Project Title: Evaluation of spring barley cultivar performance under continuous-crop and crop-crop-fallow systems in central Montana

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Objective:

Evaluate the performance of spring barley cultivars in central Montana.

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 Moccasin location was seeded in mid-April while the Denton was seeded in mid-May due to the wet spring weather. Ability to access the site quickly and using a double disk drill made if feasible to seed the Moccasin site much earlier than most spring seedings in the area. Leaf diseases were not an issue in spite of the wet May and early June weather due to the generally dry sunny conditions in mid-June through August.

The dry late spring – early summer weather severely impacted barley yields at the no-till continuous crops sites near Moccasin and Denton. There were significant yield differences at Moccasin with an experimental followed by Haxby and Conrad topping the nursery(Tables 1). The Denton barley yields did not vary significantly at the Denton location and two experimental lines had high mean yields(Tables 2). Yields at both locations were about 66% of expected yields. The high test weight, 51.5 lbs/ bu at Moccasin and 52.4 lbs/bu at Denton, are surprising. Percent plump seeds were much below malt barley contract standards with Moccasin's mean plump seed of 43.4% and Denton mean plump seed of 38.0%. There was some stem sawfly stem cutting in the spring barley, but was neither significant or uniform across the nursery. I appeared more in the exposed border seeding.

Haxby is used as the standard for multi-year yield, test weight and protein performance comparison. Haxby generally has the highest mean yield and mean test weight across years at both locations (Table 3 -6). For grain protein, Haxby is often near the bottom in multi-year comparisons (Tables 7 & 8).

Summary:

2011 Did not provide conditions for good evaluation spring crop performance potential. The late seeding coupled with abundant initial moisture followed by droughty conditions led to shallow root placement and possibly reduced root growth. The warmer conditions at emergence may have reduced tiller numbers which resulted in improved test weight levels.

Increase feed barley prices and marketing opportunities increase central Montana barley acreage in 2011. Bos Tera purchased an pure bred seed stock operation and converted it to 12,000 feedlot and yearling grazing operation. This barley purchased will accept barley with up to 18% moisture purchased on 12% moisture base. If this venture is successful it will impact some area growers cropping plans.

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 No-Till continuous crop barley variety trial near Moccasin.
Exp 367011 Central Agricultural Research Center. Moccasin, Montana

ID	Variety/Pedigree	Entry	Head Date	Plant Height	Grain Yield	Grain Yield	Test Weight	Grain Protein	Plumpness		
									Plump	mid	Thin
		#	d of Y	cm	lbs/a	bu/a	lbs/bu	%	%	%	%
MT070175	LK644///Hockett F5	8	189	60	1750	36.5	52.5	13.9	74.3	19.7	6.0
MT950186	Haxby	16	189	58	1743	36.3	54.1	14.2	27.0	45.6	27.4
2B965057	Conrad	1	197	56	1734	36.1	50.7	15.5	54.5	32.7	12.8
MT020155	MT960225/H1851195	5	187	67	1610	33.5	50.7	14.4	43.0	36.9	20.1
MT020162	MT960225/H1851195	6	195	57	1606	33.4	51.5	15.9	22.2	40.2	37.6
PI643354	Pinnacle	13	188	61	1575	32.8	50.5	13.9	70.8	20.5	8.7
PI639193	Goldeneye	12	189	63	1557	32.5	49.4	14.8	42.5	35.2	22.3
MT910189	Hockett	9	191	50	1552	32.4	52.6	15.1	44.8	35.8	19.4
6B952482	Tradition	2	187	60	1495	31.1	50.9	14.6	47.4	38.7	13.9
MT010160	MT920041/Harrington	4	191	48	1479	30.8	51.4	15.6	24.5	43.6	31.9
PI491534	Gallatin	11	189	53	1478	30.8	52.8	15.6	35.4	39.5	25.0
MT010158	MT920041/Harrington	3	194	60	1390	29.0	52.5	16.0	61.7	28.3	10.0
TR232	Metcalfe	15	191	58	1376	28.7	51.8	16.1	53.4	32.3	14.4
MT960101	Geraldine	10	199	58	1368	28.5	52.0	17.0	30.3	40.0	29.7
SK 76333	Harrington	14	191	60	1364	28.4	50.6	16.2	35.1	41.8	23.1
MT061035	Baronesse/MT981210	7	199	62	1314	27.4	50.8	16.6	27.0	46.9	26.1
Mean			191.6	58.19	1524	31.76	51.53	15.3	43.4	36.1	20.5
P-Value			0.00		0.04	0.04	0.00				
CV 1			0.5483		11.06	11.07	0.8873				
LSD (0.05)			**1.75**		**281.3**	**5.86**	**0.97**				

