RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2004

The Annual Report of the Investigations at and Administration of the
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PROJECT TITLE:

Dryland and Irrigated Spring Wheat Performance Trials near Molt, Ryegate, Hysham and Fromberg, Montana. (Exps. 049994, 049995, 049996 and 049997).

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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 2004 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 22 entries (18 commercial cultivars, 4 experimental line). The Ryegate trial was no-till planted on chemical fallow.

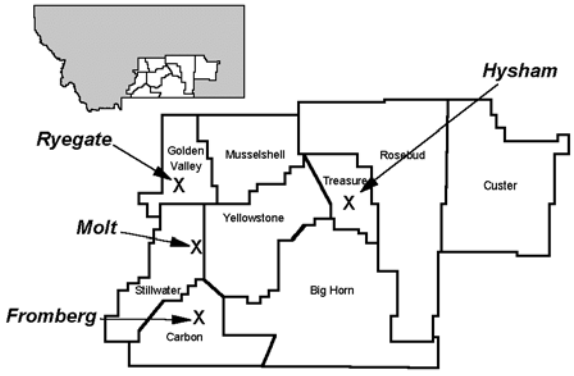

Figure 1. 2004 off-station spring wheat trial locations in south central Montana.

All studies were planted using a randomized complete block design with three replications. 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 based on a 60 pound standard bushel weight. Test weight (pounds per bushel) and percent grain moisture content were obtained for each plot using a Dickey-john™ GAC 2100 grain analyzer. Grain protein (%) 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 Hysham representing no lodging to all stems lying flat on the ground, respectively.

RESULTS:

The trial in Molt produced an average yield of 30.4 bu/ac in 2004, up nearly 100 percent from the previous year. Grain yields ranged from 22.7 bu/ac for 'Westbred 926' to 35.1 bu/ac for 'Hi-Line' (Table 1). Twelve entries had yields from 30.2 to 34.1 bu/ac, which was equal to the highest yielding entry. Average test weight at Molt in 2004 was 58.8 pounds per bushel, with 19 of the 22 entries expressing test weight values heavier than 58 lb/bu. Two entries, 'Alsen' and 'Newana', produced test weights greater than 60 pounds per bushel. Grain protein levels averaged 15.1 percent and varied from 12.8 percent for Newana to 16.6 percent for 'Conan'. Two-year average yield for spring wheat varieties tested during 2003 and 2004 in Molt averaged 22.7 bu/ac. Three-year average yield for spring wheat varieties tested during 2002, 2003 and 2004 in Molt averaged 17.6 bu/ac. No statistical differences in grain yield where detected between spring wheats tested at Molt for either past two or three years.

The Ryegate trial suffered from drought, grasshopper and hail damage, resulting in the lowest yield and poorest test weight of spring wheat entries tested at four locations in 2004. Average yield was 13.6 bu/ac and ranged from 9.0 bu/ac for 'Explorer' to 17.7 bu/ac for 'Choteau' (Table 2). No statistical differences in grain yield where detected between spring wheats tested at Ryegate during 2004 or during the past two years. Average test weight was 54.0 lb/bu, nearly 6 pounds per bushel heavier that test weights measured at this site in 2003. None of the entries produced test weights greater than or equal to 58 pounds per bushel. Grain protein averaged 17.1 percent and ranged from 15.0 to 19.2 percent.

The 2004 Hysham irrigated spring wheat trial was planted under drier-than-normal seedbed conditions, and initial stands were not uniform. Spring wheat stands at Hysham recovered substantially with timely rains in April, with spring wheat yields eventually averaging 108.5 bu/ac (Table 3). The highest yielding spring wheat cultivar was 'MTHW9420', averaging 125.9 bu/ac. Only one other entry, 'Ernest', produced yields equal with those of the highest yielding entry in 2004. Average test weight was 63.0 lb/bu, with all of the entries having test weights greater than 58 lb/bu. Grain protein levels averaged 12.5 percent and varied from 11.0 percent for MTHW9420 to 13.4 percent for 'Westbred 926'. Some lodging was observed among entries tested at Hysham in 2004, but severity was much less than levels observed at this location during previous years of testing. Two-year average yield for spring wheat varieties tested during 2003 and 2004 averaged 105.7 bu/ac, with MTHW9420 also producing the highest two-year average yield of 120.3 bu/ac. Three-year average yield for spring wheat varieties tested during 2002, 2003 and 2004 averaged 101.9 bu/ac. 'Westbred 936' produced the highest three-year average yield of 114.4 bu/ac among the 17 entries tested during this period of time.

