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:

Off-Station Spring Wheat Variety Performance Trials in South Central Montana. This research is partially supported by the Montana Wheat and Wheat Committee.

PROJECT LEADERS:

Kent A. McVay, Cropping System Specialist, SARC, Huntley
Qasim A. Khan, Research Associate, SARC, Huntley
Luther E. Talbert, Spring Wheat Breeder, PSPP, Bozeman
Hwa Young Heo, Spring Wheat Research Associate, PSPP, Bozeman

PROJECT PERSONNEL:

Tom A. Fischer, Research Specialist and Farm Foreman, SARC, Huntley
Janna Rozett, Research Assistant III, SARC, Huntley
Ken Kephart, Agronomist and Superintendent, SARC Huntley

COOPERATORS:

Greg Lackman, Hysham
Mark Robertus, Fromberg
Joseph Stahl, Musselshell
Keith & Karen Schott, Broadview

OBJECTIVES:

To provide growers in south central Montana with a reliable, unbiased, up-to-date source of information that will permit valid comparisons among improved spring wheat varieties. This information should help spring wheat producers in south central Montana select varieties best suited to their particular area and growing conditions.

METHODS:

The 2017 off-station spring wheat trials in south central Montana were established under dryland conditions near Broadview and Musselshell, and under irrigated conditions near Fromberg and Hysham, Montana (Figure 1). The spring wheat trials for this region of Montana each possessed 25 entries made up of 19-22 commercial cultivars and 3-6 experimental lines depending test site.

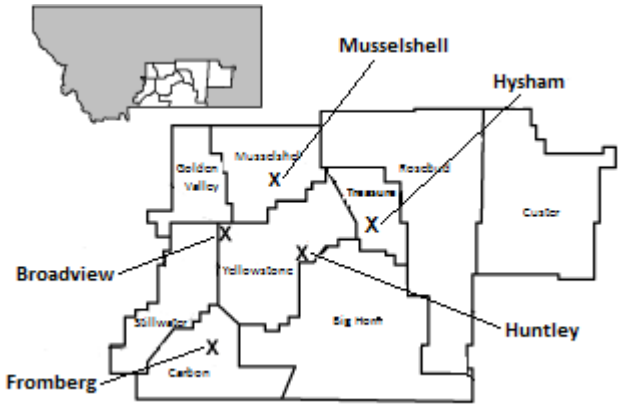

Figure 1. 2017 off-station spring wheat trial locations in south central Montana.

All studies were planted using a partially-balanced lattice design with three replications. All entries were seeded at approximately 0.75 million seeds per acre under dryland conditions (~45 lb/a) and 1.5 million seeds per acre under irrigation (~90 lb/a). Seeding rates were not adjusted for germination. Information pertaining

to the traits and characteristics of the commercial spring wheat cultivars are provided in Table 1.

Dryland test plots consisted of a 16-foot, 4-row plot with 12-inch row spacing, while irrigated plots were 16-foot, 7-row with 7-inch row spacing. All rows of each test plot were trimmed 36 inches and harvested using an experimental plot combine. Recorded grain yields were adjusted to 13% grain moisture content, and are reported in bushels per acre (bu/a) based on a 60 pound standard bushel weight. Test weight (lb/bu, pounds per bushel) and grain moisture content (%, percent) were obtained for each plot using a Dickey-John™ GAC 2100 grain analyzer. Grain protein (%, percent) was estimated using near infrared spectroscopy. Reported grain protein values are 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 severity was recorded on a 0 to 9 scale, at Huntley, Fromberg and Hysham, representing no lodging to all stems lying flat on the ground, respectively.

RESULTS:

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

Spring wheat yield at Huntley under dryland condition averaged 75 bu/a in 2017 (Table 2). High yield at this location this year was mainly attributed to high soil moisture due to three-years of fallow period at the experiment site. ‘Lanning’ was the highest yielding cultivar with 85 bu/a. Two other entries have the yield statistically equal to that of highest yielding entry. Spring wheat test weight averaged 60.1 lb/bu and ranged from 57.1 to 63.1 lb/bu. Grain protein content was high averaging 14.5 percent and all entries have protein content over 13 percent. Averaged yield over the past two- and three-years was 62 and 55 bu/a respectively. Solano was the highest yielding cultivar at Huntley over the last two years.

Dryland spring wheat yield at Broadview averaged only 18 bu/a in 2017 (Table 3) slightly better compared to last year. Lower yield at this location this year was mainly attributed to drought during the grain filling period. ‘NS Presser CLP’ was the highest yielding cultivar with 23 bu/a. Four other entries have the yield statistically equal to that of highest yielding entry. Spring wheat test weight averaged 61.4 lb/bu and ranged from 57.4 to 62.5 lb/bu. Grain protein averaged 12.0 percent. Averaged yield over the past two- and three-year was 15 and 19 bu/a respectively at Broadview. ‘WB Gunnison’ was the highest yielding cultivar averaged over the last two years.

Spring wheat trial at Musselshell was not harvest due to poor stand and drought stress during grain filling caused poor seed set.

