

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 2012 growing season was warmer and dryer than the long term average. These conditions commenced in mid-late June 2011. Therefore, cropping system and soil depth were major factors in 2012 crop performance in much of central Montana. The deep soil, crop-fallow locations, Geraldine and Winifred, had more optimal precipitation, as well, resulting in near average winter wheat yield with respective trial means of 57.3 and 62.6 bu/a. The shallower soils, dryer continuous crops sites, Moccasin and Belt, had below average yields, with trials means of 22.8 and 34.6 bu/a, respectively. Disease and insects, specifically sawfly, were not a problem for the 2012 cultivar evaluation trials. The Denton location received severe hail damage and was not harvested. The Moccasin location received significant hail on June 05.

The varieties ranking in the top ten were similar across the four harvested locations. Nebraska cultivar, Overland topped three of the four locations with cultivars Jagalene, Yellowstone, CDC Falcon and Clearstone (MTCL1077) placing near the top at all four locations (Tables1- 4). While Overland is a consistent high yielder, quality often lags. Jagalene continues to lead in high test weight. Protein levels were inverse of the yield levels with Moccasin having the high mean at 16.9% and Winifred the mean at 11.6 %. Cultivar protein ranking was not consistent, with the typical standard Rampart not placing at the top for all locations. three harvested on-farm winter wheat cultivar trials.

Multi-year summaries for yield, test weight, protein, and plant height are presented in tables 5 to 16. Each cultivar has not been in the trial for six or more years for multi-year means. Therefore, Yellowstone is used as the standard and each cultivar is compared to Yellowstone's performance for the same years at each location. Yellowstone, in general has the high multi-year mean yield at each location. Yellowstone's generally is below the trial mean and Yellowstone is intermediate for protein and plant height.

Summary:

Winter wheat yields were better than expected for the precipitation and temperature conditions due to good spring root growth.

Funding Summary:

Expenditure information to be provided by OSP. This project received no other grant support.

MWBC FY2011 Grant Submission Plans:

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

Table 1
Exp 3870

2012 Winter wheat variety trial on NTCC near Moccasin.
Central Agricultural Research Center. Moccasin, Montana.

Cultivar/Line	Origin/Pedigree	Entry	Yield bu/ac	Test weight lb/bu	Plant height in	Protein %
Overland	Nebraska, 2007	20	26.9*	55.7*	25.6	15.5
CDC Falcon	Sask/WestBred, 1999	3	25.4*	53.3	22.2	17.2
MTCL1067	Yellowstone*4/3/MTCL01158/CDC Teal 11A/Jagalene	18	25.4*	53.3	25.6	16.8
MT08172	MT9982*2/BZ9W96-895	23	25.1*	51.9	24.0	16.8
MTCL1077 (Clearstone)	Yellowstone*4/3/MTCL01158/CDC Teal 11A/Jagalene	22	24.9*	51.7	24.3	17.1
Yellowstone	Montana 2005	2	24.7*	51.9	25.1	17.3
Jagalene	AgriPro, 2002	8	24.6*	56.9**	24.4	15.9
MTS0808	MT9908//Nuplains/MTS9862	16	24.3*	54.6	22.3	16.7
Accipiter	CDC Raptor/CDC Falcon	12	23.4	52.5	23.8	17.0
Bearpaw	DMS/Rampart//Pronghorn/3/2*Rampart	14	23.0	55.0	21.4	16.5
MT0871	MT9982//MTW0072/NW97S151	19	23.0	52.5	24.1	17.6
Pryor	WestBred, 2002	9	22.8	54.5	20.3	17.0
Decade	Montana/North Dakota, 2010	11	22.6	54.6	24.1	17.1
Jerry	North Dakota, 2001	7	21.8	52.6	24.3	16.8
MTS0819	93X312E14/NuHorizon	24	21.6	53.2	24.1	16.8
Norris (CL)	Montana/WestBred, 2005	10	20.4	54.0	23.0	16.4
Genou	Montana, 2004	1	20.0	53.6	23.1	17.2
WB-Quake	Rampart/Kestrel (WestBred, 2011)	17	19.3	54.1	20.3	16.9
AP503 CL2	AgriPro, 2007	6	19.0	56.4*	22.2	17.0
Judee	93X312E14/NuHorizon	13	18.5	53.0	21.7	17.8
Ledger	WestBred, 2004	5	18.1	54.9	21.9	16.6
Rampart	Montana, 1996	4	17.9	54.4	23.1	17.7
Average			22.8	54.0	23.2	16.9
C.V. (%)			9.5	1.2	9.0	
P-value (Varieties)			<.0001	<.0001	0.1292	
LSD (0.05)			3.6	1.3	ns	

