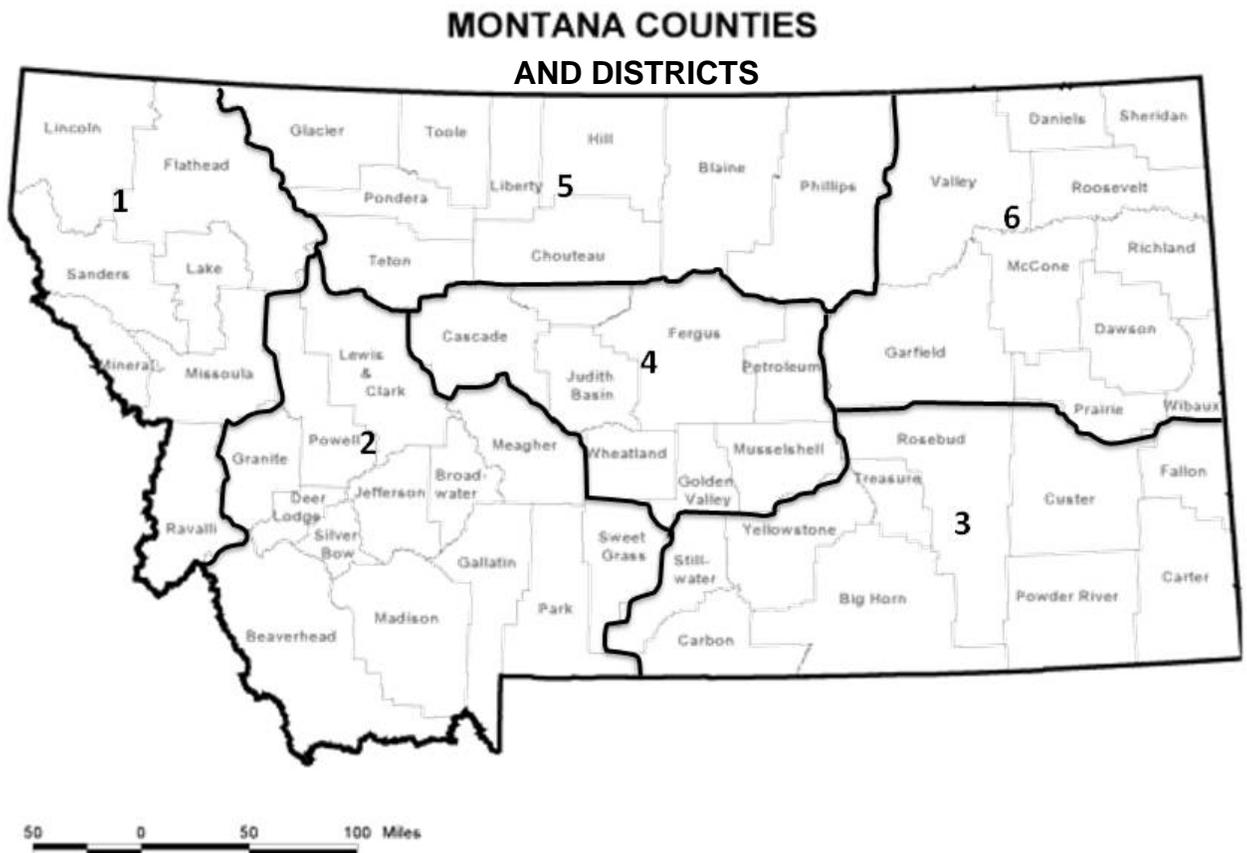


# 2016 WINTER WHEAT VARIETIES

## 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>

## 2016 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	
Northern ++		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

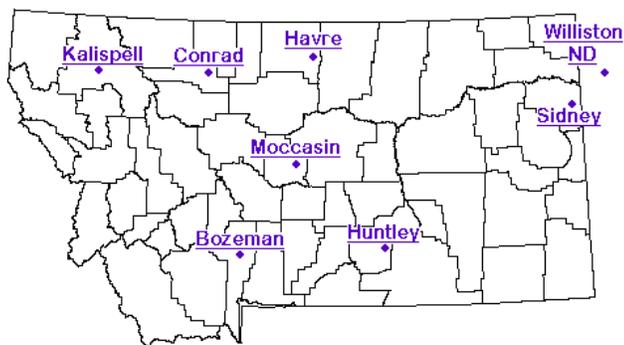


Fig. 1. Test Locations for Montana winter wheat performance tests in 2015.

## Entries

Names of commercially available varieties and experimental lines evaluated in 2015 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 30 varieties (15 public and 15 private) and 19 experimental lines (18 public and 1 private). Numbered entries preceded by a state designation [e.g. MTS1224 (Montana) or private company, LCH 10-13, (Limagrain)] 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 2015, data is provided for two (2014-2015), three (2013-2015) and four (2012-2015) 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 2015. 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	2014 Crop	2013 Crop	2014 Planting Date	Fertilizer				2015 Harvest Date
				N		P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	
				Fall	Spring			
----- Pounds per acre -----								
Kalispell	barley	spring wheat	Sep 23	9	130	40	70	Jul 29
Bozeman	fallow	spring wheat	Oct 7	186	-	10	10	Aug 1
Huntley			not pl.					
Moccasin	safflower	barley	Sep 26	10	60	10	10	Aug 3
Conrad	chem. fallow	barley	Sep 29	51	130	22	20	Jul 24
Havre	fallow	spring peas	Sep 23	100	-	20	10	Jul 21
Sidney	peas/lentils	safflower	Oct10,13	0	-	0	0	no harv.
Williston, ND	soybeans	barley	Sep 23	8	-	16	0	Jul 25

### 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 2015, Sidney lost all plots due to severe winter-kill, while Williston had moderate winter-kill.

Table 11 contains information on % winter survival and associated yield in winter-kill environments from 2007 to 2015. The data summarizes 8 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', 'Rampart', and "Genou" were leading varieties in the past but are now planted on only minor acreage. Current solid-stemmed varieties include: Judee, (released in 2011, the second leading variety at 16% of planted acreage), Bearpaw (2011, 4%), WB-Quake (2010, 2%), and Warhorse (2013, 1%).

### Plant Height

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

Table 12 contains information on yield and % sawfly cutting at 10 testing locations where sawfly pressure was present during the years 2010-2015. The data is from Havre, Loma (15 miles northeast of Ft. Benton), Turner (60 miles east-northeast of

### 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

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 2015 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.

## **2015 Test Conditions**

Statewide winter wheat yields were projected by the Montana Agricultural Statistics Service at 41 bu/a, for 2015, the same as for the 2014 harvest year. The harvested acreage in 2015 was 2.22 million acres (total production = 91.2 million bu) compared 2.24 million acres in 2014 (total production = 91.8 million bu).

Rainfall for the 2014-2015 winter crop year was below average at all locations tested (Table 13), except Havre (range -5.00 at Williston to +0.03 at Havre). Average yearly temperatures were generally above long term (6 out of 8 locations) ranging from below average at Havre (-0.5°F) to +3.1°F at Bozeman.

Yields, for the 6 locations harvested (besides extreme winter-kill at Sidney, the Huntley location was not planted for the 2015 crop year), averaged 71 bu/a {range 43 (Williston) to 115 bu/a (Kalispell)}. Yields of named varieties, across the 6 harvested locations, ranged from a low of 50 bu/a (WB4059CLP) to a high of 83 bu/a for Yellowstone.

Test weight averaged 59.9 lb/bu across all locations. Bozeman (56.2 lb/bu), Moccasin (59.3), and Conrad (59.7) were below 60 lb/bu, while Williston (60.8), Havre (61.1) and Kalispell (62.4) were above.

Extreme winter-kill occurred at Sidney and this nursery was not harvested in 2015. Percent winter survival, at Sidney, on May 20<sup>th</sup> averaged 2% {best = Jerry (43%), while only 6 other entries had stands above 5%}. Williston averaged 71% winter survival for the 2015 crop year, with a range of 16% (WB4623CLP) to 98% (Jerry) (see Table 10.)

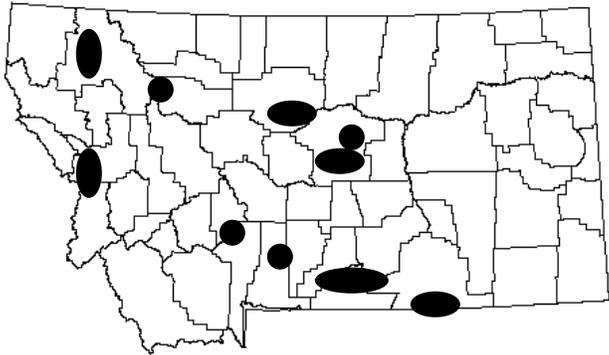
Heading dates were earlier in 2015 than long term averages at all 6 harvested locations. Havre (-12 days), Conrad (-11 days) and Bozeman, Kalispell, and Moccasin (all -9 days) had the least change at Williston (-2 days).

Stripe rust at both Bozeman (average = 15%, range 0 – 59%) and Kalispell (average = 41%, range 0 – 98%) were a factor in yield reduction for highly susceptible varieties (Bearpaw, Broadview, Byrd, Cowboy, Decade, Denali, Genou, Jerry, and WB4059CLP).

There was minor sawfly cutting recorded at the Havre Experiment Station averaging 5% (range = 0 – 15%) of stems cut across varieties. Sawfly parasites have been on the increase in the past 3 years.

Protein content averaged 12.6% across all locations (location range = 9.6 – 17.0%) tested. The range of named varieties across all locations was from a low of 11.6% (Denali) to a high of 13.6% (Rampart and WB4059CLP).

Leading winter wheat varieties planted for 2015 were Yellowstone (21.0%), Judee (16.4%), Decade (6.7%), CDC Falcon (5.6%), , Brawl CL Plus (4.4%), and Genou (4.0%).



**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’ or Cruiser Maxx seed treatment..

**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 and 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 (lb/acre) 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

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

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).

