

RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2005

The Annual Report of the Investigations at and Administration of the
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- PROJECT TITLE:** Off-Station Spring Wheat Variety Performance Trials in South Central Montana. (Exps. 059994, 059995, 059996 and 059997). 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 2005 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 each possessed 24 entries (19 commercial cultivars, 5 experimental lines). The Ryegate trial was no-till recropped into pea stubble.

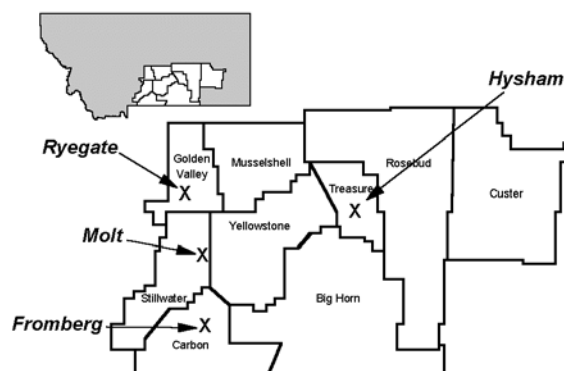


Figure 1. 2005 off-station spring wheat trial locations in south central Montana.

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 52 to 82 pounds per acre for the dryland sites and from 105 to 165 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 12-inch row spacing. Dryland test plots no-till planted into chemical 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 6-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/ac) 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 determined for each entry bulked across replications. 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 Fromberg and Hysham representing no lodging to all stems lying flat on the ground, respectively.

Table 1. Adjusted seeding rates used to establish 24 spring wheat cultivars tested at four off-station sites in south central Montana during 2005.

Cultivar	Thousand Kernel Weight	Seeds per Pound	1/ Dryland Seeding Rate		2/ Irrigated Seeding Rate	
			per plot	per acre	per plot	per acre
	grams	#	grams	pounds	grams	pounds
Agawam	49.2	9,234	50.8	81	101.6	162
Alsen	34.7	13,093	35.8	57	71.6	115
Briggs	34.6	13,112	35.8	57	71.5	114
Choteau	37.2	12,194	38.5	62	76.9	123
Conan	41.0	11,087	42.3	68	84.6	135
Ernest	37.5	12,122	38.7	62	77.4	124
Explorer	33.4	13,584	34.5	55	69.1	110
Fortuna	45.8	9,906	47.3	76	94.7	151
Hank	49.9	9,098	51.5	82	103.1	165
Ingot	34.8	13,030	36.0	58	72.0	115
Jefferson	31.7	14,319	32.8	52	65.5	105
Jerome	41.2	11,014	42.6	68	85.2	136
Knudson	37.7	12,058	38.9	62	77.8	124
McNeal	41.5	10,941	42.9	69	85.7	137
Norpro	37.5	12,122	38.7	62	77.4	124
Outlook	36.8	12,322	38.1	61	76.1	122
Reeder	38.2	11,895	39.4	63	78.9	126
Scholar	39.6	11,459	40.9	65	81.9	131
Vida (MT0245)	40.6	11,177	42.0	67	83.9	134
Westbred 926	46.5	9,770	48.0	77	96.0	154
MT0260	43.7	10,378	45.2	72	90.4	145
MT0266	43.5	10,433	45.0	72	89.9	144
MT0336	34.4	13,211	35.5	57	71.0	114
MTHW0202	45.2	10,033	46.7	75	93.5	150

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:

All spring wheat test locations planted in the spring of 2005 experienced dry conditions over-winter, but either possessed enough surface soil moisture or received enough precipitation to facilitate germination and emergence. Moisture conditions below the top few inches of the soil surface remained marginal for extended growth at the dryland sites. Spring wheat stands appeared fairly uniform at all sites two to three weeks after planting. Dry conditions prevailed during spring growth until mid-May, when late-spring rains produced above average precipitation for the region during May, June and into early July.

