

Title (4W5736): North Central Montana Off-Station Winter Wheat Variety Performance Evaluations

Principal Investigator: Peggy F. Lamb, Research Scientist, Northern Ag Research Center, Havre

Project Personnel: Phil L. Bruckner, Breeder/Geneticist, Winter Wheat, Bozeman
Jim E. Berg, Research Associate, Winter Wheat, Bozeman
Angela E. Sebelius, Research Associate, Havre
Ben Hauptman, Blaine County Extension
Tyler Lane, Chouteau County Extension

Cooperators: Max Cederberg, Landowner, Turner
Lyle McKeever & Terry McKeever, Landowners, Loma

Objectives:

Diverse cropping environments exist within the five-county area most closely served by Northern Agricultural Research Center. Winter wheat, spring wheat, barley, durum and oat production together in the five counties (Blaine, Chouteau, Hill, Liberty and Phillips) represents 28 percent of the 2010-2014 statewide cereal production totals (44 percent for winter wheat and 24 percent for spring wheat). Producers are keenly interested in variety performance data generated under local conditions. It is our objective, within budget and other resource limitations, to evaluate small grain variety performance, over time, under conditions representative of specific areas of northern Montana, yet differing from that of the Research Center. Growers in north central Montana are provided reliable, unbiased, up-to-date information to make comparisons among improved winter wheat varieties. This report provides producers in north central Montana the information necessary to select varieties best suited for their specific area and growing conditions.

Methods:

Standard off-station winter wheat variety performance trials were conducted in 2015 on chemical fallow at two locations in two northern Montana counties.

Dryland Winter Wheat Trials:

- | | |
|------------------------------------|------------|
| 1. Cederberg Farm, Blaine County | 13-36N-25E |
| 2. McKeever Farms, Chouteau County | 29-27N-10E |

Both winter wheat trials consisted of 25 entries and were seeded in replicated, 3-row, 22-foot plots on a 12-inch row spacing, utilizing a self-propelled cone seeder with Atom Jet paired row openers. All rows of each plot were trimmed to a harvest length of 16.5 feet with a three-point rototiller. Plant height was measured and percent sawfly cutting was estimated for each plot immediately prior to harvest. A 'Wintersteiger Classic' plot combine, funded in part by the Montana Wheat and Barley Committee, was used to harvest each 3-row plot. Seed was cleaned prior to measuring plot weight. Protein, test weight and moisture content were determined using a Foss Infratec 1241 near infrared analyzer. Falling number was determined using a Perten FN1700 according to the FGIS Directive 9180.38. Other variables specific to each individual trial are listed with the current year data tables.

Results:

Please note that research trial yield results recorded under wheat stem sawfly pressure are likely much higher than a producer should expect. Small plot variety trials are managed to assess maximum yield potential and are harvested in such a way that all stems and heads are picked up by the combine, regardless of lodging or cutting due to sawfly. Pickup guards coupled with an extremely slow ground speed and an exceptionally low cutting height help researchers collect all heads in order to assess seed yield potential. If you are a producer in a wheat stem sawfly environment, although hollow stemmed varieties may be high yielding in research trials in your area, we strongly recommend against growing those hollow stemmed varieties. Please be aware that if you seed hollow stemmed varieties with sawfly present, you are only creating a breeding ground for future generations of sawfly in your area and not helping combat the pest population.

Cropping environments in 2015 started out below average to marginal with warmer early spring temperatures and lower than normal precipitation across north central Montana. The Loma location went into the fall with good seeding conditions and but did not receive enough timely precipitation during the growing season, resulting in below

average winter wheat yields. Turner had good seeding conditions and above average precipitation throughout the year resulting in good stands and higher than average winter wheat yields.

At Havre, annual growing season precipitation (9/1/14 through 8/31/15) was 12.05 inches, nearly the same as the average for all years since 1916. April 1 through July 31 precipitation was 7.52 inches or 110 percent of the 100-year average. Heat units expressed as "Growing Degree Days" (GDD, base 50) from May through July totaled 1287, 100 percent of the average for the last 65 years (1951-2015). The last spring frost was on May 20 and the first fall frost of 2015 was on September 27, resulting in 130 frost-free days. The minimum winter temperature was -19 degrees F on November 14, 2014 and February 4 and 5, 2015. Overall, the 2014-2015 crop year temperatures were 2 degrees warmer than the long-term average. The April through July growing season saw an average daily temperature of 57.7 degrees F, similar to historical temperatures. July and August average temperatures were very similar to long-term averages with the high for 2015 recorded on June 29 and August 14 at 98 degrees F. There were 20 days with temperatures 90 degrees F or above, with no days over 100 degrees F.