**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>Brawl CL Plus</b>	<b>CO06052</b>	Colorado	<b>2011</b>	Teal 11A/Above//(CO99314, TX91V4931/ Halt)
<b>Byrd</b>	<b>CO06424</b>	Colorado	<b>2011</b>	TAM 112//(CO970547-7, Ike/Halt)
<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, KS91H174/RBL// KS91HW29/3/ N87V106), CO980829)/7/ TAM 111
<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>Denali</b>	<b>CO050303-2</b>	Colorado	<b>2011</b>	(Yuma/T-57/4/(CO850034, NS14/NS603// Newton /3/Probrand 835)/5/ 4*Yuma /6/(NEWS12, KS91H174/RBL// KS91HW29/3/ N87V106), CO980829)/7/ TAM 111
<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>Northern</b>	<b>MT0978</b>	Montana	<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>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// ((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>CDC Falcon</b>	<b>S94-4</b>	Western Plant Breeders/Saskatchewan	<b>1999</b>	Norstar*2/Vona//Abilene
<b>Keldin</b>	<b>ACS55017</b>	Peter Franck: Seed-Link Inc.; Ontario, Canada, Westbred LLC	<b>2011</b>	Barenburg 235/Carlisle//TRX-A16-3-2
<b>LCS Mint</b>	<b>CO050175-1</b>	Limagrain LLC	<b>2012</b>	Overley/7/CO980829, Yuma/T-57/4/(CO850034, NS14/NS603// Newton/3/Probrand 835)/5/ 4*Yuma/6/NEWS12)

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

Variety	Experimental Designation	Origin	Release Year	Pedigree
<b>Ledger</b>	<b>BZ9W96-788-d</b>	WestBred LLC	<b>2004</b>	(Hatten/SS-14, BZ9W92-709)/3/(MTSF1142, Lew/Tiber//Redwin)
<b>SY Clearstone 2CL</b>	<b>MTCL1077</b>	Syngenta, Montana	<b>2012</b>	Yellowstone*4/3/MTCL01158/CDC Teal 11A//Jagalene
<b>SY Monument</b>	<b>04BC574-2</b>	Syngenta	<b>2014</b>	(KS89180B-2-1-1/CM75113, F1//X920750-A-11-2, <u>BC991149-11</u> )/3/(00x0090-4, W95091/W98-183
<b>SY Sunrise</b>	<b>06BC796#68</b>	Syngenta Seeds	<b>2015</b>	((X920709B-5-2/KS90WGRC10//Ogallala, BC98337-10-53)/3/CDC Falcon, <u>06BC308</u> )/4/ ( <u>NE03458</u> , (McVey 78015/NE88521, NE95544)//W91-348/3/Millennium)
<b>SY Wolf</b>	<b>BC01007-7</b>	AgriPro, Syngenta	<b>2010</b>	((TAM-108/veery sib, SWM1524)//TX84V2029, TX91V3308)/3/(W93-359, WI88-052/W96-180), W99-331)/4/(97x0906-8, (Mesa/W89-328, W96-180)//(W95-188, Karl 92/W98-232))
<b>T158</b>	<b>T158</b>	Trio Research, Inc., Limagrain LLC	<b>2009</b>	KS93U206//2*(T81, TAM 107/T213 sib)
<b>WB3768</b>	<b>MTW08168</b>	Montana, licensed to: WestBred LLC (Monsanto)	<b>2013</b>	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)
<b>WB4059CLP</b>	<b>BZ9WM07-1516</b>	WestBred-Monsanto	<b>2013</b>	CDC Teal-11A/3/Pryor*2//((SWP 965-001, Grandin*2/(SF-4, imi Fidel))
<b>WB4614</b>	<b>BZ9W07-2034</b>	WestBred-Monsanto	<b>2013</b>	?
<b>WB4623CLP</b>	<b>BZ9WM09-1663</b>	WestBred-Monsanto	<b>2014</b>	?
<b>WB-Quake</b>	<b>BZ9W05-2043</b>	WestBred LLC (Monsanto)	<b>2011</b>	Rampart/Kestrel

**Public Elite Lines**

	<b>MTS0826-63</b>			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)
	<b>MT1078</b>			(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)
	<b>MT1117</b>			Yellowstone*3//((KS96WGRC40,KS93U69*2/TA 2397 (wcm resis) (Lr41))
	<b>MTCL1131</b>			Yellowstone*4/4/(Fidel/Tiber (IMI), MTCL01158)//CDC Teal 11A/3/Jagalene
	<b>MT1138</b>			(059E//Jagger/Pecos, W99-194)/3/ 2*Yellowstone
	<b>MTCS1204</b>			(Rampart*3/Fidel/6/(MTS9720, Nuwest/4/(MT88001, Sawmont/Tendoy /3/Yogo/Norin 10/Brevor)/5/(MT7863, Froid/Winoka/Centurk)) ,MTCL0510)/8/Paul/6/(Tiber*2//((IMMIBC303-17, Tam 110 sib*4/(FS2, mutagenized Fidel)), 98X96C16cl)/3/CDC Teal 11A/5/(MTCL0322, Rampart*2/IMI Fidel)/7/(MTS0531, L'Govskaya 167/Rampart/6/(MT9409, Tiber/5/ (MT8030, TAM W-103/Froid /4/Yogo//Turkey Red /Oro/3/Centurk))
	<b>MTS1224</b>			Yellowstone/5//((Lew/Tiber//Redwin, MTS92045)/3/2*Erhardt, MTS0112)/4/(MTS0125, selection from a composite of 4 crosses)

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

Variety	Experimental Designation	Origin	Release Year	Pedigree
	<b>MTF1232</b>			selection from a composite of 5 crosses: 06X272, Yellowstone/(MT0684, a composite - see pedigree); 06X276, Yellowstone/(MT06102, , a composite - see pedigree); 06X278, Yellowstone/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, Yellowstone/3/(MT06123, '2174'/(MT9440, BigSky sib)/BigSky); and 06X285, Yellowstone/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>MT1257</b>			selection from a composite of 2 crosses: 03X351, Yellowstone/ Krichauff and 03X352, Krichauff/7/(MTS04114, L'Govskaya 167/Rampart/6/(MT9409, Tiber/5/ (MT8030, TAM W-103/Froid /4/Yogo//Turkey Red /Oro/3/Centurk))
	<b>MT1265</b>			Yellowstone*4//((KS96WGRC40, KS93U69*2/TA 2397) (Lr41, wcm)
	<b>MT1286</b>			Yellowstone*2/3/(NE99445, Rawhide/Tomahawk//Karl 92)
	<b>MTS1305</b>			selection from a composite of 2 crosses: 05X161, (selection from a composite of 2 crosses - see pedigree, MTS0525/10/ (Jerry/Rampart, 97X253E54)/9/(MT03108, (NuWest/Tiber, MT9524)/8/ ((Carstens V/Ae. intermedium (TA25)//Lathrop, Cltr13092)/3/T. speltoides/4/ Fletcher/5/ 5*Centurk, Cltr17884)*4/6/Karl, KS93WGRC27)/7/Judith) and 05X162, 97X253E54/MT03108//((MTS0527, selection from a composite of 2 crosses - see pedigree)
	<b>MTCL1329 (CL2)</b>			Yellowstone/6/Jagalene/5/(selection from a composite of 3 crosses - see pedigree, 98X78cC82cl)/3/(MT0097, Erhardt//Judith/ CDC Kestrel)/4/Jerry/CDC Teal11A
	<b>MT1332</b>			selection from a composite of 3 crosses: 07X37, Yellowstone/4/(00X52E99, (Judith/SWM12099, 92X103E3)/3/ (MTR99101, Vanguard//Cltr2401/2*Judith)) /5/Yellowstone(340,233 = solid-stem markers), 07X38, Yellowstone*2/ 00X52E99, and 07X39, Yellowstone/ 00X52E99//((MT0686, (BigSky sib, MT9523)/(NE94653, Wahoo sib))
	<b>MT1348</b>			selection from a composite of 2 crosses: 04X494, (PI572290 = STARS-9303W = (Bobwhite/PI 149898), rwa2)//BigSky and 4X495, (Yellowstone sib, MT9982)/PI572290
	<b>MT1354</b>			(Yellowstone low PPO plant seln., MT08188)//(Yellowstone low PPO plant seln., MT08188)/(MT08175, Colter sib)
	<b>MT1356</b>			(Yellowstone low PPO plant seln., MT08184)//(Yellowstone low PPO plant seln., MT08185)/(MT08177, Colter sib)
	<b>MT1361</b>			(Yellowstone loppo plant seln, MT08189) /8/ (Yellowstone loppo plant seln, MT08188)/7/ (MT0419-1, Erhardt/5/ (KS92H21-4, (Plainsman IV/ Cheney// Odessa/2*Eagle/3/Pawnee /DURM, KS82H238-1)/4/HF5761/TAM 105//Bounty 203)/6/Pronghorn))

**Private Elite Lines**

	<b>LCH 10-13</b>	Limagrain LLC		Limagrain experimental line
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**Table 3. HARD WINTER : District 1-- Kalispell - Dryland (High Rainfall)**

