

# 2015 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>

## 2015 Recommended Varieties: Hard Winter Wheat for Montana by District

Variety	Districts (see map on cover)					
	1 Northwest	2 Southwest	3 Southeast	4 Central	5 North Central	6 Northeast
<b>Hard Red Winter Wheat</b>						
Bearpaw + <sup>1/</sup>			D	D	D	
Broadview (P)++					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
Jerry						D
Judee + <sup>1/</sup>			D	D	D	
Ledger (P)+		D		D	D	
MT0978 (name pending)		D	D	D	D	
SY Wolf (P)+		D	D	D	D	
Warhorse+ <sup>1/</sup>			D	D	D	
WB-Quake (P)+	D	D	D	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

<sup>1/</sup> = 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, winter-kill, or other unavoidable causes.

## Variety Testing Procedures

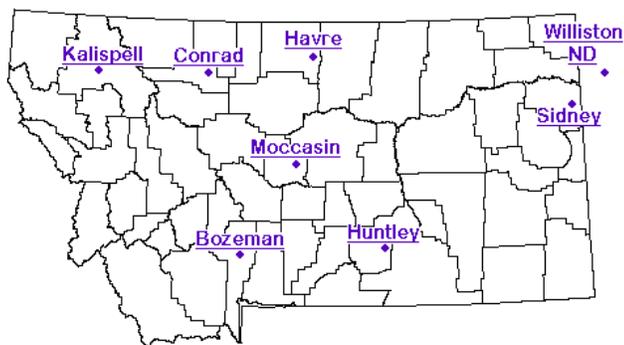


Fig. 1. Test Locations for Montana winter wheat performance tests in 2014.

## Entries

Names of commercially available varieties and experimental lines evaluated in 2014 are listed with their origins, experimental designation, release year, and pedigrees in Table 2 for the hard winter wheats. Forty-nine hard wheats are included in this summary comprising 31 varieties (13 public and 18 private) and 18 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 consists of a 49 entry test with 3 replicates. These tests are planted as 7x7 lattices or a randomized complete block design at each location. Plot size varied by location, from 35 ft<sup>2</sup> at Conrad to 60 ft<sup>2</sup> 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/ft<sup>2</sup>, 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 2014, data is provided for two (2013-2014), three (2012-2014) and four (2011-2014) year averages for hard wheat entries tested during previous cropping seasons

### 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.

**Table 1. Summary of agronomic practices used on hard winter wheat performance trials in Montana in 2014. Fall nitrogen (N), phosphorus (P<sub>2</sub>O<sub>5</sub>) and potassium (K<sub>2</sub>O) were preplant applied and incorporated.**

Location	2013 Crop	2012 Crop	2013 Planting Date	Fertilizer				2014 Harvest Date
				N		P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	
				Fall	Spring			
----- Pounds per acre -----								
Kalispell	peas	spring wheat	Oct 17	9	130	40	10	Aug 8
Bozeman	fallow	spring wheat	Sep 29	195	-	10	10	Aug 8
Huntley	chem. fallow	barley	Oct 7	60	36	15	10	Sep 8
Moccasin	chem. fallow	barley	Sep 24	10	60	15	10	Aug 5
Conrad	chem. fallow	barley	Sep 19	51	130	22	20	Aug 19
Havre	fallow	spring wheat	Sep 24	100	-	20	10	Jul 30
Sidney	fallow	safflower	Oct 2	18	-	46	0	no harv.
Williston, ND	fallow	safflower	Sep 26	6	-	26	0	no harv.

### Test Weight

Test weights (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.

significant winter injury occurred. In 2014, Sidney and Williston lost all plots due to severe winter-kill

Table 11 contains information on % winter survival and associated yield in winter-kill environments from 2007 to 2013. The data summarizes 7 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.

### 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.

### 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' (dropped from testing in 2015) were released in 1995 and 1996, respectively. These 2 varieties were planted on 4% of the winter wheat acreage in the 2014 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 2014, Genou was planted on 7% of the winter wheat acreage (fourth in acreage to Yellowstone at 20%). Judee, a solid-stemmed variety released in 2011, was the second leading variety at 11%. Other solid-stemmed varieties

### 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

include Bearpaw (2011, 2% of planted acreage), Warhorse (2013), and WB-Quake (2010, 2%).

Table 12 contains information on yield and % sawfly cutting at 15 testing locations where sawfly pressure was present during the years 2007-2013. 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 is 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) is measured. This test is 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.

## **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 2014 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.

## **2014 Test Conditions**

Statewide winter wheat yields were projected by the Montana Agricultural Statistics Service at 41 bu/a, for 2014, compared to 43 bu/a for the 2013 harvest year. The harvested acreage in 2014 was 2.24 million acres (total production = 91.8 million bu) compared 1.90 million acres in 2013 (total production = 81.7 million bu).

Rainfall for the 2013-2014 winter crop year was above average at all locations tested (Table 13), except Williston (range +6.25 at Moccasin to -0.35 at Williston). Average yearly temperatures were generally below long term (6 out of 8 locations, 1 location = the same) ranging from below average at Conrad (-3.7°F) to +0.2°F at Bozeman.

Yields, for the 6 locations harvested, averaged 91 bu/a {range 56 (Moccasin) to 136 bu/a (Kalispell)}. Yields of named varieties, across the 6 harvested locations, ranged from a low of 70 bu/a (WB4059CLP) to a high of 101 bu/a for LCS Mint.

Test weight averaged 60.3 lb/bu across all locations. Huntley (54.5) was the only location below 60 lb/bu due to a late harvest.

Extreme winter-kill occurred at both Sidney and Williston and these nurseries were not harvested in 2014. Percent winter survival, at Sidney, on May 21<sup>st</sup> averaged 6% (best = Radiant (25%), while 4 varieties had 0% stand).

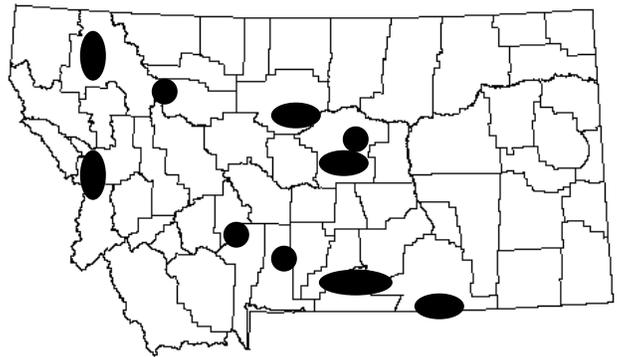
Heading dates were earlier in 2014 than long term averages. Huntley (-7 days), Bozeman (-6 days) and Havre, Kalispell, and Moccasin (all -2 days) were earlier than long term. Conrad at +4.5 days, was the only location that was later than long term.

Stripe rust (average = 7%, range 0 – 62% ) at Kalispell was a factor in yield reduction for highly susceptible varieties (Bearpaw, Carter, Decade, Genou, Jerry, and WB4059CLP). Stripe rust, at Kalispell, was greatly reduced from an average of 77% (range 23 -100%) in 2013.

There was very minor sawfly cutting recorded at the Havre Experiment Station averaging 2% of stems cut across varieties. Sawfly parasites have been on the increase in the past 2 years

Protein content averaged 12.9% across all locations (location range = 12.3 – 13.5%) tested. The range of named varieties across all locations was from a low of 11.8% (Cowboy) to a high of 13.8 (Rampart).

Leading winter wheat varieties planted for 2014 were Yellowstone (19.8%), Judée (11.4%), Decade (10.5%), Genou (6.6%), AP503 CL2 (4.8%), and CDC Falcon (4.6%).



**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,

**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 SY Clearstone 2CL are resistant) is a 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.

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	30-60	60-75	Sept. 1-15
1,2,3,4	30-60 (10-20 seeds/sq. ft.)	60-75 (20-25 seeds/sq. ft.)	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, plant 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, private, and experimental hard winter wheat varieties.**

Variety	Experimental Designation	Origin	Release Year	Pedigree
<b>Public Varieties</b>				
<b>Bearpaw</b>	<b>MTS0721</b>	Montana	<b>2011</b>	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/(TAM W-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/((P1178383/Cheyenne//3*Tendoy, ID5011)/3/(ID5006, Norin 10/Staring//2*Cheyenne), ID745101)))
<b>Colter</b>	<b>MT08172</b>	Montana	<b>2013</b>	(Yellowstone sib, MT9982)*2/(BZ9W96-895, ped. unknown from male sterile pop.)
<b>Cowboy</b>	<b>CO050322</b>	Colorado, Wyoming	<b>2012</b>	(Yuma/T-57/4/(CO850034, NS14/NS603// Newton /3/Probrand 835)/5/4*Yuma/6/ NEWS12, CO980829)/7/TAM 111 (sib of <b>Denali</b> )
<b>Decade</b>	<b>MT0552</b>	Montana; North Dakota	<b>2010</b>	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)
<b>Freeman</b>	<b>NE06545</b>	Nebraska	<b>2013</b>	(ABI86*3414/Jagalene//Karl 92, KS92-946-B-15-1)/3/ Alliance
<b>Genou</b>	<b>MTS0031</b>	Montana	<b>2004</b>	(Lew/Tiber//Redwin, MTS92015)/3/Vanguard/ Norstar
<b>Jerry</b>	<b>ND9257</b>	North Dakota	<b>2001</b>	Roughrider/(ND7571, Winoka/NB66425)/3/ Arapahoe
<b>Judee</b>	<b>MTS0713</b>	Montana	<b>2011</b>	(Vanguard/Norstar//Judith dwf, 93X312E14)/3/ NuHorizon
<b>McGill</b>	<b>NE01481</b>	Nebraska	<b>2010</b>	((Vona//Chisholm/Plainsman V, OK83201)/3/ Redland, NE92458)/4/lke
<b>(name pending)</b>	<b>MT0978</b>		<b>2015</b>	selection from a composite of 2 crosses: 00X248, (Yellowstone sib, MT9982)/4/((MT8709, Erhardt sib)/NuWest//Erhardt, MTW0072)/3/(NW97S151, KSSB0192-3/NE89529) and 00X249, (Judith/(PI262605, Karagach, RWA resis.)/3/(S86-740, Norstar/Plainsman V //Ulianovka), MTW0047)/4/MTW0072/NW97S151
<b>Promontory</b>	<b>UT1567-51</b>	Utah	<b>1990</b>	Manning/Bezostaya-1
<b>Rampart</b>	<b>MTS92042</b>	Montana	<b>1996</b>	Lew/Tiber//Redwin
<b>Warhorse</b>	<b>MTS0808</b>	Montana	<b>2013</b>	selection from a composite of 3 crosses: 00X182, ((Froid/Winoka/7/((Sinvalocho/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)
<b>Yellowstone</b>	<b>MT00159</b>	Montana	<b>2005</b>	F <sub>2</sub> composite of Promontory/Judith and Judith-dwarf/Promontory