Following a summer of timely rainfall, winter wheat yields at Turner averaged over 40 bu/ac (Table 1). An experimental breeding line from Montana State University, 'MT1286', was the highest yielding entry at 47 bu/ac. 'Broadview', 'Colter', 'Decade' and 'WB3768' along with three other experimental lines produced yields ranging from 43 to 45 bu/ac, statistically equal to that of MT1286. Test weight of all entries averaged 59 lb/bu. Sawfly cutting was nearly nonexistent in the winter wheat at Turner with no entry having even one percent cut. Stand percent, plant height, yield, moisture, test weight, protein, falling number and sawfly cutting data for the 2015 Turner dryland winter wheat trial are summarized in Table 1.

Comparable averages are calculated using a standard long-term check variety when not all entries are present in a specific trial for all years. Variety means are adjusted by multiplying the actual check mean by the ratio of the individual variety mean compared to the check mean for the same years as tested. All varieties are then directly comparable to each other when in the same nursery. A minimum of 3 years of data is necessary to be included in comparable average calculation. Four-year comparable averages for seed yield and test weight at Turner are summarized in Table 2, while four-year comparable averages for sawfly cutting are summarized in Table 3.

Loma winter wheat yields averaged 47 bu/ac with 'Northern', a 2015 Montana State University release producing the highest yield at 55 bu/ac (Table 4). 'Bearpaw', 'CDC Falcon' and two other experimental lines all yielded statistically equal to Northern. Sawfly cutting was low this year in the Loma area with cutting in the winter wheat trial averaging just under 12 percent. Plant height, yield, moisture, test weight, protein, falling number and sawfly cutting data for the 2015 Loma dryland winter wheat trial are summarized in Table 4. Ten-year comparable averages for seed yield and test weight at Loma are summarized in Table 5, while ten-year comparable averages for sawfly cutting are summarized in Table 6.

Summary:

This work has been strongly supported by producers near each of the locations, and by the Northern Agricultural Research Center Advisory Council. With budget and other resources allowing, it is planned to continue off-station cereal variety investigations in the five-county area. The Blaine County location near Turner is entering its sixth year of winter wheat testing, while the Chouteau County location, between Big Sandy and Loma, has been used for various trials since 1998.

Funding Summary:

Expenditure information for grant index 4W5736 is to be provided by Montana State University, Office of Sponsored Programs. There is no other grant support for this project.

MWBC CY2016 Grant Submission Plans:

It is planned to submit this project for funding consideration in the next calendar year.

Recognition:

This research would not have been possible without the assistance of the following summertime hourly employees: Nathan Chapman, Kasee Clark, Rocky Kuhr, Derek Matosich, Kyla McNamara, Dakota Parsons & Kathy Wesley.

TABLE 1. Dryland Fallow Winter Wheat Cultivar Evaluation Nursery Grown Off-Station at the Leon Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2015. (Exp# 15-3851-WW)

