

Title (4W5132): North Central Montana Off-Station Spring Wheat Variety Performance Evaluations

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

Project Personnel: Luther E. Talbert, Breeder/Geneticist, Spring Wheat, Bozeman
Hwa Young Heo, Research Associate, Spring Wheat, Bozeman
Angela E. Sebelius, Research Associate, Havre
Jesse Fulbright, Liberty County Extension
Ben Hauptman, Blaine Count Extension
Tyler Lane, Chouteau County Extension
Marko Manoukian, Phillips County Extension

Cooperators: Max Cederberg, Landowner, Turner
Kurt Kammerzell, Landowner, Chester
Pete Lumsden & John Flansaas, Landowners, Loring
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 33 percent of the 2009-2013 statewide totals (44 percent for winter wheat and 22 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 spring 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 spring wheat variety performance trials were conducted in 2014 on chemical fallow at four locations in four northern Montana counties.

Dryland Spring Wheat Trials:

1. Cederberg Farm, Blaine County	(3NE Turner)	13-36N-25E
2. Flansaas/Lumsden Farm, Phillips County	(1SW Loring)	24-35N-29E
3. McKeever Farms, Chouteau County	(4NW Loma)	21-27N-10E
4. Kammerzell Farm, Liberty County	(2W Chester)	07-31N-06E

All four trials consisted of 20 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 17.5 feet with a three-point rotary mower. 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, test weight and moisture content. Protein content was determined using a Foss Infratec 1241 near infrared analyzer. Other variables specific to each individual trial are listed with the current year data tables.

Results:

Please note that cereal research trial yield results recorded under wheat stem sawfly pressure are 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 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 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 2014 started out average to marginal with lower than normal early spring precipitation across north central Montana. Timely, above average rainfall events were experienced at Turner and Loring resulting in excellent spring wheat yields for growers who were not hit by one of the frequent hail storms of 2014. The Loma and Chester locations went into the fall and started out early spring dryer than normal but then received timely precipitation resulting in good to very good spring wheat seed yields.

At Havre, annual growing season precipitation (9/1/13 through 8/31/14) was 13.34 inches, 11 percent higher than the average for all years since 1916. April 1 through July 31 precipitation was 4.87 inches or 71 percent of the 99-year average. Heat units expressed as "Growing Degree Days" (GDD, base 50) from May through July totaled 1176, 91 percent of the average for the last 64 years (1951-2014). The last spring frost was on May 13 and the first fall frost of 2014 was on September 12, resulting in 121 frost-free days. The minimum winter temperature was -33 degrees F on December 7, 8 and 9. Overall, 2013-2014 crop year temperatures were very close to the long-term average. The April through July growing season saw an average daily temperature of 56.4 degrees F, only 1 degree below normal. July and August average temperatures were slightly higher than normal with the high for 2014 recorded on July 31 at 96 degrees F. There were 15 days with temperatures 90 degrees F or above, with no days over 100 degrees F.

Following a summer of substantial rainfall and minor hail storms, unfortunately the spring wheat trial at Turner was hit by a devastating season ending hail storm on August 28. The spring wheat plots at the 2014 Cederberg dryland site were not salvageable for any data collection.

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. Nine-year comparable averages (2005-2013) for spring wheat seed yield and test weight at Turner are summarized in Table 1, while nine-year comparable averages for sawfly cutting are summarized in Table 2.

Loring spring wheat yields averaged over 44 bu/ac with Montana State University release 'Vida' producing highest yield at over 54 bu/ac. MSU experimental line 'MT1172' was the only other line to produce a yield statistically equal to that of Vida. Sawfly cutting was virtually nonexistent at the Loring site with cutting in the spring wheat trial averaging only 0.9 percent. Stand percent, plant height, yield, moisture, test weight, protein and sawfly cutting data for the 2014 Loring dryland spring wheat trial are summarized in Table 3. Ten-year comparable averages for spring wheat seed yield and test weight at Loring are summarized in Table 4, while ten-year comparable averages for sawfly cutting are summarized in Table 5.

In 2013, off-station spring wheat trials were re-established at Loma. Out of the path of timely rain showers, spring wheat yields at Loma averaged 35 bu/ac. Vida, 'McNeal' and experimental line MT1172 and were the highest yielding entries at 42.8, 40.5 and 39.1 bu/ac, respectively (Table 6). Sawfly cutting in the small plot situation was nearly nonexistent this year, averaging only 0.3 percent cutting. Plant height, yield, test weight, moisture, protein and sawfly cutting data for the 2014 Loma dryland spring wheat trial are summarized in Table 6. Comparable averages for spring wheat at the Loma site will not be available until the 2015 crop year.