Irrigated spring wheat yield averaged 85 bu/a at Huntley in 2017 (Table 4). Lodging score was low (0.2 out of 9). Only ‘Fortuna’ showed relatively higher level of lodging with a score of 4.6. Grain yield varied from 42 bu/a for ‘ONeal’ to 107 bu/a for experimental line ‘HRS 3419’. Three other entries produced yield statistically equal to that of highest yielding cultivar. ‘SY Soren’ and ‘SY Ingmar’ were the highest yielding commercial cultivars at Huntley. Test weight averaged 60.3 lb/bu. Test weight ranged from 53.2 for ONeal to 63.5 lb/bu for ‘Brennan’. Grain protein levels were high and averaged 15.0 percent. ‘Solana’ was the highest yielding cultivar tested under irrigation at Huntley over the past 3-yrs (2014, 2016 -2017), averaging 96 bu/a.

No lodging was observed for most entries under irrigation at Hysham in 2017. Grain yield at Hysham was excellent and average 123 bu/a, about 20 bu/a more than the last year. This location produced the highest grain yield among all test sites in 2017. Yield ranged from 111 bu/a for 'Fortuna' to 134 bu/a for NS Presser CLP. Seven other entries produced yield ranged from 127 to 134 bu/a, statistically equal to the yield of highest yielding cultivar. Test weight was excellent averaging 64.3 lb/bu, and all entries produced test weight above 63 lb/bu. Grain protein averaged 12.7 percent and ranged from 12.0 to 13.9 percent. Average yield, at Hysham, over the past two- and three-year was 113 and 102 bu/a respectively. 'Duclair' and 'Vida' were the highest yielding cultivars for the past two and three-years respectively.

Except for few cultivars, little or no lodging was observed for most commercial cultivars under irrigation at Fromberg in 2017 (Table 6). Cultivar Fortuna exhibited relatively high lodging (6.3 out of 9) followed by NS Presser CLP (5.3 out of 9) that reduced their yield. The yield at Fromberg in 2017 averaged 103 bu/a about the same as last year. Grain yield ranged from 64 bu/a for NS Presser CLP to 121 bu/a for experimental line 'MT1543''. Eight other entries produced yield ranged from 109 to 120 bu/a, statistically equal to the highest yielding entry. 'Brennan' was the highest yielding commercial cultivar at this site. Test weight averaged 61.7 lb/bu and ranged from 55.8 for ONeal to 64.8 lb/bu for Brennan. Grain protein levels averaged 14.4 percent and ranged from 13.0 for HRS 3504 to 15.8 percent for 'Egan'. Over the past three years average yield have been fairly stable at Fromberg. Two- and Three-year average yield for spring wheat varieties tested during 2015 - 2017, was 104 and 103 bu/a respectively. The commercial cultivars Duclair and Brennan were the best performing cultivar over the past two- and three-year averaging grain yield of 113 and 111 bu/a respectively.

SUMMARY:

Higher than normal temperature and below-average precipitation during grain filling period caused late season drought stress that attributed to poor yield at dryland locations and resulted in earliest spring wheat harvest in south eastern Montana. In 2017, MT1543 was the highest yielding entry across all locations tested in south central Montana averaging 90 bu/a, and closely followed by cultivar Duclair and SY Ingmar with an average yield of 85 bu/a, (Tables 7 and 8). Duclair was also the top yielding commercial cultivar under irrigated condition over the past two- and three-years respectively (Table 9). Long-term productivity based on last two and three years average yield across all locations were also highest for Duclair (Table 8). Across all locations for the past three years, five other entries produced yields ranged from 74 to 76 bu/a, which was statistically equal to the yield of Duclair. Averaged across locations grain protein content was 13.7 percent. Overall test weight averaged 61.6 lb/bu (Table 8), while averaged 62.1 lb/bu across irrigated locations (Table 9).

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

Cultivar	1/ Origin	Year of Release	2/ Market Class	3/ PVP	4/ Maturity	5/ Straw Strength	6/ Disease Resistance: Fusarium Head Blight (Scab)	Leaf Rust	Stem Rust	Stripe Rust	Wheat Stem Sawfly	6/ Insect Resistance: Russian Wheat Aphid	Hessian Fly (GP)	7/ Quality: Milling	Baking	8/ Clearfield Type
				Yes/No										1-5	1-5	Yes/No
Alum	WSU	2014	HRS	Y	M-L	MS				MR			R			
Brennan	Syngenta	2009	HRS	Y	E	S	MR	R	R	S	S	S	S	-	-	N
Choteau	MSU	2003	HRS	Y	E-M	VS	S	-	R	S	R	S	S	4	4	N
Corbin	WestBred	2006	HRS	Y	E	MS	S	-	-	R	R	S	-	3	3	N
Duclair	MSU	2011	HRS	Y	E-M	S	-	-	MR	MR	-	-	-	-	-	N
Egan	MSU	2014	HRS	Y	-	-	-	-	-	MR	-	S	-	-	-	N
Fortuna	NDSU	1966	HRS	N	E	MW	S	R	R	VS	R	S	S	5	4	N
Lanning	MSU	2016	HRS	Y	M	S	-	-	-	-	S	S	S	3	5	N
LCS pro	Limagrain	2017	HRS	Y	M	-	MR	MR	MR	-	S	-	-	3	4	N
NS PresserCLP	Northern	2016	HRS	Y	-	-	-	-	-	-	-	-	-	-	-	Y
ONeal	WestBred	2008	HRS	Y	M	S	S	-	-	S	MS	S	-	3	3	N
Reeder	NDSU	1999	HRS	Y	M-L	S	MS	MR	R	MR	S	S	S	3	3	N
Solano	WestBred	2007	HRS	Y	-	-	-	MR	MR	MR	-	-	-	-	-	N
SY 605 CLP	Syngenta	2014	HRS	Y	E	MW	MR	R	R	-	-	-	-	-	-	Y
SY Ingmar	Syngenta	2015	HRS	Y	M	MS	MR	MR	R	-	-	-	-	-	-	N
SY Soren	Syngenta	2011	HRS	Y	E-M	S	MR	MR	R	-	-	-	-	-	-	N
Vida	MSU	2006	HRS	Y	M-L	S	S	-	MS	MR	MS	S	S	4	4	N
WB Gunnison	WestBred	2010	HRS	Y	-	-	-	-	-	.	MR	-	-.	-	-	N
WB9879CLP	WestBred	2012	HRS	Y	E-M	S	MS	S		MR	R	-	-	3	3	Y