ID	CULTIVAR or SELECTION	STAND %	PLNT HT Inches	1/	TEST WT Lbs/Bu	MOISTURE %	2/	3/	4/
				YIELD Bu/Ac			PROTEIN %	FN seconds	SAWFLY %
Bearpaw	Montana, 2011	93.6	23.2	40.4	58.3	11.2	13.9	338	0.0
Broadview	Alberta, 2009 (Meridian Seeds)	90.0	23.3	45.4	58.2	11.3	12.9	343	0.3
CDC Falcon	Sask/WestBred, 1999	92.3	23.0	40.3	59.1	11.0	13.0	343	0.3
Colter	Montana, 2013	86.8	25.7	42.8	60.3	11.6	13.8	352	0.7
Decade	Montana/North Dakota, 2010	88.5	25.1	42.8	59.3	11.3	14.3	345	0.3
Genou	Montana, 2004	93.2	27.8	40.8	59.4	11.2	13.3	339	0.0
Jerry	North Dakota, 2001	90.4	25.6	38.7	57.8	11.3	12.9	317	0.7
Judee	Montana, 2011	92.6	24.5	39.2	61.0	11.1	13.7	334	0.0
Northern	Montana, 2015	91.6	24.1	38.3	59.2	11.4	13.7	348	0.0
Rampart	Montana, 1996	89.3	24.3	31.1	58.2	11.2	14.1	343	0.3
SY Clearstone 2CL	Montana/Syngenta, 2012	90.9	26.8	38.4	59.1	11.6	13.2	346	0.3
SY Wolf	Syngenta (AgriPro), 2010	92.2	24.0	38.5	59.0	12.1	13.6	284	0.0
Warhorse	Montana, 2013	89.7	23.8	34.6	59.4	11.6	14.3	374	0.0
WB3768	Montana/WestBred, 2013	92.6	29.0	44.6	59.5	11.4	13.2	344	0.3
WB-Quake	WestBred, 2011	92.9	24.5	38.3	58.9	11.1	13.3	336	0.3
Yellowstone	Montana 2005	88.1	26.1	40.7	59.4	11.5	13.2	345	0.0
MT1078	MT02113*4/MTS0359	93.6	25.5	44.3	57.6	11.2	12.5	347	0.3
MT1117	Yellowstone*3/KS96WGRC40	90.3	26.8	38.3	60.2	12.1	13.4	339	0.3
MT1138	W99-194/2*Yellowstone	92.9	27.7	42.5	58.8	11.3	13.0	345	0.0
MT1257	Yellowstone/Krichauff	91.0	27.7	45.3	58.8	11.4	13.5	348	0.0
MT1265	Yellowstone*4/KS96WGRC40 (Lr41, wcm)	93.6	25.7	43.3	59.4	11.3	12.8	340	0.0
MT1286	Yellowstone*2/NE99445	92.0	25.6	47.2	59.1	11.6	12.7	352	0.0
MTCS1204	MTCL0510/4/Paul/3/98X96C16cl/CDC Te	90.6	25.7	32.1	59.7	11.4	14.1	341	0.0
MTS0826-63	MT9524/G15048//Rampart	90.0	27.2	40.8	58.5	11.1	13.3	333	0.0
MTS1224	Yellowstone//MTS0112/MTS0125	90.0	22.5	39.8	59.7	11.8	13.5	323	0.0
EXPERIMENTAL MEANS		91.1	25.4	40.3	59.1	11.4	13.4	340	0.2
LSD (0.05)		6.8	2.0	5.7	0.9	0.6	0.5	11.1	0.6
C.V.%		4.5	4.8	8.6	0.9	3.0	2.1	2.0	220.1
P-VALUE (Varieties)		0.9116	<.0001	<.0001	<.0001	0.0119	<.0001	<.0001	0.5102

1/ Volumetric yields are based on plot weights adjusted to uniform 12 percent grain moisture and 60 lbs/bu as the standard test weight for wheat.

2/ Protein values are adjusted to 12 percent grain moisture.

3/ FN is the falling number value reported in seconds.

4/ Sawfly rating is reported as the percentage of cut stems.

Bold indicates highest value within a column.

Bold indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05).

Management Information (15-3851-WW)

Seeding Date: September 27, 2014
Harvest Date: August 13, 2015
Fertility: 100-20-10 side banded
System: no till
Herbicide: Brox-M, 24 oz/ac
Insecticide: none
Previous Crop: Chemical Fallow - Durum
Precipitation: n/a

TABLE 2. Four-Year Yield and Test Weight Summary of Selected Entries from Dryland Fallow Winter Wheat Variety Nurseries Grown Off-Station at the Leon Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2011-2015. (Exp# 3851-WW)

