



**Winter Wheat Variety Performance Evaluations Under  
Chemical Fallow Conditions at Northern Agricultural  
Research Center Havre, MT, 2014-2023**



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Results:

This report contains both single-year and long-term data summaries limited to the most recent ten years. It should be noted that 2023 data tables in this report represent varietal performance for a single crop year at a single location only, 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 at Havre averaged just 34 bu/ac (Table 1). Montana State University breeding line 'MTV2164' was the top yielding entry producing just under 43 bu/ac, with 'MS Maverick', 'MS Sundown', 'StandClear CLP' and seven other breeding lines producing yields statically equal to that of MTV2164. Test weights of all winter wheat entries for this site averaged just under 57 lb/bu. Wheat stem sawfly cutting in the winter wheat trial at Havre minimal, averaging 10 percent cut and lodged stems. Yield, test weight, protein, heading date, maturity date, plant height and sawfly cutting data for the 2023 Intrastate Yield 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. Ten-year comparable averages (2014-2023) for winter wheat seed yield and test weight for the Intrastate Yield trial are summarized in Table 2, while ten-year comparable averages for protein content and wheat stem sawfly cutting are summarized in Table 3. Based on the comparable average calculations, 'Bobcat', is the highest yielding entry at Havre over time in conjunction with having the least amount of cutting by wheat stem sawfly.

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. Intrastate Winter Wheat Cultivar Evaluation Nursery Grown On-Station Under No-Till Dryland Fallow Conditions. Northern Agricultural Research Center. Havre, MT. 2023. (Exp# 23-3502-WW)**

ID	1/ Yield bu/ac	Test Wt lb/bu	2/ Protein %	3/ Head date	3/ Maturity date	Plant HT inches	4/ Sawfly %
AAC Coldfront	30.0	56.2	16.9	166.0	198.0	<b>27.6</b>	12.5
AAC Wildfire	31.1	53.5	17.1	170.0	198.0	<b>28.1</b>	12.5
Amplify SF	34.1	59.8	13.8	160.5	196.0	24.7	<b>5.0</b>
AP Bigfoot	32.2	<b>60.8</b>	14.3	<b>158.0</b>	<b>193.0</b>	22.2	17.5
AP Solid	29.7	<b>61.8</b>	14.2	161.0	203.0	22.5	10.0
Balance	30.3	54.1	<b>17.7</b>	164.5	200.0	24.9	15.0
Bobcat	35.5	56.5	16.9	163.5	<b>192.5</b>	25.8	<b>3.0</b>
Brawl CL Plus	33.7	<b>60.7</b>	14.5	<b>158.0</b>	<b>192.5</b>	24.3	15.0
Flathead	35.3	58.7	14.8	<b>159.5</b>	<b>193.5</b>	24.3	10.0
Fortify SF	34.7	<b>60.3</b>	14.0	161.5	194.0	25.7	<b>8.0</b>
FourOsix	33.2	55.8	15.6	162.5	196.5	26.8	15.0
Judee	34.1	55.3	<b>17.4</b>	165.5	196.5	<b>27.7</b>	<b>5.0</b>
Keldin	37.1	55.2	16.2	164.0	195.5	<b>28.0</b>	20.0
Kivari AX	37.2	59.3	12.8	<b>159.5</b>	196.5	26.2	12.5
LCS Eclipse AX	27.3	51.7	16.4	163.5	195.5	25.5	20.0
LCS Helix AX	32.0	<b>60.5</b>	13.0	<b>159.5</b>	197.0	21.8	10.0
LCS Steel AX	36.9	57.5	13.7	163.0	196.0	26.7	12.5
Loma	34.9	54.9	<b>17.2</b>	168.0	197.0	25.5	<b>5.0</b>
Milestone	33.8	52.4	16.2	164.0	195.0	26.1	12.5
MS Maverick	<b>39.0</b>	57.8	14.6	163.0	195.5	25.7	10.0
MS Sundown	<b>38.2</b>	<b>60.3</b>	14.1	<b>158.5</b>	190.0	25.7	12.5
MT WarCat	34.6	54.7	<b>18.0</b>	169.5	197.0	24.0	<b>3.0</b>
Northern	34.4	56.8	15.9	168.0	197.0	24.9	<b>8.0</b>
Ramsay	29.2	57.2	16.1	167.0	198.0	26.3	<b>8.0</b>
StandClear CLP	<b>37.5</b>	57.2	16.0	163.5	<b>193.0</b>	27.4	<b>7.5</b>
SY Clearstone 2CL	33.0	55.1	16.0	166.5	199.0	<b>29.2</b>	15.0
SY Wolverine	29.5	<b>60.5</b>	14.7	<b>159.0</b>	<b>191.5</b>	23.4	15.0
Warhorse	28.7	52.9	<b>17.4</b>	164.5	<b>193.0</b>	26.9	<b>1.0</b>
Yellowstone	33.8	55.8	16.1	165.5	196.5	26.1	10.0
AP18 AX	30.0	59.2	13.4	<b>159.5</b>	196.5	22.1	10.0
CP7017AX	32.6	57.3	14.0	<b>159.5</b>	<b>192.0</b>	21.8	<b>7.5</b>
CP7909	35.4	<b>60.7</b>	13.9	<b>158.0</b>	<b>191.5</b>	22.2	<b>7.5</b>
CPX7266AX	31.6	59.2	13.7	160.5	<b>193.5</b>	24.9	10.0
MT2019	32.7	52.9	16.5	164.0	<b>193.5</b>	23.6	15.0
MTAX21187	33.2	56.4	15.1	<b>160.0</b>	<b>193.5</b>	26.0	12.5
MTCL19151	<b>39.6</b>	56.2	15.8	161.5	194.0	23.8	20.0
MTCL2010	<b>39.3</b>	56.6	15.7	163.0	194.0	22.9	15.0
MTCS20151	<b>40.3</b>	57.8	15.9	167.5	196.0	26.0	<b>3.0</b>
MTCS20156	<b>37.4</b>	58.0	16.2	167.5	196.0	24.4	<b>3.0</b>
MTCS20158	34.3	57.0	<b>17.2</b>	165.0	196.5	24.7	<b>0.5</b>
MTFH19132	28.8	52.8	15.9	162.5	<b>193.5</b>	<b>28.3</b>	22.5
MTFH20170	33.4	57.7	15.5	<b>160.0</b>	196.0	26.8	10.0

