

## RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2006

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- PROJECT TITLE:** Off-Station Spring Wheat Variety Performance Trials in South Central Montana. (Exps. 069994, 069995, 069996 and 069997). This research is partially supported by the Montana Wheat and Barley Committee.
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- OBJECTIVES:** To provide growers in south central Montana with a reliable, unbiased, up-to-date source of information that will permit valid comparisons among improved spring wheat varieties. This information should help spring wheat producers in south central Montana select varieties best suited to their particular area and growing conditions.
- METHODS:** The 2006 off-station spring wheat trials were established under dryland conditions near Molt and Ryegate, and under irrigated conditions near Fromberg and Hysham, Montana (Figure 1). The spring wheat trials for this region of Montana each possessed 24 entries (21 commercial cultivars, 3 experimental lines).

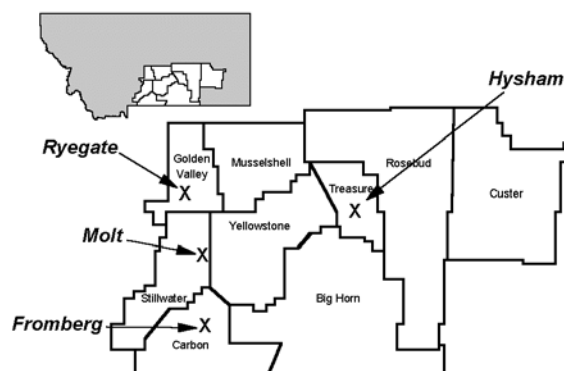


Figure 1. 2006 off-station spring wheat trial locations in south central Montana.

All studies were planted using a randomized complete block design with three replications. All entries were seeded at approximately 0.75 million seeds per

acre under dryland conditions (~60 lb/a) and 1.5 million seeds per acre under irrigation (~90 lb/a). Actual seeding rates were calculated from the thousand kernel weight determined for the seed lot of each cultivar (Table 1), and varied from 50 to 85 pounds per acre for the dryland sites and from 100 to 169 pounds per acre under irrigation. Seeding rates were not adjusted for germination. Dryland test plots established on conventional summer fallow consisted of a 15-foot, 4-row plot with 14-inch row spacing. Irrigated test plots consisted of a 15-foot, 7-row plot with 7-inch row spacing. All rows of each test plot were trimmed 36 inches and harvested using an experimental plot combine. Recorded grain yields were adjusted to 13% grain moisture content, and are reported in bushels per acre (bu/a) based on a 60 pound standard bushel weight. Test weight (lb/bu, pounds per bushel) and grain moisture content (% , percent) were obtained for each plot using a Dickey-john™ GAC 2100 grain analyzer. Grain protein (% , percent) was estimated for each entry bulked across replications using near infrared spectroscopy. Reported grain protein values are adjusted to a 12% grain moisture content. Plant height was measured in inches from the soil surface to the top of the head, excluding the awns if present. Lodging severity was recorded on a 0 to 9 scale at Hysham, representing no lodging to all stems lying flat on the ground, respectively. Information pertaining to the traits and characteristics of the 24 spring wheat entries are provided in Table 2.

Table 1. Adjusted seeding rates used to establish 24 spring wheat cultivars tested at four off-station sites in south central Montana during 2006.

Cultivar	Thousand Kernel Weight	Seeds per Pound	1/ Dryland		2/ Irrigated	
			Seeding Rate per plot	Seeding Rate per acre	Seeding Rate per plot	Seeding Rate per acre
	grams	#	grams	pounds	grams	pounds
Agawam	51.2	8,871	52.9	85	105.7	169
Briggs	35.0	12,966	36.2	58	72.3	116
Choteau	32.5	13,983	33.5	54	67.1	107
Conan	34.2	13,266	35.4	57	70.7	113
Ernest	31.1	14,592	32.1	51	64.3	103
Explorer	31.4	14,446	32.5	52	64.9	104
Fortuna	35.5	12,803	36.6	59	73.3	117
Freyr	35.7	12,721	36.9	59	73.7	118
Glenn	33.3	13,638	34.4	55	68.8	110
Hank	49.0	9,262	50.6	81	101.3	162
Ingot	35.8	12,667	37.0	59	74.1	118
Jefferson	34.5	13,148	35.7	57	71.3	114
Jerome	33.6	13,493	34.8	56	69.5	111
Knudson	33.7	13,457	34.9	56	69.7	111
McNeal	30.3	14,982	31.3	50	62.6	100
Norpro	31.0	14,646	32.0	51	64.0	102
Outlook	33.0	13,774	34.0	54	68.1	109
Reeder	33.7	13,484	34.8	56	69.6	111
Scholar	32.1	14,138	33.2	53	66.3	106
Vida	34.2	13,266	35.4	57	70.7	113
Westbred 926	45.9	9,897	47.4	76	94.8	152
MT0515	33.4	13,602	34.5	55	69.0	110
MT0564	37.2	12,213	38.4	61	76.8	123
MTHW0202	37.5	12,113	38.7	62	77.4	124