Like Hysham, the 2004 Fromberg irrigated spring wheat trial was planted under marginal surface soil moisture conditions. Unlike Hysham, spring rains did not occur and initial irrigation was delayed to divert water for emerging sugar beet crops in the area. Post-irrigation stands and subsequent tillering of the spring wheat at Fromberg did not improve enough to offset the early season moisture stress. The average spring wheat yield at Fromberg in 2004 was 69.5 bu/ac (Table 4), nearly 20 bu/ac less than yields observed at this site in 2003. Yields ranged from 51.5 bu/ac for 'Westbred 926' to 88.8 bu/ac for experimental line 'MT0245'. The highest yielding commercial cultivar tested in 2004 was Ernest spring wheat. Alsen, 'Amidon', 'Choteau', McNeal, 'MT0249', MTHW9420, 'Outlook' and 'Scholar' produced yields equal with that of the highest yielding entry. Average test weight was 59.7 lb/bu, with 18 of the 22 entries having test weights greater than 58 lb/bu. Grain protein levels averaged 13.7 percent and varied from 12.2 percent for MTHW9420 to 15.7 percent for Hi-Line. No lodging was observed among entries tested at Fromberg in 2004. Two year average yield for spring wheat varieties tested during 2003 and 2004 in Fromberg averaged 78.4 bu/ac. McNeal had the highest two-year yield of 89.2 bu/ac. Six entries produced yields equal with that of McNeal during the past two years at this location. Three-year average yield for spring wheat varieties tested during 2002 to 2004 was 71.9 bu/ac, with McNeal producing the highest average seed yield at 81.3 bu/ac. Six entries produced yields from 75.0 to 79.0 bu/ac, which was equal to the highest three-year yield.

SUMMARY:

Higher spring wheat yields were observed under dryland conditions at Molt in 2004 compared to previous years (Tables 5, 8). This improvement was largely due to more favorable soil moisture conditions at planting and during early growth periods before jointing occurred. Lingering effects of the prolonged drought were still evident during grain fill. The Ryegate trial also suffered from drought conditions, as well as grasshopper and hail damage, which further reduced yields and grain quality at that site. Discerning yield differences among entries for dryland production is difficult under such stressful conditions.

Substantial difference in yield, and ranking of the top yield entries, was evident between the two irrigated sites, Hysham and Fromberg (Table 5). Alsen, Amidon, Choteau, Ernest, McNeal, MTHW9420, Outlook and 'Scholar' produced high yields at one or the other of the two irrigated sites, but only Ernest and MTHW9420 produced yields in the top yield group at both locations. Based on three-year averages analyzed for Fromberg harvested in 2004, McNeal has been the highest yielding spring wheat cultivar grown in south central Montana since 2002 (Table 4).

FUTURE PLANS:

Off-station spring wheat variety performance trials will continue in 2005 at the Molt, Ryegate, Hysham and Fromberg locations.

Table 1. Performance of 22 spring wheat cultivars and experimental lines tested under dryland conditions near Molt, Montana during 2004. Cultivars listed alphabetically. (Exp. 049994).

