MONTANA STATE UNIVERSITY
AGRICULTURAL EXPERIMENT STATION

RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA - 2002

The Annual Report of the Investigations at and Administration of the
Southern Agricultural Research Center, Huntley, Montana

http://www.sarc.montana.edu/annualreport/2002/

PROJECT TITLE:

Dryland and Irrigated Hard Red and Hard White Winter Wheat Variety Performance Trials near Forsyth, Huntley, Indian Creek, Lodge Grass and Rapelje, Montana. (Exps. 023880, 023881, 023882, 023883 and 023884).

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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 winter wheat varieties. This information should help winter wheat producers in south central Montana select varieties best suited to their particular area and growing conditions.

METHODS:

Off-station winter wheat trials were established under dryland conditions near Forsyth, Indian Creek, Lodge Grass and Rapelje, and under irrigation at Huntley (Fig. 1). Each 2002 dryland off-station winter wheat trial had 24 entries and was planted using a randomized complete block design with three replications. The 2002 irrigated trial near Huntley possessed 26 entries. Dryland test plots consisted of a 15-foot, 4-row plot with 12-inch row spacing. The irrigated test plots consisted of a 15-foot, 7-row plot with 6-inch row spacing.

All rows of each harvested 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. Two year (2001-2002) and three year (2000-2002) yield averages are provided for cultivars tested previous years. 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 by near-infrared reflectance by the MSU Cereal Quality Lab 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 values have been rounded to the nearest inch. Lodging of some cultivars was noted at the Huntley location during 2002, and recorded on a 0 to

9 scale representing no lodging to all stems lying flat on the ground, respectively.

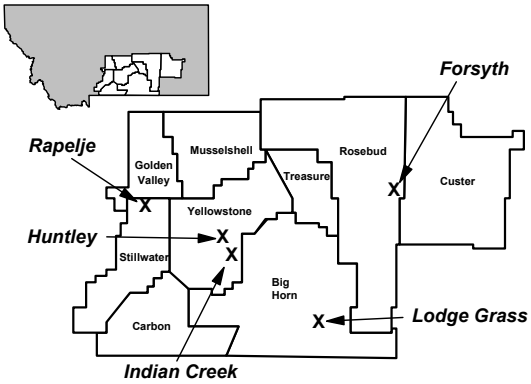

Figure 1. 2002 off-station winter wheat trial locations in south central Montana.

RESULTS:

Marginal soil moisture resulted in poor germination and spotty emergence at the Forsyth, and Indian Creek sites, but these two sites eventually developed fairly uniform plant stands. Except for a short period of below-zero weather experienced during mid December, over-wintering temperatures were unusually mild, with little or no winter injury observed at the five locations. Extremely dry conditions prevailed all season at Rapelje resulted in non-uniform stands across the test site. The Rapelje site was not harvested. Spring weather was unusually cold, particularly during March and April, which delayed crop development. Unusual hot, dry conditions during late June and throughout July hastened crop maturity.

Huntley irrigated winter wheat yields ranged from 108.7 bu/ac for 'Norstar' to 140.8 bu/ac for 'Promontory' during 2002, but no statistical difference between entries was detected (Table 1). Yield differences were not detected between entries tested at this site for three years. 'Nuplains' hard red winter wheat produced the heaviest test weight during 2002, averaging 64.3 lb/bu, with 21 of the 24 entries producing test weights heavier than 60 lb/bu.

Average yield under dryland condition at Forsyth in 2002 was 23.4 bu/ac (Table 2). There was no significant difference in yield among all entries. Average test weight was 54.3 lb/bu. Two-year average yield for winter wheat varieties tested during 2001 and 2002 averaged 24.8 bu/ac with NuWest producing the highest average seed yield at 27.3 bu/ac. Sixteen entries produced yields from 23.3 to 27.0 bu/ac, which was equal with the highest yield. Three-year average yield for winter wheat varieties tested during 2000 to 2002 averaged 30.6 bu/ac with NuWest producing the highest average seed yield at 35.3 bu/ac. Seven entries produced yields from 32.0 to 34.3 bu/ac, which was equal with the highest yield.