2/ VARIETY or SELECTION	No. of YEARS TESTED	1/ YIELD (Bushels Per Acre)							TEST WEIGHT (Pounds Per Bushel)								
		2011	2012	2013	3/ 2014	2015	AVE for YEARS TESTED	% of CHECK YIELD 4/	4-YR COMP. AVE. YIELD 5/	2011	2012	2013	3/ 2014	2015	AVE. for YEARS TESTED	% of CHECK TEST WT 4/	4-YR COMP. AVE. TEST WT 5/
PI660987 YELLOWSTONE (+)	4	49.7	24.0	63.0		40.7	44.3	100.0	44.3	61.3	58.8	61.5		59.4	60.3	100.0	60.3
PI665228 BEARPAW (+)	4	51.7	24.4	57.6		40.4	43.5	98.2	43.5	61.2	59.5	61.1		58.3	60.0	99.6	60.0
BZ9W05-2043 WB-QUAKE (P+)	4	54.0	24.4	56.9		38.3	43.4	97.9	43.4	60.7	59.2	62.0		58.9	60.2	99.9	60.2
S94-4 CDC FALCON (P+)	4	54.9	21.1	55.3		40.3	42.9	96.8	42.9	59.9	58.7	61.0		59.1	59.7	99.0	59.7
PI668090 SY CLEARSTONE 2CL (P+)	3		23.6	59.9		38.4	40.6	95.5	42.3		58.7	61.5		59.1	59.8	99.8	60.1
PI640424 GENOU (saw fly res)(+)	4	51.7	24.5	49.8		40.8	41.7	94.0	41.7	60.9	59.6	62.0		59.4	60.5	100.4	60.5
PI660291 DECADE (+)	4	50.0	20.9	52.1		42.8	41.4	93.5	41.4	61.9	60.0	61.0		59.3	60.6	100.5	60.6
PI665227 JUDEE (saw fly res)(+)	4	52.6	23.7	49.0		39.2	41.1	92.8	41.1	61.4	60.4	62.5		61.0	61.3	101.8	61.3
DH0018196 ACCIPITER (+)	3	47.4	23.9	55.1			42.1	92.4	41.0	60.4	59.0	62.2		60.5	100.0		60.3
PI670156 COLTER (++)	3		25.0	50.1		42.8	39.3	92.4	40.9		59.2	62.0		60.3	60.5	100.9	60.8
PI632433 JERRY	4	52.2	22.7	45.2		38.7	39.7	89.5	39.7	60.9	58.5	60.6		57.8	59.5	98.7	59.5
PI643430 NORRIS (P+,CL)	3	44.2	20.0	54.2			39.5	86.7	38.4	62.6	60.1	62.0		61.6	101.7		61.3
PI670157 WARHORSE (+)	4	38.1	25.1	52.1		34.6	37.5	84.6	37.5	62.5	59.5	62.2		59.4	60.9	101.1	60.9
W98-362 JAGALENE (P+)	3	46.1	18.8	46.9			37.2	81.7	36.2	63.2	61.0	62.7		62.3	102.9		62.0
PI593889 RAMPART (saw fly res)	4	43.6	22.5	45.4		31.1	35.7	80.4	35.7	62.1	59.4	61.7		58.2	60.4	100.2	60.4
BZ9W96-788-d LEDGER (P+)	3	41.2	23.4	38.1			34.2	75.1	33.3	60.8	59.6	61.0		60.5	99.9		60.2
MEANS (For Entries Listed)		48.4	23.0	51.9		39.0			40.2	61.4	59.5	61.7		59.2			60.5
6/ Growing Season Precipitation (in.)		3.7	7.5	n/a	17.6	n/a	9.6										
Soil PAW (in.) to SD @ Planting		8.6	8.9	7.8	8.5	3.6	7.5										
Total Plant Available Water (in.)		12.3	8.9	n/a	n/a	9.5	10.2										
Soil NO3 (lbs.) to SD at Planting		80	15	11	93	27	45										
Fertilizer Applied	(# N)	70	70	100	100	100	94										
	(# P ₂ O ₅)	40	40	20	20	20	24										
