

Project Title: Evaluation of winter wheat cultivar performance under continuous crop, crop-crop-fallow and crop-fallow systems in central Montana

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Project Personnel:

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Objectives:

Evaluate relative performance winter wheat cultivars and development lines in central Montana crop environments.

Results:

The 2011 growing season conditions were atypical beginning with above average precipitation in September and November. Winter precipitation was near average, while April through mid-June precipitation was much above average. Mid-June through August precipitation was below average. The Winifred location was hailed out in mid July. Stripe rust infestations were wide spread in winter wheat but was not a problem in much of the and impacted measurably on some farms but was not extreme in any of the off-station trials.

Experimental lines MTS0808 and MTS0832 top the yield ranking in the Moccasin and Denton no-till continuous crop sites (Tables 1 and 2). In the higher yield environment at near Geraldine, Yellowstone and Decade were the high yielders (Table 3). The dry summer conditions contributed to lower test weights at Moccasin while the Denton and Geraldine locations had near average test weights. Protein levels low at Denton and above average at Moccasin and Geraldine. An additional 60 units of N, in addition to the fall or winter 60 N top dress, was applied in May to the Moccasin and Geraldine locations due to the high precipitation levels.

Multi-year summaries for yield, test weight, protein, and plant height are presented in tables 4 to 19. Each variety is not entered an equal number in the multi-year means. Therefore, each variety is compared to Yellowstone's performance in the same years at each location. Yellowstone, in general has the high multi-year mean yield at each location. Yellowstone generally has a mean test weight lower than other entries and is intermediate for protein and plant height.

Summary:

Stripe rust was wide spread in central Montana. However, it was not observed as severely impacting spring wheat variety trial nurseries. The sunny dry weather that set in by mid-June appeared to alleviate the stripe rust threat. Spring wheat yields were severely impacted by the mid-May late seeding date.

Funding Summary:

Expenditure information to be provided by OSP.
No other grant support was provided for this project.

MWBC FY2011 Grant Submission Plans:

It is planned to submit this project for funding consideration in the next fiscal year.

Table 1 2011 Winter wheat variety trial on NTCC near Moccasin.
Exp 3870 Central Agricultural Research Center. Moccasin, Montana.

Cultivar/Line	Entry	Origin/Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Protein %
MTCL1068	23	Yellowstone*4/3/MTCL01158/CDC Teal 11A/Jagalene	47.1**	56.2	183.0	32.0	15.3
MTS0832	18	92X73E70/MTW9911	43.1*	58.2*	184.0	29.7	13.8
CDC Falcon	4	Sask/WestBred, 1999	42.9*	59.1*	182.7	27.3	14.0
MTCL1067	21	Yellowstone*4/3/MTCL01158/CDC Teal 11A/Jagalene	38.9*	58.2*	183.3	32.4	14.1
Yellowstone	2	Montana 2005	37.3	57.1	183.7	28.7	15.8
Bearpaw (MTS0721)	16	DMS/Rampart//Pronghorn/3/2*Rampart	37.0	59.8*	182.0	26.2	14.5
Decade	13	Montana/North Dakota, 2010	36.6	58.5*	181.0	27.0	15.2
Norris (CL)	9	Montana/WestBred, 2005	36.3	58.9*	180.0	31.5	14.1
Jagalene	5	AgriPro, 2002	36.2	58.7*	182.3	28.9	13.8
MT0871	24	MT9982//MTW0072/NW97S151	35.6	56.8	184.0	27.3	15.9
MTS0808	19	MT9908//Nuplains/MTS9862	34.7	57.0	183.0	27.3	16.1
MTCL1003	22	Jerry/CDC Teal 11A//MTCL0325	34.6	58.5*	183.0	31.2	14.6
Jerry	8	North Dakota, 2001	34.3	57.4	183.0	30.8	15.3
Pryor	7	WestBred, 2002	33.4	57.8	183.0	25.5	16.0
WB-Quake	20	Rampart/Kestrel (WestBred, 2011)	32.8	56.5	184.0	26.2	15.6
Judee (MTS0713)	15	93X312E14/NuHorizon	31.5	58.6*	182.3	28.3	15.7
Accipiter	14	CDC Raptor/CDC Falcon	30.9	56.2	184.0	26.0	14.9
Genou	1	Montana, 2004	30.1	56.1	182.3	29.4	15.6
Wahoo	12	Nebraska, 2001	29.7	58.0*	179.3	27.0	14.2
Ledger	6	WestBred, 2004	28.9	58.1*	182.3	28.2	13.7
AP 503 CL2	10	AgriPro, 2007	28.0	60.2**	182.3	27.7	15.1
MTS0826	17	MT9524/G15048//Rampart	27.2	58.1*	185.7	28.1	15.7
Bynum (CL)	11	Montana/WestBred, 2005	26.5	59.4*	182.3	29.4	14.9
Rampart	3	Montana, 1996	26.2	58.8*	183.0	31.8	15.3
Average			34.2	58.0	182.7	28.7	15.0
P-value (Varieties)			0.0014	0.0308	<.0001	0.0012	
C.V. (%)			16.4	1.9	0.4	7.4	
LSD (0.05)			9.2	2.2	1.2	3.5	

** = indicates highest value within a column

* = indicates varieties with values equal to highest variety within a column Fisher's protected LSD (p=0.05)

Seeded: 26-Sep-10 Notill Continuous Crop following hay barley.