**Private Varieties**

<b>Broadview</b>	<b>LE1911</b>	Alberta; Meridian Seeds LLC	<b>2009</b>	KS92WGRC15/CDC Kestrel//CDC Falcon
<b>Carter</b>	<b>BZ9W02-2060</b>	WestBred LLC	<b>2006</b>	Jagger/Rampart
<b>CDC Falcon</b>	<b>S94-4</b>	Western Plant Breeders/Saskatchewan	<b>1999</b>	Norstar*2/Vona//Abilene
<b>Emerson</b>	<b>MSWW-13-0001, W454</b>	Alberta; Meridian Seeds LLC	<b>2012</b>	McClintock/CDC Osprey
<b>Jagalene</b>	<b>W98-362</b>	AgriPro Seeds	<b>2002</b>	Jagger/Abilene
<b>Keldin</b>	<b>ACS55017</b>	Peter Franck: Seed-Link Inc.; Ontario, Canada, Westbred LLC	<b>2011</b>	European genetics

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

Variety	Experimental Designation	Origin	Release Year	Pedigree
LCS Colonia	NIC 05-4711-B	Germany: Limagrain LLC	2013	European genetics
LCS Mint	CO050175-1	Limagrain LLC	2012	Overley/7/CO980829, Yuma/T-57/4/(CO850034, NS14/NS603// Newton/3/Probrand 835)/5/ 4*Yuma/6/NEWS12)
LCS Wizard	VA08HRW-80	Virginia; Limagrain LLC	2013	S.6742/4/(92PAN#33, HBF0174-122, (Stepova/ TAM W-101, W2424)//Siouxland/3/'2163')/5/ (92PIN#107, HBB036J, '2157'/Parker 76//Rocky/ '2163')
Ledger	BZ9W96-788-d	WestBred LLC	2004	(Hatten/SS-14, BZ9W92-709)/3/(MTSF1142, Lew/ Tiber//Redwin)
Radiant	W337	Alberta, Meridian Seeds	2002	Norstar*6/Cmc1//Norwin/UT125512, WSMV resistant
SY Clearstone 2CL	MTCL1077	Syngenta, Montana	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))
T158	T158	Trio Research, Inc., Limagrain LLC	2009	KS93U206//2*(T81, TAM 107/T213 sib)
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)
WB4059CLP	BZ9WM07-1516	WestBred-Monsanto:	2013	CDC Teal-11A//Pryor*2/Imi Fidel F2
WB4614		WestBred-Monsanto:	2013	
WB-Quake	BZ9W05-2043	WestBred LLC (Monsanto)	2011	Rampart/Kestrel

**Public Elite Lines**

	MTS0826-63			selection from a composite of 2 crosses: 99X195, (NuWest/Tiber, MT9524)/(G15048, CG18063/ CG60725) /3/Rampart; and 99X196, (NuWest/ Tiber, MT9524)/(G15048, CG18063/ CG60725) /3/(MTS9869, Vanguard*2/ Norstar)
	MTS1024			(Karl 92/10/(UT000190 (SRW?), Hansel// "wheat"/Ag. podperae/5/ Najah/4/Delmar/3/ Delmar/ PI173438// Columbia/6/Hansel, UT1802)/9/ (UT1812, Weston/6/Delmar/3/ Delmar/ PI173438/4/ Colorow/5/ Warrior/ CI13837/7/"wheat"/Ag. podperae/8/ PI166921 /Hansel/3/ Delmar/Columbia //CI13837), <u>MT02113</u> )*4/11/( <u>MTS0359</u> , Rampart/Mironovskaya 61)
	MT1078			(Karl 92/10/(UT000190 (SRW?), Hansel// "wheat"/Ag. podperae/5/ Najah/4/Delmar/3/ Delmar/ PI173438// Columbia/6/Hansel, UT1802)/9/ (UT1812, Weston/6/Delmar/3/ Delmar/ PI173438/4/ Colorow/5/ Warrior/ CI13837/7/"wheat"/Ag. podperae/8/ PI166921 /Hansel/3/ Delmar/Columbia //CI13837), MT02113)*4/11/(MTS0359, Rampart/Mironovskaya 61)
	MT1090			Reeder/6*Yellowstone
	MT1113			Yellowstone*4//((KS96WGRC40,KS93U69*2/TA 2397 (wcm resis) (Lr41))
	MT1117			Yellowstone*3//((KS96WGRC40,KS93U69*2/TA 2397 (wcm resis) (Lr41))
	MTCL1131			Yellowstone*4/4/(Fidel/Tiber (IMI), MTCL01158)//CDC Teal 11A/3/Jagalene
	MT1138			(059E//Jagger/Pecos, W99-194)/3/ 2*Yellowstone

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

Variety	Experimental Designation	Origin	Release Year	Pedigree
	<b>MTCS1204</b>			(Rampart*3/Fidel/6/(MTS9720, Nuwest/4/(MT88001, Sawmont/Tendoy /3/Yogo/Norin 10/Brevor)/5/(MT7863, Froid/Winoka/Centurk)) , <u>MTCL0510</u> /8/ <u>Paul</u> /6/(Tiber*2/(IMMIBC303-17, Tam 110 sib*4/(FS2, mutagenized Fidel)), <u>98X96C16cl</u> )/3/CDC Teal 11A/5/(MTCL0322, Rampart*2/IMI Fidel)/7/( <u>MTS0531</u> , L'Govskaya 167/Rampart/6/(MT9409, Tiber/5/ (MT8030, TAM W-103/Froid /4/Yogo//Turkey Red /Oro/3/Centurk))
	<b>MTS1224</b>			<u>Yellowstone</u> /5/((Lew/Tiber//Redwin, MTS92045)/3/2*Erhardt, <u>MTS0112</u> )/4/(( <u>MTS0125</u> , selection from a composite of 4 crosses)
	<b>MTS1228</b>			( <u>Yellowstone</u> sib, MT9982)*4/3/((MTS0222, Rampart*2/Judith)
	<b>MTF1232</b>			selection from a composite of 5 crosses: 06X272, <u>Yellowstone</u> /(MT0684, a composite - see pedigree); 06X276, <u>Yellowstone</u> /(MT06102, , a composite - see pedigree); 06X278, <u>Yellowstone</u> /7/(MT06110, (Arapahoe/3/Brule//Hiplains/Newton, SD93528)/6/(MT9409, Tiber/5/(TAM W-103/Froid/4/Yogo//Turkey Red/Oro/3/Centurk, MT8030))); 06X282, <u>Yellowstone</u> /3/(MT06123, '2174'/(MT9440, BigSky sib)//BigSky); and 06X285, <u>Yellowstone</u> /7/((98X168E1, (Nuwest/4/(MT88001, Sawmont/Tendoy /3/Yogo//Norin 10/Brevor) /5/(MT7863, Froid/Winoka/Centurk), MTS9720)/6/(PI 191303, Alba = Belgian variety)/Elkhorn);
	<b>MT1246</b>			selection from a composite of 2 crosses: 03X316, ((Karagach, RWA resis., PI262605)/4/ (MT7863, Froid/Winoka//Centurk)/3/ Redwin, <u>MTR00118</u> )/10/(( <u>MT0241</u> , (WWP4394/NuWest /4/(Rego/Cheyenne// Winalta, MT7431)/3/(MT7978, Centurk/Marias), MT91192)/9/(NuWest/ Redwin//Rio Blanco, 88X9D105-6)/8/(((Carstens V/A. intermedium// Lathrop, Cltr15092)/3/T. speltoides/4/Fletcher/5/5*Centurk, Cltr17884)*4/6/Karl, KS93WGRC27) /7/((MT9415, Judith/Yogo))/11/ <u>CDC Falcon</u> and 03X317, (Erhardt//Judith/CDC Kestrel, <u>MT0097</u> // <u>MTR00118/MT0241</u>
	<b>MT1257</b>			selection from a composite of 2 crosses: 03X351, <u>Yellowstone</u> / Krichauff and 03X352, Krichauff/7/(( <u>MTS04114</u> , L'Govskaya 167/Rampart/6/(MT9409, Tiber/5/ (MT8030, TAM W-103/Froid /4/Yogo//Turkey Red /Oro/3/Centurk))
	<b>MT1262</b>			selection from a composite of 2 crosses: 03X314, ( <u>MT0317Z</u> , ((Carstens V/Ae. intermedium (TA25)//Lathrop, Cltr13092)/3/T. speltoides/4/Fletcher/5/ 5*Centurk, Cltr17884)*4/6/Karl, KS93WGRC27)/7/2*Judith)/8/(Erhardt//Judith/CDC Kestrel , <u>MT0097</u> )/3/Curlew and 03X315, MT0097*2/Curlew
	<b>MT1265</b>			<u>Yellowstone</u> *4/(( <u>KS96WGRC40</u> , KS93U69*2/TA 2397) (Lr41, wcm)
	<b>MT1286</b>			<u>Yellowstone</u> *2/3/(( <u>NE99445</u> , Rawhide/Tomahawk//Karl 92)