Cultivar	Grain Yield 1/ 2004	Grain Yield 1/ 2003-2004	Grain Yield 1/ 2002-2004	Test Weight	Grain Moisture 2/	Grain Protein 2/	Plant Height
	bushels/acre			lb/bu	%	%	inches
Alsen	**33.9***			60.2	13.5	14.7	27.2
Amidon	28.4	22.0	17.1	58.2	12.6	15.0	27.9
Choteau	29.3	22.4	17.4	59.2	13.2	15.3	25.2
Conan	26.1	21.9	17.1	58.7	12.8	16.6	25.1
Ernest	**30.2***	22.4	17.4	59.8	12.3	15.1	28.7
Explorer	28.5	21.5	16.8	59.0	12.5	15.1	23.7
Fortuna	**32.5***	22.9	17.7	58.8	12.9	15.5	30.0
Hank	**31.7***	24.7	19.0	58.4	12.9	14.6	24.0
Hi-Line	**35.1****	26.1	19.8	59.9	12.9	15.3	25.5
McNeal	**30.9***	24.3	18.6	57.3	12.9	15.1	26.1
MT0245	**31.9***			58.2	13.4	14.4	23.8
MT0249	**33.6***			59.8	12.7	14.0	24.1
MT0266	**34.1***			57.3	12.3	14.9	25.3
MTHW0202	25.7			59.8	13.1	15.3	23.8
MTHW9420	**31.9***	22.4	17.3	58.9	12.8	14.6	23.3
Newana	**31.0***	21.3	16.7	60.4	13.2	12.8	24.7
Outlook	**33.8***	24.1	18.6	57.8	12.9	14.2	27.2
Rambo	**31.8***	24.1	18.4	59.1	12.9	15.4	25.8
Reeder	28.8	22.8	17.6	58.6	13.3	15.6	23.8
Scholar	29.1	22.8	17.6	59.1	13.1	15.8	27.1
Westbred 926	22.7	20.2	15.9	58.1	12.8	16.4	22.1
Westbred 936	27.1	19.9	15.6	58.0	12.9	16.1	22.2
Average	30.4	22.7	17.6	58.8	12.9	15.1	25.3
PLSD (p=0.05)	5.6	ns	ns	1.5	ns	-.-	2.0
CV%	11.3	13.5	14.2	1.5	3.8	-.-	4.7

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).

Molt Dryland Spring Wheat (Exp. 049994)

Planted	April 6, 2004
Harvested	August 5, 2004
Fertility	11-52-00, 100 lbs/a at planting
Insecticide:	none applied
Previous Crop:	summer fallow
Precipitation:	n/a

Table 2. Performance of 22 spring wheat cultivars and experimental lines tested under irrigation near Ryegate, Montana during 2004. Cultivars listed alphabetically. (Exp. 049995).

Cultivar	Grain Yield 1/ 2004	Grain Yield 1/ 2003-2004	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height
	----- bushels/acre -----		lb/bu	%	%	inches
Alsen	15.1		54.4	8.9	16.5	24.8
Amidon	14.2	12.1	55.1	8.5	16.8	24.5
Choteau	17.7	13.7	56.2	8.9	15.7	22.7
Conan	10.9	11.7	55.0	8.9	17.7	21.0
Ernest	12.2	10.5	55.2	8.6	15.8	24.7
Explorer	9.0	10.4	52.3	8.2	19.2	21.7
Fortuna	12.2	13.6	54.7	8.7	16.9	24.4
Hank	13.4	13.4	54.2	8.8	16.8	20.9
Hi-Line	11.7	11.6	53.1	8.6	16.9	22.0
McNeal	13.1	12.2	52.0	8.4	18.5	21.7
MT0245	17.1		54.3	8.7	17.6	22.0
MT0249	17.3		54.5	8.8	16.3	22.2
MT0266	14.5		51.5	8.4	17.8	22.6
MTHW0202	14.3		55.8	8.9	17.5	22.1
MTHW9420	10.3	11.6	51.8	8.4	18.1	20.8
Newana	17.3	12.5	52.5	8.6	16.8	22.4
Outlook	16.5	14.4	51.9	8.3	15.4	23.5
Rambo	13.3	10.9	54.5	8.8	17.0	21.3
Reeder	13.8	12.3	53.7	8.6	16.5	22.4
Scholar	14.6	12.8	56.9	8.9	15.0	23.3
Westbred 926	9.9	12.3	55.1	8.7	17.7	19.7
Westbred 936	11.6	13.3	53.4	8.7	18.7	20.9
Average	13.6	12.3	54.0	8.7	17.1	22.4
PLSD (p=0.05)	ns	ns	2.4	ns	-.-	ns
CV%	32.5	25.4	2.8	3.1	-.-	12.8

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. 049995)

Planted	April 7, 2004
Harvested	August 13, 2004
Fertility	11-52-00, 100 lbs/a at planting
Insecticide:	none applied
Previous Crop:	chemical fallow
Precipitation:	n/a

Table 3. Performance of 22 spring wheat cultivars and experimental lines tested under irrigation near Hysham, Montana during 2004. Cultivars listed alphabetically. (Exp. 049996).