Cultivar/Line	Grain Yield (bushels/acre)				2015 Data					
	2015	2014-15	2013-15	2012-15	Test weight	Heading Date		Plant height	Stripe rust	Protein
						Ordinal	Calendar			
		2 yr	3 yr	4 yr	lb/bu	from Jan1		in	%	%
<b>Bearpaw +</b>	81.3	100.1	77.1	61.6	59.2	152.7	2-Jun	37.4	74	10.4
<b>Brawl CL Plus +</b>	90.5				61.3	147.9	28-May	35.6	75	11.4
<b>Broadview (P)</b>	67.3	98.1	85.8	67.4	57.1	153.7	3-Jun	36.4	85	11.2
<b>Byrd +</b>	85.9				60.3	149.7	30-May	36.6	87	9.1
<b>CDC Falcon (P)+</b>	89.2	107.1	96.9	82.4	62.0	152.8	1-Jun	32.1	60	9.9
<b>Colter ++</b>	<b>151.2*</b>	<b>152.1**</b>	<b>144.6**</b>	<b>132.3**</b>	63.0	155.4	4-Jun	41.6	<b>20*</b>	9.9
<b>Cowboy +</b>	91.7	116.9	101.7		60.1	151.7	1-Jun	35.2	89	10.1
<b>Decade +</b>	69.3	91.2	74.9	58.5	59.0	152.2	1-Jun	36.1	92	9.5
<b>Denali +</b>	94.1				61.4	151.8	1-Jun	38.9	81	10.1
<b>Freeman ++</b>	120.3	<b>133.4*</b>			61.8	146.9	27-Jun	38.4	50	9.4
<b>Genou +</b>	64.9	92.2	80.6	64.5	61.3	153.8	3-Jun	43.1	90	10.1
<b>Jerry</b>	59.5	90.2	74.4	59.7	57.7	154.2	3-Jun	44.8	90	9.5
<b>Judee +</b>	125.4	<b>130.9*</b>	<b>122.8*</b>	107.3	63.7	153.0	2-Jun	37.8	<b>10*</b>	9.9
<b>Keldin (P)+</b>	122.3	<b>133.2*</b>			63.8	152.5	2-Jun	35.6	35	9.8
<b>LCH 10-13 (P)</b>	76.7				62.1	150.7	31-May	39.9	92	10.4
<b>LCS Mint (P)+</b>	119.4	<b>135.6*</b>			64.6	149.5	30-May	38.2	23	9.7
<b>Ledger (P)+</b>	104.6	115.8	110.3	93.6	63.6	152.7	2-Jun	36.0	66	9.9
<b>MT1078</b>	139.0	<b>141.8*</b>	<b>130.0*</b>	113.3	61.9	153.4	2-Jun	37.8	31	9.2
<b>MT1117</b>	138.7	<b>142.2*</b>	<b>138.5*</b>		63.1	154.3	3-Jun	40.3	<b>19*</b>	9.8
<b>MT1138</b>	<b>143.5*</b>	<b>147.4*</b>	<b>141.7*</b>		62.8	154.3	3-Jun	40.6	24	9.5
<b>MT1257</b>	<b>144.3*</b>	<b>144.7*</b>			62.3	153.1	2-Jun	39.9	<b>23*</b>	10.0
<b>MT1265</b>	139.8	<b>144.4*</b>			61.8	155.2	4-Jun	41.5	<b>21*</b>	9.3
<b>MT1286</b>	113.5	<b>130.5*</b>			62.4	154.7	4-Jun	39.2	80	9.0
<b>MT1332</b>	<b>144.8*</b>				62.4	153.8	3-Jun	39.4	<b>12*</b>	9.0
<b>MT1348</b>	132.9				63.9	152.2	1-Jun	36.1	<b>15*</b>	9.7
<b>MT1354</b>	<b>154.6**</b>				63.6	153.9	3-Jun	40.1	<b>16*</b>	9.9
<b>MT1356</b>	<b>149.7*</b>				62.8	154.9	4-Jun	41.2	27	10.1
<b>MT1361</b>	123.7				62.7	154.7	4-Jun	34.5	<b>17*</b>	9.8
<b>MTCL1131</b>	140.6	<b>147.3*</b>	<b>138.3*</b>		62.9	155.4	4-Jun	42.1	<b>20*</b>	10.2
<b>MTCL1329</b>	126.4				63.5	151.6	1-Jun	36.3	32	10.0
<b>MTCS1204</b>	108.3	122.7			63.3	154.8	4-Jun	38.6	48	10.4
<b>MTF1232</b>	109.4	<b>125.8*</b>			63.5	155.9	5-Jun	50.6	53	10.1
<b>MTS0826-63</b>	126.1	<b>127.5*</b>	120.6		63.8	155.3	4-Jun	41.5	<b>15*</b>	10.1
<b>MTS1224</b>	<b>144.7*</b>	<b>142.3*</b>			62.9	154.5	4-Jun	36.9	<b>7*</b>	9.6
<b>MTS1305</b>	100.7				63.5	152.0	1-Jun	34.0	33	9.5
<b>Northern (P)++</b>	130.8	<b>140.8*</b>	<b>135.5*</b>	<b>116.7*</b>	62.7	154.4	3-Jun	38.9	<b>5**</b>	10.5
<b>Rampart</b>	101.0	113.5	104.3	90.4	63.1	153.2	2-Jun	41.8	62	10.8
<b>SY Clearstone 2CL(P)+</b>	132.0	<b>139.1*</b>	<b>132.0*</b>	<b>118.0*</b>	62.7	153.7	3-Jun	40.2	<b>17*</b>	10.4
<b>SY Monument (P)+</b>	121.5				62.2	150.8	31-May	37.0	<b>21*</b>	9.1
<b>SY Sunrise (P)++</b>	111.3				64.0	150.5	31-May	31.8	32	9.8
<b>SY Wolf (P)+</b>	105.7	121.6	119.4	104.6	63.1	150.7	31-May	32.7	<b>22*</b>	9.5
<b>T158 (P)</b>	119.0	119.9			64.0	147.5	28-May	35.2	<b>20*</b>	10.1
<b>Warhorse +</b>	132.4	<b>130.9*</b>	<b>125.7*</b>	112.9	62.9	154.4	3-Jun	38.7	<b>6*</b>	11.0
<b>WB3768 (HWW, P)++</b>	135.8	<b>143.6*</b>	<b>136.2*</b>	<b>126.6*</b>	63.1	156.7	6-Jun	43.5	<b>17*</b>	9.6
<b>WB4059CLP (P)+</b>	61.6	74.2			61.0	148.1	28-May	28.8	98	10.8
<b>WB4614 (P)++</b>	106.9	122.9			63.3	152.9	2-Jun	33.2	44	9.8
<b>WB4623CLP (P)++</b>	115.9				63.8	152.8	2-Jun	35.4	<b>12*</b>	10.9
<b>R WB-Quake (P)+</b>	127.5	125.1	120.1	108.1	63.6	153.1	2-Jun	37.7	<b>9*</b>	9.6
<b>R Yellowstone +</b>	140.5	<b>140.5*</b>	<b>135.1*</b>	<b>122.4*</b>	62.4	153.2	2-Jun	40.7	23	9.6
<b>Average</b>	<b>115.0</b>	<b>125.3</b>	<b>115.1</b>	<b>96.7</b>	<b>62.4</b>	<b>152.8</b>	<b>2-Jun</b>	<b>38.2</b>	<b>40.8</b>	<b>9.9</b>
<b>LSD (0.05)</b>	<b>12.6</b>	<b>26.9</b>	<b>22.2</b>	<b>17.5</b>		<b>1.5</b>		<b>3.1</b>	<b>17.8</b>	
<b>C.V.</b>	<b>6.2</b>	<b>10.6</b>	<b>11.7</b>	<b>12.7</b>		<b>0.6</b>		<b>4.9</b>	<b>26.0</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)				2015 Data					
	2015	2014-15	2013-15	2012-15	Test weight	Heading Date		Plant height	Stripe rust	Protein
						Ordinal	Calendar			
		2 yr	3 yr	4 yr	lb/bu	from Jan1		in	%	%
Bearpaw +	42.0	67.5	72.5	73.0	53.2	161.9	11-Jun	36.4	50	18.3
Brawl CL Plus +	71.3				56.4	156.6	6-Jun	36.6	43	17.4
Broadview (P)	42.9	70.0	72.7	70.6	51.9	162.9	12-Jun	38.3	28	18.6
Byrd +	57.2				53.6	158.7	8-Jun	36.5	44	15.9
R CDC Falcon (P)+	55.4	75.4	77.0	75.4	51.4	162.0	11-Jun	34.4	11	18.8
R Colter ++	<b>87.0*</b>	<b>94.4*</b>	<b>92.2*</b>	<b>87.9*</b>	57.4	163.5	13-Jun	39.0	3	17.2
Cowboy +	56.4	79.1	82.9		54.1	159.5	9-Jun	37.2	59	16.8
Decade +	46.6	70.7	76.8	77.2	52.5	161.9	11-Jun	35.4	39	18.4
Denali +	50.2				56.0	160.1	9-Jun	38.1	56	16.2
Freeman ++	83.8	<b>92.3*</b>			52.5	156.3	5-Jun	39.4	1	16.2
Genou +	40.9	65.7	69.9	69.5	56.6	162.7	12-Jun	40.1	21	19.4
Jerry	42.1	70.6	73.4	73.9	53.9	163.3	12-Jun	40.3	57	17.9
Judee +	64.6	<b>81.6*</b>	81.7	79.2	56.2	162.0	11-Jun	37.7	3	14.3
Keldin (P)+	85.1	<b>99.1*</b>			54.8	161.7	11-Jun	37.0	5	18.2
LCH 10-13 (P)	73.4				57.4	157.1	6-Jun	39.4	39	17.1
LCS Mint (P)+	83.5	<b>94.7*</b>			57.1	158.1	7-Jun	38.9	4	16.9
R Ledger (P)+	49.5	72.1	74.4	74.3	56.1	162.1	11-Jun	37.6	13	16.9
MT1078	83.7	<b>95.3*</b>	<b>96.1*</b>	<b>94.8**</b>	54.5	162.6	12-Jun	36.7	9	17.1
MT1117	82.6	<b>93.0*</b>	<b>90.1*</b>		57.3	163.0	12-Jun	37.7	4	16.4
MT1138	<b>87.0*</b>	<b>99.8*</b>	<b>96.4**</b>		56.4	163.0	12-Jun	39.7	7	16.3
MT1257	<b>87.7*</b>	<b>100.0**</b>			57.0	162.0	11-Jun	39.4	5	16.3
MT1265	82.1	<b>96.1*</b>			56.6	163.6	13-Jun	40.1	0	16.0
MT1286	77.6	<b>93.8*</b>			58.0	162.3	11-Jun	40.0	20	16.9
MT1332	<b>88.6*</b>				57.3	162.4	11-Jun	40.6	2	16.1
MT1348	<b>89.9*</b>				55.7	161.4	10-Jun	40.9	5	16.2
MT1354	82.6				57.9	163.3	12-Jun	39.9	6	16.1
MT1356	<b>85.7*</b>				57.0	162.7	12-Jun	40.8	4	16.5
MT1361	75.8				55.1	164.1	13-Jun	37.9	5	16.1
MTCL1131	85.1	<b>96.1*</b>	<b>94.1*</b>		58.0	163.2	12-Jun	40.4	8	16.0
MTCL1329	79.8				58.6	160.8	10-Jun	37.8	10	16.1
MTCS1204	59.2	76.0			56.2	162.2	11-Jun	38.2	32	17.1
MTF1232	55.3	75.1			57.7	166.4	15-Jun	45.3	29	19.6
MTS0826-63	70.7	80.9	80.8		<b>61.1**</b>	165.6	15-Jun	41.4	12	18.3
MTS1224	<b>89.9*</b>	<b>96.9*</b>			58.3	163.6	13-Jun	36.5	5	15.5
MTS1305	63.4				55.7	161.4	10-Jun	36.2	6	17.3
R Northern (P)++	83.1	<b>90.4*</b>	<b>90.6*</b>	<b>87.6*</b>	57.3	163.0	12-Jun	38.5	3	16.7
Rampart	53.6	71.4	72.3	71.7	57.2	163.6	13-Jun	40.4	8	19.5
SY Clearstone 2CL(P)+	82.6	<b>94.5*</b>	<b>90.3*</b>	<b>88.4*</b>	54.9	162.7	12-Jun	39.7	8	16.7
SY Monument (P)+	<b>85.9*</b>				53.3	160.4	9-Jun	36.3	0	16.7
SY Sunrise (P)++	<b>96.5**</b>				56.3	158.9	8-Jun	34.9	0	16.2
R SY Wolf (P)+	83.2	<b>92.9*</b>	<b>94.5*</b>	<b>92.0*</b>	57.2	161.0	10-Jun	37.0	3	16.9
T158 (P)	<b>95.3*</b>	<b>94.9*</b>			58.9	155.2	4-Jun	36.9	0	16.4
Warhorse +	69.8	80.7	<b>83.0*</b>	80.6	55.2	163.1	12-Jun	37.9	3	18.4
WB3768 (HWW, P)++	79.3	<b>92.3*</b>	<b>92.4*</b>	<b>88.8*</b>	58.8	165.9	15-Jun	40.5	1	16.4
WB4059CLP (P)+	56.2	72.1			55.6	157.7	7-Jun	33.5	35	18.6
WB4614 (P)++	62.0	79.9			57.6	161.9	11-Jun	37.1	9	17.2
WB4623CLP (P)++	72.7				58.9	162.0	11-Jun	37.3	6	17.8
R WB-Quake (P)+	64.9	78.8	78.1	77.5	56.7	162.9	12-Jun	37.9	14	16.5
R Yellowstone +	84.4	<b>96.4*</b>	<b>95.8*</b>	<b>91.7*</b>	56.9	162.5	12-Jun	39.1	6	13.5
Average	<b>72.0</b>	<b>85.1</b>	<b>83.8</b>	<b>80.8</b>	<b>56.2</b>	<b>161.7</b>	<b>11-Jun</b>	<b>38.3</b>	<b>15.0</b>	<b>17.0</b>
LSD (0.05)	<b>11.0</b>	<b>18.7</b>	<b>13.5</b>	<b>10.5</b>	<b>1.4</b>	<b>0.8</b>		<b>2.8</b>	<b>13.9</b>	
C.V.	<b>8.7</b>	<b>10.8</b>	<b>9.8</b>	<b>9.2</b>	<b>1.4</b>	<b>0.3</b>		<b>4.4</b>	<b>52.7</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 6. HARD WINTER : District 4-- Moccasin - Dryland