1/ MSU=Montana State University; NDSU=North Dakota State University; Syngenta, Berthoud, Colorado; WestBred=WestBred Group, Monsanto Co., Bozeman, WSU=Montana; Washington State University.
2/ HRS=hard red spring 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/ S=strong straw strength, MS=moderately strong straw strength, M=medium straw strength, MW=moderately weak straw strength, W=weak straw strength.
6/ R=resistant, MR=moderately resistant, MS=moderately susceptible, S=susceptible, VS=very susceptible.
7/ Milling and baking quality rated from 1 to 5 where 1=poor and 5=superior quality, respectively.
8/ Signifies a cultivar possessing the Clearfield trait imparting tolerance to Beyond® (imazamox) herbicide.

Table 2. Performance of 25 spring wheat cultivars tested under no-till, dryland conditions near Huntley, Montana during 2017. Cultivars listed alphabetically. (Exp. 179908).

	1/ Grain Yield			2/ Test	Grain	Grain	Plant	Heading Date	
Cultivar	**2017**	**2016-17**	**2014-17**	**Weight**	**Moisture**	**Protein**	**Height**	**Julian**	**Calendar**
	------- bushels/acre -------			lb/bu	%	%	inches		
Commercial									
Alum	74.9			58.8	7.8	14.5	38.0	161.0	Jun-10
Brennan	73.0	**66.4***		63.1	8.0	14.3	34.5	158.3	Jun-7
Choteau	71.7	58.4	51.7	59.9	7.7	14.3	37.4	161.0	Jun-10
Corbin	78.6	**65.2***	57.4	60.3	7.9	14.0	38.1	159.3	Jun-8
Duclair	73.3	**63.7***	57.4	59.5	7.9	14.2	38.3	158.3	Jun-7
Egan	72.8	**66.2***		59.1	7.4	16.2	37.6	162.0	Jun-11
Fortuna	72.2	61.3	54.7	61.5	8.3	14.4	46.8	161.5	Jun-10
Lanning	**85.4****			60.9	7.8	14.4	36.3	157.2	Jun-6
LCS Pro	79.7			60.0	8.1	14.2	43.1	160.5	Jun-9
NS Presser CLP	71.4			57.1	7.8	14.5	40.4	163.0	Jun-12
ONeal	60.8	48.9	48.4	58.0	7.6	15.3	38.7	161.3	Jun-10
Prestige	77.0			60.5	8.0	13.8	37.7	157.0	Jun-6
Redstone	**80.6***			57.6	7.5	14.9	38.1	164.1	Jun-13
Reeder	76.5	**62.6***	54.8	59.6	7.6	15.0	40.6	160.3	Jun-9
Solano	**85.1***	**71.4****	59.1	61.3	7.7	14.2	31.5	159.8	Jun-8
SY 605 CLP	75.0			62.2	8.1	14.6	40.1	157.1	Jun-6
SY Ingmar	77.9			59.9	7.7	14.7	35.4	160.6	Jun-9
SY Soren	74.7			60.4	7.6	14.8	33.4	160.1	Jun-9
Vida	77.7	**63.5***	58.1	59.6	8.0	13.8	38.8	160.7	Jun-9
WB 9668	69.9			59.8	7.7	14.6	37.9	160.6	Jun-9
WB 9879CLP	68.3			59.8	7.6	14.8	36.6	160.5	Jun-9
WB Gunnison	66.5	57.4	53.3	60.4	8.0	13.5	34.9	160.5	Jun-9
Experimental									
MT 1525	72.7			61.8	7.9	14.5	35.2	160.3	Jun-9
MT 1543	77.6			60.3	7.9	14.1	36.8	158.7	Jun-7
MT 1570	76.9			60.7	7.8	13.7	35.0	158.1	Jun-7
Average	74.8	62.3	55.0	60.1	7.8	14.5	37.7	160.1	Jun-9
PLSD (p=0.05)	5.8	9.0	ns	0.7	0.2	0.3	1.2	0.8	
CV%	4.9	5.6	7.2	0.7	1.5	1.1	0.6	0.3	

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content. Three years average based on 2014, 2016, and 2017.

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).

