

Title: Northcentral Montana Off-Station Winter Wheat Variety Performance Evaluations

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Terry McKeever, Landowner, 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 over 28 percent of the 2016-2020 statewide cereal production totals (43 percent for winter wheat, 28 percent for spring wheat and 21 percent for durum). 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 are provided reliable, unbiased, up-to-date information to make comparisons among improved winter wheat varieties. This report provides producers in northcentral 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 on chemical fallow during 2021 in two northern Montana counties.

Dryland Winter Wheat Trials:

- | | |
|------------------------------------|---------------|
| 1. Cederberg Farm, Blaine County | S13-T36N-R25E |
| 2. McKeever Farms, Chouteau County | S28-T27N-R10E |

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 approximately 17 feet with a three-point rototiller. Plant height was measured from the soil surface to the top of the head, excluding awns, and percent sawfly cutting was visually estimated for each plot immediately prior to harvest. A 'Wintersteiger' small 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 for yield determination. 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.

Please note that research trial seed 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 wheat stem 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 wheat stem sawfly present, you are only creating a breeding ground for future generations of sawfly in your area and not helping combat the pest population.

Results:

Following a warmer than average late spring and summer, with minimal scattered precipitation, winter wheat yields at Turner averaged just under 18 bu/ac (Table 1). Breeding line 'MTCS20156', which has both Clearfield genes and a more solid stem for sawfly resistance, was the highest yielding entry at just under 27 bu/ac. 'StandClear CLP', at 24 bu/ac, was the only other entry in the trial to yield statistically equal to MTCS20156. Test weights of all entries were lower than normal, averaging 58 lb/bu. Wheat stem sawfly cutting was low in the winter wheat, averaging 8 percent cut with several of the solid stem breeding lines having no cutting at all. Plant height, yield, test weight, protein, falling number and sawfly cutting data for the 2021 Turner dryland winter wheat trial are summarized in Table 1.

Comparable averages are calculated using a standard 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 three years of data is necessary to be included in the comparable average calculation. Nine-year comparable averages for seed yield and test weight at Turner are summarized in Table 2, while nine-year comparable averages for protein content and sawfly cutting are summarized in Table 3.

Loma winter wheat yields averaged just under 28 bu/ac (Table 1). 'Brawl CL Plus' was the highest yielding entry at just over 38 bu/ac. No other entry in the trial yielded statistically equal to Brawl CL Plus. Test weights of all entries were very low, averaging only 53 lb/bu. Wheat stem sawfly cutting was severe in the winter wheat, averaging 55 percent cut and lodged. 'Bobcat', 'Warhorse' and two MSU breeding lines were the least cut in the trial at Loma. Plant height, yield, test weight, protein, falling number and sawfly cutting data for the 2021 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 protein content and sawfly cutting are summarized in Table 6.

Summary:

Stand establishment in the fall of 2020 at Turner was spotty while stands at Loma were very good. Overall, the growing season started out cooler and drier than average, quickly turning to warmer and drier than average, with many fall seeded crops showing drought stress by early to mid-May. Meaningful rain events were minimal from late April through August, resulting in reduced seed yields and low test weights as northcentral Montana progressed from moderate to severe to extreme drought in 2021, as classified by the National Oceanic and Atmospheric Administration U. S. Drought Monitor.

This work has been strongly supported by producers near each of the off-station 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 twelfth year of winter wheat testing, while the Chouteau County location, between Big Sandy and Loma, has been used for various trials since 1998.

Recognition:

This research would not have been possible without the assistance of the following seasonal employees: Peyton Brown, Savannah Dawson, Teresa Miller, Kristin Obresley, Treygan Olson, Rhoda Peterson and Ivy Thomas.

