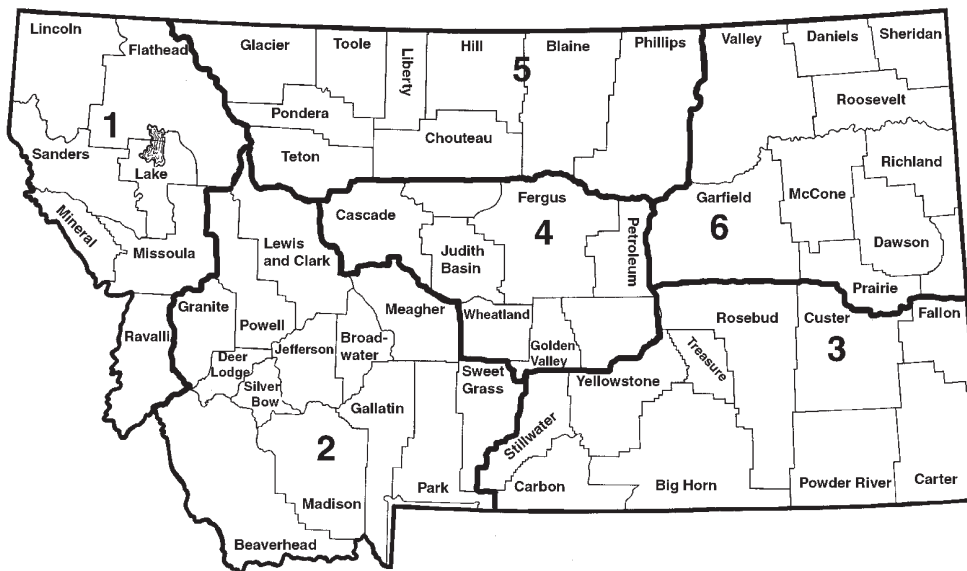


2008

Winter Wheat Varieties



Recommendations are made for the districts shown on the map.

Performance Evaluation and Recommendations

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>



2B 1093

Revised February 2008

2008 Recommended Varieties: Hard Winter Wheat and Soft White Winter Wheat for Montana by District						
Variety	Districts (see map on cover)					
	1	2	3	4	5	6
Hard Red and Hard White Winter Wheat						
Bynum (P) ^{2/} +				D	D	
Carter (P)++		D	D	D	D	D
CDC Falcon (P)+		DI	DI	DI	DI	DI
Genou + ^{2/}			D	D	D	
Hyalite (HWW, P)+		D	D	D	D	
Jagalene (P)+	D	D	D	D	D	
Jerry						D
Ledger (P)+		D		D	D	
Morgan (P)+		D	D	D	D	D
Neeley		D	D	D	D	
Norris (P)+		D	D	D		
Promontory ^{1/}	D	D	DI	D		
Pryor (P)+		D	D	D	D	D
Rampart ^{2/}			D	D	D	
Rocky (P)			D	D	D	
Vanguard ^{2/}				D	D	
Wahoo +			D	D		
Yellowstone +	D	D	D	D	D	
Soft White Winter Wheat						
Eltan	D	D				
Hill 81	D	D				
Lewjain	D					
Malcolm	D	D				

HWW = Hard White Winter Wheat

D = Dryland

I = Irrigated

(P) = a Private Variety

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

++ = PVP Title V pending

^{1/} = dwarf smut resistant

^{2/} = sawfly areas only

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WINTER WHEAT VARIETY PERFORMANCE SUMMARY IN MONTANA

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Introduction

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

Variety Testing Procedures

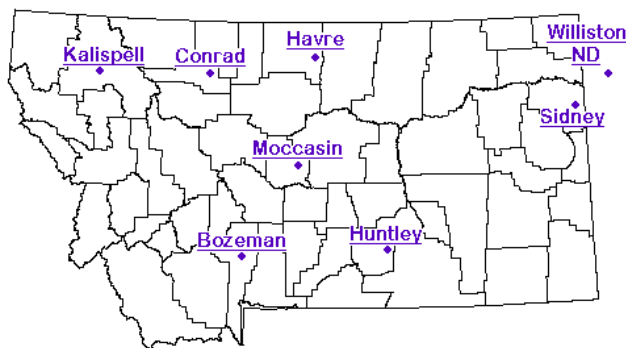


Fig. 1. Test Locations for Montana winter wheat performance tests in 2007.

Entries

Names of commercially available entries evaluated in 2007 are listed with their origins, experimental designation, release year, and pedigrees in Table 2 for the hard winter wheats and in Table 15 for the soft white wheats. Forty-nine hard wheats are included in this summary comprising 33 varieties (18 public and 15 private) and 16 experimental lines (15 public and 1 private). Numbered entries preceded by a state designation [e.g. MT0495 (Montana), WA7976 (Washington)] are experimental lines provided by the breeder of the originating state. Private experimental lines [e.g. BZ9W02-2051 (WestBred)] are submitted for testing on a fee basis. The soft white evaluation contains 16 varieties [15 soft white public (including 3 experimental lines), 1 private, and one hard wheat check (Neeley).]

Experimental Design and Seeding Methods

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

Soft white winter wheat nurseries were planted similar to the hard wheat test, except all tests were planted in a randomized complete block design.

All seed for each nursery was treated with Dividend-XL seed treatment at recommended rates before planting.

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. Separate tests comparing soft white winter wheat varieties were planted at Bozeman and Kalispell.

Table 1. Summary of agronomic practices used on hard winter wheat performance trials in Montana in 2007. Fall nitrogen (N), phosphorus (P₂O₅) and potassium (K₂O) were preplant applied and incorporated.

Location	2006 Crop	2005 Crop	2006 Planting Date	Fertilizer				2007 Harvest Date
				N		P ₂ O ₅	K ₂ O	
				Fall	Spring			
----- Pounds per acre -----								
Kalispell	fallow	Green manure	Sept. 18	30	-	30	30	Jul. 30
Bozeman	fallow	Oats	Sept. 27	9	-	38	none	Aug. 2
Huntley	chem. fallow	Fallow	Sept. 28	30	-	0	0	July 19
Moccasin	chem. fallow	barley	Sept. 26	10	60	10	10	July 25
Conrad	fallow	barley	Sept. 9	71	-	52	0	July 24
Havre	fallow	barley	Sept. 29	40	-	25	0	July 25
Sidney	fallow	safflower	Oct. 10	none	-	none	none	Aug 7
Williston, ND	fallow	safflower	Sept. 13	52	-	30	0	July 26

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 2007, data is provided for two (2006-2007), three (2005-2007) and four (2004-2007) year averages for both hard and soft wheat entries tested during previous cropping seasons.

Test Weight

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

Heading Date

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

Plant Height

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

Grain Protein

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

Winter Survival

Percent winter survival is estimated for each plot after initial spring green-up at locations where significant winter injury occurred. In 2007, only Williston had significant stand loss due to winter kill.

Table 11 contains information on % winter survival and associated yield in winter-kill environments from 2003 to 2007. The data summarizes 11 tests in which significant winter-kill occurred (test average for winter survival was less than 90%). Nine testing sites with winter-kill were in District 6 (Sidney and Williston) which is the most severe location for winter wheat survival of our testing locations.

Wheat Stem Sawfly

Wheat stem sawfly (WSS) is a persistent and economic problem for wheat growers in Montana. Currently, Montana wheat acreage infested by WSS is primarily in the north central (District 5), central (District 4) and south central (District 3) cropping districts. Host plant resistance in the form of stem solidness has been effective in reducing sawfly losses in both spring and winter wheat. Solid-stemmed winter wheats, 'Vanguard',

'Rampart' and were released in 1995 and 1996, respectively. These 2 varieties were planted on 12% of the winter wheat acreage in the 2007 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 in 2007 with 16% of the winter wheat acreage. Genou has better winter hardiness and yield than Rampart or Vanguard.

Table 12 contains information on yield and % sawfly cutting at 8 testing locations where sawfly pressure was present during the years 2003-2007. The data is from Havre and a site 25 miles north of Havre. Solidness scores (rated on a 5-25 scale are shown for solid and semi-solid varieties in Table 14.

Coleoptile Length

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

Other Agronomic Characters

Table 14 contains information on grain maturity, chaff color, relative winter survival and straw strength for the hard wheat varieties listed in this publication. Table 18 has information on maturity, winter survival and lodging for soft white winter wheats.

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) was determined for varieties in 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 general leaf spot complex. Table 18, for soft white winter wheat, contains information on dwarf smut, snow mold, stem rust and stripe rust.

Statistical Analyses and Interpretation

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

Tables 3 through 10 show 2007 data for hard winter wheat collected at all harvested experiment station sites. Tables 16 - 17 contain 2007 data for the soft white wheats. 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.

2007 Test Conditions

Statewide winter wheat yields were moderate and projected by the Montana Agricultural Statistics Service at 38 bu/a for 2007 compared to 43 bu/a for the 2006 harvest year. The harvested acreage in 2007 was 2.19 million acres (total production = 83.2 million bu) compared to 1.92 million acres in 2006 (82.6 million bu). Rainfall for the 2006-2007 winter wheat season was generally adequate to above average at all locations. Test yields ranged from 55 bu/a at Havre to 105 bu/a at Bozeman. Test weight averaged 60.4 lb/bu across all locations (Havre, Williston, and Kalispell were below 60 lb/bu). Winterkill at Williston (59% survival across varieties, range 7-90%) reduced yields of

susceptible varieties, while Sidney experienced some stand reduction. Higher than average spring rainfall resulted in increased plant height for 2007 (37in average compared to 31 inches across all locations in 2006).

Stripe rust at Bozeman and Kalispell was a factor in yield reduction for highly susceptible varieties (Ripper, Neeley, NuWest, and NuSky). Stripe rust was less of a factor in overall yield reduction at both these locations in 2007 with yield averages of 105 bu/a at Bozeman and 91 bu/a at Kalispell, compared to 80 and 60 bu/a, respectively, in 2006. There was sawfly cutting at the Havre Experiment Station averaging 27% of stems cut across varieties (range = 0 – 57%).

Protein content averaged near 13% across all locations (location range = 10.0 – 14.4%) tested. Sidney and Moccasin were below 12%. The range of genotype means across all locations was 11.7-14.9%.

Leading winter wheat varieties planted for 2007 were Genou (16.1%), CDC Falcon (13.4%), Rampart (9.7%) Neeley (7.6%), Ledger (5.9%) and Morgan (5.5%).

Dwarf Smut (TCK)

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

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

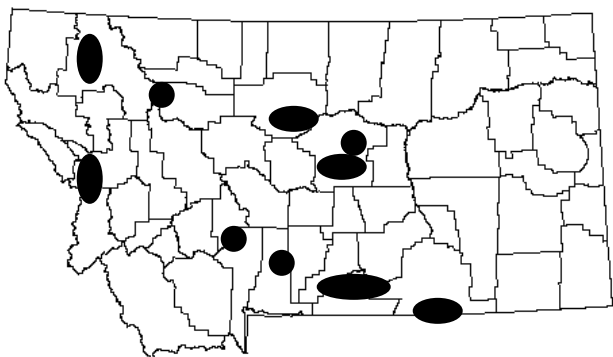


Fig. 2. Known areas of dwarf smut (TCK) infestations.

If you farm in the vicinity of one of the shaded areas in the map (Figure 2.), you would be well advised to observe closely your winter wheat crop and consider planting a resistant variety (Tables 14 and 18) or use 'Dividend' seed treatment, only.

What Recommendation by MAES Means

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

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

Recommendations of varieties are considered on a case by case basis. Yield performance of a variety is an important criteria, but also considered are test weight, grain protein content, winter survival, pest resistance and end-use quality data. In general, yield needs to be at least equal to currently recommended varieties in a particular district, unless the variety is being recommended for a specific purpose, e.g. winter hardiness, sawfly resistance. For example, Rampart and Vanguard, which are not competitive in the absence of wheat stem sawfly, are recommended in Districts 3, 4 and 5 for sawfly areas only. Only five varieties are recommended for the Northeast district due to severe winter conditions and a higher probability of stem rust in this region. Thus varieties

recommended for District 6 must have higher winter survival and stem rust resistance.

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

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

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

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

Producing Winter Wheat

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

Seed Treatment

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

Dwarf smut (bunt) can be controlled with difenoconazole. Dividend® contains this compound and is available in Montana. If you farm in a dwarf smut area contact your seed dealer or chemical

representative for more information about this seed treatment. See page 4 for known areas of dwarf smut infestations.

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

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

Drill box treatments are not effective for general use.