**TABLE 1. Intrastate Winter Wheat Cultivar Evaluation Nursery Grown On-Station Under No-Till Dryland Fallow Conditions. Northern Agricultural Research Center. Havre, MT. 2023. (Exp# 23-3502-WW)**

ID	1/ Yield bu/ac	Test Wt lb/bu	2/ Protein %	3/ Head date	3/ Maturity date	Plant HT inches	4/ Sawfly %
MTS1908	<b>38.3</b>	55.6	16.0	165.0	<b>193.0</b>	26.8	<b>7.5</b>
MTS2068	<b>39.5</b>	56.5	15.7	166.5	195.5	25.9	<b>5.0</b>
MTS2197	34.4	54.1	16.6	163.0	<b>193.5</b>	21.7	<b>3.0</b>
MTV2164	<b>42.9</b>	57.9	14.4	161.0	195.0	<b>27.6</b>	17.5
WB4422	29.6	59.1	14.5	161.5	197.5	23.5	10.0
WB4483	28.9	56.3	<b>17.3</b>	168.5	197.0	25.5	<b>5.5</b>
WB4727	<b>39.6</b>	54.5	14.6	162.5	196.0	27.3	<b>8.0</b>
EXPERIMENTAL MEANS	34.1	56.9	15.5	163.1	195.3	25.3	10.3
LSD (0.05)	5.5	1.5	0.8	2.5	3.5	1.7	8.3
C.V.%	8.0	1.3	2.7	0.7	0.9	3.3	40.2
P-VALUE (Entries)	<.0001	<.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/ No. of Days from January 1 (163 = June 12, 195= July 14).

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

**Underlined** 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 (23-3502-WW)

Seeding Date: October 5, 2022  
 Harvest Date: August 1, 2023  
 Fertility: 42-7-3-3 side banded; 100-0-0 topdressed  
 System: no till  
 Herbicide: Vendetta (24 oz/ac)  
 Insecticide: none  
 Previous Crop: Chemical Fallow - Winter Wheat  
 Precipitation: 10.5" (seeding to harvest)

**TABLE 2. Ten-Year Yield and Test Weight Summary on Selected Entries from the Dryland Intra-state Wheat Nursery. Northern Agricultural Research Center. Havre, Montana. 2014-2023. (Exp# 3502-WW)**

