

2014 WINTER WHEAT VARIETIES

Performance Evaluation and Recommendations

Recommendations are made for the districts shown on the map below



by the Montana State University
Agricultural Experiment Station

The information in this publication can also be found at a link on:

<http://plantsciences.montana.edu/crops>

Another variety selection tool is available at :

<http://www.sarc.montana.edu/php/varieties.html>

2014 Recommended Varieties: Hard Winter Wheat for Montana by District

Variety	Districts (see map on cover)					
	1	2	3	4	5	6
	Northwest	Southwest	Southeast	Central	North Central	Northeast
Hard Red Winter Wheat						
Bearpaw ++ ^{2/}			D	D	D	
Broadview (P)++					D	D
Bynum (P) ^{2/} +				D	D	
Carter (P)+		D	D	D	D	D
CDC Falcon (P)+		DI	DI	DI	DI	DI
Colter++		D	D	D	D	
Decade +			D	D	D	D
Genou + ^{2/}			D	D	D	
Jagalene (P)+	D	D	D	D	D	
Jerry						D
Judee ++ ^{2/}			D	D	D	
Ledger (P)+		D		D	D	
Norris (P)+		D	D	D		
Promontory ^{1/}	D	D	DI	D		
WB-Quake (P)++	D	D	D	D	D	D
Warhorse++ ^{2/}			D	D	D	
Yellowstone +	D	D	D	D	D	

D = Dryland

I = Irrigated

(P) = a Private Variety

+ = a "Protected" variety under the Plant Variety Protection Act

++ = PVP Title V pending

^{1/} = dwarf smut resistant

^{2/} = sawfly areas only

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WINTER WHEAT VARIETY PERFORMANCE SUMMARY IN MONTANA

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Introduction

The agronomic characteristics of winter wheat varieties recently developed or evaluated by the Montana Agricultural Experiment Station are compared in this publication with other varieties grown in the state. Varieties recommended for production in the respective districts of Montana are designated by an **R**. A brief description of each variety is given which may include a variety's particular advantages or disadvantages. The information was extracted from the Intrastate Winter Wheat Nursery. This data is prepared by research personnel of the Montana Agricultural Experiment Station. Where available, up to four years of yield data are shown for the varieties. In some years data are not available because of hail, frost, or other unavoidable causes.

Variety Testing Procedures

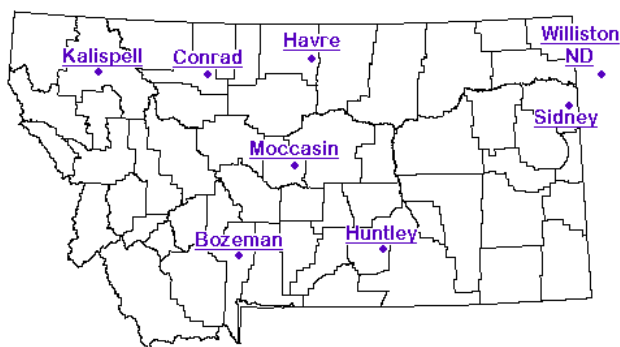


Fig. 1. Test Locations for Montana winter wheat performance tests in 2013.

Locations

Hard winter wheats were planted at 7 Montana and 1 North Dakota location (Fig. 1) including Conrad and Havre in the North Central district, Moccasin in the Central district, Huntley in the Southern district, Sidney and Williston, ND representing the Northeast district, Kalispell in the Northwest and Bozeman in the Southwest districts of the state.

Entries

Names of commercially available entries evaluated in 2013 are listed with their origins, experimental designation, release year, and pedigrees in Table 2 for the hard winter wheats and in Table 15 for the soft white wheats. Forty-nine hard wheats are included in this summary comprising 30 varieties (16 public and 14 private) and 19 experimental lines (all public). Numbered entries preceded by a state designation [e.g. MT0978 (Montana), MTS1024 (Montana)] are experimental lines provided by the breeder.

Experimental Design and Seeding Methods

The Intrastate Winter Wheat Test consisted of a 49 entry test with 3 replicates. It was planted in the form of 7x7 lattice at all. Plot size varied by location, from 35 ft² at Conrad to 60 ft² at Havre. Row number varies: Bozeman and Havre are 3-row, Conrad, Huntley, and Sidney are 4-row, Moccasin (5-row), Kalispell (7-row), and Williston (8-row) Row spacing at all locations was on 1 ft. centers, except at Williston and Kalispell (6" centers). All plots were seeded at 0.6 grams seeds/ft², which is roughly equivalent to 1 bushel per acre, except at Williston where the seeding rate was about 77 pounds per acre. Information on previous crop, planting date, fertilizer use and harvest date is available in Table 1.

All seed for each nursery was treated with Cruiser Maxx Cereals seed treatment at recommended rates before planting.

Description of Data Collected

Yield

All rows of each plot were trimmed and measured and harvested using an experimental plot combine. Grain yields are reported in bushels per acre based on a 60 pound standard bushel weight. In addition to yields obtained in 2013, data is provided for two (2012-2013), three (2011-2013) and four (2010-2013) year averages for hard wheat entries tested during previous cropping seasons

Table 1. Summary of agronomic practices used on hard winter wheat performance trials in Montana in 2013. Fall nitrogen (N), phosphorus (P₂O₅) and potassium (K₂O) were preplant applied and incorporated.

Location	2012 Crop	2011 Crop	2012 Planting Date	Fertilizer				2013 Harvest Date
				N		P ₂ O ₅	K ₂ O	
				Fall	Spring			
----- Pounds per acre -----								
Kalispell	peas	barley	Sep 25	10	60	35	90	Aug 8
Bozeman	peas	spring wheat	Sep 26	235	-	10	10	Aug 8
Huntley	chem. fallow	fallow	Oct 17	100	-	45	0	Jul 24
Moccasin	chem. fallow	barley	Sep 27	10	60	20	10	Aug 8
Conrad	fallow	barley	Sep 15	41	97	22	20	Aug 13
Havre	fallow	spring wheat	Sep 19	100	-	20	10	Aug 10
Sidney	fallow	safflower	Oct 1	0	50	0	0	no harv.
Williston, ND	fallow	safflower	Sep 26	69	-	19	0	Aug 15

Test Weight

Test weight (pounds per bushel) were obtained for each plot by using Dickey-John Grain Analysis Computer (GAC) at some locations. Other locations use a Seedburo test weight apparatus. In this case, a sample is dropped through a funnel at a given height into a quart brass bucket, excess grain is removed by a flat stick then weighed on a gram scale, and grams per quart are converted into pounds per bushels.

Heading Date

Heading date is taken when 50% of the heads in a plot were extended above the flag leaf collar. Heading dates are recorded both in ordinal date (number of days from January 1) and the actual calendar date.

Plant Height

Plant height was measured in inches from the soil surface to the top of the head, excluding the awns.

Grain Protein

Grain protein is sampled from a composite of all 3 replicated plots at each location. It is determined as a % by NIR (near infrared reflectance) on the Infratec whole grain analyzer. Samples are adjusted to a 12% moisture basis.

Winter Survival

Percent winter survival is estimated for each plot after initial spring green-up at locations where

significant winter injury occurred. In 2013, Sidney had 23% winter survival noted on May 22nd [range = 4% (Bynum) – 55% (Jerry)]; while Williston had 25% winter survival [range = 7% (Art) – 48% (MTCL1131)].

Table 11 contains information on % winter survival and associated yield in winter-kill environments from 2006 to 2013. The data summarizes 9 tests in which significant winter-kill occurred (test average for winter survival was less than 90%). All sites with winter-kill were in District 6 (Sidney and Williston) which is the most severe location for winter wheat survival of our testing locations.

Wheat Stem Sawfly

Wheat stem sawfly (WSS) is a persistent and economic problem for wheat growers in Montana. Currently, Montana wheat acreage infested by WSS is primarily in the north central (District 5), central (District 4) and south central (District 3) cropping districts. Host plant resistance in the form of stem solidness has been effective in reducing sawfly losses in both spring and winter wheat. Solid-stemmed winter wheats, 'Vanguard' (dropped from testing in 2009) and 'Rampart' were released in 1995 and 1996, respectively. These 2 varieties were planted on 6% of the winter wheat acreage in the 2012 crop year (Rampart was the leading variety planted in the 2003 to 2006 crop years). Both these varieties have marginal winter hardiness. 'Genou', released in 2004, was the leading variety during the period 2007-2011. In 2013, Genou was planted on 14% of the winter wheat acreage (second in acreage to Yellowstone at 24%). Newer solid-stemmed varieties include

Bearpaw (2011), Judee (2011), Warhorse (2013), and WB-Quake (2010).

Table 12 contains information on yield and % sawfly cutting at 17 testing locations where sawfly pressure was present during the years 2006-2013. The data is from Havre, North Havre (a site 25 miles north of Havre), Loma (15 miles northeast of Ft. Benton), Turner (60 miles east-northeast of Havre), and Willow Creek (35 miles west-northwest of Bozeman). Solidness scores (rated on a 5-25 scale) are shown for solid and semi-solid varieties in Table 14.

Coleoptile Length

Coleoptile length evaluation was performed in Bozeman under controlled (growth chamber) conditions. Twenty-five seeds per variety were planted in wetted vermiculite. After 15 days the coleoptile (sheath covering the emerging shoot that helps penetration to the soil surface) was measured. This test was replicated 3 times for each variety. Results from previous years are reported in Table 14. Long coleoptiles are generally longer than 4 inches, medium from 2.7-4 in, and short are under 2.7 in. Care should be taken not to plant short coleoptile varieties too deep.

Other Agronomic Characters

Table 14 contains information on grain maturity, chaff color, relative winter survival and straw strength for the hard wheat varieties listed in this publication.

Cereal Quality

Milling and baking characteristics for varieties are presented in Table 14. They are rated for each variety on a 1-5 scale (5 = superior). A quantitative polyphenol oxidase (PPO) has been determined for varieties since the 2006 mill and bake evaluation. These varieties are reported in Table 14 as low to high. A lower value is associated with better Asian noodle quality.

Disease Reactions

Disease reactions for hard red wheat varieties are listed in Table 14. There is information on dwarf smut, stripe rust, stem rust and leaf rust. Table 18, for soft white winter wheat, contains information on dwarf smut, snow mold, stem rust and stripe rust.

Statistical Analyses and Interpretation

The data collected at each winter wheat location was analyzed as a three-replication lattice or randomized complete block design. Least significant difference at the 0.05 probability level (LSD, $p = 0.05$) and coefficients of variation (CV) were calculated from analysis of variance at each location. The LSD is used to compare the performance of two specific varieties at a time. If the difference between two varieties exceeds the LSD this is interpreted as a true difference, because a difference between two varieties this large will only occur 5% of the time due to chance.

Tables 3 through 10 show 2012 data for hard winter wheat collected at all harvested experiment station sites. Where a variety has been in the test for two, three or four years, combined analyses of the yield data over years are presented.

Variety selection should be based on yield stability at a particular location over a period of years. Selection should also consider test weight, winter-hardiness, heading date, plant height, protein and disease resistance.

2013 Test Conditions

Statewide winter wheat yields were projected by the Montana Agricultural Statistics Service at 43 bu/a, for 2013, compared to 39 bu/a for the 2012 harvest year. The harvested acreage in 2013 was 1.90 million acres (total production = 81.7 million bu) compared 2.17 million acres in 2012 (total production = 84.6 million bu). Rainfall for the 2012-2013 winter crop year was below average at all locations tested (Table 13), except Havre, Sidney, and Williston. Average yearly temperatures were generally above long term (5 out of 8 locations) ranging from below average at Sidney (-0.4°F) and Williston (-0.7°F) to $+2.2^{\circ}\text{F}$ at Huntley.

Yields averaged 74 bu/a (range 54 (Williston) to 90 bu/a (Conrad). The nursery at Sidney was hailed out in early August prior to harvest. Yields of named varieties, across the 7 harvested locations ranged from a low of 62 bu/a (Carter) to a high of 83 bu/a for Yellowstone.

Test weight averaged 58.9 lb/bu across all locations. Conrad (60.1) was the only location above 60 lb/bu.

Winterkill at Sidney and Williston, a combined 24% survival across varieties, reduced yields of tender varieties (Art, Bynum, Curlew, Genou, Judee, Ledger, and Promontory).

Heading dates were generally later in 2013 than long term averages. Williston (+10 days), Sidney (+6 days), Moccasin (+2 days), and Havre (+1 day) had later than average heading dates. Conrad (-1 day), Huntley and Kalispell (-3 days), and Bozeman (-7 days) were earlier than long term average.

Stripe rust (average = 77%, range 23 – 100% on July 16) at Kalispell was a significant factor in yield (range 19 – 139 bushels per acre) reduction for highly susceptible varieties (Accipiter, Bearpaw, Broadview, Carter, CDC Falcon, Cowboy, Decade, Genou, Jerry, McGill, Norris, Overland, and WB-Matlock). There was some sawfly cutting recorded at the Havre Experiment Station averaging 10% of stems cut across varieties (range = 4 – 20%).

Protein content averaged 12.9% across all locations (location range = 11.5 – 14.5%) tested. Williston was the only location below 12%. The range of genotype means across all locations was 12.1 (McGill) – 13.9 (Bearpaw and Bynum) %.

Leading winter wheat varieties planted for 2013 were Yellowstone (23.5%), Genou (14.0%), AP503 CL2 (6.9%), Decade (6.0%), CDC Falcon (5.1%), and Rampart (4.5%).

Dwarf Smut (TCK)

Dwarf smut (TCK) can be controlled with 'Dividend' seed treatment (see page 5). Dwarf smut or dwarf bunt (*Tilletia controversa* Kuhn) is a fungal disease that occurs in areas where winter wheat is subjected to prolonged snow cover or unfrozen ground. The planting of dwarf smut resistant varieties (Promontory and Curlew are resistant) as one practical means of control.