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

Seeding Rate and Date

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

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

Figure 3. Seeding rate and date for winter wheat

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

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

Seeding Depth

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

Yield in Winter Wheat as Influenced by Percent Stand

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

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

Variety	Experimental Designation	Origin	Release Year	Pedigree
Public Varieties				
Alice (HWW)	SD97W609	South Dakota	2006	Abilene/Karl
BigSky	MT9432	Montana	2001	NuWest/Tiber
Bond CL	CO00D007	Colorado	2004	Yumar//TXGH12588-120*4/FS2
Darrell	SD98102	South Dakota	2006	2076-W12-11/Karl 9277/(NE89526, Lancota sel/Siouxland/6/ (TX79A2729, TAM W-103/5/ (KS73167, Pitic 62/Chris sib// 2*Sonora 64 /3/Klein Rendidor/4/ Scout)))
Genou	MTS0031	Montana	2004	(Lew/Tiber//Redwin, MTS92015)/3/Vanguard/ Norstar
Hatcher	CO980607	Colorado	2004	Yuma/T-57//TAM 200/3/4*Yuma/4/NEWS08
Jerry	ND9257	North Dakota	2001	Roughrider//(ND7571, Winoka/NB66425)/3/ Arapahoe
Neeley	IDO158	Idaho	1980	Heglar/3/Norin 10/Staring//2*Cheyenne
NuSky	MTW9441	Montana	2001	NuWest/Tiber
Promontory	UT1567-51	Utah	1990	Manning/Bezostaya-1
Rampart	MTS92042	Montana	1996	Lew/Tiber//Redwin
Ripper	CO0016	Colorado	2006	((PI 220127/Plainsman V//TAM 200/ KS87H66), KS94WGRC29 sib, CO940606)/3/(TAM 107 R2, Prairie Red sib)
Tiber	MT8003	Montana	1988	Redwin pure line selection
Vanguard	MTSF2238	Montana	1995	Lew/Tiber//Redwin
Wahoo	NE94654	Nebraska, Wyoming	2000	Arapahoe*2/Abilene
Wendy (HWW)	SD97W604	South Dakota	2004	(Gent/Siouxland, SD89333)//Abilene
Willow Creek (forage)	MT-26FWW	Montana	2005	reselection from Lunnija 56
Yellowstone	MT00159	Montana	2005	F2 composite of Promontory/Judith and Judith-dwarf/Promontory

Private Varieties

Bynum (CL)	MTCL0318	WestBred LLC, Montana	2005	Rampart/FS2//CDC Kestrel, FS2 = mutagenized Fidel
Carter	BZ9W02-2060	WestBred LLC	2006	Jagger/Rampart
CDC Buteo	S96-33	WestBred LLC Saskatchewan	2001	(Norstar*2/Vona, S86-808)//Abilene
CDC Falcon	S94-4	WestBred LLC Saskatchewan	1999	Norstar*2/Vona//Abilene
Hawken	98x0435-15	AgriPro	2007	(Heyne sib/3//W87-085, ((Vona/ W76-1141, W81-133)// Thunderbird W95-091)/5/(W96-427, Arlin/4/ (WI90-431, (F2SPS-102/TAM W-101, 84PY1003-106)/3/(84PD007-16-1, RPB/Mustang/W80-425)))
Hyalite (CL, HWW)	MTCL0306	WestBred LLC, Montana	2005	composite of crosses consisting of 98X78 ((Norwin//Froid/SD1287 /3/NuWest, MTW9727)/4/FS2/5/NuWest), 98X88 (Redwin/Rio Blanco//NuWest, MTW9722) /3/NuWest//TX12588-120, TAM 110 sib)*4/ FS2), 98X93 (NuSky//TAM 110*4/FS2/3/(N95S004, KS87809-10/Arapahoe)
Jagalene	W98-362	AgriPro Seeds	2002	Jagger/Abilene
Ledger	BZ9W96-788-d	WestBred LLC	2004	(Hatten/SS-14, BZ9W92-709)/3/(MTSF1142, Lew/Tiber//Redwin)
Morgan	S89-142	WestBred LLC Saskatchewan	1996	Archer/Norstar
MT1159CL	MTCL01159	WestBred LLC, Montana	2004	FS2/Tiber, FS2 = mutagenized Fidel (CLEARFIELD)
Norris (CL)	MTCL0316 (IMI)	WestBred LLC, Montana	2005	Big Sky//TXGH 12588-26, TAM-110 sib)*4/FS2
NuDakota (HWW)	AP 50W, BC97ROM50W	AgriPro	2006	Jagger/Romanian bulk
NuWest (HWW)	MT7811	Montana, General Mills	1994	Froid/Winoka/7/((Sinvaloch/Wichita//Hope/ Cheyenne/3/Wichita/4/ Seu Seun 27, TX55-391-56-D8)/5/Westmont, MT6928)/6/Trader
Pryor	BZ9W96-919	WestBred LLC	2002	Hatten/Abilene
Rocky	NA 1316	AgriPro	1978	Centurk pure line selection

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

Cultivar/Line	Grain Yield (bushels/acre)				2007 Data					
					Test weight	Heading Date		Plant height	Stripe rust %	Protein %
	2007	2006-2007	2005-2007	2004-2007		Julian	Calendar			
	2 yr	3 yr	4 yr		lb/bu			in	22-Jun	
Alice (HWW)+	96.3				60.0	150.7	31-May	32.7	1	13.7
BigSky +	80.9	63.0	55.5	67.2	59.4	155.3	4-Jun	43.0	12	13.4
Bond CL (CL)+	94.0	79.9*	73.0		59.2	151.0	31-May	34.3	12	11.4
Bynum (P, CL)+	81.5	70.3	82.8*		60.7	155.0	4-Jun	39.8	0	13.9
BZ9W02-2051 (P)	87.2				58.6	156.3	5-Jun	37.1	17	11.6
Carter (P)++	99.2	79.7*	75.8		58.7	155.7	5-Jun	32.5	3	12.8
CDC Buteo (P)++	95.1	73.7			62.5	156.0	5-Jun	40.4	3	12.1
CDC Falcon (P)+	104.1*	80.5*	77.0*	87.2	57.5	155.7	5-Jun	33.5	4	12.7
Darrell +	99.7				60.6	153.3	2-Jun	38.3	10	12.8
FWW-25 (forage)	52.9				51.1	159.3	8-Jun	53.3	31	13.0
Genou +	86.8	77.1*	74.2	82.9	59.5	155.7	5-Jun	39.9	4	12.9
Hatcher +	92.0	79.1*	85.7*		59.4	152.7	2-Jun	34.4	1	12.5
Hawken (P)+	88.6				62.0	148.3	28-May	30.6	0	13.9
Hyalite (P, CL, HWW)+	87.6	69.4	68.1		59.2	153.3	2-Jun	38.1	18	12.0
R Jagalene (P)+	101.4*	80.1*	94.0*	98.9*	62.8	153.3	2-Jun	36.1	0	12.7
Jerry	88.5	73.0	75.7	83.6	57.8	156.0	5-Jun	42.4	6	12.8
Ledger (P)+	99.2	80.9*	84.0*	93.6*	61.4	154.7	4-Jun	36.4	1	12.1
Morgan (P)+	94.3	69.3	57.7	69.1	58.5	157.3	6-Jun	40.2	8	12.4
MT0419	98.2	83.7*			58.4	156.0	5-Jun	37.5	2	12.7
MT0495	110.2**	93.1**			58.2	156.0	5-Jun	37.0	0	11.6
MT0552	96.2				59.0	155.7	5-Jun	36.0	1	12.4
MT0554	91.2				58.4	155.3	4-Jun	39.1	3	12.6
MT0565	79.6				57.6	156.0	5-Jun	36.7	38	13.2
MT0585	93.4				57.8	153.7	3-Jun	37.9	25	12.8
MT0598	85.5				54.3	156.7	6-Jun	41.3	30	13.1
MT1159CL (P, CL)+	80.9	68.0	73.8	77.2	58.2	155.0	4-Jun	33.1	4	13.0
MTCL0477 (CL)	88.9	76.6			59.0	155.7	5-Jun	39.8	1	12.5
MTCL0537	87.1				60.3	157.0	6-Jun	44.0	1	13.0
MTS04114 (HWW)	100.1*	76.9*			60.5	155.3	4-Jun	34.3	0	12.7
MTS04120	93.7	77.1*			60.6	156.3	5-Jun	40.9	5	11.7
MTS0531 (HWW)	100.0*				60.4	155.0	4-Jun	36.4	0	12.3
MTS0532 (HWW)	99.5				60.1	155.0	4-Jun	36.6	0	12.3
Neeley	84.8	73.1	57.8	71.4	59.6	157.3	6-Jun	40.8	13	12.6
Norris (P, CL)+	88.1	71.0	74.5		59.6	152.7	2-Jun	39.9	16	12.4
NuDakota (P, HWW)+	100.6*	72.2			59.8	152.0	1-Jun	31.6	0	13.5
NuSky (HWW)	73.1	54.9	45.0	56.2	58.7	156.7	6-Jun	40.8	19	11.7
NuWest (P, HWW)+	80.2	58.6	47.2	55.7	58.3	156.3	5-Jun	40.6	15	12.4
R Promontory ^{1/}	102.5*	86.8*	101.4*	106.9*	62.4	155.3	4-Jun	37.3	0	12.3
Pryor (P)+	88.3	79.7*	71.4	83.4	58.6	156.3	5-Jun	32.0	4	12.6
Rampart	81.6	77.8*	83.0*	88.1	59.3	156.3	5-Jun	40.2	0	13.8
Ripper +	86.4				60.4	151.0	31-May	31.9	63	12.8
Rocky (P)	95.1	78.4*	74.2	84.8	61.2	155.0	4-Jun	44.0	14	11.7
Tiber	91.7	77.9*	76.9*	84.8	60.6	156.7	6-Jun	43.2	4	13.5
Vanguard	82.7	66.5	74.3	82.1	59.1	156.0	5-Jun	41.1	1	13.6
WA007976	92.4				58.2	158.0	7-Jun	39.1	0	12.7
Wahoo +	100.2*	82.6*	77.9*	86.7	57.3	152.7	2-Jun	34.8	4	12.1
Wendy (HWW)+	106.0*	79.9*			61.4	149.7	29-May	31.8	2	13.5
Willow Creek (forage)	73.8	70.7			58.7	164.0	13-Jun	57.5	0	14.5
R Yellowstone +	102.6*	90.2*	102.1**	111.0*	58.2	156.7	6-Jun	37.0	0	12.9
Average	91.1	75.6	74.5	82.7	59.2	155.1	4-Jun	38.3	8.1	12.7
LSD (0.05)	10.2	16.4	25.5	20.5		1.0		2.1	16.5	
C.V.	6.9	10.7	20.9	17.5		0.4		3.4	126	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