2/ VARIETY or SELECTION	3/ No. of YEARS TESTED	1/ YIELD (Bushels Per Acre)							TEST WEIGHT (Pounds Per Bushel)								
		2019	2020	2021	2022	2023	3/ AVE. for YEARS TESTED	4/ % of CHECK YIELD	5/ 10-YR COMP. AVE. YIELD	2019	2020	2021	2022	2023	3/ AVE. for YEARS TESTED	4/ % of CHECK TEST WT	5/ 10-YR COMP. AVE. TEST WT
MTS1588 BOBCAT (++) (sawfly tol)	7	62.6	59.5	25.5	65.6	35.5	52.5	111.3	61.4	60.6	62.6	54.8	60.5	56.5	60.0	101.7	60.5
Winfield, 2020 CP7017AX	3			31.1	62.3	32.6	42.0	109.3	60.3			51.1	60.7	57.3	56.4	101.6	60.5
LCS, 2021 LCS STEEL AX (P+)	4		54.3	25.8	62.5	36.9	44.9	109.1	60.2	62.1	54.6	59.0	57.5	58.3	102.1	60.8	
Nutrien, 2020 MILESTONE	3			25.8	64.5	33.8	41.3	107.6	59.4			51.8	57.8	52.4	54.0	97.4	58.0
Nutrien RAMSAY	3			27.2	66.4	29.2	40.9	106.6	58.8			51.9	59.8	57.2	56.3	101.5	60.4
ACS55017 KELDIN (P+)	10	52.4	58.1	28.5	61.7	37.1	58.7	106.3	58.7	59.9	62.0	52.7	59.2	55.2	59.8	100.5	59.8
MTS18149 MT WARCAT (++)	4		56.6	25.9	57.3	34.6	43.6	105.9	58.5	62.4	54.5	57.7	54.7	57.3	100.4	59.8	
MT00159 YELLOWSTONE (+)	9	54.8	53.5	27.9	63.0	33.8	58.4	105.0	57.9	59.5	61.5	53.5	58.3	55.8	59.0	99.6	59.3
MTCS1601 STANDCLEAR CLP (P+CL)	6	61.6	53.5	23.7	57.4	37.5	48.2	103.7	57.2	60.7	62.4	54.4	60.8	57.2	59.7	102.2	60.8
LCS, 2020 LCS HELIX AX	3			29.8	57.6	32.0	39.8	103.6	57.2			54.5	61.5	60.5	58.8	106.0	63.1
CWRF, 2019 FORTIFY SF	3			22.8	61.9	34.7	39.8	103.6	57.1			54.4	61.0	60.3	58.6	105.6	62.9
Syngenta AP SOLID	3			28.9	60.1	29.7	39.6	103.0	56.8			56.9	62.5	61.8	60.4	108.9	64.8
MT1564 FLATHEAD (++)	7	49.1	50.4	35.2	56.6	35.3	48.4	102.6	56.6	60.4	63.1	51.8	60.6	58.7	60.1	101.8	60.6
Syngenta 2020 AP18 AX	3			28.6	59.4	30.0	39.3	102.3	56.5			52.1	59.9	59.2	57.1	102.9	61.3
MT1465 FOUROSIX (++)	8	57.5	53.1	23.7	58.9	33.2	54.5	100.3	55.4	60.0	62.2	53.3	58.2	55.8	59.3	100.5	59.8
MT0978 NORTHERN (+)	10	57.7	49.4	22.8	58.1	34.4	55.2	100.0	55.2	60.3	62.0	51.6	58.0	56.8	59.5	100.0	59.5
SECAN, 2015 AAC WILDFIRE (+)	6	54.0	52.0	17.6	47.8	31.1	45.8	98.6	54.4	58.8	61.5	54.1	55.9	53.5	57.7	98.6	58.7
MTCL1077 SY CLEARSTONE 2CL (P+)	10	56.8	52.4	18.8	57.6	33.0	53.6	97.2	53.6	59.5	61.6	54.6	57.7	55.1	59.3	99.6	59.3
Winfield, 2018 CP7909 (P+)	4		29.8	34.5	56.8	35.4	39.1	95.0	52.4		62.4	52.3	59.9	60.7	58.8	103.1	61.4
Syngenta 2019 SY WOLVERINE (P+)	5	48.9	49.0	28.3	54.9	29.5	42.1	94.7	52.2	60.3	63.1	54.5	60.2	60.5	59.7	103.5	61.6
Nutrien, 2020 BALANCE	3			23.8	55.0	30.3	36.4	94.6	52.2			52.4	57.7	54.1	54.7	98.7	58.8
MTS0713 JUDEE (+) (sawfly tol)	10	52.6	50.8	18.7	50.6	34.1	51.5	93.3	51.5	61.3	63.6	55.0	59.6	55.3	60.6	101.8	60.6
CO06052 BRAWL CL PLUS (+)	9	52.2	47.1	29.5	57.7	33.7	50.9	93.3	51.5	62.0	63.4	52.1	61.8	60.7	61.1	102.9	61.3
MTS1224 LOMA (++)	10	51.1	53.0	24.2	53.4	34.9	50.9	92.3	50.9	59.7	62.1	53.2	57.2	54.9	59.2	99.4	59.2
MTS0808 WARHORSE (+) (sawfly tol)	10	46.5	51.4	20.6	54.0	28.7	49.7	90.1	49.7	60.2	62.1	51.5	58.0	52.9	59.1	99.3	59.1
MEANS (For Entries Listed)		54.1	51.4	26.0	58.4	33.2			55.8	60.2	62.4	53.4	59.3	57.0			60.5
April-July Precip. (in.)		6.33	5.55	4.08	5.51	10.15	6.27										
Total Annual Precip. (in.)		11.29	10.52	10.00	8.15	7.10	11.39										
Soil PAW (in.) to SD @ Planting		7.66	9.40	6.40	7.75	17.25	9.52										
Total Plant Available Water (in.)		13.99	14.95	10.48	13.30	27.40	14.84										
Soil NO3 (lbs.) to SD at Planting		117	419	77	56	37	124										
SD (Sampling Depth in Inches)		46	47	47	48	41.5	47										
Fertilizer Applied		(# N)	125	125	125	125	89	111									
		(# P2O5)	20	20	20	20	14	19									
		(# K2O)	10	10	10	10	7	10									
		(# S)	10	10	10	10	7	7									