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

Huntley Dryland Spring Wheat (Exp. 179908)

Planted:	March 27, 2017
Harvested:	Aug. 8, 2017
Fertility:	None applied, soil had 256 lb/a residual NO3-N due to 3-yrs fallow
Herbicide:	Bromac adv. 16 oz./a + affinity Broadspec 0.5 oz./a on 4/18/17
Previous Crop:	chemical fallow
Precipitation	March-July: 6.72 inches

Table 3. Performance of 24 spring wheat cultivars tested under no-till, dryland conditions near Broadview, Montana during 2017. Cultivars listed alphabetically. (Exp. 179995).

1/ Cultivar	2/ Grain Yield			Test Weight	Grain Moisture	3/ Grain Protein	Plant Height
	2017	2016-17	2015-17				
	------- bushels/acre -------			lb/bu	%	%	inches
Commercial							
Alum	17.8	**15.5***		61.1	10.4	11.1	23.6
Brennan	17.3	13.3	19.2	62.5	10.1	13.5	24.4
Choteau	18.0	14.6	18.6	61.4	10.0	11.4	22.7
Corbin	16.6	14.9	18.1	62.1	10.1	11.6	24.1
Duclair	16.4	14.6	19.3	60.4	9.9	11.3	25.3
Egan	14.5	12.4	17.6	59.4	9.7	12.7	25.7
Fortuna							
Lanning	18.6			60.8	10.0	11.9	24.1
LCS Pro	17.6			62.5	10.7	11.3	24.3
NS Presser CLP	**23.1****			62.0	10.3	11.2	24.9
ONeal	18.4	**16.1***		60.7	10.3	11.2	26.8
Prestige	14.3			57.4	9.9	13.4	23.2
Redstone	18.6			61.6	10.1	11.6	23.1
Reeder	**20.6***	**16.1***	19.0	61.1	10.1	12.0	26.1
Solano	15.7			60.6	9.9	13.0	21.4
SY 605 CL	17.3			61.9	9.9	12.2	26.2
SY Ingmar	18.3			62.7	10.3	12.4	24.1
SY Soren	19.0	14.9	18.6	61.6	9.9	12.8	25.9
Vida	**20.2***	**17.0***	20.9	60.8	10.0	11.3	25.5
WB 9668	17.5			62.0	10.0	11.9	22.4
WB 9879CLP	17.7	**15.1***	20.2	62.2	9.9	11.6	23.9
WB Gunnison	**20.4***	**17.9****	21.2	60.9	10.4	11.6	23.9
Experimental							
MT 1525	19.4			64.4	10.2	11.2	23.2
MT 1543	16.8			61.4	9.9	11.8	22.2
MT 1570	**21.3***			60.7	9.5	13.1	24.0
Average	18.2	15.2	19.3	61.4	10.1	12.0	24.2
PLSD (p=0.05)	3.5	2.9	ns	1.6	0.4	1.1	2.1
CV%	11.7	10.9	9.4	1.6	2.3	5.4	5.4

1/ Cultivar Fortuna was grazed/damaged by deer and was excluded for data analysis.
2/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.
3/ 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).
ns Indicates no significant difference between cultivars within a column based on fisher's protected LSD (p=0.05

Broadview Dryland Spring Wheat (Exp. 179995)	
Planted:	April 24, 2017
Harvested:	August 8, 2017
Fertility:	10 gallons/a of 28.1-0-0-5 NPKS 5/12/2017
Herbicide:	Starane Flex 13.5 oz/a post emergence
Insecticide:	none applied
Previous Crop:	Safflower
Precipitation:	n/a

Table 4. Performance of 25 spring wheat cultivars tested under irrigation near Huntley, Montana during 2017 Cultivars listed alphabetically. (Exp. 179909).