Seed Date: 15 April 2011 No-Till into continuous crop winter wheat stubble.
Soils: 2 inch temp.: 7.5 C Moisture Probe: 17 - 20 inches
Fertilizer: NPKS 10+10+10+05 lbs/a w/ seed. 60 lbs N per acre as urea.

Table 2 2011 No-Till continuous crop barley variety trial near Denton.
Exp 3671 Central Agricultural Research Center. Moccasin, Montana

ID	Variety	Entry	Head Date	Plant Height	Grain Yield	Grain Yield	Test Weight	Grain Protein	Plumpness		
									Plump	mid	Thin
		#	d of Y	cm	bu/a	lbs/a	lbs/bu	%	%	%	%
MT020155	MT960225/H1851195	5		37	26.6	1279	50.5	12.5	17.2	35.7	47.1
MT061035	Baronesse/MT981210	7		39	22.9	1101	50.5	15.8	13.9	37.3	48.8
MT960101	Geraldine	10		38	22.8	1093	53.0	14.8	73.1	12.6	14.4
MT910189	Hockett	9		46	22.6	1086	54.0	14.1	47.4	34.6	18.0
MT010160	MT920041/Harrington	4		46	22.5	1081	54.0	15.4	35.3	41.5	23.2
6B952482	Tradition	2		41	21.2	1017	51.0	13.3	38.9	36.9	24.2
MT950186	Haxby	16		45	21.1	1013	51.5	14.6	6.6	34.4	59.1
PI639193	Goldeneye	12		44	20.8	999	50.0	13.5	33.5	34.8	31.7
MT070175	LK644///Hockett F5	8		47	20.8	997	52.5	13.8	56.8	26.7	16.5
PI491534	Gallatin	11		42	20.8	997	52.5	14.8	31.6	31.5	36.9
2B965057	Conrad	1		44	20.7	995	53.0	14.4	46.1	33.8	20.1
PI643354	Pinnacle	13		48	20.3	975	52.0	12.9	58.0	23.0	19.0
MT010158	MT920041/Harrington	3		46	20.3	973	54.0	13.6	34.2	35.4	30.4
SK 76333	Harrington	14		42	19.7	945	53.5	17.0	41.6	33.9	24.5
MT020162	MT960225/H1851195	6		41	19.3	927	53.5	15.1	36.4	35.5	28.0
TR232	Metcalfe	15		43	18.6	893	53.0	15.1	36.9	36.5	26.7
Mean				43.06	21.32	1023	52.41	14.4	38.0	32.8	29.3
P-value					0.68	0.67	0.00				
CV1					17.2	17.21	1.369				
LSD (0.05)					ns	ns	**1.529**				

Seed Date: 16 May 2011 no-till into continuous crop lentil stubble.
Soil: 2 inch temp: 13 C / 56 F Moisture Probe: 22 - 24 inches (rock obstructions)
Fertilizer: NPKS 10+10+10+05 lbs w/seed. 60 N top dress urea
Comment: Mid -June through early August was a very dry season with above average temperatures resulting in low barley yields.

