RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2000

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PROJECT TITLE:

Dryland and Irrigated Spring Wheat Performance Trials near Bridger, Hysham, Molt and Ryegate, Montana. (Exps. 009994, 009995, 009996 and 009997).

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OBJECTIVES:

To provide wheat 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 wheat producers in south central Montana select varieties best suited to their particular area and growing conditions.

METHODS:

Off-station spring wheat trials were established under dryland conditions near Molt and Ryegate, and under irrigated conditions near Bridger and Hysham, Montana (Fig. 1). The 2000 dryland off-station spring wheat trials had 20 entries. The 2000 irrigated off-station spring wheat trials had 23 entries.

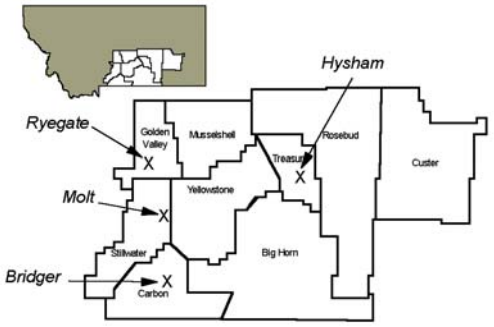

Figure 1. 2000 off-station spring wheat trial locations in south central Montana.

All studies were planted using a randomized complete block design with three replications. Dryland test plots consisted of a 15-foot, 4-row plot with 12-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. Grain protein values were adjusted to 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. Reported plant height values have been rounded to the nearest inch. Lodging of some entries was noted at the irrigated locations. Lodging severity was recorded on a 0 to 9 scale representing no lodging to all stems lying flat on the ground, respectively.

RESULTS and SUMMARY:

Severe drought stress, Russian wheat aphid (*Diuraphis noxia* Mord.) and wheat stem sawfly (*Cephus cinctus* Norton) were evident at the Molt dryland location in 2000. Substantial stem cutting from sawfly was observed at harvest. Molt spring wheat yields were severely depressed, averaging 13.3 bu/ac and ranging from the highest yield of 18.4 bu/ac for 'McNeal' to 5.9 bu/ac for 'Fergus' (Table 1). Eight other entries produced grain yields between 17.8 and 14.2 bu/ac, which was equal to the yield of McNeal. Based on two year yield averages, 'Reeder', 'Scholar', 'Lew', 'Conan', 'Fortuna' and McNeal have been the highest yielding cultivars at this site. Test weights averaged 56.6 lb/bu, which is nearly 6 pounds heavier than test weights observed at this site in 1999. Reeder, Conan and 'MTHW9710' were the only entries to produce a test weight greater than 58 lb/bu. Grain protein averaged 17.6 percent and ranged from 18.6 percent for 'Westbred 936' to 16.4 percent for Conan hard red spring wheat.

Conditions were similar at the Ryegate site in 2000 with severe drought stress and Russian wheat aphid also limiting spring wheat yield potential and crop quality (Table 2). The presence of wheat stem sawfly was not evident at Ryegate. Ryegate spring wheat yields averaged 21.0 bu/ac in 2000 and ranged from 35.8 bu/ac for Lew to 6.4 bu/ac for 'Westbred 926'. 'MT9955', McNeal and MTHW9710 produced grain yields between 30.7 and 27.0 bu/ac, which was equal to the yield of Lew. Test weights averaged 58.5 lb/bu. Grain protein averaged 18.4 percent and ranged from 19.2 percent for 'Ernest' to 17.1 percent for Conan.

Agronomic performance of the spring wheat cultivars and experimental lines tested under dryland conditions for the past two years is summarized in Table 3. Across locations, Lew hard red spring wheat was the highest yielding cultivar in 2000, averaging 26.4 bu/ac. McNeal, MT9955, Scholar and Reeder yielded 23.6, 22.4, 21.5 and 21.2 bu/ac, respectively, which is equal to the yield of Lew. Averaged over the past two years, McNeal has been the highest yielding cultivar under dryland conditions in south central Montana, averaging 38.7 bu/ac. Based on two year averages, Lew, 'Westbred Express', Reeder, Conan and Newana yielded between 36.2 and 32.2 bu/ac, equal to McNeal's two year average. Test weights for all 20 spring wheat entries averaged 57.6 lb/bu. Grain protein content averaged 18.0 percent and ranged from 16.8 percent for Conan to 19.0 percent for Westbred 936.

