

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: Jamie Sherman MSU-MAES Barley Breeder, Bozeman MT
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Objective:
Evaluate the performance of spring barley cultivars in central Montana on-farm environments.

Results:
2015 Central Montana crop year was generally good. Above average precipitation was received in Sep-Oct 2014 and May 2015 while the crop year total was 1.40 inches below average. The average crop year temperature was 2.5° F above the 103y average. Growing season precipitation was more plentiful at the Denton, Geraldine, and Winifred on-farm locations.

2015 Eighteen entry On-Farm barley trials were conducted at the CARC (NTCC), Denton (NTCC) and Geraldine (C-C-F). Muskawa and MT010158 were the high producing entries in the CARC-NTRC trial with yields of 59.6 and 54.0, respectively (Table 1). MT010158 followed by MT100126 and Harrington topped the yields at Denton with 44.1 and 42.5 bu/a (Table 2). Geraldine had the high mean location yield with MT124728 and Haxby producing the high yields at 63.8 and 61.7 bu/a, respectively (Table 3). Location test weight means were 50.5 lbs/bu. for Moccasin, 51.6 for Denton to 52.5 for Geraldine. Moccasin also had the low mean for percent plump seed at 49.3 %. Denton and Geraldine had plump seed means of 67.7 %, and 70.8 %, respectively.

Three year performance summaries are presented for CARC-NTCC, Denton, and Geraldine locations in Tables 4 through 9. Hockett, Haxby, and Champion had the high three year mean yields and test weights across the three locations. Hockett had the high three year mean percent plump seed at all three locations.

Summary:

Dr. Jamie Sherman, new barley breeder, with assistance for Grad. Student, Jay Kalous, MAES Barley breeder, coordinated the selection of entries and the preparation and distribution of seed for these trials. Liz Elmore joined the project as Assoc. Breeder.

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 2015 Moccasin no-till spring barley variety trial on continuous crop.
 Exp. 153670 Central Agricultural Research Center. Moccasin, Montana.

ID	Entry	Head date	Plant Height	Grain Yield	Test Weight	Grain Protein	Plump	Regular	Thin
		Julian	cm	bu/a	lbs/bu	%	%	%	%
MT124027	1	172	70	43.9	50.3	13.2	60.8	26.4	12.8
Conrad	13	174	64	46.8	51.1	14.7	53.8	28.3	17.9
Merit	7	173	70	43.1	49.7	14.5	45.6	31.5	22.9
MT124728	2	172	72	47.1	51.5	14.0	86.2	4.1	9.7
Hockett	11	171	72	45.6	52.6	13.8	76.0	19.9	4.1
Craft	6	171	76	47.0	53.1	13.8	68.0	24.7	7.3
Champion	5	171	71	51.1	52.6	13.6	43.8	41.7	14.5
AC Metcalfe	15	174	69	41.5	51.0	14.7	54.8	34.9	10.3
Haxby	9	172	69	50.5	52.1	12.6	41.6	43.7	14.7
Lavina	12	174	70	49.2	47.6	12.9	14.6	42.7	42.7
Moravian 115	16	175	55	38.6	50.4	14.9	40.2	40.7	19.1
MT100120	3	175	67	47.7	53.2	13.1	53.5	32.9	13.6
Harrington	8	172	65	42.8	50.2	14.5	43.0	39	18.0
MT100126	4	174	70	49.3	52.5	13.4	60.6	27.4	12.0
Haybet	10	173	70	42.7	45.1	13.8	8.6	39	52.4
Stockford	14	174	69	44.7	48.1	12.7	74.2	19.4	6.4
Muskwa	17	173	67	59.6	49.1	12.5	23.3	38.1	38.6
MT010158	18	172	69	54.0	49.4	14.1	38.6	42.6	18.8
MEAN		173	69	47.0	50.5	13.7	49.3	32.1	18.7
P-VALUE		0.0	0.0	0.0	0.0				
CV 1		0.5	3.8	9.4	2.9				
LSD (0.05)		1.4	4.3	7.3	3.1				

Seeded: 10 April , 2015 Soil Temp: 7°C Moist Probe Depth: 36"

Fertilizer:10+15+10+05 NPKS w/seed, 30 N Topdress urea Harvesting August 6, 2015.

Table 2 2015 Denton spring barley variety trial on continuous crop.
 Exp. 153671 Central Agricultural Research Center. Moccasin, Montana.