** = indicates highest value within a column. * = indicates values equal to highest value within a column, Fisher's protected LSD (p=0.05)

Seed Date: 10 October 2011 No-tillCC into hayed barley stub Soil: 2" temp.: 8 C Moist. Probe: 4" all dry
Fertilizer: W/seed NPKS 10-10-10-05 March Topdress: 80 N as Weed Control: MCPA+Bromoxinil
Harvest: 27-Jul-12
Weather: Crop Year: Precip.: 10.99" Mean temperature was above average July 2011 to August 2012.
Comments: Persisting drought conditions had severe negative impact on yield and test weight.
Freezing temperatures May 24 to 29 stressed plants. June 5, wind driven hail caused some stem and head bruising.

Table 2
Exp 3870

2012 Winter wheat variety trial NTChem Fallow near Geraldine.
Central Agricultural Research Center. Moccasin, Montana.

Cultivar/Line	Origin/Pedigree	Entry	Yield bu/ac	Test weight lb/bu	Plant height in	Protein %
Overland	Nebraska, 2007	20	67.0**	62.1*	31.9	9.7
MT08172	MT9982*2/BZ9W96-895	23	64.0*	59.5	35.8	12.3
MTCL1067	Yellowstone*4/3/MTCL01158/CDC Teal 11A/Jagalene	18	63.8*	59.9	33.9	11.0
Jagalene	AgriPro, 2002	8	63.7*	63.9**	33.1	10.0
MTCL1077 (Clearstone)	Yellowstone*4/3/MTCL01158/CDC Teal 11A/Jagalene	22	62.2*	58.0	34.6	12.7
MT0871	MT9982//MTW0072/NW97S151	19	62.1*	58.4	31.9	13.2
Yellowstone	Montana 2005	2	59.4	57.3	32.3	12.6
CDC Falcon	Sask/WestBred, 1999	3	59.2	59.0	29.5	11.0
Norris (CL)	Montana/WestBred, 2005	10	59.1	60.9	34.3	11.0
Pryor	WestBred, 2002	9	58.9	56.8	31.9	12.4
Decade	Montana/North Dakota, 2010	11	58.5	59.3	31.5	10.8
Jerry	North Dakota, 2001	7	57.5	58.9	35.4	11.6
AP503 CL2	AgriPro, 2007	6	56.6	60.5	30.3	13.4
MTS0819	93X312E14/NuHorizon	24	56.5	58.2	32.3	10.7
MTS0808	MT9908//Nuplains/MTS9862	16	55.8	57.3	29.9	12.7
Accipiter	CDC Raptor/CDC Falcon	12	55.5	57.8	31.9	11.0
Judee	93X312E14/NuHorizon	13	53.1	58.8	33.1	12.7
WB-Quake	Rampart/Kestrel (WestBred, 2011)	17	50.6	57.8	32.7	11.3
Bearpaw	DMS/Rampart//Pronghorn/3/2*Rampart	14	50.5	57.8	33.1	13.9
Ledger	WestBred, 2004	5	48.1	57.6	34.6	13.2
Genou	Montana, 2004	1	43.9	56.2	38.6	15.6
Rampart	Montana, 1996	4	42.9	56.8	38.2	15.5
Average			57.3	58.9	33.2	12.1
C.V. (%)			7.6	1.6		
P-value (Varieties)			<.0001	<.0001		
LSD (0.05)			7.1	2.0		

** = 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)

Seed Date: 11 Oct 2011 no-till into chemical fallow. Soil: 2" temp: 14C Moist. Probe to 40"
Fertilizer: NPKS w/seed: 10-10-10-05 Topdress Urea: 60N
Harvest: 26-Jul-12
Weather: Near average growing season precipitation, following a dry 2011 summer and fall.
Comments: Good growing conditions in late spring and early summer.

