

Project Title: Off-Station barley variety performance trials in Central Montana – CARC

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Objectives:

Identify top performing spring barley cultivars in central Montana.

Methods:

On-farm spring barley variety performance trials were conducted on chemical fallow or minimal tillage during 2019 at Moccasin, Geraldine and Denton. Trials consisted of both named varieties of barley and additional experimental lines. Each variety was seeded in three 5 row, 5 x 16-foot plots in a randomized experimental design. Seeding dates were April 19 at Moccasin, May 9, at Geraldine and May 10 at Denton. Starter fertilizer, 20-30-20-10 NPKS, was applied at seeding at a rate of 50 lb/ac. Broadleaf and grass weeds were controlled with a burndown of glyphosate at 1.25 pt/ac prior to planting. All plots were trimmed to a harvest length of approximately 12 feet and harvested with a small plot combine. Plots were harvested on August 28 at Geraldine, August 29 at Moccasin, and September 16 at Denton.

Results:

The Central Agricultural Research Center received 5.58 inches of precipitation in April and May alone, or 1.72 inches above normal. Above normal snowpack and wetter-than-average spring conditions delayed planting of some 2019 spring crops. The 2019 average annual air temperature (41°F) was 1.8°F below the 108-yr average and 3.1°F below the 30-yr average. Annual precipitation (18.45 in) was 3.1 inches over the 110-yr average and 3.85 inches over the 30-yr average. The maximum air temperature at 92°F on 23 July and 3 August, two of only three days in the 2019 crop year when temperatures surpassed 90°F.

The average yield for all barley varieties at Moccasin was 67.5 bu/ac (Table 11). Odyssey was the top yielding variety and differences in yield were not significant among the 8 top yielders which included AAC Connect, Balster, Champion, Craft, Expedition, Fraser, Haxby, and Hockett. Plump kernel average was 87.2% with Synergy (96.7%), Craft (96.0%), and Fraser (94.6%) having the highest percentage of plump kernels. Genie (61.7 bu/ac), was numerically the top yield variety at Denton but yield differences were not significant among the top 10 varieties. The average yield at Denton was 52.0 bu/ac (Table 12). Average plump kernel percentage was 62.5% with no statistical difference in varieties. Geraldine average yield was 63.6 bu/ac (Table 13) and yield differences were not statistically significant among any of the varieties. Plump kernels averaged 74.7% and differences in plump kernel percentages were not significant among the top 13 varieties.

Summary:

Cooler and wetter conditions contributed to high average yields but resulted in a later than usual harvest. The average yield for all barley varieties was 67.5 bu/ac at Moccasin. 52.0 bu/ac at Denton and 63.6 bu/ac at Geraldine. Protein values were not available at the time of this report.

Funding Summary:

An expenditure summary will be provided by OSP. No additional grant support was provided for this project.

MWBC FY 2020 Grant Submission Plans:

A request for continuing this project was submitted for funding consideration for the next fiscal year. Funding was awarded. Thank you!

Table 1: Barley variety trial at Moccasin, MT.

Variety/Pedigree	Year of Release	Source	Height (in)	Test Weight (lb/bu)	Plumps	Grain Yield (bu/ac)			
						2017	2018	2019	3 yr avg
AAC Connect	2016	Meridian	22.7	52.9	82.5		47.7	72.5	60.1
Balster			24.3	52.9	90.0	32.0		73.7	52.9
Champion	2007		24.7	56.3	91.9	38.3	50.5	74.9	54.6
Conrad	2007		24.7	52.9	90.3	37.4		68.5	53.0
Copeland			27.3	54.2	89.7	38.7		66.2	52.5
+ Craft			27.3	56.0	96.0			71.8	71.8
+ Expedition			21.3	54.9	88.5			73.7	73.7
Fraser	2015	CDC	24.3	52.6	94.6			76.8	76.8
Genie			22.0	53.9	87.2	37.9		68.3	53.1
Growler			23.7	53.3	83.6	28.0		62.6	45.3
Haxby	2003	MAES	23.0	56.0	87.4	34.3	49.9	72.8	52.3
Haybet	1989	MAES/USDA	29.7	53.5	59.7	33.7		47.0	40.4
Hays	2003	MAES	23.7	52.4	76.9	33.8		67.8	50.8
Hockett	2008	MAES	25.3	55.7	92.1	34.8	52.6	69.7	52.4
Lavina	1989	MAES/USDA	25.3	52.7	69.8	36.3		62.7	49.5
Merit 57			25.0	52.8	83.2	28.8	53.9	66.7	49.8
Metcalfe		Canada	26.0	54.7	84.0	36.9	45.7	65.4	49.3
Odyssey			21.3	53.5	81.5	34.3		79.0	56.6
+ Opera			21.0	52.4	73.1		62.3	75.4	68.8
Synergy			24.7	53.7	96.7	34.6		69.6	52.1
+ Voyager			24.0	53.6	93.0			66.8	66.8
Average			24.3	54.2	87.2	34.3	52.5	67.5	
LSD (0.05)			1.9	1.4	7.8	N.S.	9.7	10.4	
CV (%)			4.7	1.6	5.4	15.8	11.5	9.4	
P-value			<0.0001	<0.0001	<0.0001	0.5901	<0.0001	<0.0001	

+ = New for 2019

Bolded and underlined values are the highest mean. Bolded values are not different from the highest value based on the Least Significant Difference (LSD) test

Note: Study averages include experimental lines not listed here.