The amount of wheat lost each year because of dwarf smut is small in relation to the state's total crop, but individual operators may experience severe losses in heavily infested, localized areas.

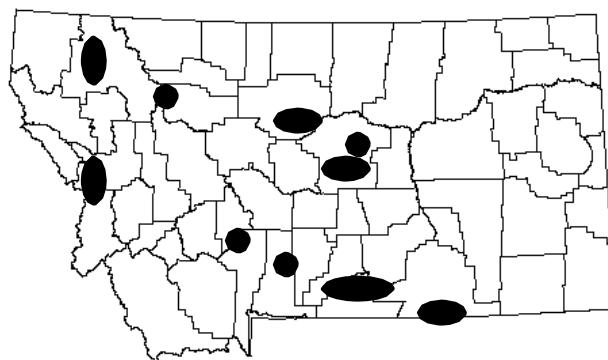


Fig. 2. Known areas of dwarf smut (TCK) infestations.

If you farm in the vicinity of one of the shaded areas in the map (Figure 2.), you would be well advised to observe closely your winter wheat crop and consider planting a resistant variety (Table 14) or use 'Dividend' seed treatment, only.

What Recommendation by MAES Means

Classification of winter wheat varieties is determined on a yearly basis by the Montana Agricultural Experiment Station (MAES) Wheat Variety Release Committee. This 16 member committee is composed of one wheat breeder, one cereal or forage quality scientist, one plant pathologist, one entomologist, one weed scientist, one cropping systems specialist, six Research Center agronomists, one manager from both the Montana Foundation Seed program and the Montana Seed Growers Association, one Montana Wheat and Barley Committee member and one representative of the Montana Agricultural Experiment Station Advisory Board.

A variety is eligible for recommendation when a minimum of 16 location-years of performance data is obtained from the Montana State University statewide winter wheat performance trials. Test results indicate that the variety is equal to or superior in overall merit to specified check cultivars and has end-use quality equal to or exceeding currently recommended varieties. For varieties originating from private companies, recommendation is considered only at the request of the company when adequate data is available.

Recommendations of varieties are considered on a case by case basis. Yield performance of a variety is an important criteria, but also considered are test weight, grain protein content, winter survival, pest resistance and end-use quality data. In general,

yield needs to be at least equal to currently recommended varieties in a particular district, unless the variety is being recommended for a specific purpose, e.g. winter hardiness, sawfly resistance. For example, Rampart, which is not competitive in the absence of wheat stem sawfly, is recommended in Districts 3, 4 and 5 for sawfly areas only. Only six varieties are recommended for the Northeast district due to severe winter conditions and a higher probability of stem rust in this region. Thus varieties recommended for District 6 must have higher winter survival and stem rust resistance.

If a serious defect in the variety is identified during performance testing, the variety will not be recommended. Examples of defects resulting in non-recommendation include: high probability of winter-kill, low grain protein, low baking quality, etc.

Lack of variety recommendation by MAES may occur due to a decision by the originating company not to test the variety in statewide performance trials. In this case the lack of recommendation is due to inadequate or no data rather than a specific varietal defect.

Montana produces primarily hard red winter and hard red spring wheats. Continuous improvement of the milling and/or baking quality of Montana grown winter wheat is one of many objectives of the Montana Agricultural Experiment Station breeding and cultivar development program. All varieties recommended by the Montana Agricultural Experiment Station have been evaluated and found to be acceptable for milling and baking performance by the Cereal Quality Laboratory at Montana State University.

The quality of Montana recommended varieties, if grown and marketed within their respective classes, is acceptable by domestic users. Montana's future as a hard red and hard white winter wheat producing state for both the domestic and export markets rests on the quality of the product.

Producing Winter Wheat

Plant **CERTIFIED CLASS SEED** of varieties **RECOMMENDED** by the Montana Agricultural Experiment Station.

Seed Treatment

Treat all winter wheat seed with a recommended fungicide to reduce losses caused by cereal smut or other seed-borne diseases. Several non-mercurial compounds are registered for grain seed treatment.

Dwarf smut (bunt) can be controlled with difenoconazole. Dividend® contains this compound and is available in Montana. If you farm in a dwarf smut area contact your seed dealer or chemical representative for more information about this seed treatment. See page 4 for known areas of dwarf smut infestations.

Diseases are best controlled when all seeds are coated with a seed treatment. Do not over-treat-- Follow recommendation of manufacturer of product as to rate.

Truck-mounted seed treaters, which apply the fungicide as the seed is augered into the drill box, do a good job of treating if operated according to manufacturer's specifications.

Drill box treatments are not effective for general use.

When using any pesticide materials, read the information on the label as to rate of application, specific uses, methods of handling, precautions, etc.

Seeding Rate and Date

The following rates and dates for seeding are general (Figure 3). The heavier seeding rate, where indicated, is applicable to plump seed of high test weight (above 60 lbs/bu) or for seed having a kernel size larger than normal for most other varieties. The lighter rates are for the smaller seeded varieties or when test weight is below normal for larger seeded varieties. Seeding rates may be lower if adequate nitrogen and phosphorus amounts are applied at planting.

Winter wheat seed lots may vary in the number of seeds per pound depending on the ratio of large-to-small seeds in a seed lot. The average is approximately 15,000 seeds per pound. A precise count of the number of seeds per pound should be made on your seed lot to help calibrate your drill. You can also calculate how many pounds of seed you will need to plant an acre.

Figure 3. Seeding rate and date for winter wheat

Districts	Dryland	Irrigated	Date of Seeding
5,6 1,2,3,4	30-60 30-60 (10-20 seeds/sq. ft.)	60-75 60-75 (20-25 seeds/sq. ft.)	Sept. 1-15 Sept. 10-25

square frame out of 3/8 inch rod. Walk the field in a zigzag pattern counting at ten random locations.

Fields that have 80 or more plants per square yard will probably produce more than if replanted to spring wheat (information taken from 1995 Master's Thesis, "Critical Overwintering Plant Population for Successful Winter Wheat Production in Montana" by Doug Holen).

As to seeding date -- DO NOT SEED TOO EARLY in areas where root rot diseases are prevalent. In areas where *Cephalosporium* stripe, wheat streak mosaic virus or other root rot diseases have caused losses, delay seeding until the soil temperature in the seed zone will stay below 55°F except for brief periods during the day. In the southern half of Montana, this is usually September 10 to 20. In Districts 5 and 6, seed between September 1 and 15. Cooler soil temperatures slow root development and reduce the probability of winter root injury and invasion by soil-borne organisms. To reduce the incidence of root and foot rots, plant winter wheat on land previously seeded to other crops such as barley, oats or spring wheat. Extreme seeding delay, however, reduces seedling vigor and increases chances of winter-kill.

Seeding Depth

Set the drill to place the seed 1 to 2 inches below the soil surface. Deeper seeding reduces tillering and lowers crop yields. With the furrow drills, wind-driven soil particles settle in the furrows covering the seed deeper than desired.

Yield in Winter Wheat as Influenced by Percent Stand

During periods of winter injury farmers are frequently faced with a decision as to whether or not a field should be torn up and re-seeded. A 40 to 50 percent winter wheat stand, if general over field, may produce as much as re-seeded spring wheat. Thinner stands will likely demand more attention for weed control.

The guidelines for evaluating winter wheat stands are to determine the average number of healthy plants per square yard. We suggest making a

Table 2. List of public and private hard winter wheat varieties.

Variety	Experimental Designation	Origin	Release Year	Pedigree
Public Varieties				
Accipiter	DH00-18-196	Saskatchewan	2008	CDC Raptor/CDC Falcon
Bearpaw	MTS0721	Montana	2011	selection from a composite of 5 crosses: 99X96, DMS/Rampart//Pronghorn/3/2/Rampart; 99X97, DMS/Rampart//Pronghorn/3/Rampart/4/(MTW9806, Redwin/Rio Blanco/NuWest); 99X98, DMS/Rampart//Pronghorn/3/Rampart/4/NuPlains; 99X99, DMS/Rampart//Pronghorn/3/Rampart/4/(MT9513, NuWest/5/(TAMW-103/Froid/4/Yogo/Turkey Red/3/Centurk, MT8030)); and 99X100, DMS/Rampart//Pronghorn/3/Rampart/6/(MT98113, Judith/5/(MT8764, Crest/(VT1230, French male sterile line)/4/(PI178383/Cheyenne/3/Tendoy, ID5011)/3/(ID5006, Norin 10/Staring/ 2*Cheyenne), ID745101)))
Colter	MT08172	Montana	2013	(Yellowstone sib, MT9982)*2/(BZ9W96-895, ped. unknown from male sterile pop.)
Cowboy	CO050322	Colorado, Wyoming	2012	(Yuma/T-57/4/(CO850034, NS14/NS603// Newton/3/Probrand 835)/5/4*Yuma/6/NEWS12, CO980829)/7/TAM 111 (sib of Denali)
Curlew	UT9325-55	Utah	2009	Golden Spike sib/3/Manning/R-82-1859/Weston
Decade	MT0552	Montana; North Dakota	2010	selection from composite of 3 crosses: ((Sumner sib, KS831936-3, (Plainsman V/Odesskaya 51))/(NE86501, Colt/Cody), N95L159, Wesley sib)/3/ CDC Clair, N95L159/(MT9602, NuWest/Tiber) and N95L159/4/(MT9609, Froid/SD1287// Redwin/3/NuWest)
Genou	MTS0031	Montana	2004	(Lew/Tiber//Redwin, MTS92015)/3/Vanguard/ Norstar
Jerry	ND9257	North Dakota	2001	Roughrider/(ND7571, Winoka/NB66425)/3/ Arapahoe
Judee	MTS0713	Montana	2011	(Vanguard/Norstar/Judith dwf, 93X312E14)/3/ NuHorizon
McGill	NE01481	Nebraska	2010	((Vona/Chisholm/Plainsman V, OK83201)/3/ Redland, NE92458)/4/Ike
Overland	NE01643	Nebraska	2007	(Millenium sib, NE94482)/(ND8974, Seward/ Archer)
Promontory	UT1567-51	Utah	1990	Manning/Bezostaya-1
Rampart	MTS92042	Montana	1996	Lew/Tiber//Redwin
Robidoux	NI04421	Nebraska	2010	(Odesskaya polukarikovaya/Cody//Pavon/ 3*Scout 66, NE96644)/3/Wahoo sib
Warhorse	MTS0808	Montana	2013	selection from a composite of 3 crosses: 00X182, ((Froid/Winoka/7/((Sinvalcho/Wichita// Hope/Cheyenne /3/Wichita/4/Seu Seun 27, TX55-391-56-D8)/5/Westmont, MT6928)/6/ Trader, MT85200)/8/ Redwin, MT9908)/9/ Nuplains/6/(MTS9862, (NuWest/ Lovrin 24 /4/((Rego/Cheyenne, Sel. 39-18-7)/ Winalta, MT7431)/3/(MT7115, Yogo/T. polonicum-70-5), MT91366)/5/ (MTS92137, Lew/Tiber//Redwin)); 00X183, Nuplains/MTS9862/4/ (MTW0047, Judith/(PI262605, Karagach, RWA resis.)/3/(S86-740, Norstar/ Plainsman V //Ulianovka)); and 00X184, Nuplains/MTS9862/5/(MTS0028, Vanguard/4/(Lew/Tiber//Redwin, MTSF1570)/3/ Norstar)
Yellowstone	MT00159	Montana	2005	F ₂ composite of Promontory/Judith and Judith-dwarf/Promontory
Private Varieties				
Art	98x0338-13	AgriPro, Sygenta	2007	Jagger/4/(W94-244-132, (TAM 200/ Mesa sib, W189-088)/3/(W188-052, (C78-244/Archer, 82F2042#2))/ Mesa sib))
Broadview	LE1911	Alberta, Meridian Seeds LLC	2009	KS92WGRC15/CDC Kestrel//CDC Falcon
Bynum (CL)	MTCL0318	WestBred LLC, Montana	2005	Rampart/FS2//CDC Kestrel, FS2 = mutagenized Fidel
Carter	BZ9W02-2060	WestBred LLC	2006	Jagger/Rampart
CDC Falcon	S94-4	Western Plant Breeders/Saskatchewan	1999	Norstar*2/Vona//Abilene
Jagalene	W98-362	AgriPro Seeds	2002	Jagger/Abilene
Ledger	BZ9W96-788-d	WestBred LLC	2004	(Hatten/SS-14, BZ9W92-709)/3/(MTSF1142, Lew/Tiber//Redwin)
Norris (CL)	MTCL0316 (IMI)	WestBred LLC, Montana	2005	Big Sky/(TXGH 12588-26, TAM-110 sib)*4/FS2
Radiant	W337	Alberta, Meridian Seeds LLC	2002	Norstar*6/Cmc1//Norwin/UT125512, WSMV resistant
SY Clearstone	MTCL1077	Syngenta,	2012	Yellowstone*4/3/MTCL01158/CDC Teal 11A/Jagalene
SY Wolf	BC01007-7	AgriPro, Syngenta	2010	((TAM-108/Veery sib, SWM1524)/TX84V2029, TX91V3308)/3/(W93-359, W188-052/W96-180), W99-331)/4/(97x0906-8, (Mesa/W89-328, W96-180)/(W95-188, Karl 92/W98-232))
WB3768	MTW08168	Montana, licensed to: WestBred LLC (Monsanto)	2013	selection from a composite of 2 crosses: 01X225, (Judith/(PI262605, Karagach, RWA resis.)/3/(S86-740, Norstar/ Plainsman V //Ulianovka), MTW0047)/4/ 2*(MT9982, Yellowstone sib.) and 01X226, MTW0047/MT9982/(MT9989, Judith/Arapahoe)
WB-Matlock	CA9W07-817	WestBred LLC (Monsanto)	2010	CDC Falcon/Jerry
WB-Quake	BZ9W05-2043	WestBred LLC (Monsanto)	2011	Rampart/Kestrel