	1/ Grain Yield			Test	Grain	2/ Grain	Plant		Heading Date	
Cultivar	**2017**	**2016-17**	**2015-17**	**2017**	**Moisture**	**protein**	**Height**	**Lodging**	**Julian**	**Calendar**
	------- bushels/acre -------			lb/bu	%	%	inches	0-9		
Commercial										
Alum	94.5	**93.1***		60.7	11.2	15.7	37.1	0.0	167.3	Jun-15
Brennan	90.7	**99.5***	**94.5***	63.5	9.8	15.3	33.2	0.0	165.0	Jun-13
Choteau	70.2	**88.5***	**83.4***	57.2	9.5	15.0	36.6	0.1	166.3	Jun-14
Corbin	81.9	84.4	79.8	60.7	9.9	14.0	36.6	0.0	165.7	Jun-13
Duclair	91.2	**100.7***	**94.9***	58.6	9.6	15.1	35.7	0.1	166.3	Jun-14
Egan	87.2	**95.8***	**91.7***	60.9	9.5	16.6	36.4	0.0	167.7	Jun-15
Fortuna	86.4	75.4	72.5	62.3	10.2	14.3	44.0	4.6	167.7	Jun-15
Lanning	90.3			61.7	9.6	15.1	34.9	0.0	166.3	Jun-14
LCS Pro	85.3			61.7	10.1	15.0	42.4	0.0	167.0	Jun-15
NS Presser CLP	57.7			55.2	10.2	14.7	39.8	0.6	169.7	Jun-17
ONeal	42.9	60.9	55.2	53.2	8.9	16.7	36.0	0.0	168.0	Jun-16
Reeder	95.4	**95.1***	**94.3***	62.2	10.8	15.2	40.7	0.1	167.3	Jun-15
Solano	84.0	**97.4***	**95.6****	61.7	9.6	14.8	29.1	0.0	167.7	Jun-15
SY 605 CLP	91.8			62.8	10.0	15.7	38.8	0.0	164.7	Jun-12
SY Ingmar	**97.2***			61.8	10.0	15.1	35.2	0.0	167.0	Jun-15
SY Soren	**97.2***	**104.4***		63.3	9.8	14.7	35.2	0.0	167.0	Jun-15
Vida	82.3	82.8	**81.8***	59.9	10.6	14.7	37.9	0.4	167.3	Jun-15
WB 9879 CLP	74.8	**92.6***		58.7	9.7	15.1	37.9	0.0	167.0	Jun-15
WB Gunnison	88.9	**95.6***	**92.5***	61.3	11.3	13.9	34.6	0.0	167.0	Jun-15
Experimental										
HRS 3419	**107.0****	**110.9****		61.2	10.0	13.7	36.9	0.0	169.7	Jun-17
HRS 3504	81.4	**92.5***		58.2	9.2	14.2	33.9	0.0	168.7	Jun-16
HRS 3616	91.8	**98.5***		61.5	9.9	15.6	36.2	0.0	166.3	Jun-14
MT 1525	66.4			58.9	9.8	15.3	35.6	0.0	167.3	Jun-15
MT 1543	**103.4***			59.5	9.7	14.1	36.2	0.0	165.7	Jun-13
MT 1570	86.0			60.4	10.3	14.6	34.0	0.0	165.3	Jun-13
Average	85.0	92.2	85.1	60.3	10.0	15.0	36.6	0.2	167.0	Jun-15
PLSD (p=0.05)	10.9	23.2	15.7	1.4	0.5	0.5	2.2	0.6	1.6	
CV%	7.8	7.5	8.5	1.4	3.3	2.0	3.7	175.6	0.6	

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Grain protein values adjusted to 12 percent grain moisture content.

Table 4 Continued.

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

Huntley Irrigated Spring Wheat (Exp. 179909)

Planted:	April 18, 2017
Harvested:	August 9, 2017
Fertility:	100-0-0, spread fall 2016; 50 lb N / acre top dressed in May 2017.
Herbicide:	RT3 24 oz/a pre-plant
Insecticide:	none
Previous Crop:	spring barley
Irrigation:	sprinkler
Precipitation:	March-July 6.72 inches

Table 5. Performance of 25 spring wheat cultivars tested under irrigation near Hysham during 2017. Cultivars listed alphabetically. (Exp. 179996).

Cultivar	Grain Yield 1/ 2017	Grain Yield 1/ 2016-17	Grain Yield 1/ 2015-17	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height	Lodging
	------- bushels/acre -------			lb/bu	%	%	inches	0-9
Commercial								
Alum	120.3	110.3		64.4	9.6	12.4	35.7	0
Brennan	113.8	108.3	98.8	65.4	9.2	13.6	32.8	0
Choteau	121.3	111.7	**102.0***	64.0	9.4	12.8	36.5	0
Corbin	123.2	**116.6***	**105.3***	64.3	9.4	12.6	35.7	0
Duclair	**133.7***	**122.1****	**109.9***	63.3	9.4	12.8	37.5	0
Egan	113.3	104.6	92.8	63.3	8.9	13.9	37.9	0
Fortuna	110.9	95.9	88.0	64.5	9.5	13.8	45.3	0
Lanning	117.1			64.6	9.2	12.3	33.6	0
LCS Pro	**133.9***			64.5	9.7	12.5	38.8	0
NS Presser CLP	**134.4****			63.1	9.6	12.5	38.8	0
ONeal	115.5	104.6		63.6	9.3	12.1	37.5	0
Reeder	122.1	**114.6***	**101.6***	64.5	9.5	12.8	37.4	0
Solano	117.5	110.9	**103.3***	65.2	9.3	12.4	28.9	0
SY 605 CLP	116.6			64.8	9.5	12.5	36.7	0
SY Ingmar	119.3			64.8	9.3	12.9	33.2	0
SY Soren	118.1	**114.7***	**102.7***	64.9	9.1	12.9	31.9	0
Vida	**133.9***	**119.8***	**110.1****	63.7	9.6	12.9	37.3	0
WB 9879 CLP	124.1	**118.3***	**103.8***	64.8	9.4	12.3	37.1	0
WB Gunnison	122.7	**117.7***	**107.6***	64.7	9.5	12.8	34.3	0
Experimental								
HRS 3419	**133.3***	**121.1***	**106.6***	63.5	9.4	11.2	35.3	0
HRS 3504	**132.7***	**122.0***		63.0	9.4	12.0	33.6	0
HRS 3616	117.0	108.4		64.4	9.5	12.5	36.5	0
MT 1525	120.8			65.3	9.5	13.1	34.8	0
MT 1543	**130.9***			63.9	9.2	13.0	35.6	0
MT 1570	**127.7***			64.4	9.5	12.8	33.6	0
Average	123.0	113.0	102.5	64.3	9.4	12.7	35.9	0
PLSD (p=0.05)	7.7	9.8	8.9	0.5	0.2	1.0	2.3	
CV%	3.8	4.9	5.6	0.4	1.3	4.9	4.1	

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 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.
** 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 Irrigated Spring Wheat (Exp. 179996)

Planted:	March 27, 2017
Harvested:	July 26, 2017
Fertility:	130-0-0 lb/a NPK in March, 2017
Herbicide:	Weld 22 oz./a + Axial 16 oz./a
Fungicide:	Nexicor 4 oz./a
Previous Crop	Sugar beet
Irrigation:	flood

Table 6. Performance of 25 spring wheat cultivars tested under irrigation near Fromberg, Montana during 2017. Cultivars listed alphabetically. (Exp. 179997).