Fertilizer: NPKS 10+10+10+05 w/seed.

90 N as top dress urea

Harvest: 8-Aug-11

Table 2 2011 Winter wheat variety trial on NTCC near Denton.
Exp 3870 Central Agricultural Research Center. Moccasin, Montana.

Cultivar/Line	Entry	Origin/Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Protein %
MTS0808	19	MT9908//Nuplains/MTS9862	39.7	61.8	26.0	12.2
MTS0832	18	92X73E70/MTW9911	37.9	61.8	28.3	11.1
Pryor	7	WestBred, 2002	37.9	61.9	27.2	11.2
MTCL1067	21	Yellowstone*4/3/MTCL01158/CDC Teal 11A//Jagalene	37.4	61.9	31.1	11.2
Jagalene	5	AgriPro, 2002	37.1	63.3*	27.6	9.9
MTCL1068	23	Yellowstone*4/3/MTCL01158/CDC Teal 11A//Jagalene	36.4	61.5	26.0	11.6
Bearpaw (MTS0721)	16	DMS/Rampart//Pronghorn/3/2*Rampart	35.9	62.9*	26.0	9.8
Norris (CL)	9	Montana/WestBred, 2005	35.9	63.3*	29.9	10.9
Decade	13	Montana/North Dakota, 2010	34.3	62.5*	26.4	11.4
Jerry	8	North Dakota, 2001	33.5	62.1*	29.1	12.3
Yellowstone	2	Montana 2005	32.8	62.0	28.0	10.4
MT0871	24	MT9982//MTW0072/NW97S151	32.1	60.3	26.8	11.6
MTS0826	17	MT9524/G15048//Rampart	32.1	62.8*	32.3	9.5
Wahoo	12	Nebraska, 2001	31.9	61.9	25.6	11.1
Genou	1	Montana, 2004	30.1	61.8	32.7	11.7
Ledger	6	WestBred, 2004	29.5	62.6*	27.2	12.3
CDC Falcon	4	Sask/WestBred, 1999	29.1	61.9	26.0	11.2
Accipiter	14	CDC Raptor/CDC Falcon	28.9	62.5*	27.6	9.9
AP 503 CL2	10	AgriPro, 2007	27.6	63.8**	28.3	11.4
Rampart	3	Montana, 1996	25.7	61.2	30.3	13.6
WB-Quake	20	Rampart/Kestrel (WestBred, 2011)	25.2	59.2	25.6	12.2
Judee (MTS0713)	15	93X312E14/NuHorizon	24.7	61.6	28.3	12.1
Bynum (CL)	11	Montana/WestBred, 2005	22.6	61.9	26.0	12.9
MTCL1003	22	Jerry/CDC Teal 11A/MTCL0325	20.6	60.7	30.3	12.1
Average			31.6	61.4	28.0	11.4
P-value (Varieties)			0.1614	0.0072		
C.V. (%)			24.5	1.3		
LSD (0.05)			ns	1.7		

** = indicates highest value within a column

* = indicates varieties with values equal to highest variety within a column,

Fisher's protected LSD (p=0.05)

Seeded: 25-Sep-11 Into lentil stubble

Soil Temp 19 C

Fertilizer: NPKS 10+10+10+05 w/seed.

60 N as top dress urea

Harvest: 15-Aug-11

Table 3 2011 Winter wheat variety trial NTFallow near Geraldine.
Exp 3870 Central Agricultural Research Center. Moccasin, Montana.