Table 3. HARD WINTER : District 1-- Kalispell - Dryland (High Rainfall)

Cultivar/Line	Grain Yield (bushels/acre)				2013 Data						
					Test	Heading Date		Plant	Lodg-	Stripe	Protein
	2013	2012-13	2011-13	2010-13	weight	Ordinal	Calendar	height	ing	rust	
		2 yr	3 yr	4 yr	lb/bu	from Jan1		in	%	%	%
Accipiter +	64.1	43.0	46.0	69.0	54.8	161.3	10-Jun	39.4	2	100	12.1
Art (P)+	123.2*	84.1	76.7	94.0	59.5	154.6	4-Jun	41.3	2	83	12.6
Bearpaw ++	31.1	23.0	27.6	58.5	38.2	157.1	6-Jun	40.2	16	100	16.4
Broadview (P)++	61.3	36.7	32.9	57.8	48.8	160.9	10-Jun	38.8	0	100	13.1
Bynum (P, CL)+	85.8	67.3	70.9	87.4	59.3	157.3	6-Jun	44.6	66	100	13.3
Carter (P)+	26.9	18.6	18.7	47.9	46.5	157.6	7-Jun	36.8	0	100	15.4
CDC Falcon (P)+	76.6	57.7	55.9	76.8	56.2	158.3	7-Jun	38.9	1	100	12.4
Colter ++	129.8*	112.6*	115.6*		59.9	160.6	10-Jun	42.5	0	40	13.1
Cowboy ++	71.3				51.5	157.5	7-Jun	40.1	0	100	12.7
Curlew ^{1/}	122.5	97.9	102.9	116.8*	60.1	158.0	7-Jun	43.7	34	64	13.1
Decade +	42.4	25.8	22.6	48.9	42.6	157.0	6-Jun	39.4	0	100	15.3
Genou +	57.4	36.8	33.2	59.8	49.9	158.9	8-Jun	44.8	39	100	13.7
R Jagalene (P)+	107.8	86.2	80.3	98.6	59.0	156.9	6-Jun	41.0	1	55	12.9
Jerry	43.0	29.3	28.9	50.9	44.6	160.2	9-Jun	48.5	5	100	13.6
Judee ++	106.6	83.7	90.8	105.1	57.4	158.9	8-Jun	39.0	31	30	12.2
Ledger (P)+	99.3	71.5	63.4	82.5	58.3	157.3	6-Jun	40.8	0	100	11.8
McGill +	77.3	49.1	51.2		55.4	154.4	3-Jun	43.0	0	100	11.8
MT0978	125.0*	92.6	95.6		57.1	160.9	10-Jun	42.2	26	27	13.1
MT10116	109.2	96.7			58.7	161.0	10-Jun	41.3	1	85	12.4
MT1078	106.6	84.8			53.7	158.7	8-Jun	40.4	0	95	13.6
MT1090	111.8	97.5			57.5	157.8	7-Jun	43.2	1	80	12.3
MT1091	112.7	92.6			55.5	158.2	7-Jun	41.7	0	90	13.1
MT1092	114.8	99.6			58.8	159.5	9-Jun	42.7	0	87	11.4
MT1102	106.4				56.0	159.4	8-Jun	40.6	0	90	13.4
MT1105	104.1	84.5			58.0	158.5	8-Jun	42.2	1	91	12.3
MT1108	122.8				58.9	158.4	7-Jun	41.9	3	92	11.7
MT1113	112.6				60.5	160.1	9-Jun	43.2	1	76	11.9
MT1117	131.1*				61.2	160.5	10-Jun	43.3	6	23	11.7
MT1137	72.6				54.2	157.5	7-Jun	41.7	0	100	12.9
MT1138	130.4*				60.3	158.7	8-Jun	44.1	0	48	12.4
MT1143	105.5				58.1	156.2	5-Jun	39.4	0	98	12.8
MT1156	112.3	92.9			59.5	160.4	9-Jun	41.7	31	20	12.5
MTCL1131	120.5				59.6	158.8	8-Jun	44.5	1	37	12
MTS0826-63	107.0				61.0	161.8	11-Jun	39.7	54	52	13.6
MTS0832	18.9				43.8	161.0	10-Jun	42.4	7	100	16.5
MTS1024	117.1	92.4			57.1	159.4	8-Jun	37.9	0	93	12.6
MTW08168 (WB3768, P,	121.5	109.6*	112.4*		58.3	161.4	10-Jun	45.2	47	70	11.8
Norris (P, CL)+	73.0	52.4	48.9	71.2	55.7	155.0	4-Jun	46.5	0	100	13.4
Overland +	79.9	48.6	43.8	68.9	53.1	156.0	5-Jun	44.8	0	100	12.9
R Promontory ^{1/}	138.5**	123.4**	124.2**	132.1**	62.8	157.0	6-Jun	43.1	0	74	11.9
Radiant (P)	114.0	100.1	99.5	111.3	61.5	160.3	9-Jun	43.5	0	43	12.5
Rampart	85.9	67.3	67.3	84.3	58.0	158.7	8-Jun	41.8	75	98	13.4
Robidoux +	120.7	85.3	79.9	97.5	58.4	154.1	3-Jun	41.7	15	67	12.0
SY Clearstone 2CL (P, C	117.8	97.0			59.6	159.8	9-Jun	43.7	0	85	12.0
SY Wolf (P)+	115.2	87.7	85.3		59.3	155.4	4-Jun	39.5	0	32	13.4
Warhorse ++	115.4	95.0	101.4	114.3*	60.9	158.3	7-Jun	39.1	34	32	13.1
WB-Matlock (P)+	59.8				50.1	158.8	8-Jun	45.5	0	100	13.7
R WB-Quake (P)+	110.3	91.1	93.5	110.6	60.0	160.8	10-Jun	42.0	7	60	12.6
R Yellowstone +	124.2*	104.4*	105.9	120.0*	59.2	159.8	9-Jun	43.9	0	76	12.4
Average	96.8	76.2	70.6	85.4	56.1	158.6	8-Jun	42.0	10.3	77.4	12.9
LSD (0.05)	15.6	19.8	17.1	20.7		1.5		2.1	27.5	17.7	
C.V.	9.6	12.8	14.8	17.2		0.5		2.9	162.6	14.1	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

* = indicates varieties yielding equal to highest yielding variety within a column based on Fisher's protected LSD (p=0.05)

R = Recommended Variety; (P) = Private Variety; + = Protected Variety; ++ = PVP Pending

^{1/} = Dwarf Smut Resistant; (HWW) = Hard White Winter Wheat

Table 4. HARD WINTER : District 2-- Bozeman - Dryland (Moderate Rainfall)

*** No harvest in 2010 due to severe hail ***								
Cultivar/Line	Grain Yield (bushels/acre)			2013 Data				
				Test	Heading Date		Plant	Protein
	2013	2012-13	2011-13	weight	Ordinal	Calendar	height	
		2 yr	3 yr	lb/bu	from Jan1		in	%
Accipiter +	74.9	73.4	69.0	58.1	166.6	16-Jun	36.4	14.9
Art (P)+	93.8*	89.7*	83.8*	61.4	160.1	9-Jun	33.8	15.0
Bearpaw ++	82.7	78.5	73.4	60.1	163.8	13-Jun	33.9	14.5
Broadview (P)++	78.3	71.2	66.2	57.9	164.5	14-Jun	34.8	14.8
Bynum (P, CL)+	81.4	76.4	73.7	62.1*	161.8	11-Jun	38.0	15.2
R Carter (P)+	82.7	76.7	63.4	60.8	163.0	12-Jun	32.6	14.2
R CDC Falcon (P)+	80.2	75.5	68.7	58.5	163.0	12-Jun	33.3	14.7
R Colter ++	87.8	81.4	86.3*	59.1	166.0	15-Jun	35.6	14.9
Cowboy ++	90.5*			59.8	162.1	11-Jun	35.5	13.9
Curlew ^{1/}	97.2*	86.9	86.9*	59.5	164.4	13-Jun	39.0	14.1
Decade +	89.0	83.8	75.7*	59.8	162.4	11-Jun	34.3	15.2
Genou +	78.4	73.3	64.8	60.9	164.3	13-Jun	38.6	15.1
R Jagalene (P)+	96.8*	92.4*	84.4*	62.6**	162.1	11-Jun	34.5	13.7
Jerry	79.0	77.3	73.8	59.0	165.8	15-Jun	42.2	14.5
Judee ++	81.8	76.8	80.9*	59.8	164.0	13-Jun	35.5	15.6
R Ledger (P)+	79.0	76.6	66.9	60.6	163.3	12-Jun	34.1	13.8
McGill +	83.9	79.6	71.0	59.4	160.2	9-Jun	35.9	14.3
MT0978	90.9*	84.8	85.7*	59.0	165.1	14-Jun	34.4	14.7
MT10116	86.3	80.8		59.4	167.1	16-Jun	35.8	14.6
MT1078	97.6*	94.3**		58.7	164.3	13-Jun	34.3	13.4
MT1090	91.5*	84.6		59.2	164.4	13-Jun	36.0	14.6
MT1091	86.3	84.8		58.4	164.3	13-Jun	35.9	14.2
MT1092	86.6	84.2		59.4	166.2	15-Jun	38.0	14.0
MT1102	91.6*			59.6	164.6	14-Jun	33.4	14.5
MT1105	88.6	83.6		59.2	164.4	13-Jun	35.6	14.5
MT1108	87.3			59.5	165.6	15-Jun	35.9	14.6
MT1113	92.3*			60.9	165.8	15-Jun	36.5	14.1
MT1117	84.2			59.8	165.4	14-Jun	35.9	15.0
MT1137	84.4			60.3	164.0	13-Jun	35.5	14.2
MT1138	89.8			59.2	165.0	14-Jun	36.6	14.4
MT1143	93.8*			59.5	162.6	12-Jun	33.6	13.6
MT1156	89.8	88.1*		60.3	165.7	15-Jun	34.6	14.0
MTCL1131	90.1			60.2	164.5	14-Jun	37.1	14.7
MTS0826-63	80.5			60.8	167.6	17-Jun	36.7	15.4
MTS0832	75.7			59.0	167.2	16-Jun	39.4	15.3
MTS1024	91.3*	90.2*		57.8	164.9	14-Jun	33.6	14.2
MTW08168 (WB3768, P,	92.7*	85.4	85.6*	59.4	168.5	18-Jun	39.8	15.0
R Norris (P, CL)+	85.8	81.5	74.1	61.0	161.3	10-Jun	37.3	14.1
Overland +	89.4	90.0*	81.6*	62.4*	161.3	10-Jun	36.3	13.8
R Promontory ^{1/}	94.0*	84.9	90.0**	61.6	164.1	13-Jun	36.8	13.4
Radiant (P)	74.9	68.6	73.5	59.1	166.0	15-Jun	37.0	14.6
Rampart	74.3	72.1	73.0	60.4	163.8	13-Jun	39.2	15.7
Robidoux +	90.2*	85.6	84.9*	61.6	160.4	9-Jun	34.7	13.8
SY Clearstone 2CL (P, C	81.8	82.3		57.9	164.6	14-Jun	35.3	14.9
SY Wolf (P)+	97.8**	91.1*	82.5*	61.4	162.9	12-Jun	33.0	14.4
Warhorse ++	87.7	80.5	83.2*	59.3	164.6	14-Jun	35.7	14.4
WB-Matlock (P)+	76.1			59.9	164.6	14-Jun	37.1	14.6
R WB-Quake (P)+	76.7	76.2	78.5*	60.0	166.1	15-Jun	35.2	15.1
R Yellowstone +	94.5*	86.9*	88.4*	59.4	164.6	14-Jun	36.6	14.1
Average	86.4	81.7	77.5	59.9	164.3	13-Jun	35.9	14.5
LSD (0.05)	7.5	7.4	15.5	0.8	1.2		1.3	
C.V.	4.9	4.4	12.2	0.7	0.4		2.1	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

* = indicates varieties yielding equal to highest yielding variety within a column based on Fisher's protected LSD (p=0.05)

R = Recommended Variety; (P) = Private Variety; + = Protected Variety; ++ = PVP Pending

