

PROJECT TITLE: Evaluation of spring wheat variety performance in off-station trials near Denton, Fort Benton and Winifred.

PROJECT LEADER: D.M. Wichman, Agronomist, Moccasin, MT

PROJECT PERSONNEL: L.E. Talbert, Spring Wheat Breeder, Bozeman, MT
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 Judee Wargo, Chouteau County Extension Agent, Fort Benton, MT

OBJECTIVES:

To evaluate the performance of spring wheat varieties in environments and cropping methods representative of the southern triangle and central Montana.

RESULTS:

Denton spring wheat yields were well below normal averaging 15 bu/a. Moisture was very limiting this year with only 5.3" of rain falling between April and July. Reeder, a new North Dakota variety, Fortuna and Newana were the top yielding varieties at 18 bu/a. There were no significant differences among variety yields or test weights. Test weights were extremely low, averaging 53 lbs/bu, and proteins were slightly above average. McNeal has the high long-term yield average at 38 bu/a, followed by Newana, Hi-Line and Amidon at 37, 35 and 35 bu/a, respectively. The current year's data and multi-year summary are presented in Tables 1 and 2.

Fort Benton spring wheat yields were slightly below normal and ranged from 17 to 30 bu/a, averaging 22 bu/a. Reeder, McNeal, Parshall, Fortuna and Hi-Line were the top five yielding varieties. McNeal has the high long-term yield average at 33 bu/a, followed by Rambo, Amidon and Lew (sawfly tolerant varieties) all at 31 bu/a. Test weights were well below normal, averaging 53 lbs/bu, while proteins were slightly above average at 15.4%. The current year's data and multi-year summary are presented in Tables 3 and 4.

Winifred spring wheat yields averaged 36 bu/a and ranged from 30 to 43 bu/a. Values were slightly below the 1998 performance. Westbred Express was the top yielding variety, followed by Reeder, Westbred 936, Parshall and MTHW9420. While long-term averages are only based on two years data, Westbred Express and Westbred 936 are the leaders at 46 bu/a. Test weights were well below normal averaging 55 bu/a, while protein values were above normal, averaging 17%. The current year's data and multi-year summary are presented in Tables 5 and 6.

SUMMARY:

The amount of rainfall received at each location varied and is reflected in the yields. Denton experienced drought conditions that led to low yields. Fort Benton and Winifred had average to slightly below average yields. Dry, windy conditions were prevalent during heading and grain-fill, which contributed to lower than normal test weights at all locations.

FUTURE PLANS:

Spring wheat variety evaluations will continue at Denton, Fort Benton and Winifred.

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Table 1. 1999 Denton Off-Station Spring Wheat Variety Trial - Exp. 9971. Central Agricultural Research Center. Moccasin, MT.

Id	Variety/Pedigree	Grain Yield (bu/a)	Test Weight (lbs/bu)	Plant Height (in.)	Protein Content (%)
ND 695	REEDER	18.3	56.0	23	14.3
CI 13596	FORTUNA	17.9	57.7	25	15.4
CI 17430	NEWANA	17.7	54.4	23	14.3
PNR 2375	PIONEER 2375	17.1	55.2	23	14.5
PI574642	MCNEAL	16.9	52.6	21	16.2
MTHW9701	CYMMIT204//MT8182/FORTUNA	16.6	52.5	22	15.1
PI592761	ERNEST	16.6	54.9	25	15.4
MT 9433	SCHOLAR	16.1	53.0	24	14.9
WB 926	WESTBRED 926	16.0	52.3	24	16.0
WB 936	WESTBRED 936	15.7	51.3	22	15.0
TR983239	FERGUS	14.5	51.7	21	16.4
PI531005	GRANDIN	14.5	48.3	25	15.5
BZ987558	CONAN	14.4	53.5	23	15.6
PI527682	AMIDON	13.5	50.9	23	15.2
ND 694	PARSHALL	13.3	52.9	26	15.0
WBEXPRES	WESTBRED EXPRESS	13.2	50.5	23	15.4
CI 17429	LEW	12.8	51.1	25	16.9
C982-324	RAMBO	12.2	52.7	23	15.7
MTHW9420	MT8182/MT8289	11.7	51.4	21	15.1
PI549275	HI-LINE	11.7	47.8	22	17.0
Experimental Mean		15.0	52.5	23.2	15.4
CV1: (s/mean)*100		23.6	8.1	7.8	-
F-Test for Var. (df=19)		1.1	0.9	2.0	-
P-Value		0.421	0.541	0.037	-
LSD (0.05)		5.9	7.1	3.0	-