Cultivar/Line	Grain Yield (bushels/acre)				2015 Data				
	2015	2014-15	2013-15	2012-15	Test weight lb/bu	Heading Date		Plant height in	Protein %
						Ordinal	Calendar		
		2 yr	3 yr	4 yr		from Jan1			
R Bearpaw +	57.9	53.8	55.2	49.4	57.5	160.5	10-Jun	34.2	10.7
R Brawl CL Plus +	50.1				<b>61.9**</b>	154.9	4-Jun	30.0	9.0
R Broadview (P)	55.9	55.7	55.4	49.8	58.6	161.2	10-Jun	33.5	9.0
R Byrd +	<b>61.4*</b>				58.5	156.6	6-Jun	32.3	9.1
R CDC Falcon (P)+	54.4	55.4	56.6	51.1	58.4	160.6	10-Jun	29.9	9.0
R Colter ++	57.9	60.3	60.1	<b>54.2*</b>	59.7	160.6	10-Jun	34.8	9.8
R Cowboy +	62.6*	60.2	60.7		58.6	159.9	9-Jun	33.4	8.8
R Decade +	55.3	56.4	58.0	51.5	58.9	159.8	9-Jun	31.0	9.6
R Denali +	<b>62.0*</b>				<b>60.7*</b>	160.3	9-Jun	33.1	8.6
R Freeman ++	55.3	57.7			56.3	153.9	3-Jun	30.6	8.9
R Genou +	44.8	46.3	46.6	42.0	58.2	159.9	9-Jun	36.1	9.4
R Jerry	<b>59.1*</b>	55.3	56.4	49.6	58.4	161.1	10-Jun	37.6	9.6
R Judee +	42.1	46.1	46.8	42.7	59.7	160.0	9-Jun	30.6	10.4
R Keldin (P)+	<b>61.5*</b>	59.0			<b>60.9*</b>	160.6	10-Jun	33.1	8.1
R LCH 10-13 (P)	50.6				<b>60.7*</b>	157.1	6-Jun	32.4	9.8
R LCS Mint (P)+	56.5	57.2			59.5	157.2	6-Jun	33.5	10.1
R Ledger (P)+	48.2	49.8	49.5	44.3	58.3	159.8	9-Jun	32.9	9.7
MT1078	<b>60.1*</b>	59.9	60.1	<b>54.1*</b>	57.5	161.2	10-Jun	32.2	8.9
MT1117	<b>61.0*</b>	<b>61.9*</b>	<b>64.6*</b>		<b>60.3*</b>	161.2	10-Jun	35.5	9.3
MT1138	<b>69.0**</b>	<b>66.4*</b>	<b>68.3**</b>		59.9	161.3	10-Jun	36.3	9.6
MT1257	<b>68.0*</b>	<b>66.7**</b>			59.5	161.0	10-Jun	34.8	9.6
MT1265	56.9	59.0			57.5	161.6	11-Jun	33.9	10.3
MT1286	58.2	59.9			<b>60.4*</b>	161.3	10-Jun	34.6	9.2
MT1332	<b>58.8*</b>				<b>60.3*</b>	160.9	10-Jun	34.5	8.8
MT1348	59.6*				<b>61.3*</b>	159.7	9-Jun	32.8	9.0
MT1354	56.3				59.2	161.1	10-Jun	34.5	9.9
MT1356	56.7				<b>60.2*</b>	160.8	10-Jun	33.5	8.9
MT1361	<b>66.5*</b>				59.2	166.9	6-Jun	32.4	9.7
MTCL1131	<b>62.6*</b>	<b>63.6*</b>	<b>66.1*</b>		<b>60.5*</b>	161.4	10-Jun	34.9	9.3
MTCL1329	<b>65.4*</b>				<b>60.8*</b>	159.5	9-Jun	32.9	9.4
MTCS1204	52.7	52.6			58.2	160.7	10-Jun	34.0	11.0
MTF1232	44.1	48.5			58.2	163.5	13-Jun	46.5	10.7
MTS0826-63	38.8	42.3	44.1		56.6	164.4	13-Jun	36.0	11.9
MTS1224	54.3	56.0			58.1	161.2	10-Jun	31.7	9.5
MTS1305	50.4				<b>60.4*</b>	159.6	9-Jun	30.7	9.0
R Northern (P)++	<b>64.2*</b>	<b>61.2*</b>	61.3	<b>54.7*</b>	59.9	163.6	13-Jun	34.1	11.0
R Rampart	45.1	44.7	44.8	40.8	58.3	161.4	10-Jun	37.3	9.6
R SY Clearstone 2CL(P)+	56.9	59.2	63.1	<b>56.0**</b>	59.1	161.2	10-Jun	34.6	9.4
R SY Monument (P)+	<b>59.8*</b>				58.1	159.9	9-Jun	32.6	9.0
R SY Sunrise (P)++	55.8				<b>60.2*</b>	157.4	6-Jun	27.5	10.1
R SY Wolf (P)+	52.5	55.9	56.1	50.4	<b>60.1*</b>	160.4	9-Jun	29.6	9.8
R T158 (P)	54.9	57.4			<b>61.5*</b>	155.1	4-Jun	29.7	8.6
R Warhorse +	51.9	51.9	54.6	48.9	59.3	162.8	12-Jun	31.6	9.8
R WB3768 (HWW, P)++	<b>59.5*</b>	60.1	61.0	<b>54.1*</b>	<b>60.5*</b>	166.3	15-Jun	37.9	10.0
R WB4059CLP (P)+	48.9	50.2			<b>60.0*</b>	155.9	5-Jun	29.1	10.2
R WB4614 (P)++	57.4	57.1			59.2	160.1	9-Jun	32.0	8.9
R WB4623CLP (P)++	47.7				<b>60.0*</b>	161.7	11-Jun	31.1	9.3
R WB-Quake (P)+	46.5	47.7	51.3	46.0	57.8	161.0	10-Jun	32.8	10.1
R Yellowstone +	<b>59.2*</b>	<b>60.7*</b>	62.6	<b>55.8*</b>	59.6	161.5	11-Jun	34.7	9.8
Average	<b>55.8</b>	<b>55.9</b>	<b>56.7</b>	<b>49.7</b>	<b>59.3</b>	<b>160.4</b>	<b>9-Jun</b>	<b>33.4</b>	<b>9.6</b>
LSD (0.05)	<b>10.8</b>	<b>6.1</b>	<b>5.1</b>	<b>4.5</b>	<b>1.9</b>	<b>1.7</b>		<b>2.7</b>	
C.V.	<b>10.9</b>	<b>5.4</b>	<b>5.5</b>	<b>6.4</b>	<b>1.6</b>	<b>0.6</b>		<b>4.6</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 7. HARD WINTER : District 5-- Conrad - Dryland