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

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

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

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

					2007 Data					
Cultivar/Line	Grain Yield (bushels/acre)				Test weight	Heading Date		Plant height	Stripe rust %	Protein %
	2007	2006-2007	2005-2007	2004-2007		Julian	Calendar			
		2 yr	3 yr	4 yr	lb/bu			in	6-Jul	
Alice (HWW)+	106.1				62.8	155.5	5-Jun	33.6	13	12.9
BigSky +	94.4	78.3	83.5	91.0	60.6	162.7	12-Jun	44.9	15	13.8
Bond CL (CL)+	114.7	94.2	100.9*		62.1	158.4	7-Jun	39.4	24	11.4
Bynum (P, CL)+	98.5	86.7	89.8		62.2	159.6	9-Jun	42.6	0	14.0
BZ9W02-2051 (P)	114.5				62.6	162.9	12-Jun	41.3	6	11.8
R Carter (P)++	106.5	90.1	96.0		61.6	162.0	11-Jun	34.2	4	12.6
CDC Buteo (P)++	101.6	89.9			62.8	163.0	12-Jun	44.7	20	12.1
R CDC Falcon (P)+	111.6	94.6*	95.9	102.1	61.7	162.0	11-Jun	35.6	15	11.6
Darrell +	99.6				61.9	159.7	9-Jun	39.7	22	12.8
FWW-25 (forage)	65.3				55.7	169.5	19-Jun	55.0	13	14.8
Genou +	96.7	83.9	87.2	93.8	61.3	162.2	11-Jun	41.7	21	13.2
Hatcher +	105.8	97.6*	101.3*		62.3	158.0	7-Jun	37.4	5	11.4
Hawken (P)+	104.4				63.1	154.7	4-Jun	34.1	0	13.1
R Hyalite (P, CL, HWW)+	103.4	87.0	95.5		61.5	160.2	9-Jun	40.4	17	13.3
R Jagalene (P)+	113.0	96.0*	100.9*	101.4	63.9*	159.0	8-Jun	37.7	7	13.2
Jerry	112.2	100.4*	99.3	104.3*	60.3	162.9	12-Jun	47.0	1	12.9
R Ledger (P)+	108.3	89.3	96.5	101.9	62.7	161.3	10-Jun	37.2	19	12.2
R Morgan (P)+	99.7	87.1	91.1	96.2	59.6	165.1	14-Jun	44.4	24	12.2
MT0419	103.7	95.7*			60.7	163.0	12-Jun	39.4	2	12.2
MT0495	127.0**	106.2*			60.5	162.8	12-Jun	41.0	3	12.6
MT0552	113.0				61.6	161.3	10-Jun	37.1	4	13.2
MT0554	110.1				60.4	162.4	11-Jun	43.7	5	11.8
MT0565	107.7				61.1	162.0	11-Jun	41.0	31	12.9
MT0585	111.8				62.7	161.4	10-Jun	39.8	6	12.4
MT0598	109.9				58.9	164.1	13-Jun	43.2	3	11.9
MT1159CL (P, CL)+	96.7	82.4	84.7	85.7	60.6	162.0	11-Jun	38.7	1	12.9
MTCL0477 (CL)	110.5	98.4*			59.7	161.9	11-Jun	39.8	7	12.3
MTCL0537	97.9				60.9	163.7	13-Jun	45.8	4	13.5
MTS04114 (HWW)	117.5*	103.3*			62.1	160.8	10-Jun	38.5	3	12.9
MTS04120	96.5	88.9			61.0	162.1	11-Jun	42.7	5	13.1
MTS0531 (HWW)	117.5*				61.9	161.6	11-Jun	38.3	0	12.7
MTS0532 (HWW)	116.2				61.9	162.2	11-Jun	38.6	1	12.4
R Neeley	94.0	82.0	89.0	98.8	60.2	164.4	13-Jun	42.7	41	12.5
R Norris (P, CL)+	105.6	91.5	96.7		62.4	160.1	9-Jun	42.4	2	12.9
NuDakota (P, HWW)+	115.4	98.8*			62.4	158.4	7-Jun	32.5	1	12.6
NuSky (HWW)	80.6	73.2	80.6	94.5	59.9	163.7	13-Jun	42.6	54	12.3
NuWest (P, HWW)+	93.0	78.7	85.1	93.3	60.3	162.8	12-Jun	42.5	37	11.9
R Promontory ^{1/}	121.6*	107.2*	107.4*	113.5*	64.4**	162.3	11-Jun	41.2	2	11.4
R Pryor (P)+	94.5	87.0	90.2	101.3	59.5	163.4	12-Jun	35.9	18	12.4
Rampart	97.0	88.7	91.2	93.2	61.4	162.1	11-Jun	43.4	0	14.3
Ripper +	112.4	1.0	1.0	1.0	61.9	155.1	4-Jun	34.5	63	12.2
Rocky (P)	107.9	96.8*	99.4	103.1	62.1	161.2	10-Jun	45.1	2	12.7
Tiber	99.8	91.8	92.7	98.6	61.9	164.0	13-Jun	48.2	8	13.9
Vanguard	95.5	85.3	88.6	92.3	61.9	162.1	11-Jun	43.0	3	13.7
WA007976	102.7				60.0	166.2	15-Jun	43.2	0	12.7
Wahoo +	118.7*	105.0*	107.7*	111.3*	60.3	158.9	8-Jun	38.5	8	12.3
Wendy (HWW)+	108.6	94.0			62.8	154.5	4-Jun	34.0	4	13.6
Willow Creek (forage)	62.8	67.6			59.4	173.4	22-Jun	58.4	1	15.5
R Yellowstone +	117.3*	108.3**	109.9**	115.1**	60.6	163.1	12-Jun	40.4	0	12.4
Average	104.5	91.4	94.4	99.5	61.3	161.7	11-Jun	41	11.1	12.8
LSD (0.05)	11.0	13.8	9.3	11.4	0.9	1.7		1.8	11.4	
C.V.	6.1	9.6	6.0	8.0	0.8	0.6		2.6	61	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

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

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

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

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

Cultivar/Line	Grain Yield (bushels/acre)				2007 Data				
	2007	2006-2007	2005-2007	2004-2007	Test weight lb/bu	Heading Date		Plant height in	Protein %
						Julian	Calendar		
		2 yr	3 yr	4 yr					
Alice (HWW)+	83.4				61.7	145.3	25-May	34.2	13.7
BigSky +	84.6	83.9	75.2	59.1	61.3	153.9	3-Jun	43.1	14.6
Bond CL (CL)+	89.2	88.0*	81.7*		62.3	147.0	27-May	35.5	12.5
Bynum (P, CL)+	88.5	90.9*	79.2		61.8	152.7	2-Jun	42.4	13.9
BZ9W02-2051 (P)	99.5*				61.0	154.7	4-Jun	39.7	13.2
R Carter (P)++	86.0	81.6	77.5		61.0	153.6	3-Jun	31.5	13.7
CDC Buteo (P)++	87.9	84.5			63.4**	154.0	3-Jun	41.6	13.3
R CDC Falcon (P)+	88.3	88.4*	83.1*	64.9*	60.8	154.0	3-Jun	33.8	12.9
Darrell +	94.8				61.0	152.3	1-Jun	40.2	13.1
FWW-25 (forage)	53.2				52.5	162.0	11-Jun	55.1	15.5
R Genou +	89.1	86.2	77.4	60.7*	61.3	154.7	4-Jun	41.7	13.2
Hatcher +	86.9	88.3*	84.1*		62.3	146.7	27-May	36.5	12.4
Hawken (P)+	86.4				62.6*	145.0	25-May	32.0	13.7
R Hyalite (P, CL, HWW)+	95.2	90.7*	82.9*		61.7	147.7	28-May	39.8	14.2
R Jagalene (P)+	95.5	93.2*	86.6*	66.1*	63.3*	151.4	31-May	36.5	13.5
Jerry	85.0	80.5	75.2	58.6	60.1	154.7	4-Jun	43.7	13.3
Ledger (P)+	92.7	87.4*	80.3*	61.5*	61.1	155.0	4-Jun	36.1	12.9
R Morgan (P)+	84.6	82.0	77.2	60.3	59.7	154.3	3-Jun	41.9	13.3
MT0419	91.0	85.5			60.5	155.0	4-Jun	35.8	13.4
MT0495	107.5**	95.8**			60.8	154.7	4-Jun	36.9	13.2
MT0552	94.1				60.9	153.3	2-Jun	35.5	14.1
MT0554	94.7				59.5	156.0	5-Jun	42.5	13.1
MT0565	94.5				60.9	155.7	5-Jun	39.8	14.7
MT0585	96.1				61.7	153.3	2-Jun	38.9	13.5
MT0598	97.5				59.4	155.7	5-Jun	42.8	12.8
MT1159CL (P, CL)+	72.0	74.2	68.2	52.2	58.9	154.3	3-Jun	34.3	13.5
MTCL0477 (CL)	99.8*	93.2*			60.7	154.3	3-Jun	40.8	12.6
MTCL0537	86.1				60.7	155.7	5-Jun	45.8	13.9
MTS04114 (HWW)	88.5	87.1*			61.1	153.0	2-Jun	34.5	13.8
MTS04120	93.3	86.2			60.9	156.3	5-Jun	43.9	12.4
MTS0531 (HWW)	103.8*				61.2	153.0	2-Jun	36.5	13.2
MTS0532 (HWW)	92.5				61.6	153.0	2-Jun	36.9	12.6
R Neeley	90.0	81.0	76.6	60.2	60.8	156.7	6-Jun	44.5	13.2
R Norris (P, CL)+	93.1	87.1*	80.3*		62.9*	149.0	29-May	39.6	13.7
NuDakota (P, HWW)+	83.8	83.4			60.4	151.3	31-May	29.4	13.6
NuSky (HWW)	87.2	79.1	73.3	58.0	60.3	153.7	3-Jun	43.5	13.3
NuWest (P, HWW)+	84.0	80.5	75.2	59.8	60.4	154.7	4-Jun	41.8	13.6
R Promontory ^{1/}	91.1	87.8*	82.4*	62.7*	62.6*	154.3	3-Jun	39.4	12.7
R Pryor (P)+	85.6	81.7	80.3*	64.0*	60.1	156.0	5-Jun	34.4	12.4
R Rampart	83.0	80.4	72.7	57.4	60.0	154.7	4-Jun	43.8	14.4
Ripper +	100.2*				62.1	145.3	25-May	34.1	13.3
R Rocky (P)	91.8	84.5	77.9	59.9	62.9*	152.7	2-Jun	42.3	13.2
Tiber	88.6	83.9	75.5	59.8	61.2	156.0	5-Jun	47.1	14.1
Vanguard	87.5	82.8	75.6	58.4	60.9	154.6	4-Jun	45.6	14.3
WA007976	88.8				57.7	158.3	7-Jun	42.5	12.4
R Wahoo +	94.7	93.1*	87.2**	66.4*	59.8	149.3	29-May	37.9	13.5
Wendy (HWW)+	86.1	85.6			62.2	145.7	26-May	30.0	13.9
Willow Creek (forage)	58.8	52.9			58.4	164.4	13-Jun	58.0	15.4
R Yellowstone +	91.3	91.4*	85.6*	67.1**	58.7	155.6	5-Jun	39.1	13.6
Average	89.1	84.8	78.9	60.9	60.8	153.4	2-Jun	39.7	13.5
LSD (0.05)	9.1	9.1	7.5	6.8	1.0	1.4		2.5	
C.V.	6.0	5.3	5.8	7.9	0.9	0.6		3.9	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

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

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

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

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

Cultivar/Line	Grain Yield (bushels/acre)				2007 Data				
	2007	2006-2007	2005-2007	2004-2007	Test weight lb/bu	Heading Date		Plant height in	Protein %
						Julian	Calendar		
		2 yr	3 yr	4 yr					
Alice (HWW)+	75.7				64.0*	157.5	7-Jun	33.1	10.0
BigSky +	62.6	60.8	52.0	51.4	61.8	162.1	11-Jun	44.8	11.7
Bond CL (CL)+	81.7*	71.7*	63.0**		62.5	155.9	5-Jun	38.1	9.7
R Bynum (P, CL)+	66.8	55.1	47.4		63.3	159.4	8-Jun	42.2	10.8
BZ9W02-2051 (P)	86.6**				62.8	162.8	12-Jun	40.3	10.0
R Carter (P)++	75.2	62.2	54.2		63.9*	160.1	9-Jun	35.1	9.9
CDC Buteo (P)++	66.0	57.1			63.8	162.2	11-Jun	43.0	10.8
R CDC Falcon (P)+	74.6	64.2*	55.8	55.7	62.4	162.1	11-Jun	36.7	9.9
Darrell +	72.2				63.0	159.3	8-Jun	40.3	9.9
FWW-25 (forage)	43.4				55.4	166.7	16-Jun	52.3	12.3
R Genou +	72.4	62.2	52.7	52.5	62.9	160.9	10-Jun	42.5	9.5
Hatcher +	80.2*	65.3*	60.4*		62.4	157.6	7-Jun	39.8	8.8
Hawken (P)+	78.2*				64.1*	155.8	5-Jun	35.1	10.0
R Hyalite (P, CL, HWW)+	76.8	61.8	55.1		62.3	159.4	8-Jun	41.4	10.6
R Jagalene (P)+	79.9*	64.5*	57.6*	55.3	64.7**	159.0	8-Jun	40.4	9.4
Jerry	72.4	63.1*	55.0	54.3	60.9	162.9	12-Jun	46.8	10.2
R Ledger (P)+	75.2	64.3*	56.3*	55.9	62.9	160.7	10-Jun	39.4	9.7
R Morgan (P)+	68.9	62.1	53.9	53.4	60.7	164.8	14-Jun	42.0	10.9
MT0419	69.5	63.4*			60.7	161.9	11-Jun	38.0	9.4
MT0495	79.6*	70.8*			60.3	162.1	11-Jun	39.8	9.4
MT0552	78.2*				61.4	160.4	9-Jun	37.0	10.2
MT0554	74.5				60.9	164.3	13-Jun	43.0	9.7
MT0565	74.6				61.2	162.0	11-Jun	40.8	9.8
MT0585	75.8				63.1	159.5	9-Jun	38.8	10.5
MT0598	77.4				60.0	163.3	12-Jun	42.5	9.5
MT1159CL (P, CL)+	66.3	56.0	48.5	48.4	59.0	162.3	11-Jun	40.7	10.4
MTCL0477 (CL)	78.0	73.3**			59.7	161.7	11-Jun	41.9	9.0
MTCL0537	64.1				61.4	163.0	12-Jun	45.4	11.3
MTS04114 (HWW)	68.4	59.2			63.2	159.5	9-Jun	37.1	9.3
MTS04120	69.2	59.9			62.5	162.3	11-Jun	45.4	9.2
MTS0531 (HWW)	82.4*				62.7	160.4	9-Jun	40.1	9.1
MTS0532 (HWW)	77.0				63.2	161.4	10-Jun	39.9	9.1
R Neeley	72.0	68.1*	57.1*	56.2	61.8	164.0	13-Jun	43.6	9.7
R Norris (P, CL)+	75.2	63.9*	56.1*		63.3	157.8	7-Jun	43.0	9.7
NuDakota (P, HWW)+	70.0	61.0			63.0	157.8	7-Jun	33.7	9.3
NuSky (HWW)	71.0	64.4*	55.6	55.0	61.0	163.9	13-Jun	40.7	10.0
NuWest (P, HWW)+	73.3	64.4*	55.8	53.4	60.8	163.0	12-Jun	41.9	9.9
R Promontory ^{1/}	79.0*	67.1*	59.0*	58.6*	63.6	160.9	1-Jun	40.0	9.7
R Pryor (P)+	74.2	67.8*	59.4*	59.3*	60.8	162.6	12-Jun	37.5	8.6
R Rampart	60.4	52.7	46.7	46.5	61.2	161.6	11-Jun	44.0	11.1
Ripper +	75.9				63.6	155.1	4-Jun	35.8	9.1
R Rocky (P)	76.0	65.0*	55.9	54.6	62.8	159.1	8-Jun	46.0	9.5
Tiber	61.5	58.6	50.7	50.5	62.1	162.7	12-Jun	45.5	10.2
R Vanguard	69.2	58.8	49.9	48.3	62.6	160.9	10-Jun	44.9	10.9
WA007976	69.6				59.3	166.4	15-Jun	42.0	10.1
R Wahoo +	83.8*	66.6*	58.5*	56.1	61.2	157.7	7-Jun	38.6	9.4
Wendy (HWW)+	64.0	54.1			64.3*	156.6	6-Jun	33.2	10.5
Willow Creek (forage)	48.2	47.0			59.9	172.6	22-Jun	51.2	11.7
R Yellowstone +	80.6*	70.3*	62.3*	61.8**	60.1	163.7	13-Jun	42.8	9.5
Average	72.4	62.5	55.2	54.1	61.9	161.2	10-Jun	41.0	10.0
LSD (0.05)	8.5	10.7	7.1	5.4	0.9	1.6		3.0	
C.V.	6.8	8.4	7.8	7.1	0.7	0.6		4.6	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