Spring wheat yield and crop quality were substantially improved by the availability of water at the irrigated sites (Tables 4 and 5). Irrigated spring wheat plots at Bridger were treated for control of Russian wheat aphid on May 23rd. Russian wheat aphid damage was minimal and did not appear to affect subsequent crop development. Spring wheat protein levels of the grain harvested from both the Bridger and Hysham locations continued to be elevated above expected values. Significant lodging also was observed at the irrigated sites compared to none observed at the dryland locations.

'ID377S' was the highest yielding spring wheat tested at the Hysham location in 2000, averaging 147.7 bu/ac (Table 4). 'Ivan', Westbred 936 and 'MTHW9420' averaged 143.3, 141.7 and 139.1 bu/ac, respectively, statistically equal to the yield of ID377S. Average test weight for the trial at Hysham was 61.4 lb/bu. Most

entries tested produced test weights heavier than 60 lb/bu. Grain protein content averaged 15.7 percent and ranged from 14.0 percent for Ivan to 17.0 percent for 'Ernest'. Older cultivars, most notably Fortuna and Lew, lodged significantly more than the remaining entries grown under the conditions experienced at Hysham in 2000.

The spring wheat cultivars tested at the Bridger site during 2000 averaged 96.8 bu/ac (Table 5), about 50 bu/ac less than the yield obtained by the spring wheats grown under irrigation at Hysham. ID377S was the highest yielding spring wheat tested at the Bridger location in 2000, averaging 127.6 bu/ac. Three other spring wheats, Newana, MT9955 and McNeal, yielded from 118.8 to 114.6 bu/ac, equaling the yield of ID377S. Average test weight at Bridger was 62.0 lb/bu, with most entries exceeding 60 lb/bu. Grain protein content at Bridger averaged 16.8 percent, and varied from 15.3 percent for ID377S and Newana to 19.2 percent for Westbred 936. As observed at Hysham, the older cultivars Fortuna and Lew exhibited more lodging than the other entries grown in the 2000 Bridger trial.

Mean agronomic performance of the spring wheat cultivars and experimental lines tested under irrigated conditions at the two locations during 2000 is summarized in Table 6. Across locations, ID377S was the highest yielding cultivar in 2000, averaging 137.6 bu/ac. Averaged across the two irrigated sites, no other spring wheat cultivar or experimental line tested in 2000 equaled the yield of ID377S. Test weights for all 20 entries across both irrigated locations averaged 61.7 lb/bu. Grain protein averaged 16.3 percent and ranged from 15.2 percent for ID377S, 'N96-0144' and Newana to 17.6 percent for Westbred 936.

Performing exceptionally well under irrigation, ID377S hard white spring wheat was the highest yielding cultivar tested at four locations in south central Montana during 2000 (Table 7 and 8). Only the experimental line MT9955 hard red spring wheat equaled the yield of ID377S. Two year yield averages for the wheats tested at the Bridger, Molt and Ryegate locations are presented in Table 7. McNeal spring wheat has been the highest yielding cultivar, averaging 52.6 bu/ac, tested at these locations the past two years. Five other hard red spring wheats performing equally well during 1999 and 2000 include Newana (52.3 bu/ac), Westbred Express (50.2 bu/ac), Reeder (49.8 bu/ac), Lew (49.3 bu/ac) and Rambo (48.9 bu/ac).

FUTURE PLANS:

Off-station spring wheat variety performance trials will continue in 2001 at the Bridger, Hysham, Molt and Ryegate locations.

Table 1. Performance of 20 hard red and hard white spring wheat cultivars and experimental lines tested under dryland conditions near Molt, Montana during 2000. Cultivars listed alphabetically. (Exp. 009994).