Huntley received slightly more than 8 inches of precipitation during this period in 2005, nearly double the 4.5 inches this location normally receives from May 1 through the first week of July. Hot, dry weather resumed in early July, hastening maturation of the crop. Stripe rust (*Puccinia striiformis*), which adversely impacted wheat yields and grain quality in other regions of the state, was present on susceptible spring wheat cultivars, especially 'McNeal', before the crop matured in south central Montana.

Molt was the driest of the four test locations in 2005, averaging only 9.7 bu/ac (Table 2). This average yield was less than 1/3 of yield produced by spring wheat cultivars tested at this location the previous year. Grain yields ranged from 7.1 bu/ac for 'Fortuna' to 13.0 bu/ac for 'Reeder', but no statistical difference in yield was observed between any of the 24 entries. Average test weight at Molt in 2005 was 60.7 pounds per bushel, nearly 2 pounds per bushel heavier than the average test weight observed at Molt in 2004. Nineteen of the 24 entries possessed test weight values heavier than 60 lb/bu. Grain protein levels averaged 10.9 percent and varied from 9.1 percent for 'Jerome' to 12.1 percent for Fortuna. Two-year average yield for spring wheat varieties tested during 2004 and 2005 at Molt averaged 19.9 bu/ac. Three-year average yield for spring wheat varieties tested during 2003, 2004 and 2005 in Molt averaged 18.4 bu/ac. No statistical differences in grain yield were detected between spring wheat cultivars tested at Molt for either the past two or three years.

The trial at Ryegate, grown under recropped dryland conditions, averaged 36.6 bu/ac in 2005, more than twice the yields observed at this location the previous year (Table 3). Grain yields ranged from 43.5 bu/ac for 'Hank' to 25.2 bu/ac for 'Ingot'. Thirteen entries had yields from 43.3 to 36.3 bu/ac, which were equal to the highest yielding entry. Average test weight at Ryegate in 2005 was 59.1 pounds per bushel, with 21 of the 24 entries expressing test weight values heavier than 58 lb/bu. Six entries, 'Agawam', 'MTHW0202', 'MT0260', 'Scholar', 'Norpro' and Reeder, produced test weights greater than 60 pounds per bushel. Grain protein levels averaged 10.7 percent and varied from 13.1 percent for 'Ernest' to 8.8 percent for Jerome. Two-year average yield for spring wheat varieties tested during 2004 and 2005 at Ryegate averaged 25.9 bu/ac. Three-year average yield for spring wheat varieties tested during 2003, 2004 and 2005 at Ryegate averaged 20.9 bu/ac. No statistical differences in grain yield were detected between spring wheat cultivars tested at Ryegate for either past two or three years.

The highest yielding spring wheat cultivar tested under irrigation at Hysham was Norpro, averaging 102.1 bu/ac (Table 4). Eleven commercial entries (Agawam, 'Briggs', 'Choteau', Ernest, Hank, 'Jefferson', Jerome, 'Knudson', 'Outlook', Reeder, 'Westbred 926') had yields from 100.9 to 89.9 bu/ac, which were equal to the highest yielding entry. Average test weight was 61.7 lb/bu, with all of the entries having test weights greater than 58 lb/bu. Grain protein levels averaged 13.6 percent and varied from 12.0 percent for 'Outlook' to 14.9 percent for 'Alsen'. Lodging was observed among entries tested at Hysham in 2005. Severity of lodging was greatest with the cultivar Scholar, whereas no lodging was observed among Agawam, Hank, Westbred 926 and Choteau spring wheats. Two-year average yield for spring wheat varieties tested during 2004 and 2005 averaged 98.1 bu/ac. Three-year average yield for spring wheat varieties tested during 2003, 2004 and 2005 averaged 99.6 bu/ac. No statistical differences in grain yield were detected between spring wheat cultivars tested at Hysham for either past two or three years.