Cultivar	Grain Yield 1/ 2017	Grain Yield 1/ 2016-17	Grain Yield 1/ 2015-17	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height	Lodging
	------- bushels/acre -------			lb/bu	%	%	inches	0-9
Commercial								
Alum	91.8	**101.0***		59.4	11.9	14.7	38.8	0.0
Brennan	**119.6***	**112.5***	**110.8****	64.8	10.8	14.1	34.8	0.0
Choteau	98.8	**103.3***	**101.7***	62.0	11.4	13.6	37.4	0.0
Corbin	101.9	**107.4***	**103.6***	62.1	11.2	14.0	38.2	0.3
Duclair	**110.6***	**113.1****	**110.5***	61.8	10.9	13.7	39.1	0.0
Egan	100.8	**100.1***	95.5	61.9	10.4	15.8	39.1	0.0
Fortuna	91.0	88.4	81.1	62.3	10.9	15.2	45.0	6.3
Lanning	**112.5***			61.7	10.7	15.1	38.5	0.0
LCS Pro	108.0			62.1	11.1	14.3	42.8	1.3
NS Presser CLP	64.3			57.3	13.0	14.4	37.1	5.3
ONeal	65.3	80.2		55.8	10.5	15.5	38.2	0.0
Reeder	101.7	**102.2***	98.9	62.2	12.1	14.4	42.0	0.0
Solano	**109.4***	**107.9***	**105.5***	62.3	11.3	14.7	31.2	0.0
SY 605 CLP	104.1			63.8	10.8	15.0	40.0	0.3
SY Ingmar	**115.8***			63.6	11.6	14.2	36.5	0.0
SY Soren	**115.4***	**110.8***	**109.7***	63.9	11.2	14.4	35.6	0.0
Vida	93.1	**99.0***	98.9	59.0	13.7	14.8	39.4	2.0
WB 9879 CLP	105.2	**112.4***	**109.5***	61.4	11.1	14.7	38.6	0.0
WB Gunnison	103.4	**105.3***	99.0	61.9	12.2	13.6	38.1	0.0
Experimental								
HRS 3419	103.8	**104.6***	**107.3***	60.7	11.3	14.2	38.1	0.0
HRS 3504	107.2	**107.7***		60.4	11.0	13.0	36.4	0.0
HRS 3616	**115.7***	**106.9***		63.1	11.2	14.4	38.3	0.0
MT 1525	102.3			62.6	12.1	14.4	37.7	0.0
MT 1543	**121.0****			62.4	10.9	14.0	38.1	0.0
MT 1570	**112.8***			63.1	11.1	13.6	36.0	0.0
Average	103.0	103.7	102.5	61.7	11.4	14.4	38.2	0.6
PLSD (p=0.05)	12.2	17.8	10.4	1.6	1.2	0.8	2.6	1.3
CV%	7.1	7.5	6.7	1.6	6.5	3.5	4.2	125.5

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 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.
** 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).

Fromberg Irrigated Spring Wheat (Exp. 179997)

Planted:	April 13, 2017
Harvested:	August 2, 2017
Fertility:	100-0-25-20 N-P-K-S lb/a on April 6, 2017
Herbicide:	Weld 24 oz/a + MCPA 8 oz/a on May 16, 2017
Insecticide/Fungicide:	Province 1.3 oz/a; Priaxor 3.5 oz./a May 16, 201
Previous Crop:	Barley
Irrigation:	overhead sprinkler

Table 7. Grain yield[1/] of spring wheat cultivars tested at five locations in south central Montana during 2017. Varieties listed by declining five-location average yield.