Planted: 4/27/1999

Harvested: 8/17/1999

Fertilizer: 60 #N

Previous Crop: Peas

Growing Season Precipitation (April - July): 5.29"

Producer/Cooperator: Richard Barber, Denton

Table 2. Denton Off-Station Spring Wheat Multi-Year Yield Summary of Selected Varieties, 1992-1999. Central Agricultural Research Center. Moccasin, MT.

Selected Varieties	1992 ^{1/}	1993	1994	1995	1996 ^{1/}	1997 ^{1/}	1998	1999	Avg.	McNeal SameYrs.
	-----bu/a-----									
McNeal	27	92	22	43	24	47	34	17	38.2	-
Amidon	23	83	23	39	23	47	30	14	35.2	38.2
Westbred 926	19	78	25	41	25	46	31	16	35.1	38.2
Grandin	25	81	24	36	20	44	32	15	34.6	38.2
Fortuna	17	66	20	33	22	42	32	18	31.2	38.2
Rambo	25	74	20	37	23	43	29	12	32.9	38.2
Lew	27	65	20	36	23	40	29	13	31.6	38.2
Newana	25	81	20	44	27	45	33	18	36.6	38.2
Hi-Line	26	76	23	45	23	46	32	12	35.3	38.2
Ernest			19	41	25	46	29	17	29.4	31.2
Fergus				36	26	43	28	15	29.5	33.0
WB Express				41	24	41	30	13	29.8	33.0
Westbred 936				39	26	43	35	16	31.7	33.0
Pioneer 2375				36	24	41	33	17	30.2	33.0
Scholar					26	46	37	16	31.3	30.5
MTHW 9420					24	44	30	12	27.4	30.5
Nursery Mean	24	77	22	38	24	44	32	15		

1/ The variety trial was planted re-crop on pea ground in 1992, re-crop on buckwheat ground in 1996 and re-crop following millet in 1997. All other years the trial was planted on fallow ground.

Table 3. 1999 Fort Benton/Highwood Spring Wheat Variety Trial - Exp. 9972. Central Agricultural Research Center. Moccasin, MT.

Id	Variety/Pedigree	Grain Yield (bu/a)	Test Weight (lbs/bu)	Plant Height (in.)	Sawfly Rating (0-5)	Protein Content (%)
ND 695	REEDER	33.7	57.1	31	2.3	15.0
PI574642	MCNEAL	31.7	52.1	31	1.7	15.6
ND 694	PARSHALL	30.5	56.1	28	2.3	15.2
CI 13596	FORTUNA	30.4	55.2	29	0.3	15.5
PI549275	HI-LINE	29.4	52.4	28	1.3	16.3
CI 17429	LEW	29.2	55.6	27	1.0	15.5
BZ987558	CONAN	28.9	54.5	32	1.3	15.2
PI527682	AMIDON	28.7	54.2	30	2.3	14.9
C982-324	RAMBO	27.8	54.9	29	1.0	15.1
PI531005	GRANDIN	26.1	52.4	31	2.3	15.7
CI 17430	NEWANA	25.3	53.6	33	1.0	13.8
PI592761	ERNEST	23.7	54.8	29	2.0	16.4
MTHW9420	MT8182/MT8289	22.8	51.0	29	2.3	14.6
PNR 2375	PIONEER 2375	22.3	51.9	30	2.0	16.0
MT 9433	SCHOLAR	22.3	54.0	29	2.0	15.7
WB 936	WESTBRED 936	19.8	52.8	28	2.0	15.5
MTHW9701	CYMMIT204//MT8182/FORTUNA	19.8	49.5	30	1.7	14.9
TR983239	FERGUS	19.6	54.2	30	2.3	15.6
WB 926	WESTBRED 926	19.2	51.5	27	2.0	15.7
WBEXPRES	WESTBRED EXPRESS	18.9	50.0	29	2.3	15.1
Experimental Mean		25.5	53.4	29.4	1.8	15.4
CV1: (s/mean)*100		11.5	4.4	8.4	28.7	-
F-Test for Var. (df=19)		7.8	2.3	1.3	4.1	-
P-Value		0.000	0.016	0.255	0.000	-
LSD (0.05)		4.8	3.9	4.1	0.8	-

