

PROJECT TITLE: Evaluation of spring wheat variety performance near Moccasin, Denton, Fort Benton, and Winifred

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OBJECTIVE:

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

RESULTS:

The Moccasin location was hailed out prior to harvest. Late spring moisture provided for fair spring wheat yield levels on the other two recrop sites. Though fallow for 1.5 years, the Winifred site had limited soil water available at seeding. Unusually cool conditions in April and May helped maximize the plant growth from what soil water was available. Again, high rainfall in June helped offset this limiting factor.

Heading Date – Heading dates are reported for the Moccasin nursery only (Table 26). Explorer, along with WestBred 926 and 936 were the first in the nursery to head (July 2, 2002) and Lew headed last (July 7, 2002).

Yield – Recrop spring wheat variety trials at Denton and Fort Benton had mean yields of 21.1 and 22.7 bu/a, respectively (Table 26). Scholar and Hi-Line had the highest mean yields for the two recrop locations. McNeal has a long-term yield higher than all other varieties evaluated at the Moccasin no-till site and is therefore used as the standard for evaluating long-term relative yield performance (Tables 28-31). At Denton and Fort Benton, Reeder and Outlook (MT9874) respectively, have three-year and two-year mean yields greater than McNeal's average for the same years. Spring wheat varieties seeded on fallow at Winifred averaged 39.5 bu/a. Reeder was the top yielder at 44.4 bu/a followed by MTW9420 and McNeal (Table 26). In multi-year comparisons, Reeder, WestBred Express, West Bred 936 and the new variety Outlook, have multi-year mean yields higher than McNeal (Table 31). Selected for sawfly resistance, Fortuna, Amidon, Rambo, Lew and Ernest had the lowest grain yields.

Plant Height – Plant heights averaged 23.6 inches across five sites (Table 26). Five entries had mean heights of just over 21 inches. WestBred 936 was the shortest at 20.8 inches.

Test Weight – Test weights averaged 57.9 lbs/bu across the three locations (Table 27). The recrop sites at Denton and Fort Benton averaged 58.4 lbs/bu and 56.9 lbs/bu respectively, while the fallow site at Winifred averaged 58.2 lbs/bu. Comparing across the sites, WestBred 926 had the highest test weight of 59.8 lbs/bu and WestBred 936 had the lowest test weight of 55.8 lbs/bu.

Protein – Across the three sites, the grain protein content averaged 17.2%. Both the Denton and Fort Benton sites averaged 17.4% while the Winifred site averaged 16.9% (Table 27). In the recrop trials, the older Newana, Fortuna, and Lew varieties, along with the new variety Outlook had the lowest mean protein contents, while MT9806 and Hank had the highest mean protein content. On the fallow Winifred site, Scholar and Ernest had the highest grain protein content of 17.9%. (Only one sample per location was used to determine protein content.)

SUMMARY:

Drought conditions at Denton and Fort Benton contributed to low yields and test weights and above normal grain protein levels. These trials continue to show how spring wheat varieties perform in less than ideal plant available water conditions. The late spring rains in Winifred provided the opportunity for the spring wheat varieties to demonstrate their yield potential. The higher yields also provided the opportunity to better assess the protein production potential of the different varieties.

FUTURE PLANS:

As funding permits, spring wheat variety evaluations will continue at these four sites.

Table 26 2002 Spring wheat heading date, yield, and plant height performance in Central Montana
Exp. 9900 Central Agricultural Research Center, Moccasin, MT

