

PROJECT TITLE: Evaluation of winter wheat variety performance in recrop trials near Moccasin, Denton, Fort Benton, and Moore.

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OBJECTIVES:
Evaluate agronomic performance of winter wheat varieties in recrop or continuous crop environments in the southern triangle and central Montana.

RESULTS:
2002 Winter wheat trials on recrop were established at Moccasin, Denton, Fort Benton and Moore.

Yield – Recrop winter wheat nursery mean yields ranged from 21.5 to 49.2. The Denton continuous crop site had the highest yields with experimental lines MT9951 and MT 9982 topping that nursery at 53.5 and 53.8 bu/a, respectively (Table 1). MT9951 and MT 9982 also had the highest mean yields across the four recrop test sites (Table 1). Rocky and Promontory had the high four location mean yields for established varieties. Neeley was used as the yield standard in multi-year yield summaries for Moccasin No-Till, Denton, Fort Benton and Moore locations presented in Tables 3, 4, 5 and 6. Neeley still is the standard bred winter wheat variety to beat for yield. Some of the new lines are matching Neeley yield levels.

Test Weight – Dry conditions during seed fill contributed to low test weights in 2002. The overall mean across four test locations was 56.4 with several varieties falling below 57 lbs/bu at all four sites (Table 6). MTR9997 and Nuplains had the highest average test weights at 59.0 and 58.6 lbs/bu, respectively.

Protein – Grain protein ranged from 11.3 to 16.4 across the four locations (Table 7). McGuire and MTS0023 had the highest grain protein content average across the four recrop locations. NuSky had the lowest single location reading at 11.3 %. However, it is suspected that this was an erroneous reading or poor sample as NuSky did not exhibit inferior protein levels at any other site. Protein content analysis was run on a single sample for a variety at a location.

Plant Height – Nursery mean plant heights range was relatively narrow in 2002. The four location mean heights had a seven inch range (Table 8). Falcon and Big Horn had the shortest means at 24 and 25, respectively. MT9951 and Norstar had the tallest average at 31 inches.

Heading Date – Heading dates were recorded for the Moccasin site only. McGuire headed 19-June-02 and was the first to head. MTS0023 headed 01-July-02 and was the last to head. Heading information is presented as day of the year from 01-January (Table 8).

Saw Fly – Sawfly damage was observed at one location, Fort Benton. Stem cutting averaged across the three reps ranged from about 18.0 down to 1.0 (Table 8). These values are ocular scores of percent and not actual stem counts. If a single stem was broke over in the two middle inter-rows it was scored as a 1.0. Therefore, it is possible that a volunteer spring wheat plant could have contributed to a variety receiving a 1.0 when it actually earned a 0.0.

SUMMARY:
2002 winter wheat growing conditions were sufficiently varied to provide a good year for evaluating agronomic characters. Conditions were not so extreme as to diminish the value of the results. The main factor missing was winter stress. The good performance of several numbered lines indicate the potential for improved varieties in the near future.

FUTURE PLANS:
Winter wheat variety evaluations will continue at Moccasin, Denton, Fort Benton, Moore, and Winifred.

Table 1 2002 Off-station winter wheat multi-location **yield** summary
 Exp. 3800 Central Agricultural Research Center Moccasin, Montana