Table 3 Moccasin multi-year spring barley variety grain yields in no-till CC.
Exp 3670 Cental Agricultural Research Center. Moccasin, Montana

Selected entries	2007	2008	2009	2010	2011	average	Haxby Same Yrs
				bu/a			
Conrad	39	41	51	56	36	46.7	49.4
Gallatin			**46**	60	31	45.5	47.8
Geraldine	45	44	47	56	29	47.8	49.4
Goldeneye			50	60	32	**55.2**	47.8
Harrington	38	41	46	40	28	41.2	49.4
Haxby	**48**	**42**	**48**	**59**	**36**	**49.4**	**49.4**
Hockett	34	45	41	56	32	44.0	49.4
Metcalfe	34	30	42	46	29	37.9	49.4
MT020155		49	51	53	29	**50.9**	46.5
MT010158		51	53	48	34	**50.7**	46.5
Pinnacle			49	52	33	44.6	47.8
Tradition					31	31.1	36.3
Means	40.8	41.0	47.9	55.27	32		

Varieties with multi-year mean > than Haxby for the same years are in **bold.**

Table 4 Denton multi-year spring barley variety grain yields in no-till CC.
Exp 3670 Cental Agricultural Research Center. Moccasin, Montana

Selected entries	2006	2007	2008	2009	2010	2011	average	Haxby Same Yrs
					bu/a			
Conrad	34	29	35	41	56	21	36.0	37.2
Gallatin				42	52	21	38.2	38.8
Geraldine	38	31	37	45	51	23	**37.3**	37.2
Goldeneye				44	59	21	**41.2**	38.8
Harrington	29	27	33	38	47	20	32.2	37.2
Haxby	**40**	**28**	**36**	**40**	**58**	**21**	**37.2**	**37.2**
Hockett	38	28	38	46	47	23	36.5	37.2
Metcalfe	35	29	36	42	49	19	34.8	37.2
MT020155			37	41	53	27	**39.4**	38.8
MT010158			34	41	58	20	38.4	38.8
Pinnacle				42	56	20	39.5	39.7
Tradition						21	**21.2**	21.1
Mean	34.5	30.0	35.9	43.4	53.2	21.32		

Varieties with multi-year mean > than Haxby for the same years are in **bold.**

Table 5 Moccasin multi-year barley variety grain test weight on no-till CC.
Exp 3670 Cental Agricultural Research Center. Moccasin, Montana

Selected entries	2006	2007	2008	2009	2010	2011	Average	Haxby Same Yrs
Conrad	no	52	49.2	52.9	50.5	50.7	51.1	53.7
Gallatin				53.3	51.1	52.8	52.4	54.0
Geraldine	harvest	52.3	49.0	53.3	51.5	52.0	51.6	53.7
Goldeneye				50.8	49.0	49.4	49.7	54.0
Harrington		51.3	47.7	53.1	50.5	50.6	50.6	**53.7**
Haxby		**54.6**	**52.2**	**54.6**	**53.2**	**54.1**	**53.7**	**53.7**
Hockett		52.7	49.4	54.3	52.4	52.6	52.3	53.7
Metcalfe		51.5	49.7	54.1	50.7	51.8	51.6	53.7
MT020155			49.3	52.6	50.7	52.5	51.3	53.5
MT010158			50.5	53.4	51.0	50.7	51.4	53.5
Pinnacle				**53.8**	51.3	50.5	51.8	54.0
Tradition						50.9	50.9	54.1
Means		51.93	49.0	53.6	51.45	51.53		

Varieties with multi-year mean > than Haxby for the same years are in **bold.**

Table 6 Denton multi-year spring barley variety test weights in no-till CC.
Exp 36701 Cental Agricultural Research Center. Moccasin, Montana