Table 3
Exp 3870

2012 Winter wheat variety trial NT ChemFallow near Winifred.
Central Agricultural Research Center. Moccasin, Montana.

Cultivar/Line	Origin/Pedigree	Entry	Yield bu/ac	Test weight lb/bu	Plant height in	Protein %
Overland	Nebraska, 2007	20	84.5**	61.5	35.4	10.2
MTCL1077 (Clearstone)	Yellowstone*4/3/MTCL01158/CDC Teal 11A/Jagalene	22	70.5	60.4	34.6	10.2
Jagalene	AgriPro, 2002	8	68.5	63.2	32.9	9.1
CDC Falcon	Sask/WestBred, 1999	3	68.3	58.6	33.5	10.8
Decade	Montana/North Dakota, 2010	11	67.1	60.3	31.2	9.5
MT08172	MT9982*2/BZ9W96-895	23	65.0	59.7	32.0	13.1
MT0871	MT9982//MTW0072/NW97S151	19	64.8	59.4	32.5	13.3
MTCL1067	Yellowstone*4/3/MTCL01158/CDC Teal 11A/Jagalene	18	64.7	59.6	34.8	10.3
Yellowstone	Montana 2005	2	64.2	60.4	31.8	10.6
Ledger	WestBred, 2004	5	63.7	60.1	32.2	12.5
AP503 CL2	AgriPro, 2007	6	63.0	62.0	31.2	11.6
Norris (CL)	Montana/WestBred, 2005	10	63.0	61.1	35.8	11.4
MTS0808	MT9908//Nuplains/MTS9862	16	62.6	57.8	34.1	12.3
Bearpaw	DMS/Rampart//Pronghorn/3/2*Rampart	14	61.4	59.9	34.0	12.9
Accipiter	CDC Raptor/CDC Falcon	12	59.7	59.9	33.6	10.2
Pryor	WestBred, 2002	9	57.8	56.5	29.0	13.2
Genou	Montana, 2004	1	57.6	60.3	37.4	12.7
MTS0819	93X312E14/NuHorizon	24	56.7	59.0	32.2	12.5
Jerry	North Dakota, 2001	7	56.2	59.1	38.1	11.9
Judee	93X312E14/NuHorizon	13	52.7	59.6	29.3	13.5
WB-Quake	Rampart/Kestrel (WestBred, 2011)	17	51.9	59.3	29.9	10.7
Rampart	Montana, 1996	4	46.8	58.5	32.2	12.6
Average			62.6	59.9	33.4	11.6
C.V. (%)			12.8	2.9	6.9	
P-value (Varieties)			0.00	0.27	0.00	
LSD (0.05)			13.2	ns	3.8	

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

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

Seed Date: 22 Sept 2011 into chemical fallow wheat stubble. Surface soil very dry, but moist at 2.5"
Fertilizer: w/Seed NPKS 10-10-10-05 Top Dress N 60lbs Soil temp: 2" depth:17 C Moist Probe: 40"
Harvest: 6-Aug-12
Weather: Late summer-fall 2011 dry. 2012 growing season good precipitation
Comments: Good stand and good growing conditions provided high yields

Table 4 2012 Winter wheat variety trial in NTCC pea stubble near Belt.
Exp 3870 Central Agricultural Research Center. Moccasin, Montana.