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

Cultivar/Line	Grain Yield (bushels/acre)				2014 Data						
					Test weight	Heading Date		Plant height	Lodging	Stripe rust	Protein
	2014	2013-13	2012-14	2011-14		Ordinal	Calendar				
		2 yr	3 yr	4 yr	lb/bu	from Jan1		in	%	%	%
<b>Bearpaw +</b>	118.9	75.0	55.0	50.4	61.9	158.7	8-Jun	36.7	1	18	12.3
<b>Broadview (P)++</b>	128.9	95.1	67.4	56.9	61.9	159.7	7-Jun	37.7	0	7	11.9
<b>Carter (P)+</b>	112.3	69.6	49.8	42.1	59.7	158.3	7-Jun	33.7	0	17	11.8
<b>CDC Falcon (P)+</b>	125.0	100.8	80.1	73.2	61.6	159.3	8-Jun	35.0	0	3	11.9
<b>Colter ++</b>	<b>152.9*</b>	<b>141.4**</b>	<b>126.0*</b>	<b>125.0*</b>	61.7	161.3	10-Jun	39.5	1	0	12.8
<b>Cowboy +</b>	142.1	106.7			61.9	158.0	7-Jun	39.5	2	10	10.8
<b>Decade +</b>	113.1	77.8	54.9	45.3	60.1	157.7	7-Jun	37.1	0	32	12.2
<b>Emerson (P)</b>	140.5				62.7	159.7	9-Jun	42.3	7	2	13.1
<b>Freeman ++</b>	<b>146.5*</b>				61.0	152.3	1-Jun	36.7	3	0	12.3
<b>Genou +</b>	119.4	88.4	64.3	54.8	62.1	161.3	10-Jun	40.0	1	35	12.1
<b>Jagalene (P)+</b>	141.9	<b>124.9*</b>	104.7	95.7	63.7	157.3	6-Jun	36.0	0	8	12.5
<b>Jerry</b>	120.8	81.9	59.8	51.9	61.0	161.0	10-Jun	46.3	3	53	11.6
<b>Judee +</b>	136.4	<b>121.5*</b>	101.2	102.2	62.6	159.3	8-Jun	37.0	1	0	12.4
<b>Keldin (P)+</b>	<b>144.0*</b>				61.9	159.0	8-Jun	36.6	0	0	12.6
<b>LCS Colonia (P)++</b>	139.0				57.7	163.0	12-Jun	33.5	0	5	12.1
<b>LCS Mint (P)+</b>	<b>151.8*</b>				60.3	153.7	3-Jun	37.7	0	0	12.7
<b>LCS Wizard (P)++</b>	117.4				63.1	157.0	6-Jun	33.3	0	24	12.4
<b>Ledger (P)+</b>	126.9	<b>113.1*</b>	89.9	79.3	62.3	158.3	7-Jun	35.6	0	3	12.1
<b>McGill +</b>	127.6	102.5	75.2	70.3	61.5	156.3	5-Jun	38.2	1	12	12.0
<b>MT0978 (name pending)</b>	<b>150.7*</b>	<b>137.9*</b>	<b>112.0*</b>	<b>109.4*</b>	63.0	160.7	10-Jun	40.9	7	0	12.4
<b>MT1078</b>	<b>144.5*</b>	<b>125.6*</b>	104.7		61.3	160.3	9-Jun	37.8	1	0	11.9
<b>MT1090</b>	142.2	<b>127.0*</b>	<b>112.4*</b>		61.6	161.3	10-Jun	39.5	0	2	11.9
<b>MT1113</b>	<b>144.6*</b>	<b>128.6*</b>			62.8	161.0	10-Jun	40.8	1	0	11.7
<b>MT1117</b>	<b>145.7*</b>	<b>138.4*</b>			63.0	161.0	10-Mar	41.1	1	0	12.1
<b>MT1138</b>	<b>151.2*</b>	<b>140.8*</b>			62.2	160.0	9-Jun	40.3	0	0	12.0
<b>MT1246</b>	<b>146.9*</b>				62.9	161.0	10-Jun	40.3	26	1	12.6
<b>MT1257</b>	<b>145.1*</b>				62.3	160.7	10-Jun	38.2	0	0	12.1
<b>MT1262</b>	<b>148.3*</b>				62.0	160.3	9-Jun	40.0	63	0	13.0
<b>MT1265</b>	<b>148.9*</b>				61.4	160.7	10-Jun	41.2	4	0	12.0
<b>MT1286</b>	<b>147.5*</b>				62.7	159.3	8-Jun	43.8	5	5	11.5
<b>MTCL1131</b>	<b>153.9**</b>	<b>137.2*</b>			62.7	161.0	10-Jun	42.3	0	0	11.9
<b>MTCS1204</b>	137.1				62.2	160.0	9-Jun	38.8	0	2	13.2
<b>MTF1232</b>	142.2				62.7	162.7	12-Jun	51.2	0	8	13.1
<b>MTS0826-63</b>	128.8	<b>117.9*</b>			62.3	163.7	13-Jun	40.6	1	0	12.9
<b>MTS1024</b>	<b>147.0*</b>	<b>132.1*</b>	<b>110.6*</b>		61.1	160.3	9-Jun	35.6	2	0	12.1
<b>MTS1224</b>	139.8				62.2	162.3	11-Jun	34.9	8	2	12.6
<b>MTS1228</b>	129.6				64.2	161.3	10-Jun	36.6	0	0	12.2
<b>Promontory</b>	<b>142.6*</b>	<b>140.6*</b>	<b>129.8**</b>	<b>128.8**</b>	64.0	157.7	7-Jun	36.6	0	0	11.6
<b>Radiant (P)</b>	133.6	<b>123.8*</b>	<b>111.2*</b>	108.0	62.7	162.3	11-Jun	40.7	0	0	11.9
<b>Rampart</b>	126.0	106.0	86.8	82.0	62.3	161.3	10-Jun	41.3	1	4	13.3
<b>SY Clearstone 2CL (P)+</b>	<b>146.1*</b>	<b>132.0*</b>	<b>113.4*</b>		62.1	160.3	9-Jun	39.9	0	0	11.8
<b>SY Wolf (P)+</b>	137.4	<b>126.3*</b>	104.3	98.3	61.8	156.7	6-Jun	36.7	0	0	12.7
<b>T158 (P)++</b>	120.7				62.5	152.7	2-Jun	31.5	0	0	12.6
<b>Warhorse +</b>	129.3	<b>122.4*</b>	106.4	<b>108.4*</b>	61.6	160.3	9-Jun	36.7	2	0	13.3
<b>WB3768 (HWW, P)++</b>	<b>151.3*</b>	<b>136.4*</b>	<b>123.5*</b>	<b>122.2*</b>	62.8	163.0	12-Jun	42.4	8	0	11.7
<b>WB4059CLP (P)+</b>	86.8				59.1	153.0	2-Jun	29.0	0	62	12.9
<b>WB4614 (P)++</b>	138.9				62.5	159.0	8-Jun	36.0	0	2	12.3
<b>R WB-Quake (P)+</b>	122.6	<b>116.5*</b>	101.6	100.8	62.6	161.0	10-Jun	37.8	1	3	12.5
<b>R Yellowstone +</b>	140.5	<b>132.4*</b>	<b>116.4*</b>	<b>114.6*</b>	62.0	161.7	11-Jun	38.3	0	2	11.9
<b>Average</b>	<b>136.2</b>	<b>116.8</b>	<b>94.5</b>	<b>86.6</b>	<b>62.0</b>	<b>159.6</b>	<b>9-Jun</b>	<b>38.4</b>	<b>3.1</b>	<b>6.6</b>	<b>12.3</b>
<b>LSD (0.05)</b>	<b>11.3</b>	<b>33.0</b>	<b>23.3</b>	<b>20.8</b>		<b>1.5</b>		<b>2.9</b>	<b>13.0</b>	<b>13.1</b>	
<b>C.V.</b>	<b>5.1</b>	<b>13.8</b>	<b>15.0</b>	<b>17.0</b>		<b>0.6</b>		<b>4.7</b>	<b>257.0</b>	<b>123.0</b>	

\*\* = indicates highest yielding variety within a column

\* = 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

(HWW) = Hard White Winter Wheat

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

Cultivar/Line	Grain Yield (bushels/acre)				2014 Data				
	2014	2013-13	2012-14	2011-14	Test weight	Heading Date		Plant height	Protein %
						Ordinal	Calendar		
		2 yr	3 yr	4 yr	lb/bu	from Jan1		in	%
Bearpaw +	92.9	87.8	83.3	78.3	63.0	163.7	13-Jun	34.0	13.6
Broadview (P)++	97.0	87.7	79.8	73.9	62.4	164.1	13-Jun	35.3	13.1
R Carter (P)+	89.2	86.0	80.9	69.9	62.0	163.0	12-Jun	32.1	13.1
R CDC Falcon (P)+	95.3	87.8	82.1	75.4	62.7	163.8	13-Jun	32.6	13.0
R Colter ++	101.7	94.8	88.2	<b>90.2*</b>	62.6	166.3	15-Jun	36.8	13.6
Cowboy +	101.8	<b>96.2*</b>			62.7	163.3	12-Jun	35.7	12.1
Decade +	94.7	91.9	87.4	80.5	62.4	163.3	12-Jun	35.7	13.3
Emerson (P)	88.6				63.1	165.3	14-Jun	38.0	13.8
Freeman ++	100.8				61.7	158.1	7-Jun	32.8	12.8
Genou +	90.4	84.4	79.0	71.2	63.2	164.0	13-Jun	39.5	13.3
Jagalene (P)+	104.1	<b>100.5*</b>	<b>96.3*</b>	<b>89.3*</b>	<b>65.0*</b>	162.7	12-Jun	35.7	13.4
Jerry	99.0	89.0	84.5	80.1	61.9	165.4	14-Jun	42.5	13.7
Judee +	98.6	90.2	84.1	<b>85.3*</b>	63.7	163.0	12-Jun	36.3	13.5
Keldin (P)+	<b>113.0**</b>				63.2	164.1	13-Jun	33.1	13.4
LCS Colonia (P)++	103.0				58.7	168.1	17-Jun	32.1	12.4
LCS Mint (P)+	<b>105.8*</b>				<b>65.0**</b>	160.7	10-Jun	34.3	12.9
LCS Wizard (P)++	91.0				63.6	161.8	11-Jun	31.1	13.7
R Ledger (P)+	94.6	86.8	82.6	73.8	63.2	163.4	12-Jun	34.5	12.5
McGill +	100.7	92.3	86.6	78.4	62.7	161.3	10-Jun	39.0	13.0
R MT0978 (name pending)	97.7	94.3	89.1	<b>88.7*</b>	62.5	165.4	14-Jun	35.3	13.3
MT1078	<b>106.9*</b>	<b>102.3**</b>	<b>98.5**</b>		61.9	165.5	15-Jun	32.7	12.4
MT1090	103.7	<b>97.6*</b>	90.9		61.9	165.7	15-Jun	37.0	12.5
MT1113	<b>108.0*</b>	<b>100.2*</b>			63.3	166.3	15-Jun	38.7	13.2
MT1117	103.4	93.8			62.5	167.3	16-Jun	36.8	13.4
MT1138	<b>112.5*</b>	<b>101.2*</b>			62.0	165.4	14-Jun	38.3	12.9
MT1246	100.9				62.9	165.1	14-Jun	35.7	13.4
MT1257	<b>112.2*</b>				61.3	164.7	14-Jun	38.7	13.2
MT1262	<b>105.6*</b>				63.1	165.7	15-Jun	39.5	13.7
MT1265	<b>110.1*</b>				61.1	167.0	16-Jun	39.0	13.3
MT1286	<b>110.0*</b>				63.4	164.6	14-Jun	38.7	13.1
MTCL1131	<b>107.1*</b>	<b>98.6*</b>			62.5	166.3	15-Jun	39.5	13.3
MTC51204	92.7				62.7	164.1	13-Jun	36.3	13.7
MTF1232	94.8				61.9	169.8	19-Jun	48.2	14.3
MTS0826-63	91.1	85.8			62.6	168.7	18-Jun	39.1	13.7
MTS1024	104.1	<b>97.7*</b>	<b>94.8*</b>		61.4	165.6	15-Jun	32.6	12.4
MTS1224	103.9				62.8	167.0	16-Jun	33.0	12.8
MTS1228	<b>105.8*</b>				62.3	165.6	15-Jun	33.8	13.2
Promontory	<b>108.6*</b>	<b>101.3*</b>	<b>92.8*</b>	<b>94.7**</b>	<b>64.6*</b>	163.3	12-Jun	37.8	12.3
Radiant (P)	89.7	82.3	75.6	77.5	62.9	167.0	16-Jun	38.7	13.0
Rampart	89.1	81.7	77.8	77.0	62.4	164.7	14-Jun	41.0	14.1
SY Clearstone 2CL (P)+	<b>106.4*</b>	94.1	90.3		61.4	165.5	15-Jun	37.7	13.3
R SY Wolf (P)+	102.6	<b>100.2*</b>	<b>94.9*</b>	<b>87.5*</b>	63.8	163.0	12-Jun	34.5	13.3
T158 (P)++	94.5				63.6	158.3	7-Jun	30.5	12.8
Warhorse +	91.5	89.6	84.2	<b>85.3*</b>	62.0	166.4	15-Jun	35.0	13.8
WB3768 (HWW, P)++	<b>105.3*</b>	<b>99.0*</b>	92.0	<b>90.6*</b>	62.4	169.1	18-Jun	41.4	13.0
WB4059CLP (P)+	87.9				62.2	160.3	9-Jun	28.7	14.2
WB4614 (P)++	97.7				62.9	164.1	13-Jun	34.0	12.8
R WB-Quake (P)+	92.6	84.7	81.7	82.0	62.3	167.0	16-Jun	37.1	13.4
R Yellowstone +	<b>108.4*</b>	<b>101.5*</b>	<b>94.1*</b>	<b>93.4*</b>	61.8	165.4	14-Jun	37.6	13.2
Average	<b>100.1</b>	<b>92.9</b>	<b>86.8</b>	<b>82.0</b>	<b>62.6</b>	<b>164.7</b>	<b>14-Jun</b>	<b>36.3</b>	<b>13.2</b>
LSD (0.05)	<b>8.8</b>	<b>7.3</b>	<b>5.9</b>	<b>12.6</b>	<b>0.6</b>	<b>1.3</b>		<b>1.3</b>	
C.V.	<b>5.1</b>	<b>3.9</b>	<b>4.2</b>	<b>10.9</b>	<b>0.5</b>	<b>0.5</b>		<b>2.2</b>	