Cultivar	Grain Yield 1/ 2004	Grain Yield 1/ 2003-2004	Grain Yield 1/ 2002-2004	Test Weight	Grain Moisture 2/	Grain Protein	Plant Height
	---------- bushels/acre ----------			lb/bu	%	%	inches
Alsen	98.4			64.4	12.0	13.1	39.9
Amidon	105.9	95.5	98.3	62.9	12.3	11.7	45.3
Choteau	105.7	110.9	106.7	64.4	11.6	11.4	37.2
Conan	102.3	100.0	96.3	62.9	12.6	12.8	38.4
Ernest	**116.2***	108.5	**109.1***	63.9	12.2	13.0	47.2
Explorer	90.7	98.2	87.9	62.3	11.0	12.7	33.0
Fortuna	109.4	92.3	90.4	64.1	11.6	12.4	42.7
Hank	109.8	**116.9***	**111.0***	62.1	12.3	12.1	35.3
Hi-Line	93.9	95.3	92.9	61.9	11.0	12.9	38.1
McNeal	112.0	109.6	**107.8***	63.5	12.7	12.6	41.3
MT0245	113.0			63.1	12.4	12.9	40.1
MT0249	108.8			63.7	11.8	12.4	36.2
MT0266	110.2			61.5	10.7	13.0	39.6
MTHW0202	107.8			63.9	12.0	12.5	37.2
MTHW9420	**125.9****	**120.3****	106.7	63.3	11.8	11.0	39.6
Newana	111.1	105.1	94.6	62.9	12.4	11.5	39.4
Outlook	109.7	107.0	**107.9***	62.1	13.4	12.8	42.1
Rambo	109.2	107.5	100.0	62.9	12.5	12.3	36.5
Reeder	110.3	107.8	106.6	63.6	12.6	13.1	43.0
Scholar	112.8	98.4	95.8	64.2	12.6	12.4	43.9
Westbred 926	109.4	107.8	**106.9***	60.9	12.2	13.4	34.9
Westbred 936	113.9	**116.6***	**114.4****	61.6	12.1	11.9	33.6
Average	108.5	105.7	101.9	63.0	12.1	12.5	39.3
PLSD (p=0.05)	10.3	8.0	7.6	0.7	1.0	-.-	2.8
CV%	5.8	6.6	8.0	0.7	4.8	-.-	4.3

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).

Hysham Irrigated Spring Wheat (Exp. 049996)

Planted	March 18, 2004
Harvested	August 2, 2004
Fertility	11-52-00, 100 lbs/a at planting; 30-9-0, 25 lbs/a, June 3, 2004
Insecticide:	none applied
Previous Crop:	sugar beets
Irrigation:	flood
Precipitation:	n/a

Table 4. Performance of 22 spring wheat cultivars and experimental lines tested under irrigation near Fromberg, Montana during 2004. Cultivars listed alphabetically. (Exp. 049997).