Cultivar/Line	Origin/Pedigree	Entry	Yield bu/ac	Test Weight lb/bu	Plant Height in	Stems Cut 0-6,0 best	Protein %
Decade	Montana/North Dakota, 2010	11	41.7**	57.8	28.0	2.3	14.5
MTCL1067	Yellowstone*4/3/MTCL01158/CDC Teal 11A/Jagalene	18	39.7*	58.1	33.3	3.7	13.8
Jagalene	AgriPro, 2002	8	39.3*	61.2**	29.0	4.3	13.2
MT08172	MT9982*2/BZ9W96-895	23	38.9*	56.2	29.0	5.7	14.6
Overland	Nebraska, 2007	20	37.8*	60.3*	29.3	2.7	12.7
MT0871	MT9982//MTW0072/NW97S151	19	37.6*	54.3	27.7	1.3*	15.1
MTCL1077 (Clearstone)	Yellowstone*4/3/MTCL01158/CDC Teal 11A/Jagalene	22	37.3*	54.5	31.6	3.3	15.1
Yellowstone	Montana 2005	2	36.8*	54.3	29.5	3.3	14.5
MTS0819	93X312E14/NuHorizon	24	36.7*	55.9	28.2	0.7*	13.8
CDC Falcon	Sask/WestBred, 1999	3	36.0	56.6	26.2	3.0	13.3
Accipiter	CDC Raptor/CDC Falcon	12	35.6	55.9	28.9	4.3	12.9
Norris (CL)	Montana/WestBred, 2005	10	35.6	58.2	30.6	3.0	13.7
MTS0808	MT9908//Nuplains/MTS9862	16	33.9	56.2	26.8	0.3**	14.6
Pryor	WestBred, 2002	9	33.2	54.9	26.6	2.7	14.7
Jerry	North Dakota, 2001	7	33.0	55.6	31.4	5.7	14.2
Ledger	WestBred, 2004	5	32.9	57.1	28.0	2.0*	14.3
Judee	93X312E14/NuHorizon	13	31.3	55.9	29.9	0.3**	15.0
WB-Quake	Rampart/Kestrel (WestBred, 2011)	17	29.6	54.4	28.9	0.7*	14.7
Bearpaw	DMS/Rampart//Pronghorn/3/2*Rampart	14	27.9	54.1	27.0	0.7*	15.2
Genou	Montana, 2004	1	27.4	53.9	31.2	1.0*	15.6
Rampart	Montana, 1996	4	26.2	54.1	31.8	1.0*	16.1
AP503 CL2	AgriPro, 2007	6	25.2	58.9*	24.7	3.3	13.9
Average			34.6	56.4	29.0	2.4	14.3
C.V. (%)			9.6	2.2	4.8	42.2	
P-value (Varieties)			<.0001	0.0001	<.0001	<.0001	
LSD (0.05)			5.4	2.6	2.3	1.7	

** = 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)

Seed Date: 11 Oct 11 Seeded into NTCC pea stubble. Soil: 2" temp.: 14 C Moist probe: 20 inches
Fertilizer: w/seed NPKS 10-10-10-05
Harvest: 3-Aug-12
Weather: Growing season dry
Comments: Some sawfly cutting. The foliage was lighter green then surrounding grower field.

Table 5 2012 Multi-year **Moccasin** NTCC winter wheat variety **yields**.

Cultivar	2007	2008	2009	2010	2011	2012	Average	Yellowstone same Yrs.
				bu/a				
Accipiter					30.9	23.4	27.2	31.0
AP503 CL2					28.0	19.0	23.5	31.0
Bearpaw				58.3	37.0	23.0	39.4	42.8
CDC Falcon	50.9	35.1	28.6	52.3	42.9	25.4	39.2	43.1
Decade		31.8	29.0	60.6	36.6	22.6	36.1	40.1
Genou	42.6	25.8	29.0	51.0	30.1	20.0	33.1	43.1
Jagalene	52.8	34.0	31.7	63.6	36.2	24.6	40.5	43.1
Jerry	45.8	31.9	28.0	58.6	34.3	21.8	36.7	43.1
Judee			28.7	53.6	31.5	18.5	33.1	40.5
Ledger	50.2	24.9	26.9	51.3	28.9	18.1	33.4	43.1
Norris (CL)	44.4	35.3	31.9	54.0	36.3	20.4	37.1	43.1
Pryor	45.0	31.5	26.3	56.0	33.4	22.8	35.8	43.1
Rampart	40.0	27.2	25.4	47.9	26.2	17.9	30.8	43.1
WB-Quake					32.8	19.3	26.1	31.0
Yellowstone	58.4	38.6	33.3	66.5	37.3	24.7	43.1	43.1
Average	46.7	29.8	29.2	55.5	34.2	22.8		

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

Table 6 Multi-year winter wheat yields near **Denton** on CC. **Hail 2012**.