Cultivar/Line	Entry	Origin/Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Protein %
Yellowstone	2	Montana 2005	78.4**	60.7	37.0	13.4
Decade	13	Montana/North Dakota, 2010	74.7*	62.3	36.9	12.9
WB-Quake	20	Rampart/Kestrel (WestBred, 2011)	73.9*	62.0	35.2	12.2
Bearpaw (MTS0721)	16	DMS/Rampart//Pronghorn/3/2*Rampart	71.8*	60.9	36.6	13.9
Jagalene	5	AgriPro, 2002	70.3*	62.9	36.9	12.6
MTS0832	18	92X73E70/MTW9911	68.4*	60.6	40.4	12.0
Pryor	7	WestBred, 2002	67.5*	60.3	34.5	11.5
Wahoo	12	Nebraska, 2001	67.1*	59.0	36.9	12.7
CDC Falcon	4	Sask/WestBred, 1999	66.9*	60.1	33.9	12.8
MTCL1067	21	Yellowstone*4/3/MTCL01158/CDC Teal 11A//Jag	66.8*	59.0	38.8	13.6
MTS0808	19	MT9908//Nuplains/MTS9862	65.7*	60.3	35.4	12.4
MTCL1068	23	Yellowstone*4/3/MTCL01158/CDC Teal 11A//Jag	63.9	59.7	38.3	12.4
MT0871	24	MT9982//MTW0072/NW97S151	62.8	60.6	36.4	13.1
Genou	1	Montana, 2004	62.1	61.0	40.8	14.5
MTCL1003	22	Jerry/CDC Teal 11A//MTCL0325	61.8	60.4	40.6	13.9
MTS0826	17	MT9524/G15048//Rampart	61.6	61.7	41.9	14.4
Accipiter	14	CDC Raptor/CDC Falcon	61.4	60.6	36.1	13.9
Jerry	8	North Dakota, 2001	61.4	60.4	41.1	13.0
Norris (CL)	9	Montana/WestBred, 2005	61.2	59.5	41.5	14.0
Judee (MTS0713)	15	93X312E14/NuHorizon	57.2	60.6	34.1	13.7
Ledger	6	WestBred, 2004	55.2	61.4	34.6	13.3
Bynum (CL)	11	Montana/WestBred, 2005	53.3	62.8	42.4	14.2
Rampart	3	Montana, 1996	52.8	60.0	40.8	14.7
AP 503 CL2	10	AgriPro, 2007	50.0	61.3	35.0	13.7
Average			64.0	60.8	37.9	13.3
LSD (0.05)			13.2	ns	1.6	
C.V. (%)			12.6	2.1	2.5	
P-value (Varieties)			0.0061	0.2415	<.0001	

** = indicates highest value within a column

* = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Seeded: 29-Sep-11 No-till intofallow barley stubble

Fertilizer: NPKS w/seed: 10+10+10+05 Plus 90N topdress as urea

Harvest Date: Harvested 11Aug2011

Table 4 Moccasin NTRC multi-year winter wheat variety yield performance

Cultivar	2006	2007	2008	2009	2010	2011	Mean	Yellowstone same Yrs.
				bu/a				
Bynum (CL)	38.6	43.1	24.4	27.6	50.9	26.5	35.2	47.7
Carter			32.1	32.0	57.1		40.4	43.9
CDC Falcon	44.3	50.9	35.1	28.6	52.3	42.9	42.2	47.7
Decade			31.8	29.0	60.6	36.6	40.5	43.9
Genou	44.9	42.6	25.8	29.0	51.0	30.1	37.2	47.7
Hyalite (CL,HW)	46.6	46.1	28.3	25.5	60.1		41.3	49.8
Jagalene	42.1	52.8	34.0	31.7	63.6	36.2	43.4	47.7
Jerry	41.8	45.8	31.9	28.0	58.6	34.3	40.1	47.7
Ledger	40.8	50.2	24.9	26.9	51.3	28.9	37.2	47.7
Neeley	54.2	43.3	28.1	29.3	54.3		41.8	49.8
Norris (CL)	47.4	44.4	35.3	31.9	54.0	36.3	41.6	47.7
Promontory	48.3	52.6	30.6	26.6	54.5		42.5	49.8
Pryor	48.8	45.0	31.5	26.3	56.0	33.4	40.2	47.7
Rampart	40.8	40.0	27.2	25.4	47.9	26.2	34.6	47.7
Wahoo	43.1	53.3	30.2	26.2	62.2	29.7	40.8	47.7
Yellowstone	52.2	58.4	38.6	33.3	66.5	37.3	47.7	47.7
Bearpaw (MTS0721)					58.3	37.0	47.7	51.9
Judee (MTS0713)				28.7	53.6	31.5	37.9	45.7
Average	45.7	46.7	29.8	29.2	55.5	34.2		

Varieties with multi-year means \geq than Yellowstone for the same years are in **bold**.

Table 5 Multi-year winter wheat yields near Denton on CC.

Cultivar	2006	2007	2008	2009	2010	2011	Ave	Yellowstone same Yrs.
			bu/a					
Bynum (CL)	39.5	40.6			26.4	22.6	32.3	41.0
Carter								
CDC Falcon	46.6	46.7			32.4	29.1	38.7	41.0
Decade			no	no	34.1	34.3	34.2	32.1
Genou	49.1	45.5	harvest	yield	27.1	30.1	38.0	41.0
Hyalite (CL,HW)	45.2	40.3			29.7		38.4	41.0
Jagalene	42.7	48.7	downy	to	31.8	37.1	40.1	41.0
Jerry	45.7	43.0	brome	variable	23.5	33.5	36.4	41.0
Ledger	38.9	48.3	won		33.4	29.5	37.5	41.0
Neeley	54.0*	47.9			20.6		34.3	43.8
Norris (CL)	48.5	45.3			26.4	35.9	39.0	41.0
Promontory	49.4	54.2			27.9		43.8	43.8
Pryor	55.0*	46.3			33.4	37.9	39.2	41.0
Rampart	44.0	45.3			28.2	25.7	35.8	41.0
Wahoo	42.5	51.3			26.8	31.9	38.1	41.0
Yellowstone	50.3	49.6			31.4	32.8	41.0	41.0
Bearpaw					30.6	35.9	33.3	32.1
Judee					30.3	24.7	27.5	32.1
Average	47.6	46.2			29.2	31.6		
Varieties with multi-year means > than Yellowstone for the same years are in bold .								