TABLE 1. Dryland Fallow Winter Wheat Cultivar Evaluation Nursery Grown Off-Station at the Max Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2021. (Exp# 21-3851-WW)

ID	CULTIVAR or SELECTION	PLNT HT Inches	1/	TEST WT Lbs/Bu	2/	3/	4/
			YIELD Bu/Ac		PROTEIN %	FN Seconds	SAWFLY %
AAC Wildfire	Alberta: SECAN, 2015	15.7	20.1	56.7	15.2	415	26.7
Bobcat	Montana, 2019	15.2	15.8	55.0	16.3	326	0.7
Brawl CL Plus	Colorado Research Foundation, 2011	15.0	16.3	60.7	15.3	406	3.7
Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2018	15.9	18.3	58.5	14.3	401	16.7
Flathead	Montana, 2019	14.2	18.7	59.4	15.0	453	2.3
FourOsix	Montana, 2018	14.6	17.6	57.9	15.4	386	13.3
Judee	Montana, 2011	16.1	15.2	58.1	17.1	312	2.3
Keldin	Westbred, 2011	14.5	15.7	57.6	14.9	366	20.0
LCS Jet	Limagrain Cereal Seeds, 2015	13.7	11.5	55.7	16.0	361	1.0
Loma	Montana, 2016	15.3	20.4	59.0	15.4	370	1.0
Northern	Montana, 2015	15.0	15.7	57.2	15.8	397	8.3
Ray	Montana, 2018	17.6	18.2	57.1	14.5	424	20.0
StandClear CLP	Montana/Nutrien	15.9	24.0	59.6	13.9	437	0.7
SY Clearstone 2CL	Montana/Syngenta, 2012	16.5	14.3	59.3	16.4	457	20.0
SY Monument	Syngenta, 2015	13.5	14.2	57.4	14.2	373	5.3
Warhorse	Montana, 2013	15.4	14.1	57.0	16.3	407	1.0
Yellowstone	Montana 2005	13.0	16.5	58.6	15.5	429	20.0
MT1745	Decade*2/NI06732	13.1	18.1	58.4	13.9	426	11.7
MT1872	MT0859//MT0840/MT0873	17.1	18.2	58.0	15.2	229	21.7
MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3*YLL	13.3	15.7	59.1	16.4	413	6.7
MTCS20156	Bobcat/(Bobcat sib, MTS1589)/StandClear CLP	13.7	26.6	59.7	14.7	394	0.3
MTS18116	Loma*2/Warhorse	15.9	20.4	58.9	14.5	360	0.0
MTS18149	Loma*2/AAC Gateway	14.2	22.5	58.9	15.2	383	0.0
MTS1831	MTS0907/MTS0827	15.7	16.1	57.0	14.8	336	0.0
MTS1855	05X438-aC71(MT0097*2//Jagalene/Choteau)/Roug	12.6	19.1	60.3	15.7	400	0.3
EXPERIMENTAL MEANS		14.9	17.7	58.2	15.3	386.4	8.1
LSD (0.05)		2.0	3.5	1.1	0.6	30.1	7.0
C.V.%		7.7	10.6	1.1	2.0	4.7	52.4
P-VALUE (Varieties)		0.0006	<.0001	<.0001	<.0001	<.0001	<.0001

1/ Volumetric yields are based on plot weights adjusted to uniform 13 percent grain moisture and 60 lbs/bu as the standard test weight for wheat

2/ Protein values are adjusted to 13 percent grain moisture.

3/ FN is the falling number value reported in seconds adjusted to 14 percent flour moisture.

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 (21-3851-WW)

Seeding Date: September 25, 2020
 Harvest Date: August 17, 2021
 Fertility: 125-20-10-10 side banded
 System: No Till
 Herbicide: Vendetta (16oz/ac), Discover (12.8oz/ac)
 Insecticide: none
 Previous Crop: Chemical Fallow - Durum
 Precipitation: 3.73" April 1 to Harvest Maturity

TABLE 2. Nine-Year Yield and Test Weight Summary of Selected Entries from Dryland Fallow Winter Wheat Variety Nurseries Grown Off-Station at the Max Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2012-2021. (Exp# 3851-WW).