Cultivar	2006	2007	2008	2009	2010	2011	Ave	Yellowstone same Yrs.
					bu/a			
Accipiter						28.9	28.9	32.8
AP 503 CL2						27.6	27.6	32.8
Bearpaw					30.6	35.9	33.3	32.1
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
Jagalene	42.7	48.7		to	31.8	37.1	40.1	41.0
Jerry	45.7	43.0		variable	23.5	33.5	36.4	41.0
Judee				stand	30.3	24.7	27.5	32.1
Ledger	38.9	48.3			33.4	29.5	37.5	41.0
Norris (CL)	48.5	45.3			26.4	35.9	39.0	41.0
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
WB Quake						25.2	25.2	32.8
Yellowstone	50.3	49.6			31.4	32.8	41.0	41.0
Average	47.6	46.2			29.2	31.6		

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

Table 7. 2012 Multi-year **Geraldine** winter wheat **yields**.

Variety	2007	2008	2009	2010	2011	2012	average	Yellowstone same yrs.
				bu/a				
Accipiter					61.4	55.5	58.5	68.9
AP503 CL2					50.0	56.6	53.3	68.9
Bearpaw				58.3	71.8	50.5	60.2	73.5
CDC Falcon	46.6	72.1	32.7	72.8	66.9	59.2	58.4	60.7
Decade		67.0	33.6	54.7	74.7	58.5	57.7	64.7
Genou	45.1	69.8	34.8	74.3	62.1	43.9	55.0	60.7
Jagalene	49.7	71.1	23.2	66.3	61.4	63.7	55.9	60.7
Jerry	41.9	68.6	34.9	76.8		57.5	55.9	60.7
Judee			34.3	53.6	57.2	53.1	49.6	63.3
Ledger	40.8	64.5	26.4	65.1	55.2	59.1	51.8	60.7
Norris (CL)	41.5	73.8	39.5	57.4	61.2	48.1	53.6	60.7
Pryor	45.5	73.2	30.4	70.2	67.5	58.9	57.6	60.7
Rampart	43.9	55.6	26.2	74.9	52.8	42.9	49.4	60.7
WB-Quake					73.9	50.6	62.3	68.9
Yellowstone	40.6	70.2	32.5	82.8	78.4	59.4	60.7	60.7
Mean	43.3	67.5	32.19	66.8	64.0	57.3		

Table 8. 2012 Multi-year winter wheat variety **yields** near **Winifred**.

Exp 3874 Central Agricultural Research Center. Moccasin, Montana.

Cultivar	2007	2008	2009	2010	2011	2012	Average	Yellowstone same Yrs.
				bu/a				
Accipiter						59.7	59.7	64.2
AP503 CL2						63.0	63.0	64.2
Bearpaw				73.6		61.4	67.5	69.1
CDC Falcon	62.5	72.1	42.7	63.8		68.3	58.3	62.4
Decade		79.5	50.1	79.2	Hail	67.1	65.5	64.3
Genou	63.1	69.8	39.7	62.4	no	57.6	53.2	62.4
Jagalene	59.1	71.1	51.7	75.1	harvest	68.5	65.1	62.4
Jerry	58.3	68.6	44.0	61.0		56.2	53.7	62.4
Judee			43.0	67.0		52.7	54.2	62.4
Ledger	59.2	64.5	41.7	65.1		63.7	56.8	62.4
Norris (CL)	58.6	73.8	41.6	74.3		63.0	59.6	62.4
Pryor	67.9	73.2	45.5	71.8		57.8	58.4	62.4
Rampart	59.8	55.6	40.7	63.5		46.8	50.3	62.4
WB-Quake						51.9	51.9	64.2
Yellowstone	71.1	70.2	48.9	74.0		64.2	62.4	62.4
Average	61.5	67.5	45.5	69.7		62.6		

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

Table 9. 2012 Multi-year winter wheat **test weight** on NTCC at **Moccasin**.