	Dryland			Irrigated				Five Location
Cultivar	Broadview	Huntley	Ave.	Huntley	Hysham	Fromberg	Ave.	Average
	bushels/acre							
MT 1543	16.8	77.6	47.2	**103.4***	**130.9***	**121.0****	**118.4****	**89.9****
SY Ingmar	18.3	77.9	48.1	**97.2***	119.3	**115.8***	**110.8***	**85.7***
Duclair	16.4	73.3	44.9	91.2	**133.7***	**110.6***	**111.8***	**85.0***
SY Soren	19.0	74.7	46.8	**97.2***	118.1	**115.4***	**110.3***	**84.9***
LCS Pro	17.6	79.7	48.7	85.3	**133.9***	108.0	**109.1***	**84.9***
MT 1570	**21.3***	76.9	49.1	86.0	**127.7***	**112.8***	**108.8***	**84.9***
Lanning	18.6	**85.4****	52.0	90.3	117.1	**112.5***	**106.7***	**84.8***
Reeder	**20.6***	76.5	48.5	95.4	122.1	101.7	**106.4***	**83.3***
Brennan	17.3	73.0	45.2	90.7	113.8	**119.6***	**108.0***	**82.9***
Solano	15.7	**85.1***	50.4	84.0	117.5	**109.4***	**103.6***	**82.3***
Vida	**20.2***	77.7	49.0	82.3	**133.9***	93.1	**103.1***	**81.5***
SY 605 CLP	17.3	75.0	46.1	91.8	116.6	104.1	**104.2***	**81.0***
Corbin	16.6	78.6	47.6	81.9	123.2	101.9	**102.3***	**80.5***
WB Gunnison	**20.4***	66.5	43.5	88.9	122.7	103.4	**105.0***	**80.4***
Alum	17.8	74.9	46.3	94.5	120.3	91.8	**102.2***	**79.9***
WB 9879 CLP	17.7	68.3	43.0	74.8	124.1	105.2	101.4	78.0
Egan	14.5	72.8	43.7	87.2	113.3	100.8	100.4	77.7
MT 1525	19.4	72.7	46.0	66.4	120.8	102.3	96.5	76.3
Choteau	18.0	71.7	44.8	70.2	121.3	98.8	96.8	76.0
NS Presser CLP	**23.1****	71.4	47.3	57.7	**134.4****	64.3	85.5	70.2
ONeal	18.4	60.8	39.6	42.9	115.5	65.3	74.5	60.6
Fortuna		72.2		86.4	110.9	91.0	96.1	
HRS 3419				**107.0****	**133.3***	103.8	**114.7***	
HRS 3504				81.4	**132.7***	107.2	**107.1***	
HRS 3616				91.8	117.0	**115.7***	**108.2***	
Redstone	18.6	**80.6***	49.6					
Prestige	14.3	77.0	45.7					
WB 9668	17.5	69.9	43.7					
Average	18.2	74.8	46.5	85.0	123.0	103.0	103.7	80.5
PLSD (p=0.05)	3.5	5.8	ns	10.9	7.7	12.2	16.5	11.2
CV%	11.7	4.9	6.4	7.8	3.8	7.1	6.1	6.4

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 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 spring wheat cultivars tested under both dryland and irrigated conditions at five locations in south central Montana during 2017. Cultivars listed alphabetically.

Cultivar	Grain Yield 1/ 2017	Grain Yield 1/ 2016-17	Grain Yield 1/ 2015-17	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height	Lodging
	------- bushels/acre -------			lb/bu	%	%	inches	0-9
Commercial								
Alum	**79.9***	**73.4***		60.9	10.2	13.7	34.7	0.0
Brennan	**82.9***	**75.6***	**75.0***	63.9	9.6	14.2	31.9	0.0
Choteau	76.0	72.5	71.7	60.9	9.6	13.4	34.1	0.0
Corbin	**80.5***	**74.2***	72.7	61.9	9.7	13.3	34.5	0.1
Duclair	**85.0***	**79.2****	**77.8****	60.7	9.5	13.4	35.2	0.0
Egan	77.7	71.5	69.1	60.9	9.2	15.0	35.3	0.0
Lanning	**84.8***			61.9	9.5	13.7	33.5	0.0
LCS Pro	**84.9***			62.2	9.9	13.5	38.3	0.3
NS Presser CLP	70.2			58.9	10.2	13.5	36.2	1.2
ONeal	60.6	60.2		58.3	9.3	14.2	35.4	0.0
Reeder	**83.3***	**74.7***	72.3	61.9	10.0	13.9	37.3	0.0
Solano	**82.3***			62.2	9.6	13.8	28.4	0.0
SY 605 CLP	**81.0***			63.1	9.6	14.0	36.4	0.1
SY Ingmar	**85.7***			62.5	9.8	13.9	32.9	0.0
SY Soren	**84.9***	**78.2***	**76.4***	62.8	9.5	13.9	32.4	0.0
Vida	**81.5***	**73.7***	**73.4***	60.6	10.4	13.5	35.8	0.5
WB 9879 CLP	78.0	**76.6***	**75.0***	61.4	9.6	13.7	34.8	0.0
WB Gunnison	**80.4***	**75.9***	**73.9***	61.9	10.3	13.1	33.1	0.0
Experimental								
MT 1525	76.3			62.6	9.9	13.7	33.3	0.0
MT 1543	**89.9****			61.5	9.5	13.4	33.8	0.0
MT 1570	**84.9***			61.8	9.6	13.5	32.5	0.0
Average	80.5	73.8	73.7	61.6	9.7	13.7	34.3	0.1
PLSD (p=0.05)	11.2	6.5	4.6	1.6	0.5	0.7	1.6	ns
CV%	6.4	7.3	7.1	1.3	4.2	3.6	3.9	385.7
Location Years	5	10	13	5	5	5	5	5

1/ Yields are based on 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 9. Performance of 25 spring wheat cultivars tested under irrigated conditions only in south central Montana during 2017. Cultivars listed alphabetically.