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

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

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

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

Cultivar/Line	Grain Yield (bushels/acre)				2007 Data				
	2007	2006-2007	2005-2007	2004-2007	Test weight lb/bu	Heading Date		Plant height in	Protein %
						Julian	Calendar		
		2 yr	3 yr	4 yr					
Alice (HWW)+	60.5				62.0	155	4-Jun	29	13.7
BigSky +	50.2	62.9	69.6	71.8	60.1	160	9-Jun	37	13.4
Bond CL (CL)+	60.5	74.5*	78.8*		62.5	154	3-Jun	35	11.7
R Bynum (P, CL)+	47.5	59.2	64.2		60.1	159	8-Jun	33	13.8
BZ9W02-2051 (P)	59.9				61.5	163	12-Jun	31	12.3
R Carter (P)++	60.9*	65.2*	70.7		62.6	160	9-Jun	30	13.1
CDC Buteo (P)++	48.7	58.0			63.9	159	8-Jun	35	12.7
R CDC Falcon (P)+	60.9*	70.7*	75.2*	74.4*	62.0	159	8-Jun	32	12.3
Darrell +	62.3*				62.0	157	6-Jun	33	12.8
FWW-25 (forage)	36.0				53.4	166	15-Jun	40	13.9
R Genou +	56.8	66.9*	73.3	72.4	60.1	159	8-Jun	35	12.8
Hatcher +	52.6	67.2*	77.5*		63.1	156	5-Jun	30	11.5
Hawken (P)+	56.6				62.6	153	2-Jun	30	12.8
R Hyalite (P, CL, HWW)+	51.0	66.8*	73.0		59.4	157	6-Jun	36	13.7
R Jagalene (P)+	56.1	63.2	69.7	69.5	64.7	156	5-Jun	32	12.6
Jerry	53.4	53.8	61.7	64.0	60.0	161	10-Jun	36	12.8
R Ledger (P)+	59.7	68.9*	74.0	74.8*	63.2	160	9-Jun	30	12.1
R Morgan (P)+	54.8	57.5	66.1	66.9	61.1	163	12-Jun	34	13.2
MT0419	60.3	72.6*			61.2	163	12-Jun	34	12.9
MT0495	60.3	72.9*			60.0	161	10-Jun	34	12.7
MT0552	62.0*				61.1	159	8-Jun	34	13.1
MT0554	59.2				60.3	161	10-Jun	37	12.3
MT0565	55.1				59.0	160	9-Jun	32	13.6
MT0585	63.8*				62.5	158	7-Jun	33	12.5
MT0598	53.2				57.2	163	12-Jun	34	12.4
MT1159CL (P, CL)+	50.7	60.7	64.0	63.1	60.2	162	11-Jun	33	12.5
MTCL0477 (CL)	59.4	71.0*			57.7	160	9-Jun	33	12.6
MTCL0537	55.6				60.8	161	10-Jun	34	12.9
MTS04114 (HWW)	60.8	66.9*			62.1	158	7-Jun	34	13.0
MTS04120	52.3	65.1*			59.9	163	12-Jun	34	12.9
MTS0531 (HWW)	60.0				62.1	160	9-Jun	30	12.6
MTS0532 (HWW)	66.0*				61.3	158	7-Jun	29	12.9
R Neeley	51.9	64.2	70.3	70.6	59.1	164	13-Jun	33	12.6
Norris (P, CL)+	59.7	71.9*	78.1*		61.7	156	5-Jun	31	12.6
NuDakota (P, HWW)+	56.9	69.0*			61.3	156	5-Jun	29	12.7
NuSky (HWW)	49.1	57.4	66.5	67.3	59.9	162	11-Jun	35	13.1
NuWest (P, HWW)+	52.1	58.8	67.1	68.6	60.8	160	9-Jun	33	12.8
Promontory ^{1/}	49.3	62.8	72.4	71.3	62.3	161	10-Jun	33	11.7
R Pryor (P)+	65.1*	74.9**	82.2**	79.4**	63.2	161	10-Jun	31	11.5
R Rampart	49.6	60.4	63.5	63.4	60.0	161	10-Jun	33	13.7
Ripper +	67.5**				61.8	154	3-Jun	30	12.5
R Rocky (P)	60.1	68.3*	73.8	74.4*	63.5	158	7-Jun	37	12.1
Tiber	52.2	60.8	67.0	66.5	61.3	162	11-Jun	36	13.2
R Vanguard	52.2	60.1	64.1	64.5	60.7	160	9-Jun	33	13.4
WA007976	57.2				58.9	164	13-Jun	31	12.5
Wahoo +	61.6*	71.0*	76.9*	75.5*	60.6	155	4-Jun	35	12.7
Wendy (HWW)+	56.5	63.8			62.5	154	3-Jun	28	13.7
Willow Creek (forage)	42.3	46.2			59.6	170	19-Jun	43	14.8
R Yellowstone +	58.9	71.3*	78.3*	76.6*	61.2	163	12-Jun	34	12.6
Average	56.1	64.8	71.1	70.3	61.0	159.7	10-Jun	33.2	12.8
LSD (0.05)	6.6	10.1	8.0	6.5					
C.V.	6.8	7.6	6.8	6.5					

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

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

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

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

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

					2007 Data					
Cultivar/Line	Grain Yield (bushels/acre)				Test weight	Heading Date		Plant height	Sawfly cutting	Protein %
	2007	2006-2007	2005-2007	2004-2007		Julian	Calendar			
		2 yr	3 yr	4 yr	lb/bu			in	%	
Alice (HWW)+	56.2				61.6*	153.6	3-Jun	28.6	10	13.9
BigSky +	51.6	54.3	52.1	55.7	59.1	158.6	8-Jun	37.3	17	15.8
Bond CL (CL)+	55.2	56.2	62.2		60.5	153.1	2-Jun	33.1	28	12.5
R Bynum (P, CL)+	53.9	58.2	55.8		60.1	158.1	7-Jun	33.3	3	14.9
BZ9W02-2051 (P)	62.3				60.0	159.2	8-Jun	32.2	38	14.0
R Carter (P)++	56.6	54.5	56.6		59.3	158.0	7-Jun	28.5	14	15.2
CDC Buteo (P)++	54.1	57.5			61.2*	158.9	8-Jun	35.1	43	14.3
R CDC Falcon (P)+	60.1	59.4	60.8	63.4**	59.1	157.5	7-Jun	29.5	28	14.2
Darrell +	59.4				60.0	155.9	5-Jun	32.0	43	14.0
FWW-25 (forage)	30.3				54.7	163.2	12-Jun	44.5	45	15.3
R Genou +	56.7	55.3	57.7	60.4*	59.4	158.4	7-Jun	35.7	8	14.8
Hatcher +	60.2	59.6	58.4		60.7	154.9	4-Jun	30.4	40	12.5
Hawken (P)+	54.8				61.4*	151.6	1-Jun	29.9	20	13.7
R Hyalite (P, CL, HWW)+	54.8	54.6	54.1		60.6	155.2	4-Jun	35.3	34	14.6
R Jagalene (P)+	55.9	52.9	55.1	58.3*	62.0**	155.7	5-Jun	30.8	23	14.2
Jerry	53.8	54.8	53.1	55.6	58.6	159.7	9-Jun	34.9	46	14.5
R Ledger (P)+	61.1	59.0	60.8	62.5*	60.9	159.0	8-Jun	30.6	16	13.4
R Morgan (P)+	50.5	53.0	50.8	53.1	58.2	161.3	10-Jun	35.5	33	14.8
MT0419	53.2	56.3			59.3	159.4	8-Jun	33.7	46	14.2
MT0495	64.1	57.9			58.7	158.4	7-Jun	32.8	30	14.6
MT0552	64.7				60.0	156.4	5-Jun	32.3	12	14.6
MT0554	54.8				57.4	159.1	8-Jun	34.7	15	14.6
MT0565	62.6				59.4	160.4	9-Jun	35.1	26	15.3
MT0585	56.5				60.8	157.0	6-Jun	33.2	9	13.6
MT0598	47.0				57.0	160.1	9-Jun	35.7	31	14.1
MT1159CL (P, CL)+	56.5	52.6	51.1	53.4	58.5	159.9	9-Jun	30.1	5	14.0
MTCL0477 (CL)	57.2	51.3			57.7	159.2	8-Jun	34.8	41	14.4
MTCL0537	51.3				60.0	159.9	9-Jun	35.2	26	14.7
MTS04114 (HWW)	55.2	56.9			60.2	157.9	7-Jun	31.9	8	14.5
MTS04120	55.4	56.0			59.8	158.8	8-Jun	34.5	8	14.6
MTS0531 (HWW)	70.9*				60.5	157.3	6-Jun	31.7	0	14.0
MTS0532 (HWW)	61.5				60.4	157.9	7-Jun	31.1	3	14.1
R Neeley	51.2	53.8	52.8	56.0	59.0	160.1	9-Jun	33.0	28	14.4
Norris (P, CL)+	56.2	52.3	54.7		61.3*	154.0	3-Jun	34.8	24	13.9
NuDakota (P, HWW)+	58.5	59.4			59.4	156.1	5-Jun	28.1	21	13.4
NuSky (HWW)	53.6	55.3	53.3	55.7	59.6	159.7	9-Jun	34.4	57	14.6
NuWest (P, HWW)+	47.2	52.2	53.7	56.2	59.5	159.0	8-Jun	34.9	48	14.8
Promontory ^{1/}	50.9	47.8	47.2	51.7	61.1*	157.6	7-Jun	33.9	57	13.8
R Pryor (P)+	48.8	51.6	55.8	60.6*	57.7	161.6	11-Jun	30.0	30	14.9
R Rampart	55.0	53.5	55.4	57.4*	58.5	159.2	8-Jun	33.9	0	15.5
Ripper +	74.5**				60.2	151.5	1-Jun	30.4	34	14.2
R Rocky (P)	50.6	51.2	54.1	59.1*	61.0	156.5	6-Jun	37.3	23	13.8
Tiber	50.7	56.0	53.3	55.7	60.0	159.7	9-Jun	36.9	42	15.0
R Vanguard	57.7	55.2	57.6	58.6*	59.8	160.0	9-Jun	36.6	8	15.0
WA007976	51.4				57.5	162.1	11-Jun	33.2	39	14.8
Wahoo +	54.6	54.3	54.8	58.8*	58.4	156.1	5-Jun	33.8	34	13.7
Wendy (HWW)+	62.5	60.9			61.5*	153.7	3-Jun	27.1	21	14.4
Willow Creek (forage)	42.2	46.6			58.8	167.6	17-Jun	42.5	54	16.2
R Yellowstone +	57.4	58.0	58.4	61.4*	58.6	160.0	9-Jun	33.1	40	14.9
Average	54.8	54.9	55.2	57.5	59.6	158.1	7-Jun	33.4	26.7	14.4
LSD (0.05)	8.0	ns	ns	6.0	1.0	1.6		2.6	19.5	
C.V.	8.3	7.7	8.7	7.4	0.9	0.6		4.5	42.1	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