Exp 3870	Yellowstone						
Cultivar / year:	2007	2008	2009	2010	2011	2012	average Same Years
	lbs/bu						
Accipiter					56.2	52.5	54.4
AP503 CL2					60.2	56.4	58.3
Bearpaw				61.0	59.8	55.0	58.6
CDC Falcon	53.7	57.4	58.6	60.6	59.1	53.3	57.1
Decade		57.0	59.0	60.7	58.5	54.6	58.0
Genou	55.1	56.6	58.8	57.7	56.1	53.6	56.3
Jagalene	56.5	58.5	57.1	61.3	58.7	56.9	58.2
Jerry	52.5	57.2	57.9	58.0	57.4	52.6	55.9
Judee			59.2	59.0	58.6	53.0	57.5
Ledger	56.6	58.1	60.3	60.1	58.1	54.9	58.0
Norris (CL)	53.8	58.6	60.7	61.2	58.9	54.0	57.9
Pryor	52.6	60.4	59.8	59.2	57.8	54.5	57.4
Rampart	56.4	57.5	50.6	59.8	58.8	54.4	56.3
WB-Quake					56.5	54.1	55.3
Yellowstone	53.1	57.1	59.4	59.8	57.1	51.9	56.4
Average	54.9	57.9	58.8	59.9	58.0	54.0	

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

Table 10. 2012 Multi-year winter wheat grain **test weights** near **Denton**.

Exp 3871	Yellowstone						
Cultivar / year:	2007	2008	2009	2010	2011	2012	Average Same Years
	lb/bu						
Accipiter					62.5		62.5
AP 503 CL2		no			63.8	Hail	63.8
Bearpaw		test		57.2	62.9		60.1
CDC Falcon	59.7	weight	58.1	57.0	61.9		59.2
Decade		data	59.0	55.1	62.5		58.9
Genou	59.9		57.1	58.2	61.8		59.3
Jagalene	62.2		58.5	56.0	63.3		60.0
Jerry	59.2		57.9	57.0	62.1		59.1
Judee			60.4	58.1	61.6		60.0
Ledger	60.7		58.4	55.4	62.6		59.3
Norris (CL)	59.7		59.1	58.4	63.3		60.1
Pryor	58.5		59.1	56.4	61.9		59.0
Rampart	59.5		57.7	55.4	61.2		58.5
WB-Quake					59.2		59.2
Yellowstone	59.2		58.3	57.1	62.0		59.2
Average	59.7		58.5	56.9	61.4		

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

Table 11 2012 Multi-year winter wheat **test weight** at **Geraldine**.

Cultivar	2007	2008	2009	2010	2011	2012	Average	Yellowstone
								Same Yr
				lbs/bu				
Accipiter					60.6	57.8	59.2	59.0
AP503 CL2					61.3	60.5	60.9	59.0
Bearpaw				58.6	60.9	57.8	59.1	59.4
CDC Falcon	59.8	62.4	59.5	59.4	60.1	59.0	60.0	59.7
Decade		63.2	59.9	61.3	62.3	59.3	61.2	59.8
Genou	60.4	62.3	59.4	60.1	61.0	56.2	59.9	59.7
Jagalene	62.0	64.5	61.1	60.8	62.9	63.9	62.3	59.7
Jerry	59.0	61.5	58.6	58.7	60.4	58.9	59.5	59.7
Judee			61.3	59.5	60.6	58.8	60.1	59.4
Ledger	60.3	62.7	59.1	59.8	61.4	60.9	60.7	59.7
Norris (CL)	60.6	63.2	60.8	60.9	59.5	57.6	60.4	59.7
Pryor	58.6	62.7	59.8	58.5	60.3	56.8	59.5	59.7
Rampart	59.9	61.7	59.3	59.6	60.0	56.8	59.5	59.7
WB-Quake					62.0	57.8	59.9	59.0
Yellowstone	58.9	61.4	59.6	60.1	60.7	57.3	59.7	59.7
Mean	60.0	62.6	59.91	59.7	60.8	58.9		

MY means > the mean of Yellowstone are in **bold**.