Agronomic performance of the winter wheat cultivars and experimental lines tested under dryland conditions near Lodge Grass during 2002 is presented in Table 3. Average grain yield was 49.6 bu/ac. Highest yield was produced by Nuplains, at 55.0 bu/ac. 'Golden Spike', 'MT9982', 'MTR9997', 'Neeley', Promontory, 'Rampart', 'Rocky' and 'Vanguard' produced yields from 51.1 to 53.9 bu/ac, which was equal with the highest yield. Average test weight was 54.9 bu/ac. Two-year average yield for winter wheat varieties tested during 2001 and 2002 averaged 45.4 bu/ac with Golden Spike producing the highest average seed yield at 50.4 bu/ac. Eight entries produced yields from 46.2 to

49.5 bu/ac, which were equal with the highest yield. Three-year average yield for winter wheat varieties tested during 2000 to 2002 in Lodge Grass averaged 51.9 bu/ac with Promontory producing the highest average seed yield at 57.4 bu/ac. Neeley, Paul, Rocky and Vanguard produced yields from 53.4 to 57.3 bu/ac which was equal with the highest yield.

The Indian Creek location demonstrated the highest level of drought stress among the three dryland off-station sites harvested in 2002. Winter wheat yields averaged 18.1 bu/ac (Table 4), which is 49 bu/ac less than the average yield during 2001. Mean plant height was 26.4 inches, approximately 5 inches shorter than plant heights measured at the Lodge Grass locations, respectively. Yields ranged from 12.3 bu/ac for the cultivar 'Paul' to 21.4 bu/ac for 'CDC Falcon'. Eighteen entries produced yields equal to CDC Falcon. Average test weight was 52.2 lb/bu. None of the entries produced test weights heavier than 60 lb/bu. Two-year average yield for winter wheat varieties tested during 2001 and 2002 averaged 43.0 bu/ac with MT9982 producing the highest average seed yield at 47.9 bu/ac. Eleven entries produced yields from 42.6 to 46.6 bu/ac, which was equal with the highest yield. Three-year average yield for winter wheat varieties tested during 2000 to 2002 averaged 39.5 bu/ac. There was no significant difference in yield among entries.

SUMMARY:

Since 1999, experiments representing 12 location-years of testing have uniformly tested 16 cultivars at several dryland and irrigated sites in south central Montana (Table 6). Under both dryland and irrigated conditions, averaged across three years, Promontory hard red winter wheat has been the highest yielding cultivar, averaging 62.5 bu/ac. Promontory also has been the highest yielding cultivar tested, at 44.2 bu/ac, when averaging only dryland environments (Table 5). Judith, NuSky, Paul, Rocky and Tiber winter wheats yielded from 41.7 to 42.0 bu/ac and are the only cultivars tested under dryland conditions to equal the yield of Promontory. Bighorn, Judith, Morgan, Neeley, Paul, Rocky and Tiber yielding from 58.6 to 61.1 bu/ac, have yielded as well as Promontory at all sites (Table 6). There was no significant difference in yield averaged among entries under both dryland and irrigated scenarios (Table 7).

FUTURE PLANS:

All five off-station winter wheat cultivar evaluations were planted during the fall of 2002 for continuation of the program through 2003.

Table 1. Performance of 26 hard red and hard white winter wheat cultivars and experimental lines tested under irrigated conditions near Huntley, Montana during 2002. Cultivars listed alphabetically. (Exp. 023880).