^{1/} = Dwarf Smut Resistant; (HWW) = Hard White Winter Wheat

Table 5. HARD WINTER : District 3-- Huntley - Dryland

Table of HARD WINTER Districts Ranking Dryland					2013 Data				
Cultivar/Line	Grain Yield (bushels/acre)				Test weight	Heading Date	Plant	Protein	
	2013	2012-13	2011-13	2010-13					
		2 yr	3 yr	4 yr	lb/bu	from Jan1		in	%
Accipiter +	62.1	61.0	65.4	68.7	58.1	162.0	11-Jun	33.6	14.8
Art (P)+	72.6*	66.0	73.7*	76.7*	60.2	156.0	5-Jun	31.2	13.9
R Bearpaw ++	61.9	58.0	63.6	70.1	58.6	161.0	10-Jun	31.5	14.7
Broadview (P)++	65.9	63.2	66.0	68.9	58.7	161.3	10-Jun	33.9	14.7
Bynum (P, CL)+	55.2	55.5	61.3	68.3	60.1	160.0	9-Jun	36.5	15.4
R Carter (P)+	64.7	62.6	64.6	66.6	60.7	160.0	9-Jun	30.6	14.8
R CDC Falcon (P)+	67.1	64.1	65.3	70.1	58.1	158.7	8-Jun	31.5	14.6
R Colter ++	66.8	67.0	70.7		59.0	162.0	11-Jun	35.5	14.1
Cowboy ++	77.1**				60.1	159.0	8-Jun	33.4	13.0
Curlew ^{1/}	71.0*	70.3*	72.5*	78.7*	58.6	156.3	5-Jun	38.0	14.1
R Decade +	71.2*	68.0	68.6	74.5	58.4	160.3	9-Jun	32.5	14.8
R Genou +	56.8	55.3	61.5	65.1	60.3	160.7	10-Jun	36.6	14.6
R Jagalene (P)+	75.1*	65.7	65.4	70.1	62.5	156.3	5-Jun	31.6	13.6
Jerry	61.4	59.7	60.6	64.5	60.1	163.3	12-Jun	39.1	13.9
R Judee ++	61.8	62.2	66.0	71.4	59.8	161.0	10-Jun	34.5	14.9
Ledger (P)+	60.3	57.6	62.5	70.2	59.7	161.0	10-Jun	32.5	13.9
McGill +	62.0	62.3	70.9		59.7	154.7	4-Jun	33.0	13.0
MT0978	67.8	65.1	71.0		58.6	166.0	15-Jun	33.3	14.5
MT10116	70.0	71.4*			58.3	161.3	10-Jun	33.0	14.1
MT1078	75.2*	76.5**			58.4	161.3	10-Jun	35.2	13.8
MT1090	66.4	73.3*			57.2	161.0	10-Jun	34.3	14.3
MT1091	64.6	64.5			57.5	161.0	10-Jun	34.5	14.2
MT1092	67.2	67.6			59.2	161.7	11-Jun	34.9	13.7
MT1102	63.2				58.6	161.7	11-Jun	32.8	14.3
MT1105	68.0	70.1*			58.1	161.0	10-Jun	33.3	13.8
MT1108	62.5				58.8	161.0	10-Jun	33.6	14.1
MT1113	72.0*				60.1	161.0	10-Jun	34.5	13.4
MT1117	64.2				59.2	161.3	10-Jun	34.9	14.1
MT1137	62.5				59.9	161.3	10-Jun	32.6	13.8
MT1138	67.8				58.3	161.0	10-Jun	32.7	14.2
MT1143	68.8				58.8	160.0	9-Jun	33.2	13.6
MT1156	67.6	68.2*			58.6	162.0	11-Jun	33.9	14.7
MTCL1131	63.0				58.0	161.0	10-Jun	35.7	14.3
MTS0826-63	63.1				60.6	164.0	13-Jun	34.8	15.2
MTS0832	62.6				58.4	164.0	13-Jun	34.0	14.9
MTS1024	72.2*	73.3*			56.8	162.0	11-Jun	33.4	13.6
MTW08168 (WB3768, P,	59.2	60.1	67.8		59.0	168.0	17-Jun	38.8	14.2
R Norris (P, CL)+	62.0	64.1	67.5	73.8	60.2	156.7	6-Jun	34.1	13.9
Overland +	75.3*	74.2*	80.2**	82.8**	62.3	157.0	6-Jun	33.3	12.8
R Promontory ^{1/}	65.9	68.0	70.9	74.1	61.2	160.3	9-Jun	35.2	13.4
Radiant (P)	59.4	58.0	62.4	66.5	58.9	161.3	10-Jun	36.3	14.2
Rampart	53.5	54.7	61.0	63.4	59.9	161.3	10-Jun	37.0	15.1
Robidoux +	65.6	68.6*	70.8	75.3	59.8	155.3	4-Jun	31.8	13.5
SY Clearstone 2CL (P, C	63.9	67.1			56.4	161.3	10-Jun	35.1	14.2
SY Wolf (P)+	64.6	66.7	71.2		60.0	156.0	5-Jun	30.7	14.5
R Warhorse ++	62.7	64.1	69.3	72.0	57.5	161.7	11-Jun	34.8	15.3
WB-Matlock (P)+	64.4				61.2	160.7	10-Jun	35.9	13.9
R WB-Quake (P)+	55.8	59.3	66.2	68.0	59.6	166.3	15-Jun	32.9	14.7
R Yellowstone +	65.4	67.4	71.7	75.9*	58.4	161.0	10-Jun	34.7	13.8
Average	65.3	64.9	67.4	71.1	59.2	160.7	10-Jun	34.1	14.2
LSD (0.05)	6.9	8.5	8.0	7.4		2.7		2.0	
C.V.	7.0	6.4	7.3	7.3		1.0		3.6	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

* = indicates varieties yielding equal to highest yielding variety within a column based on Fisher's protected LSD (p=0.05)

R = Recommended Variety; (P) = Private Variety; + = Protected Variety; ++ = PVP Pending

^{1/} = Dwarf Smut Resistant; (HWW) = Hard White Winter Wheat

Table 6. HARD WINTER : District 4-- Moccasin - Dryland

Table of HARD WINTER - District 4 - Missouri - Dryland					2013 Data				
Cultivar/Line	Grain Yield (bushels/acre)				Test weight	Heading Date	Plant height	Protein	
	2013	2012-13	2011-13	2010-13					
	2 yr	3 yr	4 yr	lb/bu	from Jan1	Calendar	in	%	
Accipiter +	52.7	41.9	45.0	46.8	60.0	173.6	23-Jun	32.6	12.2
Art (P)+	68.1*	50.3*	49.0*	53.7*	59.8	167.4	16-Jun	32.6	12.3
R Bearpaw ++	58.2	45.1	44.6	48.0	59.2	170.7	20-Jun	33.4	13.1
Broadview (P)++	54.7	43.8	44.8	48.8	58.3	171.8	21-Jun	32.3	12.4
Bynum (P, CL)+	38.5	32.4	33.2	36.1	60.5	169.7	19-Jun	35.2	13.5
R Carter (P)+	57.3	46.3*	45.5	49.8	59.1	170.4	19-Jun	30.0	12.9
R CDC Falcon (P)+	59.2	46.9*	46.7*	49.6	59.4	171.1	20-Jun	31.1	13.0
R Colter ++	59.8	48.1*	49.8*		59.9	172.3	21-Jun	31.6	12.3
Cowboy ++	61.6				57.1	171.2	20-Jun	31.5	12.5
Curlew ^{1/}	55.0	42.4	42.0	45.6	58.1	171.4	20-Jun	34.1	11.9
R Decade +	61.3	46.6*	45.4	49.2	58.3	169.1	18-Jun	33.1	12.7
R Genou +	47.3	37.7	38.4	42.8	59.2	172.0	21-Jun	35.5	12.7
R Jagalene (P)+	61.8	47.2*	44.8	49.4	62.0**	169.6	19-Jun	32.9	11.2
Jerry	58.6	43.9	45.0	49.1	59.1	171.8	21-Jun	34.5	11.6
R Judee ++	48.3	39.4	40.8	44.1	58.7	171.2	20-Jun	32.8	12.7
R Ledger (P)+	48.9	38.8	40.3	43.1	59.5	171.7	21-Jun	31.1	12.1
McGill +	66.2	48.9*	48.9*		58.5	166.8	16-Jun	33.3	11.5
MT0978	61.6	48.2*	49.3*		59.8	172.9	22-Jun	32.2	12.3
MT10116	61.1	47.6*			59.5	172.7	22-Jun	30.0	12.4
MT1078	60.7	48.4*			57.1	171.7	21-Jun	32.1	12.2
MT1090	67.4*	51.9*			59.2	172.0	21-Jun	34.7	12.2
MT1091	67.8*	52.7*			59.4	171.1	20-Jun	32.1	11.7
MT1092	67.9*	52.8*			60.2	172.6	22-Jun	32.3	12.3
MT1102	64.3				58.9	170.9	20-Jun	32.5	12.7
MT1105	70.7*	53.4**			59.1	171.1	20-Jun	32.5	11.6
MT1108	68.3*				60.1	171.4	20-Jun	32.3	11.5
MT1113	65.7				60.8*	172.6	22-Jun	33.7	12.2
MT1117	70.1*				60.3	173.3	22-Jun	32.7	11.7
MT1137	67.4*				61.5*	170.3	19-Jun	33.5	11.8
MT1138	72.1**				59.7	171.4	20-Jun	33.3	11.1
MT1143	63.5				58.9	170.6	20-Jun	33.2	11.8
MT1156	62.7	48.4*			60.4	174.2	23-Jun	31.0	12.6
MTCL1131	71.2*				60.2	172.8	22-Jun	34.3	11.7
MTS0826-63	47.6				59.6	175.0	24-Jun	34.6	13.2
MTS0832	55.6				60.4	172.7	22-Jun	32.7	11.7
MTS1024	62.2	48.8*			57.1	172.9	22-Jun	28.8	12.1
MTW08168 (WB3768, P,	62.9	48.2*	49.0*		59.8	176.3	25-Jun	33.4	11.8
R Norris (P, CL)+	52.8	42.1	41.9	45.5	60.9*	168.2	17-Jun	35.3	12.3
Overland +	69.6*	51.9*	52.5**	56.3**	60.7*	167.4	16-Jun	33.1	11.4
R Promontory ^{1/}	56.3	42.5	43.2	47.3	60.3	171.4	20-Jun	33.8	12.3
Radiant (P)	44.6	35.9	37.6	38.1	58.8	174.1	23-Jun	32.3	12.4
Rampart	45.2	36.9	37.1	40.0	60.4	172.5	22-Jun	34.9	12.9
Robidoux +	58.1	46.3*	49.4*	53.0*	57.7	169.1	18-Jun	31.2	12.1
SY Clearstone 2CL (P, C	71.0*	52.9*			57.3	174.2	23-Jun	34.6	12.6
SY Wolf (P)+	56.4	45.0	45.4		61.0*	169.8	19-Jun	30.1	11.8
R Warhorse ++	60.2	45.9*	46.3	49.4	58.6	172.3	21-Jun	30.7	12.9
WB-Matlock (P)+	58.8				60.0	173.4	22-Jun	34.8	12.5
R WB-Quake (P)+	58.6	44.3	46.2	47.1	58.9	173.6	23-Jun	32.6	12.0
R Yellowstone +	66.4	51.0*	51.3*	56.0*	59.0	171.6	21-Jun	33.6	12.2
Average	60.1	45.8	44.8	47.3	59.4	171.6	21-Jun	32.8	12.2
LSD (0.05)	5.7	8.2	5.9	5.3	1.4	1.5		2.4	
C.V.	5.4	8.8	8.1	8.0	1.2	0.5		4.4	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

* = indicates varieties yielding equal to highest yielding variety within a column based on Fisher's protected LSD (p=0.05)

R = Recommended Variety; (P) = Private Variety; + = Protected Variety; ++ = PVP Pending

