



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



Spring Wheat Off-Station Variety Performance, Loma, MT

Principal Investigator:

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Project Personnel:

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Cooperators:

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Objectives:

Commercially available spring wheat varieties and advanced breeding lines were evaluated for agronomic performance and fit at on-farm locations across 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 Chouteau County location, between Big Sandy and Loma, has been used for various trials since 1998.

Methods:

The uniform off-station spring wheat variety trial was seeded into chemical fallow ground during 2024. 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 a slow ground speed and an exceptionally low cutting height, help researchers collect all heads 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:

This report contains both single-year and long-term data summaries limited to the most recent ten years. It should be noted that the 2024 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, 2024 data shall not constitute in any form a recommendation for or against any variety or breeding line included.

Spring wheat seed yields at Loma averaged just under 35 bu/ac (Table 1). 'MT Carlson', released by Montana State University in 2023, was the top yielding entry producing nearly 45 bu/ac, with no other entry producing a yield statically equal to that of MT Carlson. Test weights of all spring wheat entries for this site averaged just over 54 lb/bu. Wheat stem sawfly cutting in the spring wheat trial near Loma averaged 12.5 % Yield, test weight, protein, falling number, plant height and sawfly cutting data for the 2024 Loma dryland spring 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. At least three years of data is needed to be included in the comparable average calculation. Ten-year comparable averages (2015-2024) for spring wheat seed yield and test weight at Loma 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, MT Carlson, 'Dagmar', 'MT UBet', 'MT Dutton' are the highest yielding varieties at Loma.

Summary:

Following establishment, the Loma spring wheat trial had good stand uniformity. Precipitation was sporadic and spotty from tillering through grain fill limiting seed yield potential. Untimely and repeated rain events following grain maturity delayed harvest and severely reduced grain quality.

This work has been strongly supported by producers in the Loma-Big Sandy 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 testing in this area. The Chouteau County location between Loma and Big Sandy has been hosting various trials for 27 years, beginning in 1998.

Recognition:

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

TABLE 1. Dryland Fallow Spring Wheat Cultivar Evaluation Nursery Grown Off-Station at McKeever Farm & Seed, Inc., Loma. Northern Agricultural Research Center. Havre, Montana. 2024.
(Exp# 24-9957-SW)

ID	1/ YIELD bu/ac	TEST WT lb/bu	2/ PROTEIN %	3/ FN seconds	PLNT HT inches	4/ SAWFLY %
AP SMITH	22.5	55.5	16.4	255	25.8	25.0
DAGMAR	37.8	55.0	16.4	205	27.8	2.3
LANNING	36.9	53.3	16.5	277	27.1	30.0
LCS ASCENT	35.4	55.8	15.4	340	26.8	36.7
MT CARLSON	44.7	53.3	15.6	264	29.0	21.7
MT DUTTON	35.1	53.6	16.7	307	29.9	10.0
MT SIDNEY	37.6	55.0	16.1	257	29.2	35.0
MT UBET	38.3	54.3	15.8	128	28.7	21.7
REEDER	36.4	53.9	16.1	339	30.2	21.7
ROCKER	33.1	54.8	16.2	453	28.5	6.7
SY LONGMIRE	31.7	55.9	16.5	242	25.9	5.0
SY ROCKFORD	25.4	51.9	16.2	305	24.8	26.7
VIDA	38.1	55.3	15.4	230	27.9	10.0
WB 9668	30.6	54.9	17.9	199	25.7	10.0
WB 9879CLP	37.1	52.7	16.4	301	28.2	2.3
WB GUNNISON	36.0	55.5	15.5	360	28.4	1.0
MT 2049	33.7	55.0	15.9	229	26.1	16.7
MT 2063	35.6	54.1	15.3	228	27.0	8.3
MT 21074	39.3	53.9	16.9	336	29.0	2.3
MT 21104	24.9	54.0	16.3	156	26.8	8.3
MT 21174	34.8	54.7	16.6	324	27.1	1.0
MT 21186	34.2	53.0	16.5	279	27.4	1.0
MT 21220	35.6	54.7	16.9	317	26.0	5.3
MT 21473	40.6	53.1	16.4	350	29.3	10.0
MT 21484	39.4	55.1	16.0	227	28.8	2.3
EXPERIMENTAL MEANS	34.9	54.3	16.2	276.6	27.6	12.5
LSD (0.05)	3.8	0.7	0.4	49.4	1.7	7.9
C.V.%	6.6	0.7	1.4	10.8	3.7	37.4
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).

NS for non-significant replaces the LSD when the probability value (P-Value) exceeds 0.05.

