2025 Montana Barley Crop Quality Report

E. Wallace, H. Uhlmann, J. Sherman, C. Hinson. Department of Plant Sciences and Plant Pathology, MSU, Bozeman MT 59717

This is the sixteenth annual crop quality report for barley grown in Montana. Collection of barley samples was coordinated by the U.S. Department of Agriculture (USDA) National Agriculture Statistics Service (NASS). Grain quality evaluations were performed by the Barley, Malt & Brewing Quality Lab at Montana State University and grade information was determined by the Montana State Grain Lab. The Montana Wheat & Barley Committee provided financial support.

Production:

According to the USDA – NASS September 2025 Small Grains Summary, 34% of barley acres planted in the US in were in Montana. This equates to 780,000 acres of barley planted in Montana. Of these barley acres, 585,000 acres were harvested. This is down 19% from the 720,000 acres harvested in 2024.

The USDA reported an average yield of 54 bushels per acre (bu/acre). This was up 3 bu/acre from 2024 when the average yield was 51 bu/acre.

Following a national trend, overall barley production in Montana was down 14% with 31.6 million bushels produced, compared to 2024 when 36.7 million bushels were reported.

Materials and Methods:

The 2025 Montana barley crop survey consists of four districts within the state (Table 1). The objective of the crop quality survey was to collect a representative number of samples from each district. The number of barley samples collected was determined by previous and projected barley production in the counties of each district.

During harvest, a total of 85 two-rowed barley samples weighing between 0.5 and 2 pounds were collected from farms and grain elevators in selected Montana counties. Sample details, including barley variety, were provided by the grower or elevator representative (Table 2).

Upon receipt, initial moisture content was recorded for each submission and samples in excess of 13.5% were allowed to air-dry prior to subsequent analyses. A subsample of each entry was then removed prior to cleaning. These subsamples were later bulked based on suitability for malting to create regional composite samples. After sub-sampling, the remaining grain was cleaned to remove dockage prior to testing for this report.

After dockage was removed, test weight, moisture, protein, and kernel assortment were determined for each of the samples. Percent total protein, reported on a dry-matter basis, was determined by near infrared transmittance on a Foss Infratec Nova grain analyzer.

Table 3 displays results. The values for state and district averages represent results of malting quality or feed quality samples from that region. (Continued on page 3.)

Montana Two-Rowed Malting Barley Quality Snapshot

- A total of 85 two-rowed malting barley samples from 17 counties in Montana were collected at harvest
- Harvested acreage and production were down from the previous year
- District average malt protein levels ranged from 10.9% in southern Montana to 12% in western Montana
- District average test weight ranged from 48.2 lb/bu in central Montana to 51.4 lb/bu in northern and southern Montana
- The North District was graded as U.S. No. 3 two-rowed malting barley, and the West and South Districts were graded at U.S. No. 4 two-rowed malting barley.
- Malt extracts ranged from 77.4% with Moravian 165 to 82.7% with Bill Coors 100.

Table 1. 2025 Barley Survey Districts in Montana

District	Counties	% Of Survey Samples
North	Blaine, Glacier, Hill, Liberty, Toole	27%
West	Cascade, Lewis and Clark, Pondera, Teton	32%
Central	Chouteau, Fergus, Judith Basin	26%
South	Big Horn, Carbon, Gallatin, Treasure, Yellowstone	15%

Table 2. Montana Sample Collection, Broken out by Barley Variety

	AC Metcalfe	Bill Coors 100	Hockett	Endurance	Voyager	Moravian 165	Explorer	Eagle	Synergy	Other or Unidentified
Number of Samples Collected	28	15	6	6	5	5	4	4	3	9
Percentage of Samples Collected	33%	18%	7%	7%	6%	6%	5%	5%	4%	11%
Percentage at Malting Grade	96%	93%	50%	100%	100%	60%	100%	100%	67%	100%
Percentage at Feed Grade	4%	7%	50%	0%	0%	40%	0%	0%	33%	0%