^{1/} = Dwarf Smut Resistant; (HWW) = Hard White Winter Wheat

Table 7. HARD WINTER : District 5-- Conrad - Dryland

2013 Data									
Cultivar/Line	Grain Yield (bushels/acre)				Test weight	Heading Date	Plant height	Protein	
	2013	2012-13	2011-13	2010-13					
	2 yr	3 yr	4 yr	lb/bu	from Jan1	in	%		
Accipiter +	84.3	90.6*	92.1*	95.1*	60.0	168.1	17-Jun	35.3	12.8
Art (P)+	101.9*	93.7*	96.7*	92.9*	60.9	162.1	11-Jun	34.1	13.0
R Bearpaw ++	82.5	80.3	83.7	87.9	60.9	165.3	14-Jun	33.8	13.4
R Broadview (P)++	89.8	88.8	91.4*	96.7*	59.7	167.6	17-Jun	34.4	13.3
R Bynum (P, CL)+	75.6	71.1	71.7	76.1	60.5	163.8	13-Jun	37.2	13.2
R Carter (P)+	89.8	87.5	88.7	88.1	60.7	167.2	16-Jun	31.1	13.4
R CDC Falcon (P)+	83.8	88.4	88.6	93.2*	59.0	165.2	14-Jun	32.3	12.9
R Colter ++	94.5*	94.9*	96.5*		60.7	169.3	18-Jun	35.1	13.1
Cowboy ++	97.8*				59.7	165.4	14-Jun	35.7	12.7
Curlew ^{1/}	89.8	86.8	89.4	92.1	58.2	166.6	16-Jun	39.3	13.8
R Decade +	89.4	85.5	87.5	90.3	60.8	162.7	12-Jun	33.4	12.6
R Genou +	74.7	76.0	78.7	82.8	60.1	167.4	16-Jun	37.2	13.9
R Jagalene (P)+	94.9*	93.9*	94.9*	94.8*	62.5*	164.2	13-Jun	34.4	12.7
Jerry	80.8	79.7	81.5	82.6	59.2	167.4	16-Jun	39.3	12.8
R Judee ++	78.8	87.1	90.5	91.9	60.4	166.1	15-Jun	34.6	12.9
R Ledger (P)+	82.7	80.5	83.4	86.6	60.7	166.7	16-Jun	32.7	11.9
McGill +	88.3	86.5	91.5*		58.7	161.6	11-Jun	34.3	12.4
MT0978	94.1*	95.6*	96.8*		60.7	169.1	18-Jun	35.0	13.2
MT10116	95.5*	95.4*			59.5	169.0	18-Jun	35.1	13.8
MT1078	104.2**	100.0**			59.6	166.9	16-Jun	34.5	12.4
MT1090	90.8	96.0*			59.0	167.7	17-Jun	35.6	13.5
MT1091	97.7*	95.2*			57.3	167.6	17-Jun	35.6	13.2
MT1092	96.6*	93.2*			59.6	167.5	17-Jun	35.8	12.2
MT1102	98.1*				59.6	169.5	19-Jun	33.2	13.5
MT1105	96.7*	93.7*			59.8	166.7	16-Jun	33.7	13.2
MT1108	94.6*				60.2	168.4	17-Jun	34.5	12.6
MT1113	89.7				60.8	168.8	18-Jun	35.4	14.0
MT1117	94.9*				60.7	169.1	18-Jun	35.9	13.0
MT1137	94.5*				62.7**	166.8	16-Jun	34.5	12.7
MT1138	99.6*				60.3	167.9	17-Jun	35.9	13.0
MT1143	95.9*				59.9	164.9	14-Jun	32.5	13.0
MT1156	90.9	89.1			60.4	168.6	18-Jun	34.8	13.5
MTCL1131	103.2*				59.7	168.3	17-Jun	37.4	12.4
MTS0826-63	84.6				60.3	170.7	20-Jun	38.2	13.8
MTS0832	74.9				60.0	168.8	18-Jun	37.3	13.2
MTS1024	90.1	92.0*			58.2	168.9	18-Jun	33.4	13.5
MTW08168 (WB3768, P, Norris (P, CL)+	98.4*	93.6*	97.1*		60.4	170.6	20-Jun	37.7	12.9
Overland +	79.8	82.4	84.6	87.4	59.3	163.4	12-Jun	36.6	12.9
Promontory ^{1/}	98.0*	92.5*	94.7*	99.1*	61.8*	162.8	12-Jun	35.3	11.8
Radiant (P)	92.1	86.0	90.5*	93.6*	60.9	165.7	15-Jun	35.2	12.3
Rampart	81.4	81.3	83.4	87.2	60.6	167.3	16-Jun	36.6	12.5
Robidoux +	75.6	74.5	75.1	77.0	60.7	166.4	15-Jun	37.7	13.9
SY Clearstone 2CL (P, C	89.1	91.7*	95.0*	96.3*	59.2	162.1	11-Jun	34.0	12.4
SY Wolf (P)+	95.2*	91.0*			57.8	167.5	17-Jun	35.9	13.1
R Warhorse ++	91.2	89.8*	96.4*		61.4*	163.4	12-Jun	30.6	12.6
WB-Matlock (P)+	79.6	82.1	86.1	90.4	58.9	168.9	18-Jun	34.2	13.4
R WB-Quake (P)+	88.9				61.6*	166.9	16-Jun	37.4	13.0
R Yellowstone +	77.7	82.7	84.2	87.0	60.7	168.9	18-Jun	34.7	13.2
	95.8*	96.0*	97.6**	100.5**	60.7	168.2	17-Jun	34.5	12.7
Average	90.0	88.2	88.9	90.0	60.1	166.8	16-Jun	35.1	13.0
LSD (0.05)	10.7	10.5	7.5	7.8	1.7	1.7		1.4	
C.V.	6.7	5.9	5.2	6.1	1.7	0.6		2.3	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

* = indicates varieties yielding equal to highest yielding variety within a column based on Fisher's protected LSD (p=0.05)

R = Recommended Variety; (P) = Private Variety; + = Protected Variety; ++ = PVP Pending

^{1/} = Dwarf Smut Resistant; (HWW) = Hard White Winter Wheat

Table 8. HARD WINTER : District 5-- Havre - Dryland

*** No harvest in 2011 due to uneven stands ***										
Cultivar/Line	Grain Yield (bushels/acre)			2013 Data						
				Test	Heading Date		Plant	Lodg-	Sawfly	Protein
	2013	2012-13	2010//13	weight	Ordinal	Calendar	height	ing	cutting	%
		2 yr	3 yr	lb/bu	from Jan1		in	%	%	%
Accipiter +	64.7	56.1	61.9	58.5	166.3	15-Jun	29.8	11	4	12.2
Art (P)+	60.9	58.7	66.1	58.1	159.0	8-Jun	28.6	10	9	12.8
R Bearpaw ++	68.7	62.1	64.0	57.8	163.1	12-Jun	28.3	19	6	12.8
R Broadview (P)++	69.1	61.0	65.1	57.8	163.1	12-Jun	30.0	30	11	12.1
R Bynum (P, CL)+	69.2	56.3	58.4	58.6	160.3	9-Jun	32.3	22	11	13.3
R Carter (P)+	61.3	56.7	62.7	58.0	162.8	12-Jun	27.2	27	10	12.5
R CDC Falcon (P)+	58.2	55.8	61.3	58.7	162.7	12-Jun	28.3	3	5	11.9
R Colter ++	63.7	67.2		59.4*	165.8	15-Jun	30.5	5	13	12.6
Cowboy ++	82.7**			59.3*	162.6	12-Jun	30.4	39	11	10.8
Curlew ^{1/}	73.6	59.1	60.1	57.9	163.0	12-Jun	33.1	33	20	12.4
R Decade +	67.4	61.6	65.1	58.7	160.5	10-Jun	30.8	4	9	13.5
R Genou +	70.6	57.1	58.6	59.1	163.3	12-Jun	32.3	41	7	11.9
R Jagalene (P)+	62.4	58.1	64.7	59.8*	160.5	10-Jun	29.5	8	13	12.3
Jerry	63.6	53.9	58.8	57.6	163.7	13-Jun	32.8	14	10	12.3
R Judee ++	72.7	60.8	64.7	60.1**	162.9	12-Jun	30.6	12	5	12.1
R Ledger (P)+	63.4	55.8	60.5	58.7	163.1	12-Jun	28.8	22	9	11.6
McGill +	62.1	59.5		58.7	161.1	10-Jun	29.2	12	12	11.2
MT0978	74.6	64.7		59.5*	164.5	14-Jun	30.2	4	7	12.3
MT10116	69.4	62.0		59.3*	165.3	14-Jun	30.5	0	8	12.3
MT1078	74.1	68.1		58.0	164.2	13-Jun	29.8	5	11	11.6
MT1090	66.6	62.5		59.1	164.0	13-Jun	31.0	8	18	12.3
MT1091	68.5	62.4		58.6	164.9	14-Jun	30.8	2	11	12.0
MT1092	65.6	58.8		59.6*	165.5	15-Jun	31.5	0	17	12.2
MT1102	70.8			59.5*	164.3	13-Jun	29.9	15	13	12.1
MT1105	67.2	64.2		58.9	162.9	12-Jun	31.3	3	14	12.1
MT1108	70.4			59.0	164.4	13-Jun	30.3	12	10	11.3
MT1113	67.3			59.6*	164.6	14-Jun	31.4	0	11	12.2
MT1117	67.9			59.8*	165.7	15-Jun	29.9	0	9	11.7
MT1137	62.3			60.1*	164.3	13-Jun	29.0	5	13	12.1
MT1138	65.8			58.9	164.4	13-Jun	32.7	1	13	12.2
MT1143	71.5			58.7	161.6	11-Jun	29.2	0	10	11.5
MT1156	69.5	61.3		59.1	165.8	15-Jun	28.7	7	13	12.3
MTCL1131	71.6			58.2	165.5	15-Jun	31.8	2	16	11.7
MTS0826-63	70.0			58.4	166.1	15-Jun	31.0	16	7	12.4
MTS0832	74.2			58.4	164.2	13-Jun	33.3	14	4	11.7
MTS1024	72.1	63.7		58.0	165.2	14-Jun	28.6	8	10	11.0
MTW08168 (WB3768, P, Norris (P, CL)+	71.4	61.8		60.0*	166.3	15-Jun	33.9	16	15	12.1
Overland +	64.8	59.9	61.8	59.5*	160.3	9-Jun	30.6	3	11	12.6
Promontory ^{1/}	69.6	59.3	66.8	58.2	159.6	9-Jun	29.9	10	10	12.1
	65.9	55.7	63.2	59.4*	162.0	11-Jun	31.8	15	16	11.3
Radiant (P)	65.7	56.5	59.2	59.1	166.4	15-Jun	30.4	0	11	11.9
Rampart	66.7	56.7	57.3	57.9	163.6	13-Jun	32.2	27	4	13.0
Robidoux +	60.7	57.6	62.1	58.6	160.4	9-Jun	29.2	11	12	11.4
SY Clearstone 2CL (P, C	74.8	67.2		58.5	165.7	15-Jun	32.6	0	14	12.1
SY Wolf (P)+	71.5	63.9		58.2	160.4	9-Jun	28.6	1	8	12.7
R Warhorse ++	70.0	60.9	64.4	59.1	164.3	13-Jun	30.4	9	2	12.3
WB-Matlock (P)+	68.6			59.0	163.0	12-Jun	31.8	25	14	13.3
R WB-Quake (P)+	71.2	59.8	63.4	58.2	166.1	15-Jun	29.7	29	4	11.5
R Yellowstone +	66.9	59.5	64.1	59.4*	166.2	15-Jun	30.7	1	10	11.9
Average	68.2	60.1	62.4	58.8	163.6	13-Jun	30.5	11.3	10.4	12.1
LSD (0.05)	6.7	ns	ns	0.9	1.7		2.3	15.1	8.0	
C.V.	5.5	8.6	8.1	0.9	0.6		4.2	78.5	45.6	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

* = indicates varieties yielding equal to highest yielding variety within a column based on Fisher's protected LSD (p=0.05)

R = Recommended Variety; (P) = Private Variety; + = Protected Variety; ++ = PVP Pending

^{1/} = Dwarf Smut Resistant; (HWW) = Hard White Winter Wheat

Table 9. HARD WINTER : District 6-- Sidney - Dryland

*** No harvest in 2013 due to severe hail prior to harvest ***

Cultivar/Line	Grain Yield (bushels/acre)			2012 and 2013 Data					
				Test weight	Winter survival	Heading Date		Plant height	Protein
	2012	2011-12	2010-12			Ordinal	Calendar		
	1 yr	2 yr	3 yr	lb/bu	%	from Jan1		in	%
Accipiter +	59.4*	58.9*	62.7*	56.0	37.4	171.9	21-Jun	32.3	11.6
Art (P)+	46.7	49.2	48.7	60.5	4.8	170.2	19-Jun	26.4	12.5
Bearpaw ++	60.3*	57.5*	54.8	58.0	18.0	171.3	20-Jun	27.8	11.5
R Broadview (P)++	58.1*	56.8	60.4*	57.5	24.6	170.8	20-Jun	29.0	11.3
Bynum (P, CL)+	48.3	42.0	42.2	59.5	3.8	171.1	20-Jun	30.9	12.9
R Carter (P)+	49.8	51.3	50.6	59.5	10.5	172.4	21-Jun	26.8	11.9
R CDC Falcon (P)+	61.9*	59.4*	59.9*	58.5	34.3	169.6	19-Jun	28.9	12.8
Colter ++	62.5*	64.5*		59.0	34.7	170.7	20-Jun	30.6	10.9
Cowboy ++					11.9	172.4	21-Jun	29.9	
Curlew ^{1/}	58.4*	56.5	54.3	59.0	10.9	173.3	22-Jun	32.4	12.2
R Decade +	55.3	60.2*	60.2*	60.0	45.7*	168.8	18-Jun	31.9	12.2
Genou +	53.4	48.5	48.6	59.0	6.7	173.7	23-Jun	31.9	14.0
Jagalene (P)+	57.3*	57.5*	54.4	60.5	19.7	170.6	20-Jun	28.0	11.9
R Jerry	65.9*	67.1*	66.1*	58.0	54.7**	169.4	18-Jun	35.0	11.8
Judee ++	51.9	48.2	49.4	58.0	10.0	173.0	22-Jun	29.4	11.4
Ledger (P)+	46.3	45.3	45.9	58.5	8.3	172.4	21-Jun	29.1	11.8
McGill +	53.5	55.0		58.5	7.6	169.8	19-Jun	29.8	11.9
MT0978	63.5*	65.9*		60.0	27.2	172.9	22-Jun	29.4	11.9
MT10116	56.3			59.0	13.1	172.9	22-Jun	26.9	11.0
MT1078	60.1*			56.5	6.4	173.7	23-Jun	27.0	10.1
MT1090	66.0*			57.0	42.3*	170.0	19-Jun	32.2	10.9
MT1091	64.0*			55.5	36.8	172.4	21-Jun	32.8	11.8
MT1092	60.4*			58.0	30.6	171.2	20-Jun	32.3	11.4
MT1102					19.1	173.5	23-Jun	29.2	
MT1105	62.0*			57.0	33.7	170.6	20-Jun	31.5	11.7
MT1108					48.0*	172.7	22-Jun	31.8	
MT1113					22.9	172.5	22-Jun	29.1	
MT1117					37.4	172.0	21-Jun	29.7	
MT1137					23.9	170.3	19-Jun	31.2	
MT1138					21.2	171.8	21-Jun	32.2	
MT1143					11.9	171.6	21-Jun	28.7	
MT1156	54.4			58.5	31.2	173.8	23-Jun	31.4	11.7
MTCL1131					40.3*	172.0	21-Jun	31.8	
MTS0826-63					21.3	172.5	22-Jun	33.1	
MTS0832					25.8	171.3	20-Jun	32.3	
MTS1024	60.1*			57.5	4.0	174.7	24-Jun	26.9	11.9
MTW08168 (WB3768, P, HWW)++	59.7*	62.0*		58.0	38.3*	172.9	22-Jun	32.3	11.1
Norris (P, CL)+	54.7	57.2*	56.8	60.5	18.2	168.0	17-Jun	29.1	11.9
Overland +	56.8	67.4**	66.7**	60.5	20.4	168.7	18-Jun	29.6	11.7
Promontory ^{1/}	64.3*	57.6*	57.8	60.5	9.1	170.8	20-Jun	29.3	11.9
Radiant (P)	55.9	54.6	55.2	56.0	52.0*	170.9	20-Jun	35.2	11.0
Rampart	43.9	45.7	44.1	57.5	10.6	172.6	22-Jun	31.9	11.8
Robidoux +	56.4	52.6	53.2	58.5	11.5	169.4	18-Jun	29.2	12.1
SY Clearstone 2CL (P, CL)++	62.9*			57.0	21.7	171.8	21-Jun	31.1	11.0
SY Wolf (P)+	54.1	56.5		60.5	13.6	170.2	19-Jun	29.3	11.2
Warhorse ++	50.9	55.2	55.2	56.0	13.5	174.0	23-Jun	28.1	11.4
WB-Matlock (P)+					46.0*	170.5	20-Jun	30.4	
R WB-Quake (P)+	49.4	51.1	50.6	56.5	16.3	171.1	20-Jun	31.6	13.5
Yellowstone +	63.7*	65.6*	64.4*	59.5	21.8	172.0	21-Jun	30.3	12.4
Average	57.4	56.0	54.9	58.4	23.1	171.6	21-Jun	30.3	11.7
LSD (0.05)	9.6	10.4	8.1		17.2	2.6		3.3	
C.V.	8.3	9.1	9.0		43.0	0.9		6.8	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