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

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

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

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

Cultivar/Line	Grain Yield (bushels/acre)				2007 Data				
	2007	2006-2007	2005-2007	2004-2007	Test weight lb/bu	Heading Date		Plant height in	Protein %
						Julian	Calendar		
		2 yr	3 yr	4 yr					
Alice (HWW)+	70.1*				62.1*	155.4	4-Jun	28.2	10.4
BigSky +	59.2	55.2	52.9	53.4	61.6*	163.7	13-Jun	37.8	12.2
Bond CL (CL)+	54.7	51.3	47.6		58.6	159.9	9-Jun	34.2	12.3
Bynum (P, CL)+	55.1	49.3	42.9		60.6	161.1	10-Jun	38.5	11.4
BZ9W02-2051 (P)	64.8*				61.0	164.0	13-Jun	34.2	12.1
R Carter (P)++	71.3*	57.1*	54.3		61.4*	162.4	11-Jun	32.9	11.7
CDC Buteo (P)++	63.2	60.8*			62.3*	162.3	11-Jun	36.0	11.0
R CDC Falcon (P)+	71.1*	66.4**	61.5*	60.3*	60.4	161.7	11-Jun	31.2	11.1
Darrell +	63.9*				61.4*	159.7	9-Jun	34.8	10.2
FWW-25 (forage)	32.6				56.0	170.3	19-Jun	48.1	15.0
Genou +	55.1	53.8	49.5	49.3	58.8	162.6	12-Jun	38.1	13.6
Hatcher +	54.5	48.9	47.1		61.5*	160.0	9-Jun	29.4	9.9
Hawken (P)+	65.9*				61.2*	157.0	6-Jun	27.7	11.5
Hyalite (P, CL, HWW)+	57.0	55.1	51.3		60.5	163.0	12-Jun	36.0	12.8
Jagalene (P)+	60.7	54.3	51.8	49.9	62.1*	160.0	9-Jun	31.3	11.5
R Jerry	71.5**	64.7*	61.8**	60.9*	59.9	163.0	12-Jun	38.9	13.3
Ledger (P)+	64.4*	56.3	50.4	48.9	60.8	161.7	11-Jun	31.8	10.4
R Morgan (P)+	65.3*	62.2*	58.5*	58.2*	59.8	164.3	13-Jun	37.8	11.8
MT0419	63.9*	57.4*			60.5	162.7	12-Jun	33.8	11.3
MT0495	66.3*	61.5*			59.0	162.0	11-Jun	35.4	12.1
MT0552	71.3*				61.1	159.7	9-Jun	34.0	12.4
MT0554	59.4				59.5	164.0	13-Jun	39.1	12.5
MT0565	64.0*				60.6	165.0	14-Jun	36.8	12.7
MT0585	61.1				59.6	161.4	10-Jun	34.3	12.4
MT0598	57.3				58.4	163.7	13-Jun	35.3	12.3
MT1159CL (P, CL)+	46.1	43.9	35.9	38.0	58.1	164.7	14-Jun	33.3	13.0
MTCL0477 (CL)	62.2	61.2*			59.7	163.7	13-Jun	34.7	9.9
MTCL0537	56.3				60.1	164.3	13-Jun	40.3	11.2
MTS04114 (HWW)	61.0	55.6			60.4	161.6	11-Jun	35.1	11.7
MTS04120	61.9	54.9			60.9	164.0	13-Jun	37.5	12.3
MTS0531 (HWW)	65.4*				61.1	161.7	11-Jun	31.8	11.9
MTS0532 (HWW)	67.0*				60.3	162.0	11-Jun	33.5	11.4
Neeley	55.2	55.5	52.6	54.0	60.2	164.3	13-Jun	37.6	10.7
Norris (P, CL)+	60.7	56.4	52.4		60.4	158.0	7-Jun	38.5	12.6
NuDakota (P, HWW)+	66.1*	58.5*			59.3	160.7	10-Jun	29.0	12.9
NuSky (HWW)	50.5	53.9	53.0	52.9	60.2	164.7	14-Jun	36.5	10.9
NuWest (P, HWW)+	53.6	53.3	52.3	53.3	59.7	164.3	13-Jun	36.6	11.9
Promontory ^{1/}	59.1	55.4	50.0	52.0	61.7*	159.7	9-Jun	33.5	10.5
R Pryor (P)+	59.7	58.8*	58.2*	60.8*	59.1	165.0	14-Jun	31.9	11.3
Rampart	53.5	49.4	46.2	46.7	60.5	162.0	11-Jun	37.5	13.3
Ripper +	70.8*				59.2	157.4	6-Jun	29.9	10.4
Rocky (P)	59.2	55.2	52.6	54.4	60.5	160.3	9-Jun	41.7	12.4
Tiber	54.9	52.2	47.0	49.2	60.4	164.0	13-Jun	42.0	12.7
Vanguard	56.2	52.4	47.1	45.8	60.6	163.0	12-Jun	38.6	13.6
WA007976	57.0				58.7	165.0	14-Jun	34.8	12.9
Wahoo +	67.2*	62.7*	59.8*	58.4*	59.0	160.0	9-Jun	33.2	11.3
Wendy (HWW)+	65.4*	56.2			62.5**	154.0	3-Jun	28.6	11.1
Willow Creek (forage)	38.3	42.6			59.1	174.7	24-Jun	49.4	14.9
Yellowstone +	69.3*	63.1*	59.6*	61.7**	59.2	163.0	12-Jun	34.7	11.9
Average	60.4	55.7	51.8	53.1	60.2	162.3	11-Jun	35.4	11.9
LSD (0.05)	7.8	10.0	7.4	6.5	1.4	1.3		2.6	
C.V.	7.6	8.8	8.7	8.7	1.3	0.5		4.4	

** = indicates highest yielding variety within a column CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

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

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

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

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

					2007 Data					
Cultivar/Line	Grain Yield (bushels/acre)				Test weight	Winter survival	Heading Date		Plant height	Protein %
	2007	2006-2007	2005-2007	2004-2007			Julian	Calendar		
	2 yr		3 yr	4 yr	lb/bu	%			in	
Alice (HWW)+	68.5				60.6*	51.7	154.0	3-Jun	26.4	12.6
BigSky +	66.0	50.5	52.5	48.2	60.6*	71.7	156.7	6-Jun	36.6	15.0
Bond CL (CL)+	48.1	38.5	43.8		58.1	28.3	153.3	2-Jun	31.4	12.4
Bynum (P, CL)+	49.5	37.3	41.7		60.5*	35.0	161.0	10-Jun	33.5	14.6
BZ9W02-2051 (P)	72.8*				60.5*	66.7	159.7	9-Jun	32.5	13.1
R Carter (P)++	66.2	47.7	52.5		58.7	61.7	159.3	8-Jun	29.0	14.8
CDC Buteo (P)++	69.3*	54.7*			61.5**	78.3*	156.7	6-Jun	35.4	13.6
R CDC Falcon (P)+	74.9*	55.8*	59.0*	53.5	58.3	75.0	156.0	5-Jun	28.8	13.9
Darrell +	78.3**				59.8	73.3	154.3	3-Jun	32.0	13.7
FWW-25 (forage)	50.2				56.0	71.7	163.7	13-Jun	49.1	15.3
Genou +	57.4	41.7	46.2	42.6	59.7	58.3	158.0	7-Jun	34.0	14.6
Hatcher +	53.5	40.7	45.5		60.8*	28.3	155.3	4-Jun	28.6	12.6
Hawken (P)+	64.2				59.6	58.3	154.0	3-Jun	38.6	13.4
Hyalite (P, CL, HWW)+	64.7	49.5	52.7		58.9	58.3	155.7	5-Jun	33.2	14.4
Jagalene (P)+	60.6	48.3	52.6	45.8	59.9	51.7	155.3	4-Jun	30.2	13.6
R Jerry	76.1*	59.8**	63.6**	60.0*	58.9	86.7*	158.0	7-Jun	35.7	14.0
Ledger (P)+	58.7	44.5	47.9	42.8	59.7	50.0	160.7	10-Jun	29.6	13.4
R Morgan (P)+	77.5*	59.0*	63.1*	60.9**	59.4	90.0**	158.3	7-Jun	35.3	13.3
MT0419	66.8	50.2			58.5	50.0	159.3	8-Jun	31.4	14.1
MT0495	77.3*	59.2*			56.9	78.3*	157.0	6-Jun	32.2	14.3
MT0552	77.7*				59.7	76.7*	154.3	3-Jun	30.3	14.0
MT0554	37.6				58.0	18.7	160.0	9-Jun	31.0	14.3
MT0565	71.3*				59.3	71.7	157.3	6-Jun	31.6	14.8
MT0585	58.1				59.2	61.7	158.7	8-Jun	32.7	13.7
MT0598	58.3				55.2	61.7	159.7	9-Jun	33.6	14.8
MT1159CL (P, CL)+	25.0	20.5	28.8	27.5	53.7	6.7	161.7	11-Jun	30.0	13.9
MTCL0477 (CL)	70.8*	55.3*			57.5	75.0	158.3	7-Jun	32.8	13.9
MTCL0537	62.5				59.8	61.7	160.3	9-Jun	36.2	14.6
MTS04114 (HWW)	68.1	51.6*			59.3	70.0	157.3	6-Jun	31.4	14.5
MTS04120	63.2	47.1			61.3*	53.3	160.0	9-Jun	34.4	13.6
MTS0531 (HWW)	69.4*				59.1	66.7	157.3	6-Jun	30.0	14.3
MTS0532 (HWW)	74.6*				59.9	73.3	156.3	5-Jun	30.8	13.9
Neeley	63.4	46.5	50.3	47.8	60.3*	63.3	160.3	9-Jun	34.1	13.9
Norris (P, CL)+	65.5	50.2	53.3		60.3*	56.7	153.7	3-Jun	33.1	13.3
NuDakota (P, HWW)+	67.9	49.9			57.9	40.0	157.0	6-Jun	25.7	13.6
NuSky (HWW)	65.8	53.0*	53.6	49.1	58.8	81.7*	160.3	9-Jun	35.0	14.6
NuWest (P, HWW)+	68.5	52.8*	55.2	50.4	59.8	76.7*	159.3	8-Jun	35.4	14.0
Promontory ^{1/}	60.7	46.5	48.3	40.9	60.9*	45.0	158.0	7-Jun	29.3	13.3
R Pryor (P)+	64.7	48.5	53.2	48.8	58.4	70.0	161.0	10-Jun	31.1	13.9
Rampart	51.1	37.9	43.0	37.3	59.5	40.0	161.0	10-Jun	32.5	15.3
Ripper +	46.9				58.3	18.3	155.7	5-Jun	26.3	13.5
Rocky (P)	68.8	54.2*	56.2	48.6	60.9*	63.3	157.0	6-Jun	35.9	13.3
Tiber	62.0	48.2	50.9	48.1	60.7*	70.0	160.7	10-Jun	38.7	14.9
Vanguard	56.8	42.2	46.5	43.2	59.5	48.3	160.3	9-Jun	35.2	15.2
WA007976	52.3				57.3	25.0	164.3	13-Jun	33.3	14.9
Wahoo +	70.4*	54.8*	58.4*	53.6	58.1	61.7	154.3	3-Jun	30.2	13.3
Wendy (HWW)+	74.7*	56.4*			61.4*	70.0	150.7	31-May	25.6	13.1
Willow Creek (forage)	46.2	38.9			59.6	78.3*	169.3	18-Jun	46.6	16.2
Yellowstone +	71.2*	54.6*	59.1*	54.2*	58.8	60.0	158.0	7-Jun	31.6	14.3
Average	63.1	48.4	51.1	47.5	59.2	59.0	158.1	7-Jun	32.6	14.0
LSD (0.05)	9.2	8.9	6.5	6.8	1.2	13.8	1.9		2.3	
C.V.	9.0	9.0	7.8	10.1	1.0	14.5	0.7		4.3	

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

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

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

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

Table 11. Yield in Winter-Kill Environments, 2003-2007: Combined Locations Winter Survival and associated Yield
Locations: Williston (2003-2007), Sidney (2003-2006), Conrad and Moccasin in 2004 = 11 locations