Variety	Site:	Moccasin	Denton	Ft Benton	Moore	Average
	System:	No-Till CC	Till-Plt CC	No-Till CC	No-Till CC	
		----- bu/a -----				
MT9951		35.7	53.5	35.3	22.0	36.6
MT9982		40.2	53.8	28.3	21.9	36.1
MTR9997		38.8	50.6	32.7	25.8	37.0
ROCKY		31.2	53.4	37.1	25.4	36.8
PROMONTORY		39.0	51.9	34.4	22.7	37.0
JUDITH		38.4	53.8	30.3	22.0	36.1
NUSKY		40.2	50.3	32.5	22.4	36.3
FALCON		38.9	53.3	32.4	19.9	36.1
NUWEST		38.1	50.5	31.7	20.6	35.2
TIBER		34.6	49.5	32.6	21.4	34.5
NUPLAINS		37.4	48.1	33.3	23.3	35.5
NEELEY		34.4	50.7	29.7	22.4	34.3
BIGSKY		36.2	46.2	31.3	21.8	33.9
RANSOM		34.9	50.9	31.2	21.0	34.5
MTS0031		35.8	46.7	31.8	22.1	34.1
BIGHORN		33.9	51.8	31.0	21.5	34.6
MORGAN		36.1	49.0	30.5	19.3	33.7
Paul		36.5	46.1	30.3	21.4	33.6
VANGUARD		35.4	45.9	33.7	19.7	33.7
GOLDEN SPIKE		34.9	49.1	30.6	18.9	33.4
XXXXXXXXXX		35.2	46.0	28.4	20.5	32.5
MTS0023		32.1	42.4	33.7	18.9	31.8
NORSTAR		33.6	44.0	28.1	20.0	31.4
MCGUIRE		30.7	42.8	26.3	20.7	30.2
OVERALL MEAN =		35.92	49.17	31.55	21.5	34.5
F-RATIO TRTS =		5.105	3.132	1.702	2.351	
LSD(0.05 by t)=		3.29	5.775	5.355	3.234	
Seeding Date:		9/24/2001	9/19/2001	9/19/2002	10/1/2001	
Harvest Date:		8/16/2002	8/5/2002	8/13/2002	8/19/2002	
Previous Crop:		Barley	Lentils	Spring Wheat	Canola	
Fertilizer:		50 lbs 20-20-20-10 w/seed at all locations				
Nitrogen:		90 top dress	60 ppi NH4	60 top dress	90 top dress	
April-July Precip:		7.49"	8.42"	8.02"	10.91"	
Producer/Cooperator:		CARC	Barber	Birkeland	Tyler	
Soil Temperature:		66.2 F			55 F	
Soil Moisture:		17"			8"	
Herbicide:		1.5 pint Bronate late May 10 lbs Fargo preplant				

Table 2 Moccasin recrop winter wheat multi-year yield summary of selected varieties, 1993-2002
Exp. 3870 Central Agricultural Research Center, Moccasin, Montana.

Selected Varieties	1993	1995	1996	1997	1998	1999	2000	2001	2002	Average	Neeley Same Yrs
	bu/a										
Neeley	44	33	31	69	47	45	43	36	34	42.4	42.4
Norstar	39	33 ^{1/}	26	54	45	41	40	32	34	38.9	42.4
Rocky	40	39	34	73	50	43	45	39	31	43.8	42.4
Tiber	45	36	29	56	46	45	41	39	35	41.3	42.4
Judith	36	40	31	63	53	43	46	36	38	42.9	42.4
Quantum 542	38	30	30	66	52	53	39	--	--	44.0	44.6
Bighorn	35	40	28	65	48	42	44	37	34	41.4	42.4
NuWest		38	30	51 ^{2/}	50	39	40	37	38	38.9	42.3
Vanguard		27 ^{1/}	27	59	47	38	39	34	35	39.9	42.3
Rampart		36	27	55 ^{2/}	48	38	37	33	--	36.5	43.4
Paul (MT 9426)							42	35	37	38.0	37.7
Promontory			29	61	50	48	46	36	39	44.1	43.6
BigSky				65	47	39	40	37	36	44.0	45.7
Morgan						42	38	35	36	37.8	41.0
Nursery Mean	37.0	37.0	29.0	61.0	47.0	42.0	41.0	35.2	36.0	41.0	

^{1/} Suspected low germination resulted in low yields. ^{2/} Yields from one rep only.

1994 trial was abandoned due to variable stand as a result of extremely wet conditions at seeding.

