Title: Off station winter wheat cultivar performance on fallow in central Montana. (4W2755)

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Objectives: To evaluate the performance of winter wheat on fallow in central Montana. Provide unbiased information on improved cereal cultivars for producers to use in the selection of best suited cereal grain varieties for central Montana and other areas with similar crop environments.

Results:
The management strategy utilized for the off-station trial sites is for CARC staff to establish, monitor, harvest, record and process the data. The producer includes the research site plot area in general field operations including weed control and broadcasting fertilizer. Special pest management operations would need to be reviewed prior to including the plot area. It may be that some varieties possess resistance to particular pathogen or insect. Field operations are to be conducted perpendicular to plot rows so that all wheel tracks, etc. impact all the plots within a replication. The concept is to evaluate the cultivars under the conditions in which the producers are going to be raising them.

The 2009 crop year experienced harsh, dry, cold and windy, weather during the winter and spring causing stand survival problems and inhibited the growth of both winter and spring cereals. Tilled black fields typically warm up quicker than stubble shaded fields, whether the fields are in a “crop-fallow” or “continuous crop” systems. Fortuitous cool summer night temperatures resulted in reduced evaporative demands allowing good cereal growth later into the summer. Some of the north Denton through Winifred areas received good summer precipitation. However, the summer precipitation was not as beneficial to yields as it would have been if received earlier. The growing season weather was conducive to higher cereal test weights with the yield potential reduced by limited spring moisture and the cool summer allowing more time for seed fill. The CARC experienced its driest June and May-June period in over 100 years. In general, winter wheat grain ripening and harvest was much later than it has been over much of the past decade.

Winter wheat yields in the Geraldine area were generally quite good. The variety trial yields were lower than the yield of the surrounding field due to reduce stand density. A greater furrow depth would have allowed placing the seed into more moist soil. While the Geraldine area climate seems milder than the CARC, the soil is much less forgiving. Seeding depth and seeding date seem to be much more critical in the Geraldine area. The nursery had a mean yield of 32.2 bu/a, with Rocky and Norris having yields of 40.9 and 39.5 bu/a, respectively (Table 1). Rocky, Promontory and Jagalene had test weights >61.0 lbs/bu, while the nursery mean was 59.9 lbs/bu. Grain protein levels were right on target with a nursery mean of 12.6%. Accipiter had trial high protein at 13.7 and Wahoo was the low protein cultivar at 11.7%. Six cultivars, CDC Falcon, Genou, Norris, Promontory, Rocky and Wahoo have multi-year yield means greater than Yellowstone at the Geraldine location (Table 2).

The 2009 Winifred winter wheat yields were about 10 bu/a below the recent five year average with a trial mean of 45.5 bu/a (Table 3). The winter wheat maturity had advanced too far prior to receiving abundant early summer rain. Jagalene was the top producing cultivar at 51.7 bu/a. Jagalene, also, had the high test weight, at 62.3 lbs/bu., and was second to CDC Falcon for high protein content at 13.5% protein. Wahoo is the only cultivar with a five year mean yield greater than Yellowstone at the Winifred location. Most of the trial cultivars have five year mean test weights equal or greater than the

Yellowstone's average test weight of 60.4 lbs/bu. Jagalene has the high five year average at 63.1 lbs/bu. When the protein data for Geraldine and Winifred are combined, seven of the 18 trial entries presented have 10 location year protein levels higher than Yellowstone (Table 6). In high residue producing environments, plant height is of increasing importance to some growers utilizing complete no-till production methods. Eight cultivars had two location (Geraldine and Winifred) multi-year mean plant heights shorter than Yellowstone (Table 7).

Summary:
The relative agronomic performance amongst winter wheat cultivars is for both crop fallow systems and no-till continuous crop systems. Therefore, whether the data is generated from a crop fallow system or a continuous crop system, the varieties the producer chooses to grow would probably the same. The results show that even the cultivars that have the high multi-year averages can have off-years for a variety of reasons. Yellowstone has demonstrated that it is a worthy yield standard and suitable check for other characters such as test weight, protein content and plant height. Historically, the central Montana trial locations have not provided a good assessment in the presence of significant sawfly cutting. In 2008 and 2009, there were some opportunities for some assessment of performance in the presence of sawfly.