In 2014, off-station spring wheat trials were established at Chester. Spring wheat yields at Chester averaged just under 36 bu/ac. Agripro variety 'Brennan', along with MSU experimental line MT1172 and public release 'Duclair' were the highest yielding entries at 43.0, 42.6 and 40.3 bu/ac, respectively (Table 7). Sawfly cutting in the small plot scenario was minimal, averaging only 2.7 percent cutting. Plant height, yield, test weight, moisture, protein and sawfly cutting data for the 2014 Chester dryland spring wheat trial are summarized in Table 7. Comparable averages for spring wheat at the Chester site will not be available until the 2016 crop year.

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 Loring location is entering its twentieth year, and the

cooperator and area producer interest and support has been outstanding. The Turner location is only 32 miles from the Loring site, but growing conditions there are quite different. Cooperator and producer support in the Big Flat area have been outstanding through the years with 2014 marking 31 years at the present Turner site. Various winter and spring cereal trials have been conducted with great producer support at the Chouteau County location, between Big Sandy and Loma, since 1998. The Chester location was reestablished in 2014 following a prolonged absence of uniform off-station spring cereal testing in Liberty County.

Funding Summary:

Expenditure information for grant index 4W5132 is to be provided by Montana State University, Office of Sponsored Programs. There is no other grant support for this project.

MWBC FY2016 Grant Submission Plans:

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

TABLE 1. Nine-Year Yield and Test Weight Summary on Selected Entries from Dryland Fallow Spring Wheat Variety Nurseries Grown Off-Station at the Leon Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2005-2014. (Exp# 9951-SW)

		No. of YEARS TESTED 3/	1/ YIELD (Bushels Per Acre)							TEST WEIGHT (Pounds Per Bushel)							
			2010	2011	2012	2013	2014 4/	AVE. for YEARS TESTED 3/	% of CHECK YIELD 5/	9-YR COMP. AVE. YIELD 6/	2010	2011	2012	2013	2014 4/	AVE. for YEARS TESTED 3/	% of CHECK TEST WT 5/
2/ VARIETY or SELECTION																	
BZ999592	ONEAL (P+)	6	37.1	30.1	23.4	61.7	36.7	126.8	36.3	57.8	61.9	60.8	63.2		60.5	101.6	60.0
PI642366	VIDA (++)	9	25.6	34.7	23.4	66.8	35.7	124.8	35.7	55.6	61.7	60.7	61.3		58.5	99.1	58.5
MT 0832	DUCLAIR (++)	4	36.7	31.3	24.0	55.7	36.9	122.5	35.0	54.8	59.9	58.9	60.8		58.6	97.5	57.6
NDSW0449	MOTT (++)	4	30.3	31.9	19.6	56.2	34.5	114.4	32.7	55.0	61.7	60.3	62.6		59.9	99.7	58.9
BZ996434	CORBIN (P+)	7	32.7	32.5	22.6	54.1	32.1	113.8	32.5	55.6	61.9	60.4	62.2		59.0	101.5	59.9
BZ9M1044	JEDD (P+)	6	41.5	26.5	18.5	49.5	32.9	113.6	32.5	57.0	61.4	62.1	62.7		60.6	101.7	60.0
ND695	REEDER (+)	9	30.9	27.3	22.8	59.0	32.4	113.2	32.4	56.5	61.4	60.5	62.8		59.1	100.0	59.1
AGRIPRO8	AP604 CL (P+)	5	31.8	29.4	19.9	55.1	35.3	113.0	32.3	55.7	62.1	61.2	63.3		60.7	100.7	59.5
PI633974	CHOTEAU (+, saw fly res)	9	32.6	30.6	22.5	52.5	32.2	112.8	32.2	53.7	61.1	59.0	61.3		57.7	97.8	57.7
BZ992322	HANK (P+)	9	36.5	24.2	20.9	46.7	31.6	110.6	31.6	54.7	60.4	60.2	60.4		58.1	98.4	58.1
BZ992588	CONAN (P+)(saw fly tol)	7	31.4	30.5			29.9	109.9	31.4	56.8	62.6				59.1	101.0	59.7
BZ902413	WB GUNNISON (P+)	3		33.0	21.5	50.3	35.0	109.0	31.2		62.3	61.0	62.8		62.0	101.2	59.7
PI574642	McNEAL	9	32.7	28.0	19.6	50.4	31.1	108.9	31.1	55.2	60.2	59.5	62.2		58.1	98.4	58.1
PI632252	OUTLOOK (++)	8	26.9	30.3	22.6		28.3	108.6	31.0	54.5	60.8	59.7			57.4	97.7	57.7
AGRIPRO7	KUNTZ (P+)	4	32.4	24.8			28.7	107.3	30.7	56.3	61.7				59.0	100.2	59.2
AGRIPR12	SY TYRA (P+)	3		25.6	19.6	54.6	33.3	103.8	29.7		62.7	61.6	63.8		62.7	102.2	60.3
ACS53610	VOLT (P+)	6	27.2	26.3	16.6	48.5	29.5	102.0	29.1	56.8	62.2	61.3	63.5		60.5	101.4	59.9
CI13596	FORTUNA (saw fly res)	9	24.4	29.2	18.6	48.4	28.6	100.0	28.6	56.4	61.7	60.7	61.6		59.0	100.0	59.0
AGRIPRO6	KELBY (P+)	6	32.9	24.6	15.8	46.4	28.7	98.9	28.3	56.8	62.6	61.4	62.8		60.3	101.2	59.8
MEANS (For Entries Listed)			31.9	29.0	20.7	53.5			31.8	55.9	61.6	60.5	62.3				59.1
7/ Growing Season Precipitation (in.)			10.3	8.3	7.5	n/a	n/a	7.2									
Soil PAW (in.) to SD @ Planting			9.0	7.9	8.9	7.8	8.9	8.1									
Total Plant Available Water (in.)			19.2	7.9	8.9	12.4	n/a	12.8									
Soil NO3 (lbs.) to SD at Planting			162	51	15	11	65	70									
SD (Sampling Depth in Inches)			48	48	48	48	48	48									
Fertilizer Applied			70	70	70	100	100	76									
			(# N)	40	40	40	20	20	36								
			(# P ₂ O ₅)	25	25	25	10	10	22								
			(# K ₂ O)														