The average spring wheat yield at Fromberg in 2005 was 86.5 bu/ac (Table 5), nearly 20 bu/ac more than yields observed at this site in 2004. Yields ranged from 107.6 bu/ac for Hank to 61.9 bu/ac for Ingot. The entries Jerome, MTHW0202 and Norpro produced yields equal with that of the highest yielding entry in 2005, ranging from 107.0 to 97.9 bu/ac. Average test weight was 59.3 lb/bu, with 20 of the 24 entries having test weights greater than 58 lb/bu. Grain

protein levels averaged 13.7 percent and varied from 12.2 percent for 'MT0260' to 15.4 percent for Ingot. Lodging was observed among the spring wheat entries tested at Fromberg in 2005, with Fortuna exhibiting the highest level of lodging at the test site. Thirteen of the 24 entries exhibited no signs of lodging at all. Two year average yield for spring wheat varieties tested during 2004 and 2005 in Fromberg averaged 77.6 bu/ac. Three-year average yield for spring wheat varieties tested during 2003 to 2005 was 79.8 bu/ac. No statistical differences in grain yield were detected between spring wheat cultivars tested at Fromberg for either past two or three years.

SUMMARY:

Higher spring wheat yields were observed under dryland conditions at Ryegate in 2005 compared to previous years (Tables 3, 6). This improvement was largely due to more favorable soil moisture conditions at planting and increased precipitation during early growth periods before flowering occurred. Lingering effects of the prolonged drought were still evident during grain fill. The Molt trial suffered from drought conditions (Tables 2, 6), which substantially reduced yields and grain quality at that site. Discerning yield differences and predicting overall performance among entries for dryland production has been difficult under such stressful conditions (Table 9).

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

FUTURE PLANS:

Off-station spring wheat variety performance trials will continue in 2006 at the Molt, Ryegate, Hysham and Fromberg locations.

Table 2. Performance of 24 spring wheat cultivars and experimental lines tested under dryland conditions near Molt, Montana during 2005. Cultivars listed alphabetically. (Exp. 059994).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	2005	2004-2005	2003-2005			%	
	----- bushels/acre -----			lb/bu	%	%	inches
Agawam	7.4			62.3	10.2	10.7	20.0
Alsen	9.1	21.5		61.3	9.9	11.8	20.8
Briggs	9.5			61.1	9.9	10.2	22.9
Choteau	8.1	18.7	17.6	60.9	9.8	11.1	17.8
Conan	9.5	17.8	17.8	60.5	9.7	11.7	20.7
Ernest	9.5	19.8	18.1	60.8	9.9	11.2	24.1
Explorer	8.7	18.6	17.3	59.9	9.9	11.1	22.7
Fortuna	7.1	19.8	17.6	59.3	9.7	12.1	22.7
Hank	10.9	21.3	20.1	60.3	10.1	10.1	19.9
Ingot	10.0			61.6	10.1	10.6	27.1
Jefferson	8.1			60.2	10.0	11.3	20.7
Jerome	8.7			61.1	10.0	9.1	20.4
Knudson	11.4			60.0	9.7	11.6	20.4
McNeal	9.8	20.4	19.5	60.0	9.8	10.6	23.1
Norpro	9.9			61.5	9.9	10.3	21.0
Outlook	11.7	22.8	20.0	58.6	9.5	11.7	23.7
Reeder	13.0	20.9	19.5	61.2	9.6	11.3	21.8
Scholar	9.9	19.5	18.5	61.3	10.0	11.5	25.5
Vida (MT0245)	10.5	21.2		59.8	9.7	11.2	21.0
Westbred 926	10.3	16.5	16.9	60.1	9.7	11.3	20.2
MT0260	10.6			62.0	10.0	10.7	21.7
MT0266	8.7	21.4		58.5	9.4	10.4	19.0
MT0336	9.0			61.5	9.9	10.7	21.0
MTHW0202	10.4	18.1		62.3	10.1	10.0	21.2
Average	9.7	19.9	18.4	60.7	9.9	10.9	21.6
PLSD (p=0.05)	ns	ns	ns	--	--	--	2.4
CV%	19.5	23.4	22.0	--	--	--	6.8