* = indicates varieties yielding equal to highest yielding variety within a column based on Fisher's protected LSD (p=0.05)

R = Recommended Variety; (P) = Private Variety; + = Protected Variety; ++ = PVP Pending

^{1/} = Dwarf Smut Resistant; (HWW) = Hard White Winter Wheat

Table 10. HARD WINTER : District 6-- Williston, North Dakota - Dryland

*** No harvest in 2010 due to severe winterkill ***									
Cultivar/Line	Grain Yield (bushels/acre)			2013 Data					
				Test	Winter	Heading Date		Plant	Protein
	2013	2012-13	2011-13	weight	survival	Ordinal	Calendar	height	
	2 yr		3 yr	lb/bu	%	from Jan1		in	%
Accipiter +	63.0*	54.9*	58.5*	58.5	38.3*	172.0	21-Jun	27.0	11.1
Art (P)+	24.6	27.1	36.8	58.9	6.7	171.0	20-Jun	23.5	12.5
Bearpaw ++	48.5	47.6	53.5*	58.9	21.7	171.0	20-Jun	26.0	12.4
R Broadview (P)++	52.8	57.7*	60.7**	58.6	31.7*	171.0	20-Jun	27.5	12.2
Bynum (P, CL)+	41.8	37.6	42.3	58.7	18.3	171.0	20-Jun	31.0	13.7
R Carter (P)+	50.9	46.4	50.7*	58.6	20.0	172.0	21-Jun	24.0	11.4
R CDC Falcon (P)+	45.8	52.7*	57.3*	58.2	31.7*	171.0	20-Jun	25.0	11.2
Colter ++	76.0*	58.9*	60.3*	58.4	43.3*	171.0	20-Jun	30.5	11.7
Cowboy ++	53.2			59.9*	15.0	172.0	21-Jun	25.0	10.5
Curlew ^{1/}	50.8	38.1	45.9	59.9*	15.0	173.5	23-Jun	31.0	12.6
R Decade +	57.1*	50.3*	56.6*	58.6	28.3	170.0	19-Jun	27.5	12.2
Genou +	52.0	40.7	44.9	59.5*	16.7	172.0	21-Jun	31.0	11.4
Jagalene (P)+	43.4	40.8	45.3	59.0	18.3	170.0	19-Jun	26.5	11.4
R Jerry	65.2*	59.5*	57.8*	57.4	46.7*	171.0	20-Jun	32.0	11.9
Judee ++	37.4	29.5	41.3	60.1*	13.3	172.0	21-Jun	26.0	11.5
Ledger (P)+	43.9	39.3	44.9	59.3*	12.0	172.0	21-Jun	26.0	12.3
McGill +	36.1	39.9	47.7	58.9	20.0	170.0	19-Jun	29.0	10.2
MT0978	61.5*	51.4*	56.5*	58.9	28.3	172.0	21-Jun	28.5	11.2
MT10116	58.1*	51.4*		58.9	21.7	172.5	22-Jun	27.5	10.9
MT1078	39.0	41.3		58.0	6.7	174.5	24-Jun	25.0	10.5
MT1090	74.7*	66.3**		58.2	30.0*	172.0	21-Jun	31.5	10.5
MT1091	78.2**	60.3*		57.7	40.0*	172.0	21-Jun	31.0	13.1
MT1092	48.5	43.5		59.5*	21.7	172.0	21-Jun	25.5	11.7
MT1102	60.6*			58.8	25.0	172.0	21-Jun	27.5	12.6
MT1105	60.5*	51.5*		58.7	28.3	171.0	20-Jun	29.0	10.6
MT1108	61.8*			59.0	25.0	172.0	21-Jun	27.0	10.0
MT1113	58.6*			59.6*	26.7	172.0	21-Jun	29.5	11.4
MT1117	59.7*			59.9*	20.0	172.0	21-Jun	27.5	11.3
MT1137	67.4*			59.0	40.0*	172.0	21-Jun	29.5	10.4
MT1138	66.4*			59.0	26.7	172.0	21-Jun	30.0	11.9
MT1143	52.0			58.6	23.3	171.0	20-Jun	26.0	9.4
MT1156	63.3*	57.3*		59.8*	31.7*	175.0	24-Jun	28.5	12.3
MTCL1131	69.8*			58.3	48.3**	173.5	23-Jun	30.0	10.9
MTS0826-63	49.4			60.2**	26.7	173.5	23-Jun	31.5	12.4
MTS0832	62.9*			58.9	38.3*	172.0	21-Jun	31.0	10.8
MTS1024	47.7	41.2		57.7	10.0	171.0	20-Jun	26.5	10.9
MTW08168 (WB3768)++	62.5*	57.7*	57.2*	59.6*	35.0*	175.0	24-Jun	31.0	10.7
Norris (P, CL)+	60.1*	52.2*	53.2*	59.2*	23.3	170.0	19-Jun	28.5	11.7
Overland +	44.3	46.9	52.7*	57.7	20.0	170.0	19-Jun	26.5	12.6
Promontory ^{1/}	46.6	38.4	44.0	59.8*	12.0	171.0	20-Jun	29.5	11.0
Radiant (P)	52.2	50.9*	54.8*	59.0	30.0*	173.5	23-Jun	30.0	11.9
Rampart	49.9	43.0	50.5*	58.4	21.7	171.0	20-Jun	32.5	12.4
Robidoux +	40.5	40.7	48.8*	58.7	16.7	170.0	19-Jun	24.0	10.5
SY Clearstone 2CL (P, C)	50.2	44.4		59.1	21.7	172.0	21-Jun	27.0	10.6
SY Wolf (P)+	53.4	40.4	46.7	58.3	23.3	170.0	19-Jun	26.5	11.7
Warhorse ++	54.3	50.5*	52.2*	58.8	33.3*	173.5	23-Jun	26.5	11.4
WB-Matlock (P)+	37.8			58.6	20.0	173.5	23-Jun	25.5	10.1
R WB-Quake (P)+	59.5*	53.5*	54.7*	58.9	28.3	173.5	23-Jun	28.5	13.3
Yellowstone +	70.5*	57.2*	60.1*	58.0	36.7*	171.0	20-Jun	31.5	11.8
Average	54.4	47.6	51.3	58.9	25.3	171.8	21-Jun	28.1	11.5
LSD (0.05)	21.7	16.5	13.0	1.1	19.8	2.6		4.3	
C.V.	24.6	17.1	15.4	1.1	48.3	0.8		7.7	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

* = indicates varieties yielding equal to highest yielding variety within a column based on Fisher's protected LSD (p=0.05)

R = Recommended Variety; (P) = Private Variety; + = Protected Variety; ++ = PVP Pending

^{1/} = Dwarf Smut Resistant; (HWW) = Hard White Winter Wheat

Table 11. 2006//2013 Intrastate Winter Wheat Test (Exp. 35): Combined Locations Winter Survival and associated Yield
(Locations: Williston (2006-08, 2012, 2013), Sidney (2006, 2008, 2010, 2011) = 9 locations

		*** No recordable Winterkill in 2009 ***														
	Winter Survival (%)								Yield under Winterkill conditions							
	2013	2012-13	2011-13	2010-13	2008-13	2007-13	2006-13	2013	2012-13	2011-13	2010-13	2008-13	2007-13	2006-13		
location-years	1	2	3	4	6	7	9	1	2	3	4	6	7	9		
Accipiter +	38.3*	43.3**	53.1**	57.8**	58.2**			63.0*	54.9*	56.0*	59.6*	52.0*				
Art (P)+	6.7	7.5	14.0	19.6				24.6	27.1	35.3	38.4					
Bearpaw ++	21.7	23.4	35.2	38.2				48.5	47.6	49.9	49.8					
Broadview (P)++	31.7*	41.7*	48.2*	54.0*				52.8	57.7*	57.0*	59.6*					
Bynum (P, CL)+	18.3	15.0	26.9	28.9	21.5	23.4	26.9	41.8	37.6	36.9	38.3	27.7	30.8	31.6		
Carter (P)+	20.0	19.2	27.0	30.2	24.9	30.2	33.5	50.9	46.4	48.5	48.7	38.9	42.8	41.3		
CDC Falcon (P)+	31.7*	41.7*	50.6*	54.5*	46.3	50.4*	53.2*	45.8	52.7*	54.1*	55.8*	48.6*	52.4*	51.6*		
Colter ++	43.3*	30.8*	39.2					76.0*	58.9*	61.4*						
Cowboy ++	15.0							53.2								
Curlew ^{1/}	15.0	11.7	24.8	29.6				50.8	38.1	43.5	45.1					
Decade +	28.3	37.5*	50.0*	51.4*	47.9	52.0*		57.1*	50.3*	55.2*	56.4*	48.3*	52.5*			
Genou +	16.7	13.5	27.1	32.4	25.0	29.8	34.1	52.0	40.7	41.6	43.4	33.7	37.1	37.6		
Jagalene (P)+	18.3	15.0	27.9	31.1	25.6	29.3	35.3	43.4	40.8	46.4	46.8	38.8	41.9	41.9		
Jerry	46.7*	41.7*	51.2*	55.7*	49.0	54.4**	57.3**	65.2*	59.5*	62.4**	62.9**	53.9**	57.1**	55.6**		
Judee ++	13.3	9.3	22.9	30.8	24.7			37.4	29.5	34.4	38.8	30.3				
Ledger (P)+	12.0	16.9	26.2	30.5	24.4	28.0	31.8	43.9	39.3	40.9	42.5	32.7	36.4	37.0		
McGill +	20.0	22.5	43.3*					36.1	39.9	45.4						
MT0978	28.3	20.8	36.3					61.5*	51.4*	57.0*						
MT10116	21.7	20.0						58.1*	51.4*							
MT1078	6.7	10.9						39.0	41.3							
MT1090	30.0*	36.7*						74.7*	66.3**							
MT1091	40.0*	29.2*						78.2**	60.3*							
MT1092	21.7	16.7						48.5	43.5							
MT1102	25.0							60.6*								
MT1105	28.3	23.3						60.5*	51.5*							
MT1108	25.0							61.8*								
MT1113	26.7							58.6*								
MT1117	20.0							59.7*								
MT1137	40.0*							67.4*								
MT1138	26.7							66.4*								
MT1143	23.3							52.0								
MT1156	31.7*	31.7*						63.3*	57.3*							
MTCL1131	48.3**							69.8*								
MTS0826-63	26.7							49.4								
MTS0832	38.3*							62.9*								
MTS1024	10.0	11.7						47.7	41.2							
MTW08168 (WB3768, Norris (P, CL)+	35.0*	30.9*	35.0					62.5*	57.7*	59.9*						
Overland +	23.3	21.7	34.7	39.3	32.1	35.6	40.6	60.1*	52.2*	54.6*	55.0*	44.0	47.1	46.3		
Promontory ^{1/}	20.0	24.2	36.9	40.9				44.3	46.9	57.2*	59.2*					
	12.0	9.0	19.7	25.7	22.0	25.3	31.2	46.6	38.4	42.5	46.4	36.1	39.6	40.1		
Radiant (P)	30.0*	29.2*	44.1*	48.5				52.2	50.9*	51.6*	52.8					
Rampart	21.7	20.2	29.9	30.3	22.5	25.0	27.7	49.9	43.0	44.4	43.6	32.0	34.8	34.8		
Robidoux +	16.7	13.4	20.2	26.5				40.5	40.7	43.4	46.1					
SY Clearstone 2CL (P	21.7	15.9						50.2	44.4							
SY Wolf (P)+	23.3	15.0	26.1					53.4	40.4	46.5						
Warhorse ++	33.3*	28.3*	40.6*	41.5				54.3	50.5*	53.5*	53.9*					
WB-Matlock (P)+	20.0							37.8								
WB-Quake (P)+	28.3	24.2	35.4	39.1				59.5*	53.5*	53.2*	52.3					
Yellowstone +	36.7*	28.4*	36.7	40.2	33.7	37.5	42.5	70.5*	57.2*	60.6*	61.0*	49.1*	52.3*	51.2		
Average	25.3	23.0	34.5	38.1	32.7	35.1	37.6	54.4	47.6	49.8	50.3	40.4	43.7	42.6		
LSD (0.05)	19.8	15.7	13.2	9.2	8.3	6.3	5.2	21.7	16.5	12.2	9.2	6.1	5.1	4.3		
C.V.	48.3	33.7	23.5	17.1	22.1	16.9	14.9	24.6	17.1	15.0	12.9	13.0	10.8	10.8		