ID	Pedigree	Mocc Heading Date	-----Yield-----						-----Plant Height-----					
			Mocc Fallow 9907	Mocc Recrop 9970	Denton Recrop 9971	Ft Benton Recrop 9972	Winifred Fallow 9973	Average Yield	Mocc Fallow 9907	Mocc Recrop 9970	Denton Recrop 9971	Ft Benton Recrop 9972	Winifred Fallow 9973	Average Height
PI527682	AMIDON	184	bu/a	bu/a	bu/a	bu/a	bu/a	bu/a	in	in	in	in	in	in
BZ992588	CONAN	184			21.5	25.0	40.2	28.9	23	20	21	23	24	21.9
PI592761	ERNEST	185			18.1	24.4	34.1	25.5	27	24	26	28	24	25.8
PI619086	EXPLORER	182			23.7	20.0	38.8	27.5	24	22	23	22	21	22.2
CI 13596	FORTUNA A	185			18.5	25.6	37.5	27.2	27	26	22	31	24	25.8
BZ992322	HANK	183			20.6	20.1	40.6	27.1	24	20	24	22	24	22.8
CI 17429	LEW	187	Hailed	Hailed	20.3	25.3	35.6	27.1	30	26	27	27	24	26.7
PI574642	MCNEAL	186			21.6	24.8	42.1	29.5	25	24	26	27	23	24.9
MT 9806	MINNPRO/AMIDON	184			21.8	20.0	40.0	27.3	27	24	25	21	21	23.4
MTHW9420	MT8182/MT8289 A	184			20.4	17.1	42.3	26.6	24	22	23	19	21	21.6
MT 9929	MT9401/MT9328	183			20.7	22.1	38.2	27.0	22	22	20	23	21	21.3
CI 17430	NEWANA	186			23.9	21.2	40.4	28.5	24	23	23	23	22	23.0
C982-324	RAMBO	186			18.3	22.6	35.6	25.5	21	23	22	26	21	22.5
MT 9874	RGABC199/MT9312	185			24.1	24.1	39.9	29.4	24	22	24	24	22	23.2
PI607557	SCHOLAR	186			20.9	27.6	41.0	29.8	30	24	25	24	22	24.9
WB 926	WESTBRED 926	182			22.1	21.5	38.0	27.2	24	22	22	23	20	22.2
WB 936	WESTBRED 936	182			20.5	22.1	41.3	28.0	22	22	20	21	20	20.8
WBEXPRES	WESTBRED EXPRESS	183			20.1	16.1	41.9	26.1	23	22	20	22	19	21.3
ND 695	Reeder	186			24.0	23.7	44.4	30.7		23	22	23	21	22.2
PI549275	HI-LINE	185			22.5	25.7	41.7	30.0		22	24	22	20	21.9
CI 13596	FORTUNA B	185							26					26.4
MTHW9420	MT8182/MT8289 B	184							28					27.7
Overall Mean		184.45			21.06	22.67	39.51		25.02	22.74	23.20	24.00	21.60	23.56
F-RATIO df=38		14.40			3.08	1.59	1.16		4.24	2.69		1.00	1.33	
P-VALUE TRTS		0.00			0.00	0.11	0.34		0.00	0.00		0.48	0.27	
CV (S/MEAN) %		0.36			9.37	17.96	10.84		8.41	7.47		23.24	9.32	
LSD(0.05 by t)		1.102			3.261	6.732	7.078		3.48	2.81		3.1	4.214	

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Planting Date: 4/8/02 4/15/02 4/19/02 4/22/02 4/19/02
Harvest Date: Hailed July 8, Aug 20, Aug 2 8/19/02 8/20/02 8/19/02
Fertilizer: 60 lbs of top dressed N applied in February; 50 lbs of 20-20-20-10 applied w/seed
Pest Control: Bronate applied in early June
Growing Season Precip (April-July): 7.49" 7.49" 8.42" 8.02" 9.20"
Growing Season Precip (April-July) 94 yr avg: 8.62"
Previous Crops: Fallow Peas Lentils Lentils Fallow
Soil Temperature: 46.4 F 42.8 F 39.2 F
Soil Moisture: 14-18" 9-12" 6" 20"
Producer/Cooperator: CARC CARC Barber Birkeland Udelhoven

Table 27 2002 Spring wheat test weight and protein performance in Central Montana
 Exp. 9900 Central Agricultural Research Center, Moccasin, MT