Planted: 4/16/1999

Harvested: 8/17/1999

Fertilizer: 50# N, topdressed.

Previous Crop: Barley

Growing Season Precipitation (April - July). 7.06"

Producer/Cooperator: Steve Birkeland, Fort Benton

Table 4. Highwood/Fort Benton Off-Station Spring Wheat Multi-Year Yield Summary of Selected Varieties, 1991-1999. Central Agricultural Research Center. Moccasin, MT.

Selected Varieties	1991	1992	1993	1994	1995	1996	1998	1999	Avg.	McNeal Same Years
	-----bu/a-----									
McNeal		18	47	37	45	32	22	28	32.7	-
Amidon	25	15	40	36	46	34	20	25	30.9	32.7
Westbred 926	31	11	41	34	37	34	21	17	27.8	32.7
Grandin	29	10	43	35	32	33	17	23	27.5	32.7
Fortuna	33	12	36	35	42	31	21	27	29.1	32.7
Rambo	27	15	43	36	46	35	19	24	31.2	32.7
Lew	24	23	41	31	43	32	21	26	30.9	32.7
Newana	29	14	42	32	39	33	19	22	28.7	32.7
Hi-Line	22	12	44	32	44	34	19	26	30.1	32.7
Ernest					45	34	19	21	29.8	31.7
Fergus					34	33	20	17	26.1	31.7
WB Express					41	33	19	17	27.4	31.7
Westbred 936					34	32	19	19	26.1	31.7
Pioneer 2375					39	35	19	20	28.1	31.7
Scholar						36	19	20	24.8	27.3
MTHW 9420						30	19	20	23.0	27.3
Nursery Mean	28.2	14.2	40.8	34.3	40.8	32.9	19.1	22.4		

1991-1996 variety trial were located on Ron Long's farm, 1997-1999 trials were located at the Birkeland farm.
 1997 trial was abandoned due to an extreme wild oat infestation.
 All trials were planted on re-crop ground.

Table 5. 1999 Winifred Spring Wheat Variety Trial - Exp. 9973. Central Agricultural Research Center. Moccasin, MT.

Id	Variety/Pedigree	Grain Yield (bu/a)	Test Weight (lbs/bu)	Plant Height (in.)	Protein Content (%)
WBEXPRES	WESTBRED EXPRESS	43.2	56.0	29	15.8
ND 695	REEDER	39.9	56.2	32	17.0
WB 936	WESTBRED 936	37.8	51.4	28	17.5
ND 694	PARSHALL	37.6	55.8	34	17.3
MTHW9420	MT8182/MT8289	37.3	52.4	31	16.4
MT 9433	SCHOLAR	37.1	56.8	36	17.8
PI574642	MCNEAL	37.0	53.7	31	16.7
BZ987558	CONAN	36.9	56.7	30	16.5
WB 926	WESTBRED 926	36.3	53.3	32	17.2
PI531005	GRANDIN	35.9	52.6	35	17.1
CI 13596	FORTUNA	35.5	57.5	36	16.0
C982-324	RAMBO	35.1	56.3	31	16.3
PNR 2375	PIONEER 2375	35.0	56.1	32	16.2
PI549275	HI-LINE	34.6	55.0	30	17.1
TR983239	FERGUS	33.9	53.6	30	17.0
CI 17430	NEWANA	33.2	55.1	28	15.3
PI592761	ERNEST	32.4	54.2	36	18.1
CI 17429	LEW	30.9	56.7	35	17.1
PI527682	AMIDON	30.8	54.4	35	16.5
MTHW9701	CYMMIT204//MT8182/FORTUNA	29.9	53.8	27	16.1
Experimental Mean		35.5	54.9	31.9	16.8
CV1: (s/mean)*100		9.0	2.1	-	-
F-Test for Var. (df=19)		3.0	6.7	-	-
P-Value		0.002	0.000	-	-
LSD (0.05)		5.3	1.9	-	-