Cultivar/Line	Winter Survival (%)					Yield under Winterkill				
	2007	2006-2007	2005-2007	2004-2007	2003-2007	2007	2006-2007	2005-2007	2004-2007	2003-2007
location-years	1	3	5	9	11	1	3	5	9	11
Alice (HWW)+	51.7					68.5				
BigSky +	71.7	62.5	71.6	62.9*	62.5	66.0	50.7	51.4	52.8	54.2
Bond CL (CL)+	28.3	37.3	48.9			48.1	41.6	43.9		
Bynum (P, CL)+	35.0	37.6	44.9			49.5	39.4	39.7		
BZ9W02-2051 (P)	66.7					72.8*				
Carter (P)++	61.7	50.6	62.7			66.2	46.1	49.8		
CDC Buteo (P)++	78.3*	68.9*				69.3*	55.9*			
CDC Falcon (P)+	75.0	67.0*	74.8*	65.1*	65.1	74.9*	57.7*	58.1*	56.8*	58.0*
Darrell +	73.3					78.3**				
FWW-25 (forage)	71.7					50.2				
Genou +	58.3	52.1	61.8	54.9	54.2	57.4	45.3	46.4	48.3	50.4
Hatcher +	28.3	31.6	44.5			53.5	41.5	44.6		
Hawken (P)+	58.3					64.2				
Hyalite (P, CL, HWW)+	58.3	55.9	64.5			64.7	50.7	51.0		
Jagalene (P)+	51.7	54.7	63.6	56.0	54.3	60.6	48.1	50.5	48.8	50.6
Jerry	86.7*	74.0*	80.6*	68.7*	68.8*	76.1*	59.1*	60.9**	59.5**	60.3*
Ledger (P)+	50.0	46.6	55.6	51.3	49.5	58.7	45.7	46.1	48.2	48.8
Morgan (P)+	90.0**	75.7**	81.9**	69.8**	70.8**	77.5*	59.1**	59.9*	59.1*	61.1*
MT0419	50.0	53.3				66.8	50.4			
MT0495	78.3*	67.6*				77.3*	58.4*			
MT0552	76.7*					77.7*				
MT0554	18.7					37.6				
MT0565	71.7					71.3*				
MT0585	61.7					58.1				
MT0598	61.7					58.3				
MT1159CL (P, CL)+	6.7	17.9	24.5	30.6		25.0	27.6	29.6	36.0	
MTCL0477 (CL)	75.0	66.3*				70.8*	56.9*			
MTCL0537	61.7					62.5				
MTS04114 (HWW)	70.0	59.2				68.1	51.1			
MTS04120	53.3	46.7				63.2	47.3			
MTS0531 (HWW)	66.7					69.4*				
MTS0532 (HWW)	73.3					74.6*				
Neeley	63.3	52.2	60.1	55.5	56.2	63.4	49.6	50.7	53.0	55.9
Norris (P, CL)+	56.7	57.6	65.0			65.5	50.9	51.3		
NuDakota (P, HWW)+	40.0	44.4				67.9	50.2			
NuSky (HWW)	81.7*	69.5*	76.9*	63.4*	63.8	65.8	54.4*	53.9	53.4	55.7
NuWest (P, HWW)+	76.7*	61.7	73.3*	61.5	61.8	68.5	52.9*	53.8	53.3	54.7
Promontory ^{1/}	45.0	49.5	53.4	48.3	50.3	60.7	48.2	47.2	48.6	52.3
Pryor (P)+	70.0	58.6	68.4	60.1	57.9	64.7	51.6	54.9	56.5*	58.1*
Rampart	40.0	38.3	48.6	46.1	44.1	51.1	40.3	42.8	43.5	44.5
Ripper +	18.3					46.9				
Rocky (P)	63.3	60.9	70.0	61.4	61.4	68.8	53.1*	53.4	53.3	55.2
Tiber	70.0	61.2	67.0	59.5	60.2	62.0	48.6	47.7	49.9	51.9
Vanguard	48.3	46.0	55.1	50.8	49.1	56.8	44.3	44.9	45.5	46.9
WA007976	25.0					52.3				
Wahoo +	61.7	64.7*	71.8	64.5*	63.9	70.4*	56.0*	57.5*	55.6*	57.1
Wendy (HWW)+	70.0	64.2				74.7*	53.2*			
Willow Creek (forage)	78.3*	73.3*				46.2	41.5			
Yellowstone +	60.0	60.1	69.7	60.3	61.5	71.2*	55.3*	57.3*	58.4*	61.5**
Average	59.0	55.5	62.4	57.4	58.3	63.1	49.5	49.9	51.6	54.3
LSD (0.05)	13.8	11.3	9.2	7.3	5.6	9.2	7.2	4.9	4.7	3.7
C.V.	14.5	12.4	11.8	13.7	11.3	9.0	8.9	7.8	9.7	8.2

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

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

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

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

Table 12. HARD WINTER WHEAT: Yield Performance under Sawfly Pressure and % Sawfly Cutting (2003-2007)

Cultivar/Line	Grain Yield (bu/a)								Sawfly Cutting (%)								8 LOC Aver- age
	N. Havre NARC 2003	Havre 2004	Havre 2005	N. Havre NARC 2005	Havre 2006	N. Havre NARC 2006	Havre 2007	N. Havre NARC 2007	N. Havre NARC 2003	Havre 2004	Havre 2005	N. Havre NARC 2005	Havre 2006	N. Havre NARC 2006	Havre 2007	N. Havre NARC 2007	
BigSky +	45.9	66.4	47.7	32.8	57.0	33.2	51.6	56.8	63.3	6.7	27.3	40.0	42.3	40.0	16.9	30.0	33.3
sf Bynum (P, CL)+			51.0	33.8	62.5	28.7	53.9	51.7			20.5	16.7	9.0	5.3	2.5	23.3	
CDC Falcon (P)+	54.1	71.0	63.7	31.4	58.6	34.8	60.1	53.6	43.3	9.0	30.5	48.3	26.9	53.3	28.2	50.0	32.2
sf Genou +	55.0	68.4	62.7	36.9	53.8	40.1	56.7	63.3	8.3	3.6	17.9	8.3	8.3	3.7	7.9	20.0	14.8*
Hyalite (P,CL, HWW)+			53.0	34.4	54.4	31.4	54.8	50.7			38.5	76.7	26.9	36.7	34.0	55.0	
Jagalene (P)+		67.7	59.5	32.9	49.9	30.6	55.9	53.2		9.8	45.4	50.0	22.0	33.3	22.5	76.7	
Jerry	61.4	63.0	49.8	34.3	55.8	27.4	53.8	55.2	61.7	8.8	41.5	88.3	20.0	38.3	45.7	68.3	41.8
Ledger (P)+		67.6	64.5		56.8	33.5	61.1	58.6		8.8	26.4		37.0	25.0	15.5	65.0	
Morgan (P)+	56.4	59.8	46.4	35.3	55.5	34.6	50.5	54.5	56.7	7.1	47.7	80.0	35.1	51.7	33.4	41.7	45.2
MT0495					54.4		64.1	59.0					19.0		30.1	71.7	
MTCL0477					61.3		57.2	52.2					35.3		40.9	81.7	
sf MTS04114 (HWW)					51.9		55.2	64.8					5.2		8.0	31.7	
sf MTS04120					51.8		55.4	61.2					8.5		7.6	16.7	
Neeley	59.2	65.5	50.9	31.4	56.4	34.2	51.2	50.1	13.3	8.8	49.2	51.7	37.3	45.0	28.2	91.7	44.4
Norris (P, CL)+			59.5	35.8	48.3	40.5	56.2	52.1			24.6	81.7	12.0	35.0	24.4	46.7	
NuSky (HWW)	55.9	63.0	49.3	30.5	57.0	39.7	53.6	52.4	90.0	9.0	38.5	81.7	32.1	65.0	57.2	70.0	55.4
Promontory 1/																	
Pryor (P)+	56.2	65.1	45.9	37.2	44.8	29.4	50.9	59.3	81.7	13.4	46.0	80.0	28.5	40.0	56.9	78.3	53.1
sf Rampart	48.6	74.7	64.3	31.6	54.4	33.3	48.8	54.6	58.3	4.0	10.0	43.3	17.7	35.0	30.2	43.3	30.2
Rocky (P)	54.8	63.3	59.2	35.9	51.9	34.0	55.0	53.9	3.3	2.9	7.7	6.7	2.7	3.7	0.0	11.7	4.8**
Tiber	51.7	74.2	59.8	35.8	51.8	35.8	50.6	54.0	23.3	9.7	29.1	35.0	11.8	15.0	23.0	56.7	25.5
sf Vanguard	45.0	62.7	48.0	34.5	61.3	34.0	50.7	52.6	31.7	6.5	30.6	70.0	18.5	40.0	42.0	78.3	39.7
Wahoo +	46.8	61.4	62.3	38.2	52.8	36.5	57.7	57.1	8.3	0.1	13.3	8.3	13.5	6.7	8.2	18.3	9.6*
Yellowstone +	58.8	70.4	59.2	35.5	58.5	40.1	57.4	53.4		3.9	28.7	46.7	14.1	33.3	33.6	56.7	48.4
Average	52.6	66.9	55.0	33.7	55.1	33.6	54.9	55.7	46.3	7.7	32.3	53.9	24.0	34.2	26.6	52.7	34.1
LSD (0.05)																	14.0
C.V. (%)																	41.4

** = 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
 1/ = Dwarf Smut Resistant; (HWW) = Hard White Winter Wheat
 sf = solid-stemmed sawfly resistant variety

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

Variety	Agronomic Characters						Cereal Quality			Disease Reactions ^{8/}			
	Maturity ^{1/}	Chaff Color	Winter Survival ^{2/}	Straw Strength ^{3/}	Stem solid ^{4/}	Coleoptile length ^{5/}	Milling ^{6/}	Baking ^{6/}	PPO ^{7/}	Dwarf Smut	Stripe Rust	Stem Rust	Leaf Spot Complex
Alice	E	White	-	-		S	-	-	-	S	MR	-	R
BigSky	M	White	4	S		M	4	3	M	S	VS	R	MR
Bond CL	E	White	2	S		M	2	2	M	S	VS	S	S
Bynum	M	Brown	2	M	20	L	5	4	M	S	R	M	R
Carter	M	White	3	S	15	S	4	5	M	S	MR	R	R
CDC Buteo	M	White	4	-		M	3	3	M	S	S	-	S
CDC Falcon	M	White	4	S		S	3	3	H	S	VS	MR	R
Darrell	M-E	White	-	-		M	-	-	-	S	MS	-	MR
Genou	M	White	2	MS	19	M	4	4	H	S	VS	S	S
Hatcher	E	White	2	S		M	2	1	H	S	MR	R	MR
Hawken	VE	White	-	-		S	-	-	-	S	R	-	MR
Hyalite	E	White	3	S		S	3	3	L	S	VS	R	S
Jagalene	E	White	2	S		M	4	3	H	S	R	R	MR
Jerry	M	White	5	MS		M	3	3	H	S	MR	R	R
Ledger	M	White	2	S	10	M	5	3	M-H	S	MR	S	VS
Morgan	M-L	White	5	MS		S	3	3	-	S	VS	R	MR
MT1159CL	M	Brown	1	S	14	L	4	3	H	S	MR	VS	S
Neeley	M-L	White	3	MS		M	2	3	M	S	VS	S	MR
Norris	E	White	3	S		M	3	3	M	S	S	S	MR
NuDakota	E	White	2	S		S	2	2	M-H	S	R	-	R
NuSky	M	White	4	M		S	3	3	L	S	VS	R	R
NuWest	M	White	4	S		S	3	3	-	S	VS	R	S
Promontory	M	Brown	2	MS		S	4	3	L	R	R	S	VS
Pryor	M	White	3	S		S	3	2	H	S	S	S	MR
Rampart	M	Brown	2	M	22	L	4	5	M	S	R	MR	S
Ripper	E	White	-			M	-	-	-	S	VS	-	R
Rocky	M-E	White	3	MW		M	3	3	-	S	S	R	S
Tiber	M	Brown	3	S		M	3	3	-	S	VS	S	MR
Vanguard	M	White	2	MS	20	L	4	4	-	S	MR	M	S
Wahoo	E	White	4	S		S	2	2	H	S	S	R	MR
Wendy	VE	White	3	-		S	3	3	M	S	R	-	MR
Willow Creek	VL	White	5	W		L	2	1	L	S	R	-	R
Yellowstone	M	White	4	S		S	3	4	M-L	S	R	VS	S

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

(Havre and Conrad data, 2005-2007)

19 and above = solid stem

10 - <19 = semi solid

varieties with no number are

hollow stemmed

8/ R = Resistant

MR = Moderately Resistant

M = Moderate

MS = Moderately Susceptible

S = Susceptible

VS = Very Susceptible

- = no information

Table 13. Precipitation (inches) and Average Monthly Temperature (°F) for Crop Year 2006-2007

Agricultural Research Center	Sept. 2006	Oct. 2006	Nov. 2006	Dec. 2006	Jan. 2006	Feb. 2007	Mar. 2007	Apr. 2007	May 2007	June 2007	July 2007	Aug 2007	Total	
													Average	
Western Triangle, Conrad	1.46	0.64	0.24	0.16	0.06	0.94	0.01	2.16	1.12	1.78	0.05	0.28	8.86	
	56.8	40.6	28.5	29.1	25.8	21.7	39.0	39.8	52.4	60.9	74.4	65.3	44.5	
Northern, Havre	1.16	0.71	0.38	0.37	0.41	0.82	0.76	2.07	2.27	2.06	1.03	0.38	12.42	
	57.7	44.8	28.8	25.9	22.6	17.8	40.1	42.0	55.8	63.7	76.8	69.1	45.4	
Northwestern, Kalispell	1.95	1.10	2.28	0.95	0.39	2.26	0.54	1.62	3.29	1.35	0.75	0.23	16.71	
	53.5	44.0	32.5	24.1	22.1	28.3	37.7	42.7	52.6	59.0	72.0	62.3	44.2	
Central, Moccasin	1.40	2.62	0.04	0.26	0.15	0.82	0.90	1.22	5.55	2.35	0.38	0.98	16.67	
	55.6	41.6	31.1	31.2	25.7	23.3	40.7	39.6	52.3	59.6	74.1	67.2	45.2	
Southern, Huntley	2.53	1.98	0.53	0.47	0.08	0.65	0.87	2.51	4.28	2.10	0.27	0.31	16.58	
	57.3	43.9	33.2	29.4	25.4	25.0	43.6	43.6	56.6	64.1	76.3	69.7	47.3	
Northeastern, Sidney	0.83	0.30	0.14	0.42	0.09	0.73	0.83	0.97	5.22	2.10	1.08	0.43	13.14	
	57.6	45.9	30.0	18.4	12.5	19.8	30.2	44.6	56.1	64.5	70.0	68.7	46.6	
Williston, N. Dakota	1.68	0.43	0.26	0.30	0.08	0.54	0.75	0.18	5.01	2.55	0.98	0.46	13.23	
	57.2	39.4	28.8	21.7	17.5	11.2	36.5	42.8	55.6	65.5	76.2	68.8	43.2	
Post Farm, Bozeman	0.88	2.91	0.44	0.21	0.38	1.19	0.48	2.13	4.98	2.64	0.32	0.61	17.57	
	57.0	44.1	33.7	25.3	21.1	26.7	40.2	42.6	53.9	61.0	74.1	66.6	45.5	

Table 15. List of soft white winter wheat varieties.