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. 059994)

Planted: April 4, 2005
Harvested: August 16, 2005
Fertility: 11-52-00, 100 lbs/a at planting
Insecticide: none applied
Previous Crop: summer fallow
Precipitation: n/a

Table 3. Performance of 24 spring wheat cultivars and experimental lines tested under irrigation near Ryegate, Montana during 2005. Cultivars listed alphabetically. (Exp. 059995).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	2005	2004-2005	2003-2005			%	
	----- bushels/acre -----			lb/bu	%	%	inches
Agawam	41.0*			60.9	9.5	11.3	29.6
Alsen	36.3*	25.7		59.6	8.8	11.6	32.6
Briggs	26.8			59.0	8.9	9.9	33.2
Choteau	40.2*	28.9	22.5	58.8	9.0	11.5	30.3
Conan	33.8	22.3	19.0	58.8	8.9	12.8	32.5
Ernest	30.8	21.5	17.3	56.0	8.2	13.1	36.1
Explorer	35.1	22.1	18.6	58.3	8.6	12.7	32.0
Fortuna	35.5	23.9	20.9	58.0	8.8	11.7	38.5
Hank	43.5**	28.4	23.4	58.4	8.8	9.9	28.9
Ingot	25.2			58.6	8.6	12.4	38.3
Jefferson	33.7			58.9	8.9	9.7	33.9
Jerome	40.0*			59.6	9.0	8.8	29.4
Knudson	26.9			59.3	8.9	10.0	31.9
McNeal	35.6	24.4	20.0	57.9	8.7	11.2	34.8
Norpro	29.7			60.0	9.1	10.0	29.2
Outlook	40.7*	28.6	23.2	57.8	8.5	10.3	34.7
Reeder	39.5*	26.7	21.3	60.0	8.9	9.8	32.4
Scholar	39.5*	27.0	21.7	60.2	9.1	11.2	38.5
Vida (MT0245)	40.9*	29.0		59.3	9.0	9.7	34.4
Westbred 926	41.1*	25.5	21.9	58.7	8.8	10.4	29.8
MT0260	39.3*			60.3	9.1	9.2	34.4
MT0266	37.4*	26.0		58.2	8.7	8.9	30.3
MT0336	43.3*			59.9	9.0	10.0	35.3
MTHW0202	43.2*	28.8		60.8	9.0	10.8	30.3
Average	36.6	25.9	20.9	59.1	8.9	10.7	33.0
PLSD (p=0.05)	7.3	ns	ns	1.7	0.4	--	2.6
CV%	12.2	16.0	21.4	1.8	2.9	--	4.8

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).

Ryegate Dryland Spring Wheat (Exp. 059995)

Planted: March 31, 2005
 Harvested: August 23, 2005
 Fertility: 11-52-00, 100 lbs/a at planting
 Herbicide: Roundup Ultra, 16 oz/a, April 1, 2005
 Insecticide: none applied
 Previous Crop: peas
 Precipitation: n/a