Cultivar/Line	Grain Yield (bushels/acre)				2015 Data				
	2015	2014-15	2013-15	2012-15	Test weight	Heading Date		Plant height	Protein %
						Ordinal	Calendar		
		2 yr	3 yr	4 yr	lb/bu	from Jan1		in	%
R Bearpaw +	66.9	82.7	82.6	81.5	58.9	155.6	5-Jun	31.9	13.7
Brawl CL Plus +	<b>85.7*</b>				<b>62.9*</b>	150.5	31-May	34.1	13.4
R Broadview (P)	77.5	93.6	92.3	<b>91.2*</b>	58.8	158.0	7-Jun	33.4	13.5
Byrd +	74.4				58.7	153.4	2-Jun	33.7	12.4
R CDC Falcon (P)+	<b>81.8*</b>	93.1	90.0	90.7	59.3	156.4	5-Jun	30.8	13.2
R Colter ++	<b>79.6*</b>	93.4	93.8	<b>94.2*</b>	58.2	158.5	8-Jun	34.1	13.5
Cowboy +	<b>83.6*</b>	<b>99.1*</b>	<b>98.6*</b>		59.5	154.9	4-Jun	32.5	12.3
R Decade +	72.9	91.3	90.6	88.4	59.8	155.8	5-Jun	32.9	13.5
Denali +	<b>95.9**</b>				<b>61.5*</b>	155.2	4-Jun	36.0	11.9
Freeman ++	<b>89.3*</b>	<b>98.0*</b>			59.6	150.7	31-May	33.5	12.6
Genou +	67.4	85.2	81.7	80.6	59.8	156.8	6-Jun	38.6	<b>14.0*</b>
Jerry	74.6	86.1	84.3	82.9	58.5	157.8	7-Jun	38.4	13.0
R Judee +	63.1	80.3	79.8	83.7	58.6	155.2	4-Jun	33.7	<b>14.4*</b>
Keldin (P)+	<b>89.8*</b>	<b>102.7*</b>			60.3	157.1	6-Jun	33.1	13.5
LCH 10-13 (P)	<b>81.8*</b>				<b>63.3**</b>	151.3	31-May	35.8	<b>13.9*</b>
LCS Mint (P)+	<b>95.2*</b>	<b>109.0**</b>			<b>62.0*</b>	153.0	2-Jun	34.4	12.4
R Ledger (P)+	77.4	85.9	84.8	83.2	61.3	155.1	4-Jun	34.0	12.6
MT1078	75.2	91.9	96.0	<b>96.0*</b>	55.3	158.2	7-Jun	33.4	13.1
MT1117	72.2	93.6	<b>94.0*</b>		58.4	158.6	8-Jun	35.0	<b>14.4*</b>
MT1138	76.8	<b>98.6*</b>	<b>98.9*</b>		58.7	157.1	6-Jun	34.8	13.3
MT1257	<b>82.3*</b>	<b>100.5*</b>			59.9	157.9	7-Jun	34.7	12.7
MT1265	<b>80.4*</b>	<b>100.0*</b>			58.7	158.2	7-Jun	36.3	13.4
MT1286	<b>89.0*</b>	<b>101.0*</b>			61.2	158.1	7-Jun	35.8	12.9
MT1332	<b>87.3*</b>				59.9	158.6	8-Jun	36.6	12.5
MT1348	<b>89.9*</b>				59.6	155.4	4-Jun	34.7	12.7
MT1354	72.6				57.9	158.5	8-Jun	35.0	13.7
MT1356	<b>87.2*</b>				59.6	158.7	8-Jun	34.9	12.8
MT1361	<b>89.5*</b>				59.2	158.9	8-Jun	32.9	12.7
MTCL1131	<b>89.0*</b>	<b>101.4*</b>	<b>102.0**</b>		58.5	158.5	8-Jun	35.1	12.4
MTCL1329	73.9				<b>62.1*</b>	155.2	4-Jun	31.2	12.7
MTCs1204	72.7	87.6			60.3	155.8	5-Jun	33.3	13.2
MTF1232	68.4	83.4			58.4	159.4	8-Jun	43.8	<b>14.5*</b>
MTS0826-63	64.8	80.1	81.6		57.9	159.9	9-Jun	34.7	<b>14.9**</b>
MTS1224	<b>80.7*</b>	94.3			57.5	159.4	8-Jun	31.3	13.3
MTS1305	74.8				60.6	155.5	5-Jun	32.3	13.1
R Northern (P)++	<b>87.9*</b>	<b>101.4*</b>	<b>99.0*</b>	<b>98.5**</b>	59.3	158.1	7-Jun	35.0	12.9
Rampart	59.5	79.6	78.3	77.1	59.7	157.8	7-Jun	36.2	<b>14.5*</b>
SY Clearstone 2CL(P)+	<b>83.0*</b>	95.8	<b>95.6*</b>	<b>93.4*</b>	57.2	158.1	7-Jun	34.2	12.6
SY Monument (P)+	<b>83.9*</b>				58.5	155.7	5-Jun	33.8	12.7
SY Sunrise (P)++	<b>82.4*</b>				<b>62.6*</b>	152.8	2-Jun	30.7	13.3
R SY Wolf (P)+	<b>90.8*</b>	<b>101.3*</b>	<b>97.9*</b>	<b>95.5*</b>	<b>61.8*</b>	154.7	4-Jun	32.0	12.9
T158 (P)	<b>83.4*</b>	92.0			<b>62.6*</b>	150.3	30-May	32.2	13.2
R Warhorse +	58.2	75.1	76.6	78.6	57.4	157.8	7-Jun	31.4	<b>14.0*</b>
WB3768 (HWW, P)++	74.9	<b>96.3*</b>	<b>97.0*</b>	<b>94.9*</b>	59.6	159.8	9-Jun	35.7	<b>13.8*</b>
WB4059CLP (P)+	65.4	66.4			<b>61.7*</b>	152.5	2-Jun	32.0	<b>13.9*</b>
WB4614 (P)++	75.5	87.9			60.5	156.4	5-Jun	32.3	13.6
WB4623CLP (P)++	67.1				59.9	157.3	6-Jun	30.7	<b>14.0*</b>
R WB-Quake (P)+	54.3	75.8	76.4	79.2	58.6	158.4	7-Jun	32.2	<b>14.0*</b>
R Yellowstone +	<b>83.1*</b>	<b>100.2*</b>	<b>98.7*</b>	<b>98.1*</b>	60.0	158.6	8-Jun	34.4	12.7
Average	<b>78.2</b>	<b>91.5</b>	<b>90.0</b>	<b>88.2</b>	<b>59.7</b>	<b>156.4</b>	<b>5-Jun</b>	<b>34.1</b>	<b>13.3</b>
LSD (0.05)	<b>16.6</b>	<b>12.7</b>	<b>8.0</b>	<b>7.7</b>	<b>1.9</b>	<b>1.5</b>		<b>2.2</b>	<b>1.1</b>
C.V.	<b>12.2</b>	<b>6.8</b>	<b>5.4</b>	<b>6.1</b>	<b>1.8</b>	<b>0.5</b>		<b>4.0</b>	<b>4.9</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

Cultivar/Line	Grain Yield (bushels/acre)				2015 Data				
	2015	2014-15	2013-15	2012-15	Test weight lb/bu	Heading Date		Plant height in	Protein %
						Ordinal	Calendar		
		2 yr	3 yr	4yr		from Jan1			
R Bearpaw +	60.1	56.7	60.7	59.4	60.5	150.9	31-May	28.0	12.7
Brawl CL Plus +	52.3				61.9	145.4	25-May	31.6	13.5*
R Broadview (P)	69.5*	65.9*	67.0*	63.4	60.0	151.6	1-Jun	31.9	12.2
Byrd +	70.5*				62.1	147.4	27-May	29.7	11.4
R CDC Falcon (P)+	66.3	63.2*	61.5	59.5	60.4	150.9	31-May	29.0	12.2
R Colter ++	65.1	63.1*	63.3	65.2	60.9	153.3	2-Jun	32.4	13.0
Cowboy +	71.7*	68.7**	73.3**		61.8	149.2	29-May	32.8	11.2
R Decade +	59.5	57.7	60.9	59.7	61.3	151.3	31-May	29.3	13.1
Denali +	72.1**				62.6	150.1	30-May	31.4	11.0
Freeman ++	57.4	56.4			60.3	145.4	25-May	28.8	12.6
Genou +	58.4	57.9	62.1	57.5	60.7	150.0	30-May	33.2	12.8
Jerry	58.9	54.8	57.7	54.4	60.0	152.0	1-Jun	34.2	12.5
R Judee +	60.5	60.8	64.7	60.8	61.8	151.2	31-May	30.6	12.8
Keldin (P)+	61.4	59.5			61.3	152.6	1-Jun	30.4	12.3
LCH 10-13 (P)	53.2				62.2	145.2	25-May	30.6	13.9**
LCS Mint (P)+	55.5	57.1			63.1**	146.9	27-May	30.7	12.3
R Ledger (P)+	63.7	62.2*	62.6	59.0	61.7	151.9	1-Jun	30.4	12.3
MT1078	65.9	61.7*	65.8	64.9	60.1	153.0	2-Jun	31.8	11.7
MT1117	60.5	61.4*	63.6		60.9	152.9	2-Jun	34.4	12.9
MT1138	65.4	63.2*	64.1		61.2	151.7	1-Jun	32.6	12.3
MT1257	64.2	63.4*			60.5	152.1	1-Jun	32.1	12.4
MT1265	58.3	58.7			60.7	152.7	2-Jun	33.7	12.7
MT1286	61.5	59.3			61.1	151.3	31-May	31.3	12.3
MT1332	66.4*				61.1	152.2	1-Jun	33.2	12.7
MT1348	67.4*				61.4	150.8	31-May	30.2	12.5
MT1354	65.7				61.4	152.8	2-Jun	32.8	12.6
MT1356	63.3				60.7	152.5	2-Jun	32.7	13.1
MT1361	64.2				60.6	153.9	3-Jun	30.1	13.1
MTCL1131	57.6	57.5	62.2		61.8	152.9	2-Jun	31.2	12.4
MTCL1329	62.9				62.1	149.3	29-May	30.7	11.9
MTCS1204	61.7	57.6			61.1	152.3	1-Jun	31.6	12.2
MTF1232	56.6	51.6			59.8	154.2	3-Jun	37.5	12.9
MTS0826-63	57.7	57.8	61.8		58.8	153.9	3-Jun	31.1	13.6*
MTS1224	55.5	53.2			60.7	153.9	3-Jun	27.5	13.3
MTS1305	65.0				61.3	151.0	31-May	30.1	12.2
R Northern (P)++	61.2	61.6*	65.9	63.2	60.6	152.6	2-Jun	31.5	13.0
Rampart	60.1	58.3	61.1	57.5	59.7	151.5	1-Jun	31.7	13.3*
SY Clearstone 2CL(P)+	58.0	58.3	63.8	62.7	60.7	151.9	1-Jun	34.2	12.5
SY Monument (P)+	65.9				61.0	150.2	30-May	30.9	11.2
SY Sunrise (P)++	64.1				61.8	149.1	29-May	26.9	12.9
R SY Wolf (P)+	59.9	65.5*	67.5*	64.7	62.5	149.6	29-May	29.4	12.3
T158 (P)	55.7	61.2*			61.8	145.0	25-May	28.1	12.5
R Warhorse +	60.3	54.2	59.4	57.5	60.8	152.6	2-Jun	29.5	12.7
WB3768 (HWW, P)++	63.0	59.2	63.3	60.5	60.6	155.0	4-Jun	33.2	12.8
WB4059CLP (P)+	48.3	51.7			61.8	146.6	27-May	26.4	13.4*
WB4614 (P)++	59.9	59.4			61.4	152.3	1-Jun	30.2	12.6
WB4623CLP (P)++	55.0				60.7	152.6	2-Jun	26.3	13.5*
R WB-Quake (P)+	57.1	51.9	58.3	55.9	60.7	153.2	2-Jun	29.9	12.8
R Yellowstone +	65.2	63.7*	64.7	61.6	60.9	152.2	1-Jun	33.4	12.3
Average	61.4	59.2	63.3	60.4	61.1	151.1	31-May	31.0	12.6
LSD (0.05)	5.7	7.7	7.0	ns	0.5	1.2		2.9	0.5
C.V.	5.3	6.4	6.7	7.9	0.4	0.4		5.6	2.5