Cultivar	Grain Yield 1/ 2002	Grain Yield 1/ 2001-2002	Grain Yield 1/ 2000-2002	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height	Lodging 3/
	bushels/acre			lb/bu	%	%	inches	0-9
Bighorn	136.9	128.1	117.4	61.3	9.7	11.7	37.0	0.3
BigSky	132.5	124.5	108.1	63.2	10.0	13.1	43.3	1.0
CDC Falcon	123.7			59.9	9.5	12.5	36.4	0.3
Declo	112.1			60.1	9.5	12.9	33.3	0.0
Golden Spike	143.5	135.3		59.5	9.9	12.0	42.3	1.7
Judith	135.8	128.0	118.4	59.7	9.9	11.8	42.0	0.7
McGuire	125.3	113.9	98.5	62.7	9.7	13.8	39.6	1.0
Morgan	129.3	133.9	112.8	61.0	9.6	11.6	41.9	1.7
MT9951	137.3			60.5	10.1	12.5	44.5	3.0
MT9982	125.9	129.6		60.7	10.1	12.3	41.5	0.7
MTR9997	129.7			62.0	9.8	12.8	38.1	2.0
MTS0023	121.3			60.4	9.7	13.9	41.9	1.7
MTS0031	128.0			61.4	9.7	12.8	39.6	2.7
NB886	139.7			61.0	9.6	12.3	30.7	0.0
Neeley	133.8	131.5	111.4	60.8	9.7	13.2	41.1	2.0
Norstar	108.7	113.8	97.9	62.4	10.0	13.7	49.4	2.0
Nuplains	127.8	120.7	108.4	64.3	10.2	11.8	36.7	0.0
NuSky	134.2	125.5	108.7	60.8	10.0	12.8	44.0	2.7
NuWest	138.6	122.2	107.0	61.3	9.9	12.4	42.9	2.0
Paul	129.5	126.7	110.9	61.0	9.7	12.7	40.1	2.0
Promontory	140.8	134.6	117.1	63.1	10.0	11.5	39.0	1.0
Rampart	136.1	128.3	114.2	61.7	9.7	13.5	42.8	1.0
Ransom	136.9	133.8		60.5	9.6	12.6	42.0	4.0
Rocky	127.3	129.2	113.1	63.1	10.2	11.6	42.1	3.7
Tiber	126.7	128.2	109.8	62.1	10.1	12.4	46.7	0.7
Vanguard	126.4	117.9	103.9	62.0	9.8	13.6	39.8	2.7
Average	130.3	126.6	109.8	61.4	9.8	12.6	40.7	1.6
LSD (p=0.05)	ns	ns	ns	1.4	0.3	-.-	3.3	2.1
CV%	11.2	11.0	13.3	1.4	1.9	-.-	4.9	84.2

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/ Lodging severity scores of 0 to 9 represent no lodging to all stems flat on the ground, respectively.
ns Indicates no significant difference between cultivars within a column based on Fisher's protected LSD (p=0.05).

Huntley Irrigated Winter Wheat (Exp. 023880)

Planted:	September 18, 2001
Harvested:	August 2, 2002
Fertility:	18-46-00, 100 lb/a PPI, September 17, 2001
Herbicide:	Harmony Extra, 0.3 oz/a; Bronate, 1 pt/a; R-11, 1 pt/a, May 13, 2002
Insecticide:	none
Previous Crop:	fallow
Precipitation:	

Table 2. Performance of 24 hard red and hard white winter wheat cultivars and experimental lines tested under dryland conditions near Forsyth, Montana during 2002. Cultivars listed alphabetically. (Exp. 023882).