Table 4. Performance of 24 spring wheat cultivars and experimental lines tested under irrigation near Hysham, Montana during 2005. Cultivars listed alphabetically. (Exp. 059996).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein		Plant Height	Lodging
	2005	2004-05	2003-05			%	%		
	----- bushels/acre -----			lb/bu	%	%	inches	0-9	
Agawam	97.4*			64.1	11.1	13.1	38.3	0.0	
Alsen	80.3	89.4		63.4	11.0	14.9	42.0	2.3	
Briggs	90.9*			62.6	10.9	14.1	41.1	2.0	
Choteau	94.3*	100.0	105.4	62.0	11.3	12.7	39.1	0.0	
Conan	86.8	94.6	95.6	61.5	10.8	13.7	40.1	1.3	
Ernest	89.9*	103.1	102.3	61.6	11.3	14.3	46.3	2.7	
Explorer	76.5	83.6	91.0	59.8	10.7	14.2	37.4	1.3	
Fortuna	79.0	94.2	87.9	60.7	11.0	13.6	41.5	4.3	
Hank	100.9*	105.4	111.5	60.6	10.8	13.6	36.9	0.0	
Ingot	78.9			64.0	11.1	14.7	47.0	2.3	
Jefferson	96.2*			62.1	10.5	12.8	40.4	3.0	
Jerome	100.1*			60.5	11.0	12.9	38.1	0.3	
Knudson	98.1*			62.9	11.4	12.5	40.3	1.3	
McNeal	87.9	100.0	102.4	61.8	10.5	12.6	42.7	2.0	
Norpro	102.1**			62.3	11.3	13.3	41.2	1.7	
Outlook	97.9*	103.8	104.0	61.1	10.5	12.0	43.6	2.7	
Reeder	90.5*	100.4	102.0	62.3	11.0	14.7	43.9	4.0	
Scholar	77.0	94.9	91.3	61.3	10.8	13.9	42.3	5.3	
Vida (MT0245)	87.9	100.5		60.9	11.2	14.1	41.1	4.7	
Westbred 926	92.8*	101.1	102.8	61.8	10.7	14.4	38.6	0.0	
MT0260	98.5*			62.0	11.1	13.0	42.7	4.0	
MT0266	95.0*	102.6		60.1	10.7	14.4	42.3	3.7	
MT0336	86.3			60.9	10.9	12.6	42.3	3.3	
MTHW0202	88.2	98.0		61.5	11.1	14.0	38.7	1.3	
Average	90.6	98.1	99.6	61.7	10.9	13.6	41.2	2.2	
PLSD (p=0.05)	13.3	ns	ns	1.2	0.3	--	2.6	2.8	
CV%	8.9	9.4	14.4	1.2	1.9	--	3.9	76.7	

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. 059996)

Planted: March 7, 2005
Harvested: August 4, 2005
Fertility: 80 lbs/a N, 40 lbs/a P, 40 lbs/a K, 25 lbs/a S, preplant incorporated, March 4, 2005
30 lb/ac N, broadcast, May 18, 2005
Herbicide: Bronate Advanced, 32 oz/a; Harmony Extra 0.5 oz/a; R-11, 16 oz/a; AMS, 3 lb/a,
May 19, 2005
Insecticide: none applied
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 2005. Cultivars listed alphabetically. (Exp. 059997).

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein		Plant Height	Lodging
	2005	2004-05	2003-05			%	%		
	----- bushels/acre -----			lb/bu	%	%	inches	0-9	
Agawam	85.7			61.1	11.6	13.8	39.4	0.0	
Alsen	79.5	75.6		60.2	11.3	14.3	44.0	0.0	
Briggs	80.4			60.7	11.2	14.2	47.4	1.3	
Choteau	89.0	84.8	86.5	58.5	11.2	14.2	41.2	0.0	
Conan	78.7	72.5	73.3	58.6	11.4	14.3	40.4	1.0	
Ernest	70.0	77.9	82.1	57.3	10.8	15.0	49.6	3.3	
Explorer	94.9	77.8	76.5	60.4	11.5	13.8	41.6	0.0	
Fortuna	70.5	66.5	70.7	58.9	11.0	14.4	47.1	4.3	
Hank	107.6**	85.9	88.0	59.6	11.4	13.5	41.2	0.0	
Ingot	61.9			60.9	11.6	15.4	52.3	2.3	
Jefferson	94.8			59.8	11.5	13.1	44.0	0.0	
Jerome	107.0*			59.7	11.3	12.5	41.5	0.0	
Knudson	88.5			59.5	11.3	12.7	43.2	0.0	
McNeal	74.8	76.6	84.4	57.2	11.0	14.1	45.3	0.0	
Norpro	97.9*			59.2	11.2	12.6	40.6	0.0	
Outlook	84.8	82.2	82.3	56.1	10.6	13.1	45.2	0.0	
Reeder	85.5	74.0	78.4	60.4	11.3	14.3	47.5	1.0	
Scholar	67.8	73.7	81.9	57.9	10.8	14.4	47.3	2.0	
Vida (MT0245)	88.3	88.6		59.1	11.3	13.1	42.4	1.3	
Westbred 926	90.6	71.0	74.1	58.1	11.1	14.5	40.7	0.0	
MT0260	90.2			59.4	11.1	12.2	45.0	1.3	
MT0266	95.4	76.6		59.1	11.1	14.1	45.2	0.3	
MT0336	90.0			59.8	11.3	12.9	43.5	0.3	
MTHW0202	102.3*	79.7		62.5	11.5	13.0	43.3	0.0	
Average	86.5	77.6	79.8	59.3	11.2	13.7	44.1	0.8	
PLSD (p=0.05)	9.8	ns	ns	1.5	0.5	-.	2.0	1.8	
CV%	6.9	31.9	24.3	1.5	2.6	-.	2.7	133.5	

