

SPRING WHEAT VARIETY PERFORMANCE SUMMARY IN MONTANA

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INTRODUCTION

The agronomic characteristics of spring wheat varieties evaluated by the Montana Agricultural Experiment Station are compared in this publication with other varieties commonly grown in the state. The objective of this summary is to help farmers select the varieties which will perform best in their area. In this bulletin we use a comparable average to evaluate variety performance. Varieties recommended for production in the respective districts of Montana are designated by an asterisk. A brief description of each variety is given which may include a variety's particular advantages or disadvantages. The information was extracted from data collected and analyzed from the Advanced Spring Wheat and Statewide Durum Wheat nurseries. These reports are prepared by research personnel of the Montana Agricultural Experiment Station. Where available, up to ten years (1999-2008) of yield data are shown for the varieties. In some years data are not available because of hail, frost, or other unavoidable causes.

The comparable average for spring wheat is calculated by using a "10 year check mean" from a group of long term varieties including; Fortuna, Ernest, and McNeal. Variety means are adjusted by multiplying the actual 10 year check mean by the ratio of the individual variety mean compared to the check mean for the same years tested as illustrated below. All varieties are then directly comparable to each other when in the same nursery.

Illustration of Formula: (Vida - 5 years at Havre-dryland, page 10)

Check Varieties 10 Year Average = 33.5
Check Varieties Average Yield for last 5 years = 32.84
Variety (Vida) in question: Average Yield for last 5 years = 40.18

$$\frac{\text{Vida 5 year average yield}}{\text{Check varieties 5 year average yield}} \text{ or } \frac{40.18}{32.84} = 1.23 \text{ (123\%)}$$

To convert Vida yield to the 10 year comparable average:

$$1.23 \text{ (Vida)} \times 33.5 \text{ (Check varieties 10 yr. avg.)} = 40.9 \text{ bu/A for Vida}$$

The comparable averages for the durum wheats were calculated by using Mountrail as a single check variety.

The more years of production data available for any particular variety, the more reliable is the "comparable average figure." Averages using less than three years data may be unreliable in predicting future performance, and have been omitted from the tables.

SPRING WHEAT PRODUCTION AND CULTURAL PRACTICES

Montana's spring wheat acreage during the past five years has ranged from 44 to 55 percent of the total wheat acreage planted. In 2008, spring wheat accounted for ~ 44% and durum 10% of the total wheat acreages.¹ Nationally, in 2008, Montana ranked second among the spring wheat and durum producing states.

The wheat stem sawfly, wheat rust diseases and leaf diseases including Septoria, remain threats to wheat growers in areas across Montana, and require the planting of resistant varieties.

Montana is recognized for production of high quality bread wheat. This reputation is essential in maintaining domestic and foreign markets. The export trade in recent years has accounted for about three-fourths of our wheat market.

Hard red spring wheat is grown in all areas of the state, with over 97% of the acreage on dryland. The largest concentration of acreage is east of the Continental Divide along the northern tier of counties. The highest producing counties in 2007 were Roosevelt, Valley and McCone.

Over 98% of durum wheat is grown on dryland, and in 2007 the highest producing counties were Sheridan and Roosevelt in northeastern Montana.

The following seeding rates and dates are general. The heavier seeding rate, where indicated, is applicable to plump seed of high test weight or seed having a kernel size larger than normal for most other varieties. The lighter rates are for seed whose test weight is below normal for wheat.

Crop	Seeds/lb	Dryland (lbs)	Irrigated (lbs)	Seeding Date
Spring Wheat	15,000	45 – 60 21 seeds/sq ft)	75 - 90 30 seeds/sq ft)	After April 1 or as soon as seedbed can be prepared.
Durum Wheat	11,000	60 - 65 16 seeds/sq ft)	75 - 90 23 seeds/sq ft)	After April 1 or as soon as seedbed can be prepared.

The map on the cover shows the districts in the state for purposes of reference for specific areas of adaptation.

¹ Montana Agricultural Statistics, 2007 . Montana Agricultural Statistics Service, Helena, MT (November 2007).

VARIETY TESTING PROCEDURES

Locations

In 2008, the Advanced Spring Wheat nursery was planted at 9 Montana sites; including Bozeman (dryland and irrigated, both hailed out in 2008), Kalispell (high rainfall), Havre (dryland), Sidney (dryland and irrigated), Huntley (dryland), Moccasin (dryland) and Conrad (dryland). The Montana statewide durum nursery was planted at Bozeman (dryland), Havre (dryland), Sidney (dryland and irrigated), Huntley (dryland), Moccasin (dryland) and Conrad (dryland and irrigated). See page 25 for Research Center locations, soil types and miscellaneous nursery management information.

Experimental Design and Data Collection

Varieties currently recommended, widely grown, recently released or owned (and entered on a fee basis) by private companies are evaluated for agronomic performance in the Advanced Spring Wheat and Statewide Durum nurseries. Also evaluated in these nurseries are experimental breeding lines tested against the check varieties. Nurseries are randomized separately at each location for statistical analysis.