Check variety is Northern.

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, HW = Hard White Wheat.

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

4/ Percent of Northern 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 Northern for the same years, and z = 10-Yr average yield or test weight for the check variety Northern.

**TABLE 3. Ten-Year Protein and Sawfly Summary on Selected Entries from the Dryland Intrastate Wheat Nursery. Northern Agricultural Research Center. Havre, Montana. 2015-2024. (Exp# 3502-SW)**

2/ VARIETY or SELECTION	3/ No. of YEARS TESTED	1/ PROTEIN % (Adjusted to 13% Grain Moisture)									SAWFLY RATING (% of Cut and Lodged Stems)						
		2019	2020	2021	2022	2023	3/ AVE. YEARS TESTED	4/ % of CHECK PROTEIN	5/ 10-YR COMP. AVE. PROTEIN	2019	2020	2021	2022	2023	3/ AVE. YEARS TESTED	4/ % of CHECK SAWFLY	5/ 10-YR COMP. AVE. SAWFLY
MTS1588 BOBCAT (++) (sawfly tol)	7	14.9	14.4	17.8	14.6	16.9	15.3	99.6	14.3	0.6	19.0	8.8	20.0	3.0	7.7	27.0	5.5
MTS0808 WARHORSE (+) (sawfly tol)	10	16.2	14.8	18.3	15.9	17.4	14.9	103.7	14.9	2.8	34.6	13.3	8.3	1.0	6.4	31.3	6.4
MTS18149 MT WARCAT (++)	4		14.8	18.2	15.2	18.0	16.5	103.9	15.0		28.6	19.5	10.0	3.0	15.3	38.9	7.9
MTS1224 LOMA (++)	10	15.2	14.7	18.3	15.4	17.2	14.6	101.8	14.6	15.4	37.8	10.3	31.7	5.0	10.9	53.7	10.9
CO06052 BRAWL CL PLUS (+)	9	15.3	14.0	17.6	15.4	14.5	14.4	99.3	14.3	13.9	30.7	23.7	48.3	15.0	15.6	69.7	14.2
MTS0713 JUDEE (+) (sawfly tol)	10	15.8	15.2	18.4	15.3	17.4	14.7	102.3	14.7	11.4	31.3	40.7	56.7	5.0	15.2	74.6	15.2
Syngenta 2020 AP18 AX	3			15.8	13.6	13.4	14.3	87.7	12.6			33.7	68.3	10.0	37.3	84.5	17.2
MT1564 FLATHEAD (++)	7	15.1	13.9	17.1	14.4	14.8	14.7	95.9	13.8	27.4	33.7	34.9	71.7	10.0	25.8	90.9	18.5
Syngenta AP SOLID	3			16.1	13.8	14.2	14.7	90.2	13.0			24.6	86.7	10.0	40.4	91.4	18.6
LCS, 2020 LCS Helix AX	3			15.8	13.9	13.0	14.2	87.4	12.6			45.1	71.7	10.0	42.3	95.6	19.4
Syngenta 2019 SY WOLVERINE (P+)	5	15.7	14.5	16.9	15.3	14.7	15.4	98.2	14.1	28.9	48.3	19.8	75.0	15.0	37.4	96.0	19.5
MTCS1601 STANDCLEAR CLP (P+, CL)	6	11.6	14.1	17.9	14.6	16.0	14.8	96.0	13.8	11.6	61.0	55.1	51.7	7.5	31.8	96.2	19.6
Winfield, 2020 CP7017AX	3			16.0	13.5	14.0	14.5	89.0	12.8			26.4	94.7	7.5	42.9	97.0	19.7
CWRF, 2019 FORTIFY SF	3			15.9	13.9	14.0	14.6	89.6	12.9			49.4	73.3	8.0	43.6	98.6	20.0