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. 059997)

Planted: March 7, 2005
Harvested: August 16, 2005
Fertility: 80 lbs/a N, 50 lbs/a P, preplant incorporated, March 4, 2005
11-52-00, 100 lbs/a at planting
Herbicide: Bronate Advanced, 12 oz/a; Starane 0.33 pt/a, May 12, 2005
Insecticide: none applied
Previous Crop: sugar beets
Irrigation: flood
Precipitation: n/a

Table 6. Grain yield^{1/} of 24 spring wheat cultivars tested at four locations in south central Montana during 2005. Varieties listed by declining four-location average yield.

Cultivar	Molt Dryland	Ryegate Dryland	Dryland Average	Fromberg Irrigated	Hysham Irrigated	Irrigated Average	Four Location Average
	----- bushels/acre -----						
Hank	10.9	43.5**	27.2	107.6**	100.9*	104.3**	65.7**
Jerome	8.7	40.0*	24.3	107.0*	100.1*	103.5*	63.9*
MTHW0202	10.4	43.2*	26.8	102.3*	88.2	95.2*	61.0*
Norpro	9.9	29.7	19.8	97.9*	102.1**	100.0*	59.9*
MT0260	10.6	39.3*	24.9	90.2	98.5*	94.3*	59.6*
MT0266	8.7	37.4*	23.1	95.4	95.0*	95.2*	59.2*
Outlook	11.7	40.7*	26.2	84.8	97.9*	91.4*	58.8*
Westbred 926	10.3	41.1*	25.7	90.6	92.8*	91.7*	58.7*
Jefferson	8.1	33.7	20.9	94.8	96.2*	95.5*	58.2*
Agawam	7.4	41.0*	24.2	85.7	97.4*	91.6*	57.9*
Choteau	8.1	40.2*	24.1	89.0	94.3*	91.7*	57.9*
MT0336	9.0	43.3*	26.1	90.0	86.3	88.1	57.1*
Reeder	13.0	39.5*	26.3	85.5	90.5*	88.0	57.1*
Vida (MT0245)	10.5	40.9*	25.7	88.3	87.9	88.1	56.9*
Knudson	11.4	26.9	19.2	88.5	98.1*	93.3*	56.2
Explorer	8.7	35.1	21.9	94.9	76.5	85.7	53.8
Conan	9.5	33.8	21.7	78.7	86.8	82.8	52.2
McNeal	9.8	35.6	22.7	74.8	87.9	81.4	52.0
Briggs	9.5	26.8	18.1	80.4	90.9*	85.6	51.9
Alsen	9.1	36.3*	22.7	79.5	80.3	79.9	51.3
Ernest	9.5	30.8	20.1	70.0	89.9*	80.0	50.0
Scholar	9.9	39.5*	24.7	67.8	77.0	72.4	48.6
Fortuna	7.1	35.5	21.3	70.5	79.0	74.8	48.0
Ingot	10.0	25.2	17.6	61.9	78.9	70.4	44.0
Average	9.7	36.6	23.1	86.5	90.6	88.5	55.8
PLSD (p=0.05)	ns	7.3	ns	9.8	13.3	13.6	9.2
CV%	19.5	12.2	29.5	6.9	8.9	12.9	20.3