Cultivar	Grain Yield 1/ 2002	Grain Yield 1/ 2001-2002	Grain Yield 1/ 2000-2002	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height
	---------- bushels/acre ----------			lb/bu	%	%	inches
Bighorn	26.4	**26.8***	**34.1***	55.1	8.0	15.1	24.9
BigSky	20.3	**23.8***	28.7	52.3	8.1	16.8	30.3
CDC Falcon	23.4			54.1	8.0	15.3	24.1
Golden Spike	23.0	**23.9***		51.6	7.8	15.7	28.3
Judith	26.1	**26.7***	**33.6***	52.8	8.2	15.1	27.5
McGuire	22.7	**23.3***	30.0	55.6	8.1	17.2	27.7
Morgan	22.5	**25.4***	**33.1***	54.6	8.1	15.3	27.6
MT9951	26.7			53.1	8.1	15.8	29.8
MT9982	21.8	**27.0***		54.7	8.4	16.1	27.1
MTR9997	26.4			55.4	8.1	16.1	27.3
MTS0023	20.2			52.5	8.1	16.8	26.4
MTS0031	21.5			53.5	7.8	17.5	26.9
Neeley	23.8	**26.4***	31.2	54.8	8.1	16.1	27.7
Norstar	20.8	**25.3***	**32.0***	55.2	8.2	15.0	33.2
Nuplains	24.7	**24.1***	28.6	56.6	8.7	14.8	24.2
NuSky	21.9	**26.3***	**34.3***	53.8	8.2	15.5	27.6
NuWest	23.1	**27.3****	**35.3****	54.6	8.3	14.5	27.8
Paul	23.6	**24.1***	**32.0***	52.0	8.3	14.9	25.6
Promontory	21.9	**24.0***	31.3	53.4	8.1	15.7	26.2
Rampart	20.5	19.8	21.6	54.8	7.9	15.7	26.8
Ransom	22.9	**24.9***		52.5	8.1	14.2	26.5
Rocky	30.3	**26.7***	31.3	56.8	8.6	14.6	29.8
Tiber	25.2	**26.0***	**33.4***	57.1	8.3	15.8	29.0
Vanguard	22.5	19.8	19.9	55.4	7.9	16.9	27.2
Average	23.4	24.8	30.6	54.3	8.2	15.7	27.5
LSD (p=0.05)	ns	4.1	3.9	ns	0.3	- -	2.7
CV%	19.6	14.3	13.7	3.8	2.5	- -	6.0

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

Forsyth Dryland Winter Wheat (Exp. 023882)

Planted:	September 27, 2001
Harvested:	August 1, 2002
Fertility:	11-52-00, 120 lb/a in-furrow, September 27, 2001
Herbicide:	n/a
Insecticide:	none
Previous Crop:	summer fallow
Precipitation:	n/a

Table 3. Performance of 24 hard red and hard white winter wheat cultivars and experimental lines tested under dryland conditions near Lodge Grass, Montana during 2002. Cultivars listed alphabetically. (Exp. 023883).

Cultivar	Grain Yield 1/ 2002	Grain Yield 1/ 2001-2002	Grain Yield 1/ 2000-2002	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height
	----------	bushels/acre	----------	lb/bu	%	%	inches
Bighorn	49.6	**46.3***	52.7	55.1	7.8	15.9	26.8
BigSky	46.8	42.4	52.9	54.1	8.1	16.5	34.2
CDC Falcon	49.4			53.3	7.9	16.2	25.4
Golden Spike	**51.4***	**50.4****		52.8	7.6	15.5	31.0
Judith	47.3	41.9	51.9	52.8	8.3	16.0	30.7
McGuire	50.4	42.5	47.7	57.6	8.5	16.5	31.3
Morgan	44.3	40.4	45.7	55.0	8.1	15.2	31.0
MT9951	48.7			54.4	8.2	15.9	34.9
MT9982	**51.1***	**48.0***		54.9	8.3	15.2	28.6
MTR9997	**53.0***			56.6	8.2	16.1	31.9
MTS0023	45.2			54.2	7.9	16.9	32.9
MTS0031	46.9			54.5	8.0	16.8	33.2
Neeley	**51.4***	45.2	**56.0***	51.9	8.1	15.9	32.8
Norstar	44.1	43.2	51.1	56.2	8.2	16.8	39.1
Nuplains	**55.0****	42.6	47.2	57.9	8.6	15.5	27.2
NuSky	48.0	44.1	50.7	55.7	8.2	15.7	32.9
NuWest	48.2	44.0	47.7	56.3	8.5	15.2	30.4
Paul	49.2	**47.8***	**57.3***	52.7	8.1	16.0	28.3
Promontory	**53.9***	**49.5***	**57.4****	55.9	8.2	15.2	28.9
Rampart	**52.7***	**47.3***	52.9	55.9	7.9	16.0	32.3
Ransom	50.2	**46.9***		53.8	8.1	15.7	31.3
Rocky	**53.4***	**48.5***	**53.5***	53.7	8.7	15.2	34.2
Tiber	48.3	**46.2***	52.8	55.9	8.1	15.6	34.9
Vanguard	**52.2***	45.1	**53.4***	55.9	8.0	15.8	32.4
Average	49.6	45.4	51.9	54.9	8.2	15.9	31.5
LSD (p=0.05)	4.2	4.4	4.4	2.9	0.2	-.-	2.2
CV%	5.1	8.4	9.1	3.2	1.7	-.-	4.2