Funding Summary:
Expenditure information to be provided by OSP
No other grant support 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 2009 Geraldine winter wheat variety evaluations on tilled fallow.
Exp 3872 Central Agricultural Research Center. Moccasin, MT.

Cultivar	Trt	Plant Height	Grain Yield	Test Weight	Protein Content	Sawfly Cutting
	#	"	bu/a	lbs/bu	%	%
Jagalene	6	23	23.2	61.1	12.0	46.7
Bynum (CL)	16	28	25.0	59.3	13.0	18.3
Genou	1	26	34.8	59.4	12.7	11.7
Neeley	7	29	26.3	59.4	12.7	55.0
MTS0531 (HW)	18	24	35.7	59.9	12.6	7.0
Norris (CL)	12	28	39.5	60.8	13.2	38.3
Hyalite (CL, HW)	15	27	33.8	60.2	12.6	60.0
Carter	21	25	31.9	58.9	13.1	53.3
MT0495	17	26	34.7	59.4	13.6	41.7
Jerry	9	28	34.9	58.6	12.3	62.0
Rampart	4	28	26.2	59.3	12.4	10.0
Rocky	10	28	40.9	61.9	13.0	16.7
Wahoo	14	28	33.2	59.0	11.7	28.3
MTS0713	24	27	34.3	61.3	11.2	10.0
Pryor	8	20	30.4	59.8	12.2	10.0
Promontory	11	26	27.3	61.0	13.0	63.3
Yellowstone	3	26	32.5	59.6	12.8	43.3
MT0552	20	27	33.6	59.9	12.0	33.3
CDC Falcon	2	24	32.7	59.5	12.6	25.0
Ledger	5	25	26.4	59.1	12.6	28.3
MTS0532 (HW)	19	26	35.5	60.2	12.6	16.7
Accipiter	22	24	37.3	60.2	13.7	16.7
MT06103	23	27	31.7	60.5	12.7	56.7
NuSky (HWW)	13	29	30.7	59.9	12.8	23.3
Mean		26.2	32.19	59.91	12.6	32.32
P value			0.00	0.00		0.00
CV1			15.4	0.8		28.3
LSD 0.05			ns	1.017		15.04

Seed Date: 25 Sept 09 in loose tilled fallow seedbed. Harvest: 22-Aug-09

Soil: 2 inch dept temp: 12.5^{o} C. Moist probe depth: 34" (hit rocks).

Fertilizer: W/seed 10+10+10+05 NPKS Top Dress: 60 N as urea.

Comment: Stands establishment was marginal. It would have been better to have seeded earlier or to have tilled just prior to seeding to bring up moist soil to the surface. Cutting height was 4 to 5 inches, so most of the cut stems were captured.

Table 2. 2008 Geraldine winter wheat varieties multi-year yield performance.
Exp 3872 Central Agricultural Research Center. Moccasin, Montana.

Variety	2005	2006	2007	2008	2009	average	Yellowstone same yrs.
				bu/a			
Yellowstone	49.1	98.1	40.6	70.2	32.5	58.1	58.1
Bynum (CL)	46.8	88.0	40.9	62.7	25.0	52.7	58.1
Carter				57.6	31.9	44.8	51.4
CDC Falcon	55.7	90.9	46.6	72.1	32.7	59.6	58.1
Genou	59.0	86.3	45.1	69.8	34.8	59.0	58.1
Hyalite (CL,HW)	55.0	87.4	45.1	68.7	33.8	58.0	58.1
Jagalene	45.0	99.7	49.7	71.1	23.2	57.7	58.1
Jerry	42.7	84.6	41.9	68.6	34.9	54.5	58.1
Ledger		93.2	40.8	64.5	26.4	56.2	60.4
Neeley	50.1	89.7	38.9	75.5	26.3	56.1	58.1
Norris (CL)	52.9	94.3	41.5	73.8	39.5	60.4	58.1
NuSky (HW)	42.5	79.3	43.8	68.1	30.7	52.9	58.1
Promontory	49.7	89.3	34.6	72.9	27.3	54.8	58.1
Pryor	52.4	92.2	45.5	73.2	30.4	58.7	58.1
Rampart	53.0	85.5	43.9	55.6	26.2	52.8	58.1
Rocky	53.5	94.8	44.2	57.9	40.9	58.3	58.1
MT0552				67.0	33.6	50.3	51.4
Wahoo	60.4	98.6	42.8	63.9	33.2	59.8	58.1
Mean	50.9	90.5	43.3	67.5	32.19		

2007 had marginal stand and was hailed prior to harvest.