Cultivar	Grain Yield 1/ 2004	Grain Yield 1/ 2003-2004	Grain Yield 1/ 2002-2004	Test Weight	Grain Moisture 2/	Grain Protein	Plant Height
	bushels/acre			lb/bu	%	%	inches
Alsen	**71.7***			62.0	13.6	13.7	27.0
Amidon	**73.5***	**85.1***	**77.0***	59.0	16.1	12.7	33.6
Choteau	**80.6***	**85.3***	**79.0***	62.0	12.8	13.1	26.4
Conan	66.2	70.6	66.9	51.2	23.8	14.0	25.2
Ernest	**85.7***	**88.1***	**77.7***	58.9	16.5	13.4	34.2
Explorer	60.7	67.4	61.6	60.2	11.3	14.6	25.4
Fortuna	62.5	70.7	64.3	61.5	12.6	14.9	29.5
Hank	64.2	78.2	74.1	57.9	16.1	13.7	23.3
Hi-Line	58.7	71.7	68.5	61.0	13.2	15.7	24.2
McNeal	**78.3***	**89.2****	**81.3****	61.4	12.5	14.3	28.8
MT0245	**88.8****			59.3	15.1	12.8	28.4
MT0249	**73.9***			62.8	10.7	13.6	25.6
MT0266	57.8			58.7	11.4	14.6	24.2
MTHW0202	57.1			60.2	14.1	13.6	23.8
MTHW9420	**73.5***	76.8	65.2	62.4	12.7	12.2	25.0
Newana	70.3	79.3	72.0	60.7	13.2	12.3	26.4
Outlook	**79.7***	**81.1***	**75.0***	58.8	14.8	12.6	28.2
Rambo	67.7	**82.7***	**77.6***	57.8	17.0	12.7	24.8
Reeder	62.5	74.9	72.1	57.5	16.4	14.1	25.8
Scholar	**79.6***	**88.9***	**78.8***	60.2	14.5	13.7	30.9
Westbred 926	51.5	65.8	61.4	59.1	13.1	13.7	20.6
Westbred 936	65.4	76.4	70.0	61.5	11.9	14.4	22.1
Average	69.5	78.4	71.9	59.7	14.3	13.7	26.5
PLSD (p=0.05)	17.3	9.5	6.6	3.7	3.5	-.-	1.4
CV%	15.1	10.5	9.9	3.8	15.0	-.-	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).

Fromberg Irrigated Spring Wheat (Exp. 049997)

Planted	March 12, 2004
Harvested	August 16, 2004
Fertility	11-52-00, 100 lbs/a at planting
Herbicide	Bronate Advanced @ 32 oz/a; Harmony Extra @ 0.5 oz/a; R-11 @ 16 oz/a; AMS @ 3 lb/a, April 30, 2004
Insecticide:	none applied
Previous Crop:	sugar beets
Irrigation:	flood
Precipitation:	n/a

Table 5. Grain yield[1/] of 22 spring wheat cultivars tested at four locations in south central Montana during 2004. Varieties listed by declining four-location average yield.

Cultivar	Fromberg Irrigated	Hysham Irrigated	Irrigated Average	Molt Dryland	Ryegate Dryland	Dryland Average	Four Location Average
	---------- bushels/acre ----------						
MT0245	**88.8****	113.0	**100.9***	**31.9***	17.1	**24.5***	**62.7****
Ernest	**85.7***	**116.2***	**101.0****	**30.2***	12.2	**21.2***	**61.1***
MTHW9420	**73.5***	**125.9****	**99.7***	**31.9***	10.3	**21.1***	**60.4***
Outlook	**79.7***	109.7	**94.7***	**33.8***	16.5	**25.1***	**59.9***
Scholar	**79.6***	112.8	**96.2***	29.1	14.6	**21.8***	**59.0***
McNeal	**78.3***	112.0	**95.2***	**30.9***	13.1	**22.0***	**58.6***
MT0249	**73.9***	108.8	**91.4***	**33.6***	17.3	**25.5****	**58.4***
Choteau	**80.6***	105.7	**93.1***	29.3	17.7	**23.5***	**58.3***
Newana	70.3	111.1	90.7	**31.0***	17.3	**24.2***	**57.4***
Amidon	**73.5***	105.9	89.7	28.4	14.2	**21.3***	55.5
Rambo	67.7	109.2	88.5	**31.8***	13.3	**22.6***	55.5
Hank	64.2	109.8	87.0	**31.7***	13.4	**22.5***	54.8
Alsen	**71.7***	98.4	85.0	**33.9***	15.1	**24.5***	54.8
Westbred 936	65.4	113.9	89.7	27.1	11.6	19.4	54.5
Fortuna	62.5	109.4	85.9	**32.5***	12.2	**22.4***	54.2
MT0266	57.8	110.2	84.0	**34.1***	14.5	**24.3***	54.2
Reeder	62.5	110.3	86.4	28.8	13.8	**21.3***	53.8
Conan	66.2	102.3	84.2	26.1	10.9	18.5	51.4
MTHW0202	57.1	107.8	82.5	25.7	14.3	20.0	51.2
Hi-Line	58.7	93.9	76.3	**35.1****	11.7	**23.4***	49.9
Westbred 926	51.5	109.4	80.5	22.7	9.9	16.3	48.4
Explorer	60.7	90.7	75.7	28.5	9.0	18.8	47.2
Average	69.5	108.5	89.0	30.4	13.6	22.0	55.5
PLSD (p=0.05)	17.3	10.3	9.9	5.6	ns	4.6	5.4
CV%	15.1	5.8	9.7	11.3	32.5	18.0	12.1