1/ Equivalent to 0.75 million seeds per acre on a mass basis.

2/ Equivalent to 1.5 million seeds per acre on a mass basis.

## **RESULTS:**

The 2006 spring wheat test sites were unusually dry over-winter, with very little snow accumulating during December, January and February. Dry conditions prevailed until mid-March, when early spring rains produced above average precipitation during a 3 week period from late March to early April. All four of the test locations planted in the spring of 2006 possessed adequate soil moisture to

facilitate germination and emergence. Spring wheat stands appeared fairly uniform at all sites before the end of May.

The region was unusually dry and warm during May, June and July. Huntley received only 1.7 inches of precipitation during this period in 2006, compared to 5.9 inches this location normally receives during this three month interval. Accumulated heat units at Huntley were 20 percent above normal from May 1 to the middle of July. The trial at Ryegate was severely damaged by drought and grasshopper infestations during June and July, and was not harvested for yield in 2006. Stripe rust (*Puccinia striiformis*), which adversely impacted some spring wheat in this region of the state the previous year, was not evident during 2006. Hot, dry weather beginning in late May and continuing through June and July, hastened maturation of the crop. Overall, irrigated off-station spring wheat yields and test weight values in 2006 were above average, with average grain protein content comparable to studies conducted at these sites the previous year. Intermittent drought conditions continue to dampen the performance of spring cultivars tested under dryland conditions.

Molt spring wheat yields averaged 13.7 bu/a in 2006 (Table 3), which was nearly 1.5 times the spring wheat yields experienced at this site in 2005. Grain yields ranged from 11.3 bu/a for 'Ernest' to 15.3 bu/a for 'Jefferson'. Twelve commercial entries ('Agawam', 'Briggs', 'Choteau', 'Explorer', 'Freyr', 'Glenn', 'Hank', 'Ingot', 'Jerome', 'Outlook', 'Reeder', 'Vida' and 'Westbred 926') produced yields between 13.4 and 15.1 bu/a, which are statically equal to the yield of Jefferson. Average test weight at Molt in 2006 was 58.8 pounds per bushel, nearly 2 pounds per bushel lighter than the average test weight observed at Molt in 2005 and very similar to average test weights measured in 2004. Test weight among the 24 entries varied from 54.4 lb/bu for 'McNeal' to 62.1 lb/bu for Glenn. Sixteen of the 21 hard red spring wheat entries possessed test weight values heavier than 58 lb/bu. Only one of the three hard white entries (Agawam) possessed test weight values heavier than 60 lb/bu. Grain protein levels averaged 12.8 percent and varied from 11.0 percent for Jerome to 14.6 percent for McNeal. Two-year average yield for spring wheat varieties tested during 2005 and 2006 at Molt averaged 11.7 bu/a. Three-year average yield for spring wheat varieties tested during 2004, 2005 and 2006 in Molt averaged 17.5 bu/a. No statistical differences in grain yield were detected between spring wheat cultivars tested at Molt for either the past two or three years.

The highest yielding spring wheat cultivar tested under irrigation at Hysham was Hank, averaging 123.8 bu/a (Table 4). Fourteen commercial entries (Agawam, Briggs, Choteau, Freyr, Glenn, Ingot, Jefferson, Jerome, 'Knudson', 'Norpro', Reeder, Vida and Westbred 926) had yields from 111.1 to 123.6 bu/a, which were equal to the highest yielding entry. Average test weight was 61.6 lb/bu, with most of the hard red spring wheat entries having test weights greater than 58 lb/bu. All three hard white entries possessed mean test weights above 60 lb/bu. Grain protein levels averaged 12.9 percent and varied from 12.3 percent for Outlook to 13.9 percent for Vida. Minor lodging was observed among the entries tested at Hysham in 2006. No lodging was observed for most entries, and the modest amount of lodging that was observed, did not appear to deleteriously affect the overall performance of those cultivars. Two-year average yield for spring wheat varieties tested during 2005 and 2006 averaged 101.8 bu/a, with Norpro averaging the highest yield (112.9 bu/a) the past two years. Three-year average yield for spring wheat varieties tested during 2004, 2005 and 2006 averaged 102.5 bu/a, with the cultivar Hank averaging the high yield of 111.5 bu/a for the past three years.