ID	Pedigree	----- Test Weight -----						----- Protein -----					
		Mocc Fallow	Mocc Recrop	Denton Recrop	Ft Benton Recrop	Winifred Fallow	Mean	Mocc Fallow	Mocc Recrop	Denton Recrop	Ft Benton Recrop	Winifred Fallow	Mean
		9907	9970	9971	9972	9973		9907	9970	9971	9972	9973	
		lbs/bu	lbs/bu	lbs/bu	lbs/bu	lbs/bu	lbs/bu	%	%	%	%	%	%
PI527682	AMIDON			58.5	57.2	58.2	58.0			17.6	16.6	16.5	16.9
BZ992588	CONAN			59.4	57.8	60.5	59.2			18.0	17.2	16.2	17.1
PI592761	ERNEST	Hailed	Hailed	58.4	58.2	58.4	58.3	Hailed	Hailed	18.2	17.4	17.9	17.8
PI619086	EXPLORER			58.7	56.5	56.9	57.4			17.1	18.1	17.4	17.5
CI 13596	FORTUNA A			58.7	58.3	59.1	58.7			15.8	16.7	16.3	16.3
BZ992322	HANK			56.8	53.5	56.4	55.6			17.8	19.7	17.0	18.2
CI 17429	LEW			59.4	59.6	59.4	59.5			16.9	16.0	17.1	16.7
PI574642	MCNEAL			56.6	56.6	59.1	57.4			18.6	17.3	16.7	17.5
MT 9806	MINNPRO/AMIDON			58.1	54.7	57.8	56.9			18.3	19.2	17.8	18.4
MTHW9420	MT8182/MT8289 A			55.9	55.4	57.3	56.2			17.0	17.2		17.1
MT 9929	MT9401/MT9328			59.6	55.2	57.7	57.5			17.2	18.5	17.1	17.6
CI 17430	NEWANA			59.7	57.9	59.2	58.9			15.1	16.1	15.8	15.7
C982-324	RAMBO			59.5	58.0	59.2	58.9			17.9	16.8	16.6	17.1
MT 9874	Outlook (RGABC199/MT9312)			57.9	56.5	57.6	57.3			15.9	16.5	16.5	16.3
PI607557	SCHOLAR			59.4	58.0	60.1	59.2			17.4	17.6	17.9	17.6
WB 926	WESTBRED 926			65.4	57.7	56.2	59.8			18.9	17.3	17.1	17.8
WB 936	WESTBRED 936			55.5	56.1	55.8	55.8			17.9	17.6	17.7	17.7
WBEXPRES	WESTBRED EXPRESS			55.7	57.7	59.0	57.5			17.1	16.6	16.9	16.9
ND 695	Reeder			58.3	56.5	60.1	58.3			17.2	17.2	16.8	17.1
PI549275	HI-LINE			56.4	57.1	56.9	56.8			18.1	17.4	16.1	17.2
Average				58.4	56.9	58.2	57.9			17.4	17.4	16.9	17.2
CV (s/mean)*100					4.377								
LSD (0.05)					1.373								

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Table 28 Moccasin recrop spring wheat multi-year yield summary of selected varieties, 1992-2002
 Exp. 9970 Central Agricultural Research Center, Moccasin, MT.

Selected Varieties	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002**	Mean	McNeal Same Years
	----- bu/a -----												
McNeal	39	52	22	45	24	63	37	42	33	33	*	39.0	--
Outlook (MT 9874)										32	*	32.0	33.0
Reeder (ND 695)								33	35	36	*	34.4	36.0
Grandin	30	54	20	40	20	52	35	33	31	31	*	34.6	39.0
Fortuna	27	44	24	35	22	48	33	37	33	29	*	33.2	39.0
Rambo	34	43	23	39	21	55	33	36	31	28	*	34.3	39.0
Lew	34	46	20	36	19	52	35	35	29	30	*	33.6	39.0
Conan (BZ 992588)								37	28	34	*	33.0	36.0
Hi-Line	29	49	21	39	22	57	35	31	33	29	*	34.5	39.0
Ernest			21	40	20	48	34	30	30	27	*	31.3	37.3
Fergus				41	20	56	34	33	30	--	*	35.7	39.5
WB Express				39	23	57	34	40	31	34	*	36.9	39.5
WestBred 936				43	23	53	34	37	32	28	*	35.7	39.5
Scholar					24	51	33	35	33	35	*	35.2	38.6
MTHW 9420					23	66	38	37	33	31	*	38.0	38.6
Explorer (MTHW9710)									30	35	*	32.5	33.0
MT 9929										29	*	28.6	33.0
Nursery Mean	31.1	48.1	22.4	40.4	21.9	54.8	34.5	35.5	31.6	31.3			

**Hailed July 8, Aug 20 and Aug 22, 2002 in Moccasin.

Table 29 Denton recrop spring wheat multi-year yield summary of selected varieties, 1992-2002
Exp. 9971 Central Agricultural Research Center, Moccasin, MT