Agronomic data collected throughout the growing season includes heading date, plant height, lodging, disease and insect reactions. Experimental plots are trimmed, measured and harvested with small plot combines. The grain is weighed for yield and test weight. One trait important to wheat growers is resistance to the wheat stem sawfly. The major mode of resistance is a solid versus hollow stemmed variety. To evaluate this trait we cut several stems of each variety and score them on a scale of 1=hollow, 2=2/5 solid, 3=3/5 solid, 4=4/5 solid and 5=solid. The cuts are made in the center of each internode, so there are 5 scores per stem. The five scores are added up to get a total number ranging from 5=very hollow up to 25=very solid. The most reliable solid stemmed varieties should have a total score of at least 18. Recent studies have also shown that certain plant volatiles attract the female sawflies to the stems. Some varieties even with hollow stems with low volatility can tolerate sawfly populations and suffer minor cutting. Entries are submitted to the Cereal Quality Lab at MSU, Bozeman for protein, milling, baking and Asian noodle quality evaluation as needed. Data is analyzed and summarized for each location and overall comparisons are made to determine which varieties and/or experimental lines look promising for Montana producers. When sufficient data is collected and analyzed, promising varieties and/or lines are submitted to the MAES wheat variety release and recommendation committee.

WHEAT RECOMMENDATION PROCEDURE FOLLOWED BY THE MAES

Recommendation of spring 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 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 from the Montana Agricultural Experiment Advisory Board.

A variety is eligible for recommendation when a minimum of 16 location-years of performance data is obtained from the MAES statewide spring wheat performance trials. Test results must 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 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, disease and 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; such as, sawfly 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 low test weight, 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.

SPRING WHEAT VARIETY

Agronomic Characteristics

Variety	Origin	Year Released	Milling ^{1/}	Baking ^{1/}	Plant Height	Maturity	Lodging	Shattering
HARD RED								
Amidon	North Dakota	1988	5	4	Tall	Medium	M	M
Choteau	Montana	2003	4	4	Semidwarf	Medium	R	R
Conan	WestBred, LLC.	1997	3	3	Semidwarf	Medium	R	-
Corbin	WestBred, LLC.	2006	3	3	Semidwarf	Early	R	-
Ernest	North Dakota	1995	5	4	Tall	Medium	M	M
Fortuna	North Dakota & Montana	1966	5	4	Tall	Medium	M	S
Freyr	AgriPro Wheat	2004	3	3	Semidwarf	Med-early	R	-
Hank	WestBred, LLC.	1999	3	5	Semidwarf	Early	R	R
Jedd	WestBred, LLC.	2008	3	3	Semidwarf	Early	R	-
Kelby	AgriPro Wheat	2006	3	3	Semidwarf	Early	R	-
Kuntz	AgriPro Wheat	2007	3	3	Semidwarf	Med-early	R	-
McNeal	Montana	1995	3	5	Semidwarf	Mid-Late	R	R
Norpro	AgriPro Wheat	2000	3	4	Semidwarf	Medium	R	R
ONeal	WestBred, LLC.	2008	4	4	Semidwarf	Medium	R	-
Outlook	Montana	2003	3	4	Semidwarf	Mid-Late	R	R
Reeder	North Dakota	1999	4	4	Semidwarf	Med-early	MR	-
Scholar	Montana	1998	5	4	Med-Tall	Mid-Late	MR	-
Vida	Montana	2005	4	4	Semidwarf	Mid-late	MR	R
Volt	WestBred, LLC.	2008	3	2	Semidwarf	Mid-late	R	-
WestBred 926	WestBred, LLC.	1987	4	5	Semidwarf	Early	R	M
HARD WHITE								
MTHW9420	Montana	2000	3	3	Semidwarf	Medium	R	R
Explorer	Montana	2002	4	5	Semidwarf	Medium	R	R

^{1/} Superior = 5, Inferior = 1; ^{2/} Weak under irrigation; Legend: R = Resistant, MR = Moderately Resistant, MS = Moderately Susceptible, S = Susceptible, T = Tolerant, - = unknown

**SPRING WHEAT VARIETY
Insect and Disease Reaction**

Variety	Sawfly	Stripe rust	Leaf rust	Stem rust	Leaf Spot Complex
HARD RED					
Standard					
Amidon	MR	-	R	R	M
Ernest	R	MS	R	R	R
Fortuna	R	S	R	R	S
Scholar	MR	MR	MR	R	S
Semidwarf					
Choteau	R	MS	-	R	MR
Conan	R	R	R	R	MR
Corbin	R	R	-	-	-
Freyr	S	MR	MR	MR	R
Hank	S	MR	R	R	MR
Jedd	S	MS	-	-	-
Kelby	S	MS	R	R	R
Kuntz	S	MS	MR	R	-
McNeal	S	S	MS	MR	R
Norpro	S	S	MR	R	S
ONeal	S	S	-	-	MR
Outlook	S	MS	MR	R	MR
Reeder	S	MR	MR	R	MR
Vida	MR	MR	MR	MS	MR
Volt	S	R	-	-	R
WestBred 926	S	-	R	R	M
HARD WHITE					
MTHW9420	S	-	MR	R	MR
Explorer	MR	MR	MR	R	S

R = Resistant , MR = Moderately Resistant, MS = Moderately Susceptible, S = Susceptible, T = Tolerant, - = unknown