The average spring wheat yield at Fromberg in 2006 was 104.9 bu/a (Table 5), nearly 15 bu/a more than yields observed at this site in 2005 and approximately 35 bu/a more than yields observed in 2004. Yields ranged from 116.4 bu/a for Agawam to 87.3 bu/a for Explorer. The commercial entries Briggs, Choteau, Hank, Jefferson, Jerome, McNeal, Norpro, and Vida produced yields equal with

that of the highest yielding entry in 2006, ranging from 108.2 to 114.4 bu/a. Average test weight was 63.13 lb/bu, with all 24 entries having test weights greater than 60 lb/bu. Grain protein levels averaged 12.6 percent and varied from 11.9 percent for Jefferson to 13.7 percent for Vida. No lodging was observed among the spring wheat entries tested at Fromberg in 2006. Two year average yield for spring wheat varieties tested during 2005 and 2006 in Fromberg averaged 95.3 bu/a. Three-year average yield for spring wheat varieties tested during 2004 to 2006 was 86.3 bu/a. No statistical differences in grain yield were detected between spring wheat cultivars tested at Fromberg for either past two or three years.

**SUMMARY:**

Both the Molt and Ryegate trials suffered from drought conditions during late spring and through the summer growth period, which substantially reduced yields in 2006. The Ryegate site was not harvested. Grain quality of the spring wheat harvested at Molt was not as adversely affected as yield. This was likely due to more favorable soil moisture conditions at planting, but lingering effects of the prolonged drought were still evident during grain fill. Discerning yield differences and predicting overall performance among entries for dryland production has been difficult under such stressful conditions (Table 3).

A substantial difference in yield, but a general agreement in ranking of the top yield entries was evident between the two irrigated test sites at Hysham and Fromberg (Table 6, 8). The commercial spring wheat entries Hank, Agawam, Choteau, Vida, Jerome, Norpro, Briggs, and Jefferson all produced high yields at both locations. The commercial entries Freyr, Westbred 926, Reeder, Glenn, Knutson and Ingot produced high yields at Hysham, but not at the Fromberg site. McNeal was among the highest yielding entries at Fromberg, but not at the Hysham site in 2006. The highest yielding spring wheat cultivars tested under irrigation at both test sites the past three seasons include Hank, Vida, Choteau, Outlook, McNeal, Ernest, Westbred 926 and Reeder (Table 8).

**FUTURE PLANS:**

Off-station spring wheat variety performance trials will continue in 2007 at the Molt, Ryegate, Hysham and Fromberg locations.

Table 2. Selected characteristics and traits of 24 spring wheat cultivars performance tested at four off-station sites in south central Montana during 2006.

