

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

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**Project Personnel:** T.K. Blake MSU-MAES Barley Breeder, Bozeman Mt  
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**Objective:**  
Evaluate the performance of spring barley cultivars in central Montana environments.

**Results:**  
2014 Central Montana crop year was generally good. Above average precipitation was received in Sep-Oct 2013 period with below average precipitation in mid-to-late spring. The northern Fergus county, including the Denton area experienced severe drought conditions.

2014 Sixteen entry On-Farm barley trials were conducted at the CARC (NTCC and C-F), Denton (NTCC) and Geraldine (C-C-F). Haxby and Metcalfe were the high producing barley in the CARC-NTRC trial with yields of 54.3 and 53.4 bu/a, respectively (Table 1). Hockett and Tradition produced the high yields at Denton with 33.4 and 31.1 bu/a yield (Table 2). Champion and Craft produced the high yields at Geraldine with 59.8 and 53.8 bu/a yield, respectively (Table 3). Test weights were much above average for all four locations with trial means ranging from 51.9 for Moccasin NTRC and Denton to 54.2 at the Geraldine location. The Moccasin recrop had the lowest nursery mean for plump seed percent, at 18%, while Denton had a mean of 40%, Geraldine 46% and Moccasin Fallow a 36% plump seed.

Three year performance summaries are presented for CARC-NTCC, Denton, and Geraldine locations in Tables 4 through 9. Harrington had the high three year mean yield at CARC. Champion produced the three year high yield for the Denton and Geraldine locations. Haxby had high three year mean test weight at the CARC location while Hockett had the 3y high mean test weight at Denton and Geraldine.

**Summary:**

Retired MSU-MAES Barley breeder, Tom Blake, coordinated the selection of entries and the preparation and distribution of seed for these trials.

**Funding Summary:**

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

**MWBC FY2011 Grant Submission Plans:**

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

Table 1 2014 CARC-NTRC barley performance trial on NTRC on 2013 barley stubble.  
Exp 143670 Central Agricultural Research Center. Moccasin, Montana

ID	entry	Head Date	Plant Height	Grain Yield	Test Weight	Protein Content	Plump	Regular	Thin
	#	Julian	cm	bu/a	lbs/bu	%	%	%	%
Harrington	8	181	71	50.6	50.0	12.6	46	33	21
MT100120	14	182	80	51.1	51.2	13.0	32	35	33
MT090180	12	183	77	51.7	52.9	12.0	3	19	78
Hockett	10	181	81	45.1	50.5	11.5	8	26	65
Haxby	9	182	79	54.3	53.5	13.4	13	32	55
Metcalfe	11	181	78	53.4	52.6	11.8	35	39	26
MT090190	13	183	75	45.1	50.6	13.5	5	22	73
Craft	4	181	86	42.0	50.3	14.1	1	12	87
Tradition	16	181	84	46.9	53.6	13.4	7	32	61
Geraldine	7	181	80	46.4	51.3	13.5	4	30	66
Conrad	2	183	69	47.7	50.7	11.3	5	27	69
MT100126	15	183	79	47.5	52.6	12.0	7	29	64
Eslick	5	182	72	51.0	51.3	12.2	5	29	66
Cowboy	3	183	90	43.3	52.6	11.8	39	35	25
Gallatin	6	181	83	43.7	54.2	13.0	25	35	40
Champion	1	181	77	40.5	53.6	14.7	47	36	17
Mean		181.9	78.9	47.51	51.96	12.7	18	29	53
P-value		0.00	0.00	0.75	0.14				
CV 1		0.3	6.4	17.8	2.8				
LSD(0.05 by t)		0.93	8.5	14.07	3.2				

Seeded: 18 Apr 14 2" soil temp: 5°C Fertilizer: 10+15+10+5 w/seed + 60 N topdress urea.  
Harvest: 12-Aug-14

Table 2 2014 Denton barley performance trial on continuous crop after lentils.  
Exp 143671 Central Agricultural Research Center. Moccasin, Montana