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

* = indicates varieties yielding equal to highest yielding variety within a column based on Fisher's protected LSD (p=0.05)

(P) = Private Variety; + = Protected Variety; ++ = PVP Pending

^{1/} = Dwarf Smut Resistant; (HWW) = Hard White Winter Wheat

Table 12. HARD WINTER WHEAT: Yield Performance under Sawfly Pressure and % Sawfly Cutting (2006-2013)
Cutting (Note: Sawfly cutting in each location-year >10%)

Cultivar/Line	Grain Yield (bu/a)								Sawfly Cutting (%)							
	2013	2012-13	2011-13	2010-13	2009-13	2008-13	2007-13	2006-13	2013	2012-13	2011-13	2010-13	2009-13	2008-13	2007-13	2006-13
Location-years	2	5	7	9	11	13	15	17	2	5	7	9	11	13	15	17
Accipiter +	61.5	46.8	47.8*	50.5	49.5				5	26	26	33	33			
Bearpaw ++ ss	63.0	47.6	48.7*	51.5					13	12*	11*	9*				
CDC Falcon (P)+	63.3	46.7	49.4*	52.7*	50.9*	51.4*	52.1*	51.6*	7	27	23	30	31	32	33	34
Colter ++	61.3	46.7							23	36						
Decade +	63.1	48.6*	49.8*	53.5*	51.5*	52.3*			16	28	25	31	30	31		
Genou + ss	64.2	47.7	48.5*	50.3	49.1	50.0	51.4*	51.0	15	15*	15*	19*	20	20	19	18
Jagalene (P)+	59.5	42.7	44.6	49.6	48.1	49.6	50.3	49.1	17	35	32	37	39	40	41	40
Jerry	59.3	43.0	45.8	47.9	46.2	47.2	48.2	47.4	15	33	31	38	41	40	42	41
Judee ++ ss	69.2	50.2*	52.3**	54.8*	52.9*				18	16*	13*	16*	17*			
Ledger (P)+	60.3	48.0	47.2	51.4	50.0*	50.4	51.7*	50.6	17	25	23	31	30	30	32	31
MT0978	73.6								12							
MT1078	68.7								18							
MT1090	67.0								14							
MTS0832 ss	61.5								11							
MTS1024 ss	69.2								14							
MTW08168 (WB3768, P, HWW)	66.2								22							
Norris (P, CL)+	59.6	44.5	44.5	47.8	46.4	47.9	48.7	48.7	20	34	35	40	43	43	42	40
Overland +	70.6	51.4*							8	31						
Rampart ss	61.7	43.3	45.0	47.4	46.1	46.3	47.4	46.8	10	10*	9*	9**	9**	10**	9**	9**
SY Clearstone 2CL (P)++	68.7	54.1**							17	31						
Warhorse ++ ss	65.7	50.7*	50.3*						5	4**	4**					
WB-Quake (P) + ss	68.0	46.9	50.5*						19	12*	11*					
Yellowstone +	66.9	49.9*	51.6*	55.7**	53.3**	54.1**	54.2**	54.0**	13	31	28	34	37	37	40	41
Average	64.9	47.6	48.3	51.1	49.5	49.9	50.5	49.9	14.3	23.8	20.4	27.2	30.0	31.4	32.3	31.5
LSD (0.05)	ns	5.4	4.6	4.0	3.6	3.4	3.1	2.9	ns	19.6	13.8	13.4	10.6	9.8	9.5	9.0
C.V. (%)	7.3	9.4	8.9	8.4	8.6	8.6	8.6	8.6	41	65	64	52	42	40	41	42

** = indicates highest value within a column

ss = solid-stemmed sawfly resistant variety

* = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

(P) = Private Variety; + = Protected Variety; ++ = PVP Pending

1/ = Dwarf Smut Resistant; (HWW) = Hard White Winter Wheat

Table 13. Precipitation (top, in inches) and Average Monthly Temperature (bottom, °F) for Crop Year 2012-2013

Agricultural Research Center	Sept. 2012	Oct. 2012	Nov. 2012	Dec. 2012	Jan. 2013	Feb. 2013	Mar. 2013	Apr. 2013	May 2013	June 2013	July 2013	Aug 2013	Total Average
Western Triangle, Conrad	0.00	1.30	0.11	0.00	0.25	0.10	0.29	0.56	2.64	3.09	0.46	1.36	10.16
	1984-2013 Average = 11.60 (Temp = 43.8)												
	59.9	38.5	32.7	21.3	24.4	31.4	30.4	37.1	51.6	58.4	66.1	67.4	44.0
Northern, Havre	0.17	1.27	0.61	0.18	0.57	0.45	0.56	0.61	4.91	5.10	2.66	1.37	18.46
	1916-2013 Average = 12.00 (Temp = 42.8)												
	59.8	41.0	30.3	19.6	20.0	26.5	29.7	39.8	55.0	61.0	68.8	69.6	43.4
Northwestern, Kalispell	0.75	2.46	1.66	1.84	0.67	0.20	0.66	2.12	3.29	2.76	0.03	0.93	17.37
	1980-2013 Average = 20.26 (Temp = 44.8)												
	55.4	41.9	35.8	28.5	23.9	32.6	35.3	40.4	52.4	58.5	67.2	66.0	44.8
Central, Moccasin	0.09	1.26	0.54	0.14	0.22	0.26	0.10	0.68	3.17	3.78	1.69	0.97	12.90
	1911-2013 Average = 15.30 (Temp = 42.8)												
	60.0	42.7	36.5	24.8	27.2	28.3	33.6	37.2	51.6	57.7	68.1	68.9	44.7
Southern, Huntley	0.00	1.12	0.50	0.08	0.52	0.11	0.13	1.07	5.16	1.97	0.39	1.19	12.24
	1911-2013 Average = 13.38 (Temp = 45.5)												
	61.4	44.2	36.9	25.3	25.4	31.6	44.5	41.1	56.3	61.9	71.6	72.6	47.7
Northeastern, Sidney	0.68	1.81	0.38	0.45	0.46	0.09	1.39	1.11	6.32	4.69	1.15	4.48	23.01
	1949-2013 Average = 14.08 (Temp = 43.3)												
	58.0	45.9	30.3	18.1	12.9	19.7	30.4	44.6	56.0	64.5	70.1	68.8	42.9
Williston (WREC), N. Dakota	0.12	1.55	0.93	0.28	0.21	0.05	0.90	0.35	6.20	4.21	1.75	1.97	18.52
	1957-2013 Average = 14.21 (Temp = 43.1)												
	64.5	43.1	28.7	16.5	14.7	22.6	21.7	35.9	56.9	64.2	69.5	70.8	42.4
Post Farm, Bozeman	0.23	0.40	0.86	0.92	0.31	0.28	0.38	0.32	3.20	2.84	0.69	0.53	10.96
	1958-2013 Average = 15.83 (Temp = 43.5)												
	61.0	45.4	35.9	25.1	24.0	28.2	35.9	41.5	52.8	60.0	64.6	68.8	45.2

Table 14. Selected agronomic characters, cereal quality evaluations and disease reactions of hard winter wheat varieties.

Variety	Agronomic Characters						Cereal Quality			Disease Reactions ^{8/}			
	Maturity ^{1/}	Chaff Color	Winter Survival ^{2/}	Straw Strength ^{3/}	Stem solid ^{4/}	Coleoptile length ^{5/}	Milling ^{6/}	Baking ^{6/}	PPO ^{7/}	Dwarf Smut	Stripe Rust	Stem Rust	Leaf Rust
Accipiter	M-L	White	5	S		M	2	3	H	S	S	MR	R
Art	E	White	2	S		S	3	2	M	S	MR	MR	M
Bearpaw	M	White	2	M	21	M	4	3	H	S	S	R	S
Broadview	M	White	5	S		S	3	3	H	S	S	R	R
Bynum	M	Brown	2	MW	18	L	5	4	M	S	R	MS	S
Carter	M	White	3	S	14	S	4	5	M	S	S	MS	M
CDC Falcon	M	White	4	S	7	S	3	3	H	S	S	MR	R
Colter	M	White	4	S		S	3	4	M	S	R	R	S
Cowboy	M	White	2	S		M	-	-	-	S	S	R	-
Curlew	M	Brown	2	S		M	4	3	L	R	R	VS	S
Decade	M	White	4	S		M	3	4	H	S	S	R	MS
Genou	M	White	2	MW	18	M	4	4	H	S	S	S	MR
Jagalene	E	White	2	S		M	4	3	H	S	R	MR	MS
Jerry	M	White	5	M		M	3	3	H	S	S	R	R
Judee	M	White	2	M	19	M	3	4	H	S	R	S	S
Ledger	M	White	2	S	10	M	5	3	M-H	S	S	S	MS
McGill	E	White	3	S		M	2	3	M	S	S	R	-
MTW08168 (WB3768)	L	White	3	M		M	3	3	L	S	R	R	-
Norris	E	White	3	S		M	3	3	M	S	S	S	MS
Overland	E	White	3	S		M	3	2	M	S	S	R	R
Promontory	M	Brown	2	MS		S	4	3	L	R	R	VS	S
Radiant	M-L	White	4	S		S	3	3	H	S	R	VS	M
Rampart	M	Brown	2	MW	21	L	4	5	M	S	R	MR	S
Robidoux	E	White	2	S		S	3	3	H	S	MS	S	S
SY Clearstone 2CL	M	White	3	S		S	3	3	M	S	R	MR	-
SY Wolf	M	White	3	S		M	3	2	M	S	R	R	-
Warhorse	M	White	4	S	21	M	3	3	H	S	R	R	MR
WB-Matlock	M	White	3	S		M	3	3	M	S	S	R	-
WB-Quake	M-L	White	3	S	19	M	4	4	H	S	R	MR	MR
Yellowstone	M	White	4	S		S	3	4	M	S	R	S	MS

1/ VE = Very Early, E = Early, M = Medium, L = Late, VL = Very Late

2/ 5 = Best Winter survival (over several years at Sidney, Williston and Moccasin)

3/ W = Weak

5/ L = long

6/ 5 = Superior

7/ PPO = Polyphenol Oxidase

MW = Medium Weak

M = medium

4

(low is better for noodles)

M = Medium

S = short

3

L = low

MS = Medium Strong

- = no info.

2

M = medium

S = Strong

1 = Inferior

H = high

4/ scored 5-25, 25 = most solid

Combined Bozeman, Conrad, Havre, Moccasin,

and Sidney data; 2010-2012

varieties with no number were not evaluated

8/ R = Resistant

MR = Moderately Resistant

M = Moderate

MS = Moderately Susceptible

S = Susceptible

VS = Very Susceptible

- = no information

Additional Descriptive Information for Winter Wheat Varieties

New for the 2014 Bulletin:

Cowboy – is an awned, white glumed, high yielding hollow-stemmed public variety developed in in Colorado and jointly released in 2012 by Colorado and Wyoming. In limited testing in Montana, Cowboy has average test weight and below average protein and winter hardiness (= 2 (0-5 scale, 5 = best). Cowboy is a medium to early heading variety with shorter than average plant height. Cowboy is susceptible to stripe rust , but resistant to stem rust. Milling and baking quality will be determined, for Montana, in spring 2014. PVP, Title V is pending (Certificate #201300476).

WB3768 – is a white-chaffed hard white winter wheat developed by the Montana Agricultural Experiment Station and licensed exclusively to WestBred/Monsanto in 2013. WB3768 is a high yielding variety similar to Yellowstone. WB3768 is similar to Yellowstone for most agronomic traits with the exception of higher test weight and later heading date and maturity. WB3768 is 1.8 inches taller than Yellowstone. Like Yellowstone, WB3768 is resistant to prevalent races of stem rust, but susceptible to stem and leaf rust. WB3768 has acceptable milling and baking quality. WB3768 is a low PPO cultivar with favorable Asian noodle color stability and noodle score. PVP, Title V will be applied for.

Varieties previously in bulletin:

Accipiter – hard red winter wheat developed by the Crop Development Center, Saskatoon, Saskatchewan and registered in 2008. Accipiter is a medium to late maturing average height wheat with white chaff. Accipiter has above average yield, below average test weight and protein, and excellent winter hardiness. Accipiter is susceptible to stripe rust and moderately resistant to stem rust. Accipiter has below average milling and average baking quality. PVP, Title V is issued (Certificate #201100370).

Art – hard red winter wheat developed by Syngenta (AgriPro) Seeds in 2007. Art is an early maturing, short statured wheat, with white chaff. Art has average yield, above average test weight and protein, and below average winter hardiness. Art is moderately resistant to stripe and stem rust. Art has average milling and below average baking quality.

PVP, Title V has been issued (Certificate #200700349).

Bearpaw – hard red winter wheat developed by the Montana Agricultural Experiment Station in 2011. Bearpaw is a white-glumed, solid-stem, semi-dwarf (*Rht1*) wheat with medium maturity. Bearpaw has average yield, test weight, and protein, and below average winter hardiness. Bearpaw is resistant to prevalent races of stem rust but susceptible to stripe and leaf rust. Stem-solidness of Bearpaw is most similar to Rampart. Bearpaw is a high PPO variety with above average milling and average baking properties. PVP, Title V option has been issued (Certificate #201200407).

Broadview – hard red winter wheat developed by the Lethbridge, Alberta winter wheat breeding program in 2009 and licensed to Meridian Seeds LLC. Broadview is a medium maturing, medium statured wheat, with white chaff. Broadview has above average yield, average test weight and protein, and excellent winter hardiness. Broadview is susceptible to stripe rust and resistant to stem and leaf rust. Broadview is a high PPO variety with average milling and baking properties, similar to CDC Falcon. PVP, Title V will be applied for.