Cultivar	1/ Origin	Year of Release	2/ Market Class	3/ PVP	4/ Maturity	5/ Straw Strength	6/ Disease Resistance				6/ Insect Resistance			7/ Quality	
							Fusarium Head Blight (Scab)	Leaf Rust	Stem Rust	Stripe Rust	Wheat Stem Sawfly	Russian Wheat Aphid	Hessian Fly (GP Biotype)	Milling	Baking
							Yes/No							1-5	1-5
<u>Commercial Entries</u>															
Agawam	WestBred	2005	HW	Y	E	VS	S	-	-	R	R	S	S	-	-
Briggs	SDSU	2002	HRS	Y	E-M	M	S	R	MR	MR	S	S	S	-	-
Choteau	MSU	2003	HRS	Y	E-M	VS	S	-	R	S	R	S	S	4	4
Conan	WestBred	1997	HRS	Y	-	S	S	R	-	R	MS	S	S	3	3
Ernest	NDSU	1995	HRS	Y	M-L	M	S	R	R	R	MR	S	S	5	4
Explorer	MSU	2002	HW	Y	E	S	S	MR	R	MR	S	S	S	4	5
Fortuna	NDSU	1966	HRS	N	E	MW	S	R	R	VS	R	S	S	5	4
Freyr	AgriPro	2004	HRS	Y	M	S	MR	MR	MR	MR	S	S	S	3	3
Glenn	NDSU	2005	HRS	Y	M	S	MR	R	R	MR	S	S	S	4	4
Hank	WestBred	1999	HRS	Y	E	S	S	R	R	MR	S	S	R	3	5
Ingot	SDSU	1998	HRS	Y	E-M	M	MS	S	R	-	S	S	S	-	-
Jefferson	UI	1998	HRS	Y	M	S	S	MS	-	MR	S	S	MR	-	-
Jerome	UI	2004	HRS	Y	M	S	S	-	-	R	S	S	R	-	-
Knudson	AgriPro	2001	HRS	Y	M	M	MR	R	R	S	S	S	S	3	4
McNeal	MSU	1995	HRS	N	M	S	S	MS	MR	VS	S	S	S	3	5
Norpro	AgriPro	1999	HRS	Y	M	S	MS	MR	R	VS	S	S	S	3	4
Outlook	MSU	2003	HRS	Y	M-L	S	S	MR	R	S	S	R	S	3	4
Reeder	NDSU	1999	HRS	Y	M-L	S	MS	MR	R	MR	S	S	S	4	4
Scholar	MSU	1998	HRS	Y	M-L	VS	S	MR	R	MR	MR	S	S	5	4
Vida	MSU	2006	HRS	Y	M-L	S	S	-	MS	MR	MS	S	S	4	5
Westbred 926	WestBred	1987	HRS	Y	E-M	S	S	R	R	MR	S	S	R	4	5
<u>Experimental Entries</u>															
MT0515	MSU	-	HRS	-	-	-	-	-	-	-	-	-	-	-	-
MT0564	MSU	-	HRS	-	-	-	-	-	-	-	-	-	-	-	-
MTHW0202	MSU	-	HW	-	E	-	-	-	-	-	R	S	S	-	-

1/ AgriPro=AgriPro Seeds Inc. Berthoud, Colorado; MSU=Montana State University; NDSU=North Dakota State University; SDSU=South Dakota State University; UI=University of Idaho; WestBred=WestBred LLC, Bozeman, Montana.

2/ HRS=hard red spring wheat market class; HW=hard white wheat market class.

3/ Indicates a cultivar is protected under the Federal Plant Variety Protection Act of 1970 and amended in 1995.

4/ E=early maturity, M=medium maturity, L=late maturity.

5/ S=strong straw strength, MS=moderately strong straw strength, M=medium straw strength, MW=moderately weak straw strength, W=weak straw strength.

6/ R=resistant, MR=moderately resistant, MS=moderately susceptible, S=susceptible, VS=very susceptible.

7/ Milling and baking quality rated from 1 to 5 where 1=poor and 5=superior quality, respectively.

Table 3. Performance of 24 spring wheat cultivars and experimental lines tested under dryland conditions near Molt, Montana during 2006. Cultivars listed alphabetically. (Exp. 069994).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain	Plant Height
	2006	2005-06	2004-06			Protein	
	----- bushels/acre -----			lb/bu	%	%	inches
Agawam	<b>14.8*</b>	11.1		60.7	8.6	11.6	22.6
Briggs	<b>14.8*</b>	12.2		59.7	8.4	11.7	25.5
Choteau	<b>13.4*</b>	10.8	16.9	59.3	8.0	12.6	19.9
Conan	11.6	10.6	15.7	60.3	8.4	13.2	20.0
Ernest	11.3	10.4	17.0	58.7	8.0	13.1	23.8
Explorer	<b>14.1*</b>	11.4	17.1	57.5	8.0	13.3	23.5
Fortuna	12.8	10.0	17.5	57.2	8.0	13.8	24.9
Freyr	<b>14.7*</b>			59.2	8.2	13.5	22.9
Glenn	<b>14.5*</b>			62.1	8.5	12.5	26.4
Hank	<b>15.1*</b>	13.0	19.2	58.6	8.4	11.2	20.6
Ingot	<b>13.9*</b>	12.0		60.9	8.6	11.8	26.5
Jefferson	<b>15.3**</b>	11.7		58.0	8.1	12.7	22.2
Jerome	<b>14.2*</b>	11.5		59.1	8.5	11.0	20.5
Knudson	12.9	12.2		60.7	8.3	12.5	19.8
McNeal	11.7	10.8	17.5	54.4	7.6	14.6	21.4
Norpro	11.4	10.7		59.0	8.1	12.5	19.8
Outlook	<b>14.1*</b>	12.9	19.9	56.1	7.6	13.2	20.6
Reeder	<b>15.1*</b>	14.1	19.0	58.5	8.2	12.4	21.1
Scholar	12.7	11.3	17.2	58.9	8.3	13.4	23.3
Vida	<b>14.1*</b>	12.3	18.5	57.8	8.4	12.6	20.7
Westbred 926	<b>14.5*</b>	12.4	15.8	59.1	8.5	11.8	20.7
MT0515	12.9			58.5	8.3	12.5	19.9
MT0564	<b>13.9*</b>			57.6	8.0	13.4	22.0
MTHW0202	<b>13.7*</b>	12.1	16.6	58.3	8.2	13.1	21.8
Average	13.7	11.7	17.5	58.8	8.2	12.6	22.1
PLSD (p=0.05)	2.3	ns	ns	2.4	0.5	--	2.3
CV%	10.3	19.7	20.3	2.5	3.5	--	6.2