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).

ns Indicates no significant difference between cultivars 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 2005. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein	Plant Height
	2005	2004-2005	2003-2005			%	
	----- bushels/acre -----			lb/bu	%	%	inches
Agawam	57.9*			62.1	10.6	12.2	31.8
Alsen	51.3	53.0		61.1	10.2	13.2	34.9
Briggs	51.9			60.8	10.2	12.1	36.2
Choteau	57.9*	58.1	58.0*	59.9	10.3	12.4	32.1
Conan	52.2	51.8	51.4	59.7	10.2	13.1	33.4
Ernest	50.0	55.6	54.9	58.6	10.1	13.4	39.0
Explorer	53.8	50.5	50.8	59.5	10.2	13.0	33.4
Fortuna	48.0	51.1	49.3	59.2	10.1	13.0	37.4
Hank	65.7**	60.2	60.8**	59.6	10.3	11.8	31.7
Ingot	44.0			61.2	10.4	13.3	41.2
Jefferson	58.2*			60.3	10.2	11.7	34.7
Jerome	63.9*			60.1	10.3	10.8	32.4
Knudson	56.2			60.5	10.3	11.7	34.0
McNeal	52.0	55.3	56.6*	59.1	10.0	12.1	36.5
Norpro	59.9*			60.6	10.4	11.6	33.0
Outlook	58.8*	59.3	57.4*	58.4	9.8	11.8	36.8
Reeder	57.1*	55.5	55.3*	60.9	10.2	12.5	36.4
Scholar	48.6	53.8	53.3	60.0	10.2	12.8	38.4
Vida (MT0245)	56.9*	59.8		59.8	10.3	12.0	34.7
Westbred 926	58.7*	53.5	53.9	59.6	10.1	12.7	32.4
MT0260	59.6*			60.7	10.3	11.3	35.9
MT0266	59.2*	56.7		59.1	10.0	12.0	34.2
MT0336	57.1*			60.3	10.3	11.6	35.5
MTHW0202	61.0*	56.1		61.7	10.4	12.0	33.4
Average	55.8	55.4	54.7	60.1	10.2	12.2	35.0
PLSD (p=0.05)	9.2	ns	5.7	1.2	0.3	1.0	2.0
CV%	20.3	21.4	22.2	2.3	3.4	5.9	7.0
Location Years	4	8	12	4	4	4	4