2/ VARIETY or SELECTION	No. of YEARS TESTED 3/	1/ YIELD (Bushels Per Acre)					AVE. for YEARS TESTED 3/			9-YR COMP. AVE YIELD 5/	TEST WEIGHT (Pounds Per Bushel)					AVE. for YEARS TESTED 3/			9-YR COMP. AVE TEST WT 5/
		2017	2018	2019	2020	2021	YIELD 4/	% CHECK	2017		2018	2019	2020	2021	TEST WT 4/				
MTS1588 BOBCAT (++)	5	22.9	34.5	73.4	55.7	15.8	40.5	102.4	44.4	57.6	62.0	59.8	60.5	55.0	59.0	99.9	59.4		
MTS1224 LOMA (++)	7	21.3	35.4	70.9	58.0	20.4	43.6	100.7	43.7	57.1	61.8	58.9	60.3	59.0	59.6	100.6	59.8		
MT00159 YELLOWSTONE (+)	9	19.1	36.1	74.7	51.2	16.5	43.4	100.0	43.4	55.5	61.4	59.3	60.3	58.6	59.4	100.0	59.4		
MTCS1601 STANDCLEAR CLP (P+,CL)	4		35.5	55.9	57.9	24.0	43.4	97.1	42.1		62.1	60.3	61.9	59.6	60.9	101.8	60.4		
SECAN, 2015 AAC WILDFIRE (+)	3			58.3	59.7	20.1	46.0	97.0	42.0			58.1	59.5	56.7	58.1	97.8	58.1		
MT0978 NORTHERN (+)	8	21.3	38.3	65.4	56.9	15.7	43.7	95.4	41.4	57.3	61.8	59.7	60.2	57.2	59.7	100.4	59.6		
MTCL1077 SY CLEARSTONE 2CL (P+,CL)	9	19.0	33.1	61.8	54.5	14.3	40.6	93.5	40.6	56.6	61.1	59.1	60.0	59.3	59.4	100.0	59.4		
MTF1432 RAY (++)	5	18.2	34.9	61.7	51.8	18.2	37.0	93.5	40.5	56.6	60.1	57.6	58.5	57.1	58.0	98.2	58.3		
MT1465 FOUROSIX (++)	5	19.1	34.3	61.7	51.0	17.6	36.7	92.9	40.3	57.1	61.7	58.6	60.1	57.9	59.1	100.1	59.4		
CWRF, 2018 BYRD CL PLUS (+,CL)	3			56.4	55.8	18.3	43.5	91.7	39.8			59.7	61.1	58.5	59.7	100.6	59.8		
MTS0713 JUDEE (+)(saw fly tol)	9	18.1	31.6	59.0	57.1	15.2	39.6	91.4	39.6	55.9	62.6	60.2	61.1	58.1	59.3	99.9	59.3		
ACS55017 KELDIN (P+)	6	20.8	33.4	63.9	56.3	15.7	39.7	90.8	39.4	57.5	61.9	59.7	60.0	57.6	59.3	100.3	59.6		
MT0552 DECADE (+)	8	21.1	35.7	59.4	53.4		42.3	90.4	39.2	56.7	61.8	58.9	60.6		59.6	100.1	59.5		
MTS0808 WARHORSE (+)(saw fly tol)	9	16.9	31.5	51.9	49.7	14.1	37.3	86.0	37.3	57.7	60.4	58.7	60.2	57.0	59.8	100.7	59.8		
Syngenta, 2015 SY MONUMENT (P+)	5	18.7	27.2	55.2	51.9	14.2	33.5	84.6	36.7	55.2	61.2	58.8	60.0	57.4	58.5	99.2	58.9		
LCS, 2015 LCS JET (P+)	4		32.6	55.4	45.1	11.5	36.1	81.0	35.1		58.8	56.4	58.1	55.7	57.3	95.6	56.8		
MT1564 FLAHEAD (++)	4		28.1	52.2	43.4	18.7	35.6	79.7	34.6		61.7	59.3	60.9	59.4	60.3	100.7	59.8		
CWRF, 2011 BRAWL CLP (+,CL)	5	16.4	22.0	46.6	33.9	16.3	27.0	68.4	29.7	57.7	62.7	59.8	61.8	60.7	60.6	102.6	60.9		

MEANS (For Entries Listed) 19.4 32.8 60.2 52.4 16.9 **39.4** 56.8 61.5 59.0 60.3 57.9 **59.3**

6/ Growing Season Precipitation (in.)		2.9	4.7	3.0	5.9	3.7	7.1
Soil PAW (in.) to SD @ Planting		5.8	7.3	7.6	9.4	6.1	7.3
Total Plant Available Water (in.)		8.7	12.0	10.5	15.3	9.8	14.8
Soil NO3 (lbs.) to SD at Planting		72	64	115	231	106	76
SD (Sampling Depth in Inches)		48	38	48	45	42	44
Fertilizer Applied	(# N)	100	125	125	125	125	107
	(# P ₂ O ₅)	20	20	20	20	20	22
	(# K ₂ O)	10	10	10	10	10	12
	(#S)	0	10	10	10	10	4

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, HW = Hard White.