ID	entry	Plant	Grain	Test	Protein			
		Height	Yield	Weight	Content	Plump	Regular	Thin
	#	cm	bu/a	lbs/bu	%	%	%	%
Harrington	8	54	21.9	49.4	11.9	52	28	20
MT090190	13	47	30.9	52.8	13.7	31	36	33
Cowboy	3	58	26.6	52.5	14.2	58	28	14
Geraldine	7	54	28.3	51.0	13.5	18	38	44
Haxby	9	54	26.5	52.4	12.7	6	45	48
Champion	1	53	28.4	51.2	12.0	19	44	37
Craft	4	63	29.1	53.1	13.2	43	33	24
Gallatin	6	59	27.5	50.2	14.1	8	38	54
MT100126	15	58	28.6	53.5	11.9	47	36	17
Metcalfe	11	55	27.1	50.0	12.2	46	33	21
Eslick	5	48	30.6	50.8	11.7	14	38	48
Tradition	16	62	31.0	52.0	11.9	50	37	13
MT100120	14	53	31.1	54.2	10.9	73	20	7
Conrad	2	52	30.4	51.4	13.3	52	31	18
Hockett	10	55	33.4	54.1	12.5	65	24	11
MT090180	12	59	30.0	53.2	11.8	63	25	12
Mean		55.3	28.84	51.96	12.6	40	33	26
P value			0.09	0.03				
CV1			12.0	2.5				
LSD (0.05 by t)			5.78	2.75				

Seeded: April 22, 2014 Soil: 2" Temp: 10 C Moist Probe Depth: 24"  
Fertilizer: 10+15+10+05 NPKS w/seed, 30 N Topdress urea  
Harvest: 09-Aug-14

Table 3 2014 Gerdline barley performance trial 2013 wheat stubble.  
Exp 143672 Central Agricultural Research Center. Moccasin, Montana

ID	entry #	Head	Plant	Grain	Test	Protein	Plump	Regular	Thin
		Date	Height	Yield	Weight	Content			
		Julian	cm	bu/a	lbs/bu	%	%	%	%
Champion	1		61	59.8	54.6	11.8	28	51	21
Craft	4		66	53.8	55.7	12.2	57	28	14
Tradition	16		70	53.1	53.6	12.0	51	35	14
Haxby	9		68	52.8	55.2	11.8	28	44	27
MT090180	12		67	52.4	53.9	12.0	46	38	16
Conrad	2		59	52.1	53.2	13.0	54	28	18
MT090190	13		57	51.3	54.7	13.5	61	28	11
MT100126	15		62	51.3	54.4	11.3	51	35	13
MT100120	14		63	50.4	54.1	11.5	64	24	12
Harrington	8		65	44.9	53.1	13.4	49	29	22
Hockett	10		60	44.3	54.6	12.6	56	27	17
Geraldine	7		68	43.7	54.3	13.4	30	44	26
Gallatin	6		68	42.7	54.3	13.0	44	36	20
Metcalfe	11		59	38.7	53.7	14.1	53	29	18
Cowboy	3		85	35.4	54.3	14.7	43	36	21
Eslick	5		55	34.0	53.4	13.5	17	39	43
Mean			64.6	47.55	54.18	12.7	45.8	34.6	19.6
P-value				0.00	0.43				
CV 1				9.1	1.7				
LSD(0.05 by t)				7.18	2.02				

Seeded: 21Apr-14, No-till into winter wheat stubble.

Air temp: 57F Soil: 2" depth temp. 11C, Soil Moist Probe depth: 20"

Harvest: 18-Aug-14

Table 4 2014 CARC fallow barley performance trial NT on 2012 barley stubble.  
Exp 143607 Central Agricultural Research Center. Moccasin, Montana

ID	entry #	Head	Plant	Grain	Test	Protein			
		Date Julian	Height cm	Yield bu/a	Weight lbs/bu	Content %	Plump %	Regular %	Thin %
Craft	4	181		64.5	55.3	12.9	44	29	28
Champion	1	182		64.0	53.3	14.9	10	42	48
Eslick	5	183		61.3	52.3	13.6	26	43	31
Hockett	10	181		60.7	53.4	14.8	24	41	36
Geraldine	7	182		58.8	54.1	14.9	35	40	25
MT100120	14	183		58.6	53.6	13.3	62	27	11
Haxby	9	182		57.6	54.2	13.5	13	49	38
MT100126	15	184		57.4	53.8	13.9	43	40	18
MT090180	12	183		57.1	52.9	13.2	35	45	20
Conrad	2	183		53.8	52.3	14.1	66	26	9
MT090190	13	184		53.6	53.0	15.9	32	42	25
Gallatin	6	181		53.4	54.2	13.5	57	32	11
Cowboy	3	184		53.2	54.2	14.0	75	20	5
Harrington	8	183		50.7	50.7	15.6	25	39	35
Metcalfe	11	182		45.4	49.8	16.6	16	40	43
Tradition	16	181		44.7	47.9	15.0	7	27	66
Mean		182.5		55.92	52.8	14.4	35.6	36.4	28.0
P-value		0.00		0.06	0.00				
CV 1		0.2		13	1.511				
LSD(0.05 by t)		0.7112		12.12	1.7				

Seeded: 29 Apr 14 Fertilizer: 10+15+10+5 w/seed + 30 N topdress urea.