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.

2/ Grain protein values adjusted to 12 percent grain moisture content.

ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Molt Dryland Spring Wheat (Exp. 069994)

Planted: May 3, 2006  
Harvested: August 9, 2006  
Fertility: 11-52-00, 100 lbs/a in-furrow at planting  
Herbicide: Roundup Ultra, PPI, 16 oz/a, May 8, 2006  
Insecticide: none applied  
Previous Crop: summer fallow  
Precipitation: n/a

Table 4. Performance of 24 spring wheat cultivars and experimental lines tested under irrigation near Hysham, Montana during 2006. Cultivars listed alphabetically. (Exp. 069996).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein		Plant Height	Lodging
	2006	2005-06	2004-06			%	%		
	----- bushels/acre -----			lb/bu	%	%	inches	0-9	
Agawam	<b>116.8*</b>	<b>107.1*</b>		61.1	15.4	12.9	34.0	0.0	
Briggs	<b>117.3*</b>	<b>104.1*</b>		62.6	13.2	13.2	37.8	0.0	
Choteau	<b>117.7*</b>	<b>106.0*</b>	<b>105.9*</b>	62.5	13.6	13.0	34.9	0.0	
Conan	102.6	94.7	97.2	57.8	15.4	13.0	34.4	0.0	
Ernest	107.4	98.7	<b>104.5*</b>	62.3	13.2	12.7	42.9	0.0	
Explorer	92.1	84.3	86.4	60.3	12.7	12.7	32.2	0.3	
Fortuna	107.2	93.1	98.5	62.7	12.2	12.9	37.8	1.0	
Freyr	<b>123.6*</b>			62.1	13.1	13.3	37.1	0.0	
Glenn	<b>111.1*</b>			64.5	13.2	13.5	38.6	0.0	
Hank	<b>123.8**</b>	<b>112.4*</b>	<b>111.5**</b>	61.5	12.6	12.6	33.7	0.0	
Ingot	<b>116.0*</b>	97.5		63.7	13.0	13.1	40.9	0.0	
Jefferson	<b>113.9*</b>	<b>105.1*</b>		62.2	12.2	12.6	34.3	0.0	
Jerome	<b>118.8*</b>	<b>109.5*</b>		61.8	12.8	12.8	35.6	0.0	
Knudson	<b>113.4*</b>	<b>105.8*</b>		61.3	14.3	12.4	35.7	1.7	
McNeal	109.3	98.6	<b>103.1*</b>	61.7	12.5	13.1	39.8	0.0	
Norpro	<b>123.6*</b>	<b>112.9**</b>		61.2	14.8	12.6	35.6	0.0	
Outlook	107.1	102.5	<b>104.9*</b>	60.3	13.0	12.3	39.4	0.0	
Reeder	<b>112.5*</b>	101.5	<b>104.4*</b>	62.1	12.9	12.8	38.3	0.0	
Scholar	104.4	90.7	98.1	62.3	12.1	13.3	39.0	0.0	
Vida	<b>116.4*</b>	102.1	<b>105.8*</b>	58.6	15.7	13.9	35.8	0.3	
Westbred 926	<b>120.1*</b>	<b>106.5*</b>	<b>107.5*</b>	60.8	12.8	13.0	34.6	0.0	
MT0515	<b>121.3*</b>			59.8	14.9	12.8	37.3	0.0	
MT0564	<b>117.6*</b>			62.5	12.3	13.5	33.4	0.0	
MTHW0202	<b>117.1*</b>	102.7	<b>104.4*</b>	63.7	13.1	12.9	37.0	0.0	
Average	113.8	101.8	102.5	61.6	13.4	12.9	36.7	0.1	
PLSD (p=0.05)	13.3	9.5	8.6	2.0	1.8	--	2.5	ns	
CV%	7.1	7.7	8.7	2.0	8.1	--	4.2	656.2	