DURUM VARIETY

Variety	Origin	Agronomic Characteristics				Disease Reaction			
		Year Released	Maturity	Plant Height	Stripe Rust	Leaf Rust	Stem Rust	Leaf Spot Complex	
AC Avonlea	AG Canada	1999	Medium	Medium	-	R	R	MS	
Alzada	WestBred, LLC.	2004	Early	Semidwarf	R	R	-	MS	
Alkabo	North Dakota	2005	Medium	Medium	-	R	R	MR	
Ben	North Dakota	1996	Medium	Medium	MS	R	R	R	
Dilse	North Dakota	2002	Late	Medium	-	R	R	MS	
Divide	North Dakota	2005	Medium	Medium	-	R	R	MR	
Grenora	North Dakota	2005	M Early	M tall	-	R	R	MR	
Kyle	AG Canada	1984	Medium	Tall	-	MR	R	MS	
Lebsock	North Dakota	1999	Medium	Medium	-	R	R	MS	
Maier	North Dakota	1999	Med-late	Medium	-	R	R	MS	
Monroe	North Dakota	1985	Early	Tall	MS	R	R	MS	
Mountrail	North Dakota	1999	Late	Medium	-	R	R	MS	
Munich	North Dakota	1995	Medium	Medium	-	R	R	-	
Pierce	North Dakota	2001	Medium	Medium	-	R	R	MS	
Plaza	North Dakota	1999	Late	Semidwarf	-	R	R	MR	
Strongfield	AG Canada	2004	Medium	Medium	-	R	R	R	
Vic	North Dakota	1979	Mid-Early	Tall	MR	MR	R	MR	

R = Resistant, MR = Moderately Resistant, MS = Moderately Susceptible, S = Susceptible, T = Tolerant, - = unknown

2004-08 Stem solidness, % stems cut and grain yield for selected spring wheats grown in offstation spring wheat nurseries in north-central Montana

	STEM SOLIDNESS 2004		% PLOT CUT BY SAWFLYS 2004		GRAIN YIELD (BU/AC) 2004		STEM SOLIDNESS 2005		% PLOT CUT BY SAWFLYS 2005		GRAIN YIELD (BU/AC) 2005	
	2004	2004	2004 TURNER	2004 LORING	2004 TURNER	2004 LORING	2005	2005 LORING	2005 TURNER	2005 LORING	2005 NO. HAVRE	2005 NO. HAVRE
FORTUNA	18.7	11.7	49.7	44.9	14.0	30.0	21.7	31.6	26.3			
MCNEAL	5.8	43.3	58.4	46.9	6.3	88.3	71.7	34.5	34.5			
ERNEST	13.0	20.0	54.5	48.2	12.3	40.0	28.3	34.1	34.1			
SCHOLAR	13.0	36.7	52.9	43.0	10.3	40.0	61.7	30.7	30.7			
CONAN	8.9	15.0	53.0	45.4	7.7	35.0	26.7	36.3	29.4			
REEDER	5.3	28.3	56.0	41.4	5.5	33.3	65.0	38.8	20.4			
OUTLOOK	5.9	31.7	54.6	49.0	6.7	38.3	63.3	38.3	25.9			
CHOTEAU	21.8	15.0	55.2	52.7	19.6	26.7	8.3	37.3	27.9			
HANK	7.1	36.7	51.8	41.5	7.6	31.7	60.0	37.2	25.2			
VIDA	8.5	18.3	64.0	59.9	10.2	33.3	28.3	48.8	29.6			

	STEM SOLIDNESS 2006		% PLOT CUT BY SAWFLYS 2006		GRAIN YIELD (BU/AC) 2006		STEM SOLIDNESS 2007		% PLOT CUT BY SAWFLYS 2007		GRAIN YIELD (BU/AC) 2007	
	2006	2006 DRY	2006 IRR	2006 LORING	2006 TURNER	2006 LORING	2007	2007 LORING	2007 TURNER	2007 LORING	2007 NO. HAVRE	2007 NO. HAVRE
FORTUNA	17.5	18.7	16.3	23.3	8.3	17.1	3.7	8.3	23.7	26.5	38.3	
MCNEAL	6.75	6.7	6.8	73.3	71.7	7.9	16.7	12.0	23.6	30.6	40.0	
ERNEST	15.75	14.3	17.2	21.7	15.0	13.2	11.7	10.0	22.4	27.2	39.7	
SCHOLAR	12.3	14.1	10.5	60.0	63.3	11.3	11.7	5.0	24.4	45.3		
CONAN	9.85	10.4	9.3	26.7	13.3	7.6	10.0	8.3	22.4	32.4	46.5	
REEDER	6.35	6.5	6.2	81.7	55.0	8.1	10.0	8.3	24.3	33.3	45.5	
OUTLOOK	7.2	7.8	6.6	81.7	68.3	24.4	6.7	2.3	24.0	29.5	41.5	
CHOTEAU	21.3	21.7	20.9	21.7	5.0	10.1	20.0	15.0	25.1	32.2	41.5	
HANK	7.7	8.1	7.3	78.3	63.3	11.3	3.7	1.0	23.9	36.3	46.4	
VIDA	11	13.9	8.1	53.3	23.3	10.2	2.3	1.0	25.0	31.8	45.4	
CORBIN	9.75	10.0	9.5	71.7	48.3	7.5	6.7	10.0	17.3	29.0	42.7	
NORPRO	6.7	6.9	6.5	90.0	68.3	8.9	13.3	15.0	20.3	30.2	42.1	
FREYR	7.2	8.1	6.3	90.0	68.3	8.9	13.3	15.0	20.3	30.2	42.1	