3/ Only the most recent 5 years shown, but summary calculations include all years noted. 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/ 9-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 = 9-Yr average yield or test weight for the check variety Yellow stone.

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

TABLE 3. Nine-Year Protein and Sawfly Summary of Selected Entries from Dryland Fallow Winter Wheat Variety Nurseries Grown Off-Station at the Max Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2012-2021. (Exp# 3851-WW).

2/ VARIETY or SELECTION	No. of YEARS TESTED 3/	1/ PROTEIN % (Adjusted to 13% grain moisture)					SAWFLY RATING (% of cut and lodged stems)					9-YR COMP. AVE. SAWFLY 5/						
		2017	2018	2019	2020	2021	AVE. for YEARS TESTED 3/	% of CHECK PROTEIN 4/	9-YR COMP. AVE. PROTEIN 5/	2017	2018		2019	2020	2021	AVE. for YEARS TESTED 3/	% of CHECK SAWFLY 4/	
LCS, 2015	LCS JET (P+)	4		14.6	13.7	13.8	16.0	14.5	98.7	12.9		0.0	0.0	5.0	1.0	1.5	15.5	1.1
MTS0808	WARHORSE (+)(saw fly tol)	9	14.3	15.7	14.4	14.5	16.3	13.7	104.4	13.7	0.3	0.3	0.3	5.0	1.0	1.1	15.5	1.1
MTS1224	LOMA (++)	7	14.7	16.1	14.7	14.3	15.4	14.3	103.6	13.6	0.3	0.3	0.0	4.5	1.0	0.9	15.6	1.1
MTS1588	BOBCAT (++)	5	14.1	15.3	13.8	14.0	16.3	14.7	101.3	13.3	0.7	0.0	0.7	4.5	0.7	1.3	16.5	1.2
MT1564	FLAHEAD (++)	4		16.1	14.7	14.3	15.0	15.1	102.2	13.4		0.0	1.0	4.7	2.3	2.0	20.8	1.5
MTS0713	JUDEE (+)(saw fly tol)	9	14.9	16.6	14.6	14.7	17.1	13.9	106.0	13.9	0.0	0.0	0.0	4.1	2.3	1.7	23.9	1.7
MTCS1601	STANDCLEAR CLP (P+,CL)	4		15.8	14.0	13.6	13.9	14.3	97.4	12.8		0.0	0.3	9.4	0.7	2.6	26.8	1.9
Syngenta, 2015	SY MONUMENT (P+)	5	12.1	14.8	13.4	13.0	14.2	13.5	93.0	12.2	0.7	0.0	0.3	8.5	5.3	3.0	37.6	2.7
CWRF, 2011	BRAWL CLP (+,CL)	5	13.0	16.1	15.2	14.5	15.3	14.8	102.0	13.4	0.0	0.3	0.7	11.1	3.7	3.1	39.9	2.9
MT0978	NORTHERN (+)	8	14.3	15.8	14.3	14.1	15.8	14.1	104.1	13.7	0.3	0.0	0.3	15.4	8.3	3.2	55.1	3.9
MT1465	FOUROSIX (++)	5	14.2	15.5	14.3	13.9	15.4	14.7	101.0	13.3	0.3	0.7	0.3	13.0	13.3	5.5	70.0	5.0
ACS55017	KELDIN (P+)	6	13.3	15.2	13.9	14.1	14.9	13.7	98.8	13.0	1.0	1.0	1.0	10.1	20.0	5.5	83.9	6.0
MT00159	YELLOWSTONE (+)	9	13.7	15.3	14.1	14.0	15.5	13.1	100.0	13.1	0.7	0.7	1.0	17.1	20.0	7.2	100.0	7.2
MT0552	DECADE (+)	8	14.5	16.3	14.7	14.4		13.5	105.6	13.9	0.3	1.0	0.0	17.5		5.6	100.1	7.2
MTF1432	RAY (++)	5	13.6	15.1	13.8	13.8	14.5	14.1	97.5	12.8	0.3	1.0	0.7	17.7	20.0	7.9	100.6	7.2
MTCL1077	SY CLEARSTONE 2CL (P+,CL)	9	14.2	16.0	14.4	14.1	16.4	13.4	102.5	13.4	0.0	1.0	1.0	23.5	20.0	7.2	101.0	7.2
CWRF, 2018	BYRD CL PLUS (+,CL)	3			13.2	12.8	14.3	13.4	92.3	12.1			0.7	22.1	16.7	13.1	103.4	7.4
SECAN, 2015	AAC WILDFIRE (+)	3			13.8	13.7	15.2	14.2	97.8	12.8			0.7	12.8	26.7	13.4	105.1	7.5
MEANS (For Entries Listed)			13.9	15.6	14.2	14.0	15.4			13.2	0.4	0.4	0.5	11.5	9.6			4.1
6/ Growing Season Precipitation (in.)			2.9	4.7	3.0	5.9	3.7	7.1										
Soil PAW (in.) to SD @ Planting			5.8	7.3	7.6	9.4	6.1	7.3										
Total Plant Available Water (in.)			8.7	12.0	10.5	15.3	9.8	14.8										
Soil NO3 (lbs.) to SD at Planting			72	64	115	231	106	76										
SD (Sampling Depth in Inches)			48	38	48	45	42	44										
Fertilizer Applied																		
		(# N)	100	125	125	125	125	107										
		(# P2O5)	20	20	20	20	20	22										
		(# K2O)	10	10	10	10	10	12										
		(#S)	0	10	10	10	10	4										