Planted: 4/27/1999

Harvested: 8/18/1999

Fertilizer: 60# N

Growing Season Precipitation (April - July): 7.43"

Producer/Cooperator: Bruce Udelhoven, Winifred

Table 6. Winifred Off-Station Spring Wheat Multi-Year Yield Summary of Selected Varieties, 1998-1999. Central Agricultural Research Center. Moccasin, MT.

Selected Varieties	1998	1999	Avg.	McNeal Same Years
	-----bu/a-----			
McNeal	47	37	41.8	-
Amidon	40	31	35.2	41.8
Westbred 926	47	36	41.5	41.8
Grandin	46	36	41.1	41.8
Fortuna	39	36	37.4	41.8
Rambo	43	35	38.9	41.8
Lew	34	31	32.5	41.8
Newana	42	33	37.8	41.8
Hi-Line	46	35	40.5	41.8
Ernest	41	32	36.6	41.8
Fergus	44	34	39.0	41.8
WB Express	48	43	45.5	41.8
Westbred 936	53	38	45.6	41.8
Pioneer 2375	48	35	41.3	41.8
Scholar	38	37	37.6	41.8
MTHW 9420	44	37	40.8	41.8
Nursery Mean	42.5	35.5		

PROJECT TITLE: Evaluation of spring barley variety performance in off-station trials near Denton and Fort Benton.

PROJECT LEADER: D.M. Wichman, Agronomist, Moccasin, MT

PROJECT PERSONNEL: T.K. Blake, Barley Breeder, Bozeman, MT
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J. Vavrovsky, Agricultural Research Specialist, Moccasin, MT
Dave Philips, Fergus County Extension Agent, Lewistown, MT
Judee Wargo, Chouteau County Extension Agent, Fort Benton, MT

OBJECTIVES:
To evaluate the performance of spring barley varieties in environments and cropping methods representative of the southern triangle and central Montana.

RESULTS:
Denton barley yields ranged from 27 to 38 bu/a and averaged 32 bu/a. Three of the top four yielding varieties/lines were experimental lines, with the top yielding line a Lewis by Baronesse cross (MTLB). Baronesse has the highest long-term yield average with 55 bu/a. Due to the shortage of rainfall in the Denton area this summer all varieties are well below their long-term yield averages. However, test weights were normal, averaging 48 lbs/bu and proteins were slightly elevated, averaging 15%. The current year's data and multi-year summary are presented in Tables 1 and 2.
Fort Benton barley yields were well above normal this year averaging 75 bu/a and ranging from 67 to 82 bu/a. This is the highest yielding nursery for this area in the last eight years with trials in 1993 and 1997 being the only other years that the average yield was above 70 bu/a. Western Plant Breeders Xena and Baronesse were the top two yielding varieties, and Valier had an average yield of 75 bu/a. Test weights averaged 50 lbs/bu and the average percentage of plump kernels was 64%. All varieties were above their long-term yield averages and Baronesse has the highest average at 61 bu/a. The current year's data and multi-year summary are presented in Tables 3 and 4.