	STEM SOLIDNESS 2008		% PLOT CUT BY SAWFLYS 2008		GRAIN YIELD (BU/AC) 2008		STEM SOLIDNESS 2008		AVERAGE (2004-2008)	
	2008	2008 TURNER	2008 LORING	2008 NO. HAVRE	2008 TURNER	2008 LORING	2008 NO. HAVRE	STEM SOLIDNESS	% CUTTING	YIELD
FORTUNA	21.1	8.3	4.0	20.0	17.5	29.1	25.6	17.8	14.7	29.6
MCNEAL	7.0	46.7	6.7	28.3	19.4	34.9	34.9	6.9	48.2	33.3
ERNEST								14.8	-	-
SCHOLAR								12.7	-	-
CONAN	11.0	10.0	2.3	4.0	18.9	30.9	38.6	9.9	14.0	32.9
REEDER	7.0	18.3	3.7	31.7	18.1	36.8	40.3	6.5	36.6	32.8
OUTLOOK	9.6	30.0	8.3	16.7	18.8	31.7	33.4	7.4	38.8	32.9
CHOTEAU	24.9	13.3	2.3	18.3	20.3	34.9	41.0	21.9	12.5	34.3
HANK	7.7	20.0	2.3	33.3	18.4	35.8	38.2	8.2	40.5	32.4
VIDA	13.5	20.0	6.7	6.7	20.2	33.6	42.0	11.4	21.1	37.8
CORBIN	9.7	11.7	2.3	2.3	19.7	34.7	42.0	9.6	-	-
NORPRO	6.4	23.3	3.7	25.0	18.9	33.7	40.0	7.1	-	-
FREYR	9.4	31.7	6.7	34.7	19.4	32.4	38.1	7.8	-	-
KELBY	6.4	21.7	5.3	25.0	19.1	34.1	34.5	7.8	-	-
KUNTZ	7.3	35.0	5.3	26.7	17.5	34.5	41.1	8.6	-	-
VOLT	8.0	70.0	23.3	6.7	16.2	30.0	39.6	7.9	-	-
ONEAL	6.6	21.7	1.0	11.7	20.5	38.6	44.5	7.5	-	-
JEDD	9.1	23.3	1.0	16.7	20.8	39.5	45.8	9.4	-	-

NURSERY MANAGEMENT INFORMATION FOR THE 2008 ADVANCED SPRING WHEAT NURSERY

	Bozeman irrigated 2	Bozeman dryland 2	Havre 5	Sidney dryland 6	Sidney irrigated 6	Kalispell 1	Moccasin 4	Huntley dryland 3	Conrad dryland 5
DISTRICT									
Location:									
Latitude °N	45° 41'	45° 41'	48° 30'	47° 40'	47° 40'	48° 10'	47° 03'	45° 55'	48° 18.4'
Longitude °W	111° 00'	111° 00'	109° 48'	104° 08'	104° 08'	114° 15'	109° 57'	108° 15'	111° 55.5'
Elevation (ft)	4772	4772	2689	2200	1950	2890	4300	3200	3700
Precipitation:									
Avg. moisture (in.) ¹	16.05	16.05	11.89	13.77	13.77	20.19	15.30	13.22	11.31
2008 moisture (in.)	18.51	18.51	12.21	7.24	8.11	19.05	12.52	12.65	11.89
2008 Moisture (Apr.-July)	8.91	8.91	8.09	3.44	4.11	10.68	8.15	7.41	7.79
Avg. moisture (Apr.-July)	8.32	8.32	6.74	8.00	8.00	9.14	8.58	6.97	6.99
Irrigation water applied (in.)	5.50				flood				
Previous Crop:									
2005	fallow	fallow	Fallow	Sm.grains	Barley	alfalfa	-	-	-
2006	Winter wheat	Winterwheat	Sp.Wheat	Safflower	Sugarbeets	alfalfa	-	-	-
2007	fallow	Fallow	Fallow	Fallow	Safflower	alfalfa	fallow	Chem. fallow	Fallow
Soil Type:									
Series	Amsterdam	Amsterdam	Joplin	Williams	Savage	Creston	Judith-Danvers	Fort Collins	Scobey
Texture ²	SiL	SiL	CL	CL	SiC	SiL	CL	SiL	CL
Fertilization:									
Available N (lb/ac)	170	170	252	67	18		na		
Applied N-P-K (actual lb/ac)	50/0/0	50/0/0	70/40/25	36/92/0	70	21/30/60/24	60 lb N	100/40/20	71/52/0
Planting date	5/15/08	5/16/08	4/18/08	4/16/08	4/29/08	5/8/08	4/17/08	3/11/08	5/5/08
Harvest date	Hailed out	Hailed out	8/13/08	8/5/08	8/19/08	9/15/08	8/15/08	7/30/08	8/25/08

¹ Moisture September- August, Sidney is October- September

² C= clay, L= loam, Sa=sand, Si=silt or silty, F=fine and VF=veryfine

ADDITIONAL DESCRIPTIVE INFORMATION ON SPRING WHEAT VARIETIES

Hard Red Spring Wheats

AMIDON - An awned, standard height hard red spring wheat cooperatively developed and released by North Dakota Agricultural Experiment Station and United States Department of Agriculture (USDA) in 1988. It was developed from the cross SU-28-1*2/3/Lew//Tioga*2/ RL6043 and tested as ND606. It is similar to Stoa in heading date and plant height with a tendency to greater lodging. It is resistant to leaf rust and stem rust, with a leaf spotting rating better than Stoa and Len. Shattering resistance and test weight have been rated as satisfactory. Amidon has been yielding consistently more than Stoa when yields were below 30 bu/A. Amidon has exhibited an intermediate level of stem solidness. Amidon has a higher protein than Newana, and overall milling and baking qualities are equal to or better than Newana. The kernel characteristics do not meet spring wheat classing requirements of the Federal Grain Inspection Service.