\*\* = indicates highest yielding variety within a column

\* = 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

(HWW) = Hard White Winter Wheat

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

*** Late harvest (Sept. 8th), low test weight values ***									
Cultivar/Line	Grain Yield (bushels/acre)				2014 Data				
					Test weight	Heading Date		Plant height	Protein
	2014	2013-13	2012-14	2011-14		Ordinal	Calendar		
	2 yr	3 yr	4 yr		lb/bu	from Jan1	in	%	
R Bearpaw +	86.5	74.2	67.5	69.4	54.9	151.7	31-May	35.9	13.5
Broadview (P)++	75.8	70.9	67.4	68.5	53.0	154.3	3-Jun	35.4	13.9
R Carter (P)+	74.8	69.8	66.6	67.1	54.5	152.3	1-Jun	32.6	14.4
R CDC Falcon (P)+	88.6	<b>77.9*</b>	72.3	<b>71.1*</b>	53.3	153.7	3-Jun	33.9	13.6
R Colter ++	<b>99.6*</b>	<b>83.2*</b>	<b>77.8*</b>	<b>77.9*</b>	54.2	155.0	4-Jun	36.7	14.1
Cowboy +	90.4	<b>83.8*</b>			54.1	150.7	30-May	34.9	12.2
R Decade +	85.5	<b>78.4*</b>	73.8	<b>72.9*</b>	53.0	150.7	30-May	35.6	13.8
Emerson (P)	90.6				52.9	154.0	3-Jun	38.5	14.1
Freeman ++	96.8				54.8	149.0	28-May	36.7	12.7
Genou +	66.1	61.5	58.9	62.7	55.2	154.3	3-Jun	41.4	<b>14.6*</b>
Jagalene (P)+	<b>101.8*</b>	<b>88.5*</b>	<b>77.7*</b>	<b>74.5*</b>	<b>57.6*</b>	151.0	30-May	36.4	13.3
Jerry	73.0	67.2	64.1	63.7	52.7	155.0	4-Jun	41.4	13.9
R Judee +	79.3	70.6	67.9	69.4	53.9	152.7	2-Jun	36.2	14.0
Keldin (P)+	<b>100.8*</b>				55.8	154.0	3-Jun	36.3	12.3
LCS Colonia (P)++	91.3				49.4	155.0	4-Jun	33.2	12.4
LCS Mint (P)+	<b>106.4*</b>				<b>58.0**</b>	149.0	28-May	37.0	12.8
LCS Wizard (P)++	90.9				<b>57.4*</b>	149.3	28-May	33.5	12.8
Ledger (P)+	73.5	66.9	62.9	65.2	55.7	151.7	31-May	34.3	13.4
McGill +	95.1	<b>78.6*</b>	73.2	<b>77.0*</b>	53.4	149.0	28-May	39.4	12.6
R MT0978 (name pending)	<b>99.1*</b>	<b>83.5*</b>	<b>76.4*</b>	<b>78.0*</b>	53.8	154.7	4-Jun	36.9	13.9
MT1078	<b>98.7*</b>	<b>87.0*</b>	<b>83.9*</b>		53.6	153.7	3-Jun	36.4	13.1
MT1090	<b>103.3*</b>	<b>84.9*</b>	<b>83.3*</b>		54.3	154.3	3-Jun	37.7	12.8
MT1113	<b>100.6*</b>	<b>86.3*</b>			55.6	154.7	4-Jun	38.3	12.8
MT1117	93.5	<b>78.9*</b>			54.2	155.0	4-Jun	38.3	13.4
MT1138	89.8	<b>78.8*</b>			53.0	154.7	4-Jun	36.7	13.5
MT1246	92.6				52.4	154.3	3-Jun	36.0	13.2
MT1257	<b>99.8*</b>				53.4	153.7	3-Jun	38.6	13.4
MT1262	92.7				54.2	154.0	3-Jun	36.8	13.6
MT1265	97.8				53.4	154.7	4-Jun	38.2	13.4
MT1286	89.9				54.8	153.7	3-Jun	38.1	13.0
MTCL1131	95.4	<b>79.2*</b>			54.1	154.0	3-Jun	39.7	12.6
MTCS1204	87.4				55.5	153.0	2-Jun	35.6	13.9
MTF1232	82.6				56.4	156.0	5-Jun	53.6	<b>15.2**</b>
MTS0826-63	86.5	74.8			56.2	154.7	4-Jun	39.3	<b>14.5*</b>
MTS1024	<b>108.4**</b>	<b>90.3**</b>	<b>85.0**</b>		54.0	154.0	3-Jun	33.4	12.2
MTS1224	94.5				54.4	155.0	4-Jun	36.0	13.6
MTS1228	96.7				54.3	154.0	3-Jun	35.3	13.9
Promontory	<b>101.3*</b>	<b>83.6*</b>	<b>79.1*</b>	<b>78.5*</b>	<b>57.9*</b>	153.0	2-Jun	38.8	13.1
Radiant (P)	81.1	70.3	65.7	67.1	53.2	154.7	4-Jun	38.0	<b>14.5*</b>
Rampart	77.5	65.5	62.3	65.1	55.9	154.0	3-Jun	42.7	<b>14.8*</b>
SY Clearstone 2CL (P)+	<b>100.9*</b>	<b>82.4*</b>	<b>78.4*</b>		52.6	153.3	2-Jun	36.1	13.7
R SY Wolf (P)+	<b>99.2*</b>	<b>81.9*</b>	<b>77.5*</b>	<b>78.2*</b>	51.5	151.7	1-Jun	33.6	13.5
T158 (P)++	<b>104.6*</b>				<b>57.4*</b>	149.0	28-May	34.1	12.4
R Warhorse +	94.6	<b>78.7*</b>	74.2	<b>75.6*</b>	55.9	154.0	3-Jun	35.6	14.4
WB3768 (HWW, P)++	81.4	70.3	67.2	<b>71.2*</b>	52.9	155.7	5-Jun	39.8	13.8
WB4059CLP (P)+	70.3				53.0	149.0	28-May	33.3	13.7
WB4614 (P)++	70.0				55.2	153.7	3-Jun	34.6	14.3
R WB-Quake (P)+	84.9	70.4	67.8	<b>70.9*</b>	<b>57.2*</b>	154.3	3-Jun	37.1	13.1
R Yellowstone +	<b>99.4*</b>	<b>82.4*</b>	<b>78.1*</b>	<b>78.6**</b>	54.4	155.0	4-Jun	38.1	13.0
Average	<b>90.6</b>	<b>77.4</b>	<b>72.4</b>	<b>71.5</b>	<b>54.5</b>	<b>153.2</b>	<b>2-Jun</b>	<b>37.1</b>	<b>13.5</b>
LSD (0.05)	<b>10.2</b>	<b>12.9</b>	<b>9.4</b>	<b>8.3</b>	<b>1.1</b>	<b>1.1</b>		<b>2.2</b>	<b>0.7</b>
C.V.	<b>6.6</b>	<b>8.1</b>	<b>7.9</b>	<b>8.2</b>	<b>1.3</b>	<b>0.5</b>		<b>3.9</b>	<b>3.1</b>

