

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

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

RESULTS:
Denton yields ranged from 41 to 76 bu/a, with Quantum 542 producing the highest yield. The average yield was 60 bu/a and the average test weight was 60 lbs/bu. Experimental lines MT 9524 and MT 9432 both had test weights of 62 lbs/bu. Long term yield averages (8 or more years) for Quantum 542 is 62 bu/a while Judith, Neeley, Tiber and Rocky are 55, 53, 52 and 52 bu/a respectively. The current year's data and multi-year summary are presented in Tables 1 and 2.

Fort Benton yields were extremely below normal and ranged from 18 to 28 bu/a. This location experienced very dry conditions, receiving only 3.5 inches of rainfall from May through mid-August, with nearly two inches of that total coming at the end of July to early August. The winter wheat plots were planted into a field that previously had barley. Test weights were below normal for all varieties and averaged 57 lbs/bu. The current year's data and multi-year summary are presented in Tables 3 and 4.

Moore yields were above normal and ranged from 50 to 78 bu/a, with Quantum 542 producing the high yield. This year all varieties yielded more than their long-term averages. Test weights averaged 61.2 lbs/bu and ranged from 60 to 63 lbs/bu. Neeley has the highest 10-year average yield with 45 bu/a, followed by Tiber and Judith at 44 bu/a. The eight-year average yield for Quantum 542 is 50 bu/a. The current year's data and multi-year summary are presented in Tables 5 and 6.

Winifred yields were above average and ranged from 52 to 76 bu/a with the average yield equal to 64 bu/a. Experimental line MTW 9441 was the top yielder followed by Quantum 542 (75 bu/a) and Tiber and NuWest each at 72 bu/a. Test weights averaged 59 bu/a. Quantum 542 has the high five year average for yield at 56 bu/a followed by Norstar, Neeley, Tiber and Bighorn, each at 50 bu/a. This winter wheat trial was planted on fallow and received 10.8 inches of rain from April through July. The current year's data and multi-year summary are presented in Tables 7 and 8.

SUMMARY:

The winter wheat yields were generally above average, with the exception of Fort Benton, despite the drought stress experienced in May at most locations. Two lines, Quantum 542 and MT 9524, had excellent yield performance at all locations and MT 9514, Tiber, Judith, and NuWest performed well at three of the five locations. The amount of rainfall received at each location varied widely and is reflected in the yields. Test weights were generally normal to slightly below normal.

FUTURE PLANS:

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

**Table 1. 1998 Denton Off-Station Winter Wheat Variety Performance Trial - Exp. 3871.
Central Agricultural Research Center, Moccasin, MT.**

Variety/Line	Grain Yield (bu/a)	Test Weight (lbs/bu)	Plant Height (in.)	Protein Content (%)
Quantum 542	75.7	60.7	32	13.7
MT 9432	69.1	61.8	36	14.7
MT 9514	68.7	60.2	34	11.9
MT 9524	67.3	61.6	35	14.2
Bighorn	67.3	59.6	28	14.4
Kestrel	65.8	59.3	33	12.7
Judith	65.6	59.6	34	14.0
Promontory	65.3	60.7	33	13.6
Manning	62.3	59.2	32	13.9
Vanguard	61.5	58.8	31	15.2
Rocky	61.1	60.5	30	13.9
Tiber	60.5	59.7	36	14.5
Neeley	60.5	59.2	35	12.7
MTW 9441	60.3	60.4	34	14.4
NuWest	59.0	60.1	35	14.0
Redwin	56.7	60.5	37	15.3
Rampart	55.4	58.6	34	15.1
Erhardt	55.3	60.5	30	15.4
Halt	53.0	58.7	29	15.6
Norstar	51.3	59.4	43	13.9
Elkhorn	50.5	58.5	36	14.6
Pronghorn	49.0	58.5	28	15.6
McGuire	48.6	59.8	29	16.0
Alliance	41.2	58.3	28	15.3
Experimental Means	59.6	59.8	33.0	14.4
F-Value for Var. (df=23)	12.3**	28.5**	-	-
CV 1: (s/mean)*100	6.7	0.5	-	-
LSD (0.05)	6.5	0.5	-	-

** Denotes Statistical Significance at P<= 0.01

Planted: 9/25/1997

Harvested: 8/10/1998

Previous Crop: Peas

Fertilizer: 18-46-0 w/ seed, 60 units N as anhydrous pre-plant.