\*\* = 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

*** No harvest in 2013 due to severe hail prior to harvest ***								
Cultivar/Line	2014, 2015 = severe winter-kill, no harvest		2012 and 2013 Data					
	Grain Yield (bushels/acre)		Test weight	Winter survival	Heading Date		Plant height	Protein
	2012				Ordinal	Calendar		
Bearpaw +		<b>60.3*</b>	58.0	18.0	171.3	20-Jun	27.8	11.5
Brawl CL Plus +								
R Broadview (P)		<b>58.1*</b>	57.5	24.6	170.8	20-Jun	29.0	11.3
Byrd +								
R CDC Falcon (P)+		<b>61.9*</b>	<b>58.5*</b>	34.3	169.6	19-Jun	28.9	12.8
Colter ++		<b>62.5*</b>	<b>59.0*</b>	34.7	170.7	20-Jun	30.6	10.9
Cowboy +				11.9	172.4	21-Jun	29.9	
R Decade +		55.3	<b>60.0*</b>	<b>45.7*</b>	168.8	18-Jun	31.9	12.2
Denali +								
Freeman ++								
Genou +		53.4	<b>59.0*</b>	6.7	173.7	23-Jun	31.9	14.0
R Jerry		<b>65.9*</b>	58.0	<b>54.7**</b>	169.4	18-Jun	35.0	11.8
Judee +		51.9	58.0	10.0	173.0	22-Jun	29.4	11.4
Keldin (P)+								
LCH 10-13 (P)								
LCS Mint (P)+								
Ledger (P)+		46.3	<b>58.5*</b>	8.3	172.4	21-Jun	29.1	11.8
MT1078		<b>60.1*</b>	56.5	6.4	173.7	23-Jun	27.0	10.1
MT1117				37.4	172.0	21-Jun	29.7	
MT1138				21.2	171.8	21-Jun	32.2	
MT1257								
MT1265								
MT1286								
MT1332								
MT1348								
MT1354								
MT1356								
MT1361								
MTCL1131								
MTCL1329								
MTCS1204				<b>40.3*</b>	172.0	21-Jun	31.8	
MTF1232								
MTS0826-63				21.3	172.5	22-Jun	33.1	
MTS1224								
MTS1305								
Northern (P)++		<b>63.5*</b>	<b>60.0*</b>	27.2	172.9	22-Jun	29.4	11.9
Rampart		43.9	57.5	10.6	172.6	22-Jun	31.9	11.8
SY Clearstone 2CL(P)+		<b>62.9*</b>	57.0	21.7	171.8	21-Jun	31.1	11.0
SY Monument (P)+								
SY Sunrise (P)++								
SY Wolf (P)+		54.1	<b>60.5**</b>	13.6	170.2	19-Jun	29.3	11.2
T158 (P)								
Warhorse +		50.9	56.0	13.5	174.0	23-Jun	28.1	11.4
WB3768 (HWW, P)++		<b>59.7*</b>	58.0	<b>38.3*</b>	172.9	22-Jun	32.3	11.1
WB4059CLP (P)+								
WB4614 (P)++								
WB4623CLP (P)++								
R WB-Quake (P)+		49.4	56.5	16.3	171.1	20-Jun	31.6	13.5
Yellowstone +		<b>63.7*</b>	<b>58.8*</b>	21.8	172.0	21-Jun	30.3	12.4
Average		<b>57.4</b>	<b>58.8</b>	<b>23.1</b>	<b>171.6</b>	<b>21-Jun</b>	<b>30.3</b>	<b>11.7</b>
LSD (0.05)		<b>9.6</b>	<b>1.9</b>	<b>17.2</b>	<b>2.6</b>		<b>3.3</b>	
C.V.		<b>8.3</b>	<b>1.6</b>	<b>43.0</b>	<b>0.9</b>		<b>6.8</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)

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)			2015 Data					
	2015	2013//15	2012//15	Test weight	Winter survival	Heading Date		Plant height	Protein
						Ordinal	Calendar		
		2 yr	3 yr	lb/bu	%	from Jan1		in	%
<b>Bearpaw +</b>	42.9	45.7	46.0	60.5	73	159.0	8-Jun	26.4	13.5
<b>Brawl CL Plus +</b>	25.5			61.9	53	156.5	6-Jun	24.8	14.3
<b>Broadview (P)</b>	<b>58.1*</b>	<b>55.5*</b>	<b>57.8*</b>	60.0	<b>95*</b>	157.5	7-Jun	27.2	11.4
<b>Byrd +</b>	49.3			62.1	<b>88*</b>	157.0	6-Jun	26.4	13.3
<b>CDC Falcon (P)+</b>	<b>54.8*</b>	50.3	<b>53.4*</b>	60.4	<b>94*</b>	157.5	7-Jun	25.0	12.5
<b>Colter ++</b>	48.4	<b>62.2*</b>	<b>55.4*</b>	60.9	<b>90*</b>	160.0	9-Jun	29.1	12.8
<b>Cowboy +</b>	28.7	41.0		61.8	28	159.5	9-Jun	28.5	12.0
<b>Decade +</b>	47.7	52.4	<b>49.4*</b>	61.3	<b>78*</b>	157.5	7-Jun	27.6	14.7
<b>Denali +</b>	39.8			62.6	75	159.0	8-Jun	28.5	11.9
<b>Freeman ++</b>	45.0			60.3	73	157.0	6-Jun	25.6	14.0
<b>Genou +</b>	47.6	49.8	43.0	60.7	<b>83*</b>	159.0	8-Jun	29.7	12.9
<b>Jerry</b>	<b>52.3*</b>	<b>58.8*</b>	<b>57.1*</b>	60.0	<b>98**</b>	156.5	6-Jun	29.1	12.9
<b>Judee +</b>	27.9	32.7	28.9	61.8	40	160.5	10-Jun	28.3	15.7
<b>Keldin (P)+</b>	28.1			61.3	28	161.0	10-Jun	26.8	15.0
<b>LCH 10-13 (P)</b>	33.0			62.2	60	156.5	6-Jun	28.7	12.8
<b>LCS Mint (P)+</b>	29.9			<b>63.1**</b>	29	158.0	7-Jun	28.7	12.6
<b>Ledger (P)+</b>	45.5	44.7	41.3	61.7	73	160.0	9-Jun	27.0	12.6
<b>MT1078</b>	42.8	40.9	41.8	60.1	58	160.5	10-Jun	28.9	12.2
<b>MT1117</b>	46.5	53.1		60.9	<b>90*</b>	159.5	9-Jun	29.5	13.1
<b>MT1138</b>	<b>52.4*</b>	<b>59.4*</b>		61.2	<b>90*</b>	159.5	9-Jun	29.3	11.4
<b>MT1257</b>	<b>51.5*</b>			60.5	<b>85*</b>	159.0	8-Jun	28.9	11.5
<b>MT1265</b>	48.4			60.7	<b>88*</b>	160.5	10-Jun	28.5	12.3
<b>MT1286</b>	<b>54.3*</b>			61.1	<b>88*</b>	159.5	9-Jun	29.5	13.0
<b>MT1332</b>	<b>57.3*</b>			61.1	<b>90*</b>	160.0	9-Jun	30.1	12.1
<b>MT1348</b>	38.4			61.4	53	159.5	9-Jun	26.2	12.5
<b>MT1354</b>	<b>52.1*</b>			61.4	<b>90*</b>	160.0	9-Jun	30.3	13.3
<b>MT1356</b>	<b>50.6*</b>			60.7	<b>78*</b>	159.5	9-Jun	28.1	12.6
<b>MT1361</b>	<b>51.0*</b>			60.6	<b>93*</b>	160.0	9-Jun	26.8	12.8
<b>MTCL1131</b>	<b>55.4*</b>	<b>62.6*</b>		61.8	<b>80*</b>	160.5	10-Jun	28.5	11.3
<b>MTCL1329</b>	46.2			62.1	69	158.5	8-Jun	28.1	12.7
<b>MTCS1204</b>	48.7			61.1	<b>88*</b>	159.0	8-Jun	28.9	11.9
<b>MTF1232</b>	31.2			59.8	63	162.5	12-Jun	38.4	14.8
<b>MTS0826-63</b>	<b>54.9*</b>	52.2		58.8	<b>90*</b>	160.5	10-Jun	29.5	13.4
<b>MTS1224</b>	<b>52.1*</b>			60.7	<b>95*</b>	159.0	8-Jun	24.4	12.8
<b>MTS1305</b>	27.1			61.3	50	160.5	10-Jun	24.6	12.4
<b>Northern (P)++</b>	50.5	<b>56.0*</b>	<b>51.1*</b>	60.6	<b>85*</b>	161.0	10-Jun	27.0	11.7
<b>Rampart</b>	33.0	41.5	39.6	59.7	70	160.5	10-Jun	32.1	13.9
<b>SY Clearstone 2CL(P)+</b>	45.7	48.0	44.8	60.7	73	160.0	9-Jun	29.7	12.1
<b>SY Monument (P)+</b>	40.8			61.0	75	157.5	7-Jun	24.4	13.2
<b>SY Sunrise (P)++</b>	24.2			61.8	36	157.5	7-Jun	22.4	14.9
<b>SY Wolf (P)+</b>	35.9	44.7	38.9	62.5	55	159.5	8-Jun	27.0	13.4
<b>T158 (P)</b>	35.6			61.8	60	156.0	5-Jun	25.0	12.8
<b>Warhorse +</b>	40.8	47.6	47.3	60.8	<b>78*</b>	160.5	10-Jun	26.0	12.0
<b>WB3768 (HWW, P)++</b>	<b>53.2*</b>	<b>57.9*</b>	<b>56.2*</b>	60.6	<b>90*</b>	161.5	11-Jun	32.9	12.1
<b>WB4059CLP (P)+</b>	21.6			61.8	30	157.5	7-Jun	23.6	14.5
<b>WB4614 (P)++</b>	43.9			61.4	<b>78*</b>	159.5	9-Jun	26.0	12.4
<b>WB4623CLP (P)++</b>	14.4			60.7	16	163.5	13-Jun	23.2	15.4
<b>WB-Quake (P)+</b>	47.3	53.4	<b>51.4*</b>	60.7	75	160.0	9-Jun	27.2	13.5
<b>Yellowstone +</b>	<b>64.2**</b>	<b>67.4**</b>	<b>59.5**</b>	60.9	<b>93*</b>	158.5	8-Jun	28.3	12.5
<b>Average</b>	43.2	<b>51.2</b>	<b>47.9</b>	<b>61.1</b>	<b>71.4</b>	<b>159.2</b>	<b>8-Jun</b>	<b>27.8</b>	<b>13.0</b>
<b>LSD (0.05)</b>	13.7	<b>13.7</b>	<b>11.7</b>	<b>0.5</b>	<b>21.8</b>	<b>2.0</b>		<b>1.7</b>	
<b>C.V.</b>	15.8	<b>12.9</b>	<b>14.7</b>	<b>0.4</b>	<b>15.2</b>	<b>0.6</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 11. 2007//2015 Intrastate Winter Wheat Test (Exp. 35): Combined Locations Winter Survival and associated Yield (Locations: Williston (2007-2008, 2012, 2013, 2015), Sidney (2008, 2010, 2011) = 8 locations**  
**\*\*\* No recordable Winterkill, with a harvest, in 2009 and 2014 \*\*\***