Table 3. Montana State and District Two-Rowed Barley Crop Quality

State and District	Number of Samples	% Moisture Content	% Dockage	Test Weight (lb/bu)	% Protein Content	Kernel Assortment % Plump	Kernel Assortment % Thin
North	**23**	**10.8**	**0.93**	**51.3**	**11.6**	**96.2**	**1.2**
Malt Grade	20	10.8	0.94	51.3	11.1	96.5	1.1
	CV	0.09	0.76	0.03	0.14	0.04	0.88
Feed Grade	3	11.3	0.82	51.1	15.1	94.4	1.7
	CV	0.04	0.71	0.01	0.07	0.08	1.30
West	**27**	**10.8**	**1.4**	**49.7**	**12.2**	**96.0**	**1.4**
Malt Grade	24	10.7	1.5	49.7	12.0	95.8	1.5
	CV	0.08	0.81	0.05	0.13	0.03	0.72
Feed Grade	3	10.9	1.0	49.2	14.5	98.1	0.6
	CV	0.10	0.17	0.00	0.03	0.00	0.14
Central	**22**	**10.7**	**1.1**	**47.9**	**11.9**	**96.6**	**1.0**
Malt Grade	21	10.7	1.2	47.8	11.8	97.4	0.7
	CV	0.14	1.22	0.04	0.10	0.02	0.88
Feed Grade	1	10.5	0.6	48.3	15.3	80.2	7.3
	CV	—	—	—	—	—	—
South	**13**	**11.9**	**0.9**	**51.2**	**11.1**	**97.3**	**1.1**
Malt Grade	12	12.1	0.9	51.4	10.9	97.9	0.9
	CV	0.07	0.55	0.03	0.09	0.01	0.63
Feed Grade	1	9.5	1.8	47.9	13.3	90.6	3.9
	CV	—	—	—	—	—	—
State Average	**85**	**10.9**	**1.1**	**49.9**	**11.8**	**96.4**	**1.2**
Malt Grade	77	10.8	1.2	49.9	11.5	96.7	1.1
	CV	0.11	0.94	0.05	0.12	0.03	0.86
Feed Grade	8	10.8	1.0	49.7	14.6	93.5	2.3
	CV	0.08	0.49	0.03	0.06	0.08	1.1

Table 4. Montana Barley Grades

District	Dockage (%)	Grade**	Test Weight (lb/bu)	Protein (%)	Sound Barley*** (%)	Skinned and Broken Kernels (%)	Thin Barley (%)
North	0.36	U.S. No. 3 Two-Rowed Malting Barley	50.5	11.7	96.8	3.0	2.4
West	0.19	U.S. No. 4 Two-Rowed Malting Barley	49.5	12.3	95.5	4.5	2.9
Central	0.29	U.S. Sample Grade Barley	48.0	11.9	75.7	24.1	0.3
South	0.43	U.S. No. 4 Two-Rowed Malting Barley	51.5	11.3	95.1	4.8	0.5

***Grade specifications provided in United States Department of Agriculture, Marketing and Regulatory Programs, Agricultural Marketing Service, Federal Grain Inspection Service, Washington, D.C., Grain Inspection U.S. Standards, Subpart B—United States Standards for Barley, August 2018 Subpart B -- www.ams.usda.gov/sites/defaultt/files/media/BarleyStandards.pdf*
****Injured-by-frost kernels and injured-by-mold kernels are not considered damaged or considered against sound barley.*

(Continued from page 1.)

Barley samples were deemed to have suitable malting quality based on protein and plump values. Barley having protein greater than 14% or plumps over a 6/64th sieve less than 70% were rejected as not suitable quality. District composite samples were made from suitable barley samples and submitted to the Montana State Grain Laboratory for determination of grade, Table 4.

Barley samples having suitable malting quality were sorted and pooled within variety (i.e. Beaut, Buzz, Churchill, Connect, Eagle, Endurance, Explorer, Hockett, Mayflower, Moravian 165, Raptor, and Synergy) or within variety and region for varieties having more entries (BC-100, Metcalfe, and Voyager). New this year, barley samples were also sorted based on growing conditions (dryland or irrigated).

Pooled grain was then malted in a two-steep malting profile using MSU's CLP micromalters. Malt quality data was obtained and is reported in Table 5.

Varieties:

The majority of barley acreage in Montana was planted to malting varieties (NASS). AC Metcalfe, Bill Coors 100, and Hockett are among the most commonly planted two-rowed malting varieties. The most collected barley variety in 2025 was AC Metcalfe. It comprised 33% of the samples (Table 2). Bill Coors 100, and Endurance were the next most collected varieties, at 7%, respectively. They were followed by Voyager and Moravian 165 at 6%.

Quality of Two-Rowed Malting Barley Varieties:

State and district averages of individual two-rowed malting barley samples are presented in Table 3. Of the 85 samples collected, 77 were of acceptable malting quality. The average moisture of the these two-rowed barley samples was 10.8%. The average two-rowed barley test weight was 49.9 lb/bu and average barley protein content was 11.5%. The average kernel assortment was 96.7% plump with 1.1% thin kernels.

North District

The North District had the highest percentage of samples rejected. Notwithstanding, 87% of samples collected were of suitable malting quality. Of those, the average test weight was 51.3 lb/bu. Barley protein content was 11.1%. The average kernel plumpness was 96.5% with 1.1% thin kernels.

West District

The West District only had three samples rejected with 89% being of suitable malting quality. The average test weight was 49.7 lb/bu. Barley protein content was 12.0%. The average kernel plumpness was 95.8% with 1.5% thin kernels.

Central District

95% of Central District samples were of suitable malting quality with only one rejected. This district had an average protein of 10.7%. The average test weight was 47.8 lb/bu. Central had an average kernel plumpness of 97.4% with 0.7% thin kernels.

South District

The South District had only one sample rejected with 92% being of suitable malting quality. The samples had the highest average test weight at 51.4 lb/bu, and the lowest protein content at 10.9%. The district also had the highest average kernel plumpness at 97.9% plump with 0.9% thin kernels.