MT0978 NORTHERN (+)	10	14.8	14.8	18.2	14.7	15.9	14.4	100.0	14.4	37.6	24.6	33.3	91.3	8.0	20.3	100.0	20.3
Nutrien RAMSAY	3			18.7	14.6	16.1	16.5	101.0	14.5			32.0	93.3	8.0	44.4	100.5	20.4
SECAN, 2015 AAC WILDFIRE (+)	6	14.6	13.8	17.6	15.7	17.1	15.4	99.8	14.4	32.4	52.4	17.3	80.0	12.5	33.4	100.8	20.5
Nutrien, 2020 MILESTONE	3			16.8	13.4	16.2	15.8	96.9	13.9			41.3	85.0	12.5	46.3	104.6	21.3
Nutrien, 2020 BALANCE	3			18.9	15.5	17.7	17.4	106.7	15.4			44.0	81.7	15.0	46.9	106.1	21.6
MT00159 YELLOWSTONE (+)	9	15.1	14.4	17.5	14.0	16.1	14.1	98.3	14.1	30.2	38.4	27.5	99.0	10.0	24.2	107.0	21.7
Winfield, 2018 CP7909 (P+)	4			13.5	16.5	14.7	13.9	91.9	13.2			56.3	37.8	70.0	7.5	42.9	109.2
LCS, 2021 LCS STEEL AX (P+)	4			12.5	16.8	13.0	13.7	14.0	87.8	12.6		54.0	41.1	84.7	12.5	48.1	122.3
MT1465 FOUROSIX (++)	8	14.9	14.2	17.4	14.7	15.6	14.7	99.3	14.3	38.6	62.4	27.1	96.3	15.0	30.4	122.5	24.9
MTCL1077 SY CLEARSTONE 2CL (P+)	10	15.3	14.7	17.6	14.5	16.0	14.3	99.2	14.3	44.0	55.1	25.5	93.0	15.0	25.7	126.5	25.7
ACS55017 KELDIN (+)	10	15.1	14.3	18.7	14.7	16.2	14.1	97.9	14.1	45.9	61.1	37.2	90.0	20.0	27.9	137.4	27.9
MEANS (For Entries Listed)		15.0	14.3	17.4	14.6	15.6			13.9	24.3	42.9	30.8	69.3	9.8			18.6
April-July Precip. (in.)		6.33	5.55	4.08	5.51	10.15	6.27										
Total Annual Precip. (in.)		11.29	10.52	10.00	8.15	7.10	11.39										
Soil PAW (in.) to SD @ Planting		7.66	9.40	6.40	7.75	17.25	9.52										
Total Plant Available Water (in.)		13.99	14.95	10.48	13.30	27.40	14.84										
Soil NO3 (lbs.) to SD at Planting		117	419	77	56	37	124										
SD (Sampling Depth in Inches)		46	47	47	48	42	47										
Fertilizer Applied																	
(# N)		125	125	125	125	89	111										
(# P2O5)		20	20	20	20	14	19										
(# K2O)		10	10	10	10	7	10										
(# S)		10	10	10	10	7	7										

Check variety is Northern.

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, HW = Hard White Wheat.

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

4/ Percent of Northern protein or sawfly rating 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 sawfly rating of a given entry for years tested, y = average protein or sawfly rating for Northern for the same years, and z = 10-Yr average protein or sawfly rating for the check variety Northern.