



**On-Farm Cereal Variety and Advanced Breeding Line  
Testing across Montana for Environment Specific  
Cultivar Recommendations:**



**Winter Wheat Off-Station Variety Performance, Loring, MT**

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Objectives:

Commercially available winter wheat varieties and advanced breeding lines were evaluated for agronomic performance and fit at on-farm locations across the state of Montana. Sites chosen for the research considered the environment, growing conditions and soil types, and represent the major land areas for producers in those regions served by Northern Agricultural Research Center. The Phillips County location near Loring entered its second year of winter wheat testing in crop year 2023, however off-station variety trials have been conducted at the site since 1996.

Methods:

The uniform off-station winter wheat variety performance trial was seeded into lightly tilled chemical fallow ground during 2023. The trial consisted of 25 entries seeded in replicated, three-row, 22-foot plots on a 12-inch row spacing, utilizing a self-propelled cone seeder with Atom Jet paired row openers. All plots 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 three-row plot. Prior to measuring plot weight for yield determination, seed was either cleaned or weighed in-dirt as per protocols. Protein, test weight and moisture content were determined on a clean sample 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:

It should be noted that the 2023 data table in this report represents varietal performance for a single crop year at a single location, therefore cannot be considered representative of performance expected when differing conditions due to location, year and management are imposed. By itself, 2023 data shall not constitute in any form a recommendation for or against any variety or breeding line included.

Winter wheat seed yields near Loring averaged just under 49 bu/ac (Table 1). Montana State University breeding line 'MTCS20151' was the top yielding entry producing just over 64 bu/ac. 'Bobcat', 'Brawl CL Plus', 'Flathead', 'Loma', 'MT WarCat', 'SY Monument', 'Yellowstone' along with four other MSU breeding lines produced yields statistically equal to that of MTCS20151. Test weights of all winter wheat entries for this site averaged 58 lb/bu. Wheat stem sawfly infestation was moderate, with cutting in the winter wheat trial at averaging over 20 percent while Bobcat, 'Warhorse' and 'StandClear CLP' had less than eight percent cutting. Yield, test weight, protein, falling number, plant height and sawfly cutting data for the 2023 Loring 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. Because winter wheat trials were initiated in crop year 2022 near Loring, comparable averages for this site will not be available until 2024.

#### Summary:

Overall, the growing season started out drier than average, with many later fall-seeded crops not emerging until early in 2023. Following snow cover that persisted into early April, the Loring site had less than ideal stand uniformity, with silted areas and washes due to rapid snow melt and high rainfall runoff. Stand damage caused by the runoff increased the variability of seed yield across the trial. With continued timely rain events through May and June, the winter wheat thrived throughout the season, ultimately producing higher yields than initially expected.

This work has been strongly supported by producers in the Loring-White Water area, and by the Northern Agricultural Research Center Advisory Board. With budget and other resources allowing, it is planned to continue off-station winter wheat variety and breeding line investigations in this area. The Phillips County location near Loring has been used for various spring cereal variety trials since 1996 and is entering its third year as winter wheat testing site.

#### Recognition:

This research would not have been possible without the assistance of the following seasonal employees: Clara Haslem, Brady Kueffler, Cleta Lamb, Teresa Miller, and Nevaeh Phillips.

**TABLE 1. Dryland Fallow Winter Wheat Cultivar Evaluation Nursery Grown Off-Station at the Flansaas-Lumsden Farm, Loring. Northern Agricultural Research Center. Havre, Montana. 2023. (Exp# 23-3855-WW)**