Selected Varieties	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Mean	McNeal Same Years
McNeal	27	92	22	43	24	47	34	17	29	29	22	35.1	-
Outlook (MT 9874)										29	24	26.8	25.3
Reeder (ND 695)								18	28	32	24	25.6	24.2
Grandin	25	81	24	36	20	44	32	15	26	28	--	33.1	35.1
Fortuna	17	66	20	33	22	42	32	18	29	26	19	29.4	35.1
Rambo	25	74	20	37	23	43	29	12	25	27	18	30.3	35.1
Lew	27	65	20	36	23	40	29	13	25	27	20	29.6	35.1
Conan (BZ 992588)								14	26	28	22	22.5	24.2
Hi-Line	26	76	23	45	23	46	32	12	26	27	23	32.6	35.1
Ernest			19	41	25	46	29	17	24	28	18	27.5	29.6
Fergus				36	26	43	28	15	23	--	--	28.5	32.3
WB Express				41	24	41	30	13	25	27	--	28.7	30.6
WestBred 936				39	26	43	35	16	26	31	21	29.6	30.6
Scholar					26	46	37	16	29	31	21	29.4	28.8
MTHW 9420					24	44	30	12	26	28	20	26.3	28.8
Explorer (MTHW9710)									27	29	24	26.7	26.5
MT 9929										30	21	25.5	25.3
Nursery Mean	24.0	77.0	22.0	38.0	24.0	44.0	32.0	15.0	26.6	28.0	21.1		

The variety trial was planted re-crop on pea ground in 1992, re-crop on buckwheat in 1996, re-crop following millet in 1997, and lentils in 2002. All other years the trial was planted on fallow ground.

Table 30 Fort Benton recrop spring wheat multi-year yield summary of selected varieties, 1992-2002
 Exp. 9972 Central Agricultural Research Center, Moccasin, MT.

Selected Varieties	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Mean	McNeal Same Years
	----- bu/a -----												
McNeal		18	47	37	45	32	22	28	14	10	25	27.8	-
Outlook (MT 9874)										11	24	17.5	17.4
Reeder (ND 695)								34	15	10	24	20.7	19.2
Grandin	29	10	43	35	32	33	17	23	12	9	--	24.3	28.1
Fortuna	33	12	36	35	42	31	21	27	16	10	26	26.2	27.8
Rambo	27	15	43	36	46	35	19	24	13	11	23	26.5	27.8
Lew	24	23	41	31	43	32	21	26	13	11	25	26.4	27.8
Conan (BZ 992588)								29	13	9	25	19.2	19.2
Hi-Line	22	12	44	32	44	34	19	26	13	10	26	25.6	27.8
Ernest					45	34	19	21	13	11	24	23.9	25.1
Fergus					34	33	20	17	12	--	--	23.2	28.2
WB Express					41	33	19	17	11	8	16	20.7	25.1
WestBred 936					34	32	19	19	14	7	22	21.0	25.1
Scholar						36	19	20	16	12	28	21.8	21.8
MTHW 9420						30	19	20	14	8	17	18.0	21.8
Explorer (MTHW9710)									15	7	20	14.1	16.3
MT 9929										8	22	15.2	17.4
Nursery Mean	28.2	14.2	40.8	34.3	40.8	32.9	19.1	22.4	13.6	10.0	22.7		

The 1991-1996 variety trials were located on Ron Long's farm; the 1997-2000 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.

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Table 31
Exp. 9973

Winifred fallow spring wheat multi-year yield summary of selected varieties, 1998-2002
Central Agricultural Research Center, Moccasin, MT

Selected Varieties	1998	1999	2000	2001	2002	Average	McNeal Same Years
	----- bu/a -----						
McNeal	47	37	31	24	42	36.2	--
Outlook (MT 9874)	--	--	--	28	40	34.1	33.1
Reeder (ND 695)	--	40	30	30	44	36.1	33.5
Grandin	46	36	28	22	--	33.0	34.8
Fortuna	39	36	29	24	38	33.1	36.2
Rambo	43	35	23	25	36	32.3	36.2
Lew	34	31	28	27	36	31.1	36.2
Conan (BZ 992588)	--	37	22	29	40	32.0	33.5
Hi-Line	46	35	27	26	42	35.1	36.2
Ernest	41	32	28	24	34	31.8	36.2
Fergus	44	34	24	--	--	34.0	38.3
WB Express	48	43	30	29	42	38.4	36.2
WestBred 936	53	38	27	26	41	37.1	36.2
Scholar	38	37	27	29	41	34.4	36.2
MTHW 9420	44	37	28	25	42	35.3	36.2
Explorer (MTHW9710)			27	25	39	30.2	32.4
MT 9929				24	38	31.1	33.1
Nursery Mean	42.5	35.5	27.5	26	39.5		

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