Growing Season Precipitation (May – July): 8.35"

Producer/Cooperator: Richard Barber, Denton

Table 2. Denton Off-Station Winter Wheat Multi-Year Yield Summary of Selected Varieties, 1988-1998. Central Agricultural Research Center. Moccasin, MT.

Selected Varieties	1988	1989	1990	1991	1992	1993	1995	1996	1997	1998	Avg.	Neeley Same Yrs
	-----bu/a-----											
Centurk	24	53	48	59	25	55	74	44	58		49	52
Norstar	11	59	44	39	24	55	51 ^{1/}	35	54	51	42	53
Neeley	20	52	55	64	24	66	82	44	62	61	53	-
Rocky	26	67	50	60	22	57	73	46	59	61	52	53
Tiber	20	59	52	55	28	65	73	42	65	61	52	53
Judith	27	64	59	61	26	55	87	45	59	66	55	53
Quantum 542		71	57		40	59	78	48	67	76	62	56
Bighorn			48	60 ^{2/}	23	56	73	46	64	67	55	57
Hawk				62	17	50	77	30	57		49	57
Agassiz				46	15	51	61	38	62		46	57
NuWest			50	54			67	43	64	59	56	61
Kestrel						60	80	44	60	66	62	63
Erhardt							71	42	62	55	58	62
Vanguard							56	41	56	62	53	62
Rampart							76	40	51	55	56	62
McGuire							71	42	54	49	54	62
Yuma								43	58		51	53
Promontory								53	56	65	58	56
MT 9432									64	62	63	62
Nursery Mean	20.5	55.3	49.0	53.2	22.2	56.0	73.1	42.9	59.6	59.6		
Crop Yr. Precip. (in.) (Sept. - Aug.)	12.2	20.0	16.0	12.0	11.9	23.0	18.6	10.2	17.9	14.7 ^{3/}		
April Precip (in.)	1.8	2.4	0.8	2.4	1.2	1.2	2.5	0.7	1.4	0.6		
May Precip (in.)	2.6	2.9	4.2	2.2	1.0	1.9	3.3	3.3	2.5	3.3		
June Precip (in.)	2.3	3.2	1.5	2.8	2.9	5.4	3.3	1.4	4.4	3.7		
July Precip (in.)	1.5	1.9	1.0	1.1	1.7	7.0	3.6	0.1	2.5	4.1		

1/ Suspected low germination resulted in low yields.

2/ Bighorn was planted on one end of the trial (not randomized).

3/ Total does not include August 1998 precipitation.

1994 trial was abandoned due to variable stands resulting from wind damage.

Trials were located on the Richard Barber farm, Denton, MT.

Table 3. 1998 Fort Benton Off-Station Winter Wheat Variety Performance Trial –
Exp. 3872. Central Agricultural Research Center. Moccasin, MT.