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 6. Performance of 22 spring wheat cultivars and experimental lines tested under both dryland and irrigated conditions at four locations in south central Montana during 2004. Cultivars listed alphabetically.

Cultivar	1/ Grain Yield 2004	2003-2004	2002-2004	Test Weight	2/ Grain Moisture	Grain Protein	Plant Height
	---------- bushels/acre ----------			lb/bu	%	%	inches
Alsen	54.8			60.2	12.0	14.5	29.7
Amidon	55.5	53.7	54.7	58.8	12.4	14.1	32.8
Choteau	**58.3***	**58.1***	**57.9***	60.5	11.6	13.9	27.9
Conan	51.4	51.0	51.3	57.0	14.5	15.3	27.4
Ernest	**61.1***	**57.4***	**57.6***	59.5	12.4	14.3	33.7
Explorer	47.2	49.4	47.2	58.4	10.8	15.4	26.0
Fortuna	54.2	49.9	49.5	59.8	11.4	14.9	31.7
Hank	54.8	**58.3***	**58.1***	58.2	12.5	14.3	25.9
Hi-Line	49.9	51.2	51.5	59.0	11.4	15.2	27.5
McNeal	**58.6***	**58.8****	**58.9****	58.5	11.6	15.1	29.5
MT0245	**62.7****			58.7	12.4	14.4	28.6
MT0249	**58.4***			60.2	11.0	14.1	27.0
MT0266	54.2			57.3	10.7	15.1	27.9
MTHW0202	51.2			60.0	12.0	14.7	26.7
MTHW9420	**60.4***	**57.8***	53.7	59.1	11.4	14.0	27.2
Newana	**57.4***	54.5	52.3	59.2	11.9	13.4	28.2
Outlook	**59.9***	**56.7***	**57.6***	57.7	12.4	13.8	30.2
Rambo	55.5	**56.3***	55.4	58.6	12.8	14.4	27.1
Reeder	53.8	54.4	55.8	58.4	12.7	14.8	28.7
Scholar	**59.0***	**55.7***	54.7	60.1	12.3	14.2	31.3
Westbred 926	48.4	51.5	52.5	58.3	11.7	15.3	24.3
Westbred 936	54.5	**56.5***	**57.0***	58.6	11.4	15.3	24.7
Average	55.5	54.8	54.4	58.9	12.0	14.6	28.4
PLSD (p=0.05)	5.4	3.3	2.9	1.2	0.9	1.1	1.5
CV%	12.1	10.6	10.9	2.4	9.6	5.1	6.4
Location Years	4	8	11	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).

Table 7. Performance of 22 spring wheat cultivars and experimental lines tested under irrigated conditions only in south central Montana during 2004. Cultivars listed alphabetically.