\*\* = indicates highest yielding variety within a column

\* = 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

(HWW) = Hard White Winter Wheat

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

Cultivar/Line	Grain Yield (bushels/acre)				2014 Data				
	2014	2013-13	2012-14	2011-14	Test weight	Heading Date		Plant height	Protein %
						Ordinal	Calendar		
		2 yr	3 yr	4 yr	lb/bu	from Jan1		in	%
R Bearpaw +	49.6	53.9	46.6	45.8	61.8	164.7	14-Jun	31.5	12.9
Broadview (P)++	55.5	55.1	47.7	47.5	60.9	166.7	16-Jun	31.3	13.0
R Carter (P)+	54.4	55.9	49.0	47.8	61.9	164.4	13-Jun	28.2	13.6
R CDC Falcon (P)+	56.3	57.8	50.0	49.1	60.4	167.0	16-Jun	30.3	13.4
R Colter ++	<b>62.6*</b>	<b>61.2*</b>	<b>52.9*</b>	<b>53.0*</b>	60.2	169.1	18-Jun	34.0	13.0
Cowboy +	57.8	59.7			60.6	166.7	16-Jun	32.1	12.8
R Decade +	57.4	59.4	50.2	48.4	62.0	165.0	14-Jun	32.2	13.3
Emerson (P)	48.3				61.2	168.1	17-Jun	33.7	13.5
Freeman ++	60.0				59.8	160.1	9-Jun	33.8	13.1
Genou +	47.7	47.5	41.0	40.8	58.5	167.8	17-Jun	37.6	14.3
Jagalene (P)+	56.2	59.0	50.2	47.7	<b>64.2**</b>	166.0	15-Jun	32.4	13.0
Jerry	51.4	55.0	46.4	46.6	59.6	169.4	18-Jun	36.0	15.4
R Judee +	50.0	49.2	42.9	43.1	60.1	164.9	14-Jun	31.4	14.1
Keldin (P)+	56.5				60.7	170.0	19-Jun	30.6	13.0
LCS Colonia (P)++	54.4				56.7	170.6	20-Jun	31.7	12.8
LCS Mint (P)+	57.9				<b>63.7*</b>	162.9	12-Jun	30.5	13.0
LCS Wizard (P)++	53.2				62.7	165.9	15-Jun	31.4	13.0
R Ledger (P)+	51.4	50.2	43.0	43.1	61.2	165.0	14-Jun	32.7	13.0
McGill +	57.2	<b>61.7*</b>	<b>51.6*</b>	<b>51.0*</b>	61.5	162.6	12-Jun	32.9	12.6
R MT0978 (name pending)	58.1	59.9	<b>51.5*</b>	<b>51.5*</b>	60.3	169.5	19-Jun	31.7	13.8
MT1078	59.6	60.2	<b>52.1*</b>		60.5	167.8	17-Jun	32.0	12.8
MT1090	<b>64.2*</b>	<b>65.8*</b>	<b>56.0**</b>		59.4	166.9	16-Jun	34.1	13.5
MT1113	59.9	<b>62.8*</b>			61.5	167.8	17-Jun	35.3	12.8
MT1117	62.8*	<b>66.5*</b>			60.6	168.8	18-Jun	30.8	13.8
MT1138	<b>63.7*</b>	<b>67.9**</b>			61.3	167.1	16-Jun	35.4	13.1
MT1246	55.2				60.1	170.5	20-Jun	29.3	13.0
MT1257	<b>65.4**</b>				60.5	166.9	16-Jun	34.5	13.6
MT1262	54.3				60.7	170.3	19-Jun	31.1	14.5
MT1265	<b>61.0*</b>				60.1	170.6	20-Jun	33.1	13.5
MT1286	<b>61.5*</b>				62.8	168.0	17-Jun	34.9	12.3
MTCL1131	<b>64.6*</b>	<b>67.9**</b>			60.8	169.6	19-Jun	35.8	13.6
MTC51204	52.5				61.5	169.7	19-Jun	32.3	13.1
MTF1232	52.9				58.7	170.8	20-Jun	41.4	13.6
MTS0826-63	45.8	46.7			61.0	170.7	20-Jun	32.6	14.5
MTS1024	57.4	59.8	<b>51.6*</b>		59.0	168.6	18-Jun	32.1	12.5
MTS1224	57.6				61.5	168.9	18-Jun	31.0	12.9
MTS1228	57.6				60.7	167.2	16-Jun	30.3	13.7
Promontory	59.8	58.1	48.3	47.4	62.7	166.2	15-Jun	32.4	12.8
Radiant (P)	49.8	47.2	40.5	40.6	60.5	168.1	17-Jun	31.5	13.6
Rampart	44.2	44.7	39.3	38.9	59.1	167.4	16-Jun	34.8	14.5
SY Clearstone 2CL (P)+	<b>61.4*</b>	<b>66.2*</b>	<b>55.7*</b>		59.7	167.3	16-Jun	35.3	12.7
R SY Wolf (P)+	59.3	57.9	49.7	48.9	61.3	164.8	14-Jun	31.5	12.8
T158 (P)++	59.8				62.8	163.9	13-Jun	28.8	12.8
R Warhorse +	51.8	56.0	47.8	47.7	60.9	166.1	15-Jun	30.1	13.5
WB3768 (HWW, P)++	60.6	<b>61.8*</b>	<b>52.3*</b>	<b>51.9*</b>	59.6	171.1	20-Jun	36.3	12.5
WB4059CLP (P)+	51.4				59.6	161.6	11-Jun	29.4	13.9
WB4614 (P)++	56.8				60.7	167.8	17-Jun	31.4	13.2
R WB-Quake (P)+	48.8	53.7	45.8	46.8	60.3	169.9	19-Jun	31.8	13.5
R Yellowstone +	<b>62.1*</b>	<b>64.3*</b>	<b>54.7*</b>	<b>54.0**</b>	61.7	168.8	18-Jun	33.9	12.9
Average	<b>56.3</b>	<b>57.8</b>	<b>48.7</b>	<b>47.2</b>	<b>60.7</b>	<b>167.3</b>	<b>16-Jun</b>	<b>32.6</b>	<b>13.3</b>
LSD (0.05)	4.6	6.2	5.2	4.3	1.2	2.3		2.8	
C.V.	4.8	5.2	6.5	6.4	1.0	0.8		5.1	

\*\* = indicates highest yielding variety within a column

\* = 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

(HWW) = Hard White Winter Wheat

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

Cultivar/Line	Grain Yield (bushels/acre)				2014 Data				
	2014	2013-13	2012-14	2011-14	Test weight	Heading Date		Plant height	Protein
						Ordinal	Calendar		
		2 yr	3 yr	4 yr	lb/bu	from Jan1		in	%
R Bearpaw +	98.5	90.5	86.4	87.4	60.1	170.7	20-Jun	29.7	12.8
R Broadview (P)++	<b>109.6*</b>	99.7	<b>95.7*</b>	96.0	60.6	170.5	20-Jun	31.5	12.0
R Carter (P)+	104.2	97.0	93.0	92.6	60.1	169.1	18-Jun	28.5	12.6
R CDC Falcon (P)+	104.4	94.1	93.7	92.6	60.7	171.5	21-Jun	28.7	12.0
R Colter ++	<b>107.2*</b>	100.9	<b>99.0*</b>	<b>99.2*</b>	60.2	174.6	24-Jun	32.9	12.9
Cowboy +	<b>114.5*</b>	<b>106.2*</b>			61.2	171.6	21-Jun	31.3	11.4
R Decade +	<b>109.6*</b>	99.5	93.5	93.0	60.5	167.7	17-Jun	30.7	12.5
Emerson (P)	<b>106.9*</b>				61.4	175.5	25-Jun	33.5	12.8
Freeman ++	106.6				58.7	166.7	16-Jun	27.3	12.4
Genou +	103.0	88.9	85.0	84.8	61.3	172.8	22-Jun	34.4	12.4
Jagalene (P)+	<b>110.4*</b>	<b>102.7*</b>	<b>99.4*</b>	<b>98.8*</b>	<b>63.2*</b>	169.6	19-Jun	32.5	12.4
Jerry	97.5	89.2	85.6	85.5	59.9	173.4	22-Jun	34.0	12.2
R Judee +	97.5	88.2	90.6	92.3	62.1	169.4	18-Jun	30.2	12.6
Keldin (P)+	<b>115.6*</b>				61.5	172.8	22-Jun	29.8	12.2
LCS Colonia (P)++	<b>112.7*</b>				56.5	177.6	27-Jun	27.0	11.9
LCS Mint (P)+	<b>122.7*</b>				<b>63.7**</b>	166.7	26-Jun	30.4	11.9
LCS Wizard (P)++	<b>109.2*</b>				61.9	169.4	18-Jun	26.6	12.3
R Ledger (P)+	94.4	88.6	85.1	86.2	61.4	170.0	19-Jun	30.2	11.8
McGill +	<b>106.7*</b>	97.5	93.2	95.3	60.9	168.5	18-Jun	33.4	12.1
R MT0978 (name pending)	<b>114.9*</b>	<b>104.5*</b>	<b>102.0*</b>	<b>101.4*</b>	60.1	173.5	23-Jun	30.5	12.3
MT1078	<b>108.6*</b>	<b>106.4*</b>	<b>102.9*</b>		59.4	173.2	23-Jun	29.8	11.9
MT1090	94.4	92.6	<b>95.4*</b>		59.2	173.1	22-Jun	31.6	12.5
MT1113	<b>123.2**</b>	<b>106.5*</b>			62.1	176.5	26-Jun	32.6	12.1
MT1117	<b>115.0*</b>	<b>105.0*</b>			61.6	171.6	21-Jun	33.3	12.6
MT1138	<b>120.3*</b>	<b>110.0**</b>			60.5	172.5	22-Jun	32.9	12.1
MT1246	<b>112.3*</b>				60.3	172.6	22-Jun	32.2	12.3
MT1257	<b>118.7*</b>				60.5	173.1	22-Jun	32.0	12.0
MT1262	<b>111.3*</b>				61.5	173.8	23-Jun	30.8	12.4
MT1265	<b>119.5*</b>				60.9	175.7	25-Jun	31.7	12.0
MT1286	<b>112.9*</b>				61.4	173.7	23-Jun	31.9	12.2
MTCL1131	<b>113.8*</b>	<b>108.5*</b>			61.4	175.9	25-Jun	33.7	12.0
MTC51204	102.4				61.6	174.7	24-Jun	31.8	12.3
MTF1232	98.3				60.2	176.4	25-Jun	42.0	13.6
MTS0826-63	95.3	90.0			59.5	175.3	24-Jun	35.6	13.1
MTS1024	103.2	96.7	<b>95.7*</b>		59.0	173.0	22-Jun	28.7	11.6
MTS1224	<b>107.8*</b>				60.0	176.1	25-Jun	27.9	12.4
MTS1228	103.5				60.4	173.8	23-Jun	29.7	12.4
Promontory	105.7	98.9	92.5	94.3	<b>63.0*</b>	171.7	21-Jun	32.7	11.1
Radiant (P)	101.4	91.4	88.0	87.9	60.9	173.4	22-Jun	35.4	12.6
Rampart	99.7	87.7	82.9	81.3	61.0	171.3	20-Jun	33.7	13.4
SY Clearstone 2CL (P)+	<b>108.6*</b>	<b>101.9*</b>	<b>96.9*</b>		60.6	173.8	23-Jun	33.7	11.8
R SY Wolf (P)+	<b>111.7*</b>	<b>101.5*</b>	<b>97.1*</b>	<b>100.2*</b>	61.6	168.8	18-Jun	27.3	12.4
T158 (P)++	100.5				<b>63.2*</b>	166.0	15-Jun	25.9	12.1
R Warhorse +	91.9	85.8	85.3	87.6	60.1	171.8	21-Jun	29.0	13.0
WB3768 (HWW, P)++	<b>117.6*</b>	<b>108.0*</b>	<b>101.6*</b>	<b>102.2*</b>	60.6	176.8	26-Jun	36.0	12.4
WB4059CLP (P)+	67.3				60.0	166.5	16-Jun	25.3	12.8
WB4614 (P)++	100.2				60.9	172.0	21-Jun	30.1	12.2
R WB-Quake (P)+	97.2	87.5	87.5	87.4	60.2	174.2	23-Jun	31.5	12.7
R Yellowstone +	<b>117.2*</b>	<b>106.5*</b>	<b>103.1**</b>	<b>102.5**</b>	59.9	175.5	25-Jun	32.7	12.1
Average	<b>106.6</b>	<b>97.9</b>	<b>93.2</b>	<b>92.8</b>	<b>60.8</b>	<b>172.3</b>	<b>21-Jun</b>	<b>31.3</b>	<b>12.3</b>
LSD (0.05)	<b>16.5</b>	<b>8.8</b>	<b>8.2</b>	<b>6.1</b>	<b>1.4</b>	<b>3.0</b>		<b>1.9</b>	
C.V.	<b>8.8</b>	<b>4.4</b>	<b>5.4</b>	<b>4.6</b>	<b>1.3</b>	<b>1.0</b>		<b>3.4</b>	