Table 3 Denton recrop winter wheat multi-year yield summary of selected varieties, 1990-2002
Exp. 3801 Central Agricultural Research Center, Moccasin, MT

Selected Varieties	1990	1991	1992	1993	1995	1996	1997	1998	1999	2001	2002	Avg.	Neeley Same Yrs
	bu/a												
Neeley	55	64	24	66	82	44	62	61	45	48	51	54.7	54.7
Norstar	44	39	24	55	51 ^{1/}	35	54	51	35	40	44	42.1	54.7
Rocky	50	60	22	57	73	46	59	61	40	31	53	50.2	54.7
Tiber	52	55	28	65	73	42	65	61	46	45	49	52.8	54.7
Judith	59	61	26	55	87	45	59	66	45	42	54	54.5	54.7
Quantum 542	57	--	40	59	78	48	67	76	48	--	--	59.1	55.1
Bighorn	48	60 ^{2/}	23	56	73	46	64	67	39	30	52	49.8	54.7
NuWest	50	54	--	--	67	43	64	59	45	39	51	52.4	56.9
Vanguard					56	41	56	62	35	34	46	47.1	56.1
Rampart					76	40	51	55	37	33	--	48.7	57.0
Paul (MT 9426)										41	46	43.4	49.5
Promontory						53	56	65	47	37	52	51.7	51.8
BigSky							64	62	44	39	46	51.0	53.4
Morgan									46	34	49	43.0	48.0
Nursery Mean	49.0	53.0	22.0	56.0	73.0	43.0	60.0	60.0	42.0	36.0			

^{1/} Suspected low germination resulted in low yields. ^{2/} Bighorn was planted on one end of the trial.

1994 trial abandoned due to a variable stand as a result of wind damage.

2000 yields not reported due to plugged drill opener.

Table 4 Fort Benton recrop winter wheat multi-year yield summary of selected varieties, 1991-2002
Exp. 3802 Central Agricultural Research Center, Moccasin, MT

Selected Varieties	1991	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Average	Neeley
	bu/a												Same Yrs
Neeley	74	58	50	69	47	51	27	45	10	6	30	42.5	42.5
Norstar	55	49	43	56 ^{1/}	32	45	25	40	12	6	28	33.5	42.5
Rocky	68	51	44	63	42	56	25	54	10	6	37	41.5	42.5
Tiber	66	56	47	74	46	54	28	52	10	6	33	42.9	42.5
Judith	63	39	44	70	36	51	26	54	13	6	30	39.3	42.5
Quantum 542	–	54	52	78	45	54	28	54	12	–	–	47.1	44.6
Bighorn	66 ^{2/}	55	43	70	34	55	27	50	10	6	31	38.1	42.5
NuWest	63	–	41	66	36	49	28	44	10	5	32	37.4	40.9
Vanguard			40	68 ^{1/}	40	51	25	48	11	6	34	31.9	37.2
Rampart			45	77	39	52	24	50	10	7	–	38.0	38.1
Paul (MT 9426)									9	6	30	15.3	15.3
Promontory					49	55	25	59	9	6	34	33.9	30.9
BigSky						52	26	51	11	3	31	29.0	28.2
Morgan								49	10	5	31	23.8	22.8
Nursery Mean	62.0	51.0	45.0	69.0	40.0	52.0	25.0	49.0	10.0	5.0	32.0	40.0	

^{1/} Suspected low germination resulted in low yields. ^{2/} Bighorn was planted on one end of the trial and not randomized. 1992 trial was abandoned due to volunteer barley infestation. 1995 trial had a high incidence of volunteer spring wheat. The trial was located on the Ron Long farm, Shonkin, MT, 1988-1996 and on the Steve Birkeland farm, Fort Benton, MT, 1997-2001.

Table 5 Moore recrop winter wheat multi-year yield summary for selected varieties, 1990-2002
Exp. 3804 Central Agricultural Research Center, Moccasin, Montana.