SUMMARY:
The trial at Fort Benton was planted no-till re-crop following barley while the Denton trial followed peas. Barley yields ranged from below average to above average depending on the location and the amount of rainfall received. Fort Benton had the highest average trial yields at 75 bu/a and Denton was well below average (32 bu/a). Across locations, the top two yielding varieties were Hector and Western Plant Breeder's new variety Xena. Valier, a new feed barley released from Montana State University, yielded 53 bu/a across all locations. Test weights were normal at Denton and above average at Fort Benton. Proteins were above average at both locations.

FUTURE PLANS:
Spring barley variety evaluations will continue at Denton and Fort Benton.

Table 1. 1999 Denton Off-Station Barley Variety Trial - Exp. 3671. Central Agricultural Research Center. Moccasin, MT.

Id	Variety/Line	Grain Yield (bu/a)	Test Weight (lbs/bu)	Plant Height (in.)	Plump (%)^{1/}	Thin (%)^{2/}	Protein Content (%)
MTLB 5	MTLB 5	38.1	48.9	19	35.0	27.4	14.5
CI 15514	HECTOR	37.0	46.4	21	24.1	44.2	15.4
MT920073	MT920073	36.4	48.6	19	72.8	9.8	14.2
MT950186	MT950186	34.1	49.5	18	53.1	20.3	14.6
BZ594-19	WPB XENA	33.6	46.7	18	28.1	34.1	14.6
SK 76333	HARRINGTON	33.1	47.1	18	46.4	22.5	14.7
PI491534	GALLATIN	31.4	48.0	19	42.8	29.5	15.4
MTLB 13	MTLB 13	31.1	47.2	18	47.0	24.1	14.0
CI 15856	LEWIS	30.7	47.5	20	40.9	31.5	16.0
PI591823	CHINOOK	30.4	46.2	20	24.9	46.3	15.6
ND 9866	STARK	30.1	48.9	21	54.5	20.1	13.9
MTLB 6	MTLB 6	30.0	48.1	18	38.7	26.1	15.4
PI483237	BOWMAN	29.1	47.9	20	63.5	15.3	15.0
MT960228	MT960228	27.4	46.4	18	43.6	24.8	15.3
MTLB 30	VALIER	27.1	46.9	17	16.4	41.9	14.8
PI568246	BARONESSE	26.5	45.6	16	54.8	19.6	14.7
Experimental Mean		31.6	47.5	18.8	42.9	27.4	14.9
CV1: (s/mean)*100		19.7	1.7	8.7	25.0	29.4	-
F-Test for Var. (df=15)		1.0	5.5	2.2	5.9	4.9	-
P-Value		0.523	0.000	0.036	0.000	0.000	-
LSD (0.05)		10.4	1.4	2.7	17.9	13.4	-

1/ Plump > 6/64

2/ Thin < 5.5/64

Planted: 4/27/1999

Harvested: 8/17/1999

Fertilizer: 60# N

Previous Crop: Peas

Growing Season Precipitation: 5.29"

Producer/Cooperator: Richard Barber, Denton

Table 2. Denton Off-Station Barley Multi-Year Yield Summary of Selected Varieties, 1992-1999. Central Agricultural Research Center. Moccasin, MT.

Selected Varieties	1992 ^{1/}	1993	1994	1995	1996 ^{1/}	1997 ^{1/}	1998 ^{2/}	1999	Avg.	Hector SameYrs
	-----bu/a-----									
Hector	45	90	41	66	32	67	40	37	52.3	-
Harrington	37	102	33	70	25	68	40	33	51.0	52.3
Lewis	33	101	41	69	31	79	34	31	52.3	52.3
Bowman	37	99	42	67	29	65	37	29	50.6	52.3
Gallatin	39	100	40	68	31	78	38	31	53.2	52.3
Chinook	30	106	37	70	30	79	41	30	52.9	52.3
Stark	36	105	41	71	32	75	40	30	53.8	52.3
Baronesse	37	121	38	73	31	73	41	27	55.1	52.3
WPB Xena								34	33.6	37.0
Valier								27	27.1	37.0
Nursery Mean	36.8	104.0	38.0	67.9	29.8	72.3	39.3	31.6		

1/ Trial was planted re-crop on pea ground in 1992, re-crop following buckwheat in 1996, re-crop following millet in 1997 and all years on fallow.