Cultivar	Grain Yield 1/ 2000	Grain Yield 1/ 1999-2000	Test Weight	Grain Moisture	Plant Height	Grain Protein 2/
	------ bushels/acre ------		lb/bu	-%-	-inches-	-%-
Amidon	**16.8***	17.8	52.9	7.2	23	17.7
Conan	13.2	**19.2***	59.0	7.9	19	16.4
Ernest	13.9	16.8	57.3	7.4	22	18.5
Fergus	5.9	12.5	-.-3/	7.2	18	17.6
Fortuna	12.9	**19.2***	56.3	7.4	24	17.9
Grandin	**14.2***	15.0	57.8	7.7	22	17.5
Hi-Line	**14.3***	17.9	57.7	7.3	19	18.3
ID377S (hard white)	12.0		55.1	7.6	19	17.7
Lew	**17.0***	**20.7***	55.5	7.6	23	17.7
McNeal	**18.4****	**18.7***	54.9	7.2	21	17.2
MT9955	14.0		54.4	7.2	19	17.5
MTHW9420 (hard white)	11.0	14.6	56.4	7.9	19	17.0
MTHW9710 (hard white)	13.6		59.7	7.8	18	17.6
Newana	**15.8***	17.4	57.9	7.5	19	18.0
Rambo	**15.2***	17.0	57.8	7.8	20	17.0
Reeder	**17.8***	**21.9****	58.8	7.7	19	17.4
Scholar	**17.5***	**20.8***	55.6	7.7	21	16.9
Westbred 926	6.9	16.3	-.-3/	7.7	18	18.1
Westbred 936	6.0	14.8	-.-3/	7.3	17	18.6
Westbred Express	10.1	17.5	54.7	7.6	15	17.8
Average	13.3	17.5	56.6	7.5	19.7	17.6
LSD (p=0.05)	4.3	3.9	5.1	-	2.2	-
CV%	19.3	19.0	5.4	-	6.6	-

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Grain protein values adjusted to 12 percent grain moisture content.
3/ Insufficient sample size to accurately estimate test weight.
** 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. 009994)

Planted:	March 24, 2000
Harvested:	July 27, 2000
Fertility:	11-52-00, 120 lb/a in-furrow, March 24, 2000
	40-20-00, 75 lb/a broadcast, May 17, 2000
Herbicide:	Harmony Extra, 0.5 oz/a; Buctril, 1 pt/a; R-11, 1 pt/a, May 23, 2000
Insecticide:	Malathion 5EC, 1 pt/a; R-11, 1 pt/a, May 23, 2000
Previous Crop:	summer fallow
Precipitation:	not available

Table 2. Performance of 20 hard red and hard white spring wheat cultivars and experimental lines tested under dryland conditions near Ryegate, Montana during 2000. Cultivars listed alphabetically. (Exp. 009995).

Cultivar	Grain Yield 1/ 2000	Grain Yield 1/ 1999-2000	Test Weight	Grain Moisture	Plant Height	Grain Protein 2/
	------ bushels/acre ------		lb/bu	-%-	-inches-	-%-
Amidon	18.6	30.2	58.0	9.0	23	18.2
Conan	25.3	**34.7***	60.0	8.9	20	17.1
Ernest	19.9	27.0	59.4	8.7	23	19.2
Fergus	9.0	27.8	59.0	8.6	19	18.3
Fortuna	17.9	31.2	57.5	8.9	22	17.9
Grandin	16.9	30.5	60.2	8.9	23	18.0
Hi-Line	21.3	30.8	59.1	8.9	20	19.1
ID377S (hard white)	25.5		58.5	8.8	22	18.0
Lew	**35.8****	**36.2***	58.5	9.1	23	18.2
McNeal	**28.9***	**38.7****	55.7	8.4	22	19.0
MT9955	**30.7***		56.2	8.6	21	19.1
MTHW9420 (hard white)	16.7	29.5	59.0	8.8	17	18.2
MTHW9710 (hard white)	**27.0***		58.8	8.9	19	18.2
Newana	23.4	**32.2***	58.5	8.8	21	18.7
Rambo	19.4	31.9	60.5	9.0	20	17.6
Reeder	24.6	**34.9***	60.0	8.7	21	17.8
Scholar	25.4	32.0	59.5	8.8	23	18.5
Westbred 926	6.4	26.9	55.9	8.3	20	18.8
Westbred 936	6.6	23.8	57.3	8.5	19	19.3
Westbred Express	20.2	**35.5***	58.4	8.9	19	18.4
Average	21.0	31.4	58.5	8.8	20.7	18.4
LSD (p=0.05)	10.2	6.6	1.1	-	3.2	-
CV%	29.4	18.1	1.1	-	9.4	-

1/ Yields are based on a 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).