CHOTEAU – Developed and released by the Montana Agricultural Experiment Station in 2003. Choteau was derived from the cross of MT 9401/MT 9328. Choteau is a semidwarf hard red spring wheat with solid stems conferring tolerance to the wheat stem sawfly. The spike is lax and tapered with white awns and glumes. Kernels are red, ovate with a medium crease and brush. Choteau is resistant to the prevalent race of stem rust in Montana. Choteau has good grain protein and acceptable milling and baking quality. 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.

CONAN - Developed and released by WestBred, LLC. in 1999. Conan was selected from the cross WestBred Rambo x WestBred 906R. Conan is a sawfly tolerant, white chaffed, semidwarf, hard red spring wheat. The spike is mid-dense, strap shaped and awned. The seeds are elliptical with rounded cheeks. The brush is long and collared. Conan is similar to WestBred Rambo in yield, but is 2 to 4 days earlier, .5 to .9 percentage points higher in protein, and has good milling and baking qualities. Conan is resistant to the prevalent races of stripe rust and leaf rust, and has shown good tolerance to Septoria and Tan spot. This variety is protected under the Plant Variety Protection Act.

CORBIN - Developed and released by WestBred, LLC in 2006. Corbin is a hard red spring wheat derived from the cross Border x Conan. This line is best adapted to the wheat stem sawfly areas of Montana. Corbin is a one gene semi-dwarf with moderately strong straw. Disease/sawfly ratings for Corbin show it to be moderately resistant to stripe rust and similar to Conan for sawfly tolerance. The head is strap shaped, lax, awned and inclined at maturity. The plant color is green and the leaves and stem have slight waxy coating. The chaff color is white. The glume is acuminate and the shoulders are elevated. The seed is red and elliptical with rounded cheeks. The brush is large with medium length hair and collared. The embryo is mid-sized, the crease is mid-wide and mid-deep. Milling and baking quality is acceptable for the market class being grown in Montana, as determined by the MSU Quality Lab. This variety is protected under the Plant Variety Protection Act.

ERNEST - Developed from the cross ND 622*2/Cutless, made by the North Dakota Agricultural Experiment Station and released in 1995. Ernest is an awned, white chaffed, standard height, solid stemmed hard red spring wheat. It is resistant to wheat stem sawfly, prevalent races of leaf rust and stem rust. 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.

FORTUNA - Developed from the cross, Rescue-Chinook x (Frontana x Kenya 58-Newthatch), made at North Dakota Agricultural Experiment Station with the Crops Research Division of USDA cooperating. A joint North Dakota-Montana release was made in 1966. Fortuna is beardless with white chaff and straw. It is a solid-stemmed variety, resistant to the wheat stem sawfly. Fortuna is susceptible to Septoria and black chaff fungus. It is a relatively high yielding variety with superior milling properties, and has acceptable baking properties.

FREYR - Developed from the cross "Sonja/Vance/3/Sumai3/Dalen" and released by AgriPro in 2003. It is a white chaffed, hollow stemmed, hard red spring variety. Freyr has exhibited consistently high yields across Montana in 2004 and 2005 testing. It is intermediate in height, similar to Reeder, with moderately strong straw strength. Maturity is medium-early, similar to Reeder and two days earlier than McNeal. Test weight is very good. Protein is medium averaging 0.2% below McNeal. Freyr has the best rating available for fusarium head blight (scab) at moderately resistant. It is moderately resistant to the prevalent races of stem, leaf and stripe rust. It has good tolerance to leaf spotting diseases, such as tan spot and septoria. Freyr has acceptable overall breadmaking quality. 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.

HANK – Developed by WestBred, LLC. and released in 2000. Hank was derived from the cross of WestBred 926/WestBred 936. Hank is an early maturing white chaffed, awned, semidwarf hard red spring wheat. Seed of Hank is elliptical and long with rounded cheeks. The brush is large with long hair and the crease is medium in depth and width. Hank is resistant to stem rust, leaf rust, stripe rust and powdery mildew and has shown good tolerance to Dry Land Root Rot. Hank has good straw strength and is tolerant to shattering. Hank is tolerant to races of the Hessian fly found in the PNW region. Hank is susceptible to damage by the wheat stem sawfly. Hank is tolerant to the wild oat herbicide 'Avenge'. The milling and baking qualities of Hank are acceptable. Hank is protected under the Plant Variety Protection Act (Certificate # 200000191).