Check Variety is Fortuna.

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 or Title 5 Pending, HW = Hard White Wheat.

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

4/ No harvest in 2014 due to hail.

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

6/ 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 Fortuna for the same years, and z = 9-Yr average yield or test weight for the check variety Fortuna.

7/ Seeding to 14 days prior to harvest maturity.

TABLE 2. Nine-Year Sawfly Summary on Selected Entries from Dryland Fallow Spring Wheat Variety Nurseries Grown Off-Station at the Leon Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2005-2014. (Exp# 9951-SW)

2/ VARIETY or SELECTION	No. of YEARS TESTED	1/ SAWFLY RATING (% of cut and lodged stems)										AVE. for YEARS TESTED	% of CHECK SAWFLY	9-YR COMP. AVE SAWFLY
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014 3/			
NDSW0449 MOTT (++)	4						3.7	5.0	1.0	0.0		2.4	16.0	2.0
BZ902413 WB GUNNISON (P+)	3							6.7	2.3	0.3		3.1	17.9	2.3
BZ996434 CORBIN (P+)	7			5.0	11.7	3.7	10.3	21.7	18.3	2.0		10.4	84.2	10.7
BZ992588 CONAN (P+)(saw fly tol)	7	5.0	26.7	11.7	10.0	3.7	3.7	23.3				12.0	92.3	11.8
CI 13596 FORTUNA (saw fly res)	9	5.0	23.3	16.7	8.3	1.0	8.3	28.3	20.0	3.7		12.7	100.0	12.7
PI633974 CHOTEAU (+, saw fly res)	9	5.0	21.7	6.7	13.3	3.7	13.3	36.7	28.3	6.7		15.0	118.0	15.0
AGRIPRO6 KELBY (P+)	6				21.7	7.0	8.7	30.2	21.7	3.3		15.4	132.8	16.9
MT 0832 DUCLAIR (++)	4						13.7	33.3	30.0	4.0		20.3	134.3	17.1
BZ9M1044 JEDD (P+)	6				23.3	3.7	3.7	43.3	16.7	3.7		15.7	135.4	17.3
AGRIPR12 SY TYRA (P+)	3							46.7	23.3	3.7		24.6	141.7	18.0
BZ999592 ONEAL (P+)	6				21.7	7.0	2.3	40.0	35.0	5.0		18.5	159.3	20.3
PI642366 VIDA (++)	9	0.0	53.3	38.3	20.0	2.3	18.3	26.7	33.3	3.3		21.7	170.6	21.7
AGRIPRO8 AP604 CL (P+)	5					13.3	20.0	38.3	28.3	10.0		22.0	189.5	24.1
BZ992322 HANK (P+)	9	6.7	78.3	38.3	20.0	5.7	8.3	58.3	28.3	8.3		28.0	220.1	28.0
ND 695 REEDER (+)	9	5.0	81.7	35.0	18.3	6.7	16.7	53.3	33.3	5.3		28.4	222.7	28.4
PI632252 OUTLOOK (++)	8	8.3	81.7	41.7	30.0	13.3	21.7	46.7	36.7			35.0	252.3	32.1
AGRIPRO7 KUNTZ (P+)	4				35.0	13.3	18.3	61.7				32.1	279.0	35.5
PI574642 McNEAL	9	16.7	73.3	56.7	46.7	18.3	25.0	80.0	61.7	21.7		44.4	348.9	44.4
ACS53610 VOLT (P+)	6				70.0	25.0	38.3	93.3	76.7	48.3		58.6	504.8	64.3
MEANS (For Entries Listed)		6.5	55.0	27.8	25.0	8.5	13.8	40.7	29.1	8.1				22.3
6/ Growing Season Precipitation (in.)		9.7	2.5	7.0	6.6	6.0	10.3	8.3	7.5	n/a	n/a	7.2		
Soil PAW (in.) to SD @ Planting		8.0	8.8	5.8	8.1	7.8	9.0	7.9	8.9	7.8	8.9	8.1		
Total Plant Available Water (in.)		17.7	11.3	9.6	14.6	13.8	19.2	7.9	8.9	12.4	n/a	12.8		
Soil NO3 (lbs.) to SD at Planting		84	64	81	n/a	94	162	51	15	11	65	70		
SD (Sampling Depth in Inches)		48	48	48	48	48	48	48	48	48	48	48		
Fertilizer Applied	(# N)	70	70	70	70	70	70	70	70	100	100	76		
	(# P ₂ O ₅)	40	40	40	40	40	40	40	40	20	20	36		
	(# K ₂ O)	25	25	25	25	25	25	25	25	10	10	22		