Table 6. 2011 Geraldine winter wheat varieties multi-year yield performance.

Variety	2006	2007	2008	2009	2010	2011	average	Yellowstone same yrs.
				bu/a				
Bynum (CL)	88.0	40.9	62.7	25.0	62.6	53.3	55.4	67.1
Carter			57.6	31.9	72.6		54.0	61.8
CDC Falcon	90.9	46.6	72.1	32.7	72.8	66.9	63.7	67.1
Decade			67.0	33.6	54.7	74.7	57.5	66.0
Genou	86.3	45.1	69.8	34.8	74.3	62.1	62.1	67.1
Hyalite (CL,HW)	87.4	45.1	68.7	33.8	54.9	70.3	60.0	67.1
Jagalene	99.7	49.7	71.1	23.2	66.3	61.4	61.9	67.1
Jerry	84.6	41.9	68.6	34.9	76.8		61.4	64.8
Ledger	93.2	40.8	64.5	26.4	65.1	55.2	57.5	67.1
Neeley	89.7	38.9	75.5	26.3	73.5		60.8	64.8
Norris (CL)	94.3	41.5	73.8	39.5	57.4	61.2	61.3	67.1
Promontory	89.3	34.6	72.9	27.3	56.1		56.0	64.8
Pryor	92.2	45.5	73.2	30.4	70.2	67.5	63.2	67.1
Rampart	85.5	43.9	55.6	26.2	74.9	52.8	56.5	67.1
Wahoo	98.6	42.8	63.9	33.2	77.0	67.1	63.8	67.1
Yellowstone	98.1	40.6	70.2	32.5	82.8	78.4	67.1	67.1
Bearpaw					58.3	71.8	65.1	80.6
Judee				34.3	53.6	57.2	48.4	64.6
Mean	90.5	43.3	67.5	32.19	66.8	64.0		

2007 had marginal stand and was hailed prior to harvest.

Table 7. 2011 Winifred winter wheat variety multi-year yield performance
Exp 3874 Central Agricultural Research Center. Moccasin, Montana.

Cultivar	2006	2007	2008	2009	2010	2011	Average	Yellowstone same Yrs.
	bu/a							
Bynum (CL)	53.2	55.2	62.7	40.5	59.1	Hail	54.1	65.0
Carter			61.7	47.8	64.0	no	57.8	64.4
CDC Falcon	52.1	62.5	72.1	42.7	63.8	harvest	58.6	65.0
Decade			79.5	50.1	79.2		69.6	64.4
Genou	56.6	63.1	69.8	39.7	62.4		58.3	65.0
Hyalite (CL,HW)	59.5	64.6	68.7	49.3	69.2		62.3	65.0
Jagalene	54.6	59.1	71.1	51.7	75.1		62.3	65.0
Jerry	54.2	58.3	68.6	44.0	61.0		57.2	65.0
Ledger	59.4	59.2	64.5	41.7	65.1		58.0	65.0
Neeley	57.1	65.8	75.5	40.4	70.2		61.8	65.0
Norris (CL)	58.1	58.6	73.8	41.6	74.3		61.3	65.0
Promontory	51.4	61.9	72.9	46.3	80.0		62.5	65.0
Pryor	59.8	67.9	73.2	45.5	71.8		63.6	65.0
Rampart	52.8	59.8	55.6	40.7	63.5		54.5	65.0
Wahoo	65.2	73.1	63.9	49.7	75.9		65.6	65.0
Yellowstone	60.7	71.1	70.2	48.9	74.0		65.0	65.0
Bearpaw					73.6		73.6	74.0
Judee				43.0	67.0		55.0	61.5
Average	56.9	61.5	67.5	45.5	69.7			

MY means \geq the mean of Yellowstone are in bold.

Table 8. Multi-year winter wheat test weight for the NTRC at Moccasin.