ID	ORIGIN or PEDIGREE	1/	2/	3/	4/		
		YIELD bu/ac	TEST WT lb/bu	PROTEIN %	FN seconds	PLNT HT inches	SAWFLY %
AAC Wildfire	Alberta: SECAN, 2015	49.7	55.4	<u>14.8</u>	444	<b>29.6</b>	30.0
Bobcat	Montana, 2019	<b>55.6</b>	57.6	<b>14.6</b>	443	26.3	<b>3.7</b>
Brawl CL Plus	Colorado Research Foundation, 20	<b>54.7</b>	<b>59.7</b>	13.8	413	25.4	30.0
Bridger CL Plus	Montana/Circle S, 2023 (MTCL19151)	31.7	<b>59.1</b>	13.8	432	23.7	23.3
Flathead	Montana, 2019	<b>51.4</b>	<b>59.6</b>	12.9	449	25.9	21.7
FourOsix	Montana, 2018	34.2	57.6	13.7	444	26.3	33.3
Keldin	Westbred, 2011	37.2	57.8	13.8	419	<b>28.4</b>	25.0
Loma	Montana, 2016	<b>61.4</b>	57.3	14.0	404	27.4	15.0
MT WarCat	Loma*2/AAC Gateway	<b>59.7</b>	57.8	14.1	411	26.3	15.0
Northern	Montana, 2015	37.5	<b>58.7</b>	14.0	460	26.2	30.0
StandClear CLP	Montana/Nutrien, 2020	45.8	<b>59.1</b>	13.6	431	26.9	<b>8.3</b>
SY Monument	Syngenta, 2015	<b>60.0</b>	56.3	12.9	456	25.5	25.0
Warhorse	Montana, 2013	42.2	56.2	<b>14.3</b>	<b>488</b>	27.7	<b>5.3</b>
Yellowstone	Montana 2005	<b>57.4</b>	56.8	14.0	<b>483</b>	<b>30.4</b>	28.3
MTS2068	potential release, 2024	<b>60.7</b>	58.2	13.5	469	27.6	<b>5.3</b>
MT2019	MT10114/MT10128//MTW1251	<b>56.9</b>	55.9	13.7	<b>504</b>	26.6	23.3
MTAX21187	FourOsix*2/Crescent AX	35.1	57.0	13.5	441	25.7	45.0
MTCL2010	MT0871/(06X445B1-2, SY Clearston	<b>57.1</b>	<b>58.9</b>	13.5	453	25.5	40.0
MTCS20151	Loma//(Bobcat sib, MTS1589)/Stan	<b>64.4</b>	<b>58.9</b>	13.2	404	26.8	<b>4.0</b>
MTCS20156	Bobcat//(Bobcat sib, MTS1589)/Sta	39.0	<b>59.6</b>	13.9	429	23.3	<b>3.7</b>
MTCS20158	Bobcat//(Bobcat sib, MTS1589)/Sta	40.7	<b>60.1</b>	14.0	421	23.0	<b>1.0</b>
MTFH20170	09x257cD9-2/DecadeFhb1-DH7	40.8	58.3	<b>14.4</b>	457	26.7	48.3
MTS1908	(Judee sib, MTS0819)//08X350-A6/	46.3	58.4	13.3	452	26.4	10.0
MTS2197	Bobcat//LCS Jet/MTS1703	43.0	58.5	14.0	429	20.5	<b>3.7</b>
MTV2164	MT1265*2/Joe	<b>51.7</b>	57.9	13.1	452	<b>28.8</b>	33.3
EXPERIMENTAL MEANS		48.6	58.0	13.8	443.5	26.3	20.5
LSD (0.05)		13.0	1.5	0.5	28.8	2.4	10.3
C.V.%		16.4	1.6	2.4	4.0	5.7	30.7
P-VALUE (Varieties)		<.0001	<.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 the highest or lowest value within a column (whichever is most desirable for the specific characteristic).

**Bold** indicates values equal to the underlined value within a column based on Fisher's protected LSD (P=0.05).

**Management Information (23-3855-WW)**

Seeding Date: October 6, 2022  
Harvest Date: August 15, 2023  
Fertility: 89-14-7-7 side banded  
System: Minimum Till  
Herbicide: none  
Insecticide: none  
Previous Crop: Chemical Fallow - Spring Wheat  
Precipitation: 5.39" April 1 to harvest maturity