Long-term check variety is Fortuna.

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 or Title 5 Pending, HW = Hard White Wheat.

3/ No harvest in 2014 due to hail.

4/ Percent of Fortuna cut 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 saw fly rating of a given entry for years tested, y = average saw fly rating for Fortuna for the same years, and z = 9-Yr average saw fly rating for the check variety Fortuna.

6/ Seeding to 14 days prior to harvest maturity.

TABLE 3. Dryland Fallow Spring Wheat Cultivar Evaluation Nursery Grown Off-Station at the Flansaas-Lumsden Farm, Loring. Northern Agricultural Research Center. Havre, Montana. 2014. (Exp# 14-9955-SW)

ID	CULTIVAR or SELECTION	STAND %	PLNT HT Inches	1/ YIELD Bu/Ac	TEST WT Lbs/Bu	MOISTURE %	2/ PROTEIN %	3/ SAWFLY %
AGRIPR10	BRENNAN	94.3	21.9	47.3	57.4	12.4	15.2	0.0
PI633974	CHOTEAU	95.5	21.6	42.5	55.5	12.3	15.5	1.0
WB9879CL	CHOTEAU*3/CHOTEAU/IMI8134	98.1	24.4	43.7	55.5	12.3	16.0	0.0
MT 1103	CHOTEAU/MT0515	95.9	24.0	47.2	56.8	12.1	15.6	0.0
MT 1203	CHOTEAU/MT0744	95.5	23.2	43.6	55.6	12.4	16.2	0.0
MT 1236	CHOTEAU/REEDER(07SR241)//CHOTEAU/	93.0	21.4	36.8	54.8	12.4	16.6	0.0
BZ996434	CORBIN	97.1	23.6	41.4	56.4	12.6	15.4	0.3
PI660981	DUCLAIR	94.6	24.2	47.2	55.3	12.1	15.7	0.3
CI 13596	FORTUNA	95.2	28.7	38.3	56.3	12.3	15.3	1.0
BZ9M1044	JEDD	89.2	20.1	38.0	56.7	12.4	14.6	0.7
PI574642	MCNEAL	97.8	25.5	40.7	56.1	12.7	16.0	7.0
CAP400-1	MCNEAL/GLUPRO*2//CAP19/CH	97.4	23.7	41.5	54.7	12.4	17.2	0.3
NDSW0449	MOTT	96.5	23.2	41.9	55.3	12.3	16.3	0.7
MT 1172	MT0245/IMI8209-1//MT0245	95.9	24.4	48.7	55.8	12.3	15.4	0.7
BZ999592	ONEAL	94.3	23.3	45.3	57.0	12.6	15.7	0.0
ND 695	REEDER	96.8	24.8	47.7	57.1	12.4	15.9	2.3
AGRIPR12	SY TYRA	94.9	21.5	47.5	56.7	12.4	15.1	0.7
PI642366	VIDA	96.8	25.0	54.3	56.9	12.3	14.8	0.3
ACS52610	VOLT	96.5	25.8	45.8	58.1	12.5	14.8	2.0
BZ92413R	WB GUNNISON	94.6	24.3	45.9	57.5	12.2	14.6	0.0
EXPERIMENTAL MEANS		95.5	23.7	44.3	56.3	12.4	15.6	0.9
LSD (0.05)		4.8	2.5	6.0	0.5	0.3	0.5	2.4
C.V.%		3.0	6.4	8.1	0.6	1.3	1.9	164.3
P-VALUE (Varieties)		0.1733	<.0001	<.0001	<.0001	0.0052	<.0001	0.0003