Ryegate Dryland Spring Wheat (Exp. 009995)

Planted:	March 28, 2000
Harvested:	August 7, 2000
Fertility:	11-52-00, 120 lb/a in-furrow, March 28, 2000
	40-20-00, 75 lb/a broadcast, May 17, 2000
Herbicide:	Harmony Extra, 0.5 oz/a; Buctril, 1 pt/a; R-11, 1 pt/a, May 23, 2000
Insecticide:	Malathion 5EC, 1 pt/a; R-11, 1 pt/a, May 23, 2000
Previous Crop:	summer fallow
Precipitation:	not available

Table 3. Performance of 20 hard red and hard white spring wheat cultivars and experimental lines tested at two dryland locations in south central Montana during 2000. Cultivars listed alphabetically. (Exps. 009994 & 009995).

Cultivar	Grain Yield 1/ 2000	Grain Yield 1/ 1999-2000	Test Weight	Grain Moisture	Plant Height	Grain Protein 2/
	bushels/acre		lb/bu	%	inches	%
Amidon	17.7	30.2	55.4	8.1	23	18.0
Conan	19.2	**34.7***	59.5	8.4	19	16.8
Ernest	16.9	27.0	58.4	8.1	23	18.9
Fergus	7.5	27.8	-.-3/	7.9	18	18.0
Fortuna	15.4	31.2	56.9	8.2	23	17.9
Grandin	15.6	30.5	59.0	8.3	23	17.8
Hi-Line	17.8	30.8	58.4	8.1	20	18.7
ID377S (hard white)	18.8		56.8	8.2	21	17.9
Lew	**26.4****	**36.2***	57.0	8.4	23	18.0
McNeal	**23.6***	**38.7****	55.3	7.8	22	18.1
MT9955	**22.4***		55.3	7.9	20	18.3
MTHW9420 (hard white)	13.9	29.5	57.7	8.3	18	17.6
MTHW9710 (hard white)	20.3		59.3	8.4	18	17.9
Newana	19.6	**32.2***	58.2	8.2	20	18.4
Rambo	17.3	31.9	59.1	8.4	20	17.3
Reeder	**21.2***	**34.9***	59.4	8.2	20	17.6
Scholar	**21.5***	32.0	57.6	8.3	22	17.7
Westbred 926	6.6	26.9	-.-3/	8.0	19	18.5
Westbred 936	6.3	23.8	-.-3/	7.9	18	19.0
Westbred Express	15.2	**35.5***	56.5	8.2	17	18.1
Average	17.1	31.4	57.6	8.2	20.2	18.0
LSD (p=0.05)	5.4	6.6	2.6	0.2	1.9	0.6
CV%	27.5	18.1	3.9	2.5	8.2	2.7

1/ Yields are based on a 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Grain protein values adjusted to 12 percent grain moisture content.
3/ Insufficient sample size to accurately estimate test weight at Molt.
** 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 4. Performance of 23 hard red and hard white spring wheat cultivars and experimental lines tested under irrigation near Hysham, Montana during 2000. Cultivars listed alphabetically. (Exp. 009996).