Variety	Grain Yield (bu/a)	Test Weight (lbs/bu)	Plant Height (in.)	Protein Content (%)
NuWest	28.4	56.1	20	14.1
Tiber	28.1	55.6	21	13.8
MT 9524	27.6	58.6	26	13.8
Quantum 542	27.5	57.5	23	15.8
Neeley	27.0	53.9	19	13.1
Kestrel	27.0	55.9	21	14.3
Redwin	26.8	58.7	25	-
Bighorn	26.7	57.1	18	15.3
Erhardt	26.4	57.2	19	13.8
MTW 9441	26.2	58.2	24	-
MT 9432	26.1	58.2	23	-
Judith	25.9	51.2	25	14.8
MT 9514	25.5	57.1	20	12.0
Norstar	25.4	57.5	23	14.5
Rocky	25.2	57.5	21	14.0
Vanguard	24.6	57.5	18	15.3
Promontory	24.5	58.1	23	14.4
Rampart	24.3	55.1	18	13.2
Elkhorn	24.0	56.7	22	13.9
Manning	23.9	57.3	23	13.9
McGuire	23.8	53.0	17	15.4
Pronghorn	20.1	54.7	18	15.2
Halt	18.6	56.6	20	15.7
Alliance	18.1	57.3	21	15.3
Experimental Means	25.1	56.5	21.2	14.4
F-Value for Var. (df=23)	6.3**	2.4**	-	-
CV 1: (s/mean)*100	7.5	3.7	-	-
LSD (0.05)	3.1	3.4	-	-

** Denotes Statistical Significance at $P \leq 0.01$

Planted: 9/29/97 into barley stubble.

Harvested: 8/14/98

Previous Crop: Barley

Fertilizer: 18-46-0 w/ seed, pre-plant fertilizer information not available

Growing Season Precipitation (May – July): 5.5”

Producer/Cooperator: Steve Birkeland, Fort Benton

Table 4. Fort Benton Off-Station Winter Wheat Multi-Year Yield Summary of Selected Varieties, 1988-1998. Central Agricultural Research Center. Moccasin, MT.

Selected Varieties	1988	1989	1990	1991	1993	1994	1995	1996	1997	1998	Ave.	Neeley Same Yrs.
Centurk	20	68	55	66	50	45	66	38	54		51	58
Norstar	21	74	53	55	49	43	56 ^{2/}	32	45	25	45	55
Neeley	26	83	64	74	58	50	69	47	51	27	55	-
Rocky	21	75	56	68	51	44	63	42	56	25	50	55
Tiber	24	76	59	66	56	47	74	46	54	28	53	55
Judith	24	70	67	63	39	44	70	36	51	26	49	55
Quantum 542		81	70		54	52	78	45	54	28	58	56
Bighorn			59	66 ^{1/}	55	43	70	34	55	27	51	55
Hawk				66	53	42	59	33	51		51	58
Agassiz				57	48	40	62	32	46		47	58
NuWest			58	63		41	66	36	49	28	49	55
Kestrel					58	44	70	43	49	27	49	50
Erhardt						44	72	35	49	26	45	49
Vanguard						40	68 ^{2/}	40	51	25	45	49
Rampart						45	77	39	52	24	47	49
McGuire							59	34	51	24	42	49
Yuma								45	56		51	49
Promontory								49	55	25	43	42
MT 9432									52	26	39	39
Nursery Mean	21.3	70.9	58.1	62.1	51.3	44.5	68.7	40.0	51.7	25.1		
Crop Yr. Precip. (in.) (Sept. - Aug.)	9.8	25.8	17.2	14.7	26.4 ^{3/}	9.4	20.6	12.1	16.2	15.0 ^{4/}		
April Precip. (in.)	0.6	3.0	0.9	2.8	2.3	1.8	1.5	1.5	2.2	na		
May Precip. (in.)	2.1	2.5	3.4	2.5	1.9	1.5	4.0	3.0	2.5	na		
June Precip. (in.)	2.4	2.6	1.7	4.5	5.5	1.1	7.0	1.3	2.7	na		
July Precip. (in.)	1.7	2.1	1.3	1.2	8.7	0.5	2.3	0.6	1.2	na		

1/ Bighorn was planted on one end (not randomized). 2/ Suspected low germination resulted in low yields. 3/ Total is missing Jan-Mar. 1993 rainfall.

4/ Total does not include August 1998 precipitation.

* 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. 1997-1998.

Table 5. 1998 Moore Off-Station Winter Wheat Variety Performance Trial - Exp. 3873.
Central Agricultural Research Center. Moccasin, MT.