N.S. = Not Significant

Table 2: Barley variety trial at Denton, MT.

Variety/Pedigree	Year of Release	Source	Height (in)	Test Weight (lb/bu)	Plumps	Grain Yield (bu/ac)			
						2017	2018	2019	3 yr avg
AAC Connect	2016	Meridian	26.0	50.0	54.6		48.9	58.9	53.9
Balster			26.0	49.3	47.1	27.5	55.3	49.0	43.9
Champion	2007		27.3	53.7	61.7	<u>32.6</u>	46.7	60.6	46.6
Conrad	2007		26.7	51.1	61.4	30.1	48.6	48.8	42.5
Copeland			28.3	50.4	69.2	10.4	43.1	51.7	35.1
+ Craft			27.7	55.1	82.0			51.8	51.8
+ Expedition			23.0	50.5	44.5			51.0	51.0
Fraser	2015	CDC	26.7	48.5	48.5		49.1	52.5	50.8
Genie			25.0	51.9	59.6		50.6	61.7	56.2
Growler			26.7	49.5	49.6		50.7	51.1	50.9
Haxby	2003	MAES	26.0	53.6	70.0	31.9	55.5	59.8	49.1
Haybet	1989	MAES/USDA	31.0	52.9	35.3	29.1	45.1	41.1	38.4
Hays	2003	MAES	28.0	50.2	39.7	26.0	49.0	50.9	42.0
Hockett	2008	MAES	26.3	54.5	78.7	30.6	51.3	52.2	44.7
Lavina	1989	MAES/USDA	29.0	51.0	39.0	27.5	54.5	54.7	45.6
Merit 57			26.7	50.4	38.0	22.9	50.0	45.2	39.4
Metcalfé		Canada	28.0	54.1	74.7	31.6	45.2	53.4	43.4
Odyssey			22.0	52.2	51.4	30.1	50.4	54.4	45.0
+ Opera			22.7	48.6	36.2			49.7	49.7
Synergy			28.0	51.5	76.1	30.1		54.1	42.1
+ Voyager			26.7	50.7	72.5			50.5	50.5
Average			26.3	51.8	62.5	27.8	48.6	52.0	
LSD (0.05)			2.0	2.2	18.8	6.1	N.S.	10.0	
CV (%)			4.7	2.6	18.3	13.3	15.7	11.8	
P-value			<0.0001	<0.0001	<0.0001	<0.0001	0.3670	0.0456	

+ = New for 2019

Bolded and underlined values are the highest mean. Bolded values are not different from the highest value based on the Least Significant Difference (LSD) test

Note: Study averages include experimental lines not listed here.

N.S. = Not Significant

Table 3: Barley variety trial at Geraldine, MT.

Variety/Pedigree	Year of Release	Source	Height (in)	Test Weight (lb/bu)	Plumps	Grain Yield (bu/ac)		
						2018	2019	2 yr avg
AAC Connect	2016	Meridian	24.0	54.0	71.3	97.9	68.4	83.2
Balster			24.0	54.2	84.1	93.6	65.6	79.6
Champion	2007		24.7	56.6	78.5	94.6	68.9	81.8
Conrad	2007		25.0	53.6	77.5	95.9	67.8	81.9
Copeland			26.7	53.5	79.6	85.6	63.0	74.3
+ Craft			25.0	56.1	86.8		60.9	60.9
+ Expedition			21.3	54.9	83.8		73.7	73.7
Fraser	2015	CDC	24.7	53.6	74.7	99.8	68.4	84.1
Genie			22.7	54.8	73.5	95.7	71.5	83.6
Growler			24.3	52.1	81.9	94.0	67.7	80.9
Haxby	2003	MAES	22.0	56.0	75.6	101.5	66.3	83.9
Haybet	1989	MAES/USDA	25.3	54.0	35.4	62.9	47.6	55.3
Hays	2003	MAES	24.7	51.8	47.0	89.4	60.8	75.1
Hockett	2008	MAES	23.0	53.5	70.1	88.9	64.2	76.6
Lavina	1989	MAES/USDA	25.7	54.1	55.6	81.5	63.4	72.5
Merit 57			25.7	52.7	50.0	111.0	62.8	86.9
Metcalfe		Canada	26.7	52.9	61.9	92.4	55.4	73.9
Odyssey			21.7	53.8	67.4	86.7	61.8	74.3
+ Opera			21.0	53.6	67.8		63.4	63.4
Synergy			26.0	53.4	83.5		65.8	65.8
+ Voyager			26.3	54.5	88.3		70.4	70.4
Average			24.1	54.4	74.7	93.0	63.6	
LSD (0.05)			2.5	2.2	17.3	17.1	14.1	
CV (%)			6.3	2.4	14.1	11.2	13.5	
P-value			0.0001	0.0002	<0.0001	0.0030	0.1000	

+ = New for 2019

Bolded and underlined values are the highest mean. Bolded values not different from the highest value based on the Least Significant Difference (LSD) tes

Note: Study averages include experimental lines not listed here.

N.S. = Not Significant