	(# K ₂ O)	25	25	10	10	10	13										

Long term check variety is Yellow stone.

1/ See MCES Bulletin 1098 or the Plant Sciences & Plant Pathology website at <http://plantsciences.montana.edu/> for evaluation of other important variety performance characteristics to include protein, quality, winter hardiness, disease resistance, etc. before making cultivar selection decisions.

2/ P = Private Variety, + = Protected Variety, ++ = PVP Title 5 Pending, CL = Clearfield Tolerant.

3/ No harvest in 2014 due to hail.

4/ Percent of Yellow stone yield or test weight for the same data years as those in which a given entry was tested.

5/ 4-Yr Comparable Average = (x/y) * z where x = average yield or test weight of a given entry for years tested, y = average yield or test weight for Yellow stone for the same years, and z = 4-Yr average yield or test weight for the check variety Yellow stone.

6/ April 1 to 14 days prior to harvest maturity.

TABLE 3. Four-Year Sawfly Summary of Selected Entries from Dryland Fallow Winter Wheat Variety Nurseries Grown Off-Station at the Leon Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2011-2015. (Exp# 3851-WW)

2/ VARIETY or SELECTION	No. of YEARS TESTED	1/ SAWFLY RATING (% of cut and lodged stems)					AVE. for YEARS TESTED	% of CHECK SWFLY 4/	4-YR COMP. AVE SWFLY 5/
		2011	2012	2013	3/ 2014	2015			
PI670157	WARHORSE (+)	4	1.0	2.3	0.7	0.0	1.0	26.1	1.0
PI593889	RAMPART (saw fly res)	4	1.0	11.7	2.3	0.3	3.8	100.0	3.8
PI665227	JUDEE (saw fly res)(+)	4	7.0	8.3	0.7	0.0	4.0	104.4	4.0
PI640424	GENOU (saw fly res)(+)	4	1.0	18.3	1.0	0.0	5.1	132.6	5.1
PI668090	SY CLEARSTONE 2CL (P+)	3		18.3	1.0	0.3	6.6	137.2	5.3
S94-4	CDC FALCON (P+)	4	2.3	18.3	3.7	0.3	6.2	160.9	6.2
PI665228	BEARPAW (+)	4	3.7	20.0	1.0	0.0	6.2	160.9	6.2
BZ9W05-2043	WB-QUAKE (P+)	4	20.0	10.0	0.7	0.3	7.8	202.2	7.8
PI670156	COLTER (++)	3		21.7	6.7	0.7	9.7	202.3	7.8
PI660291	DECADE (+)	4	11.7	23.3	2.0	0.3	9.3	243.5	9.3
PI660987	YELLOWSTONE (+)	4	20.0	18.3	6.7	0.0	11.2	293.5	11.2
PI632433	JERRY	4	13.7	26.7	5.3	0.7	11.6	302.2	11.6
BZ9W96-788-d	LEDGER (P+)	3	25.0	15.0	5.3		15.1	302.2	11.6
PI643430	NORRIS (P+,CL)	3	11.7	30.0	5.0		15.6	311.1	11.9
DH0018196	ACCIPITER (+)	3	26.7	18.3	2.3		15.8	315.6	12.1
W98-362	JAGALENE (P+)	3	21.7	25.0	3.7		16.8	335.6	12.9