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).

Lodge Grass Dryland Winter Wheat (Exp. 023883)

Planted:	October 9, 2001
Harvested:	August 1, 2002
Fertility:	11-52-00, 120 lb/a in-furrow, October 9, 2001
Herbicide:	n/a
Insecticide:	none
Previous Crop:	summer fallow
Precipitation:	n/a

Table 4. Performance of 24 hard red and hard white winter wheat cultivars and experimental lines tested under dryland conditions at the Indian Creek location near Huntley, Montana during 2002. Cultivars listed alphabetically. (Exp. 023884).

Cultivar	Grain Yield 1/ 2002	Grain Yield 1/ 2001-2002	Grain Yield 1/ 2000-2002	Test Weight	Grain Moisture	Grain Protein 2/	Plant Height
	bushels/acre			lb/bu	%	%	inches
Bighorn	**19.0***	**44.0***	37.6	52.8	8.0	17.7	23.4
BigSky	14.1	40.3	40.0	51.4	8.2	19.2	26.5
CDC Falcon	**21.4****			49.2	7.6	18.6	24.0
Golden Spike	**18.8***	**43.6***		50.3	7.8	17.9	27.1
Judith	**16.3***	**42.6***	40.3	48.9	8.3	18.7	26.5
McGuire	**20.9***	**46.6***	40.9	54.9	8.3	18.5	28.2
Morgan	**18.8***	**45.8***	42.8	52.6	8.2	16.7	26.2
MT9951	**20.0***			52.4	8.1	19.1	27.2
MT9982	**20.9***	**47.9****		52.2	8.5	17.8	27.7
MTR9997	**20.5***			53.2	8.1	18.4	27.6
MTS0023	**18.2***			52.2	8.0	19.0	25.8
MTS0031	**19.8***			51.2	7.8	18.8	29.2
Neeley	**17.8***	39.3	36.8	51.0	8.1	18.1	26.7
Norstar	15.5	38.4	37.5	56.3	8.4	18.5	27.8
Nuplains	**20.4***	38.0	34.6	54.9	8.5	17.7	24.5
NuSky	13.7	42.1	40.8	52.2	8.1	19.0	25.3
NuWest	14.9	**44.4***	39.9	52.0	8.2	18.6	24.6
Paul	12.3	40.8	36.4	49.1	8.3	19.0	22.6
Promontory	**18.2***	**46.6***	44.0	52.7	8.2	18.0	26.2
Rampart	**20.6***	42.2	40.6	52.5	7.9		27.2
Ransom	**18.3***	**42.8***		49.2	8.0	17.8	27.3
Rocky	**17.5***	**45.5***	41.0	53.6	8.2	18.9	27.4
Tiber	**17.6***	**43.4***	39.0	54.2	8.2	18.1	26.9
Vanguard	**19.8***	**43.3***	40.0	52.8	8.0	18.0	28.1
Average	18.1	43.0	39.5	52.2	8.1	18.4	26.4
LSD (p=0.05)	5.2	5.4	ns	1.4	0.3	-.-	2.6
CV%	17.6	10.9	14.9	1.7	2.0	-.-	5.9

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).