Management Information (24-9957-SW)

Seeding Date:	April 25, 2024
Harvest Date:	September 3, 2024
Fertility:	100-20-10-10 side banded
System:	No Till
Herbicide:	Vendetta 24 oz; OpenSky 16 oz
Insecticide:	none
Previous Crop:	Chemical Fallow - Spring Wheat
Precipitation:	2.42" *

* Precip from July 12-September 3, only

TABLE 2. Ten-Year Yield and Test Weight Summary on Selected Entries from Dryland Fallow Spring Wheat Variety Nurseries Grown Off-Station at McKeever Farm & Seed, Inc., Loma. Northern Agricultural Research Center. Havre, Montana. 2015-2024. (Exp# 9957-SW)

Seed, Inc., Loma, Northern Agricultural Research Center, Haver, Montana, 2015-2024 (Expn 5557 SW)																		
		1/ YIELD (Bushels Per Acre)								TEST WEIGHT (Pounds Per Bushel)								
	3/ No. of YEARS TESTED						3/ AVE. for YEARS	4/ % of CHECK	5/ 10-YR COMP. AVE.						3/ AVE. for YEARS	4/ % of CHECK	5/ 10-YR COMP. AVE.	
2/ VARIETY		2020	2021	2022	2023	2024	TESTED	YIELD	YIELD	2020	2021	2022	2023	2024	TESTED	TEST WT	TEST WT	
MT CARLSON (+)	4		16.5	32.7	70.8	44.7	41.2	113.5	40.7		55.1	54.1	59.5	53.3	55.5	99.8	55.1	
DAGMAR (+)	7	52.1	17.0	33.7	66.3	37.8	42.4	106.1	38.0	60.4	56.0	55.8	60.4	55.0	57.0	102.2	56.4	
MT UBET (+)	3			30.0	69.0	38.3	45.7	105.9	37.9			53.7	58.8	54.3	55.6	99.2	54.8	
MT DUTTON (+)	4		15.2	28.9	70.9	35.1	37.5	103.4	37.1		53.2	53.2	60.1	53.6	55.0	98.9	54.6	
VIDA (+)	10	52.2	15.4	29.9	61.6	38.1	35.8	100.0	35.8	59.6	54.4	54.6	58.3	55.3	55.2	100.0	55.2	
WB GUNNISON (P+)(sawfly tol)	9	50.5	18.0	28.4		36.0	32.3	97.9	35.1	59.3	56.5	54.9		55.5	55.6	101.3	55.9	
DUCLAIR (+)(sawfly tol)	9	48.0	15.8	27.1	63.2		34.8	97.7	35.0	58.2	53.1	54.0	59.5		54.7	99.2	54.7	
LANNING (+)	10	42.6	10.5	25.8	75.2	36.9	34.9	97.5	34.9	58.4	53.5	53.0	59.9	53.3	53.6	97.0	53.6	
BRENNAN (P+)	9	52.6	15.3	28.1	60.9		33.9	95.4	34.2	61.4	57.5	57.0	62.4		57.7	104.6	57.8	
NS PRESSER CLP (P+)	8	49.7	12.5	25.1	62.2		34.3	95.2	34.1	56.5	52.5	52.0	58.1		53.4	96.5	53.3	
CORBIN (P+)	9	50.2	19.6	25.3	53.4		33.6	94.5	33.9	59.8	56.3	55.3	59.5		55.8	101.2	55.8	
MT SIDNEY (+)	6	50.9	12.7	26.4	68.5	37.6	38.1	93.0	33.3	60.8	55.2	55.9	61.6	55.0	57.2	101.6	56.1	
WB9879CLP (P+)	10	50.3	15.3	25.6	59.3	37.1	33.0	92.2	33.0	59.3	54.2	54.9	59.6	52.7	55.0	99.7	55.0	
SY INGMAR (P+)	7	41.1	9.1	24.0	65.2		35.5	91.0	32.6	57.9	56.4	53.7	61.2		56.1	101.1	55.8	
SY SOREN (P+)	9	45.0	15.8	25.7	63.1		31.1	87.4	31.3	58.6	55.1	53.8	60.5		55.1	99.7	55.1	
REEDER (+)	10	36.0	10.9	24.5	64.5	36.4	30.0	83.8	30.0	58.4	53.8	54.5	60.1	53.9	54.8	99.2	54.8	
MEANS (For Entries Listed)		47.8	14.6	27.6	64.9	37.8			34.8	59.1	54.9	54.4	60.0	54.2			55.2	
6/ Growing Season Precipitation (in.)																		
Soil PAW (in.) to SD @ Planting		9.81	7.94	5.31	n/a	n/a	8.12											
Total Plant Available Water (in.)		9.81	n/a	6.30	n/a	n/a	10.29											
Soil NO3 (lbs.) to SD at Planting		197	193	120	n/a	n/a	166											
SD (Sampling Depth in Inches)		48	45	42	n/a	n/a	46											
Fertilizer Applied	(# N)	100	100	46	46	100	92											
	(# P ₂ O ₅)	20	20	9	9	20	18											
	(# K ₂ O)	10	10	5	5	10	9											
	(# S)	10	10	5	5	10	7											

Check variety is Vida.

1/ See MCES Bulletin 1093 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.