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, HW = Hard White.

3/ Only the most recent 5 years shown, but summary calculations include all years noted. No harvest in 2014 due to hail.

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

5/ 9-Yr Comparable Average = (x/y) * z where x = average protein or saw fly rating of a given entry for years tested, y = average protein or saw fly rating for Yellow stone for the same years, and z = 9-Yr average protein or saw fly rating for the check variety Yellow stone.

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. 2021. (Exp# 21-3853-WW)

ID	ORIGIN or PEDIGREE	PLNT HT Inches	1/	TEST WT Lbs/Bu	2/	3/	4/
			YIELD Bu/Ac		PROTEIN %	FN Seconds	SAWFLY %
AAC Wildfire	Alberta: SECAN, 2015	21.4	22.5	51.4	15.2	392	79.4
Bobcat	Montana, 2019	21.7	31.8	54.3	14.8	332	15.9
Brawl CL Plus	Colorado Research Foundation, 2011	24.7	36.3	55.2	14.7	261	61.1
Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2018	21.3	27.8	52.6	14.9	292	68.4
Flathead	Montana, 2019	21.5	29.3	54.4	15.0	351	62.6
FourOsix	Montana, 2018	25.2	29.9	51.9	14.9	373	84.1
Judee	Montana, 2011	21.4	23.6	54.7	15.7	339	61.3
Keldin	Westbred, 2011	23.8	27.2	53.5	14.3	337	76.8
LCS Jet	Limagrain Cereal Seeds, 2015	20.7	25.3	50.9	14.5	393	46.9
Loma	Montana, 2016	21.1	30.5	53.0	15.1	397	68.0
Northern	Montana, 2015	23.9	28.1	52.8	15.5	427	57.9
Ray	Montana, 2018	25.7	26.0	53.2	14.2	427	74.8
StandClear CLP	Montana/Nutrien	22.9	29.1	54.5	14.5	394	57.5
SY Clearstone 2CL	Montana/Syngenta, 2012	24.4	24.3	53.9	15.0	445	64.6
SY Monument	Syngenta, 2015	22.6	26.7	52.2	13.6	385	74.8
Warhorse	Montana, 2013	22.3	28.1	52.2	15.1	392	16.9
Yellowstone	Montana 2005	24.1	27.5	52.5	14.6	430	81.4
MT1745	Decade*2/NI06732	22.5	30.5	51.9	14.8	393	65.3
MT1872	MT0859//MT0840/MT0873	22.6	26.3	52.0	15.0	248	25.5
MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3*YLL	21.1	24.9	53.8	15.1	456	78.5
MTCS20156	Bobcat/(Bobcat sib, MTS1589)/StandClear CLP	23.2	29.2	54.0	15.3	342	30.3
MTS18116	Loma*2/Warhorse	20.6	23.2	53.9	15.4	363	9.5
MTS18149	Loma*2/AAC Gateway	21.8	26.9	52.7	15.3	443	52.5
MTS1831	MTS0907/MTS0827	20.5	27.0	54.0	15.6	366	14.3
MTS1855	05X438-aC71(MT0097*2//Jagalene/Choteau)/Roug	21.8	27.6	52.7	15.6	465	48.3
EXPERIMENTAL MEANS		22.5	27.6	53.1	15.0	377.7	55.1
LSD (0.05)		2.5	4.2	1.1	0.7	26.8	15.3
C.V.%		6.4	8.6	2.0	2.5	4.3	15.4
P-VALUE (Varieties)		0.0019	<.0001	<.0001	<.0001	<.0001	<.0001