Exp 3870 Cultivar / year:	2006	2007	2008	2009	2010	2011 ave	Yellowstone Same Years	
				lbs/bu				
Bynum (CL)	63.4	57.8	58.4	60.1	60.5	59.4	59.9	58.1
Carter			58.1	57.4	60.2		59.8	59.4
CDC Falcon	63.2	53.7	57.4	58.6	60.6	59.1	58.8	58.1
Decade			57.0	59.0	60.7	58.5	58.8	58.4
Genou	63.3	55.1	56.6	58.8	57.7	56.1	57.9	58.1
Hyalite (CL, HWW)	62.0	55.1	57.6	58.4	61.0		59.3	58.7
Jagalene	63.5	56.5	58.5	57.1	61.3	58.7	59.3	58.1
Jerry	64.0	52.5	57.2	57.9	58.0	57.4	57.8	58.1
Ledger	62.2	56.6	58.1	60.3	60.1	58.1	59.2	58.1
Neeley	63.3	52.1	56.7	57.4	58.5		58.6	58.7
Norris (CL)	63.3	53.8	58.6	60.7	61.2	58.9	59.4	58.1
Promontory	64.6	57.0	57.3	62.2	62.3		61.2	58.7
Pryor	63.8	52.6	60.4	59.8	59.2	57.8	58.9	58.1
Rampart	63.0	56.4	57.5	50.6	59.8	58.8	57.7	58.1
Wahoo	62.9	54.6	57.1	60.5	56.9	58.0	58.3	58.1
Yellowstone	62.1	53.1	57.1	59.4	59.8	57.1	58.1	58.1
Bearpaw (MTS0721)					61.0	59.8	60.4	58.5
Judee (MTS0713)				59.2	59.0	58.6	58.9	58.8
Average	63.1	54.9	57.9	58.8	59.9	58.0		

Varieties with multi-year means \geq than Yellowstone for the same years are in **bold**.

Table 9. 2011 Multi-year winter wheat grain test weights near Denton.

Exp 3871 Cultivar / year:	2006	2007	2008	2009	2010	2011	Ave	Yellowstone Same Years
					lb/bu			
Bynum (CL)	63.0	59.6		57.9	56.3	61.9	59.7	59.9
Carter			downy	58.5	56.6		57.6	57.7
CDC Falcon	64.0	59.7	brome	58.1	57.0	61.9	60.1	59.9
Decade			won	59.0	55.1	62.5	58.9	59.1
Genou	64.9	59.9		57.1	58.2	61.8	60.4	59.9
Hyalite (CL, HWW)	64.4	57.5		59.1	59.1		60.0	59.4
Jagalene	65.2	62.2		58.5	56.0	63.3	61.0	59.9
Jerry	63.2	59.2		57.9	57.0	62.1	59.9	59.9
Ledger	64.4	60.7		58.4	55.4	62.6	60.3	59.9
Neeley	63.4	59.9		57.8	58.5		59.9	59.4
Norris (CL)	64.4	59.7		59.1	58.4	63.3	61.0	59.9
Promontory	64.7	61.3		58.8	57.1		60.5	59.4
Pryor	64.7	58.5		59.1	56.4	61.9	60.1	59.9
Rampart	63.7	59.5		57.7	55.4	61.2	59.5	59.9
Wahoo	63.7	59.1		57.3	55.6	61.9	59.5	59.9
Yellowstone	62.9	59.2		58.3	57.1	62.0	59.9	59.9
Bearpaw					57.2	62.9	60.1	59.6
Judee				60.4	58.1	61.6	60.0	59.1
Average	63.9	59.7		58.5	56.9	61.4		

Varieties with multi-year means \geq than Yellowstone for the same years are in **bold**.

Table 10 2011 Multi-year winter wheat test weight at Geraldine.

Cultivar	2006	2007	2008	2009	2010	2011	Mean	Yellowstone
								Same Yr
				lbs/bu				
Bynum (CL)	64.3	60.3	62.4	59.3	60.3	62.8	61.6	60.6
Carter			62.1	58.9	59.9		60.3	60.4
CDC Falcon	64.3	59.8	62.4	59.5	59.4	60.1	60.9	60.6
Decade			63.2	59.9	61.3	62.3	61.7	60.5
Genou	64.7	60.4	62.3	59.4	60.1	61.0	61.3	60.6
Hyalite (CL, HWW)	63.0	60.7	62.8	60.2	61.3		61.6	60.6
Jagalene	63.8	62.0	64.5	61.1	60.8	62.9	62.5	60.6
Jerry	65.5	59.0	61.5	58.6	58.7	60.4	60.6	60.6
Ledger	62.9	60.3	62.7	59.1	59.8	61.4	61.0	60.6
Neeley	64.3	59.6	62.8	59.4	59.0		61.0	60.6
Norris (CL)	64.3	60.6	63.2	60.8	60.9	59.5	61.6	60.6
Promontory	64.9	61.3	63.9	61.0	60.1		62.2	60.6
Pryor	64.7	58.6	62.7	59.8	58.5	60.3	60.8	60.6
Rampart	64.1	59.9	61.7	59.3	59.6	60.0	60.8	60.6
Wahoo	64.0	58.0	61.1	59.0	59.7	59.0	60.1	60.6
Yellowstone	62.9	58.9	61.4	59.6	60.1	60.7	60.6	60.6
Bearpaw					58.6	60.9	59.8	60.4
Judee				61.3	59.5	60.6	60.5	60.1
Mean	64.1	60.0	62.6	59.91	59.7	60.8		

MY means > the mean of Yellowstone are in bold.