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/ 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 (14-9955-SW)

Seeding Date: May 13, 2014

Harvest Date: September 7, 2014

Fertility: 100-20-10 side banded

System: no till

Herbicide: Axial, 16.4 oz/ac; Brox-M, 16 oz/ac

Insecticide: none

Previous Crop: Chemical Fallow - Spring Wheat

Precipitation: 5.59"

TABLE 4. Ten-Year Yield and Test Weight Summary on Selected Entries from Dryland Fallow Spring Wheat Variety Nurseries Grown Off-Station at the Flansaa/Lumsden Farm, Loring. Northern Agricultural Research Center. Havre, Montana. 2005-2014. (Exp# 9955-SW)

2/ VARIETY or SELECTION		No. of YEARS TESTED 3/	1/ YIELD (Bushels Per Acre)					AVE. for YEARS TESTED 3/	% of CHECK YIELD 4/	10-YR COMP. AVE. YIELD 5/	TEST WEIGHT (Pounds Per Bushel)					AVE. for YEARS TESTED 3/	% of CHECK TEST WT 4/	10-YR COMP. AVE. TEST WT 5/
			2010	2011	2012	2013	2014				2010	2011	2012	2013	2014			
CI 13596	VIDA (++)	10	37.0	38.0	29.7	71.4	54.3	40.1	129.0	40.1	56.5	61.2	60.8	60.5	56.9	58.3	99.3	58.3
ND 695	ONEAL (P+)	7	36.3	40.5	28.7	61.4	45.3	40.3	121.9	37.9	58.2	62.2	60.4	62.0	57.0	60.3	102.0	59.9
PI574642	REEDER (+)	10	32.9	34.9	26.6	70.3	47.7	37.2	119.8	37.2	56.7	61.7	60.2	61.8	57.1	58.6	99.8	58.6
PI633974	OUTLOOK (++)	8	28.6	37.0	29.1			31.2	114.7	35.6	55.3	60.6	60.0			57.2	97.5	57.3
PI642366	CORBIN (++)	8	30.5	36.6	29.3	58.8	41.4	36.6	113.9	35.4	55.8	61.5	60.9	60.8	56.4	58.7	99.0	58.1
BZ992322	AP604 CL (P+)	5	29.8	31.9	27.4	63.6		37.3	113.8	35.3	55.4	62.1	60.6	61.0		60.0	102.5	60.2
PI632252	DUCLAIR (++)	5	34.9	33.5	26.1	56.4	47.2	39.6	112.5	34.9	55.3	59.3	60.3	59.3	55.3	57.9	98.1	57.6
BZ996434	SY TYRA (P+)	4		34.0	26.8	59.3	47.5	41.9	112.0	34.8		62.5	57.9	61.3	56.7	59.6	102.0	59.9
BZ992588	JEDD (P+)	7	36.2	32.5	27.6	50.8	38.0	36.5	110.6	34.3	57.8	62.8	60.5	60.9	56.7	60.1	102.3	60.1
ACS53610	KUNTZ (P+)	4	30.1	32.9				32.0	110.3	34.3	56.5	61.9				59.5	99.8	58.7
BZ999592	HANK (P+)	9	30.2	32.9	25.4	53.4		33.2	109.7	34.1	55.1	60.6	60.5	58.8		57.8	97.0	57.0
BZ9M1044	MOTT (P+)	5	32.8	37.4	23.3	57.1	41.9	38.5	109.3	34.0	56.2	61.1	60.4	60.6	55.3	58.7	96.9	56.9
AGRIPRO6	CHOTEAU (+)(saw fly res)	10	29.6	34.2	25.1	55.7	42.5	33.7	108.6	33.7	54.5	60.5	59.7	59.6	55.5	57.3	97.4	57.3
PI619086	VOLT (P+)	7	34.7	34.6	21.5	57.8	45.8	35.9	108.6	33.7	57.8	62.5	60.6	62.4	58.1	60.2	102.0	59.9
AGRIPRO3	CONAN (P+)(saw fly tol)	7	32.8	32.4				29.8	106.9	33.2	57.4	61.6				58.8	102.7	60.4
AGRIPRO8	WB GUNNISON (P+)	4		34.8	23.1	55.4	45.9	39.8	106.4	33.0		61.8	59.4	61.7	57.5	60.1	103.0	60.5
AGRIPRO7	McNEAL	10	29.3	33.2	22.9	55.0	40.7	32.9	106.0	32.9	55.7	60.3	60.1	61.3	56.1	57.7	97.6	57.4
AGRIPR12	KELBY (P+)	6	35.1	33.3	22.4	53.0		33.6	104.6	32.5	57.0	62.7	61.0	61.6		60.3	99.6	58.5
BZ902413	FORTUNA (saw fly res)	10	26.4	34.2	22.7	54.4	38.3	31.1	100.0	31.1	56.4	61.0	59.8	60.9	56.3	58.2	99.0	58.2
MEANS (For Entries Listed)			32.2	34.7	25.7	58.4	44.3	35.9		34.6	56.3	61.5	60.2	60.9	56.5	58.9		58.7
6/ Growing Season Precipitation (in.)			11.6	n/a	n/a	9.5	5.6	7.2										
Soil PAW (in.) to SD @ Planting			7.7	7.1	8.8	8.8	8.9	8.6										
Total Plant Available Water (in.)			19.3	n/a	8.8	14.6	n/a	13.9										
Soil NO3 (lbs.) to SD at Planting			94	50	34	34	64	60										
SD (Sampling Depth in Inches)			48	48	48	48	48	48										
Fertilizer Applied			(# N)	70	70	70	100	100	76									
			(# P ₂ O ₅)	40	40	40	20	20	36									
			(# K ₂ O)	25	25	25	10	10	22									