2/ Only two reps were harvested in 1998, due to extremely uneven germination in one replication.

Table 3. 1999 Highwood/Fort Benton Off-Station Barley Variety Trial - Exp. 3672.
Central Agricultural Research Center. Moccasin, MT.

Id	Variety/Line	Grain Yield (bu/a)	Test Weight (lbs/bu)	Plant Height (in.)	Plump (%) ^{1/}	Thin (%) ^{2/}	Protein Content (%)
BZ594-19	WPB XENA	82.1	49.8	27	62.8	9.9	12.2
PI568246	BARONESSE	81.5	49.5	26	66.6	10.8	12.8
MT960228	MT960228	78.9	50.4	25	66.4	9.8	13.1
PI491534	GALLATIN	76.9	50.5	24	61.6	12.8	13.5
MTLB 5	MTLB 5	76.9	50.4	27	54.5	15.0	14.4
MT920073	MT920073	76.7	50.9	26	67.8	10.1	13.7
CI 15514	HECTOR	76.4	49.8	27	59.8	15.1	12.5
MTLB 30	VALIER	75.2	50.2	25	62.5	11.7	14.8
MTLB 13	MTLB 13	75.1	49.1	27	50.4	18.7	14.4
MTLB 6	MTLB 6	75.0	50.6	25	70.8	8.9	12.9
ND 9866	STARK	73.7	51.7	32	81.3	5.1	14.0
PI591823	CHINOOK	73.5	49.1	28	61.1	12.9	13.6
MT950186	MT950186	73.2	52.0	27	69.6	9.0	13.2
PI483237	BOWMAN	72.6	51.1	28	85.2	3.7	14.1
CI 15856	LEWIS	71.6	50.2	26	50.6	18.5	14.2
SK 76333	HARRINGTON	67.4	46.5	26	44.2	18.6	14.8
Experimental Mean		75.4	50.1	26.6	63.5	11.9	13.6
CV1: (s/mean)*100		6.4	1.8	-	15.7	37.6	-
F-Test for Var. (df=15)		1.7	5.9	-	3.5	3.0	-
P-Value		0.104	0.000	-	0.002	0.005	-
LSD (0.05)		8.0	1.5	-	16.6	7.5	-

1/ Plump > 6/64

2/ Thin < 5.5/64

Planted: 4/16/1999

Harvested: 8/3/1999

Fertilizer: 50# N, topdressed.

Growing Season Precipitation: 7.06"

Producer/Cooperator: Steve Birkeland, Fort Benton

Table 4. Highwood/Fort Benton Off-Station Barley Multi-Year Yield Summary of Selected Varieties, 1992-1999. Central Agricultural Research Center. Moccasin, MT.

Selected Varieties	1992	1993	1994	1995	1996	1997	1998	1999	Avg.	Hector SameYrs
	-----bu/a-----									
Hector	21	69	65	56	48	74	31	76	55.1	-
Harrington	21	68	54	64	51	68	23	67	52.1	55.1
Lewis	19	73	61	50	53	77	31	72	54.5	55.1
Bowman	20	75	59	59	44	84	35	73	56.1	55.1
Gallatin	28	66	63	52	46	67	29	77	53.5	55.1
Chinook	20	74	66	67	55	80	29	74	58.1	55.1
Stark	19	71	62	51	52	71	34	74	54.2	55.1
Baronesse	24	75	72	73	49	81	34	82	61.2	55.1
WPB Xena								82	82.1	76.4
Valier								75	75.2	76.4
Nursery Mean	22.5	71.2	63.0	62.2	49.8	71.3	30.6	75.4		

All trials were planted on re-crop ground.

1992-1996 the trials were located on Ron Long's farm, 1997-1999 trials were located at the Birkeland farm.