Table 12. 2012 Multi-year winter wheat **test weight** at **Winifred**.

Cultivar	2007	2008	2009	2010	2011	2012	Average	Yellowstone
								Same Yrs.
				lbs/bu				
Accipiter					Hail	59.9	59.9	60.4
AP503 CL2					no	62.0	62.0	60.4
Bearpaw				63.5	Harvest	59.9	61.7	61.0
CDC Falcon	60.6	60.6	58.5	62.7		58.6	60.2	60.3
Decade		61.7	61.4	63.1		60.3	61.6	60.9
Genou	59.8	61.2	58.0	63.7		60.3	60.6	60.3
Jagalene	62.3	63.2	62.3	64.2		63.2	63.0	60.3
Jerry	59.3	60.5	58.3	61.7		59.1	59.8	60.3
Judee			59.0	63.6		59.6	60.7	60.8
Ledger	59.7	61.4	59.6	63.8		60.1	60.9	60.3
Norris (CL)	60.6	62.5	60.4	63.8		61.1	61.7	60.3
Pryor	59.7	61.5	59.1	62.6		56.5	59.9	60.3
Rampart	59.8	61.0	58.8	63.3		58.5	60.3	60.3
WB-Quake						59.3	59.3	60.4
Yellowstone	58.1	61.2	60.4	61.6		60.4	60.3	60.3
Average	60.0	61.5	59.9	63.4				

MY means > the mean of Yellowstone are in **bold**.

Table 13. 2012 Multi-year winter wheat grain **protein** near **Moccasin**.

Exp 3800	Yellowstone						
Cultivar / Year	2007	2008	2009	2010	2011	2012	Average same Years
	%						
Accipiter					14.9	17.0	16.0
AP503 CL2					15.1	17.0	16.1
Bearpaw				13.4	14.5	16.5	14.8
CDC Falcon	16.2	11.0	14.7	13.4	14.0	17.2	14.4
Decade		11.6	16.0	13.4	15.2	17.1	14.7
Genou	15.5	11.9	14.7	14.5	15.6	17.2	14.9
Jagalene	15.2	11.3	14.5	12.9	13.8	15.9	13.9
Jerry	15.1	11.1	15.0	13.4	15.3	16.8	14.5
Judee			15.6	13.7	15.7	17.8	15.7
Ledger	17.2	10.6	14.0	12.8	13.7	16.6	14.2
Norris (CL)	17.4	11.0	13.4	12.7	14.1	16.4	14.2
Pryor	14.3	10.8	15.0	13.8	16.0	17.0	14.5
Rampart	15.6	11.8	15.4	13.7	15.3	17.7	14.9
WB-Quake					15.6	16.9	16.3
Yellowstone	15.2	11.3	15.9	13.3	15.8	17.3	14.8
Average	15.7	11.5	14.7	13.5	15.0	16.9	

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

Table 14. 2012 Multi-Year winter wheat grain **protein** content near Denton.

Exp 3871	Yellowstone						
Cultivar / Year	2007	2008	2009	2010	2011	2012	Average same Years
	%						
Accipiter		no				Hail	
AP503 CL2		harvest				no	
Bearpaw				11.1	9.8	harvst	10.5
CDC Falcon	14.5		13.4	11.4	11.2		12.6
Decade			14.2	11.5	11.4		12.4
Genou	10.9		14.1	11.8	11.7		12.1
Jagalene	14.6		13.9	10.9	9.9		12.3
Jerry	10.9		13.3	12.0	12.3		12.1
Judee			13.9	11.3	12.1		12.4
Ledger	11.3		13.1	11.8	12.3		12.1
Norris (CL)	11.8		14.2	10.6	10.9		11.9
Pryor	11.6		12.3	11.2	11.2		11.6
Rampart	11.3		13.8	12.3	13.6		12.8
WB Quake							
Yellowstone	11.2		13.3	11.5	10.4		11.6
Average	11.7		13.7	11.6	11.4		12.1

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

Table 15. 2012 Multi-year winter wheat grain **protein** at **Geraldine**.