\*\* = indicates highest yielding variety within a column

\* = 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

(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)			2014 Data				
	2014	2013-14	2012-14	Test weight	Heading Date		Plant height	Protein %
					Ordinal	Calendar		
		2 yr	3 yr	lb/bu	from Jan1		in	%
R Bearpaw +	53.3	61.0	59.1	60.6	161.2	10-Jun	23.2	13.2
R Broadview (P)++	62.3	65.7	61.4	60.3	160.0	9-Jun	24.7	12.5
R Carter (P)+	58.8	60.1	57.4	60.9	160.3	9-Jun	23.5	12.9
R CDC Falcon (P)+	60.1	59.2	57.2	60.9	159.1	8-Jun	23.0	12.6
R Colter ++	61.1	62.4	65.2	61.3	162.7	12-Jun	26.2	13.1
Cowboy +	<b>65.6*</b>	74.2		61.6	159.7	9-Jun	21.8	11.6
R Decade +	55.9	61.7	59.7	60.8	159.5	9-Jun	24.1	12.5
Emerson (P)	56.0			61.3	159.4	8-Jun	28.2	13.5
Freeman ++	55.4			60.4	156.2	5-Jun	25.3	11.5
Genou +	57.3	64.0	57.1	61.4	159.7	9-Jun	26.4	12.2
Jagalene (P)+	52.8	57.6	56.3	62.7	159.0	8-Jun	24.9	12.5
Jerry	50.7	57.2	52.8	60.1	161.4	10-Jun	26.0	13.1
R Judee +	61.0	66.9	60.9	61.9	159.8	9-Jun	26.0	12.8
Keldin (P)+	57.6			61.0	159.7	9-Jun	23.5	12.4
LCS Colonia (P)++	37.4			58.3	164.6	14-Jun	25.0	12.8
LCS Mint (P)+	58.6			<b>63.6**</b>	155.8	5-Jun	24.8	11.4
LCS Wizard (P)++	62.6			62.4	158.0	7-Jun	22.5	12.4
R Ledger (P)+	60.7	62.1	57.4	61.6	161.0	10-Jun	26.2	12.0
McGill +	<b>64.2*</b>	63.2	61.1	60.8	158.1	7-Jun	27.3	12.3
R MT0978 (name pending)	62.0	68.3	63.8	61.0	162.1	11-Jun	24.5	13.1
MT1078	57.5	65.8	64.5	60.4	160.8	10-Jun	27.0	12.0
MT1090	59.8	63.2	61.6	61.1	161.5	11-Jun	28.3	12.5
MT1113	61.2	64.3		61.4	161.3	10-Jun	26.7	12.8
MT1117	62.3	65.1		61.7	162.3	11-Jun	28.2	13.0
MT1138	61.0	63.4		60.7	161.0	10-Jun	29.2	12.7
MT1246	55.7			60.8	162.5	12-Jun	25.5	13.8
MT1257	62.6			60.8	160.2	9-Jun	28.2	12.7
MT1262	51.4			61.4	161.6	11-Jun	25.4	13.5
MT1265	59.0			61.0	161.4	10-Jun	27.7	12.7
MT1286	57.0			61.3	162.1	11-Jun	27.5	13.0
MTCL1131	57.3	64.5		61.5	162.0	11-Jun	27.1	12.8
MTCS1204	53.4			60.9	161.3	10-Jun	26.2	13.2
MTF1232	46.5			60.4	164.4	13-Jun	35.9	13.3
MTS0826-63	57.8	63.9		61.0	163.1	12-Jun	27.0	13.3
MTS1024	56.3	64.2	61.2	60.2	161.3	10-Jun	25.0	12.4
MTS1224	50.8			60.5	163.6	13-Jun	25.0	13.5
MTS1228	62.6			60.4	162.3	11-Jun	25.9	12.7
Promontory	60.1	63.0	57.1	62.3	159.9	9-Jun	25.1	11.4
Radiant (P)	59.8	62.8	57.6	61.5	162.0	11-Jun	27.6	12.7
Rampart	56.5	61.6	56.6	60.9	161.2	10-Jun	27.6	12.7
SY Clearstone 2CL (P)+	58.5	66.7	64.3	60.7	160.9	10-Jun	28.9	12.4
R SY Wolf (P)+	<b>71.0**</b>	71.3	66.2	62.2	159.0	8-Jun	25.7	12.6
T158 (P)++	<b>66.7*</b>			62.1	155.3	4-Jun	23.6	10.7
R Warhorse +	48.0	59.0	56.6	61.0	161.1	10-Jun	25.6	13.5
WB3768 (HWW, P)++	55.4	63.4	59.6	61.5	163.8	13-Jun	32.6	13.2
WB4059CLP (P)+	55.0			60.3	156.7	6-Jun	22.6	12.5
WB4614 (P)++	58.9			62.4	161.6	11-Jun	24.1	12.2
R WB-Quake (P)+	46.7	59.0	55.4	60.9	162.8	12-Jun	25.7	12.8
R Yellowstone +	62.1	64.5	60.4	60.7	161.3	10-Jun	26.3	12.6
<b>Average</b>	<b>57.6</b>	<b>63.5</b>	<b>59.6</b>	<b>61.1</b>	<b>160.7</b>	<b>10-Jun</b>	<b>26.1</b>	<b>12.6</b>
<b>LSD (0.05)</b>	<b>7.1</b>	<b>ns</b>	<b>ns</b>	<b>0.5</b>	<b>1.4</b>		<b>2.5</b>	
<b>C.V.</b>	<b>7.0</b>	<b>7.4</b>	<b>8.3</b>	<b>0.4</b>	<b>0.5</b>		<b>5.4</b>	

\*\* = indicates highest yielding variety within a column

\* = 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

(HWW) = Hard White Winter Wheat

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

Cultivar/Line	*** No harvest in 2013 due to severe hail prior to harvest ***								
	2014 = severe winter-kill, no harvest			2012 and 2013 Data					
	Grain Yield (bushels/acre)		2012	2011-12	Test weight	Winter survival	Heading Date		Plant height
2012	2011-12	Ordinal					Calendar		
			2 yr	lb/bu	%	from Jan1		in	%
Bearpaw +	60.3*	57.5		58.0	18.0	171.3	20-Jun	27.8	11.5
R Broadview (P)++	58.1*	56.8		57.5	24.6	170.8	20-Jun	29.0	11.3
R Carter (P)+	49.8	51.3		59.5*	10.5	172.4	21-Jun	26.8	11.9
R CDC Falcon (P)+	61.9*	59.4*		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	
R Decade +	55.3	60.2*		60.0*	45.7*	168.8	18-Jun	31.9	12.2
Emerson (P)									
Freeman ++									
Genou +	53.4	48.5		59.0*	6.7	173.7	23-Jun	31.9	14.0
Jagalene (P)+	57.3*	57.5		60.5**	19.7	170.6	20-Jun	28.0	11.9
R Jerry	65.9*	67.1**		58.0	54.7**	169.4	18-Jun	35.0	11.8
Judee +	51.9	48.2		58.0	10.0	173.0	22-Jun	29.4	11.4
Keldin (P)+									
LCS Colonia (P)++									
LCS Mint (P)+									
LCS Wizard (P)++									
Ledger (P)+	46.3	45.3		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 (name pending)	63.5*	65.9*		60.0*	27.2	172.9	22-Jun	29.4	11.9
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
MT1113					22.9	172.5	22-Jun	29.1	
MT1117					37.4	172.0	21-Jun	29.7	
MT1138					21.2	171.8	21-Jun	32.2	
MT1246									
MT1257									
MT1262									
MT1265									
MT1286									
MTCL1131					40.3*	172.0	21-Jun	31.8	
MTCS1204									
MTF1232									
MTS0826-63					21.3	172.5	22-Jun	33.1	
MTS1024	60.1*			57.5	4.0	174.7	24-Jun	26.9	11.9
MTS1224									
MTS1228									
Promontory	64.3*	57.6		60.5**	9.1	170.8	20-Jun	29.3	11.9
Radiant (P)	55.9	54.6		56.0	52.0*	170.9	20-Jun	35.2	11.0
Rampart	43.9	45.7		57.5	10.6	172.6	22-Jun	31.9	11.8
SY Clearstone 2CL (P)+	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
T158 (P)++									
Warhorse +	50.9	55.2		56.0	13.5	174.0	23-Jun	28.1	11.4
WB3768 (HWW, P)++	59.7*	62.0*		58.0	38.3*	172.9	22-Jun	32.3	11.1
WB4059CLP (P)+									
WB4614 (P)++									
R WB-Quake (P)+	49.4	51.1		56.5	16.3	171.1	20-Jun	31.6	13.5
Yellowstone +	63.7*	65.6*		58.8*	21.8	172.0	21-Jun	30.3	12.4
Average	57.4	56.4		58.8	23.1	171.6	21-Jun	30.3	11.7
LSD (0.05)	9.6	8.8		1.9	17.2	2.6		3.3	
C.V.	8.3	7.5		1.6	43.0	0.9		6.8	

\*\* = indicates highest yielding variety within a column

\* = 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

(HWW) = Hard White Winter Wheat

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

*** No harvest in 2014 due to severe winterkill ***										
Cultivar/Line	Grain Yield (bushels/acre)			2013 Data						
	2013	2012-13	2011-13	Test weight	Winter survival	Heading Date		Plant height	Protein	
						Ordinal	Calendar			
		2 yr	3 yr	lb/bu	%	from Jan1		in	%	
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	<b>31.7*</b>	171.0	20-Jun	27.5	12.2	
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	<b>31.7*</b>	171.0	20-Jun	25.0	11.2	
Colter ++	<b>76.0*</b>	<b>58.9*</b>	60.3	58.4	<b>43.3*</b>	171.0	20-Jun	30.5	11.7	
Cowboy +	53.2			<b>59.9*</b>	15.0	172.0	21-Jun	25.0	10.5	
R Decade +	<b>57.1*</b>	<b>50.3*</b>	56.6	58.6	28.3	170.0	19-Jun	27.5	12.2	
Emerson (P)										
Freeman ++										
Genou +	52.0	40.7	44.9	<b>59.5*</b>	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	<b>65.2*</b>	<b>59.5*</b>	57.8	57.4	<b>46.7*</b>	171.0	20-Jun	32.0	11.9	
Judee +	37.4	29.5	41.3	<b>60.1*</b>	13.3	172.0	21-Jun	26.0	11.5	
Keldin (P)+										
LCS Colonia (P)++										
LCS Mint (P)+										
LCS Wizard (P)++										
Ledger (P)+	43.9	39.3	44.9	<b>59.3*</b>	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 (name pending)	<b>61.5*</b>	<b>51.4*</b>	56.5	58.9	28.3	172.0	21-Jun	28.5	11.2	
MT1078	39.0	41.3		58.0	6.7	174.5	24-Jun	25.0	10.5	
MT1090	<b>74.7*</b>	<b>66.3**</b>		58.2	<b>30.0*</b>	172.0	21-Jun	31.5	10.5	
MT1113	<b>58.6*</b>			<b>59.6*</b>	26.7	172.0	21-Jun	29.5	11.4	
MT1117	<b>59.7*</b>			<b>59.9*</b>	20.0	172.0	21-Jun	27.5	11.3	
MT1138	<b>66.4*</b>			59.0	26.7	172.0	21-Jun	30.0	11.9	
MT1246										
MT1257										
MT1262										
MT1265										
MT1286										
MTCL1131	<b>69.8*</b>			58.3	<b>48.3**</b>	173.5	23-Jun	30.0	10.9	
MTCS1204										
MTF1232										
MTS0826-63	49.4			<b>60.2**</b>	26.7	173.5	23-Jun	31.5	12.4	
MTS1024	47.7	41.2		57.7	10.0	171.0	20-Jun	26.5	10.9	
MTS1224										
MTS1228										
Promontory	46.6	38.4	44.0	59.8*	12.0	171.0	20-Jun	29.5	11.0	
Radiant (P)	52.2	<b>50.9*</b>	54.8	59.0	<b>30.0*</b>	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	
SY Clearstone 2CL (P)+	50.2	44.4		<b>59.1*</b>	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	
T158 (P)++										
Warhorse +	54.3	50.5*	52.2	58.8	<b>33.3*</b>	173.5	23-Jun	26.5	11.4	
WB3768 (HWW, P)++	<b>62.5*</b>	<b>57.7*</b>	57.2	<b>59.6*</b>	<b>35.0*</b>	175.0	24-Jun	31.0	10.7	
WB4059CLP (P)+										
WB4614 (P)++										
R WB-Quake (P)+	<b>59.5*</b>	<b>53.5*</b>	54.7	58.9	28.3	173.5	23-Jun	28.5	13.3	
Yellowstone +	<b>70.5*</b>	<b>57.2*</b>	60.1	58.0	<b>36.7*</b>	171.0	20-Jun	31.5	11.8	
Average	<b>54.4</b>	<b>48.0</b>	<b>52.3</b>	<b>58.9</b>	<b>25.3</b>	<b>171.8</b>	<b>21-Jun</b>	<b>28.1</b>	<b>11.5</b>	
LSD (0.05)	<b>21.7</b>	<b>16.8</b>	<b>ns</b>	<b>1.1</b>	<b>19.8</b>	<b>2.6</b>		<b>4.3</b>		
C.V.	<b>24.6</b>	<b>17.0</b>	<b>15.3</b>	<b>1.1</b>	<b>48.3</b>	<b>0.8</b>		<b>7.7</b>		