Cultivar	Grain Yield 1/ 2004	Grain Yield 1/ 2003-2004	Grain Yield 1/ 2002-2004	Test Weight	Grain Moisture 2/	Grain Protein 2/	Plant Height
	bushels/acre			lb/bu	%	%	inches
Alsen	85.0			63.2	12.8	13.4	33.5
Amidon	89.7	90.3	87.7	61.0	14.2	12.2	39.5
Choteau	**93.1***	**98.1***	**92.9***	63.2	12.2	12.3	31.8
Conan	84.2	85.3	81.6	57.1	18.2	13.4	31.8
Ernest	**101.0****	**98.3***	**93.4***	61.4	14.4	13.2	40.7
Explorer	75.7	82.8	74.7	61.2	11.2	13.7	29.2
Fortuna	85.9	81.5	77.3	62.8	12.1	13.7	36.1
Hank	87.0	**97.5***	**92.6***	60.0	14.2	12.9	29.3
Hi-Line	76.3	83.5	80.7	61.5	12.1	14.3	31.2
McNeal	**95.2***	**99.4****	**94.6****	62.4	12.6	13.5	35.1
MT0245	**100.9***			61.2	13.8	12.9	34.2
MT0249	**91.4***			63.3	11.2	13.0	30.9
MT0266	84.0			60.1	11.1	13.8	31.9
MTHW0202	82.5			62.1	13.0	13.1	30.5
MTHW9420	**99.7***	**98.5***	86.0	62.8	12.2	11.6	32.3
Newana	90.7	92.2	83.3	61.8	12.8	11.9	32.9
Outlook	**94.7***	**94.0***	**91.4***	60.4	14.1	12.7	35.2
Rambo	88.5	**95.1***	88.8	60.3	14.8	12.5	30.6
Reeder	86.4	91.3	89.3	60.6	14.5	13.6	34.4
Scholar	**96.2***	**93.7***	87.3	62.2	13.6	13.1	37.4
Westbred 926	80.5	86.8	84.1	60.0	12.7	13.6	27.8
Westbred 936	89.7	**96.5***	**92.2***	61.5	12.0	13.2	27.9
Average	89.0	92.1	86.9	61.4	13.2	13.1	32.9
PLSD (p=0.05)	9.9	6.2	5.0	1.9	1.8	1.2	1.6
CV%	9.7	8.3	8.8	2.7	11.9	4.4	4.1
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).

Table 8. Performance of 22 spring wheat cultivars and experimental lines tested under dryland conditions only in south central Montana during 2004. Cultivars listed alphabetically.

Cultivar	Grain Yield 1/ 2004	Grain Yield 1/ 2003-2004	Grain Yield 1/ 2002-2004	Test Weight	Grain Moisture 2/	Grain Protein 2/	Plant Height
	bushels/acre			lb/bu	%	%	inches
Alsen	**24.5***			57.3	11.2	15.6	26.0
Amidon	**21.3***	17.0	15.1	56.7	10.6	15.9	26.2
Choteau	**23.5***	18.1	15.9	57.7	11.0	15.5	24.0
Conan	18.5	16.8	14.9	56.9	10.8	17.2	23.0
Ernest	**21.2***	16.5	14.6	57.5	10.5	15.5	26.7
Explorer	18.8	15.9	14.2	55.7	10.4	17.2	22.7
Fortuna	**22.4***	18.2	16.0	56.8	10.8	16.2	27.2
Hank	**22.5***	19.1	16.7	56.3	10.9	15.7	22.5
Hi-Line	**23.4***	18.9	16.5	56.5	10.8	16.1	23.8
McNeal	**22.0***	18.2	16.0	54.7	10.7	16.8	23.9
MT0245	**24.5***			56.3	11.0	16.0	22.9
MT0249	**25.5****			57.2	10.7	15.2	23.1
MT0266	**24.3***			54.4	10.4	16.4	24.0
MTHW0202	20.0			57.8	11.0	16.4	23.0
MTHW9420	**21.1***	17.0	15.0	55.3	10.6	16.4	22.1
Newana	**24.2***	16.9	15.0	56.5	10.9	14.8	23.6
Outlook	**25.1***	19.3	16.9	54.9	10.6	14.8	25.3
Rambo	**22.6***	17.5	15.4	56.8	10.9	16.2	23.5
Reeder	**21.3***	17.5	15.5	56.2	11.0	16.1	23.1
Scholar	**21.8***	17.8	15.7	58.0	11.0	15.4	25.2
Westbred 926	16.3	16.3	14.5	56.6	10.8	17.1	20.9
Westbred 936	19.4	16.6	14.7	55.7	10.8	17.4	21.6
Average	22.0	17.5	15.5	56.4	10.8	16.1	23.8
PLSD (p=0.05)	4.6	ns	ns	1.4	0.5	ns	2.5
CV%	18.0	17.7	17.9	2.2	3.7	5.4	9.2
Location Years	2	4	5	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).