MEANS (For Entries Listed) 11.9 17.9 3.0 0.3 **8.0**

6/ Growing Season Precipitation (in.)		3.7	7.5	n/a	17.6	n/a	9.6	
Soil PAW (in.) to SD @ Planting		8.6	8.9	7.8	8.5	3.6	7.5	
Total Plant Available Water (in.)		12.3	8.9	n/a	n/a	9.5	10.2	
Soil NO3 (lbs.) to SD at Planting		80	15	11	93	27	45	
Fertilizer Applied	(# N)	70	70	100	100	100	88	
	(# P ₂ O ₅)	40	40	20	20	20	28	
	(# K ₂ O)	25	25	10	10	10	16	

Long term check variety is Rampart.

1/ See MCES Bulletin 1098 or the Plant Sciences & Plant Pathology website at <http://plantsciences.montana.edu/> for evaluation of other important variety performance characteristics to include protein, quality, winter hardiness, disease resistance, etc. before making cultivar selection decisions.

2/ P = Private Variety, + = Protected Variety, ++ = PVP Title 5 Pending, CL = Clearfield Tolerant.

3/ No harvest in 2014 due to hail.

4/ Percent of Rampart saw fly rating for the same data years as those in which a given entry was tested.

5/ 4-Yr Comparable Average = (x/y) * z where x = average saw fly rating of a given entry for years tested, y = average saw fly rating for Rampart for the same years, and z = 4-Yr average saw fly rating for the check variety Rampart.

6/ April 1 to 14 days prior to harvest maturity.

TABLE 4. Dryland Fallow Winter Wheat Cultivar Evaluation Nursery Grown Off-Station at McKeever Farm & Seed, Inc., Loma. Northern Agricultural Research Center. Havre, Montana. 2015. (Exp# 15-3853-WW)

ID	CULTIVAR or SELECTION	STAND %	PLNT HT Inches	1/	TEST WT Lbs/Bu	MOISTURE %	2/	3/	4/
				YIELD Bu/Ac			PROTEIN %	FN seconds	SAWFLY %
Bearpaw	Montana, 2011	95.4	25.2	50.9	56.8	9.1	14.3	350	3.7
Broadview	Alberta, 2009 (Meridian Seeds)	93.4	26.4	49.0	56.4	8.9	14.9	370	6.7
CDC Falcon	Sask/WestBred, 1999	92.7	27.3	55.1	57.2	9.0	13.9	363	5.3
Colter	Montana, 2013	93.1	27.1	41.5	55.9	9.2	14.8	364	21.7
Decade	Montana/North Dakota, 2010	97.7	27.9	45.4	56.2	9.5	15.1	358	2.3
Genou	Montana, 2004	96.7	31.8	41.9	56.8	9.1	14.9	348	10.0
Jerry	North Dakota, 2001	97.0	33.0	46.5	55.9	9.1	14.1	363	13.3
Judee	Montana, 2011	96.1	26.0	43.2	56.7	9.1	15.2	338	2.3
Northern	Montana, 2015	95.8	29.6	55.3	57.4	9.2	15.0	365	15.0
Rampart	Montana, 1996	96.7	30.2	49.1	58.7	9.0	14.2	342	5.0
SY Clearstone 2CL	Montana/Syngenta, 2012	96.4	30.2	47.5	56.9	9.3	14.4	359	18.3
SY Wolf	Syngenta (AgriPro), 2010	96.4	29.0	48.4	58.9	9.3	14.1	337	6.7
Warhorse	Montana, 2013	94.4	28.6	44.8	56.8	9.2	14.3	365	1.0
WB3768	Montana/WestBred, 2013	94.1	30.2	48.3	57.3	9.2	14.4	368	26.7
WB-Quake	WestBred, 2011	93.8	27.2	43.3	56.6	9.0	14.5	322	2.3
Yellowstone	Montana 2005	96.1	29.2	46.2	56.6	9.3	14.3	368	15.0
MT1078	MT02113*4/MTS0359	95.4	29.2	48.1	56.2	9.1	13.8	347	20.0
MT1117	Yellowstone*3/KS96WGRC40	94.7	28.7	43.0	56.6	9.3	15.0	368	15.0
MT1138	W99-194/2*Yellowstone	95.5	28.5	47.7	56.3	9.3	14.8	364	15.0
MT1257	Yellowstone/Krichauff	97.4	28.1	45.2	56.4	9.2	14.7	367	25.0
MT1265	Yellowstone*4/KS96WGRC40 (Lr41, wcm)	97.1	30.4	52.5	57.5	9.4	14.1	366	15.0
MT1286	Yellowstone*2/NE99445	91.8	29.7	54.3	58.7	9.4	13.7	366	25.0
MTCS1204	MTCL0510/4/Paul/3/98X96C16cl/CDC Te	95.4	30.2	49.4	58.2	9.2	13.7	352	13.3
MTS0826-63	MT9524/G15048//Rampart	97.7	29.2	45.4	56.7	9.1	15.0	325	1.0
MTS1224	Yellowstone//MTS0112/MTS0125	98.4	25.2	44.0	56.1	9.2	15.2	342	13.3
EXPERIMENTAL MEANS		95.6	28.7	47.4	57.0	9.2	14.5	355	11.9
LSD (0.05)		4.6	2.6	5.1	1.1	0.2	0.9	11.1	9.8
C.V.%		2.9	5.5	6.5	1.2	1.4	3.8	1.9	49.9
P-VALUE (Varieties)		0.3831	<.0001	<.0001	<.0001	<.0001	0.0073	<.0001	<.0001