Selected Varieties	1990	1991 ^{1/}	1992	1994	1995	1996	1997	1998	2000	2001	2002	Average	Neeley
	bu/a												Same Yrs
Neeley	34	64	42	37	45	36	56	72	28	37	22	43.0	43.0
Norstar	35	49	28	37	31 ^{2/}	34	48	67	29	35	20	38.2	43.0
Rocky	29	57	33	36	40	41	57	66	29	34	25	40.6	43.0
Tiber	33	56	41	35	43	39	57	69	29	32	21	41.4	43.0
Judith	36	56	32	34	47	35	54	65	30	38	22	40.8	43.0
Quantum 542	41	–	48	35	43	46	58	78	35	–	–	48.0	44.1
Bighorn	42	58 ^{3/}	34	35	41	34	60	66	26	37	22	39.7	43.3
NuWest	47	55	–	42	46	34	55	70	27	36	21	43.3	43.1
Vanguard				29	29 ^{2/}	35	52	57	27	34	20	36.3	41.6
Rampart				34	44	33	49	57	28	33	–	39.7	44.4
Paul (MT 9426)									28	39	21	29.4	29.0
Promontory						39	56	62	28	32	23	40.0	41.8
BigSky							56	67	29	38	22	42.4	43.0
Morgan									26	35	19	26.7	29.0
Nursery Mean	36.0	54.0	35.0	35.0	41.0	36.0	54.0	63.0	28.0	34.4	21.5		

^{1/} 1991 trial suffered aphid damage. ^{2/} Suspected low germination resulted in low yields. ^{3/} Bighorn was planted on one end of the trial and not randomized. 1993 trial suffered hail damage. 1999 trial not harvested due to cheat grass infestation.

Table 6
Exp. 3800

2002 Off-station winter wheat multi-location **test weight** performance
Central Agricultural Research Center Moccasin, Montana

Variety	Site:	Moccasin	Denton	Ft Benton	Moore	Average
	System:	No-Till CC	Till-Plt CC	No-Till CC	No-Till CC	
----- lbs/bu -----						
MTR9997		59.6	60.7	57.1	58.6	59.0
NUPLAINS		59.7	60.6	56.7	57.6	58.6
TIBER		59.2	59.2	56.7	59.0	58.5
BIGSKY		59.9	60.5	56.1	56.6	58.3
ROCKY		57.8	60.2	55.7	56.3	57.5
MCGUIRE		57.6	60.0	56.9	55.5	57.5
PROMONTORY		58.6	59.6	56.0	54.9	57.3
NORSTAR		59.2	58.6	56.5	53.6	57.0
NUWEST		58.6	58.4	55.7	54.7	56.8
NUSKY		59.8	59.0	54.9	54.2	57.0
BIGHORN		58.8	60.0	54.4	55.2	57.1
MT9982		59.0	58.6	54.5	55.2	56.8
NEELEY		57.3	58.0	55.2	55.0	56.4
MTS0031		56.7	57.2	54.3	56.7	56.2
MTS0023		58.6	56.0	55.2	54.5	56.1
VANGUARD		57.3	58.2	54.4	55.3	56.3
MORGAN		57.6	57.9	54.1	54.3	56.0
GOLDEN SPIKE		57.2	57.9	53.2	54.6	55.7
RANSOM		56.2	56.3	53.2	53.8	54.9
MT9951		55.9	57.4	53.4	51.7	54.6
FALCON		54.7	58.3	52.0	51.5	54.1
JUDITH		55.7	58.4	51.8	51.5	54.3
XXXXXXXX		57.1	54.4	52.2	52.8	54.1
Paul		55.3	55.9	51.7	52.0	53.7
Average:		57.8	58.4	54.7	54.8	56.4

Table 7 2002 Off-station winter wheat multi-location **protein** performance
 Exp. 3800 Central Agricultural Research Center Moccasin, Montana