Cultivar	2007	2008	2009	2010	2011	2012	Yellowstone	
							average	same Yrs
					%			
Accipiter					13.9	11.0	12.5	13.0
AP503 CL2					13.7	13.4	13.6	13.0
Bearpaw				13.1	13.9	13.9	13.6	12.8
CDC Falcon	14.0	12.0	12.6	12.9	12.8	11.0	12.6	12.6
Decade		12.6	12.0	12.0	12.9	10.8	12.1	12.6
Genou	13.0	12.3	12.7	13.5	14.5	15.6	13.6	12.6
Jagalene	13.1	12.6	12.0	12.0	12.6	10.0	12.1	12.6
Jerry	12.6	11.9	12.3	13.4	13.0	11.6	12.5	12.6
Judee			11.2	12.8	13.7	12.7	12.6	12.8
Ledger	13.8	11.6	12.6	12.6	13.3	13.2	12.9	12.6
Norris (CL)	14.2	12.2	13.2	16.1	14.0	11.0	13.5	12.6
Pryor	11.9	11.5	12.2	11.6	11.5	12.4	11.9	12.6
Rampart	12.5	13.1	12.4	14.7	14.7	15.5	13.8	12.6
WB Quake					12.2	11.3	11.8	13.0
Yellowstone	12.8	11.7	12.8	12.3	13.4	12.6	12.6	12.6
Average	13.0	12.2	12.6	13.2	13.3	12.1		

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

Table 16. 2012 Multi-year winter wheat grain **protein** at **Winifred**.

Cultivar	2007	2008	2009	2010	2011	2012	Yellowstone	
							average	Same Yrs.
					%			
Accipiter						10.2	10.2	10.6
AP503 CL2						11.6	11.6	10.6
CDC Falcon	12.4	10.3	13.6	8.8	Hail	12.9	11.6	11.4
Bearpaw				10.2		10.8	10.5	10.0
Decade		10.7	12.6	9.5	no	9.5	10.6	11.1
Genou	13.3	10.7	13.3	9.4	Harvest	12.7	11.9	11.4
Jagalene	13.6	10.8	13.5	9.2		9.1	11.2	11.4
Jerry	13.9	10.3	13.4	9.2		11.9	11.7	11.4
Judee			12.8	8.7		13.5	11.7	10.9
Ledger	12.2	11.0	12.1	10.2		12.5	11.6	11.4
Norris (CL)	11.6	11.6	12.7	9.4		11.4	11.3	11.4
Pryor	11.8	10.5	13.4	8.2		13.2	11.4	11.4
Rampart	13.3	12.0	12.7	10.7		12.6	12.3	11.4
WB-Quake						10.7	10.7	10.6
Yellowstone	12.7	11.8	12.7	9.3		10.6	11.4	11.4
Average	12.7	11.4	12.6	9.7		11.6		

MY means $\geq$ the mean of Yellowstone are emboden.

Table 17 2011 and 2012 **Multi-Location** winter wheat plant **heights**.

Cultivar	2011	2011	2011	2011	2012	2012	2012	2012	Average
	Mocc	Dntn	Grldn	Wnfrd	Mocc	Dntn	Grldn	Wnfrd	
	NTCC	NTCC	NTCF	NTCF	NTCC	NTCC	NTCF	NTCF	
	inches								
Pryor	26	27	35	Hail	20	Hail	32	29	28.1
WB-Quake	26	26	35		20		33	30	28.3
CDC Falcon	27	26	34		22		30	34	28.7
AP503 CL2	28	28	35		22		30	31	29.1
Judee	28	28	34		22		33	29	29.1
Decade	27	26	37		24		32	31	29.5
Bearpaw	26	26	37		21		33	34	29.6
Ledger	28	27	35		22		35	32	29.8
Accipiter	26	28	36		24		32	34	29.8
Yellowstone	29	28	37		25		32	32	30.5
Jagalene	29	28	37		24		33	33	30.6
Norris (CL)	32	30	42		23		34	36	32.7
Rampart	32	30	41		23		38	32	32.7
Jerry	31	29	41		24		35	38	33.1
Genou	29	33	41		23		39	37	33.7
Average	28.7	28.0	37.9		23.2		33.2	33.4	30.7