1/ Volumetric yields are based on plot weights adjusted to uniform 13 percent grain moisture and 60 lbs/bu as the standard test weight for wheat

2/ Protein values are adjusted to 13 percent grain moisture.

3/ FN is the falling number value reported in seconds adjusted to 14 percent flour moisture.

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 (21-3853-WW)

Seeding Date: September 23, 2020
 Harvest Date: August 12, 2021
 Fertility: 125-20-10-10 side banded
 System: No Till
 Herbicide: Vendetta (16oz/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 Farms and Seed Inc., Loma. Northern Agricultural Research Center. Havre, Montana. 2012-2021. (Exp# 3853-WW)

2/ VARIETY or SELECTION	No. of YEARS TESTED 3/	1/ YIELD (Bushels Per Acre)								TEST WEIGHT (Pounds Per Bushel)							
		2017	2018	2019	2020	2021	AVE. for YEARS TESTED 3/	% of CHECK YIELD 4/	10-YR COMP. AVE. YIELD 5/	2017	2018	2019	2020	2021	AVE. for YEARS TESTED 3/	% of CHECK TEST WT 4/	10-YR COMP. AVE. TEST WT 5/
MTS1588 BOBCAT (++) (saw fly res)	5	49.7	66.5	73.9	59.2	31.8	56.2	116.4	58.6	61.1	61.0	61.8	60.4	54.3	59.7	102.9	59.4
CWRF, 2011 BRAWL CLP (+,CL)	5	48.8	61.4	61.0	62.1	36.3	53.9	111.6	56.2	61.7	62.1	61.6	61.5	55.2	60.4	104.1	60.1
SYNGENTA, 2015 SY MONUMENT (P+)	5	40.0	63.3	74.2	59.4	26.7	52.7	109.1	55.0	60.1	60.3	60.4	58.9	52.2	58.4	100.6	58.0
CWRF, 2018 BYRD CL PLUS (+,CL)	3			60.4	62.7	27.8	50.3	107.6	54.2			61.4	59.0	52.6	57.7	100.9	58.2
MTS0978 NORTHERN (+)	9	43.9	63.3	60.7	67.8	28.1	53.0	107.3	54.1	60.2	60.1	60.3	60.0	52.8	58.2	100.6	58.0
ACS55017 KELDIN (P+)	6	38.7	62.7	63.6	58.4	27.2	50.4	105.8	53.3	60.2	60.2	60.7	59.5	53.5	58.4	101.6	58.6
MT1465 FOUROSIX (+)	5	43.4	59.6	61.3	56.4	29.9	50.1	103.8	52.3	60.8	59.6	60.5	59.6	51.9	58.5	100.7	58.1
MTF1432 RAY (+)	5	41.4	59.2	61.6	58.7	26.0	49.4	102.2	51.5	58.4	57.6	59.6	59.2	53.2	57.6	99.2	57.2
MT1564 FLATHEAD (++)	4		54.6	54.5	61.0	29.3	49.9	100.2	50.5		61.3	60.9	59.7	54.4	59.1	102.6	59.2