Table 3. 2009 Winifred winter wheat variety evaluations on no-till fallow.
Exp 3872 Central Agricultural Research Center. Moccasin, MT.

Cultivar	Trt	Plant Height	Grain Yield	Test Weight	Protein Content
	#	"	bu/a	lbs/bu	%
Jagalene	6	26.4	51.7	62.3	13.5
MT0495	17	29.1	50.5	59.1	13.2
MT0552	20	24.4	50.1	61.4	12.6
Rocky	10	32.7	49.9	62.0	12.6
Wahoo	14	29.1	49.7	58.6	12.1
Hyalite (CL, HWW)	15	28.0	49.3	61.4	11.4
Yellowstone	3	28.0	48.9	60.4	12.7
NuSky (HWW)	13	31.5	48.5	61.0	11.3
Carter	21	24.4	47.8	58.8	13.1
Promontory	11	32.7	46.3	61.3	12.4
MT06103	23	31.9	46.1	60.7	12.2
MTS0531 (HWW)	18	28.3	45.7	59.9	10.6
Pryor	8	25.2	45.5	59.1	13.4
Jerry	9	33.1	44.0	58.3	13.4
MTS0532 (HWW)	19	28.7	43.7	60.5	13.1
MTS0713	24	26.8	43.0	59.0	12.8
Accipiter	22	27.6	42.9	59.1	13.4
CDC Falcon	2	24.4	42.7	58.5	13.6
Ledger	5	26.8	41.7	59.6	12.1
Norris (CL)	12	31.1	41.6	60.4	12.7
Rampart	4	31.5	40.7	58.8	12.7
Bynum (CL)	16	30.3	40.5	59.7	13.1
Neeley	7	29.9	40.4	58.5	11.4
Genou	1	27.6	39.7	58.0	13.3
Average		28.73	45.45	59.85	12.61
P-value (Varieties)			0.01	0.00	
C.V. (%)			9.4	0.9	
LSD (0.05)			7	0.8	

Seed Date: 25 Sept 08 no-till into chem fallow. Harvest: 13 Aug 09
Soil: 2 inch temp: 11.5o C Soil Moisture Probe: 34"
Fertilizer: w/seed 10+10+10+05 NPKS lbs/a
Comment: There were some thin spot and sawfly cutting in some of the plots. Willow Creek end borders (six plots) averaged 35.2/a with a 60.4 test weight.

Table 4. 2008 Winifred fallow multi-year winter wheat variety yield performance
Exp 3874 Central Agricultural Research Center. Moccasin, Montana.

Cultivar	2005	2006	2007	2008	2009	Average	Yellowstone same Yrs.
				bu/a			
Yellowstone	54.3	60.7	71.1	70.2	48.9	61.0	61.0
Bynum (CL)	46.2	53.2	55.2	62.7	40.5	51.6	61.0
Carter				61.7	47.8	54.8	59.6
CDC Falcon	54.9	52.1	62.5	72.1	42.7	56.9	61.0
Genou	49.4	56.6	63.1	69.8	39.7	55.7	61.0
Hyalite (CL,HW)	56.0	59.5	64.6	68.7	49.3	59.6	61.0
Jagalene	56.0	54.6	59.1	71.1	51.7	58.5	61.0
Jerry	48.3	54.2	58.3	68.6	44.0	54.7	61.0
Ledger		59.4	59.2	64.5	41.7	56.2	62.7
Neeley	49.9	57.1	65.8	75.5	40.4	57.7	61.0
Norris (CL)	55.3	58.1	58.6	73.8	41.6	57.5	61.0
NuSky (HW)	53.3	55.4	60.8	68.1	48.5	57.2	61.0
Promontory	51.0	51.4	61.9	72.9	46.3	56.7	61.0
Pryor	58.3	59.8	67.9	73.2	45.5	60.9	61.0
Rampart	41.6	52.8	59.8	55.6	40.7	50.1	61.0
Rocky	47.6	59.8	57.5	57.9	49.9	54.5	61.0
MT0552				79.5	50.1	64.8	59.6
Wahoo	60.2	65.2	73.1	63.9	49.7	62.4	61.0
Average	52.5	56.9	61.5	67.5	45.5	57.6	

2008 had soil washing from runoff and lower yields than producer field.