location-years	Winter Survival (%)							Yield under Winterkill conditions						
	2015	2013-15	2012-15	2011-15	2010-15	2008-15	2007-15	2015	2013-15	2012-15	2011-15	2010-15	2008-15	2007-15
	1	2	3	4	5	7	8	1	2	3	4	5	7	8
<b>Bearpaw +</b>	73	47	40	45	45			42.9	45.7	46.0	48.2	48.4		
<b>Brawl CL Plus +</b>	53							25.5						
<b>Broadview (P)</b>	95*	63*	60*	60*	62*			58.1*	55.5*	57.8*	57.3*	59.3*		
<b>Byrd +</b>	88*							49.3						
<b>CDC Falcon (P)+</b>	94*	63*	59*	61*	62*	53*	56*	54.8*	50.3	53.4*	54.3*	55.6*	49.5*	52.7*
<b>Colter ++</b>	90*	67*	51*	52*				48.4	62.2*	55.4*	58.2*			
<b>Cowboy +</b>	28	21						28.7	41.0					
<b>Decade +</b>	78*	53*	51*	57*	57*	52*	55*	47.7	52.4	49.4	53.3*	54.7*	48.2*	51.9*
<b>Denali +</b>	75							39.8						
<b>Freeman ++</b>	73							45.0						
<b>Genou +</b>	83*	50	37	41	42	33	36	47.6	49.8	43.0	43.1	44.3	35.7	38.4
<b>Jerry</b>	98**	72**	61**	63**	64**	56**	60**	52.3*	58.8*	57.1*	59.9*	60.7*	53.7**	56.5**
<b>Judee +</b>	40	27	20	27	33	27		27.9	32.7	28.9	32.8	36.6	30.0	
<b>Keldin (P)+</b>	28							28.1						
<b>LCH 10-13 (P)</b>	60							33.0						
<b>LCS Mint (P)+</b>	29							29.9						
<b>Ledger (P)+</b>	73	42	35	38	39	31	34	45.5	44.7	41.3	42.1	43.1	34.5	37.6
<b>MT1078</b>	58	32	26					42.8	40.9	41.8				
<b>MT1117</b>	90*	55*						46.5	53.1					
<b>MT1138</b>	90*	58*						52.4*	59.4*					
<b>MT1257</b>	85*							51.5*						
<b>MT1265</b>	88*							48.4						
<b>MT1286</b>	88*							54.3*						
<b>MT1332</b>	90*							57.3*						
<b>MT1348</b>	53							38.4						
<b>MT1354</b>	90*							52.1*						
<b>MT1356</b>	78*							50.6*						
<b>MT1361</b>	93*							51.0*						
<b>MTCL1131</b>	80*	64*						55.4*	62.6*					
<b>MTCL1329</b>	69							46.2						
<b>MTCS1204</b>	88*							48.7						
<b>MTF1232</b>	63							31.2						
<b>MTS0826-63</b>	90*	58*						54.9*	52.2					
<b>MTS1224</b>	95*							52.1*						
<b>MTS1305</b>	50							27.1						
<b>Northern (P)++</b>	85*	57*	42	49				50.5	56.0*	51.1*	55.4*			
<b>Rampart</b>	70	46	37	40	38	29	31	33.0	41.5	39.6	41.6	41.4	32.2	34.5
<b>SY Clearstone 2CL(P)+</b>	73	47	35					45.7	48.0	44.8				
<b>SY Monument (P)+</b>	75							40.8						
<b>SY Sunrise (P)++</b>	36							24.2						
<b>SY Wolf (P)+</b>	55	39	28	33				35.9	44.7	38.9	43.9			
<b>T158 (P)</b>	60							35.6						
<b>Warhorse +</b>	78*	55*	45	50	49			40.8	47.6	47.3	50.3	51.3		
<b>WB3768 (HWW, P)++</b>	90*	63*	51*	49				53.2*	57.9*	56.2*	58.2*			
<b>WB4059CLP (P)+</b>	30							21.6						
<b>WB4614 (P)++</b>	78*							43.9						
<b>WB4623CLP (P)++</b>	16							14.4						
<b>WB-Quake (P)+</b>	75	52	41	45	46			47.3	53.4	51.4*	51.8	51.3		
<b>Yellowstone +</b>	93*	65*	50*	51*	51	42	44	64.2**	67.4**	59.5**	61.5**	61.6**	51.3*	53.8*
<b>Average</b>	71.4	52.0	42.6	47.5	49.0	40.5	45.1	43.2	51.2	47.9	50.7	50.7	41.9	46.5
<b>LSD (0.05)</b>	21.8	20.3	14.4	12.6	10.5	9.0	6.9	13.7	13.7	11.7	9.5	7.7	6.4	5.6
<b>C.V.</b>	15.2	18.8	20.5	18.7	16.8	20.5	15.1	15.8	12.9	14.7	13.1	12.0	14.2	11.9