MT00159 YELLOWSTONE (+)	10	42.5	58.9	53.2	59.6	27.5	50.4	100.0	50.4	59.9	58.9	59.2	59.8	52.5	57.7	100.0	57.7
MTCL1077 SY CLEARSTONE 2CL (P+,CL)	10	38.4	59.9	55.4	66.2	24.3	50.0	99.2	50.0	60.2	58.5	59.4	59.2	53.9	57.6	99.9	57.6
SECAN, 2015 AAC WILDFIRE (+)	3			60.0	56.3	22.5	46.2	98.9	49.9			59.9	58.6	51.4	56.6	99.1	57.2
MTS1224 LOMA (+)	7	41.5	57.7	60.0	61.7	30.5	46.2	97.4	49.1	60.5	58.5	60.7	59.8	53.0	57.4	100.1	57.8
MTS0713 JUDEE (+) (saw fly tol)	10	41.1	56.8	62.0	55.8	23.6	48.5	96.2	48.5	60.9	60.2	62.4	59.8	54.7	58.8	101.8	58.8
MTCS1601 STANDCLEAR CLP (P+)	4		54.5	50.5	56.1	29.1	47.6	95.6	48.2		60.8	60.9	61.2	54.5	59.3	103.1	59.5
MT0552 DECADE (+)	9	40.4	61.5	61.3	59.8		50.1	94.6	47.7	60.0	60.0	61.0	59.0		58.6	100.6	58.1
LCS, 2015 LCS JET (P+)	4		51.4	58.3	46.8	25.3	45.5	91.3	46.0		56.7	57.8	57.3	50.9	55.7	96.7	55.8
MTS0808 WARHORSE (+) (saw fly tol)	10	40.6	43.5	44.5	52.4	28.1	45.1	89.4	45.1	60.8	59.5	61.4	59.8	52.2	58.5	101.3	58.5
MEANS (For Entries Listed)		42.3	58.4	59.8	58.9	27.9			51.1	60.4	59.7	60.6	59.6	53.1			58.2
6/ Growing Season Precipitation (in.)		n/a	n/a	n/a	n/a	n/a	8.0										
Soil PAW (in.) to SD @ Planting		n/a	7.5	8.2	7.4	7.9	7.8										
Total Plant Available Water (in.)		n/a	n/a	n/a	n/a	n/a	17.1										
Soil NO3 (lbs.) to SD at Planting		n/a	147	100	115	97	109										
SD (Sampling Depth in Inches)		48	48	48	48	45	48										
Fertilizer Applied																	
	(# N)	100	100	125	125	125	105										
	(# P ₂ O ₅)	20	20	20	20	20	22										
	(# K ₂ O)	10	10	10	10	10	12										
	(#S)	0	10	10	10	10	4										

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 Protein and Sawfly Summary of Selected Entries from Dryland Fallow Winter Wheat Variety Nurseries Grown Off-Station at McKeever Farms and Seed Inc., Loma. Northern Agricultural Research Center. Havre, Montana. 2012-2021. (Exp# 3853-WW)