Harvest; 15-Aug-14

Table 4 Three year CARC Moccasin NTCC spring barley performance summary.  
Exp3870Mc Central Agricultural Research Center. Moccasin, Montana.

Cultivar	<u>Grain Yield (bu/a)</u>				<u>Test Weight (lbs/bu)</u>				<u>Grain Protein (%)</u>			
	2014	2013	2012	3y Ave.	2014	2013	2012	3y Ave.	2014	2013	2012	3y Ave.
cdc Cowboy	43.3	41.8	23.2	36.1	52.6	47.5	52.7	50.9	11.8	18.5	17.8	16.0
Champion	40.5	55.4	27.4	41.1	53.6	47.0	52.7	51.1	14.7	16.0	16.6	15.8
Conrad	47.7	50.5	30.0	42.7	50.7	46.0	51.8	49.5	11.3	18.2	17.9	15.8
Eslick	51.0	53.8	29.5	44.8	51.3	50.0	51.4	50.9	12.2	17.2	17.4	15.6
Gallatin	43.7	49.2	29.3	40.7	54.2	48.5	51.2	51.3	13.0	17.6	17.1	15.9
Harrington	50.6	53.1	37.6	47.1	50.0	45.0	53.4	49.5	12.6	16.4	16.7	15.2
Haxby	54.3	58.0	25.0	45.8	53.5	49.0	51.6	51.4	13.4	15.4	16.6	15.1
Hockett	45.1	53.6	34.1	44.3	50.5	48.5	51.1	50.0	11.5	15.5	15.3	14.1
Metcalfe	53.4	47.6	24.5	41.8	52.6	47.5	51.7	50.6	11.8	18.1	18.6	16.2
Tradition	46.9	53.3	28.1	42.8	53.6	44.0	49.7	49.1	13.4	15.6	17.1	15.4
Trial Ave	47.51	53.4	29.5	43.5	51.96	47.13	51.46	50.2	12.7	16.56	17.3	15.5

Table 5 Three year CARC Moccasin NTCC spring barley performance summary.  
Exp3870Mc Central Agricultural Research Center. Moccasin, Montana.

Cultivar	<u>Head Date (Julian)</u>				<u>Plump Seed (%)</u>				<u>Plant Height (inches)</u>			
	2014	2013	2012	3y Ave.	2014	2013	2012	3y Ave.	2014	2013	2012	3y Ave.
cdc Cowboy	183	183	n	183	39	39	23.5	34	36	32	27	32
Champion	181	181	o	181	47	26	2.0	25	31	28	21	27
Conrad	183	182		183	5	42	16.1	21	28	25	19	24
Eslick	182	182	d	182	5	30	6.7	14	29	25	19	24
Gallatin	181	181	a	181	25	31	1.7	19	33	27	23	28
Harrington	181	182	t	182	46	52	3.5	34	28	27	24	26
Haxby	182	180	a	181	13	49	3.8	22	32	28	21	27
Hockett	181	181		181	8	61	8.2	26	32	28	20	27
Metcalfe	181	182		182	35	40	8.4	28	31	27	21	26
Tradition	181	181		181	7	27	3.7	13	34	28	23	28
Mean	181.9	181.4		182	18	39.8	9.2	22	31.5	27.4	21.5	26.8

Table 6 Three year Denton NTCC spring barley performance summary.  
Exp3871Dn Central Agricultural Research Center. Moccasin, Montana.

Cultivar	<u>Grain Yield (bu/a)</u>				<u>Test Weight (lbs/bu)</u>				<u>Grain Protein (%)</u>			
	2014	2013	2012	3y Ave.	2014	2013	2012	3y Ave.	2014	2013	2012	3y Ave.
cdc Cowboy	28.4	26.5	38.0	30.9	51.2	54.0	48.6	51.3	12.0	13.7	15.9	13.9
Champion	30.4	35.1	44.5	36.6	51.4	54.0	49.4	51.6	13.3	11.6	14.3	13.1
Conrad	26.6	32.5	44.8	34.6	52.5	53.0	49.1	51.5	14.2	14.1	15.7	14.7
Eslick	30.6	34.6	38.9	34.7	50.8	53.0	47.1	50.3	11.7	12.5	16.5	13.6
Gallatin	27.5	35.0	40.2	34.3	50.2	53.5	49.7	51.1	14.1	12.3	15.4	13.9
Harrington	21.9	36.2	35.6	31.3	49.4	53.5	44.9	49.2	11.9	12.6	16.7	13.7
Haxby	26.5	35.0	45.2	35.6	52.4	56.0	50.2	52.8	12.7	12.4	14.5	13.2
Hockett	33.4	29.7	40.6	34.6	54.1	54.0	49.1	52.4	12.5	12.2	14.8	13.2
Metcalfe	27.1	33.7	39.3	33.4	50.0	54.0	46.5	50.2	12.2	12.1	17.9	14.1
Tradition	31.0	27.4	39.1	32.5	52.0	52.5	50.3	51.6	11.9	13.3	13.8	13.0
Trial Ave	28.84	33.21	40.6	34.2	51.96	53.88	48.25	51.4	12.6	12.5	12.8	12.6