Cultivar	Grain Yield 1/ 2017	Grain Yield 1/ 2016-17	Grain Yield 1/ 2015-17	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height	Lodging
	------- bushels/acre -------			lb/bu	%	%	inches	0-9
Commercial								
Alum	**102.2***	101.5		61.5	10.9	14.3	37.2	0.0
Brennan	**108.0***	106.8	**103.5***	64.6	10.0	14.3	33.6	0.0
Choteau	96.8	101.2	98.5	61.0	10.1	13.8	36.8	0.0
Corbin	**102.3***	102.8	99.4	62.4	10.1	13.6	36.8	0.1
Duclair	**111.8***	**112.0***	**107.8***	61.2	10.0	13.9	37.4	0.0
Egan	100.4	100.2	94.5	62.0	9.6	15.5	37.8	0.0
Fortuna	96.1	86.6	82.2	63.1	10.2	14.4	44.8	3.7
Lanning	**106.7***			62.6	9.8	14.2	35.7	0.0
LCS Pro	**109.1***			62.8	10.3	14.0	41.3	0.4
NS Presser CLP	85.5			58.5	11.0	13.9	38.6	2.0
ONeal	74.5	81.9		57.5	9.5	14.8	37.2	0.0
Reeder	**106.4***	104.0	99.0	63.0	10.8	14.1	40.0	0.0
Solano	**103.6***	105.4	**102.6***	63.0	10.1	14.0	29.7	0.0
SY 605 CLP	**104.2***			63.8	10.1	14.4	38.5	0.1
SY Ingmar	**110.8***			63.4	10.3	14.1	35.0	0.0
SY Soren	**110.3***	110.0	**105.7***	64.0	10.0	14.0	34.2	0.0
Vida	**103.1***	100.5	99.1	60.9	11.3	14.1	38.2	0.8
WB 9879 CLP	101.4	107.8	**103.2***	61.6	10.1	14.0	37.9	0.0
WB Gunnison	**105.0***	106.2	**101.4***	62.6	11.0	13.4	35.7	0.0
Experimental								
HRS 3419	**114.7***	**112.2****	**108.0****	61.8	10.2	13.0	36.7	0.0
HRS 3504	**107.1***	107.4		60.6	9.9	13.1	34.6	0.0
HRS 3616	**108.2***	104.6		63.0	10.2	14.2	37.0	0.0
MT 1525	96.5			62.3	10.5	14.3	36.0	0.0
MT 1543	**118.4****			61.9	9.9	13.7	36.6	0.0
MT 1570	**108.8***			62.6	10.3	13.6	34.5	0.0
Average	103.7	103.0	100.4	62.1	10.2	14.0	36.9	0.3
PLSD (p=0.05)	16.5	2.0	7.6	2.1	0.7	0.9	1.6	1.4
CV%	6.1	6.6	6.6	1.2	4.6	3.5	4.0	178.1
Location Years	3	6	8	3	3	3	3	3

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 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.
** 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 24 spring wheat cultivars tested under dryland conditions in south central Montana during 2017. Cultivars listed alphabetically.

1/ Cultivar	2/ Grain Yield 2017	2016-17	2015-17	Test 2017	Grain Moisture	3/ Grain Protein	Plant Height
	------- bushels/acre -------			lb/bu	%	%	inches
Commercial							
Alum	46.3	31.4		59.9	9.1	12.8	30.8
Brennan	45.2	28.9	29.4	62.8	9.0	13.9	29.4
Choteau	44.8	29.5	28.9	60.7	8.9	12.8	30.1
Corbin	47.6	31.4	30.0	61.2	9.0	12.8	31.1
Duclair	44.9	30.1	29.9	60.0	8.9	12.7	31.9
Egan	43.7	28.4	28.3	59.2	8.6	14.4	31.6
Fortuna							
Lanning	52.0			60.9	8.9	13.1	30.2
LCS Pro	48.7			61.2	9.4	12.8	33.8
NS Presser CLP	47.3			59.6	9.0	12.9	32.6
ONeal	39.6	27.6		59.4	8.9	13.3	32.7
Prestige	45.7			59.0	8.9	13.6	30.4
Redstone	49.6			59.6	8.8	13.3	30.6
Reeder	48.5	30.9	29.7	60.4	8.8	13.5	33.3
Solano	50.4			61.0	8.8	13.6	26.4
SY 605 CLP	46.1			62.1	9.0	13.4	33.1
SY Ingmar	48.1			61.3	9.0	13.6	29.8
SY Soren	46.8	30.5	29.5	61.0	8.8	13.8	29.7
Vida	49.0	33.4	32.4	60.2	9.0	12.6	32.2
WB 9668	43.7			60.9	8.9	13.2	30.1
WB 9879 CLP	43.0	29.8	29.9	61.0	8.8	13.2	30.3
WB Gunnison	43.5	30.6	30.0	60.7	9.2	12.6	29.4
Experimental							
MT 1525	46.0			63.1	9.1	12.9	29.2
MT 1543	47.2			60.9	8.9	13.0	29.5
MT 1570	49.1			60.7	8.7	13.4	29.5
Average	46.5	30.2	29.8	60.7	8.9	13.2	30.7
PLSD (p=0.05)	ns	ns	ns	2.5	ns	ns	3.4
CV%	6.4	8.0	8.3	1.2	2.1	3.6	3.5
Location Years	2	4	5	2	2	2	2

1/ Cultivar Fortuna was grazed/damaged by deer and was excluded for data analysis.
2/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.
3/ 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).