Barley Grades:

Montana district composite samples were inspected for an official grade (Table 4) by the State Grain Lab in Great Falls. The North District composite was graded as U.S. No. 3 two-rowed malting barley with test weights of 50.5 lb/bu. The South District composite was graded U.S. No. 4 two-rowed malting barley with a test weight of 51.5 lb/bu.

The West District was graded as U.S. No. 4 as well, and had a test weight of 49.5 lb/bu and the highest protein of the composites at 12.3%.

While all four composites had minimal dockage, the Central District composite was the only sample to have significant damage with 24.1% noted as skinned and broken.

The North District had the lowest skinned and broken percentage at 3.0%, while Central had the lowest level of thin kernels at 0.3%.The Central District composite sample was graded as U.S. Sample Grade barley and had a test weight of 48.0 lb/bu and a protein of 11.9%.

Table 5. 2025 Average Malt Quality by Variety

Variety	Region	Conditions	# of Samples	Extract FG DB %	Total Protein (%)	Soluble Protein %	S/T %	B-Glucan mg/L	FAN mg/L	DP *ASBC	AA D.U.
BC-100	North	Dry	2	82.6	10.8	5.0	46.1	27	249	221	84
BC-100	South	Dry	2	82.7	11.3	5.7	50.1	30	272	197	89
BC-100	South	Irr	5	82.5	11.3	5.6	49.1	25	269	176	86
BC-100	West	Dry	3	81.5	11.9	5.9	49.8	27	277	250	96
BC-100	West	Irr	1	82.4	11.1	5.2	47.1	31	251	196	88
Beaut	Central	Dry	2	80.8	11.6	4.6	39.5	49	216	175	66
Buzz	North	Dry	2	80.5	11.3	5.8	51.8	61	272	135	114
Churchill	Central	Dry	1	80.0	11.8	5.2	43.7	9	281	147	100
Connect	North	Dry	1	79.3	12.6	4.4	35.2	427	174	188	50
Eagle	West	Irr	2	82.4	10.7	5.5	51.3	26	269	181	94
Endurance	Central	Dry	4	82.5	11.8	6.2	52.6	57	279	187	78
Explorer	South	Irr	4	80.6	11.0	3.6	32.6	62	164	139	59
Hockett	State	Dry	3	79.7	12.7	5.7	44.5	95	243	216	86
Mayflower	Central	Dry	1	80.4	11.9	4.9	41.4	40	229	161	63
Metcalfe	Central	Dry	10	79.6	11.3	5.8	51.1	17	286	198	103
Metcalfe	North	Dry	11	80.5	11.5	5.6	48.6	24	254	198	95
Metcalfe	West	Dry	6	78.1	12.0	6.2	51.5	43	273	213	89
Moravian 165	State	Dry	3	77.4	12.4	6.5	52.3	17	294	244	105
Raptor	West	Unknown	1	77.7	11.8	6.6	55.5	53	314	212	88
Synergy	South	Irr	1	80.8	12.4	6.3	50.6	74	270	188	71
Voyager	West	Dry	2	80.1	11.3	5.8	51.4	46	262	197	106
Voyager	West	Irr	1	82.5	11.0	5.3	47.9	28	251	181	104

Malting Process:

Barley samples were pooled based on variety to generate representative statewide samples, or if there were enough samples, a region of the state. Malts were generated at the MSU Barley, Malt & Brewing Quality Lab with a program that consisted of two steeps (23 hrs wet, 17 hrs rest, 4 hrs wet) and 100 hrs of germination time. Malting was held at 13 °C during the steeping phase and 18 °C during the germination phase. Malts were kilned in a base malt profile consisting of 12 hrs at 60 °C, 6 hrs at 65 °C, 2 hrs at 75 °C, and 3 hrs at 85 °C. Samples were manually de-culmed and malt quality analysis was performed directly.

Malting Observations:

Most varieties demonstrated extract of 80% or better, with BC-100 from the South District and North Districts and Endurance in the Central District, having the three highest values of 82.7%, 82.6% and 82.5%, respectively. Moravian 165 had the lowest extract at 77.4%. Almost all varieties had good breakdown of B-glucan with all but Connect under 100 mg/L. Raptor had the highest FAN values being over 300 mg/L.

All varieties generated appropriate enzyme content for brewing and distilling. BC-100 had the highest DP value at 249.7 °ASBC with Moravian 165 right behind it at 243.6 °ASBC. Buzz was the lowest at 134.9 °ASBC. A-amylase ranged from 50 D.U. to 144.2 D.U. with Connect at the low end and Buzz at the high end.

References

Small Grains 2025 Summary (September 2025), USDA, National Agricultural Statistics Service.

United States Department of Agriculture, Marketing and Regulatory Programs, Agricultural Marketing Service, Federal Grain Inspection Service, Washington, D.C. Grain Inspection U.S. Standards, Subpart B—United States Standards for Barley, August 2018 Subpart B -- www.ams.usda.gov/sites/defaultt/files/media/BarleyStandards.pdf