\*\* = indicates highest yielding variety within a column

\* = 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

(HWW) = Hard White Winter Wheat

**Table 11. 2007//2013 Intrastate Winter Wheat Test (Exp. 35): Combined Locations Winter Survival and associated Yield (Locations: Williston (2007-2008, 2012, 2013), Sidney (2008, 2010, 2011) = 7 locations  
\*\*\* No recordable Winterkill in 2009 and 2014 (with harvest) \*\*\***

location-years	Winter Survival (%)							Yield under Winterkill conditions						
	2013	2012-13	2011-13	2010-13	2008-13	2007-13	2013	2012-13	2011-13	2010-13	2008-13	2007-13		
	1	2	3	4	6	7	1	2	3	4	6	7		
<b>Bearpaw +</b>	21.7	23.4	35.2	38.2			48.5	47.6	49.9	49.8				
<b>Broadview (P)++</b>	<b>31.7*</b>	<b>41.7*</b>	<b>48.2*</b>	<b>54.0*</b>			52.8	<b>57.7*</b>	<b>57.0*</b>	<b>59.6*</b>				
<b>Carter (P)+</b>	20.0	19.2	27.0	30.2	24.9	30.2	50.9	46.4	48.5	48.7	38.9	42.8		
<b>CDC Falcon (P)+</b>	<b>31.7*</b>	<b>41.7*</b>	<b>50.6*</b>	<b>54.5*</b>	<b>46.3</b>	<b>50.4*</b>	45.8	<b>52.7*</b>	<b>54.1*</b>	<b>55.8*</b>	<b>48.6*</b>	<b>52.4*</b>		
<b>Colter ++</b>	43.3*	30.8*	39.2				<b>76.0*</b>	<b>58.9*</b>	<b>61.4*</b>					
<b>Cowboy +</b>	15.0						53.2							
<b>Decade +</b>	28.3	<b>37.5*</b>	<b>50.0*</b>	<b>51.4*</b>	47.9	<b>52.0*</b>	<b>57.1*</b>	<b>50.3*</b>	<b>55.2*</b>	<b>56.4*</b>	<b>48.3*</b>	<b>52.5*</b>		
<b>Emerson (P)</b>														
<b>Freeman ++</b>														
<b>Genou +</b>	16.7	13.5	27.1	32.4	25.0	29.8	52.0	40.7	41.6	43.4	33.7	37.1		
<b>Jagalene (P)+</b>	18.3	15.0	27.9	31.1	25.6	29.3	43.4	40.8	46.4	46.8	38.8	41.9		
<b>Jerry</b>	<b>46.7*</b>	<b>41.7*</b>	<b>51.2*</b>	<b>55.7*</b>	49.0	<b>54.4**</b>	<b>65.2*</b>	<b>59.5*</b>	<b>62.4**</b>	<b>62.9**</b>	<b>53.9**</b>	<b>57.1**</b>		
<b>Judee +</b>	13.3	9.3	22.9	30.8	24.7		37.4	29.5	34.4	38.8	30.3			
<b>Keldin (P)+</b>														
<b>LCS Colonia (P)++</b>														
<b>LCS Mint (P)+</b>														
<b>LCS Wizard (P)++</b>														
<b>Ledger (P)+</b>	12.0	16.9	26.2	30.5	24.4	28.0	43.9	39.3	40.9	42.5	32.7	36.4		
<b>McGill +</b>	20.0	22.5	<b>43.3*</b>				36.1	39.9	45.4					
<b>MT0978 (name pending)</b>	28.3	20.8	36.3				<b>61.5*</b>	<b>51.4*</b>	<b>57.0*</b>					
<b>MT1078</b>	6.7	10.9					39.0	41.3						
<b>MT1090</b>	<b>30.0*</b>	<b>36.7*</b>					<b>74.7*</b>	<b>66.3**</b>						
<b>MT1113</b>	26.7						<b>58.6*</b>							
<b>MT1117</b>	20.0						<b>59.7*</b>							
<b>MT1138</b>	26.7						<b>66.4*</b>							
<b>MT1246</b>														
<b>MT1257</b>														
<b>MT1262</b>														
<b>MT1265</b>														
<b>MT1286</b>														
<b>MTCL1131</b>	<b>48.3**</b>						69.8*							
<b>MTC1204</b>														
<b>MTF1232</b>														
<b>MTS0826-63</b>	26.7						49.4							
<b>MTS1024</b>	10.0	11.7					47.7	41.2						
<b>MTS1224</b>														
<b>MTS1228</b>														
<b>Promontory</b>	12.0	9.0	19.7	25.7	22.0	25.3	46.6	38.4	42.5	46.4	36.1	39.6		
<b>Radiant (P)</b>	<b>30.0*</b>	<b>29.2*</b>	<b>44.1*</b>	48.5			52.2	<b>50.9*</b>	<b>51.6*</b>	52.8				
<b>Rampart</b>	21.7	20.2	29.9	30.3	22.5	25.0	49.9	43.0	44.4	43.6	32.0	34.8		
<b>SY Clearstone 2CL (P)+</b>	21.7	15.9					50.2	44.4						
<b>SY Wolf (P)+</b>	23.3	15.0	26.1				53.4	40.4	46.5					
<b>T158 (P)++</b>														
<b>Warhorse +</b>	<b>33.3*</b>	<b>28.3*</b>	<b>40.6*</b>	41.5			54.3	<b>50.5*</b>	<b>53.5*</b>	<b>53.9*</b>				
<b>WB3768 (HWW, P)++</b>	<b>35.0*</b>	<b>30.9*</b>	35.0				<b>62.5*</b>	<b>57.7*</b>	<b>59.9*</b>					
<b>WB4059CLP (P)+</b>														
<b>WB4614 (P)++</b>														
<b>WB-Quake (P)+</b>	28.3	24.2	35.4	39.1			<b>59.5*</b>	<b>53.5*</b>	<b>53.2*</b>	52.3				
<b>Yellowstone +</b>	<b>36.7*</b>	<b>28.4*</b>	36.7	40.2	33.7	37.5	<b>70.5*</b>	<b>57.2*</b>	<b>60.6*</b>	<b>61.0*</b>	<b>49.1*</b>	<b>52.3*</b>		
<b>Average</b>	<b>25.3</b>	<b>23.0</b>	<b>34.5</b>	<b>38.1</b>	<b>32.7</b>	<b>35.1</b>	<b>54.4</b>	<b>47.6</b>	<b>49.8</b>	<b>50.3</b>	<b>40.4</b>	<b>43.7</b>		
<b>LSD (0.05)</b>	<b>19.8</b>	<b>15.7</b>	<b>13.2</b>	<b>9.2</b>	<b>8.3</b>	<b>6.3</b>	<b>21.7</b>	<b>16.5</b>	<b>12.2</b>	<b>9.2</b>	<b>6.1</b>	<b>5.1</b>		
<b>C.V.</b>	<b>48.3</b>	<b>33.7</b>	<b>23.5</b>	<b>17.1</b>	<b>22.1</b>	<b>16.9</b>	<b>24.6</b>	<b>17.1</b>	<b>15.0</b>	<b>12.9</b>	<b>13.0</b>	<b>10.8</b>		

\*\* = indicates highest yielding variety within a column

\* = 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

(HWW) = Hard White Winter Wheat

**Table 12. HARD WINTER WHEAT: Yield Performance under Sawfly Pressure and % Sawfly Cutting (2007-2013) Cutting (Note: Sawfly cutting in each location-year >10%)**

Cultivar/Line	No Sawfly Cutting at Havre (2.1%) or Loma (4.4%) >10% in 2014														
	Grain Yield (bu/a)					Sawfly Cutting (%)									
	2013	2012-13	2011-13	2010-13	2009-13	2008-13	2007-13	2013	2012-13	2011-13	2010-13	2009-13	2008-13	2007-13	
Location-years	2	5	7	9	11	13	15	2	5	7	9	11	13	15	
<b>Accipiter + Bearpaw + ss</b>	61.5	46.8	<b>47.8*</b>	50.5	49.5			5	26	26	33	33			
<b>CDC Falcon (P)+ Colter ++</b>	63.0	47.6	<b>48.7*</b>	51.5				13	<b>12*</b>	<b>11*</b>	<b>9*</b>				
<b>Decade + Genou + ss</b>	63.3	46.7	<b>49.4*</b>	<b>52.7*</b>	<b>50.9*</b>	<b>51.4*</b>	<b>52.1*</b>	7	27	23	30	31	32	33	
<b>Jagalene (P)+ Jerry</b>	61.3	46.7						23	36						
<b>Judee + ss</b>	63.1	<b>48.6*</b>	<b>49.8*</b>	<b>53.5*</b>	<b>51.5*</b>	<b>52.3*</b>		16	28	25	31	30	31		
<b>MT0978 (name pending)</b>	64.2	47.7	<b>48.5*</b>	50.3	49.1	50.0	<b>51.4*</b>	15	<b>15*</b>	<b>15*</b>	<b>19*</b>	20	20	19	
<b>MT1078</b>	59.5	42.7	44.6	49.6	48.1	49.6	50.3	17	35	32	37	39	40	41	
<b>MT1090</b>	59.3	43.0	45.8	47.9	46.2	47.2	48.2	15	33	31	38	41	40	42	
<b>MT1117</b>	69.2	<b>50.2*</b>	<b>52.3**</b>	<b>54.8*</b>	<b>52.9*</b>			18	<b>16*</b>	<b>13*</b>	<b>16*</b>	<b>17*</b>			
<b>MT1138</b>	73.6							12							
<b>MT1286</b>	68.7							18							
<b>MTCs1204 ss</b>	67.0							14							
<b>MTS0826-63 ss</b>															
<b>MTS1024 ss</b>	69.2							14							
<b>Rampart ss</b>	61.7	43.3	45.0	47.4	46.1	46.3	47.4	10	<b>10*</b>	<b>9*</b>	<b>9**</b>	<b>9**</b>	<b>10**</b>	<b>9**</b>	
<b>SY Clearstone 2CL (P)+ Warhorse + ss</b>	68.7	<b>54.1**</b>						17	31						
<b>WB3768 (P, HWW++)</b>	65.7	<b>50.7*</b>	<b>50.3*</b>					5	<b>4**</b>	<b>4**</b>					
<b>WB-Quake (P)+ ss</b>	66.2							22							
<b>Yellowstone +</b>	68.0	46.9	<b>50.5*</b>					19	<b>12*</b>	<b>11*</b>					
<b>Average</b>	66.9	<b>49.9*</b>	<b>51.6*</b>	<b>55.7**</b>	<b>53.3**</b>	<b>54.1**</b>	<b>54.2**</b>	13	31	28	34	37	37		
<b>LSD (0.05)</b>	<b>64.9</b>	<b>47.6</b>	<b>48.3</b>	<b>51.1</b>	<b>49.5</b>	<b>49.9</b>	<b>50.5</b>	<b>14.3</b>	<b>23.8</b>	<b>20.4</b>	<b>27.2</b>	<b>30.0</b>	<b>31.4</b>	<b>32.3</b>	
<b>C.V. (%)</b>	ns	5.4	4.6	4.0	3.6	3.4	3.1	ns	20	14	13	11	10	10	
	7.3	9.4	8.9	8.4	8.6	8.6	8.6	41	65	64	52	42	40	41	