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

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

6/ April 1 to 14 days prior to harvest

TABLE 3. Ten-Year Protein and Sawfly Summary on Selected Entries from Dryland Fallow Spring Wheat Variety Nurseries Grown Off-Station at McKeever Farm & Seed, Inc., Loma. Northern Agricultural Research Center. Havre, Montana. 2015-2024. (Exp# 9957-SW)

		1/ PROTEIN % (Adjusted to 13% grain moisture)								SAWFLY RATING (% of cut and lodged stems)								
2/ VARIETY	3/ No. of YEARS TESTED	2020	2021	2022	2023	2024	3/ AVE. for YEARS	4/ % of CHECK	5/ 10-YR COMP. AVE.	2020	2021	2022	2023	2024	3/ AVE. for YEARS	4/ % of CHECK	5/ 10-YR COMP. AVE.	
WB GUNNISON (P+)(sawfly tol)	9	14.1	15.3	15.8		15.5	16.0	98.2	15.7	1.0	0.0	3.7		1.0	0.9	9.2	0.8	
WB9879CLP (P+)	10	14.9	16.2	16.7	13.2	16.4	16.4	102.8	16.4	1.0	2.3	5.3	0.0	2.3	1.4	17.2	1.4	
DAGMAR (+)	7	15.0	15.8	16.5	13.5	16.4	15.8	103.5	16.5	2.3	11.7	7.0	0.0	2.3	3.6	34.2	2.9	
CORBIN (P+)	9	15.2	15.9	16.9	13.5		16.8	104.6	16.7	5.0	12.0	10.0	0.3		3.4	42.3	3.5	
DUCLAIR (+)(sawfly tol)	9	15.2	16.5	16.7	12.5		16.4	102.4	16.3	5.0	12.0	8.7	0.0		4.1	50.0	4.2	
VIDA (+)	10	14.2	15.1	15.9	13.0	15.4	16.0	100.0	16.0	5.0	21.7	31.7	0.3	10.0	8.3	100.0	8.3	
MT CARLSON (+)	4		14.7	16.0	12.7	15.6	14.7	99.2	15.8		23.3	30.0	0.0	21.7	18.8	117.8	9.8	
MT DUTTON (+)	4		16.3	16.7	12.0	16.7	15.4	103.8	16.6		26.7	48.3	0.0	10.0	21.3	133.5	11.1	
NS PRESSER CLP (P+)	8	15.6	15.6	16.1	12.6		16.2	101.3	16.2	21.7	25.0	53.3	0.7		13.9	162.9	13.6	
MT UBET (+)	3			16.5	12.9	15.8	15.1	102.1	16.3			58.3	0.0	21.7	26.7	190.5	15.9	
MT SIDNEY (+)	6	14.5	15.3	16.4	12.4	16.1	15.1	101.5	16.2	18.3	23.3	78.3	0.0	35.0	27.5	227.1	18.9	
SY INGMAR (P+)	7	15.0	15.7	16.8	12.8		16.1	102.6	16.4	16.7	40.0	73.3	0.3		21.3	235.3	19.6	
SY SOREN (P+)	9	15.3	16.1	17.0	13.3		16.9	105.6	16.9	16.7	43.3	63.3	0.0		19.4	238.6	19.9	
BRENNAN (P+)	9	14.6	15.6	16.2	13.3		16.3	101.5	16.2	13.3	46.7	71.7	0.0		19.7	241.8	20.2	
REEDER (+)	10	14.8	15.7	16.2	13.4	16.1	16.4	102.4	16.4	13.3	51.7	70.0	0.0	21.7	21.7	260.4	21.7	
LANNING (+)	10	14.8	15.5	16.9	12.2	16.5	16.5	103.2	16.5	6.7	66.7	78.3	0.0	30.0	24.9	298.8	24.9	
MEANS (For Entries Listed)		14.9	15.7	16.5	12.9	16.1			16.3	9.5	25.7	40.4	0.1	14.9			12.3	
6/ Growing Season Precipitation (in.)		n/a	n/a	0.99	7.09	n/a	4.14											
Soil PAW (in.) to SD @ Planting		9.81	7.94	5.31	n/a	n/a	8.12											
Total Plant Available Water (in.)		9.81	n/a	6.30	n/a	n/a	10.29											
Soil NO3 (lbs.) to SD at Planting		197	193	120	n/a	n/a	166											
SD (Sampling Depth in Inches)		48	45	42	n/a	n/a	46											
Fertilizer Applied		100	100	46	46	100	92											
	(# N)	20	20	9	9	20	18											
	(# P2O5)	10	10	5	5	10	9											
	(# K2O)	10	10	5	5	10	7											
	(# S)	10	10	5	5	10												

Check variety is Vida.

1/ See MCES Bulletin 1093 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.

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

4/ Percent of Vida 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 Vida for the same years, and z = 10-Yr average protein or sawfly rating for the check variety Vida.

6/ April 1 to 14 days prior to harvest