Check Variety is Fortuna.

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 or Title 5 Pending, HW = Hard White Wheat.

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

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

6/ Seeding to 14 days prior to harvest maturity.

TABLE 5. Ten-Year Sawfly Summary on Selected Entries from Dryland Fallow Spring Wheat Variety Nurseries Grown Off-Station at the Flansaas/Lumsden Farm, Loring. Northern Agricultural Research Center. Havre, Montana. 2005-2014. (Exp# 9955-SW)

2/ VARIETY or SELECTION	No. of YEARS TESTED	1/ SAWFLY RATING (% Cut and Lodged)										AVE. for YEARS TESTED	% of CHECK SAWFLY 3/	10-YR COMP. AVE SAWFLY 4/
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
NDSW0449 MOTT (++)	5						1.0	5.0	1.0	0.0	0.7	1.5	40.8	3.2
BZ902413 WB GUNNISON (P+)	4							5.0	1.0	1.0	0.0	1.8	46.6	3.6
BZ996434 CORBIN (P+)	8			2.3	2.3	2.3	5.3	10.0	3.7	0.7	0.3	3.4	68.1	5.3
BZ9M1044 JEDD (P+)	7				1.0	2.3	2.3	10.0	11.7	0.0	0.7	4.0	77.7	6.1
BZ999592 ONEAL (P+)	7				1.0	3.7	2.3	16.7	8.3	0.0	0.0	4.6	88.7	6.9
P1633974 CHOTEAU (+)(saw fly res)	10	26.7	5.0	2.3	2.3	3.7	8.3	16.7	6.7	0.7	1.0	7.3	94.0	7.3
BZ992588 CONAN (P+)(saw fly tol)	7	35.0	13.3	1.0	2.3	1.0	1.0	13.3				9.6	96.2	7.5
CI 13596 FORTUNA (saw fly res)	10	30.0	8.3	3.7	4.0	5.3	11.7	6.7	6.7	0.7	1.0	7.8	100.0	7.8
AGRIPRO6 KELBY (P+)	6				5.3	2.3	3.7	15.0	15.0	0.0		6.9	118.0	9.2
AGRIPRO7 KUNTZ (P+)	4				5.3	5.0	10.0	20.0				10.1	145.8	11.4
P1642366 VIDA (++)	10	33.3	23.3	3.7	6.7	8.3	10.0	18.3	10.0	0.3	0.3	11.4	146.5	11.4
AGRIPRO8 AP604 CL	5					3.7	8.3	15.0	18.3	0.3		9.1	147.0	11.5
MT 0832 DUCLAIR (++)	5						10.0	15.0	6.7	0.0	0.3	6.4	170.3	13.3
AGRIPR12 SY TYRA (p+)	4							15.0	11.7	0.0	0.7	6.8	181.8	14.2
ND 695 REEDER (+)	10	33.3	55.0	10.0	3.7	3.7	10.3	18.3	15.0	0.7	2.3	15.2	195.3	15.2
BZ992322 HANK (P+)	9	31.7	63.3	20.0	2.3	6.7	5.0	11.7	11.7	0.7		17.0	198.7	15.5
P1632252 OUTLOOK (++) (RWA resistant)	8	38.3	68.3	10.0	8.3	8.3	13.3	15.0	16.7			22.3	233.6	18.2
ACS53610 VOLT (P+)	7				23.3	26.7	15.0	23.3	26.7	6.7	2.0	17.7	343.3	26.8
P1574642 McNEAL	10	88.3	71.7	16.7	6.7	21.7	20.0	20.0	25.0	1.0	7.0	27.8	356.3	27.8
MEANS (For Entries Listed)		39.6	38.5	7.7	5.3	7.0	8.1	14.2	11.5	0.8	1.3			11.7
5/ Growing Season Precipitation (in.)		n/a	2.4	7.4	8.9	5.3	11.6	n/a	n/a	9.5	5.6	7.2		
Soil PAW (in.) to SD @ Planting		9.1	8.3	8.3	8.2	10.5	7.7	7.1	8.8	8.8	8.9	8.6		
Total Plant Available Water (in.)		9.1	10.7	15.7	17.2	15.7	19.3	n/a	8.8	14.6	n/a	13.9		
Soil NO3 (lbs.) to SD at Planting		54	81	89	n/a	42	94	50	34	34	64	60		
SD (Sampling Depth in Inches)		48	48	48	48	48	48	48	48	48	48	48		
Fertilizer Applied (# N)		70	70	70	70	70	70	70	70	100	100	76		
(# P ₂ O ₅)		40	40	40	40	40	40	40	40	20	20	36		
(# K ₂ O)		25	25	25	25	25	25	25	25	10	10	22		