\*\* = 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

(HWW) = Hard White Winter Wheat

Table 13. Precipitation (top, in inches) and Average Monthly Temperature (bottom, °F) for Crop Year 2013-2014

Agricultural Research Center	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug	Total
	2013	2013	2013	2013	2014	2014	2014	2014	2014	2014	2014	2014	Average
Western Triangle, Conrad	1.03	0.18	0.58	0.16	0.54	0.10	0.37	1.49	0.62	4.35	0.85	2.53	12.80
	58.3	41.5	29.4	18.6	27.1	12.3	23.5	40.9	50.6	55.2	67.6	64.1	40.8
Northern, Havre	1.62	0.36	0.30	0.79	0.31	0.26	0.89	0.92	0.79	2.96	0.20	3.94	13.34
	61.6	42.6	27.4	12.0	23.5	11.5	24.9	44.1	52.9	58.7	70.0	68.0	41.4
Northwestern, Kalispell	2.65	0.36	2.00	0.99	1.36	1.66	2.32	0.76	1.17	6.39	0.51	1.73	21.90
	57.2	39.6	31.4	21.9	26.6	17.1	33.2	42.3	51.8	55.9	66.6	65.1	42.4
Central, Moccasin	3.74	1.57	0.15	0.56	1.14	0.37	1.12	0.64	1.64	2.45	1.47	6.72	21.63
	59.7	45.7	32.8	21.4	28.0	14.5	27.9	38.0	50.6	55.3	38.2	65.3	42.3
Southern, Huntley	2.94	1.87	0.22	1.36	0.64	1.14	0.87	0.87	1.87	2.39	0.38	3.33	17.88
	63.3	43.5	33.3	18.8	28.4	19.5	31.5	45.7	55.4	61.4	70.6	69.1	45.0
Northeastern, Sidney	1.13	1.06	0.72	0.29	0.07	0.04	0.38	1.62	3.55	1.11	0.47	5.17	15.61
	57.8	43.1	26.6	9.7	18.8	12.6	27.9	41.6	56.1	62.3	68.2	68.4	41.9
Williston (WREC), N. Dakota	1.53	1.90	0.23	0.65	0.17	0.82	0.09	1.45	1.32	1.59	0.83	3.28	13.86
	64.0	42.0	27.0	8.0	15.0	10.0	26.0	41.0	56.0	62.0	69.0	69.0	40.8
Post Farm, Bozeman	3.04	0.80	0.56	1.00	0.47	1.09	1.79	1.21	2.01	3.28	0.39	2.96	18.60
	59.0	42.1	33.9	20.9	29.2	17.6	33.9	44.5	53.2	57.0	68.4	64.9	43.7

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

Variety	Agronomic Characters							Cereal Quality			Disease Reactions <sup>8/</sup>			
	Maturity <sup>1/</sup>	Chaff Color	Winter Survival <sup>2/</sup>	Straw Strength <sup>3/</sup>	Stem solid <sup>4/</sup>	Clear-field	Coleoptile length <sup>5/</sup>	Milling <sup>6/</sup>	Baking <sup>6/</sup>	PPO <sup>7/</sup>	Dwarf Smut	Stripe Rust	Stem Rust	Leaf Rust
Bearpaw	M	White	2	M	22	N	M	4	3	H	S	S	R	S
Broadview	M	White	5	S		N	S	3	3	H	S	S	R	R
Carter	M	White	3	S	14	N	S	4	5	M	S	S	MS	M
CDC Falcon	M	White	4	S	7	N	S	3	3	H	S	S	MR	R
Colter	M	White	4	S		N	S	3	4	M	S	R	R	S
Cowboy	M	White	2	S		N	M	2	2	M	S	S	R	-
Decade	M	White	4	S		N	M	3	4	H	S	S	R	MS
Emerson	M	White	-	M		N	-	-	-	-	S	R	-	-
Freeman	E	White	-	S		N	-	-	-	-	S	R	-	-
Genou	M	White	2	MW	19	N	M	4	4	H	S	S	S	MR
Jagalene	E	White	2	S		N	M	4	3	H	S	R	MR	MS
Jerry	M	White	5	M		N	M	3	3	H	S	S	R	R
Judee	M	White	2	M	20	N	M	3	4	H	S	R	S	S
Keldin	M	White	-	S		N	-	-	-	-	S	R	-	-
LCS Colonia	L	White	-	S		N	-	-	-	-	S	MR	-	-
LCS Mint	E	White	-	S		N	-	-	-	-	S	R	-	-
LCS Wizard	E	White	-	S		N	-	-	-	-	S	S	-	-
Ledger	M	White	2	S	10	N	M	5	3	M-H	S	S	S	MS
McGill	E	White	3	S		N	M	2	3	M	S	S	R	-
MT0978 (pending)	M	White	3	S		N	S	3	3	L	S	R	R	-
Promontory	M	Brown	2	MS		N	S	4	3	L	R	R	VS	S
Radiant	M-L	White	4	S		N	S	3	3	H	S	R	VS	M
Rampart	M	Brown	2	MW	21	N	L	4	5	M	S	R	MR	S
SY Clearstone 2CL	M	White	3	S		Y	S	3	3	M	R	R	MR	-
SY Wolf	M	White	3	S		N	M	3	2	M	S	R	R	-
T158	E	White	-	S		N	-	-	-	-	S	R	-	-
Warhorse	M	White	4	S	22	N	M	3	3	H	S	R	R	MR
WB3768	L	White	3	M		N	M	3	3	L	MR	R	R	-
WB4059CLP	E	White	-	S		Y	-	-	-	-	S	VS	-	-
WB4614	M	White	-	S		N	-	-	-	-	S	R	-	-
WB-Quake	M-L	White	3	S	21	N	M	4	4	H	S	R	MR	MR
Yellowstone	M	White	4	S		N	S	3	4	M	MS	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

8/

R = Resistant

Combined 2014 Bozeman, Conrad, Havre, and Moccasin data varieties with no number were not evaluated

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 2015 Bulletin:

**Emerson** – hard red winter wheat developed by the Lethbridge, Alberta winter wheat breeding program in 2012 and licensed to Meridian Seeds LLC. Emerson is a medium maturing, medium tall statured wheat, with white chaff. Emerson has average yield, average test weight and above average protein. Emerson is resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. Emerson will not be in the Montana Intrastate Winter Wheat testing for 2015.

**Freeman** – hard red winter wheat developed by Nebraska and released in 2013. Freeman is an early maturing, medium short statured wheat, with white chaff. Freeman has average yield, below average test weight and average protein. Freeman is resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V will be applied for.

**Keldin** – hard red winter wheat developed by Peter Franck (Germany) and released by WestBred in 2011. Keldin is a medium maturing, medium short statured wheat, with white chaff. Keldin has above average yield and test weight and average protein. Keldin is resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V has been issued (Certificate #201300462).

**LCS Colonia** – hard red winter wheat developed by Limagrain and released in 2013. LCS Colonia is an awnless, late maturing, short statured wheat, with white chaff. LCS Colonia has average yield and below average test weight and protein. LCS Colonia is moderately resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V is pending (Certificate #201500028). LCS Colonia will not be in the Montana Intrastate Winter Wheat testing for 2015.

**LCS Mint** – hard red winter wheat developed by Colorado and released by Limagrain in 2012. LCS Mint is an early maturing, medium statured wheat, with white chaff. LCS has above average yield and test weight and average protein. LCS Mint is resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V has been issued (Certificate #2013004481).

**LCS Wizard** – hard red winter wheat developed by Virginia and released by Limagrain in 2013. LCS Wizard is an early maturing, short statured wheat, with white chaff. LCS Wizard has average yield, above average test weight and average protein. LCS Wizard is susceptible to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V is pending (Certificate #201400349). LCS Wizard will not be in the Montana Intrastate Winter Wheat testing for 2015.

**MT0978 (name pending)** – hard red winter wheat developed the Montana Agricultural Experiment Station and available to growers in fall 2015. MT0978 is a medium-late maturing, medium-short statured wheat, with white chaff. MT0978 has average yield (similar to Yellowstone and Colter), average test weight, and average protein. MT0978 is resistant to both stem and stripe rust. N MT0978 is a low PPO variety with average milling and average baking properties. PVP, Title V will be applied for.

**T158** – hard red winter wheat developed by Trio Research (now part of Limagrain) and released in 2009. T158 is an early maturing, short statured wheat, with white chaff. T158 has average yield, above average test weight, and below average protein. T158 is resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V will be applied for.

**WB4059CLP** – hard red winter wheat developed by WestBred and released in 2013. WB4059CLP is an awnless, early maturing, short statured wheat, with white chaff. WB4059CLP has below average yield and test weight and above average protein. WB4059CLP is very susceptible to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V has been issued (Certificate #2013004481).

**WB4614** – hard red winter wheat developed by WestBred and released in 2013. WB4614 is a medium maturing, medium short statured wheat, with white chaff. WB4614 has average yield and protein and above average test weight. WB4614 is resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V will be applied for.

## Varieties previously in bulletin:

**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.

**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). Carter will not be in Montana Intrastate Winter Wheat testing for 2015.

**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.

**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 are below average in Montana tests. PVP, Title V has been issued (Certificate #201300476).

**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 rust but very susceptible to 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. Jagalene will not be in the Montana Intrastate Winter Wheat testing for 2015.

**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 has been issued (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). McGill will not be in the Montana Intrastate Winter Wheat testing for 2015.

**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. Promontory will not be in the Montana Intrastate Winter Wheat testing for 2015.

**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. Radiant will not be in the Montana Intrastate Winter Wheat testing for 2015.

**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. Rampart will not be in the Montana Intrastate Winter Wheat testing for 2015.

**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 resistant to common bunt. SY Clearstone 2CL is a medium PPO variety with average mill and above average bake properties. PVP, Title V has been issued (Certificate

#201300357). 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 has been issued (Certificate #201400131).

**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 is moderately resistant to common bunt. 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 is pending (Certificate #201500028).

**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>**