Indian Creek Dryland Winter Wheat (Exp. 023884)

Planted: September 26, 2001
Harvested: August 1, 2002
Fertility: 11-52-00, 120 lb/a in-furrow, September 26, 2001
Herbicide: n/a
Insecticide: none
Previous Crop: summer fallow
Precipitation: n/a

Table 5. Performance of 24 hard red and hard white winter wheat cultivars and experimental lines tested under dryland conditions only in south central Montana during 2002. Cultivars listed alphabetically.

Cultivar	Grain Yield 1/ 2002	Grain Yield 1/ 2001-2002	Grain Yield 1/ 2000-2002	Test Weight	Grain Moisture	Plant Height
	---------- bushels/acre ----------			lb/bu	%	inches
Bighorn	**31.7***	**39.0***	41.5	54.3	7.9	25.9
BigSky	27.1	35.5	40.5	52.6	8.1	32.2
CDC Falcon	**31.4***			52.2	8.0	24.8
Golden Spike	**31.1***	**39.3***		51.6	7.7	29.7
Judith	29.9	37.1	**42.0***	51.5	8.2	29.1
McGuire	**31.3***	37.5	39.5	56.0	8.3	29.5
Morgan	28.5	37.2	40.5	54.1	8.1	29.3
MT9951	**31.8***			53.3	8.1	32.3
MT9982	**31.3***	**41.0****		53.9	8.4	27.8
MTR9997	**33.3***			55.1	8.2	29.6
MTS0023	27.9			53.0	8.0	29.7
MTS0031	29.4			53.1	7.9	30.1
Neeley	**31.0***	37.0	41.3	52.6	8.1	30.2
Norstar	26.8	35.6	40.2	55.9	8.2	36.1
Nuplains	**33.3***	34.9	36.8	56.4	8.7	25.7
NuSky	27.9	37.5	**41.9***	53.9	8.2	30.2
NuWest	28.7	**38.6***	41.0	54.3	8.4	29.1
Paul	28.4	37.6	**41.9***	51.3	8.2	26.9
Promontory	**31.3***	**40.0***	**44.2****	54.0	8.1	27.5
Rampart	**31.3***	36.5	38.4	54.4	7.9	29.5
Ransom	**30.5***	38.2		51.8	8.1	28.9
Rocky	**33.8****	**40.2***	**41.9***	54.7	8.7	32.0
Tiber	30.4	**38.5***	**41.7***	55.7	8.2	32.0
Vanguard	**31.5***	36.1	37.7	54.7	8.0	29.8
Average	30.4	37.7	40.7	53.8	8.2	29.5
LSD (p=0.05)	3.3	2.7	2.7	1.5	0.2	1.7
CV%	11.7	10.7	12.3	3.1	2.1	5.1
Location years	3	6	9	3	3	3

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).

Table 6. Performance of 24 hard red and hard white winter wheat cultivars and experimental lines tested under dryland and irrigated conditions at 4 locations in south central Montana during 2002. Cultivars listed alphabetically.

