-	-	61.2	9.2	13.4	31.6
MTCL1732	**84.0**	**79.8**	-	60.6	9.1	12.2	30.9
MTCL1737	77.1	-	-	60.3	9.2	12.6	30.3
MTCS1601	81.4	74.3	84.2	62.3	9.3	12.5	32.5
MTS18149	73.5	-	-	60.7	9.5	13.2	30.0
Average	81.0	76.0	85.7	61.0	9.2	12.8	32.3
PLSD (p=0.05)	11.9	7.5	5.8	1.2	ns	0.9	1.6
CV%	7.6	8.2	7.3	1.3	4.2	4.6	4.7
Location x	4	8	13	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.
Bold Indicates highest yielding cultivar within a column.
Bold Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).