JEDD – Jedd was developed by WestBred, LLC from the cross '4*Hank/SWP965-001/Teal11A' and released in 2008. Jedd contains two patented genes (L1B S653N and L1D S653N) that confer tolerance to the BASF grass herbicide "Beyond" (imazimox). Jedd is semidwarf with good lodging resistance and is medium in heading and maturity. Jedd yields well and has good test weight. Jedd is moderately susceptible to races of stripe rust in western Montana and has good tolerance to Hessian fly biotypes in Washington, but the reaction is unknown for Montana biotypes. Jedd has average grain protein and acceptable milling and baking quality. This variety is protected under the Plant Variety Protection Act.

KELBY – Kelby was developed by AgriPro and released to AgriPro Associates in 2006. Kelby was derived from the cross ‘N97-00117/3/n92-0098//Sumai 3/Dalen’. It is a hollow stemmed, semidwarf, hard red spring wheat. Kelby is an early heading spring wheat and maintains a good test weight across locations. Kelby has the Asian background (Sumai 3) for fusarium head blight resistance giving it an intermediate scab tolerance. It is resistant to stem and leaf rust and shows good tolerance to leaf spotting diseases. It shows moderate susceptibility to stripe rust. Kelby is susceptible to damage by the wheat stem sawfly. Grain protein of Kelby is good and the milling and baking quality is 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.

KUNTZ – Kuntz was developed by AgriPro and released to AgriPro Associates in 2007. Kuntz was derived from the cross ‘N97-0214/3/N93-0338//Sumai3/Dalen’. It is a hollow stemmed, semidwarf, hard red spring wheat with very good straw strength. Kuntz has the Asian background (Sumai 3) for fusarium head blight resistance giving it an intermediate scab tolerance. Maturity of Kuntz is medium-early, similar to Reeder and two days earlier than McNeal. Test weight is average compared to other check varieties and the protein averages slightly lower than checks. Kuntz is resistant to stem rust, moderately resistant to leaf rust and shows good tolerance to leaf spotting diseases. It shows moderate susceptibility to stripe rust and is susceptible to damage by the wheat stem sawfly. Milling and baking quality of Kuntz is fair. 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.

McNEAL - Developed from the cross RS6880/Glenman made by the Montana Agricultural Experiment Station. It was released in March 1995. McNeal is a semidwarf, hard red spring wheat with red chaff and tan straw. The spike is awned and mid-dense. The glumes are reddish brown with some white on the outer edges of the lemma and palea. Kernels are red, ovate, medium length with a short brush. The cheeks are slightly rounded with a medium crease. Under Montana growing conditions McNeal is moderately resistant to lodging. It is moderately resistant to prevalent races of stem rust and wheat streak mosaic virus. McNeal is moderately susceptible to leaf rust and stripe rust. It is susceptible to Russian wheat aphid and the wheat stem sawfly. Under some climatic conditions one white chaffed plant per 2,000 plants may appear in the field. McNeal's milling and baking qualities are acceptable by industry.

NORPRO - Developed from the cross “Norseman/2369//Dalen” and released in 2000 by AgriPro Wheat. Norpro is a hard red spring wheat that is white chaffed, awned and hollow stemmed. In Montana State tests during the 2002-4 seasons, Norpro exhibited good yielding ability especially under irrigation. It is a semidwarf with very good lodging resistance. It has medium maturity and good test weight. It has resistance to stem rust and moderate resistance to leaf rust. It has very good tolerance to foliar diseases. Protein levels have been slightly lower (.3%) than McNeal. Norpro has acceptable breadmaking quality. 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.

ONEAL- ONeal is a hard red spring wheat developed by WestBred, LLC from the cross ‘McNeal/WestBred 906R’ and was released in 2008. ONeal is a hollow stemmed, semidwarf wheat with red chaff. ONeal heads about the same as McNeal and one day later than Choteau. ONeal is susceptible to stripe rust. Test weight of ONeal is average with grain protein, milling and baking traits similar to McNeal. Application for the Plant Variety Protection Act has been submitted.

OUTLOOK – Developed from the cross of PI372129/Amidon//Amidon/3/MT 9312 and released by the Montana Agricultural Experiment Station in 2003. It is a semidwarf hard red spring wheat with good resistance to the Russian wheat aphid and has been one of the highest yielding wheats in our Advanced spring wheat nursery across Montana from 2000-2003. Outlook has middense, erect, tapering heads with red awns and glumes. Outlook shows good resistance to prevalent races of stem rust in Montana. Outlook has acceptable milling and baking quality. Outlook is protected under the Plant Variety Protection Act (Certificate # 200400008) and can only be sold or advertised by variety name as a class of certified seed.

REEDER - Developed by the North Dakota Agricultural Experiment Station, the cross involved a relative of 'Stoa', a NDSU experimental line and germplasm from a breeding program in Brazil. Reeder was released in 1999. Reeder is an awned, semidwarf hard red spring wheat. Reeder yields well especially in northeastern Montana and western North Dakota. Reeder has resistance to the upper midwest races of stem and leaf rust. Milling and baking qualities 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.

SCHOLAR - Developed from the cross, MT8808/'Marberg', made by the Montana Agricultural Experiment Station. Scholar was released in 1998. It is a good yielding hard red spring wheat with moderate resistance to the wheat stem sawfly. Scholar is awned with white chaff and straw and is intermediate in height. Scholar has good resistance to Septoria and stem rust, is moderately resistant to leaf rust, and moderately susceptible to stripe rust. Scholar has good milling and baking qualities. This variety is protected under the Plant Variety Protection Act.