ID	Entry	Head date	Plant Height	Grain Yield	Test Weight	Grain Protein	Plump	Regular	Thins
		Julian	cm	bu/a	lbs/bu	%	%	%	%
MT124027	1	177	67.0	40.1	52.1	14.9	80.5	20.7	9.5
Conrad	13	178	67.0	35.3	52.7	17.1	76.0	23.5	10.5
Merit	7	178	60.3	38.5	49.9	17.9	53.6	34.0	26.1
MT124728	2	177	66.0	37.7	52.3	16.7	66.7	29.1	16.8
Hockett	11	176	63.7	41.5	54.9	16.0	90.9	15.6	7.2
Craft	6	177	67.3	39.4	54.6	15.2	73.0	32.5	10.6
Champion	5	176	64.7	42.0	53.2	15.5	67.5	32.4	12.1
AC Metcalfe	15	177	66.7	37.7	52.2	17.4	73.4	26.3	9.5
Haxby	9	176	64.0	44.0	53.9	15.2	69.0	33.9	11.9
Lavina	12	178	65.7	38.4	46.7	15.8	23.4	46.5	44.5
Moravian 115	16	180	57.0	35.5	51.0	16.4	55.1	29.8	27.7
MT100120	3	179	68.0	42.5	53.1	13.4	75.9	26.0	11.1
Harrington	8	176	67.3	42.5	51.0	14.6	69.7	30.2	15.2
MT100126	4	178	67.0	40.4	53.1	13.7	88.6	17.1	7.2
Haybet	10	177	67.3	38.1	47.4	16.5	14.6	44.9	52.8
Stockford	14	178	61.7	36.0	49.2	14.2	89.9	16.5	6.6
Muskwa	17	176	64.3	40.2	50.7	14.0	67.2	30.1	13.4
MT010158	18	176	65.0	44.1	50.4	15.3	84.2	20.3	10.8
MEAN		177	65.0	39.7	51.6	15.5	67.7	28.3	16.9
P-VALUE		0.0	0.3	0.9	0.0				
CV 1		0.4	7.1	16.2	2.4				
LSD (0.05)		1.3	7.7	10.7	2.6				

Seeded: April 17, 2015 Soil:2" Temp: 9°C Moist Probe Depth: 36"

Fertilizer:10+15+10+05 NPKS w/seed, 30 N Topdress urea Harvesting August 11, 2015.

Table 3 2015 Geraldine spring barley variety trial on continuous crop.
Exp. 153672 Central Agricultural Research Center. Moccasin, Montana.

ID	Entry	Head date	Plant Height	Leaf Disease	Grain Yield	Test Weight	Grain Protein	Plump	Regular	Thin
		Julian	cm	0-5 scale	bu/a	lbs/bu	%	%	%	%
MT124027	1	175	61.0	1.0	57.2	52.1	12.1	82.7	13.4	3.9
Conrad	13	175	61.3	1.0	54.9	52.7	14.6	79.9	13.3	6.8
Merit	7	175	61.7	1.3	63.8	50.8	14.6	63.5	24.1	12.4
MT124728	2	175	62.7	1.3	54.2	53.6	14.2	78.2	15.4	6.4
Hockett	11	175	61.7	1.3	51.6	55.2	12.7	84.7	11.1	4.2
Craft	6	174	65.3	1.0	53.2	54.6	13.1	89.7	8.1	2.2
Champion	5	174	62.3	1.0	59.5	54.5	12.3	81.4	14.7	3.9
AC Metcalfe	15	174	65.7	1.0	54.8	51.5	13.9	69.3	22.5	8.2
Haxby	9	174	62.7	1.3	61.7	53.8	12.3	83.2	14.5	2.3
Lavina	12	176	60.0	1.0	50.5	47.7	14.3	35	42.7	22.3
Moravian 115	16	177	52.0	1.3	44.1	51.5	14.1	60.6	22.5	16.9
MT100120	3	177	65.7	1.0	51.2	54.1	12.8	75	17.1	7.9
Harrington	8	175	63.3	1.0	55.1	52.7	13.9	62	26.9	11.1
MT100126	4	176	69.7	1.0	58.1	53.2	12.1	84	11.7	4.3
Haybet	10	176	67.3	1.3	46.9	50.6	14.9	16.5	44.1	39.4
Stockford	14	177	72.7	1.0	47.3	51.4	13.3	81.9	13	5.1
Muskwa	17	174	67.0	1.0	53.0	51.4	11.6	61.6	26.8	11.6
MT010158	18	174	69.0	1.7	56.3	54.1	12.7	85.5	11.6	2.9
MEAN		175	63.9	1.1	54.1	52.5	13.3	70.8	19.6	9.5
P-VALUE		0.0	0.0	0.8	0.5	0.0				
CV 1		0.3	7.6	37.0	16.6	2.0				
LSD (0.05)		0.9	8.1	0.7	14.9	2.2				

Seeded: 23 April , 2015 Soil:" Temp: Moist Probe Depth: "

Fertilizer:10+15+10+05 NPKS w/seed, 30 N Topdress urea Harvesting August 12, 2015.

Table 4 Three year CARC Moccasin NTCC spring barley performance summary.
ExpMc 15367 Central Agricultural Research Center. Moccasin, Montana.