Bynum – a CLEARFIELD (CL) wheat with imidazolinone tolerance, developed by the Montana Agricultural Experiment Station in 2005 and licensed to WestBred LLC. Bynum is a solid stem “Rampart-type” CLEARFIELD hard red winter cultivar similar in most characteristics to Rampart. It is lower yielding than Norris and similar in yield to MT1159CL. Bynum has a solid stem, high grain protein, and excellent bread baking quality. Bynum is resistant to stripe rust and has some resistance to stem rust. PVP, Title V has been issued (Certificate #200600285). Additionally, the CLEARFIELD gene is patented.

Carter – a semi-solid stem hard red winter wheat released by WestBred LLC in 2007. Carter is a medium maturity semidwarf wheat. It has average yield, test weight, and winterhardines and good protein. Carter is moderately susceptible to stem rust and susceptible to stripe rust. Carter has above average milling and baking quality. PVP, Title V has been issued (Certificate #200800383).

CDC Falcon – hard red winter wheat developed by the Crop Development Center, Saskatoon, Saskatchewan and registered in 1998. Licensed to

WestBred LLC. Superior stem and leaf rust resistance over all current winter wheat varieties in western Canada. High yield, good winter-hardiness, semidwarf, short strong straw, especially good for direct seeding and straight cut harvest. CDC Falcon is moderately resistant to stem rust and susceptible to stripe rust. It is rated as having acceptable milling and baking quality. CDC Falcon is protected under the Plant Variety Protection Act, but not the Title V option (Certificate #200800322).

Colter – is an awned, white glumed, high yielding hard red winter wheat to be released in fall 2013 by the Montana Agricultural Experiment Station. Colter is similar to Yellowstone for grain yield and most agronomic traits with the exception that Colter is about 0.5 lb/bu higher for test weight and has superior stem rust resistance relative to Yellowstone. Colter is moderately resistant to stripe rust, but susceptible to leaf rust. Colter has excellent milling and baking bread quality, similar to Yellowstone. PVP, Title V will be applied for.

Curlew – hard red winter wheat released by Utah in 2009. Curlew is an early to medium maturing tall wheat with brown chaff. In the initial year of testing in Montana, Curlew had above average yield and test weight and average protein. Curlew appears resistant to stripe rust but very susceptible to stem rust. Curlew is resistant to dwarf bunt. Curlew has above average milling and average baking properties. It is a low PPO variety.

Decade – hard red winter wheat developed by the Montana Agricultural Experiment Station and released jointly with North Dakota (pending at publication) in 2010. Decade is an early to medium maturing reduced height wheat with white chaff. Decade is a high yielding wheat with good winter hardiness and medium to high test weight and protein. Decade is resistant to prevalent races of stem and stripe rust. Decade has excellent milling and baking quality. Seed available fall 2010. PVP, Title V has been issued (Certificate #201100096).

Genou – a solid-stem hard red winter wheat with improved yield potential and cold tolerance relative to Rampart. Stem solidness is relatively good, although not as good as Rampart. Test weight, maturity, plant height, grain protein, and end-use qualities are similar to those of Rampart and Vanguard. Genou is susceptible to both stem and stripe rust. Foundation seed was made available in fall of 2004. Genou (French for knee) is named after a school house in The Knees area of Chouteau County. PVP with Title V option has been issued (Certificate #200500334).

Jagalene – Developed from the cross “Abilene/Jagger” and released by AgriPro in 2003. Jagalene is a hollow-stemmed hard red winter variety. It has been tested in Montana Intrastate Trials and Off-Station trials during the 2003 through 2005 seasons. It has exhibited consistently high yields in Crop Reporting Districts 1 through 5. Jagalene has excellent test weight ranking higher than all checks. It is a semi-dwarf with height shorter than all checks except CDC Falcon. Lodging resistance is very good. It has early heading, nearly 6 days earlier than Neeley and earlier than all checks. Winterhardiness levels would be considered average to below average. It has excellent general disease resistance, including the entire soil virus complex, stem rust, stripe rust, tan spot and septoria. Protein is average compared to the checks. Jagalene has excellent milling and very good baking characteristics. This variety is protected under the Plant Variety (Certificate #200200160) Protection Act and can only be sold or advertised by variety name as a class of certified seed.

Jerry – hard red winter wheat released by North Dakota State University in 2001. It is white-chaffed and awned and similar in maturity to Roughrider. Jerry has good winter hardiness and is a top yielder in areas where winterkill can occur. Jerry has average test weight and protein under Montana conditions. It has good resistance to prevalent races of stem and leaf rust, but is susceptible to stripe rust. Mixing properties and baking performance are equal to Roughrider.

Judee – hard red winter wheat developed by the Montana Agricultural Experiment Station in 2011. Judee is a white-glumed, solid-stem, semi-dwarf (*Rht1*) wheat with medium maturity. Judee has average yield, test weight, and protein, and below average winter hardiness. Judee is susceptible to prevalent races of stem and leaf rust but resistant to stripe rust. Stem-solidness of Judee is most similar to Genou. Judee is a high PPO variety with average mill and above average bake properties. PVP, Title V is pending (Certificate #201200161).

Ledger – hard red winter wheat developed by WestBred LLC and released in 2004. Ledger is an early maturing wheat, semidwarf wheat with average winter hardiness. The Montana Intrastate Winter Wheat Program testing shows this variety to be of average yield and protein with above average test weight. Ledger is susceptible to stripe rust and stem rust. Milling and baking characteristics are acceptable. Ledger is protected under the Plant Variety Protection Act, but not the Title V option (Certificate #200600063).

McGill – hard red winter wheat developed by Nebraska in 2010. McGill is an early maturing, medium statured wheat with white glumes. McGill has above average yield, average test weight, and below average protein. Winter-hardiness was above average in 2011 at Sidney. McGill is susceptible to stripe rust, but resistant to stem rust. McGill has below average milling and average baking properties. PVP, Title V has been issued (Certificate #201100399).

Norris - a CLEARFIELD (CL) wheat with imidazolinone tolerance, developed by the Montana Agricultural Experiment Station in 2005 and licensed to WestBred LLC. Norris is a high yielding hard red winter CLEARFIELD cultivar that could replace MT1159CL once seed becomes available. Norris is significantly higher in yield than other CLEARFIELD checks and similar in yield to Neeley. Norris has high test weight, good crop tolerance to herbicide, and is relatively early in heading compared to Montana varieties. Grain protein of Norris is relatively low, but milling and baking characteristics are acceptable. Norris is susceptible to both stem and stripe rust. PVP, Title V has been issued (Certificate #200600286). Additionally, the CLEARFIELD gene is patented.

Overland – hard red winter wheat developed in Nebraska and released jointly with South Dakota in 2007. Overland is an early maturing average height wheat with white chaff. In the initial year of testing in Montana, Overland had average yield, test weight, and protein. Overland is resistant to stem rust and susceptible to stripe rust. Overland has average milling and below average baking quality. PVP, Title V has been issued (Certificate #200700333).

Promontory – Released by the Utah Agricultural Experiment Station in 1991. It is a hard red winter wheat of medium height with awns and bronze chaff. Promontory is a high yielding line with excellent test weight. It has poor winterhardiness. Promontory is resistant to dwarf bunt and stripe rust and susceptible to stem rust. Promontory has average milling and above average baking characteristics. It has low PPO and could be used as a dual-purpose (bread and noodles) variety.

Radiant – hard red winter wheat released by Alberta in 2002 and marketed by Meridian Seeds. Radiant is a medium to late maturing, medium tall wheat with white chaff. Radiant has good winter hardiness in North Dakota tests. In the initial year of testing in Montana, Radiant had average yield, average test weight, and below average protein.

Radiant appears resistant to stripe rust and very susceptible to stem rust. Radiant has average milling and baking quality.

Rampart – Released by the Montana Agricultural Experiment Station in 1996. It is an awned, red chaffed, solid-stemmed hard red winter wheat variety. The kernel is long with a sloping back and a heavy brush. The cheeks are rounded to angular with an open crease. Rampart is resistant to the wheat stem sawfly. It is moderately resistant to prevalent races of stem rust. Rampart is resistant to stripe rust. It is susceptible to leaf rust, dwarf smut and the Russian wheat aphid. Rampart has excellent milling and baking properties and is a sister line to Vanguard.

Robidoux – hard red winter wheat developed by Nebraska in 2010. Robidoux is an early maturing, medium statured wheat, with white chaff. Robidoux has above average yield, average test weight, and below average protein, and winter hardiness. Robidoux is moderately susceptible to stripe rust and susceptible to stem rust. Robidoux is a high PPO variety with average mill and bake qualities. PVP, Title V has been issued (Certificate #201100398).

SY Clearstone 2CL – a 2-gene CLEARFIELD hard red winter wheat developed by Montana Agricultural Experiment Station in 2012 and licensed exclusively to Syngenta Seeds. SY Clearstone wheat 2CL is very similar to Yellowstone. It is a medium maturing, medium tall, white chaffed wheat with average winter hardiness. It is a high yielding wheat with average test weight and protein. SY Clearstone 2CL is resistant to stripe rust and has moderate resistance to stem rust, the latter an improvement over Yellowstone. SY Clearstone 2CL is a medium PPO variety with average mill and above average bake properties. PVP, Title V will be applied for. Additionally, the CLEARFIELD genes are patented.

SY-Wolf – hard red winter wheat developed by Syngenta (AgriPro) Seeds in 2010. SY-Wolf is a medium maturing, short statured wheat with white glumes. SY-Wolf has above average yield and test weight and average protein. Winter-hardiness was average in 2011 at Sidney. SY-Wolf is moderately susceptible to moderately resistant (MS/MR) to stripe rust, but resistant to stem rust. Boomer has average milling and below average baking properties. PVP, Title V has been issued (Certificate #201100390).

Warhorse - is an awned, white glumed, solid-stemmed hard red winter wheat released in 2013

by the Montana Agricultural Experiment Station. Warhorse has medium maturity and has medium short, semi-dwarf height. Warhorse's winter hardiness, rated at 4 on 0-5 scale, is an improvement over other solid stem varieties. Stem solidness is similar to that of Bearpaw and Rampart, while sawfly cutting of stems is very low (similar to Rampart). Warhorse yield is similar to Judee, while test weight and protein are above average. Warhorse is resistant to both stem and stripe rust. Warhorse has acceptable mill and bake qualities. PVP, Title V will be applied for.

WB-Matlock – hard red winter wheat developed by WestBred (Monsanto) in 2010. WB-Matlock is a medium to late maturing, medium tall statured wheat, with white chaff. WB-Matlock has average yield, above average test weight and protein, and average winter hardiness. WB-Matlock is susceptible to stripe rust, but resistant to stem rust. WB-Matlock is a high PPO variety with average mill and bake qualities. PVP, Title V has been issued (Certificate #201100362).

WB-Quake – hard red winter wheat developed by WestBred (Monsanto) in 2011. WB-Quake is a medium to late maturing, medium statured solid-stemmed wheat, with white chaff. WB-Quake has above average yield, average test weight and protein with average winter hardiness. WB-Quake is resistant to stripe rust and moderately resistant to stem rust. WB-Quake is a high PPO variety with above average milling and baking properties. PVP, Title V is issued (Certificate #201100471).

Yellowstone – hard red winter wheat developed by the Montana Agricultural Experiment Station and released to seed growers in 2005. Yellowstone is a very high yielding winter hardy variety with medium test weight, maturity, height, and grain protein. Yellowstone has excellent baking and good Asian noodle quality. It is moderately resistant to TCK smut and resistant to stripe rust, but susceptible to stem rust. Yellowstone has been the leading winter wheat variety planted in Montana since 2012. PVP, Title V has been issued (Certificate #200600284).

Plant Variety Protection

The Plant Variety Act, signed into law in 1970, offers legal protection to developers of new varieties of plants which reproduce sexually – that is, through seeds. The law provides for a Plant Variety Protection Office in the U.S. Department of Agriculture. The office receives and processes applications and when “novelty” is established,

issues a certificate granting protection rights specified by the applicant.

The owner (or developer) holding a “certificate of protection” has complete control over the variety for 20 years. The law provides two types of protection:

1. Without Seed Certification

The owner of the protected variety may exclude others from reproducing the variety, selling it, offering it for sale, importing or exporting it, or use it in the commercial production of a hybrid or a different variety without permission. In this sense, the owner of a protected variety may bring civil damage action against anyone who infringes upon his rights.

2. Certified Seed Option

The owner may specify that the seed of his variety “...be sold or advertised only as a class of Certified Seed”. Production and sale of such seed by variety name, when not certified, constitute a violation of the Federal Seed Act. This means of protection may be used extensively for publicly as well as privately developed varieties.

Amendments to the Plant Variety Protection Act (PVPA) have passed both houses of Congress and been signed into law by the President. These amendments went into effect in 1995. The farmers exemption has been changed for new varieties. Seed for varieties issued a certificate after April 4, 1995, may only be purchased from the owner or his agent. A farmer can only save seed of these varieties for use on his own farm and cannot sell seed of the protected variety to his neighbor.

A variety protected under the certification option does not permit a farmer producing seed to sell or offer for sale or advertise by variety name unless it is certified. Sale of such seed by variety name as uncertified seed will constitute a violation of the Federal Seed Act. Interstate movement of seed is subject to inspection by Federal Seed Control officials. Seed within the state is subject to inspection by State Department of Agriculture inspectors.

Owners of protected varieties will give public notice that their variety is protected by affixing to the label or container the words: “Unauthorized Propagation Prohibited” or the words, “Unauthorized Seed Multiplication Prohibited”. Producers must check the label (tag) or the container for the above wording

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Note: Information in this article is available on the web at:

<http://plantsciences.montana.edu/crops>