2/ VARIETY or SELECTION	No. of YEARS TESTED 3/	1/ PROTEIN % (Adjusted to 13% grain moisture)					SAWFLY RATING (% of cut and lodged stems)					10-YR COMP. AVE. PROTEIN 5/	10-YR COMP. AVE. SAWFLY 5/				
		2017	2018	2019	2020	2021	AVE. for YEARS TESTED 3/	% of CHECK PROTEIN 4/	2017	2018	2019			2020	2021	AVE. for YEARS TESTED 3/	% of CHECK SAWFLY 4/
MTS0808 WARHORSE (+)(saw fly tol)	10	16.0	14.6	14.1	13.9	15.1	14.5	103.7	14.5	13.3	17.2	16.6	3.9	16.9	8.3	21.2	8.3
MTS1588 BOBCAT (++) (saw fly res)	5	15.2	13.6	11.8	13.5	14.8	13.8	97.3	13.6	24.4	7.2	6.3	4.3	15.9	11.6	22.6	8.8
MTS1224 LOMA (+)	7	14.9	14.5	13.3	13.8	15.1	14.9	102.0	14.2	38.4	32.3	22.3	13.1	68.0	27.3	69.9	27.3
MTS0713 JUDEE (+)(saw fly tol)	10	16.0	13.9	12.1	14.3	15.7	14.4	103.4	14.4	40.6	65.0	41.0	4.2	61.3	28.0	71.8	28.0
MTCS1601 STANDCLEAR CLP (P+,CL)	4		14.0	12.8	13.7	14.5	13.7	99.0	13.8		48.4	45.0	11.6	57.5	40.6	72.1	28.2
SECAN, 2015 AAC WILDFIRE (+)	3			12.9	13.9	15.2	14.0	101.6	14.2			20.3	10.9	79.4	36.9	78.8	30.8
CWRF, 2011 BRAWL CLP (+,CL)	5	14.7	14.9	13.3	13.0	14.7	14.1	99.7	13.9	31.3	73.9	39.3	2.4	61.1	41.6	81.3	31.8
CWRF, 2018 BYRD CL PLUS (+,CL)	3			11.8	13.0	14.9	13.2	95.9	13.4			39.2	8.7	68.4	38.8	82.8	32.4
MT1564 FLAHEAD (++)	4		13.7	13.3	13.5	15.0	13.9	100.0	13.9		65.4	55.7	6.1	62.6	47.5	84.3	32.9
MT0978 NORTHERN (+)	9	15.6	14.3	13.1	13.9	15.5	14.9	103.6	14.5	31.6	75.7	50.5	4.7	57.9	28.7	88.1	34.4
MT0552 DECADE (+)	9	15.3	14.6	11.8	13.8		14.2	102.1	14.2	51.8	76.5	34.8	7.8		30.9	89.9	35.1
LCS, 2015 LCS JET (P+)	4		13.9	11.6	13.1	14.5	13.3	95.7	13.4		89.9	52.8	14.9	46.9	51.1	90.8	35.5
SYNGENTA, 2015 SY MONUMENT (P+)	5	13.7	12.8	12.0	12.3	13.6	12.9	90.9	12.7	53.7	65.8	38.2	3.4	74.8	47.2	92.2	36.0
MTF1432 RAY (+)	5	15.1	14.6	11.9	13.5	14.2	13.9	97.8	13.7	50.7	67.1	31.9	11.7	74.8	47.2	92.3	36.1
MT00159 YELLOWSTONE (+)	10	15.3	14.1	13.3	13.5	14.6	14.0	100.0	14.0	30.6	84.8	53.5	5.5	81.4	39.1	100.0	39.1
MTCL1077 SY CLEARSTONE 2CL (P+,CL)	10	15.6	14.5	12.4	13.7	15.0	13.9	99.8	13.9	46.0	79.4	62.2	10.3	64.6	40.6	103.9	40.6
MT1465 FOUROSIX (+)	5	15.0	13.9	12.1	13.9	14.9	14.0	98.6	13.8	57.9	74.6	65.5	17.4	84.1	59.9	117.1	45.8
ACS55017 KELDIN (P+)	6	15.0	13.9	12.5	13.4	14.3	14.3	97.6	13.6	78.0	80.7	48.9	14.6	76.8	50.9	118.4	46.3

MEANS (For Entries Listed) 15.2 14.1 12.6 13.5 14.8 13.9 42.2 62.7 40.2 8.6 61.9 32.1

6/ Growing Season Precipitation (in.)		n/a	n/a	n/a	n/a	n/a	8.0
Soil PAW (in.) to SD @ Planting		n/a	7.5	8.2	7.4	7.9	7.8
Total Plant Available Water (in.)		n/a	n/a	n/a	n/a	n/a	17.1
Soil NO3 (lbs.) to SD at Planting		n/a	147	100	115	97	109
SD (Sampling Depth in Inches)		48	48	48	48	45	48
Fertilizer Applied	(# N)	100	100	125	125	125	105
	(# P ₂ O ₅)	20	20	20	20	20	22
	(# K ₂ O)	10	10	10	10	10	12
	(#S)	0	10	10	10	10	4

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 protein or saw fly 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 protein or saw fly rating of a given entry for years tested, y = average protein or saw fly rating for Yellow stone for the same years, and z = 10-Yr average protein or saw fly rating for the check variety Yellow stone.

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