Table 11. 2011 Multi-year winter wheat test weight at Winifred.

Cultivar	2006	2007	2008	2009	2010	2011	Mean	Yellowstone Same Yrs.
				lbs/bu				
Bynum (CL)	63.8	60.0	61.4	59.7	64.3	Hail	61.8	60.7
Carter			61.0	58.8	64.0	no	61.3	61.1
CDC Falcon	63.7	60.6	60.6	58.5	62.7	Harvest	61.2	60.7
Decade			61.7	61.4	63.1		62.1	61.1
Genou	63.8	59.8	61.2	58.0	63.7		61.3	60.7
Hyalite (CL, HWW)	64.0	60.2	62.3	61.4	63.4		62.3	60.7
Jagalene	65.2	62.3	63.2	62.3	64.2		63.4	60.7
Jerry	61.8	59.3	60.5	58.3	61.7		60.3	60.7
Ledger	63.5	59.7	61.4	59.6	63.8		61.6	60.7
Neeley	62.4	60.1	61.6	58.5	63.3		61.2	60.7
Norris (CL)	64.4	60.6	62.5	60.4	63.8		62.3	60.7
Promontory	64.4	61.5	63.0	61.3	64.7		63.0	60.7
Pryor	60.9	59.7	61.5	59.1	62.6		60.8	60.7
Rampart	62.7	59.8	61.0	58.8	63.3		61.1	60.7
Wahoo	62.9	58.9	59.2	58.6	61.6		60.2	60.7
Yellowstone	62.4	58.1	61.2	60.4	61.6		60.7	60.7
Bearpaw					63.5		63.5	61.6
Judee				59.0	63.6		61.3	61
Average	63.1	60.0	61.5	59.9	63.4			

MY means > the mean of Yellowstone are in bold.

Table 12. Multi-year winter wheat grain protein near Moccasin.

Exp 3800 Cultivar / Year:	2006	2007	2008	2009	2010	2011	Ave same Years	Yellowstone
				%				
Bynum (CL)	15.8	15.5	12.4	15.0	14.3	14.9	14.7	14.3
Carter			11.7	15.0	13.5		13.4	13.5
CDC Falcon	13.8	16.2	11.0	14.7	13.4	14.0	13.9	14.3
Decade			11.6	16.0	13.4	15.2	14.1	14.1
Genou	15.1	15.5	11.9	14.7	14.5	15.6	14.6	14.3
Hyalite (CL, HWW)	15.2	16.3	11.1	15.1	13.3		14.2	14.0
Jagalene	15.3	15.2	11.3	14.5	12.9	13.8	13.8	14.3
Jerry	15.1	15.1	11.1	15.0	13.4	15.3	14.2	14.3
Ledger	15.1	17.2	10.6	14.0	12.8	13.7	13.9	14.3
Neeley	13.9	14.9	10.8	14.7	13.5		13.6	14.0
Norris (CL)	14.3	17.4	11.0	13.4	12.7	14.1	13.8	14.3
Promontory	14.5	15.7	10.6	13.0	12.1		13.2	14.0
Pryor	13.5	14.3	10.8	15.0	13.8	16.0	13.9	14.3
Rampart	15.5	15.6	11.8	15.4	13.7	15.3	14.6	14.3
Wahoo	14.4	17.2	12.4	14.2	13.4	14.2	14.3	14.3
Yellowstone	14.4	15.2	11.3	15.9	13.3	15.8	14.3	14.3
Bearpaw (MTS0721)					13.4	14.5	14.0	14.5
Judee (MTS0713)				15.6	13.7	15.7	15.0	14.7
Average	14.6	15.7	11.5	14.7	13.5	15.0		

Varieties with multi-year means \geq than Yellowstone for the same years are in **bold**.

Table 13. Multi-Year winter wheat grain protein content near Denton.

Exp 3871 Cultivar / Year:	2006	2007	2008	2009	2010	2011	Ave	Yellowstone same Years
Bynum (CL)	11.9	11.3	no	15.2	12.6	12.9	12.8	11.4
Carter			harvest	14.2	10.9		12.6	12.4
CDC Falcon	9.9	14.5		13.4	11.4	11.2	12.1	11.4
Decade			downy	14.2	11.5	11.4	12.4	11.7
Genou	10.6	10.9	brome	14.1	11.8	11.7	11.8	11.4
Hyalite (CL, HWV)	10.8	11.7	won	14.8	11.3		12.2	11.6
Jagalene	10.2	14.6		13.9	10.9	9.9	11.9	11.4
Jerry	11.6	10.9		13.3	12.0	12.3	12.0	11.4
Ledger	11.4	11.3		13.1	11.8	12.3	12.0	11.4
Neeley	9.8	10.8		14.1	12.0		11.7	11.6
Norris (CL)	9.5	11.8		14.2	10.6	10.9	11.4	11.4
Promontory	10.7	10.6		12.8	11.2		11.3	11.6
Pryor	8.3	11.6		12.3	11.2	11.2	10.9	11.4
Rampart	10.5	11.3		13.8	12.3	13.6	12.3	11.4
Wahoo	10.5	13.5		13.0	10.7	11.1	11.8	11.4
Yellowstone	10.5	11.2		13.3	11.5	10.4	11.4	11.4
					11.1	9.8	10.5	11.0
				13.9	11.3	12.1	12.4	11.7
Average	10.4	11.7		13.7	11.6	11.4		

Varieties with multi-year means \geq than Yellowstone for the same years are in **bold**.