Long-term check variety is Fortuna.

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 or Title 5 Pending, HW = Hard White Wheat.

3/ Percent of Fortuna 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 Fortuna for the same years, and z = 10-Yr average saw fly rating for the check variety Fortuna.

5/ Seeding to 14 days prior to harvest maturity.

TABLE 6. Dryland Fallow Spring Wheat Cultivar Evaluation Nursery Grown Off-Station at McKeever Farm & Seed, Inc., Loma. Northern Agricultural Research Center. Havre, Montana. 2014. (Exp# 14-9957-SW)

ID	CULTIVAR or SELECTION	STAND %	PLNT HT Inches	1/ YIELD Bu/Ac	TEST WT Lbs/Bu	MOISTURE %	2/ PROTEIN %	3/ SAWFLY %
AGRIPR10	BRENNAN	94.3	22.7	35.4	59.3	8.7	15.5	0.3
PI633974	CHOTEAU	93.6	24.5	35.0	56.1	8.9	15.8	0.0
WB9879CL	CHOTEAU*3/CHOTEAU/IMI8134	92.2	24.1	37.3	56.0	8.9	15.7	0.3
MT 1103	CHOTEAU/MT0515	93.1	25.3	34.6	56.0	8.8	16.3	0.0
MT 1203	CHOTEAU/MT0744	90.0	23.3	29.3	56.0	8.8	16.4	0.0
MT 1236	CHOTEAU/REEDER(07SR241)//CHOTEAU/	92.8	23.6	38.6	55.2	8.8	16.3	0.0
BZ996434	CORBIN	94.2	25.0	37.0	56.5	8.9	15.3	0.0
PI660981	DUCLAIR	95.3	24.6	35.4	56.1	8.8	16.0	0.0
CI 13596	FORTUNA	91.1	31.3	34.3	57.7	8.8	15.8	1.0
BZ9M1044	JEDD	89.9	21.2	28.5	56.8	8.9	15.4	0.0
PI574642	MCNEAL	97.3	27.1	40.5	54.9	9.0	15.8	0.7
CAP400-1	MCNEAL/GLUPRO*2//CAP19/CH	94.3	24.7	37.4	54.7	8.7	17.0	0.7
NDSW0449	MOTT	93.4	26.2	32.3	57.0	9.0	16.7	0.3
MT 1172	MT0245/IMI8209-1//MT0245	92.5	24.8	39.1	55.6	9.0	15.5	0.0
BZ999592	ONEAL	94.0	24.8	37.3	55.6	9.2	15.9	0.7
ND 695	REEDER	94.2	24.6	35.7	55.7	9.0	16.0	0.7
AGRIPR12	SY TYRA	93.7	23.0	33.4	56.4	9.0	15.0	0.0
PI642366	VIDA	94.2	24.9	42.8	55.2	8.9	15.7	0.3
ACS52610	VOLT	91.3	23.0	35.0	58.3	8.9	15.8	1.0
BZ92413R	WB GUNNISON	90.9	24.1	35.8	57.3	9.0	15.0	0.0
EXPERIMENTAL MEANS		93.1	24.7	35.7	56.3	8.9	15.8	0.3
LSD (0.05)		5.6	2.2	4.9	1.1	0.2	0.6	0.6
C.V.%		3.6	5.4	8.3	1.2	1.5	2.4	123.7
P-VALUE (Varieties)		0.5877	<.0001	0.0002	<.0001	0.0302	<.0001	0.0036