Variety	Grain Yield (bu/a)	Test Weight (lbs/bu)	Plant Height (in.)	Protein Content (%)
Quantum 542	77.9	61.9	37	13.1
MT 9514	76.9	61.6	39	11.3
MT 9524	73.4	62.5	38	13.0
Neeley	72.4	60.7	38	11.1
Kestrel	70.1	60.7	40	11.2
NuWest	69.7	61.3	37	13.4
Tiber	69.1	61.7	40	13.9
MT 9432	67.3	62.5	35	13.3
Norstar	66.8	62.5	45	12.2
Rocky	66.1	62.1	36	13.3
Bighorn	65.7	61.5	32	13.3
MTW 9441	64.8	61.1	32	12.7
Judith	64.7	60.6	35	12.7
Promontory	61.7	62.2	34	12.7
Elkhorn	59.2	60.6	38	13.1
Redwin	58.0	61.4	38	14.3
Vanguard	57.0	61.1	35	15.0
Rampart	56.7	60.8	32	14.9
Erhardt	55.9	61.1	34	13.7
Manning	54.5	60.7	34	13.5
McGuire	54.1	60.8	33	15.2
Pronghorn	51.0	59.8	27	15.2
Halt	50.8	59.8	28	15.3
Alliance	49.8	60.1	33	15.2
Experimental Means	63.1	61.2	35.4	13.4
F-Value for Var. (df=23)	15.6**	21.1**	-	-
CV 1: (S/mean)*100	5.8	0.5	-	-
LSD (0.05)	6.0	0.5	-	-

Note: Plot sprayed with NuChem's Stand and Stimulate - 5/7/1998.

** Denotes Statistical Significance at $P \leq 0.01$.

Planted: 9/22/97

Harvested: 8/15/98

Previous Crop: Fallow

Fertilizer: 18-46-0 w/ seed, 60# N pre-plant

Growing Season Precipitation (May - July): 9.0"

Producer/Cooperator: Gary Helig, Moore

Table 6. Moore Off-Station Winter Wheat Multi-Year Yield Summary of Selected Varieties, 1988-1998. Central Agricultural Research Center. Moccasin, MT.

Selected Varieties	1988	1989	1990	1991 ^{1/}	1992	1994	1995	1996	1997	1998	Avg.	Neeley Same Yrs.
	-----bu/a-----											
Centurk	26	45	35	58	30	36	31	38	53		39	42
Norstar	9	47	35	49	28	37	31 ^{3/}	34	48	67	39	45
Neeley	17	46	34	64	42	37	45	36	56	72	45	-
Rocky	24	49	29	57	33	36	40	41	57	66	43	45
Tiber	20	50	33	56	41	35	43	39	57	69	44	45
Judith	28	49	36	56	32	34	47	35	54	65	44	45
Quantum 542		52	41		48	35	43	46	58	78	50	46
Bighorn			42	58 ^{2/}	34	35	41	34	60	66	46	48
Hawk				62	31	35	32	20	49		38	47
Agassiz				49	35	33	42	41	50		42	47
NuWest			47	55		42	46	34	55	70	50	49
Kestrel						34	41	36	56	70	47	49
Erhardt						37	42	43	57	56	47	49
Vanguard						29	29 ^{3/}	35	52	57	40	49
Rampart						34	44	33	49	57	43	49
McGuire							41	37	48	54	45	52
Yuma								27	53		40	46
Promontory								39	56	62	52	51
MT 9432									56	67	62	64
Nursery Mean	20.1	46.3	36.4	54.3	35.4	35.4	40.5	36.3	54.0	63.1		

1/ 1990 Nursery suffered aphid damage.
 2/ Bighorn was planted on one end (not randomized).
 3/ Lower yields resulted from suspected low germination.
 1993 Nursery suffered hail damage

Table 7. 1998 Winifred Off-Station Winter Wheat Variety Performance Trial - Exp. 3874.
Central Agricultural Research Center. Moccasin, MT.