1/ Volumetric yields are based on plot weights adjusted to uniform 12 percent grain moisture and 60 lbs/bu as the standard test weight for wheat.

2/ Protein values are adjusted to 12 percent grain moisture.

3/ FN is the falling number value reported in seconds.

4/ Sawfly rating is reported as the percentage of cut stems.

Bold indicates highest value within a column.

Bold indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05).

Management Information (15-3853-WW)

Seeding Date: October 7, 2014
Harvest Date: July 23, 2015
Fertility: 100-20-10 side banded
System: no till
Herbicide: Brox-M, 24 oz/ac
Insecticide: none
Previous Crop: Chemical Fallow - Spring Wheat
Precipitation: n/a

TABLE 5. Ten-Year Yield and Test Weight Summary of Selected Entries from Dryland Fallow Winter Wheat Variety Nurseries Grown Off-Station at McKeever Farm and Seed Inc., Loma. Northern Agricultural Research Center. Havre, Montana. 2006-2015. (Exp# 3853-WW)

2/ VARIETY or SELECTION	No. of YEARS TESTED 3/	1/ YIELD (Bushels Per Acre)					TEST WEIGHT (Pounds Per Bushel)					10-YR COMP. AVE. YIELD 5/	10-YR COMP. AVE. TEST WT 5/						
		2011	2012	2013	2014	2015	AVE. for YEARS TESTED 3/	% of CHECK YIELD 4/	2011	2012	2013			2014	2015	AVE. for YEARS TESTED 3/	% of CHECK TEST WT 4/		
MTS0978	NORTHERN (++)	3			72.5	44.5	55.3	57.4	108.1	64.8				58.8	62.2	57.4	59.5	101.6	58.8
PI660987	YELLOWSTONE (+)	10	62.2	59.0	66.9	46.2	46.2	59.9	100.0	59.9	60.3	56.7	57.8	61.2	56.6	57.9	100.0	57.9	
PI668090	SY CLEARSTONE 2CL (P+)	4		56.8	62.6	48.4	47.5	53.8	98.7	59.1		55.6	57.2	61.2	56.9	57.7	99.5	57.5	
MTW08168	WB3768 (P++,HW)	3			60.9	43.6	48.3	50.9	95.9	57.4				58.0	61.5	57.3	58.9	100.7	58.3
S94-4	CDC FALCON (P+)	10	57.1	52.0	68.4	42.1	55.1	57.1	95.4	57.1	60.3	55.6	58.0	61.8	57.2	58.0	100.2	58.0	
PI670157	WARHORSE (+)	5	60.8	53.8	61.3	45.4	44.8	53.2	94.9	56.8	59.3	56.0	59.8	62.5	56.8	58.9	100.6	58.2	
PI665227	JUDEE (saw fly res)(+)	7	62.6	49.5	65.6	45.3	43.2	52.3	93.6	56.0	61.5	56.5	59.8	62.8	56.7	58.7	101.6	58.8	
PI660291	DECADE (+)	8	55.2	53.8	58.7	34.4	45.4	54.3	92.9	55.6	59.6	57.3	58.5	62.3	56.2	58.0	101.0	58.4	
BZ9W05-2043	WB-QUAKE (P+)	5	64.9	43.2	64.7	40.6	43.3	51.3	91.5	54.8	61.0	53.9	57.1	62.5	56.6	58.2	99.5	57.6	
PI670156	COLTER (++)	4		55.3	58.8	42.9	41.5	49.6	90.9	54.5		58.1	58.0	61.4	55.9	58.3	100.5	58.1	
W98-362	JAGALENE (P+)	9	52.5	49.4	56.6	43.3		55.4	90.3	54.1	61.3	59.5	59.7	63.6		60.2	103.8	60.1	
BZ9W96-788-d	LEDGER (P+)	8	49.2	55.4	57.2			56.2	88.9	53.2	60.4	59.4	59.5			59.0	102.3	59.2	
BZ96-919	PRYOR (P+)	7	55.3	52.3				55.4	88.2	52.8	58.8	56.6				57.5	99.8	57.8	
PI665228	BEARPAW (+)	6	51.2	52.9	57.3	38.2	50.9	50.9	87.9	52.6	59.8	56.8	58.8	62.1	56.8	58.1	101.0	58.4	
PI640424	GENOU (saw fly res)(+)	10	49.1	49.4	57.8	46.1	41.9	51.3	85.7	51.3	59.7	55.0	58.4	62.1	56.8	57.6	99.6	57.6	
DH0018196	ACCIPITER (+)	6	53.2	45.4	58.3	45.2		49.2	85.5	51.2	59.1	55.7	58.8	61.8		57.6	99.4	57.5	
PI643430	NORRIS (P+,CL)	8	45.2	44.3	54.3			53.8	85.0	50.9	60.1	55.6	59.2			58.5	101.6	58.8	
PI593889	RAMPART (saw fly res)	10	55.0	40.8	56.7	37.6	49.1	49.8	83.1	49.8	60.7	55.3	58.3	62.2	58.7	58.5	101.1	58.5	
PI632433	JERRY	10	53.6	43.7	55.0	36.5	46.5	49.8	83.1	49.8	59.2	55.4	58.3	61.0	55.9	57.3	99.1	57.3	
MEANS (For Entries Listed)			55.1	50.4	60.8	42.5	47.1			54.3	60.1	56.4	58.6	62.0	56.8			58.3	
6/ Growing Season Precipitation (in.)			9.4	9.4	8.8	6.0	n/a	8.5											
Soil PAW (in.) to SD @ Planting			9.6	7.9	9.1	10.4	3.6	8.0											
Total Plant Available Water (in.)			19.4	7.9	n/a	16.1	12.4	12.6											
Soil NO3 (lbs.) to SD at Planting			26	68	51	85	126	107											
Fertilizer Applied		(# N)	70	70	100	100	100	79											
		(# P ₂ O ₅)	40	40	20	20	20	34											
		(# K ₂ O)	25	25	10	10	10	21											

Long-term check variety is Yellow stone.

1/ See MCES Bulletin 1098 or the Plant Sciences & Plant Pathology website at <http://plantsciences.montana.edu/> for evaluation of other important variety performance characteristics to include protein, quality, winter hardiness, disease resistance, etc. before making cultivar selection decisions.

2/ P = Private Variety, + = Protected Variety, ++ = PVP Title 5 Pending, CL = Clearfield Line, HW = Hard White.

3/ Only the most recent 5 years shown, but summary calculations include all years noted.

4/ Percent of Yellow stone yield or test weight for the same data years as those in which a given entry was tested.

5/ 10-Yr Comparable Average = (x/y) * z where x = average yield or test weight of a given entry for years tested, y = average yield or test weight for Yellow stone for the same years, and z = 10-Yr average yield or test weight for the check variety Yellow stone.

6/ April 1 to 14 days prior to harvest maturity.