VIDA - Vida was derived from the cross of Scholar/Reeder made in 1998 by the Montana Agricultural Experiment Station. Vida was released in 2005. Vida is a high yielding hard red spring with moderate resistance to leaf and stripe rust but is moderately susceptible to stem rust. Vida is a semidwarf wheat with white glumes and awns. Kernels are red, ovate with rounded cheeks and a mid-deep crease. Vida has good milling and 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.

VOLT – Volt is a hard red spring wheat developed by Dr. Peter Franck with the plant breeding company, PZO Pflanzenzucht Oberlimpurg, in Germany and has been thoroughly tested by WestBred, LLC and released in 2008. Volt is a high yielding semidwarf wheat under irrigated conditions with good tolerance to stripe rust and fusarium head blight. Volt heads four days later than Hank. Volt is a hollow stemmed wheat susceptible to wheat stem sawfly damage. Volt has fair milling and baking quality. Application for the Plant Variety Protection Act has been submitted.

WestBred 926 - Developed by WestBred, LLC. from a recurrent selection population. WestBred 926 is a semidwarf hard red spring wheat similar to WestBred 906R. WestBred 926 was released in 1987. The spike is awned, white chaffed, slightly longer and more oblong than WestBred 906R. The kernel is red, ovate, with medium length brush, and rounded cheeks. It is resistant to stem rust and powdery mildew.

Hard White Spring Wheats

MTHW9420 – Developed by the Montana Agricultural Experiment Station from the cross of MT8182/MT8289 and was released in 2000. It is a semidwarf spring wheat with medium maturity. MTHW9420 is white chaffed and has hard white kernels. 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.

EXPLORER - Developed by the Montana Agricultural Experiment Station and released in 2002. It was derived from the cross of MT8182/Fortuna//Pondera/MT8182. Explorer is a semidwarf variety with early maturity. Explorer has white chaff and hard white kernels. It has good stem rust resistance, but is susceptible to foliar diseases especially Septoria. Explorer has exceptional milling and baking quality. 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.

Durum Wheats

AC AVONLEA - Released by Ag Canada in 1997. AC Avonlea has medium maturity, straw strength and height. It has good resistance to stem and leaf rusts. It has a good overall durum milling and processing quality. 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.

ALKABO - Was selected from the cross D901247/D89263 and released by the North Dakota Agricultural Experiment Station in cooperation with the USDA-ARS in 2005. It is a standard height variety with medium maturity and is day length-sensitive. It has white culm, midlong spikes with white awns and glumes. It is resistant to races of leaf and stem rust found in North Dakota. It has moderate resistance to tan spot and Fusarium head blight. 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.

ALZADA - Developed from the cross 'Mohawk/Kofa' and released in 2004 by WestBred, LLC. Alzada was tested extensively by WestBred, LLC trials in Arizona and in irrigated and dryland Pacific Northwest locations prior to testing in the Montana State University statewide trials. Alzada is an early, non-daylength sensitive durum that produces yields combined with very high quality grain when grown in northern durum areas. Alzada is a semidwarf variety with excellent straw strength, good tolerance to sawfly and a good foliar disease package. Alzada has medium protein levels and with strong gluten characteristics, Alzada produces a bright yellow semolina from which high quality durum products can be made. 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.

BEN - Developed from the cross of D8024/Monroe by the North Dakota Agricultural Experiment Station. Ben is a high-yielding, high-test weight, stiffed-strawed variety. It is a day length-sensitive durum. Ben has long erect spikes, is awned, mid-dense and oblong. Ben is a medium tall, medium maturing variety. It has three per 10,000 plants which are taller than the average height of the crop. Depending on the environment Ben may have one per 1000 bronze-colored chaffed plants in a field. Ben is resistant to stem rust, leaf rust and tan spot. It is moderately resistant to Fusarium head blight. Ben is protected under the Plant Variety Protection Act of 1994 and can only be sold or advertised by variety name as a class of certified seed.

DILSE – Was selected from the cross ‘Maier’/D88273 and released by the North Dakota Agricultural Experiment Station in cooperation with the USDA-ARS in 2002. It is a standard height, late-maturing variety that is day length-sensitive. It has white culm, midlong spikes with white awns and glumes. It is resistant to races of leaf and stem rust found in North Dakota. 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.

DIVIDE - Was selected from the cross “Ben’//‘Belzer’ and released by the North Dakota Agricultural Experiment Station in cooperation with the USDA-ARS in 2005. It is a standard height variety with medium maturity and is day length-sensitive. It has white culm, midlong spikes with white awns and glumes. It is resistant to races of leaf and stem rust found in North Dakota. It has moderate resistance to tan spot and Fusarium head blight. 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.

GRE Nora -Was selected from the cross D901260/D901419 and released by the North Dakota Agricultural Experiment Station in cooperation with the USDA-ARS in 2005. It is a tall standard height variety with medium to early maturity and is day length-sensitive. It has white culm, midlong spikes with white awns and glumes. It is resistant to races of leaf and stem rust found in North Dakota. It has moderate resistance to tan spot and Fusarium head blight. 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.