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.

2/ Grain protein values adjusted to 12 percent grain moisture content.

\*\* Indicates highest yielding cultivar within a column.

\* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).

ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

#### Hysham Irrigated Spring Wheat (Exp. 069996)

Planted: March 17, 2006  
 Harvested: July 25, 2006  
 Fertility: 35-60-60, PPI, March 10, 2006; 60-0-0, PRE, March 17, 2006  
 Herbicide: Bronate Advanced, 12.8 oz/a; Starane 4.8 oz/a; Express 0.1 oz/a; Headline 3 oz/a; non-ionic surfactant, 10 oz/a, POST, May 11, 2006  
 Insecticide: Warrior, 2.5 oz/a, POST, May 11, 2006  
 Previous Crop: sugar beets  
 Irrigation: flood  
 Precipitation: n/a

Table 5. Performance of 24 spring wheat cultivars and experimental lines tested under irrigation near Fromberg, Montana during 2006. Cultivars listed alphabetically. (Exp. 069997).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain	Plant Height
	2006	2005-06	2004-06			Protein	
	----- bushels/acre -----			lb/bu	%	%	inches
Agawam	<b>116.4**</b>	101.1		65.1	9.7	13.3	32.3
Briggs	<b>110.6*</b>	95.5		63.6	9.1	12.8	34.8
Choteau	<b>113.5*</b>	101.3	94.4	64.0	9.4	12.6	36.0
Conan	95.1	86.9	80.0	62.6	9.3	12.2	32.8
Ernest	100.4	85.2	85.4	63.3	9.2	12.2	43.0
Explorer	87.3	91.1	80.9	61.2	8.7	12.8	31.5
Fortuna	102.2	86.4	78.4	63.6	9.4	12.3	39.7
Freyr	105.0			63.6	9.3	13.0	35.5
Glenn	102.6			65.9	9.7	12.6	37.5
Hank	<b>112.6*</b>	110.1	94.8	61.1	8.9	12.7	31.9
Ingot	93.9	77.9		64.1	9.4	12.6	41.1
Jefferson	<b>108.2*</b>	101.5		62.9	9.1	11.9	33.3
Jerome	<b>111.2*</b>	109.1		62.9	9.1	12.4	32.5
Knudson	98.4	93.4		62.6	9.2	12.5	33.5
McNeal	<b>108.6*</b>	91.7	87.2	61.8	9.0	12.6	37.3
Norpro	<b>109.2*</b>	103.5		63.3	9.2	12.4	33.6
Outlook	102.7	93.8	89.1	61.5	8.9	12.8	37.6
Reeder	102.5	94.0	83.5	63.5	9.0	12.0	35.9
Scholar	99.4	83.6	82.3	63.2	9.3	13.0	40.9
Vida	<b>114.4*</b>	101.4	97.2	62.7	9.5	13.7	36.4
Westbred 926	102.5	96.5	81.5	61.9	8.8	12.4	31.6
MT0515	<b>109.0*</b>			64.2	9.4	12.0	36.2
MT0564	<b>108.6*</b>			63.1	9.1	12.8	35.0
MTHW0202	103.8	103.1	87.7	63.7	9.2	12.6	33.2
Average	104.9	95.3	86.3	63.1	9.2	12.6	35.5
PLSD (p=0.05)	8.3	ns	ns	0.6	0.2	--	1.9
CV%	4.8	15.7	22.1	0.6	1.4	--	3.2

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.

2/ Grain protein values adjusted to 12 percent grain moisture content.

\*\* Indicates highest yielding cultivar within a column.

\* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).

ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Fromberg Irrigated Spring Wheat (Exp. 069997)

Planted: April 6, 2006  
 Harvested: August 7, 2006  
 Fertility: n/a  
 Herbicide: n/a  
 Insecticide: none applied  
 Previous Crop: sugar beets  
 Irrigation: flood  
 Precipitation: n/a

Table 6. Grain yield<sup>1/</sup> of 24 spring wheat cultivars tested at four locations in south central Montana during 2006. Varieties listed by declining four-location average yield.

Cultivars	Molt Dryland	Hysham Irrigated	Fromberg Irrigated	Irrigated Average	Three Location Average
	-----bushels per acre -----				
Hank	15.1*	123.8**	112.6*	118.2**	83.8**
Agawam	14.8*	116.8*	116.4**	116.6*	82.7*
Choteau	13.4*	117.7*	113.5*	115.6*	81.6*
Vida	14.1*	116.4*	114.4*	115.4*	81.6*
Jerome	14.2*	118.8*	111.2*	115.0*	81.4*
Norpro	11.4	123.6*	109.2*	116.4*	81.4*
Freyr	14.7*	123.6*	105.0	114.3*	81.1*
MT0515	12.9	121.3*	109.0*	115.1*	81.1*
Briggs	14.8*	117.3*	110.6*	113.9*	80.9*
MT0564	13.9*	117.6*	108.6*	113.1*	80.0*
Jefferson	15.3**	113.9*	108.2*	111.0*	79.1*
Westbred 926	14.5*	120.1*	102.5	111.3*	79.0*
MTHW0202	13.7*	117.1*	103.8	110.5*	78.2*
Reeder	15.1*	112.5*	102.5	107.5	76.7*
McNeal	11.7	109.3	108.6*	108.9	76.5*
Glenn	14.5*	111.1*	102.6	106.9	76.1*
Knudson	12.9	113.4*	98.4	105.9	74.9
Ingot	13.9*	116.0*	93.9	105.0	74.6
Outlook	14.1*	107.1	102.7	104.9	74.6
Fortuna	12.8	107.2	102.2	104.7	74.1
Ernest	11.3	107.4	100.4	103.9	73.0
Scholar	12.7	104.4	99.4	101.9	72.2
Conan	11.6	102.6	95.1	98.8	69.8
Explorer	14.1*	92.1	87.3	89.7	64.5
Average	13.7	113.8	104.9	109.4	77.5
PLSD (p=0.05)	2.3	13.3	8.3	8.4	7.8
CV%	10.3	7.1	4.8	6.4	10.6

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.

\*\* Indicates highest yielding cultivar within a column.

\* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).

Table 7. Performance of 24 spring wheat cultivars and experimental lines tested under both dryland and irrigated conditions at four locations in south central Montana during 2006. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	2006	2005-2006	2004-2006			%	
	----- bushels/acre -----			lb/bu	%	%	inches
Agawam	<b>82.7*</b>	<b>68.5*</b>		62.3	11.2	12.6	29.6
Briggs	<b>80.9*</b>	64.3		62.0	10.3	12.6	32.7
Choteau	<b>81.6*</b>	<b>68.0*</b>	<b>64.5*</b>	61.9	10.4	12.7	30.2
Conan	69.8	59.7	56.7	60.3	11.0	12.8	29.1
Ernest	73.0	59.9	60.3	61.4	10.1	12.7	36.6
Explorer	64.5	58.4	54.3	59.7	9.8	12.9	29.0
Fortuna	74.1	59.2	57.4	61.2	9.9	13.0	34.1
Freyr	<b>81.1*</b>			61.6	10.2	13.3	31.8
Glenn	<b>76.1*</b>			64.2	10.5	12.9	34.2
Hank	<b>83.8**</b>	<b>73.5**</b>	<b>66.7**</b>	60.4	10.0	12.2	28.8
Ingot	74.6	57.1		62.9	10.4	12.5	36.1
Jefferson	<b>79.1*</b>	<b>67.2*</b>		61.0	9.8	12.4	30.0
Jerome	<b>81.4*</b>	<b>71.4*</b>		61.3	10.1	12.1	29.5
Knudson	74.9	64.2		61.5	10.6	12.5	29.7
McNeal	<b>76.5*</b>	62.5	61.1	59.3	9.7	13.4	32.8
Norpro	<b>81.4*</b>	<b>69.1*</b>		61.1	10.7	12.5	29.7
Outlook	74.6	65.6	<b>63.5*</b>	59.3	9.8	12.8	32.5
Reeder	<b>76.7*</b>	65.5	<b>61.3*</b>	61.4	10.0	12.4	31.8
Scholar	72.2	58.7	58.8	61.5	9.9	13.2	34.4
Vida	<b>81.6*</b>	<b>67.5*</b>	<b>65.7*</b>	59.7	11.2	13.4	31.0
Westbred 926	<b>79.0*</b>	<b>67.4*</b>	60.5	60.6	10.0	12.4	29.0
MT0515	<b>81.1*</b>			60.8	10.9	12.4	31.1
MT0564	<b>80.0*</b>			61.0	9.8	13.2	30.1
MTHW0202	<b>78.2*</b>	<b>68.4*</b>	<b>62.2*</b>	61.9	10.2	12.9	30.7
Average	77.5	64.8	61.0	61.2	10.3	12.7	31.4
PLSD (p=0.05)	7.8	6.5	5.4	1.8	1.0	ns	2.8
CV%	10.6	16.5	18.3	3.2	10.0	4.4	9.3
Location Years	3	7	11	3	3	3	3