Table 14. Multi-year winter wheat grain protein at Geraldine.

Cultivar	2006	2007	2008	2009	2010	2011	Yellowstone	
							Mean	same Yrs
					%			
Bynum (CL)	13.0	12.9	13.6	13.0	13.9	14.2	13.4	12.6
Carter			12.5	13.1	12.7		12.8	12.3
CDC Falcon	10.8	14.0	12.0	12.6	12.9	12.8	12.5	12.6
Decade			12.6	12.0	12.0	12.9	12.4	12.6
Genou	11.8	13.0	12.3	12.7	13.5	14.5	13.0	12.6
Hyalite (CL, HWW)	13.2	13.0	13.3	12.6	12.7		13.0	12.4
Jagalene	11.2	13.1	12.6	12.0	12.0	12.6	12.3	12.6
Jerry	12.9	12.6	11.9	12.3	13.4	13.0	12.7	12.6
Ledger	11.6	13.8	11.6	12.6	12.6	13.3	12.6	12.6
Neeley	11.6	12.0	11.8	12.7	13.4		12.3	12.4
Norris (CL)	12.0	14.2	12.2	13.2	16.1	14.0	13.6	12.6
Promontory	11.7	12.7	11.1	13.0	12.2		12.1	12.4
Pryor	11.5	11.9	11.5	12.2	11.6	11.5	11.7	12.6
Rampart	11.8	12.5	13.1	12.4	14.7	14.7	13.2	12.6
Wahoo	11.5	13.1	11.8	11.7	12.0	12.7	12.1	12.6
Yellowstone	12.4	12.8	11.7	12.8	12.3	13.4	12.6	12.6
Bearpaw					13.1	13.9	13.5	12.9
Judee				11.2	12.8	13.7	12.6	12.8
Average	12.2	13.0	12.2	12.6	13.2	13.3		

MY means ≥ the mean of Yellowstone are in bold.

Table 15. 2011 Multi-year winter wheat grain protein at Winifred.

Cultivar	2006	2007	2008	2009	2010	2011	Yellowstone	
							Ave.	Same Yrs.
				%				
Bynum (CL)	12.8	13.7	12.2	13.1	10.7		12.5	11.3
Carter			11.4	13.1	10.3	Hail	11.6	11.3
CDC Falcon	11.8	12.4	10.3	13.6	8.8	no	11.4	11.3
Decade			10.7	12.6	9.5	Harvest	10.9	11.3
Genou	12.6	13.3	10.7	13.3	9.4		11.9	11.3
Hyalite (CL, HWW)	10.0	13.1	11.6	11.4	9.1		11.0	11.3
Jagalene	12.3	13.6	10.8	13.5	9.2		11.9	11.3
Jerry	12.3	13.9	10.3	13.4	9.2		11.8	11.3
Ledger	11.6	12.2	11.0	12.1	10.2		11.4	11.3
Neeley	12.5	11.1	10.9	11.4	9.6		11.1	11.3
Norris (CL)	9.9	11.6	11.6	12.7	9.4		11.0	11.3
Promontory	11.0	12.1	10.3	12.4	10.1		11.2	11.3
Pryor	12.0	11.8	10.5	13.4	8.2		11.2	11.3
Rampart	13.5	13.3	12.0	12.7	10.7		12.4	11.3
Wahoo	11.2	13.0	12.6	12.1	9.5		11.7	11.3
Yellowstone	10.2	12.7	11.8	12.7	9.3		11.3	11.3
Bearpaw					10.2		10.2	9.3
Judee				12.8	8.7		10.8	11
Average	11.5	12.7	11.4	12.6	9.7			

MY means \geq the mean of Yellowstone are emboden.