Cultivar	1/ Grain Yield	Test Weight	Grain Moisture	Plant Height	2/ Lodging Severity	3/ Grain Protein
	bu/acre	lb/bu	%	inches	0-9	%
Amidon	114.8	60.9	11.0	44	1.0	16.6
Conan	117.5	61.2	11.2	36	0.0	14.9
Ernest	117.1	62.4	11.3	43	0.0	17.0
Fergus	134.8	61.0	11.2	34	0.0	15.5
Fortuna	122.1	62.4	11.3	42	6.7	15.7
Grandin	117.1	61.7	11.2	40	0.7	16.3
Hi-Line	124.1	61.1	11.0	35	0.0	15.3
ID377S (hard white)	**147.7****	62.0	11.3	39	1.3	15.0
Ivan	**143.3***	62.9	11.2	36	0.0	14.0
Lew	99.1	61.7	11.3	45	6.7	16.7
McNeal	125.7	60.8	10.8	41	0.0	16.6
MT9955	134.3	61.3	11.0	39	0.0	16.6
MTHW9420 (hard white)	**139.1***	61.0	11.0	37	0.0	15.1
MTHW9710 (hard white)	114.4	59.9	11.0	33	0.0	15.7
N96-0144	122.6	62.0	11.3	38	1.3	14.8
Newana	122.1	60.6	10.2	37	0.3	15.0
Norpro	124.0	61.3	11.2	37	0.0	15.2
Rambo	125.5	61.4	11.2	38	0.0	15.1
Reeder	115.2	62.1	11.2	40	0.3	16.5
Scholar	116.7	61.4	11.2	40	1.0	16.4
Westbred 926	129.2	60.2	11.0	34	0.0	16.0
Westbred 936	**141.7***	60.6	11.0	34	0.0	16.0
Westbred Express	130.0	62.1	10.8	31	0.0	16.1
Average	125.1	61.4	11.1	37.9	0.8	15.7
LSD (p=0.05)	10.0	0.6	0.5	2.2	1.2	-
CV%	4.9	0.6	2.5	3.6	88.7	-

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Lodging severity scores of 0 to 9 represent no lodging to all stems flat on the ground, respectively.
3/ 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. 009996)

Planted:	March 20, 2000
Harvested:	August 8, 2000
Fertility:	40-20-00, 250 lb/a broadcast, May 18, 2000
Herbicide:	Express, 0.1 oz/a; Bronate, 16 oz/a; Starane, 5 oz/a, May 8, 2000
Insecticide:	none
Irrigation:	profile flooded, May 11, 2000 profile flooded, June 12, 2000
Previous Crop:	sugar beets
Precipitation:	not available

Table 5. Performance of 23 hard red and hard white spring wheat cultivars and experimental lines tested under irrigation near Bridger, Montana during 2000. Cultivars listed alphabetically. (Exp. 009997).

Cultivar	Grain Yield 1/ 2000	Grain Yield 1/ 1999-00	Test Weight	Grain Moisture	Plant Height	Lodging Severity 2/	Grain Protein 3/
	bushels/acre		lb/bu	%	inches	0-9	%
Amidon	94.0	90.9	60.8	8.9	34	0.0	17.0
Conan	83.5	83.5	59.9	11.0	29	0.0	16.9
Ernest	96.4	90.1	61.8	8.3	38	0.0	18.0
Fergus	87.5	88.6	61.3	10.0	30	0.0	17.2
Fortuna	94.8	87.1	62.7	8.5	36	1.3	16.9
Grandin	83.1	91.4	62.5	8.3	35	0.0	18.0
Hi-Line	87.8	93.3	61.6	8.0	32	0.0	17.8
ID377S (hard white)	**127.6****		63.1	8.7	35	0.0	15.3
Ivan	94.7		63.1	8.7	30	0.0	15.0
Lew	104.3	91.0	63.4	8.9	37	1.3	15.8
McNeal	**114.6***	**100.3***	61.9	8.1	34	0.0	16.6
MT9955	**118.2***		62.3	8.2	34	0.0	16.5
MTHW9420 (hard white)	86.3	85.5	62.4	8.2	31	0.0	16.8
MTHW9710 (hard white)	97.4		61.6	8.1	31	0.0	16.9
N96-0144	98.4		61.9	8.6	32	0.0	15.5
Newana	**118.8***	**107.4****	62.7	8.2	34	0.0	15.3
Norpro	92.7		62.2	8.3	31	0.0	16.7
Rambo	101.6	**97.7***	61.8	8.9	32	0.0	15.9
Reeder	92.9	92.6	62.1	8.8	32	0.0	17.7
Scholar	101.2	88.5	62.6	8.6	34	0.0	16.8
Westbred 926	79.7	81.2	60.7	8.1	27	0.0	17.7
Westbred 936	70.1	77.8	60.7	8.2	26	0.0	19.2
Westbred Express	100.3	**97.5***	61.7	8.1	29	0.0	17.5
Average	96.8	90.8	62.0	8.6	32.2	0.1	16.8
LSD (p=0.05)	15.6	10.1	0.8	0.8	2.2	0.4	-
CV%	9.8	9.6	0.8	5.3	4.1	230.1	-

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Lodging severity scores of 0 to 9 represent no lodging to all stems flat on the ground, respectively.
3/ 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).