TABLE 6. Ten-Year Sawfly Summary of Selected Entries from Dryland Fallow Winter Wheat Variety Nurseries Grown Off-Station at McKeever Farm and Seed Inc., Loma. Northern Agricultural Research Center. Havre, Montana. 2006-2015. (Exp# 3853-WW)

2/ VARIETY or SELECTION		No. of YEARS TESTED	1/ SAWFLY RATING (% of cut and lodged stems)										AVE for YEARS TESTED	% of CHECK SWFLY 3/	10-YR COMP. AVE SWFLY 4/
			2006	2007	2008	2009	2010	2011	2012	2013	2014	2015			
PI670157	WARHORSE (+)	5						5.0	5.0	8.3	0.7	1.0	4.0	40.7	3.2
PI665228	BEARPAW (+)	6					8.3	10.0	13.3	20.0	1.0	3.7	9.4	95.4	7.6
PI593889	RAMPART (saw fly res)	10	0.0	0.0	3.7	16.7	10.0	10.0	16.7	16.7	0.7	5.0	7.9	100.0	7.9
BZ9W05-2043	WB-QUAKE (P+)	5						15.0	12.5	33.3	3.7	2.3	13.4	136.2	10.8
MT0978	NORTHERN (++)	3								16.7	3.7	15.0	11.8	158.0	12.5
PI665227	JUDEE (saw fly res)(+)	7				31.7	53.3	10.0	31.7	30.0	3.7	2.3	23.2	214.9	17.1
PI640424	GENOU (saw fly res)(+)	10	0.0	2.0	3.7	50.0	51.7	21.7	26.7	23.3	4.0	10.0	19.3	243.1	19.3
PI660291	DECADE (+)	8			2.3	40.0	96.3	13.3	71.7	23.3	5.0	2.3	31.8	293.9	23.3
MTW08168	WB3768 (P++,HW)	3								28.3	11.7	26.7	22.2	298.2	23.7
BZ96-919	PRYOR (P+)	7	0.3	0.3	1.0	28.3	70.0	6.7	76.7				26.2	321.6	25.5
PI668090	SY CLEARSTONE 2CL (P+)	4							97.7	20.0	3.7	18.3	34.9	357.8	28.4
S94-4	CDC FALCON (P+)	10	0.3	0.7	1.0	63.3	99.7	15.0	86.7	10.0	3.7	5.3	28.6	359.9	28.6
BZ9W96-788-d	LEDGER (P+)	8	0.0	3.7	4.0	38.3	100.0	26.7	68.3	25.0			33.2	360.9	28.6
PI670156	COLTER (++)	4							93.0	33.3	8.3	21.7	39.1	400.4	31.8
DH0018196	ACCIPITER (+)	6				60.0	97.7	28.3	90.0	6.7	5.3		48.0	407.4	32.3
W98-362	JAGALENE (P+)	9	2.3	5.3	2.3	71.3	99.7	28.3	86.7	21.7	3.7		35.7	432.1	34.3
PI632433	JERRY	10	0.7	6.7	8.3	76.3	96.7	30.0	88.3	20.0	5.0	13.3	34.5	435.1	34.5
PI660987	YELLOWSTONE (+)	10	0.7	2.3	10.0	85.0	99.3	21.7	97.7	15.0	5.0	15.0	35.2	443.1	35.2
PI643430	NORRIS (P+,CL)	8	0.3	11.7	18.3	91.7	93.0	45.0	86.7	28.3			46.9	508.7	40.4
MEANS (For Entries Listed)			0.5	3.6	5.5	54.4	75.1	19.1	61.7	21.1	4.3	10.1			23.4
5/ Growing Season Precipitation (in.)			8.6	6.9	8.9	n/a	n/a	9.4	9.4	8.8	6.0	n/a	8.3		
Soil PAW (in.) to SD @ Planting			7.6	n/a	10.5	7.5	10.1	9.6	7.9	9.1	10.4	3.6	8.5		
Total Plant Available Water (in.)			16.2	n/a	19.4	7.5	10.1	19.4	7.9	n/a	16.1	12.4	13.6		
Soil NO3 (lbs.) to SD at Planting			192	n/a	300	36	82	26	68	51	85	126	107		
Fertilizer Applied		(# N)	70	70	70	70	70	70	70	100	100	100	79		
		(# P ₂ O ₅)	40	40	40	40	40	40	40	20	20	20	34		
		(# K ₂ O)	25	25	25	25	25	25	25	10	10	10	21		

Long-term check variety is Rampart.

1/ See MCES Bulletin 1098 or the Plant Sciences & Plant Pathology website at <http://plantsciences.montana.edu/> for evaluation of other important variety performance characteristics to include protein, quality, disease resistance, etc. before making cultivar selection decisions.

2/ P = Private Variety, + = Protected Variety, ++ = PVP Title 5 Pending, CL = Clearfield Line, HW = Hard White.

3/ Percent of Rampart cut for the same data years as those in which a given entry was tested.

4/ 10-Yr Comparable Average = (x/y) * z where x = average saw fly rating of a given entry for years tested, y = average saw fly rating for Rampart for the same years, and z = 10-Yr average saw fly rating for the check variety Rampart.

5/ April 1 to 14 days prior to harvest maturity.