Variety	Site: Moccasin		Denton		Ft Benton		Moore		Average
	System: No-Till CC		Till-Plt CC		No-Till CC		No-Till CC		
	%	%	%	%	%	%	%	%	%
McGuire	16.6	15.2	15.9	15.5	15.9	15.5	15.80		15.80
*MTS0023	15.1	14.9	16.8	15.8	16.8	15.8	15.65		15.65
*CDC Falcon	15.8	12.8	16.2	15.9	16.2	15.9	15.18		15.18
Vanguard	15.6	13.9	15.9	15.2	15.9	15.2	15.15		15.15
Judith	15.0	13.6	15.1	15.6	15.1	15.6	14.83		14.83
*MT9951	16.0	13.4	14.1	15.7	14.1	15.7	14.80		14.80
XXXXXXXXXXXX	14.6	13.6	16.4	14.2	16.4	14.2	14.70		14.70
Norstar	14.5	14.0	14.9	15.3	14.9	15.3	14.68		14.68
Nuplains (HWW)	15.0	14.2	14.1	15.3	14.1	15.3	14.65		14.65
BigSky	14.6	13.3	15.5	15.1	15.5	15.1	14.63		14.63
*MTR9997	15.4	13.1	14.5	14.4	14.5	14.4	14.35		14.35
MT9982	15.3	12.6	14.9	14.5	14.9	14.5	14.33		14.33
NuWest (HWW)	15.6	12.7	14.3	14.4	14.3	14.4	14.25		14.25
*MTS0031	15.0	13.5	14.2	13.8	14.2	13.8	14.13		14.13
Morgan	15.5	13.1	14.4	13.4	14.4	13.4	14.10		14.10
Tiber	16.1	13.3	13.9	13.0	13.9	13.0	14.08		14.08
Ransom	15.4	13.1	14.5	13.1	14.5	13.1	14.03		14.03
Paul (MT9426)	14.7	12.4	14.9		14.9		14.00		14.00
Neeley	14.2	12.7	15.3	13.6	15.3	13.6	13.95		13.95
Promontory	13.9	12.3	14.0	15.5	14.0	15.5	13.93		13.93
Bighorn	13.9	12.0	15.6	14.0	15.6	14.0	13.88		13.88
Golden Spike (HWW)	13.8	12.3	14.2	15.0	14.2	15.0	13.83		13.83
NuSky (HWW)	14.2	11.3	14.8	14.9	14.8	14.9	13.80		13.80
Rocky	14.7	12.4	14.3	13.5	14.3	13.5	13.73		13.73
Average	15.02	13.15	14.95	14.64	14.95	14.64	14.43		14.43

*new for 2002

Table 8 2002 Recrop winter wheat heading date, plant height, and sawfly stem cutting.
Exp. 3800 Central Agricultural Research Center, Moccasin, Montana.

Variety	Mbcc Heading	Mbcc No-Till CC	Denton Till-Pt CC	Ft Benton No-Till CC	Moore No-Till CC	Average Height	Ft Benton Sawfly Stem Cutting
	d of y	"	"	"	"	"	%
MT9951	178	28	34	31	31	31.1	1.3
NORSTAR	181	29	38	26	30	30.8	4.7
ROCKY	178	30	34	28	31	30.8	1.3
BIGSKY	179	29	32	30	31	30.4	4.0
TIBER	180	29	35	28	30	30.4	7.3
MCGUIRE	177	30	33	27	30	29.9	2.7
VANGUARD	179	28	33	28	29	29.6	1.0
RANSOM	179	29	33	26	29	29.1	7.7
NUWEST	179	26	35	26	29	29.1	4.7
NEELEY	179	28	32	28	28	29.0	11.0
MTR9997	178	29	31	27	28	28.7	18.3
MORGAN	181	27	33	26	28	28.5	6.0
MTS0031	179	29	33	26	26	28.5	1.3
NUSKY	179	27	32	26	28	28.3	3.0
MT9982	181	27	34	25	27	28.2	16.7
XXXXXXXX	180	26	32	27	27	28.0	3.7
GOLDEN SPIKE	179	28	31	27	26	27.9	16.7
PROMONTORY	179	26	32	26	27	27.9	12.3
JUDITH	178	27	32	23	28	27.5	8.7
MTS0023	182	27	31	26	25	27.3	1.0
Paul	179	26	30	25	27	26.9	11.0
NUPLAINS	178	25	28	24	24	25.3	1.0
BIGHORN	179	25	28	23	24	25.1	3.7
FALCON	179	24	24	22	26	24.0	1.0
Average	179	27.4	32.1	26.3	27.9	28.4	6.3