Bridger Irrigated Spring Wheat (Exp. 009997)

Planted:	March 28, 2000
Harvested:	August 14, 2000
Fertility:	11-52-00, 120 lb/a in-furrow, March 28, 2000
	40-20-00, 250 lb/a broadcast, May 23, 2000
Herbicide:	Harmony Extra, 0.5 oz/a; Buctril, 1 pt/a; R-11, 1 pt/a, May 23, 2000
Insecticide:	Malathion 5EC, 1 pt/a; R-11, 1 pt/a, May 23, 2000
Previous Crop:	fallow
Irrigation:	profile flooded, June 6 and 7, 2000
	profile flooded, July 5 and 6, 2000
Precipitation:	4.26 inches

Table 6. Performance of 23 hard red and hard white spring wheat cultivars and experimental lines tested under irrigation at two locations in south central Montana during 2000. Cultivars listed alphabetically. (Exps. 009996 & 009997).

Cultivar	1/ Grain Yield	Test Weight	Grain Moisture	Plant Height	2/ Lodging Severity	3/ Grain Protein
	bu/acre	lb/bu	%	inches	0-9	%
Amidon	104.4	60.8	10.0	39	0.5	16.8
Conan	100.5	60.6	11.1	33	0.0	15.9
Ernest	106.8	62.1	9.8	40	0.0	17.5
Fergus	111.1	61.2	10.6	32	0.0	16.4
Fortuna	108.4	62.5	9.9	39	4.0	16.3
Grandin	100.1	62.1	9.8	37	0.3	17.2
Hi-Line	105.9	61.4	9.5	33	0.0	16.6
ID377S (hard white)	**137.6****	62.6	10.0	37	0.7	15.2
Ivan	119.0	63.0	9.9	33	0.0	14.5
Lew	101.7	62.6	10.1	41	4.0	16.3
McNeal	120.2	61.4	9.4	37	0.0	16.6
MT9955	126.3	61.8	9.6	36	0.0	16.0
MTHW9420 (hard white)	112.7	61.7	9.6	34	0.0	16.3
MTHW9710 (hard white)	105.9	60.8	9.5	32	0.0	16.6
N96-0144	110.5	61.9	10.0	35	0.7	15.2
Newana	120.5	61.7	9.2	36	0.2	15.2
Norpro	108.3	61.8	9.8	34	0.0	16.0
Rambo	113.5	61.6	10.1	35	0.0	15.5
Reeder	104.0	62.1	10.0	36	0.2	17.1
Scholar	109.0	62.0	9.9	37	0.5	16.6
Westbred 926	104.5	60.5	9.6	30	0.0	16.9
Westbred 936	105.9	60.6	9.6	30	0.0	17.6
Westbred Express	115.1	61.9	9.4	30	0.0	16.8
Average	111.0	61.7	9.8	35.1	0.5	16.3
LSD (p=0.05)	9.2	0.5	0.4	1.5	0.6	0.9
CV%	7.2	0.7	3.9	3.8	117.1	4.7

1/ Yields are based on 60 pound standard bushel weight and adjusted to 13.0 percent moisture content.
2/ Lodging severity scores of 0 to 9 represent no lodging to all stems flat on the ground, respectively.
3/ Grain protein values adjusted to 12 percent grain moisture content.
** Indicates highest yielding cultivar within a column.

Table 7. Performance of 20 hard red and hard white spring wheat cultivars and experimental lines tested across four locations in south central Montana during 2000. Cultivars listed alphabetically. (Exps. 009994, 009995, 009996 & 009997).