Cultivar	Grain Yield 1/			Test Weight	Grain Moisture /2	Plant Height
	2002	2001-2002	2000-2002			
	----------	bushels/acre	----------	lb/bu	%	inches
Bighorn	58.0	**61.3***	**60.5***	56.1	8.4	28.0
BigSky	53.4	57.8	57.4	55.3	8.6	33.6
CDC Falcon	54.5			54.1	8.3	27.5
Golden Spike	59.2	**63.3***		53.5	8.3	32.2
Judith	56.4	**59.8***	**61.1***	53.5	8.7	31.7
McGuire	54.8	56.6	54.3	57.7	8.7	31.7
Morgan	53.7	**61.4***	**58.6***	55.8	8.5	31.7
MT9951	58.2			55.1	8.6	34.1
MT9982	54.9	**63.1***		55.6	8.8	31.2
MTR9997	57.4			56.8	8.6	31.2
MTS0023	51.2			54.8	8.4	31.8
MTS0031	54.1			55.1	8.4	32.2
Neeley	56.7	**60.6***	**58.9***	54.6	8.5	32.0
Norstar	47.3	55.2	54.6	57.5	8.7	37.4
Nuplains	57.0	56.3	54.7	58.4	9.0	28.1
NuSky	54.5	**59.5***	58.6	55.6	8.6	32.4
NuWest	56.2	**59.5***	57.5	56.1	8.7	31.4
Paul	53.7	**59.9***	**59.2***	53.7	8.6	29.1
Promontory	58.7	**63.7****	**62.5****	56.3	8.6	30.1
Rampart	57.5	**59.4***	57.3	56.2	8.4	32.3
Ransom	57.1	**62.1***		54.0	8.5	31.8
Rocky	57.1	**62.4***	**59.7***	56.8	8.9	33.4
Tiber	54.5	**60.9***	**58.8***	57.3	8.7	34.4
Vanguard	55.2	56.5	54.3	56.5	8.4	31.9
Average	55.5	60.0	58.0	55.7	8.6	31.7
LSD (p=0.05)	ns	4.4	3.9	1.2	0.1	1.3
CV%	13.9	13.0	14.6	2.7	2.0	5.3
Location years	4	8	12	4	4	4

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).

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

Table 7. Grain yield[1/] of 24 hard red and hard white winter wheats tested at four locations in south central Montana during 2002. Varieties listed by declining four-location average yield.

Cultivar	Forsyth Dryland	Lodge Grass Dryland	Indian Creek Dryland	Dryland Average	Huntley Irrigated	Four Location Average
	bushels per acre					
Golden Spike	23.0	**51.4***	**18.8***	**31.1***	143.5	59.2
Promontory	21.9	**53.9***	**18.2***	**31.3***	140.8	58.7
MT9951	26.7	48.7	**20.0***	**31.8***	137.3	58.2
Bighorn	26.4	49.6	**19.0***	**31.7***	136.9	58.0
Rampart	20.5	**52.7***	**20.6***	**31.3***	136.1	57.5
MTR9997	26.4	**53.0***	**20.5***	**33.3***	129.7	57.4
Rocky	30.3	**53.4***	**17.5***	**33.8****	127.3	57.1
Ransom	22.9	50.2	**18.3***	**30.5***	136.9	57.1
Nuplains	24.7	**55.0****	**20.4***	**33.3***	127.8	57.0
Neeley	23.8	**51.4***	**17.8***	**31.0***	133.8	56.7
Judith	26.1	47.3	**16.3***	29.9	135.8	56.4
NuWest	23.1	48.2	14.9	28.7	138.6	56.2
Vanguard	22.5	**52.2***	**19.8***	**31.5***	126.4	55.2
MT9982	21.8	**51.1***	**20.9***	**31.3***	125.9	54.9
McGuire	22.7	50.4	**20.9***	**31.3***	125.3	54.8
Tiber	25.2	48.3	**17.6***	30.4	126.7	54.5
NuSky	21.9	48.0	13.7	27.9	134.2	54.5
CDC Falcon	23.4	49.4	**21.4****	**31.4***	123.7	54.5
MTS0031	21.5	46.9	**19.8***	29.4	128.0	54.1
Morgan	22.5	44.3	**18.8***	28.5	129.3	53.7
Paul	23.6	49.2	12.3	28.4	129.5	53.7
BigSky	20.3	46.8	14.1	27.1	132.5	53.4
MTS0023	20.2	45.2	**18.2***	27.9	121.3	51.2
Norstar	20.8	44.1	15.5	26.8	108.7	47.3
Average	23.4	49.6	18.1	30.4	130.3	55.5
LSD (p=0.05)	ns	4.2	5.2	3.3	ns	ns
CV%	19.6	5.1	17.6	11.7	11.2	13.9

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).

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