Table 5. Multi-year winter wheat test weight at Geraldine and Winifred.
Exp 3800 Central Agricultural Research Center. Moccasin, Montana.

Cultivar	Grld 2005	Wnfrd 2005	Grld 2006	Wnfrd 2006	Grld 2007	Wnfrd 2007	Grld 2008	Wnfrd 2008	Grld 2009	Wnfrd 2009	Ave.	Yellowstone Same Yrs.
							lbs/bu					
Yellowstone	59.1	59.9	62.9	62.4	58.9	58.1	61.4	61.2	59.6	60.4	60.4	60.4
Bynum (CL)	61.2	62.3*	64.3	63.8	60.3	60.0	62.4	61.4	59.3	59.7	61.4	60.4
Carter							62.1	61.0	58.9	58.8	60.2	60.7
CDC Falcon	60.8	61.3	64.3	63.7	59.8	60.6	62.4	60.6	59.5	58.5	61.1	60.4
Genou	60.5	61.3	64.7	63.8	60.4	59.8	62.3	61.2	59.4	58.0	61.1	60.4
Hyalite (CL, HW\	61.6	61.5	63.0	64.0	60.7	60.2	62.8	62.3	60.2	61.4	61.8	60.4
Jagalene	63.0	63.5	63.8	65.2	62.0	62.3	64.5	63.2	61.1	62.3	63.1	60.4
Jerry	58.6	59.1	65.5	61.8	59.0	59.3	61.5	60.5	58.6	58.3	60.2	60.4
Ledger			62.9	63.5	60.3	59.7	62.7	61.4	59.1	59.6	61.2	60.6
Neeley	59.4	62.3	64.3	62.4	59.6	60.1	62.8	61.6	59.4	58.5	61.0	60.4
Norris (CL)	60.8	60.2	64.3	64.4	60.6	60.6	63.2	62.5	60.8	60.4	61.8	60.4
NuSky (HWW)	58.4	60.2	63.0	62.9	61.0	60.6	62.8	62.4	59.9	61.0	61.2	60.4
Promontory	61.6	63.1	64.9	64.4	61.3	61.5	63.9	63.0	61.0	61.3	62.6	60.4
Pryor	59.7	59.9	64.7	60.9	58.6	59.7	62.7	61.5	59.8	59.1	60.7	60.4
Rampart	60.2	60.2	64.1	62.7	59.9	59.8	61.7	61.0	59.3	58.8	60.8	60.4
Rocky	62.4	62.4	65.1	64.4	61.2	60.6	63.7	61.9	61.9	62.0	62.6	60.4
MT0552							63.2	61.7	59.9	61.4	61.5	60.7
Wahoo	60.5	60.7	64.0	62.9	58.0	58.9	61.1	59.2	59.0	58.6	60.3	60.4
Average	59.84	60.8	64.1	63.1	60.0	60.0	62.6	61.5	59.91	59.9	61.2	

Grld - Geraldine on fallow Wnfrd - Winifred on fallow

Table 6. Multi-year winter wheat grain protein at Geraldine and Winifred.
Exp 3800 Central Agricultural Research Center. Moccasin, Montana.