KYLE - Developed from the cross of Wakooma/2/(DT322, Blue Giant/4*Lakota)/3/Wakooma/2/ (DT320, Blue Giant/2*Lakota) by Agriculture Canada Research Station, Swift Current, Saskatchewan. It was released in 1984. Kyle has a white glumes, glabrous spike, with long spreading awns that turn black at maturity. It has medium-sized kernels. Kyle is resistant to prevalent races of leaf and stem rust. It is moderately susceptible to tan spot and septoria leaf spot and susceptible to loose smut.

LEB SOCK – Lebsock was released in 1999 by the North Dakota Agricultural Experiment Station. It has good yield, high test weight and a high semolina extract. Lebsock is a stiff-strawed durum with medium height and maturity with day length sensitivity. It is resistant to stem and leaf rust and moderately resistant to Tan spot and is moderately susceptible to Fusarium head blight. 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.

MAIER – The North Dakota Agricultural Experiment Station released Maier durum wheat in 1999. Maier is a late maturing, stiff-strawed, day length sensitive durum with a medium height. Maier has a good semolina extraction with strong gluten. Maier is resistant to stem and leaf rust diseases. 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.

MONROE - Developed from the cross of (D6771/Rugby)/Vic by the North Dakota Agriculture Experiment Station. It was released in 1985. It is early maturing with white chaff. The kernels are large. Monroe is resistant to prevalent races of stem rust and moderately resistant to prevalent races of leaf rust. The combination of earliness and high yield makes Monroe well suited for growing in all durum areas of the state.

MOUNTRAIL – Developed from the cross D8479/Renville made by the North Dakota Agricultural Experiment Station which was released in 1999. Mountrail is a medium height, late maturing, stiff-strawed, day-length sensitive durum wheat. It is resistant to both leaf and stem rusts, but only moderately resistant to Tan spot and moderately susceptible to Fusarium head blight. Mountrail has a high semolina extract with strong gluten. 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.

MUNICH - Developed from the cross D8030/D8016 by the North Dakota Agricultural Experiment Station and released in 1995. It is a day length sensitive durum wheat. Munich is a strong gluten durum variety. It is resistant to leaf rust and stem rust and moderately susceptible to Fusarium head blight. 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.

PIERCE - Was selected from the cross D86117/D88289 and released by the North Dakota Agricultural Experiment Station in cooperation with the USDA-ARS in 2001. It is a standard height variety with medium maturity and is day length-sensitive. It has white culm, midlong lax spikes with white awns and glumes. It is resistant to races of leaf and stem rust found in North Dakota and is moderately susceptible to Fusarium head blight. 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.

PLAZA – Derived from the cross, DT606/D8291, and released in 1999 by the North Dakota Agricultural Experiment Station. It is a late maturing semi-dwarf durum. Plaza has an average protein with strong gluten. It is resistant to leaf and stem rusts. 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.

STRONGFIELD – Released by Ag Canada in 2004. Strongfield is medium in height and maturity. It shows good resistance to leaf and stem rusts prevalent across the Canadian plains, but only moderately resistant to common bunt. It exhibits good end use qualities with a high protein, low grain cadmium concentration, high yellow pigment and a moderately strong gluten content.

VIC - Developed from the cross, Edmore/Ward, by the North Dakota Agricultural Experiment Station cooperatively with Agricultural Research, Science and Education Administration, USDA. This variety was released to growers in 1979. It is a standard height, day length-sensitive spring durum. It has white awns and glumes. Vic is resistant to stem rust and moderately resistant to leaf rust and blackpoint. The milling, processing and cooking properties of this variety are satisfactory.

* The asterisk is used as a part of the formulation to indicate the number of backcrosses of parents constituting the variety.

PLANT VARIETY PROTECTION (PVP)

The developer of a new distinct variety may obtain protection (essentially a patent) for that variety if he/she chooses to do so, provided the variety meets the requirements of the Plant Variety Protection Act of 1970. This Act permits the owner or developer of a variety to prohibit others from selling, sexually multiplying, using for propagation for seed, or using to produce a hybrid, seed of his variety.

Two options, for plant variety protection, are available to the developer of the variety. Under the first option, the developer of the variety or his/her agent may sell either certified or uncertified seed of the variety. If the developer of the variety has reason to believe that anyone is infringing on his/her rights, he/she may resort to civil action.

The other option ("certification option") for protecting a variety utilizes the provision of Title V of the Federal Seed Act. A variety protected in this manner may be sold by variety name only as a class of certified seed.

It is the responsibility of the seller to inform the buyer if the variety is protected. Each container of seed sold should be labeled with a tag indicating the type of protection which the owner has. Under the first option, the label will state: "Unauthorized Propagation Prohibited - U.S. Protected Variety."

If the owner of the variety has chosen the other option for variety protection, the label will state, "Unauthorized Propagation Prohibited - To be Sold by Variety Name Only as a Class of Certified Seed - U.S. Protected Variety."

PLEASE NOTE: Varieties protected under the 1994 PVP act no longer can be sold without permission of the variety owner (the farmer exemption has been excluded)'

A complete listing of all protected varieties is available in the "Official Journal of the Plant Variety Protection Office" which may be obtained upon request from:

Plant Variety Protection Office
Warehouse Division, AMS
U.S. Dept. of Agriculture
National Agricultural Library
Beltsville, MD 20705
Phone: (301) 504-5518
Internet: <http://www.ams.usda.gov/science/pvpo/pvpindex.htm>

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