Table 7 Three year Denton NTCC spring barley performance summary.  
Exp3871Dn Central Agricultural Research Center. Moccasin, Montana.

Cultivar	<u>Plump Seed (%)</u>				<u>Plant Height (inches)</u>			
	2014	2013	2012	3y Ave.	2014	2013	2012	3y Ave.
cdc Cowboy	19	92.2	12.7	41	21	26	27	25
Champion	52	82.0	1.7	45	21	20	23	21
Conrad	58	91.8	9.0	53	23	19	22	21
Eslick	14	62.4	1.0	26	19	17	21	19
Gallatin	8	81.9	2.0	31	24	19	23	22
Harrington	52	89.3	3.6	48	22	17	22	20
Haxby	6	82.6	1.6	30	22	19	21	21
Hockett	65	91.8	5.2	54	22	20	23	22
Metcalfe	46	86.9	3.3	45	22	21	23	22
Tradition	50	87.0	10.6	49	25	22	24	24
Trial Ave	40	85.5	15.6	47.2	55.3	19.25	22.5	32.3

Table 8 Three year Geraldine NTC-C-F spring barley performance summary.  
Exp3872Gd Central Agricultural Research Center. Moccasin, Montana.

Cultivar	Grain Yield (bu/a)				Test Weight (lbs/bu)				Grain Protein (%)			
	2014	2013	2012	3y Ave.	2014	2013	2012	3y Ave.	2014	2013	2012	3y Ave.
cdc Cowboy	35.4	49.1	48.0	44.2	54.3	54.4	53.8	54.2	14.7	13.0	13.3	13.7
Champion	59.8	51.6	59.7	57.0	54.6	55.1	54.1	54.6	11.8	10.9	11.4	11.4
Conrad	52.1	51.9	57.3	53.7	53.2	53.1	51.4	52.5	13.0	11.6	13.5	12.7
Eslick	34.0	53.3	49.9	45.7	53.4	54.4	52.7	53.5	13.5	10.9	12.9	12.4
Gallatin	42.7	53.5	50.4	48.8	54.3	54.7	51.9	53.6	13.0	11.9	12.6	12.5
Harrington	44.9	51.7	53.0	49.9	53.1	53.6	52.1	52.9	13.4	11.6	13.0	12.7
Haxby	52.8	51.4	64.6	56.3	55.2	55.8	56.1	55.7	11.8	10.4	12.1	11.4
Hockett	44.3	52.5	53.7	50.2	54.6	56.0	54.2	54.9	12.6	10.7	11.3	11.5
Metcalfe	38.7	51.8	51.1	47.2	53.7	55.5	52.7	53.9	14.1	10.9	13.8	12.9
Tradition	53.1	51.7	56.5	53.8	53.6	54.6	51.4	53.2	12.0	11.0	12.8	11.9
Trial Ave	47.55	52.65	54.3	51.5	54.18	54.74	52.5	53.8	12.7	11.17	12.7	12.2

Table 9 Three year Geraldine NTC-C-F spring barley performance summary.  
Exp3872Gd Central Agricultural Research Center. Moccasin, Montana.

Cultivar	Plump Seed (%)				Plant Height (inches)			
	2014	2013	2012	3y Ave.	2014	2013	2012	3y Ave.
cdc Cowboy	43	95	72	70	34	n	26	30
Champion	28	90	46	55	24	o	23	24
Conrad	54	88	64	69	24		23	23
Eslick	17	82	26	42	22	d	24	23
Gallatin	44	87	55	62	27	a	26	27
Harrington	49	89	47	62	26	t	28	27
Haxby	28	84	33	49	27	a	27	27
Hockett	56	94	79	76	24		33	28
Metcalfe	53	91	54	66	24		26	25
Tradition	51	91	29	57	28		27	27
Trial Ave	45.8	89.29	50.5	61.9	25.8		39.5	32.7