Cultivar	Grld 2005	Wnfrd 2005	Grld 2006	Wnfrd 2006	Grld 2007	Wnfrd 2007	Grld 2008	Wnfrd 2008	Grld 2009	Wnfrd 2009	Ave.	Yellowstone Same Yrs.
							%					
Yellowstone	15.0	13.3	12.4	10.2	12.8	12.7	11.7	11.8	12.8	12.7	12.5	12.5
Bynum (CL)	15.6	13.2	13.0	12.8	12.9	13.7	13.6	12.2	13.0	13.1	13.3	12.5
Carter							12.5	11.4	13.1	13.1	12.5	12.3
CDC Falcon	14.5	12.9	10.8	11.8	14.0	12.4	12.0	10.3	12.6	13.6	12.5	12.5
Genou	15.3	13.5	11.8	12.6	13.0	13.3	12.3	10.7	12.7	13.3	12.9	12.5
Hyalite (CL, HWW)	15.1	12.7	13.2	10.0	13.0	13.1	13.3	11.6	12.6	11.4	12.6	12.5
Jagalene	15.8	12.9	11.2	12.3	13.1	13.6	12.6	10.8	12.0	13.5	12.8	12.5
Jerry	15.4	14.6	12.9	12.3	12.6	13.9	11.9	10.3	12.3	13.4	13.0	12.5
Ledger			11.6	11.6	13.8	12.2	11.6	11.0	12.6	12.1	12.1	12.1
Neeley	14.8	12.9	11.6	12.5	12.0	11.1	11.8	10.9	12.7	11.4	12.2	12.5
Norris (CL)	13.5	12.5	12.0	9.9	14.2	11.6	12.2	11.6	13.2	12.7	12.3	12.5
NuSky (HWW)	15.3	12.6	10.0	10.6	13.9	13.0	12.2	11.7	12.8	11.3	12.3	12.5
Promontory	13.8	12.6	11.7	11.0	12.7	12.1	11.1	10.3	13.0	12.4	12.1	12.5
Pryor	14.6	12.0	11.5	12.0	11.9	11.8	11.5	10.5	12.2	13.4	12.1	12.5
Rampart	15.9	13.9	11.8	13.5	12.5	13.3	13.1	12.0	12.4	12.7	13.1	12.5
Rocky	14.7	13.0	13.4	10.7	14.2	13.1	10.9	9.3	13.0	12.6	12.5	12.5
MT0552							12.6	10.7	12.0	12.6	12.0	12.3
Wahoo	14.9	12.2	11.5	11.2	13.1	13.0	11.8	12.6	11.7	12.1	12.4	12.5
Average	14.9	13.0	12.2	11.5	13.0	12.7	12.2	11.4	12.6	12.6		

Grld - Geraldine on fallow Wnfrd - Winifred on fallow

Table 7. Multi-year winter wheat plant height at Geraldine and Winifred.
Exp 3800 Central Agricultural Research Center. Moccasin, Montana.

Cultivar	Grld 2005	Wnfrd 2005	Grld 2006	Wnfrd 2006	Grld 2007	Wnfrd 2007	Grld 2008	Wnfrd 2008	Grld 2009	Wnfrd 2009	Ave.	Yellowstone Same Yrs.
							inches					
Yellowstone	36	37	41	35	34	36	34	28	26	28	33.6	33.6
Bynum	34	37	39	40	35	37	34	35	28	30	34.9	33.6
Carter							29	26	25	24	25.9	29.1
CDC Falcon	29	33	38	31	34	32	30	27	24	24	30.1	33.6
Genou	37	38	39	37	30	40	35	33	26	28	34.2	33.6
Hyalite (CL, HWW)	36	38	38	39	35	38	34	31	27	28	34.2	33.6
Jagalene	34	35	38	34	32	34	32	28	23	26	31.7	33.6
Jerry	33	40	43	39	34	42	36	32	28	33	36.0	33.6
Ledger			35	38	34	32	32	29	25	27	31.5	32.9
Neeley	36	38	41	42	32	42	36	34	27	30	35.6	33.6
Norris (CL)	38	38	41	38	29	44	37	31	29	31	35.5	33.6
NuSky (HWW)	36	38	44	39	35	42	37	33	28	32	36.3	33.6
Promontory	30	36	40	35	33	33	32	32	29	33	33.3	33.6
Pryor	31	34	37	36	32	36	30	29	26	25	31.6	33.6
Rampart	33	38	39	39	31	39	34	33	20	32	33.9	33.6
Rocky	38	37	43	45	32	41	37	36	28	33	36.9	33.6
MT0552							30	30	28	24	28.1	29.1
Wahoo	33	35	39	33	33	34	32	27	28	29	32.4	33.6
Average	34.1	37.0	40.3	37.9	32.7	38.1	33.4	31	26.2	28.7		

Grld - Geraldine on fallow Wnfrd - Winifred on fallow