Cultivar/ Line	Experimental Designation	Origin	Release Year	Pedigree
Public Varieties				
Eltan	WA7431	Washington	1990	Luke/8/(BR-70443-3, PI167822)/7/(Cltr13438, (Norin 10/Brevor, Sel. 14, Cltr13253)/6/(Sel. 53, Cltr12597, (Turkey Red/Florence// Fortyfold /Federation/4/Oro//Turkey Red/ Florence/3/Oro //Fortyfold/Federation, Sel. 27-15, Cltr12250) /5/Rio/Rex)
Finch	WA7853	Washington	2002	Dusty*2/3/(WA7164, VPM 1/Moisson 951// Yamhill/Hyslop)
Hubbard	ID86-10420A	Idaho	2000	Hill 81/Augusta
Kmor	WA7529	Washington	1990	Luke/10/(VH067375, (Sel. 101, Cltr13438, (Norin 10/Brevor, Sel. 14, Cltr13253)/6/(Sel. 53, (Turkey Red/Florence//Fortyfold/ Federation/4/Oro// Turkey Red/Florence /3/Oro//Fortyfold/ Federation, Sel. 27-15, Cltr12250)/5/Rio/Rex)/9/(Norin 10/Brevor, Sel. 14)/6/Sel. 53/7/Odin/8/(Vogel 1, Cltr13431, (Norin 10/Brevor, Sel.14)/6/(Sel. 50-3, Orfed /5/Fortyfold/Federation/4/Oro//Turkey Red/ Florence/3/Oro//Fortyfold/ Federation)/7/(Sel. 53, see above)/11/Aegilops ventricosa/Trit. persicum//3*Marne/3/Moisson
Lambert	ID85-153	ID, OR, WA	1994	Stephens/Sprague
Lewjain	WA6363	WA, OR, ID	1982	Luke/9/Super Helvia/8/Suweon 92/7/(Vogel 4, Cltr13645, (Oro//Turkey Red/Florence/3/3* Elgin, Elgin Sel. 19)/4/Elmar/5/Illinois No. 1/6/ Vogel 1813)
MacVicar	ORFW75336	Oregon	1992	Yamhill/McDermid//Triticum spelta var. Alba /3/Suweon 92/Roedel/6/(Warrior//Atlas 66/ Comanche/3/Comanche/Ottawa, NE68513) /4/Hyslop/5/Backa
Masami	WA7916	Washington, Idaho	2004	MacVicar/3/(PI561031, WA7625, VPM/Moisson 951//2*Hill 81)
Rod	WA7662	Washington	1992	Luke/Daws//Hill 81
Simon	ID91-34302A	Idaho	2003	Haven/Lambert//Madsen
Xerpha	WA7937	Washington	2007	Eltan/Estica

Private Varieties

MAC-1	PB1-85-WW-1	Plant Breeders 1, Inc., Moscow, ID	1992	selection from a bulk of Daws/ CIMMYT/Pacific Northwest wheats
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Table 16. SOFT WHITE WINTER WHEAT: District 1 -- Kalispell - Dryland (High Rainfall)

Neeley yield severely affected by stripe rust infestation at Kalispell in 2005										
Cultivar/Line	Grain Yield (bushels/acre)				Test weight lb/bu	2007 Data				
	2007	2006-2007		2005-2007		2004-2007	Heading Date Julian	Calendar	Plant height in	Protein %
		2 yr	3 yr							
R Eltan Finch Hubbard + Kmor	88.1	78.6	93.1	103.6	54.5	159.0	8-Jun	36.1	13.1	
	81.4	85.2	103.2	112.4	53.4	162.7	12-Jun	36.7	14.4	
	96.7	85.7	91.6	104.3	56.9	158.3	7-Jun	41.3	12.0	
	94.0	87.1	96.0	103.8	52.4	160.7	10-Jun	34.8	13.1	
R Lambert Lewjain MAC-1 + MacVicar	90.9	85.7	101.4	109.5	54.5	156.7	6-Jun	37.5	13.1	
	100.8*	90.1	96.9	105.2	55.4	163.0	12-Jun	37.8	12.0	
	87.1	79.2	98.3	106.4	56.6	156.3	5-Jun	38.3	13.3	
	81.3	78.6	92.8	104.2	50.6	157.0	6-Jun	34.8	14.5	
Masami + MTCL0489 (CL) MTCL0549 (CL) MTCL0550 (CL) Neeley (HRW) Rod Simon + Xerpha	85.6	80.6	97.4		53.1	161.3	10-Jun	35.6	12.7	
	106.2**	83.4	93.8		57.8	153.7	3-Jun	36.4	12.3	
	87.5	80.7			52.8	157.0	6-Jun	39.9	13.9	
	101.5*	84.2			57.1	154.7	4-Jun	35.0	12.2	
	94.6	74.2	53.9	69.5	60.0	157.0	6-Jun	43.6	12.1	
	92.1	88.8	105.8	114.3	52.9	161.0	10-Jun	33.6	12.9	
	95.0	87.5	105.9	113.7	55.6	157.0	6-Jun	35.7	12.6	
	99.4*				53.4	161.3	10-Jun	36.6	13.7	
Average	92.6	83.3	94.6	104.3	54.8	158.5	8-Jun	37.1	13.0	
LSD (0.05)	9.1	ns	ns	ns	ns	2.9		1.5		
C.V.	5.9	11.8	20.5	16.8	2.6	1.1		2.4		

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

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

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

Table 17. SOFT WHITE WINTER WHEAT: District 2 -- Bozeman - Dryland (Moderate Rainfall)

Cultivar/Line	Grain Yield (bushels/acre)				2007 Data			
	2007	2006-2007 2 yr	2005-2007 3 yr	2004-2007 4 yr	Test weight lb/bu	Heading Date Julian	Plant height in	Protein %
						Calendar		
R Eltan	124.5	111.7	110.6	112.8	57.4	167.7	17-Jun	11.9
Finch	106.6	98.5	97.6	101.7	56.9	172.7	22-Jun	13.2
Hubbard +	109.2	97.5	99.1	104.8	58.4	168.7	18-Jun	12.7
Kmor	109.5	99.3	99.1	100.2	53.9	169.3	18-Jun	12.4
Lambert	109.7	101.0	102.5	106.3	57.3	163.7	13-Jun	12.7
Lewjain	120.3	111.2	104.9	104.6	55.6	170.3	19-Jun	12.9
MAC-1 +	126.0*	109.6	107.0	108.5	59.6*	163.7	13-Jun	12.7
MacVicar	109.3	95.7	96.1	99.0	54.6	166.0	15-Jun	12.6
Masami +	111.3	98.4	96.4		54.4	170.7	20-Jun	12.3
MTCL0489 (CL)	130.3*	107.2	107.6		59.7*	162.0	11-Jun	11.5
MTCL0549 (CL)	116.5	104.9			57.0	164.3	13-Jun	12.7
MTCL0550 (CL)	133.5**	114.0			59.6*	162.0	11-Jun	11.9
Neeley (HRW)	113.9	91.1	95.0	102.1	60.6**	165.0	14-Jun	12.4
Rod	114.4	100.6	102.5	107.2	54.0	168.7	18-Jun	12.9
Simon +	123.6	109.5	109.0	111.5	58.6	164.0	13-Jun	12.1
Xerpha	123.2				57.4	167.7	17-Jun	12.6
Average	117.6	103.3	102.1	105.3	57.2	166.6	16-Jun	12.5
LSD (0.05)	8.2	ns	ns	ns	1.5	1.6		
C.V.	4.2	6.5	6.3	6.3	1.5	0.6		

** = indicates highest yielding variety within a column

CL = CLEARFIELD wheat tolerant to imidazolinone (IMI) herbicides

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

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

Table 18. Selected agronomic characters and disease reactions of soft white winter wheats.

Variety	Agronomic Characters			Diseases ^{3/}			
	Maturity ^{1/}	Winter Survival ^{2/}	Lodging ^{3/}	Dwarf Smut	Snow Mold	Stem Rust	Stripe Rust
Eltan	L	2	MS	MR	MR	MS	R
Finch	M-L	2	MR	-	-	S	R
Hubbard +	M	2	MR	S	-	-	MR
Kmor	M-L	1	M	MR	S	MS	R
Lambert	E-M	1	M	S	MS	-	R
Lewjain	L	1	M	MR	MS	MS	MR
MAC-1 (P) +	E-M	2	MR	-	-	-	R
MacVicar	E-M	1	MR	S	S	MS	R
Masami +	M-L	-	-	-	-	-	MR
Rod	M-L	1	MR	S	S	MS	R
Simon +	E	2	MR	-	-	-	R
Xerpha	M-L	-	-	-	-	-	R

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

1/ E = Early; M = Medium, L = Late

2/ 5 = Best Winter survival (over several years at Moccasin)

3/ VR = Very Resistant

R = Resistant

MR = Moderately Resistant

M = Moderate

MS = Moderately Susceptible

S = Susceptible

- = no information

Additional Descriptive Information for Winter Wheat Varieties

Hard Winter Wheat

New for the 2008 Bulletin:

Alice – hard **white** winter wheat released by South Dakota in 2006. Alice is an early maturing, white chaffed, short semidwarf wheat. In the initial year of testing in Montana, Alice had above average yield and test weight, average protein, and below average winter hardiness. Alice appears moderately resistant to stripe rust. PVP, Title V has been issued.

Darrell – hard red winter wheat released by South Dakota in 2006. Darrell is an early maturing, white chaffed, medium height semidwarf wheat. In the initial year of testing in Montana; Darrell had above average winter hardiness and average yield, test weight, and protein. Darrell appears moderately susceptible to stripe rust. PVP, Title V has been issued.

Hawken – hard red winter wheat released by AgriPro in 2007. Hawken is an early maturing, white chaffed, short semidwarf wheat. In the initial year of testing in Montana, Hawken had above average test weight and average yield, protein, and winter hardiness. Hawken is resistant to stripe rust. PVP, Title V has been issued.

Ripper – hard red winter wheat released by Colorado in 2006. Ripper is an early maturing, white chaffed, short semidwarf wheat. In the initial year of testing in Montana, Ripper had above average yield and test weight, below average protein, and poor winter hardiness. Ripper is very susceptible to stripe rust. PVP, Title V has been issued.

Varieties previously in bulletin:

BigSky - is a broadly adapted, high-yielding hard red winter wheat cultivar with medium maturity, good foliar disease resistance, and dual purpose (bread and Asian noodle) end-use quality. Yield performance is similar to Judith, Kestrel, Neeley and Rocky and higher than Tiber and Erhardt. Test weight is superior to all these varieties. BigSky is of medium maturity heading 1-2 days later than Judith, similar in height to Tiber, but with strong, stiff straw. BigSky is resistant to stem rust but susceptible to leaf and stripe rust. Resistance to Septoria and tan spot is good. Milling and baking qualities of BigSky are within acceptable ranges.

BigSky was released by the Montana AES in the fall of 2001. This variety is protected under the Plant Variety Protection Act and can only be sold or advertised by variety name as a class of certified seed.

Bond CL – hard red winter wheat was developed by the Colorado Agricultural Experiment Station and released to seed producers in 2004. Bond CL was released based on its resistance to Biotype 1 of the Russian wheat aphid, its tolerance of imizamox (IMI) herbicide, and its adaptation to dryland production in Eastern Colorado and the west-central Great Plains, and improved bread and baking qualities relative to available IMI-tolerant cultivars. Bond CL is a medium-early maturing semidwarf. It is susceptible to stem rust, leaf rust, and very susceptible to stripe rust. It is moderately susceptible to wheat streak mosaic virus. PVP with Title V option has been issued. Additionally, the CLEARFIELD gene is patented.

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

Carter – a semi-solid stem hard red winter wheat released by WestBred LLC in 2007. Carter is a medium maturity semidwarf wheat. It has average yield, test weight, and winterhardines and good protein. Carter is resistant to stem rust and moderately resistant to stripe rust. Carter has average milling and above average baking quality. PVP will be applied for.

CDC Buteo – hard red winter wheat developed by the Crop Development Center, Saskatoon, Saskatchewan and registered in 2001. It is being tested by WestBred LLC. CDC Buteo is a medium to late maturity standard height wheat. It has average yield and protein with good test weight and winterhardines. CDC Buteo is susceptible to stripe rust. It is rated as having acceptable milling and baking quality. PVP, Title V has been applied for.

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.

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.