Cultivar	Grain Yield 1/ 2000	Grain Yield 1/ 1999-2000	Test Weight	Grain Moisture	Plant Height	Grain Protein 2/
	bushels/acre		lb/bu	%	inches	%
Amidon	61.0	46.3	59.9	9.0	31	17.4
Conan	59.9	45.8	60.4	9.8	26	16.3
Ernest	61.8	44.6	61.2	8.9	31	18.2
Fergus	59.3	43.0	60.4	9.2	25	17.1
Fortuna	61.9	45.8	60.9	9.0	31	17.1
Grandin	57.9	45.6	61.5	9.0	30	17.5
Hi-Line	61.9	47.3	60.6	8.8	27	17.6
ID377S (hard white)	**78.2****		61.2	9.1	29	16.5
Lew	64.1	**49.3***	61.2	9.2	32	17.1
McNeal	71.9	**52.6****	59.5	8.6	30	17.4
MT9955	**74.3***		59.9	8.8	28	17.4
MTHW9420 (hard white)	63.3	43.2	60.8	9.0	26	16.8
MTHW9710 (hard white)	63.1		60.1	8.9	25	17.1
Newana	70.0	**52.3***	60.6	8.7	28	16.8
Rambo	65.4	**48.9***	61.2	9.2	27	16.4
Reeder	62.6	**49.8***	61.4	9.1	28	17.4
Scholar	65.2	47.1	61.2	9.1	29	17.2
Westbred 926	55.6	41.5	59.0	8.8	24	17.6
Westbred 936	56.1	38.8	59.5	8.7	24	18.3
Westbred Express	65.2	**50.2***	60.7	8.8	23	17.5
Average	63.9	46.6	60.6	9.0	27.7	17.2
LSD (p=0.05)	5.2	4.2	0.5	0.3	1.2	0.9
CV%	10.2	13.6	0.9	3.5	5.3	6.2
Location Years	4	6	3	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 8. Yield[1/] of 23 hard red and hard white spring wheat cultivars and experimental lines tested under dryland and irrigated conditions at two locations in south central Montana during 2000. Cultivars listed by declining four-year location average yield. (Exps. 009994, 009995, 009996 & 009997).

Cultivar	Dryland			Irrigated			4 Location Average
	Molt	Ryegate	Average	Bridger	Hysham	Average	
	bushels/acre						
ID377S (hard white)	12.0	25.5	18.8	**127.6****	**147.7****	**137.6****	**78.2****
MT9955	14.0	**30.7***	**22.4***	**118.2***	134.3	126.3	**74.3***
McNeal	**18.4****	**28.9***	**23.6***	**114.6***	125.7	120.2	71.9
Newana	**15.8***	23.4	19.6	**118.8***	122.1	120.5	70.0
Rambo	**15.2***	19.4	17.3	101.6	125.5	113.5	65.4
Scholar	**17.5***	25.4	**21.5***	101.2	116.7	109.0	65.2
Westbred Express	10.1	20.2	15.2	100.3	130.0	115.1	65.2
Lew	**17.0***	**35.8****	**26.4****	104.3	99.1	101.7	64.1
MTHW9420 (hard white)	11.0	16.7	13.9	86.3	**139.1***	112.7	63.3
MTHW9710 (hard white)	13.6	**27.0***	20.3	97.4	114.4	105.9	63.1
Reeder	**17.8***	24.6	**21.2***	92.9	115.2	104.0	62.6
Fortuna	12.9	17.9	15.4	94.8	122.1	108.4	61.9
Hi-Line	**14.3***	21.3	17.8	87.8	124.1	105.9	61.9
Ernest	13.9	19.9	16.9	96.4	117.1	106.8	61.8
Amidon	**16.8***	18.6	17.7	94.0	114.8	104.4	61.0
Conan	13.2	25.3	19.2	83.5	117.5	100.5	59.9
Fergus	5.9	9.0	7.5	87.5	134.8	111.1	59.3
Grandin	**14.2***	16.9	15.6	83.1	117.1	100.1	57.9
Westbred 936	6.0	6.6	6.3	70.1	**141.7***	105.9	56.1
Westbred 926	6.9	6.4	6.6	79.7	129.2	104.5	55.6
Ivan				94.7	**143.3***	119.0	
N96-0144				98.4	122.6	110.5	
Norpro				92.7	124.0	108.3	
Average	13.3	21.0	17.1	96.8	125.1	111.0	63.9
LSD (p=0.05)	4.3	10.2	5.4	15.6	10.0	9.2	5.2
CV%	19.3	29.4	27.5	9.8	4.9	7.2	10.2

1/ Yields are based on a 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).