Variety	Grain Yield (bu/a)	Test Weight (lbs/bu)	Plant Height (in.)	Protein Content (%)	Lodging Score (0-9) ^{1/}
MT 9441	76.1	58.6	32	14.3	2
Quantum 542	74.6	60.0	27	13.7	3
Tiber	72.4	59.2	32	14.1	3
NuWest	72.1	60.2	32	13.8	2
Judith	70.4	58.3	30	13.7	2
MT 9524	67.3	59.1	30	14.5	2
Alliance	67.2	59.0	29	13.3	5
Erhardt	66.2	59.2	32	14.9	4
MT 9432	66.1	58.8	34	14.8	3
Norstar	66.1	59.6	38	13.6	2
Neeley	65.0	56.5	30	12.8	2
Halt	64.5	57.9	27	14.7	4
MT 9514	64.1	57.9	33	12.4	3
Bighorn	63.1	59.1	29	14.0	2
Rocky	62.4	59.6	32	13.4	4
Manning	61.9	57.1	32	13.4	5
Elkhorn	59.9	57.7	35	14.1	5
Redwin	59.6	59.2	33	15.1	3
Kestrel	59.1	57.4	33	12.8	2
Promontory	58.2	59.0	30	13.3	3
McGuire	57.1	58.8	28	15.2	2
Pronghorn	53.8	57.8	27	14.5	4
Vanguard	53.4	58.7	27	14.9	4
Rampart	51.7	57.5	29	15.0	4
Experimental Means	62.3	58.6	30.9	14.0	3.1
F-Value for Var. (df=23)	3.2**	6.8**	-	-	-
CV 1: (S/mean)*100	5.7	1.1	-	-	-
LSD (0.05)	10.2	1.0	-	-	-

1/ Lodging Scores recorded on one rep only – Rep 1 washed during a brief, heavy rainstorm, which probably contributed to the lodging – the other two reps looked fine.

** Denotes Statistical Significance at P<= 0.01.

Planted: 9/25/97

Harvested: 8/11/98

Previous Crop: Fallow

Fertilizer: 18-46-0 w/ seed, 60# N pre-plant

Growing Season Precipitation (April – July): 10.8”

April May June July
0.59” 2.64” 4.46” 3.07”

Producer/Cooperator: Bruce Udelhoven, Winifred

Table 8. Winifred Off-Station Winter Wheat Multi-Year Yield Summary of Selected Varieties, 1992-1998. Central Agricultural Research Center. Moccasin, MT. 1998.

Selected Varieties	1992	1994	1996	1997	1998	Avg.	Neeley Same Yrs
	-----bu/a-----						
Centurk	31	53	55	56		49	46
Norstar	30	50	50	51	66	50	50
Neeley	40	52	43	51	65	50	-
Rocky	32	50	55	45	62	49	50
Tiber	36	47	57	38	72	50	50
Judith	30	51	52	43	70	49	50
Quantum 542	47	59	55	45	75	56	50
Bighorn	31	53	50	54	63	50	50
Hawk	25	55	36	51		42	46
Agassiz	30	42	46	39		39	46
NuWest		49	50	46	72	54	53
Kestrel		54	52	38	59	51	53
Erhardt		52	52	50	66	55	53
Vanguard		44	45	39	53	45	53
Rampart		49	43	33	52	44	53
McGuire			49	51	57	52	53
Yuma			47	42		44	47
Promontory			54	41	58	51	53
MT 9432				50	66	58	58
Nursery Mean	31.6	50.5	49.9	45.1	63.9		
Crop Yr. Precip. (in.) (Sept. - Aug.)	13.3	13.1	13.5	16.7	10.8		
April Precip. (in.)	0.6	2.2	0.6	1.7	0.6		
May Precip. (in.)	0.8	2.0	3.3	2.8	2.6		
June Precip. (in.)	3.6	2.6	2.0	2.8	4.5		
July Precip. (in.)	3.5	0.9	0.7	2.7	3.1		

The 1993 and 1995 trials were not harvested due to hail damage.