Hatcher – hard red winter wheat was developed by the Colorado Agricultural Experiment Station and released to seed producers in 2004. Hatcher was released based on its resistance to Biotype 1 of the Russian wheat aphid and its adaptation to nonirrigated production in Eastern Colorado and the west-central Great Plains. Hatcher is an awned, white-chaffed, medium maturity, semidwarf wheat. It is moderately susceptible to stripe rust, resistant to stripe rust, susceptible to wheat streak mosaic virus and barley yellow dwarf virus, and heterogeneous for resistance to the Great Plains biotype of the Hessian fly. Industry has rated Hatcher as acceptable for milling and baking quality. PVP with Title V option has been issued.

Hyalite – a CLEARFIELD (CL) wheat with imidazolinone tolerance, developed by the Montana Agricultural Experiment Station in 2005 and licensed to WestBred LLC. Hyalite is a good yielding hard **white** winter CLEARFIELD cultivar. Hyalite is significantly higher in yield than other CLEARFIELD checks, similar in yield to Neeley, and better yielding than NuSky and NuWest. Hyalite has average test weight, good crop tolerance to herbicide, and is relatively early in heading compared to Montana varieties. Hyalite is resistant to stem rust and very susceptible to stripe rust. Grain protein of Hyalite is above average and milling and baking characteristics are acceptable.

PVP, Title V has been issued. Additionally, the CLEARFIELD gene is patented.

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. Winterhardness 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 Protection Act and can only be sold or advertised by variety name as a class of certified seed.

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

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 moderately resistant to stripe rust and susceptible to stem rust. Milling and baking characteristics are acceptable. Ledger is protected under the Plant Variety Protection Act, but not the Title V option.

Morgan – Developed by the Crop Development Centre, University of Saskatchewan. Western Plant Breeders was granted the production rights. It is an awned, white chaffed, semidwarf hard red winter wheat. The spike is tapered, mid-dense and lacks a waxy bloom. The glumes are medium long, medium wide, no pubescence and have oblique shoulders. Morgan is resistant to stem rust, moderately susceptible to leaf rust, and very

susceptible to stripe rust. Morgan is protected under the Plant Variety Protection Act, but not the Title V option.

MT1159CL - a CLEARFIELD (CL) wheat with imidazolinone tolerance, developed by the Montana Agricultural Experiment Station in 2004 and licensed to WestBred LLC. MT1159CL is a medium maturity, semidwarf hard red winter wheat. MT1159CL has moderate winter hardiness and production should be restricted to areas where winter kill risk is moderate. Crop tolerance to Beyond herbicide is equal or superior to Above under Montana conditions. MT1159CL has yield potential similar to Above, medium test weight, and fair end-use qualities. MT1159CL is moderately resistant to stripe rust and very susceptible to stem rust. PVP, Title V has been issued. Additionally, the CLEARFIELD gene is patented.

Neeley – Developed and released in 1980 by USDA-ARS and the Idaho Agricultural Research Station. It is a hard red wheat. It is a semidwarf variety with intermediate maturity. Neeley is susceptible to stem rust and very susceptible to stripe rust. Neeley has average protein and winter-hardiness.

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

NuDakota – hard **white** wheat released by AgriPro in 2006. It is a white chaffed, early maturing, semidwarf cultivar. In limited testing (1 year) in the Montana Intrastate Winter Wheat Test, NuDakota has average yield, test weight, and protein. It has below average winterhardiness. NuDakota is resistant to stripe rust. It has fair milling and baking characteristics. PVP with Title V option has been issued.

NuSky – hard **white** winter wheat to be released by the Montana Agricultural Experiment Station as a public release in the fall of 2001. High yielding, medium maturity, good winterhardiness,

intermediate height, good straw strength, average grain protein, and good milling, bread-baking, and Asian noodle characteristics. Like NuWest, NuSky is resistant to stem rust and susceptible to stripe rust. Field performance and end-use quality characteristics are very similar to NuWest.

NuWest – Developed by the Montana Agricultural Experiment Station. It was released in 1994 and is currently licensed to General Mills. NuWest is a hard **white** winter wheat of intermediate height. The spike is awned, white chaffed and erect at maturity. The kernels are hard, white and elliptical. The germ is large, with a mid-long brush, cheeks are rounded with a narrow straight crease. There is approximately one red kernel per 1500 white kernels. NuWest is resistant to prevalent races of stem rust found in Montana. It is susceptible to leaf rust, wheat streak mosaic virus and dwarf bunt. It is resistant to stem rust, very susceptible to stripe rust, and moderately susceptible to Cephalosporium stripe. It is susceptible to Russian wheat aphid and the wheat stem sawfly. This variety is protected under the Plant Variety Protection Act and can only be sold or advertised by variety name as a class of certified seed.

Paul – a hollow-stemmed, winter-hardy, high quality hard red winter wheat with yield potential similar to Judith and Neeley. Has improved winter hardiness and baking quality relative to Neeley. Test weight of Paul is low but slightly higher than that of Judith. Paul is of medium to late maturity, relatively short, with straw strength similar to Neeley. Paul is resistant to stem rust, but susceptible to leaf and stripe rust. Foundation seed was available in fall of 2003. ‘Paul’ is named in honor of Paul L. Brown’s long-term contributions to Montana dryland agriculture. PVP has been abandoned.

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.

Pryor – hard red winter wheat released by Western Plant Breeders in 2002. Pryor is a white chaffed, awned variety with short stature and medium winter hardiness. Pryor is a high yielding variety with average test weight and below average protein. It is susceptible to stem rust and stripe rust and moderately resistant to leaf spot complex. Pryor has average milling and baking characteristics. This

variety is protected under the Plant Variety Protection Act without the Title V option.

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 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.

Rocky – A pure line selection from Centurk developed and released by Nickerson American Plant Breeders (now Agripro Seed Company) in 1978. Rocky is a hard red winter wheat that has white glumes and awns. It is similar in most characteristics to Centurk but differs in glume shape and beak length and has better resistance to soil born mosaic. Rocky is resistant to stem rust, but susceptible to stripe rust. Rocky tends to be about three to four days later in heading than Centurk but dries down for harvest as early as Centurk. Rocky is adapted to the same areas as Centurk, but has superior yields under most conditions. Rocky has average milling and baking qualities when compared to Redwin.

Tiber – A standard height hard red winter wheat variety released by the Montana Agricultural Experiment Station in 1987. Tiber was selected from a Redwin population based on its tolerance to the leaf spot disease complex. Tiber is a bearded, brown chaffed, stiff-strawed variety. It has a high yield potential, good shatter resistance and good winter-hardiness (similar to Redwin). Tiber's resistance to lodging and shattering is equal to Redwin; shorter in straw height than Winalta. Tiber has moderate resistance to the leaf spot complex, but is susceptible to dwarf smut, stem rust, and stripe rust. Tiber has average milling and baking quality.

Vanguard – Developed by the Montana Agricultural Experiment Station and released in 1995. Vanguard is the first sawfly-tolerant winter wheat released in Montana since 1965. It is resistant to the wheat stem sawfly. It was released as an emergency measure to reduce yield losses due to the sawfly. Vanguard has awned spikes, with white chaff and the straw is white. Vanguard is moderately resistant to stripe rust, has some resistance to stem rust, leaf rust and susceptible to dwarf smut.

Wahoo – hard red winter wheat released jointly by Nebraska and Wyoming in 2000. Wahoo is a semidwarf, early maturing white chaffed variety. It has above average yield, below average test weight, and average protein under Montana conditions. Wahoo is moderately resistant to stem rust and leaf rust, but susceptible to stripe rust, wheat streak, and barley yellow dwarf viruses. Milling and baking characteristics are acceptable. This variety is protected under the Plant Variety Protection Act and can only be sold or advertised by variety name as a class of certified seed.

Wendy – hard **white** wheat released by South Dakota in 2006. It is a white chaffed, early maturing, short semidwarf cultivar. In limited testing (1 year) in the Montana Intrastate Winter Wheat Test, Wendy has average yield and above average test weight and protein. It has average winterhardiness. Wendy is resistant to stripe rust. It has acceptable milling and baking characteristics. PVP with Title V option has been issued.

Willow Creek – awnletted wheat specialty crop for winter cereal **forage** released by Montana AES in 2005. Willow Creek is a white chaffed, tall, very late maturing variety with good winterhardiness. In limited (1 year) Montana Intrastate Winter Wheat Test, Willow Creek has low grain yield and test weight, but good protein. Willow Creek is resistant to stripe rust. Willow Creek has poor milling and baking characteristics.

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 potentially could occupy acreage currently planted to Neeley, Tiber CDC Falcon, Paul, Promontory, and Morgan. PVP, Title V has been issued.

Soft White Winter Wheat

New for the 2008 Bulletin:

Xerpha – soft white winter wheat released by Washington in 2007. Xerpha is a medium to late maturing, white chaffed semidwarf wheat. In the initial year of testing in Montana, Xerpha had above average yield and average test weight and protein. Xerpha appears resistant to stripe rust.

Varieties previously in bulletin:

Eltan – Developed cooperatively by USDA-ARS and the Washington Agricultural Experiment Station and released jointly by the Washington, Oregon and Idaho AES in 1990. Eltan is a semidwarf, soft white winter wheat. The spike is awned and white chaffed. It is resistant to dwarf bunt (TCK), snow mold and common bunt. Eltan is moderately susceptible to prevalent races of stripe rust, but susceptible to stem rust and leaf rust.

Finch – Developed by the Washington AES and released in 2002. Finch is an awned, white chaffed medium-late maturing soft white winter wheat. It has resistance to strawbreaker foot rot, stripe rust and powdery mildew. Yield potential similar to Eltan, test weight better than Eltan in limited Montana testing.

Hubbard – Tall semidwarf with good straw strength developed by the Idaho AES and released in 2000. Good resistance to stripe rust; susceptible to cephalosporium stripe, strawbreaker foot rot, Septoria tritici blotch, common bunt and dwarf bunt. Yield potential and test weight better than Eltan in limited Montana testing. This variety is protected under the Plant Variety Protection Act and can only be sold or advertised by variety name as a class of certified seed.

Kmor – developed by the USDA-ARS and the Washington Agricultural Experiment Station. Kmor is a semidwarf, white chaffed, soft white winter wheat. It was released jointly by the Washington, Oregon and Idaho AES in 1990. Kmor is resistant to stripe rust, moderately resistant to Cephalosporium, common bunt, strawbreaker foot rot, and dwarf smut. It is susceptible to snow mold, leaf rust and stem rust.

Lambert – Developed by the Idaho AES and jointly released in 1995 by the Idaho, Oregon and Washington Agricultural Experiment Stations. Lambert is an awned, semidwarf, soft white winter wheat. The kernels are soft, white and ovate, with a mid-deep crease and a mid-sized germ. It is resistant to stripe rust, more tolerant than Stephens to both Cephalosporium stripe and snow mold. Lambert is susceptible to strawbreaker foot rot and dwarf bunt. Lambert's quality characteristics have been accepted by industry.

Lewjain – developed and jointly released by the Washington AES and the USDA-ARS in 1982. It is a semidwarf, soft white winter wheat. It is white chaffed, awned, with a common head type. Lewjain is resistant to some races of common smut

and dwarf smut. In the adult stage it is resistant to stripe rust and moderately resistant to *Cephalosporium gramineum*. It is susceptible to leaf rust, stem rust, flag smut and foot rot.

MAC-1 – soft white winter developed by Plant Breeders 1, Moscow, ID in 1992. Currently licensed to Lake Seeds in Ronan, MT. Above average yield and test weight in first year of testing at Bozeman and Kalispell. High protein for soft white winter wheat. This variety is protected under the Plant Variety Protection Act and can only be sold or advertised by variety name as a class of certified seed.

MacVicar – Jointly released in 1980 by the Washington AES and the USDA-ARS. The spike is awned, white chaffed, fusiform and lax. Kernels are white, mid-long, ovate to elliptical, the crease is narrow and shallow. The brush is mid-long and cheeks are rounded. The glumes are glabrous, mid-long, mid-wide with narrow acuminate beaks and shoulders are wanting.

Masami - developed by Washington State University and released, jointly with Idaho, in 2004. Masami is an awned, white-chaffed semidwarf soft white winter wheat. It is targeted to replace Eltan and Madsen in all precipitation zones of eastern Washington as it consistently produces higher grain yields, especially in those areas where foot rot is a problem for Eltan and cold hardiness is a problem for Madsen. When compared to Eltan, Madsen, and Rod, extensive data indicate that Masami is equal or superior in grain yield, cold-hardiness, end-use quality, and resistance to stripe rust and foot rot. PVP has been applied for without Title V option.

Rod – Developed by Washington State University in cooperation with USDA-ARS. Released jointly by the Washington, Oregon and Idaho AES. Rod has some winter-hardiness (similar to Stephens), moderately weak straw and medium-late heading. Resistant to local races of stripe rust and common bunt, but susceptible to dwarf bunt, stem rust, leaf rust and snow mold.

Simon – Early maturing semidwarf developed by the Idaho AES and released in 2003. Yield potential similar to Eltan, test weight better than Eltan in limited Montana testing. This variety is protected under the Plant Variety Protection Act and can only be sold or advertised by variety name as a class of certified seed.

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>