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/ 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 (14-9957-SW)

Seeding Date: May 6, 2014

Harvest Date: August 12, 2014

Fertility: 100-20-10 side banded

System: no till

Herbicide: Bromac, 27 oz/ac

Insecticide: none

Previous Crop: Chemical Fallow - Spring Wheat

Precipitation: 5.11"

TABLE 7. Dryland Fallow Spring Wheat Cultivar Evaluation Nursery Grown Off-Station at the Kammerzell Farm, Chester. Northern Agricultural Research Center. Havre, Montana. 2014. (Exp# 14-9953-SW)

ID	CULTIVAR or SELECTION	STAND %	PLNT HT Inches	1/ YIELD Bu/Ac	TEST WT Lbs/Bu	MOISTURE %	2/ PROTEIN %	3/ SAWFLY %
AGRIPR10	BRENNAN	93.3	23.3	43.0	56.5	11.7	16.2	2.3
PI633974	CHOTEAU	86.8	23.7	29.9	53.3	11.8	17.1	3.7
WB9879CL	CHOTEAU*3/CHOTEAU/IMI8134	94.7	23.3	33.1	54.1	11.7	17.0	1.0
MT 1103	CHOTEAU/MT0515	93.9	23.6	35.2	55.6	11.9	17.2	0.3
MT 1203	CHOTEAU/MT0744	92.4	24.4	38.8	54.3	12.2	17.2	3.7
MT 1236	CHOTEAU/REEDER(07SR241)//CHOTEAU/	93.4	22.1	36.1	51.5	11.3	17.5	2.3
BZ996434	CORBIN	95.3	24.8	36.4	54.3	11.9	17.0	0.0
PI660981	DUCLAIR	97.8	25.7	40.3	52.6	11.6	17.3	2.3
CI 13596	FORTUNA	90.6	28.5	33.4	55.2	12.0	16.9	2.3
BZ9M1044	JEDD	90.8	21.1	31.5	55.6	11.9	16.3	1.7
PI574642	MCNEAL	93.4	25.3	34.6	53.7	11.7	17.1	8.3
CAP400-1	MCNEAL/GLUPRO*2//CAP19/CH	94.4	24.3	33.9	53.3	11.5	18.4	7.0
NDSW0449	MOTT	96.5	27.2	36.4	53.9	11.7	17.7	0.7
MT 1172	MT0245/IMI8209-1//MT0245	96.2	22.8	42.6	52.6	12.4	16.8	1.0
BZ999592	ONEAL	94.9	23.6	33.6	55.8	11.9	17.5	0.7
ND 695	REEDER	94.0	22.2	34.4	54.0	12.2	17.2	5.7
AGRIPR12	SY TYRA	94.1	22.9	34.7	53.7	11.9	16.2	2.0
PI642366	VIDA	95.3	23.7	37.0	52.8	11.9	16.9	1.0
ACS52610	VOLT	94.7	24.1	35.0	56.9	12.3	16.4	7.0
BZ92413R	WB GUNNISON	95.0	23.1	38.3	54.5	12.0	16.2	0.3
EXPERIMENTAL MEANS		93.9	24.0	35.9	54.2	11.9	17.0	2.7
LSD (0.05)		4.4	2.1	3.7	0.9	0.7	0.4	5.3
C.V.%		2.8	5.2	6.3	1.0	3.4	1.6	119.4
P-VALUE (Varieties)		0.0083	<.0001	<.0001	<.0001	0.1754	<.0001	0.0570

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/ 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 (14-9953-SW)

Seeding Date: May 7, 2014

Harvest Date: August 19, 2014

Fertility: 100-20-10 side banded

System: no till

Herbicide: none

Insecticide: none

Previous Crop: Chemical Fallow - Spring Wheat

Precipitation: not available