Table 16 Multi-Year winter wheat plant height on NTCC near Moccasin

Cultivar	2006	2007	2008	2009	2010	2011	Yellowstone	
							Ave	Same Yr
					inches			
Bynum	32	43	28	25.6		29.4	31.6	31.5
Carter			24	24.1			24.1	27.3
CDC Falcon	28	36	24	22.6	data	27.3	27.6	31.5
Decade				23.6	lost	27.0	25.3	26.9
Genou	32	43	29	24.7		29.4	31.6	31.5
Hyalite (CL, HWW)	32	42	28	23.4			31.5	32.2
Jagalene	28	37	26	23.5		28.9	28.7	31.5
Jerry	36	44	31	26.0		30.8	33.7	31.5
Ledger	31	39	27	23.1		28.2	29.6	31.5
Neeley	34	43	30	24.9			33.0	32.2
Norris (CL)	32	42	30	26.4		31.5	32.3	31.5
Promontory	35	41	26	26.2			32.2	32.2
Pryor	27	37	25	20.6		25.5	27.0	31.5
Rampart	33	42	28	24.8		31.8	31.9	31.5
Wahoo	31	38	27	24.8		27.0	29.5	31.5
Yellowstone	34	42	28	25.1		28.7	31.5	31.5
Bearpaw (MTS0721)						26.2	26.2	30.1
Judee (MTS0713)				22.3		28.3	25.3	26.9
Average	32.6	41.2	28.0	24.3		28.7		

Table 17. 2011 Multi-year plant height of winter wheat near Denton.

Exp 3871 Cultivar	2006	2007	2008	2009	2010	2011	Ave.	Yellowstone Same Years
Bynum	28	35	downy	23	33	26	28.9	28.1
Carter			brome	20	25		19.5	27.5
CDC Falcon	30	31	won	18	26	26	26.4	28.1
Decade				19	30	26	25.2	26.3
Genou	31	29		21	28	33	28.3	28.1
Hyalite (CL, HWW)	22	33		21	31		25.5	28.2
Jagalene	26	31		20	29	28	26.6	28.1
Jerry	26	33		25	29	29	28.3	28.1
Ledger	24	30		20	27	27	25.8	28.1
Neeley	28	31		23	32		27.3	28.2
Norris (CL)	27	32		24	29	30	28.4	28.1
Promontory	28	33		24	28		28.2	28.2
Pryor	23	29		18	28	27	25.2	28.1
Rampart	29	37		23	30	30	29.8	28.1
Wahoo	24	32		22	28	26	26.3	28.1
Yellowstone	30	32		21	30	28	28.1	28.1
Bearpaw					31	26	28.4	29.2
Judee				20	28	28	25.3	26.3
Average	27.9	32.5		21.6	29.2	28.0		

Varieties with multi-year means \leq Yellowstone are in bold.

Table 18. 2011 Multi-year winter wheat plant height at Geraldine.
Exp 3800 Central Agricultural Research Center. Moccasin, Montana.

Cultivar								Yellowstone	Same Yrs
	2006	2007	2008	2009	2010	2011	Mean		
	inches								
Bynum	39	35	34	28	36	42	35.6	35.5	
Carter			29	25	40		31.2	34.0	
CDC Falcon	38	34	30	24	37	34	32.7	35.5	
Decade			30	28	41	37	34.1	34.4	
Genou	39	30	35	26	44	41	35.7	35.5	
Hyalite (CL, HWW)	38	35	34	27	40		34.4	35.0	
Jagalene	38	32	32	23	39	37	33.3	35.5	
Jerry	43	34	36	28	45	41	37.7	35.5	
Ledger	35	34	32	25	42	35	33.8	35.5	
Neeley	41	32	36	27	43		35.7	35.0	
Norris (CL)	41	29	37	29	44	42	36.9	35.5	
Promontory	40	33	32	29	42		35.3	35.0	
Pryor	37	32	30	26	38	35	33.0	35.5	
Rampart	39	31	34	20	43	41	34.8	35.5	
Wahoo	39	33	32	28	43	37	35.3	35.5	
Yellowstone	41	34	34	26	41	37	35.5	35.5	
Bearpaw					43	37	39.8	38.9	
Judee				27	41	34	34.0	34.6	
Average	40.3	32.7	33.4	26.2	41	37.9			

MY means \leq the mean of Yellowstone are in bold.

Table 19. 2011 Multi-year winter wheat plant height at Winifred.

Cultivar	2006	2007	2008	2009	2010	2011	Ave.	Yellowstone Same Yrs.
				inches				
Bynum	40	37	35	30	40	Hail	36	33
Carter			26	24	30	no	27	31
CDC Falcon	31	32	27	24	32	Harvest	29	33
Decade			30	24	34		30	31
Genou	37	40	33	28	39		35	33
Hyalite (CL, HWW)	39	38	31	28	36		34	33
Jagalene	34	34	28	26	33		31	33
Jerry	39	42	32	33	37		37	33
Ledger	38	32	29	27	32		32	33
Neeley	42	42	34	30	38		37	33
Norris (CL)	38	44	31	31	40		37	33
Promontory	35	33	32	33	36		34	33
Pryor	36	36	29	25	32		32	33
Rampart	39	39	33	32	40		37	33
Wahoo	33	34	27	29	35		32	33
Yellowstone	35	36	28	28	35		33	33
Bearpaw					36		36	35
Judee				26	34		30	32
Average	37.9	38.1	30.8	28.7	35.8			

MY means \leq the mean of Yellowstone are in bold.