\*\* = 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 (2010//2015)**  
 (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 (%)				
	2015	2013//15	2012//15	2011//15	2010//15	2015	2013//15	2012//15	2011//15	2010//15
Location-years	1	3	6	8	10	1	3	6	8	10
<b>Bearpaw + ss</b>	50.8	58.9	52.9	49.0	<b>51.4*</b>	7*	11	<b>10*</b>	<b>10*</b>	<b>9*</b>
<b>Broadview (P)</b>	48.3					7*				
<b>CDC Falcon (P)+</b>	<b>53.1*</b>	59.9	53.1	49.9	<b>52.7*</b>	3*	6*	24	20	27
<b>Colter ++</b>	41.4	54.6	50.0			22	23	36		
<b>Decade +</b>	46.6	57.6	53.8	49.4	<b>52.9*</b>	4*	<b>12*</b>	24	23	28
<b>Genou + ss</b>	42.2	56.9	51.2	47.7	49.5	9	13	<b>14*</b>	<b>14*</b>	<b>18*</b>
<b>Jerry</b>	45.3	54.6	47.5	45.8	47.7	13	14	30	29	35
<b>Judee + ss</b>	43.4	60.6	<b>54.1*</b>	51.2	<b>53.7*</b>	1*	<b>12*</b>	<b>14*</b>	<b>11*</b>	<b>15*</b>
<b>MT1078</b>	49.3	<b>62.2*</b>				23	20			
<b>MT1117</b>	43.4					15				
<b>MT1138</b>	47.8					16				
<b>MT1257</b>	46.7					26				
<b>MT1265</b>	<b>52.9*</b>					15				
<b>MT1286</b>	51.4					25				
<b>MTCS1204 ss</b>	46.7					8				
<b>MTS0826-63 ss</b>	45.7					3*				
<b>MTS1224 ss</b>	46.2					12				
<b>Northern ++</b>	<b>55.1**</b>					15	13			
<b>Rampart ss</b>	46.7	56.7	48.1	45.2	47.3	2*	7*	8*	8*	8**
<b>SY Clearstone 2CL (P)+</b>	49.3	<b>62.2*</b>	<b>59.3**</b>			18	17	31		
<b>SY Wolf (P)+</b>	49.9					9				
<b>Warhorse + ss</b>	44.3	58.5	<b>54.5*</b>	49.6		0**	4**	3**	3**	
<b>WB3768 (P)++</b>	49.2	60.5				29	24			
<b>WB-Quake (P)+</b>	44.0	60.0	50.8	49.7		3*	13	11*	10*	
<b>Yellowstone +</b>	46.4	60.1	<b>54.4*</b>	51.0	<b>54.8**</b>	15	14	30	26	32
<b>Average</b>	<b>47.4</b>	<b>59.4</b>	<b>47.6</b>	<b>48.8</b>	<b>51.2</b>	<b>11.9</b>	<b>13.5</b>	<b>19.0</b>	<b>15.4</b>	<b>21.5</b>
<b>LSD (0.05)</b>	<b>3.4</b>	<b>6.5</b>	<b>5.0</b>	ns	<b>3.7</b>	<b>8.4</b>	<b>9.2</b>	<b>17.3</b>	<b>12.5</b>	<b>13.6</b>
<b>C.V. (%)</b>	<b>3.8</b>	<b>6.5</b>	<b>9.0</b>	<b>8.9</b>	<b>8.0</b>	<b>39</b>	<b>41</b>	<b>79</b>	<b>81</b>	<b>71</b>

\*\* = indicates highest value within a column  
 \* = 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  
 ss = solid-stemmed sawfly resistant variety

Table 13. Precipitation (top, in inches) and Average Monthly Temperature (bottom, °F) for Crop Year 2014-2015

Agricultural Research Center	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug	Total
	2014	2014	2014	2014	2015	2015	2015	2015	2015	2015	2015	2015	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	9.02
	54.8	48.5	24.0	24.4	23.9	26.8	40.0	43.1	58.9	63.8	66.1	66.3	44.2
Northern, Havre	0.83	1.08	0.38	0.30	0.66	0.41	0.34	0.34	2.53	0.79	3.86	0.53	12.05
	56.7	49.6	24.8	23.6	20.8	23.3	39.4	45.3	51.4	65.5	68.8	67.9	44.7
Northwestern, Kalispell	0.75	2.13	2.84	2.66	2.52	1.04	1.43	0.30	0.43	1.02	0.63	0.19	15.94
	54.2	48.0	28.8	25.0	22.6	32.4	38.6	43.6	52.7	63.7	65.7	64.0	44.9
Central, Moccasin	2.34	0.65	0.45	0.35	0.31	0.20	0.34	1.48	3.79	1.76	1.77	0.54	13.98
	55.2	50.0	27.0	28.8	28.5	28.7	39.9	42.4	48.5	62.7	65.5	66.7	42.3
Southern, Huntley	0.65	0.29	0.55	0.53	0.85	0.13	0.11	1.30	2.66	1.78	0.94	1.26	11.05
	58.3	50.7	28.8	26.2	26.0	30.6	44.0	46.7	53.8	66.0	71.2	68.7	47.6
Northeastern, Sidney	0.71	0.23	0.39	0.25	0.26	0.19	0.39	0.35	1.74	3.53	2.12	1.19	11.37
	57.8	48.5	22.0	22.9	20.7	16.7	39.3	46.4	53.7	66.7	71.1	69.3	44.6
Williston (WREC), N. Dakota	0.84	0.17	0.18	0.08	0.15	0.12	0.15	0.31	1.80	2.73	1.87	1.30	9.70
	60.2	50.2	22.7	21.6	20.0	15.7	39.9	48.0	55.3	68.6	72.6	72.8	45.6
Post Farm, Bozeman	1.47	0.86	1.18	0.67	0.30	0.40	0.19	1.41	2.93	0.66	1.58	0.87	12.52
	57.1	50.8	28.4	26.6	27.2	34.9	42.9	43.9	51.0	64.5	66.3	67.1	46.7

**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	21	N	M	4	2	H	S	S	R	S
Brawl CL Plus	E	White	2	-		Y	-	-	-	-	S	S	-	-
Broadview	M	White	5	S		N	S	3	3	H	S	S	R	R
Byrd	E	White	4	-		N	-	-	-	-	S	S	-	-
CDC Falcon	M	White	4	S	6	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
Denali	M	White	3	-		N	-	-	-	-	S	S	-	-
Freeman	E	White	3	S		N	-	2	2	H	S	R	-	-
Genou	M	White	2	MW	19	N	M	4	4	H	S	S	S	MR
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	2	S		N	-	3	3	H	S	R	-	-
LCS Mint	E	White	2	S		N	-	3	3	H	S	R	-	-
Ledger	M	White	2	S	10	N	M	5	3	M-H	S	S	S	MS
MTS1224 (pending)	M-L	White	4	MS	19	N	-	4	4	ML	S	R	R	-
Northern	M	White	3	S		N	S	3	3	L	S	R	R	-
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 Monument	M	White	3	-		N	-	-	-	-	S	R	-	-
SY Sunrise	E	White	2	-		N	-	-	-	-	S	R	-	-
SY Wolf	M	White	3	S		N	M	3	2	M	S	R	R	-
T158	E	White	3	S		N	-	3	2	H	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	2	S		Y	-	3	3	H	S	VS	-	-
WB4614	M	White	4	S		N	-	3	3	H	S	R	-	-
WB4623CLP	M-L	White	1	-		Y	-	-	-	-	S	R	-	-
WB-Quake	M-L	White	3	S	20	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

MW = Medium Weak

M = Medium

MS = Medium Strong

S = Strong

5/ L = long

M = medium

S = short

- = no info.

6/

5 = Superior

4

3

2

1 = Inferior

7/ PPO = Polyphenol Oxidase

(low is better for noodles)

L = low

M = medium

H = high

4/ scored 5-25, 25 = most solid

Combined 2011-2015 Bozeman, Conrad, Havre, Loma, and Moccasin data; varieties with no number were not evaluated

8/

R = Resistant

MR = Moderately Resistant

M = Moderate

MS = Moderately Susceptible

S = Susceptible

VS = Very Susceptible

- = no information

## Additional Descriptive Information for Winter Wheat Varieties

### New for the 2016 Bulletin:

**Brawl CL Plus** – hard red winter wheat developed by Colorado and released in 2011. Brawl CL Plus is an early maturing, medium short statured wheat, with white chaff. Brawl CL Plus has average yield and above average test weight and protein. Brawl CL Plus is susceptible to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V has been issued (Certificate #201200434). Additionally, the CLEARFIELD genes are patented.

**Byrd** – hard red winter wheat developed by Colorado and released in 2011. Byrd is an early maturing, medium short statured wheat, with white chaff. Byrd has average yield and test weight and below average protein. Byrd is susceptible to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V has been issued (Certificate #201200432).

**Denali** – hard red winter wheat developed by Colorado and released in 2011. Denali is a medium maturing, medium statured wheat, with white chaff. Denali has average yield and test weight and below average protein. Denali is susceptible to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V has been issued (Certificate #201200433). Denali will not be in the Montana Intrastate Winter Wheat testing for 2016.

**MTS1224 (pending)** – hard red winter wheat developed by the Montana Agricultural Experiment Station and available to growers in fall 2016. MTS1224 is a semi-solid stemmed (similar to Genou), medium-late maturing, medium short statured wheat, with white chaff. MTS1224 has above average yield and average test weight and protein. MTS1224 is resistant to both stripe and stem rust. MTS1224 is a medium low PPO line with above average mill and bake. PVP, Title V will be applied for.

**SY Monument** – hard red winter wheat developed by Syngenta and released in 2015. SY Monument is a medium maturing, medium short statured wheat, with white chaff. SY Monument has average yield, below average test weight and average protein. SY Monument is resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V has been issued (Certificate #201400332).

**SY Sunrise** – hard red winter wheat developed by Syngenta and released in 2015. SY Sunrise is an early maturing, short statured wheat, with white chaff. SY Sunrise has average yield, above average test weight, and average protein. SY Sunrise is resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V is pending (Certificate #201500370).

**WB4623CLP** – hard red winter wheat developed by WestBred and released in 2015. WB4623CLP is a medium late maturing, short statured wheat, with white chaff. WB4623CLP has average yield, test weight, and protein. WB4623CLP is resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V is pending (Certificate #201500189). Additionally, the CLEARFIELD genes are patented.

### 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.

**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 is pending (Certificate #201500029).

**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. PVP, Title V has been issued (Certificate #201100096).

**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. Freeman is a high PPO variety with below average mill and bake characteristics. PVP, Title V is pending (Certificate #201400398).

**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). Genou will not be in the Montana Intrastate Winter Wheat testing for 2016.

**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).

**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. Keldin is a high PPO variety with average mill and bake characteristics. PVP, Title V has been issued (Certificate #201300462).

**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. LCS Mint is a high PPO variety with average mill and bake characteristics. PVP, Title V has been issued (Certificate

#2013004481). LCS Mint will not be in the Montana Intrastate Winter Wheat testing for 2016.

**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). Ledger will not be in the Montana Intrastate Winter Wheat testing for 2016.

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

**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).

**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. T158 is a high PPO variety with average mill and and below average bake characteristics.

**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).

**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. WB4059CLP is a high PPO variety with average mill and bake characteristics. PVP, Title V has been issued (Certificate #2013004481). Additionally, the CLEARFIELD genes are patented.

**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. WB4614 is a high PPO variety with average mill and bake characteristics. PVP, Title V is pending (Certificate #201500188).

**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>**