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 2005. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain Protein		Plant Height	Lodging
	2005	2004-05	2003-05			%	%		
	----- bushels/acre -----			lb/bu	%	%	inches	0-9	
Agawam	91.6*			62.6	11.4	13.5	38.9	0.0	
Alsen	79.9	82.5		61.8	11.1	14.6	43.0	1.2	
Briggs	85.6			61.6	11.1	14.2	44.2	1.7	
Choteau	91.7*	92.4	95.9*	60.2	11.2	13.5	40.2	0.0	
Conan	82.8	83.5	84.5	60.0	11.1	14.0	40.2	1.2	
Ernest	80.0	90.5	92.2*	59.5	11.1	14.7	48.0	3.0	
Explorer	85.7	80.7	83.8	60.1	11.1	14.0	39.5	0.7	
Fortuna	74.8	80.4	79.3	59.8	11.0	14.0	44.3	4.3	
Hank	104.3**	95.6	99.8**	60.1	11.1	13.6	39.0	0.0	
Ingot	70.4			62.5	11.4	15.1	49.6	2.3	
Jefferson	95.5*			61.0	11.0	13.0	42.2	1.5	
Jerome	103.5*			60.1	11.2	12.7	39.8	0.2	
Knudson	93.3*			61.2	11.3	12.6	41.8	0.7	
McNeal	81.4	88.3	93.4*	59.5	10.7	13.4	44.0	1.0	
Norpro	100.0*			60.7	11.2	13.0	40.9	0.8	
Outlook	91.4*	93.0	93.1*	58.6	10.6	12.6	44.4	1.3	
Reeder	88.0	87.2	90.2*	61.4	11.1	14.5	45.7	2.5	
Scholar	72.4	84.3	86.6	59.6	10.8	14.2	44.8	3.7	
Vida (MT0245)	88.1	94.5		60.0	11.3	13.6	41.8	3.0	
Westbred 926	91.7*	86.1	88.4	60.0	10.9	14.5	39.7	0.0	
MT0260	94.3*			60.7	11.1	12.6	43.8	2.7	
MT0266	95.2*	89.6		59.6	10.9	14.3	43.8	2.0	
MT0336	88.1			60.4	11.1	12.8	42.9	1.8	
MTHW0202	95.2*	88.8		62.0	11.3	13.5	41.0	0.7	
Average	88.5	87.8	89.7	60.5	11.1	13.7	42.6	1.5	
PLSD (p=0.05)	13.6	ns	10.7	ns	ns	1.1	2.5	2.0	
CV%	12.9	18.9	17.9	3.0	3.6	3.8	5.0	110.6	
Location Years	2	4	6	2	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).

Table 9. Performance of 24 spring wheat cultivars and experimental lines tested under dryland conditions only in south central Montana during 2005. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield			Test Weight	Grain Moisture	2/ Grain	Plant Height
	2005	2004-2005	2003-2005			Protein	
	----- bushels/acre -----			lb/bu	%	%	inches
Agawam	24.2			61.3	9.8	11.0	24.8
Alsen	22.7	23.6		60.1	9.3	11.7	26.7
Briggs	18.1			59.6	9.4	10.1	28.1
Choteau	24.1	23.8	20.1	59.4	9.4	11.3	24.1
Conan	21.7	20.1	18.4	59.2	9.3	12.3	26.6
Ernest	20.1	20.6	17.7	57.2	9.1	12.2	30.1
Explorer	21.9	20.3	17.9	58.7	9.2	11.9	27.3
Fortuna	21.3	21.8	19.3	58.3	9.3	11.9	30.6
Hank	27.2	24.9	21.8	58.9	9.5	10.0	24.4
Ingot	17.6			59.3	9.4	11.5	32.7
Jefferson	20.9			59.2	9.4	10.5	27.3
Jerome	24.3			60.0	9.5	9.0	24.9
Knudson	19.2			59.5	9.3	10.8	26.1
McNeal	22.7	22.4	19.7	58.4	9.3	10.9	29.0
Norpro	19.8			60.4	9.5	10.2	25.1
Outlook	26.2	25.7	21.6	58.0	9.0	11.0	29.2
Reeder	26.3	23.8	20.4	60.3	9.2	10.6	27.1
Scholar	24.7	23.3	20.1	60.5	9.6	11.4	32.0
Vida (MT0245)	25.7	25.1		59.5	9.3	10.5	27.7
Westbred 926	25.7	21.0	19.4	59.1	9.2	10.9	25.0
MT0260	24.9			60.7	9.6	10.0	28.0
MT0266	23.1	23.7		58.3	9.1	9.7	24.7
MT0336	26.1			60.3	9.4	10.4	28.1
MTHW0202	26.8	23.4		61.2	9.6	10.4	25.8
Average	23.1	22.9	19.7	59.5	9.4	10.8	27.3
PLSD (p=0.05)	ns	ns	ns	1.1	0.4	1.6	2.8
CV%	29.5	19.5	21.3	1.3	3.2	7.3	8.4
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.

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