Selected entries	2006	2007	2008	2009	2010	2011	Average	Haxby Same Yrs
				lbs/bu				
Conrad	50.4	46.1	49.9	55.0	53.0	53.0	51.2	53.2
Gallatin				55.1	53.5	52.5	53.7	53.6
Geraldine	53.2	46.7	51.1	54.3	53.0	53.0	51.9	53.2
Goldeneye				52.2	51.1	50.0	51.1	53.6
Harrington	49.6	46.8	52.3	55.4	53.1	53.5	51.8	53.2
Haxby	**54.8**	**50.2**	**53.4**	**55.0**	**54.2**	**51.5**	**53.2**	**53.2**
Hockett	54.3	49.6	51.5	55.8	53.9	54.0	53.2	53.2
Metcalfe	52.0	47.0	51.2	55.6	52.8	53.0	51.9	53.2
MT020155			50.1	52.7	53.3	50.5	51.7	53.5
MT010158			51.8	54.3	54.5	54.0	53.7	53.5
Pinnacle				55.5	54.3	52.0	53.9	53.6
Tradition						51.0	51.0	51.5
Mean	51.59	46.98	50.87	55.0	53.6	52.41		

Varieties with multi-year mean > than Haxby for the same years are in **bold.**

Table 7 Moccasin multi-year barley variety grain protein on no-till CC.
Exp 3670 Cental Agricultural Research Center. Moccasin, Montana

Selected entries	2006	2007	2008	2009	2010	2011	ave.	Haxby Same Yrs
		%						
Conrad	no	16.0	14.0	16.1	12.8	15.5	**14.9**	13.3
Gallatin				**15.1**	10.9	15.6	**13.9**	13.3
Geraldine	harvest	16.4	13.7	15.0	12.1	17	**14.8**	13.3
Goldeneye				13.3	11.1	14.8	13.1	13.3
Harrington		15.5	14.0	15.0	12.1	16.2	**14.6**	13.3
Haxby		**13.8**	**12.6**	**14.8**	**10.9**	**14.2**	**13.3**	**13.3**
Hockett		15.8	13.2	14.4	12.0	15.1	**14.1**	13.3
Metcalfe		17.3	15.2	15.5	11.6	16.1	**15.1**	13.3
MT020155			13.2	15.0	12.3	14.4	**13.7**	13.1
MT010158			13.3	15.4	11.8	16.0	**14.1**	13.1
Pinnacle				**12.9**	10.1	13.9	12.3	13.3
Tradition						14.6	**14.6**	14.2
Means		15.51	13.10	14.60	11.37	15.3		

Varieties with multi-year mean > than Haxby for the same years are in **bold.**

Table 8 Denton multi-year barley variety protein content in no-till CC.
Exp 3670 Cental Agricultural Research Center. Moccasin, Montana

Selected entries	2006	2007	2008	2009	2010	2011	ave	Haxby Same Yrs
				%				
Conrad	14.0	16.5	13.7	15.0	12.5	14.4	**14.4**	13.4
Gallatin				14.4	12.7	14.8	**14.0**	13.5
Geraldine	14.0	15.3	14.2	14.1	13.3	14.8	**14.3**	13.4
Goldeneye				12.1	12.8	13.5	12.8	13.5
Harrington	13.0	15.7	13.6	14.4	13.9	17.0	**14.6**	13.4
Haxby	**12.6**	**13.7**	**13.4**	**13.7**	**12.1**	**14.6**	**13.4**	**13.4**
Hockett	12.9	13.5	13.2	13.5	12.2	14.1	13.2	13.4
Metcalfe	13.3	15.0	14.0	14.9	13.4	15.1	**14.3**	13.4
MT020155				13.5	13.7	12.2	12.5	13.0	13.5
MT010158				14.5	14.8	13.4	13.6	**14.1**	13.5
Pinnacle					13.1	11.6	12.9	12.5	13.5
Tradition							13.3	13.3	14.6
Mean	13.50	14.36	13.59	13.80	12.56	14.2		

Varieties with multi-year mean > than **Haxby** for the same years are in **bold.**