Cultivar	Grain Yield (bu/a)				Test Weight (lbs/bu)				Grain Protein (%)			
	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.
Champion	51.1	40.5	55.4	49.0	52.6	53.6	47.0	51.1	13.6	14.7	16.0	14.8
Conrad	46.8	47.7	50.5	48.3	51.1	50.7	46.0	49.3	14.7	11.3	18.2	14.7
Harrington	42.8	50.6	53.1	48.8	50.2	50.0	45.0	48.4	14.5	12.6	16.4	14.5
Haxby	50.5	54.3	58.0	54.2	52.1	53.5	49.0	51.5	12.6	13.4	15.4	13.8
Hockett	45.6	45.1	53.6	48.1	52.6	50.5	48.5	50.5	13.8	11.5	15.5	13.6
Metcalfe	41.5	53.4	47.6	47.5	51.0	52.6	47.5	50.4	14.7	11.8	18.1	14.9
Trial Ave	46.4	48.6	53.0	49.3	51.6	51.8	47.2	50.2	14.0	12.6	16.6	14.4

Table 5 Three year CARC Moccasin NTCC spring barley performance summary.
ExpMc 153670 Central Agricultural Research Center. Moccasin, Montana.

Cultivar	Head Date (Julian)				Plump Seed (%)				Plant Height (cm)			
	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.
Champion	171	181	181	178	44	47	26	39	71	78	70	73
Conrad	174	183	182	180	54	5	42	34	64	70	62	65
Harrington	172	181	182	179	43	46	52	47	65	72	69	69
Haxby	172	182	180	178	42	13	49	35	69	80	71	73
Hockett	171	181	181	178	76	8	61	49	72	82	70	75
Metcalfe	174	181	182	179	55	35	40	43	69	80	69	73
Mean	172	182	181	178	52	26	45	41	69	77	69	71

Table 6 Three year Denton NTCC spring barley performance summary.
Exp Dn3871 Central Agricultural Research Center. Moccasin, Montana.

Cultivar	<u>Grain Yield (bu/a)</u>				<u>Test Weight (lbs/bu)</u>				<u>Grain Protein (%)</u>			
	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.
Champion	42.0	30.4	35.1	35.8	53.2	51.4	54.0	52.9	15.5	13.3	11.6	13.5
Conrad	35.3	26.6	32.5	31.5	52.7	52.5	53.0	52.7	17.1	14.2	14.1	15.1
Harrington	42.5	21.9	36.2	33.5	51.0	49.4	53.5	51.3	14.6	11.9	12.6	13.0
Haxby	44.0	26.5	35.0	35.2	53.9	52.4	56.0	54.1	15.2	12.7	12.4	13.4
Hockett	41.5	33.4	29.7	34.9	54.9	54.1	54.0	54.3	16.0	12.5	12.2	13.6
Metcalfe	37.7	27.1	33.7	32.9	52.2	50.0	54.0	52.1	17.4	12.2	12.1	13.9
Trial Ave	40.5	27.7	33.7	34.0	53.0	51.6	54.1	52.9	16.0	12.8	12.5	13.8

Table 7 Three year Denton NTCC spring barley performance summary.
Exp Dn3671 Central Agricultural Research Center. Moccasin, Montana.

Cultivar	<u>Plump Seed (%)</u>				<u>Plant Height (cm)</u>			
	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.
Champion	68	52	82	67	65	53	51	56
Conrad	76	58	92	75	67	59	48	58
Harrington	70	52	89	70	67	55	43	55
Haxby	69	6	83	53	64	55	48	56
Hockett	91	65	92	83	64	56	51	57
Metcalfe	73	46	87	69	67	56	53	59
Trial Ave	74	47	87	69	66	56	49	57

Table 8. Three year Geraldine NTC-C-F spring barley performance summary.
Exp Gd3672 Central Agricultural Research Center. Moccasin, Montana.

Cultivar	<u>Grain Yield (bu/a)</u>				<u>Test Weight (lbs/bu)</u>				<u>Grain Protein (%)</u>			
	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.
Champion	59.5	59.8	51.6	57.0	54.5	54.6	55.1	54.7	12.3	11.8	10.9	11.7
Conrad	54.9	52.1	51.9	53.0	52.7	53.2	53.1	53.0	14.6	13.0	11.6	13.1
Harrington	55.1	44.9	51.7	50.6	52.7	53.1	53.6	53.1	13.9	13.4	11.6	13.0
Haxby	61.7	52.8	51.4	55.3	53.8	55.2	55.8	54.9	12.3	11.8	10.4	11.5
Hockett	51.6	44.3	52.5	49.5	55.2	54.6	56.0	55.2	12.7	12.6	10.7	12.0
Metcalfe	54.8	38.7	51.8	48.4	51.5	53.7	55.5	53.5	13.9	14.1	10.9	13.0
Trial Ave	56.3	48.8	51.8	52.3	53.4	54.0	54.8	54.1	13.3	12.8	11.0	12.4

Table 9 Three year Geraldine NTC-C-F spring barley performance summary.
Exp Gd3672 Central Agricultural Research Center. Moccasin, Montana.

Cultivar	<u>Plump Seed (%)</u>				<u>Plant Height (cm)</u>			
	2015	2014	2013	3y Ave.	2015	2014	2013	2y Ave.
Champion	81	28	90	67	62	62	n	62
Conrad	80	54	88	74	61	60	o	61
Harrington	62	49	89	67	63	66	d	65
Haxby	83	28	84	65	63	69	a	66
Hockett	85	56	94	78	62	61	t	61
Metcalfe	69	53	91	71	66	60	a	63
Trial Ave	77	45	89	70	63	63		63