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.

2/ Grain protein values adjusted to 12 percent grain moisture content.

\*\* Indicates highest yielding cultivar within a column.

\* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).

ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Table 8. Performance of 24 spring wheat cultivars and experimental lines tested under irrigated conditions only in south central Montana during 2006. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain	Plant Height
	2006	2005-06	2004-06			Protein	
	----- bushels/acre -----			lb/bu	%	%	inches
Agawam	<b>116.6*</b>	<b>104.1*</b>		63.1	12.6	13.1	33.1
Briggs	<b>113.9*</b>	99.8		63.1	11.2	13.0	36.3
Choteau	<b>115.6*</b>	<b>103.6*</b>	<b>100.1*</b>	63.3	11.5	12.8	35.4
Conan	98.8	90.8	88.6	60.2	12.4	12.6	33.6
Ernest	103.9	91.9	<b>95.0*</b>	62.8	11.2	12.5	43.0
Explorer	89.7	87.7	83.7	60.7	10.7	12.8	31.8
Fortuna	104.7	89.7	88.5	63.2	10.8	12.6	38.8
Freyr	<b>114.3*</b>			62.9	11.2	13.2	36.3
Glenn	106.9			65.2	11.5	13.1	38.0
Hank	<b>118.2**</b>	<b>111.2**</b>	<b>103.2**</b>	61.3	10.8	12.7	32.8
Ingot	105.0	87.7		63.9	11.2	12.9	41.0
Jefferson	<b>111.0*</b>	<b>103.3*</b>		62.6	10.7	12.3	33.8
Jerome	<b>115.0*</b>	<b>109.3*</b>		62.4	10.9	12.6	34.0
Knudson	105.9	99.6		61.9	11.8	12.5	34.6
McNeal	108.9	95.1	<b>95.2*</b>	61.8	10.7	12.9	38.5
MT0515	<b>115.1*</b>			62.0	12.2	12.4	36.7
MT0564	<b>113.1*</b>			62.8	10.7	13.2	34.2
MTHW0202	<b>110.5*</b>	<b>102.9*</b>	<b>96.1*</b>	63.7	11.2	12.8	35.1
Norpro	<b>116.4*</b>	<b>108.2*</b>		62.2	12.0	12.5	34.6
Outlook	104.9	98.1	<b>97.0*</b>	60.9	11.0	12.6	38.5
Reeder	107.5	97.7	<b>94.0*</b>	62.8	11.0	12.4	37.1
Scholar	101.9	87.2	90.2	62.7	10.7	13.2	39.9
Vida	<b>115.4*</b>	101.7	<b>101.5*</b>	60.7	12.6	13.8	36.1
Westbred 926	<b>111.3*</b>	101.5	<b>94.5*</b>	61.3	10.8	12.7	33.1
Average	109.4	98.6	94.4	62.4	11.3	12.8	36.1
PLSD (p=0.05)	8.4	9.2	9.5	2.0	ns	0.6	2.4
CV%	6.4	11.4	15.1	2.7	10.7	2.1	5.5
Location Years	2	4	6	2	2	2	2

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.

2/ Grain protein values adjusted to 12 percent grain moisture content.

\*\* Indicates highest yielding cultivar within a column.

\* Indicates cultivars yielding equal to highest yielding cultivar within a column based on Fisher's protected LSD (p=0.05).

ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).