Canadian Grain Commission | Commission canadienne des grains

Barley Production and Quality of Western Canadian Malting Barley

2024

Annual Barley Harvest Report

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Summary

Production

In 2024, the total area seeded with barley in western Canada was 2.504 million hectares. This is approximately 13% lower than in 2023 and 7% lower than the 10-year average (2.688 million hectares). Barley production in western Canada in 2024 is estimated at 7.839 million tonnes. This is approximately 10% lower than in 2023 and 7% lower than the 10-year average. Heat stress during the filling period contributed to a lower than expected barley yield and production.

Top varieties

In 2024, AAC Synergy remained the most popular variety in western Canada, accounting for approximately 34% of the area seeded with malting barley. The area seeded with CDC Copeland (17%) continued to decline. The area seeded with newer varieties, such as CDC Fraser (8%), and CDC Churchill (7%), increased noticeably. The acreage of Sirish increased to 14%, although this malting variety (registered in 2017) is used mostly for general purpose or feed. The area seeded with AAC Connect (12%) in 2024 was similar to that in 2023. The area seeded with AC Metcalfe declined to approximately 1.5% of the area seeded with malting barley.

Growing conditions

The cool and wet conditions at the beginning of the 2024 growing season substantially improved soil moisture which gave the barley crop a good start. Excessive heat in July, however, substantially affected the physical characteristics and composition of barley grain in 2024. Occasional rain in August caused some pre-harvest sprouting in parts of Alberta and Saskatchewan.

Barley quality

The average test weight of malting barley in 2024 was 64.7 kg/hL, which is lower than the 2023 average (65.0 kg/hL) and lower than the 10-year average (66.6 kg/hL). The average 1000 kernel weight in 2024 was 44.1 g, which is substantially lower than the 10-year average (45.6 g). The lower kernel plumpness in 2024 was associated with a lower starch content in the grain. However, the average level of barley proteins (12.2%) in 2024, was similar to last year, and only slightly higher than the 10-year average (12.0%). Despite some pre-harvest sprouting, barley exhibited an excellent average germination energy (99%), a high germination index, and no water sensitivity.

Malting performance

In 2024, the combination of lower test weight, lower grain density and smaller kernel size in malting barley contributed to relatively easy and quick water absorption during steeping and good modification during germination. This resulted in the production of well-modified malt with high friability and ample levels of enzymes (diastatic power and α-amylase), soluble proteins, and free amino nitrogen (FAN). Wort from 2024 barley was also noted for its low levels of β-glucans and very good (low) viscosity values. The smaller, lighter and thinner kernels of 2024 barley negatively affected the malt extract. Malt made from 2024 barley produced lower than expected levels of extract with substantial differences in extract levels among different Canadian malting varieties. The overall malting performance of this year’s barley, however, was good.

Part 1: Growing and harvest conditions in 2024

Beneficial rain was received across much of western Canada in April and early May, which substantially improved soil moisture and gave the crop a good start in 2024. By the end of May seeding progress in Alberta was ahead of normal, but seeding in Manitoba and Saskatchewan lagged due to a significant rainfall. In May, the average temperature across the Prairies was close to normal (Figure 1.1), but the amount of precipitation was much higher than normal (Figure 1.2). In June, lower temperatures and rainfall continued to contribute to optimal soil moisture conditions in much of Saskatchewan and Alberta, but led to excessive soil moisture in parts of Manitoba.

The cool temperatures in May and June (approximately 2°C below normal) delayed crop growth across the Prairies, but by the end of June the crop conditions were generally favorable across western Canada. Temperatures in July increased significantly, with Alberta and western parts of Saskatchewan experiencing consecutive days with temperatures exceeding 35°C (Figure 1.3). While the warmer weather in July was beneficial to crop development, the excessive heat also had a negative effect on the crop. After a very strong start to the growing season, the yield expectations were not met. The heat stress in July also contributed to lower grain plumpness and lower test weight than normal. Occasional rain in August (Figure 1.4) caused some pre-harvest sprouting.

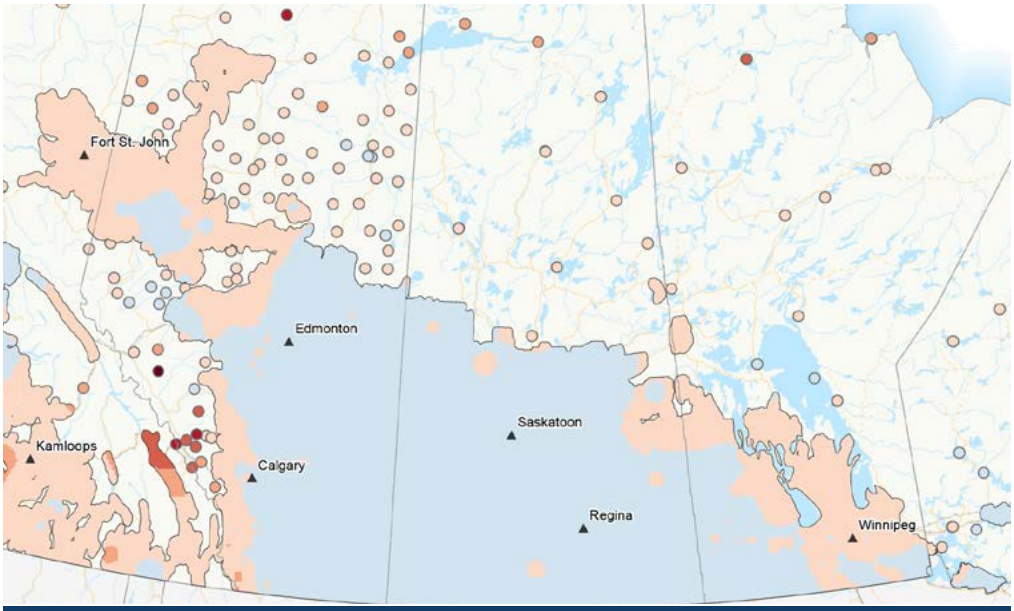


Figure 1.1 Mean temperature difference (°C) from normal in May 2024.

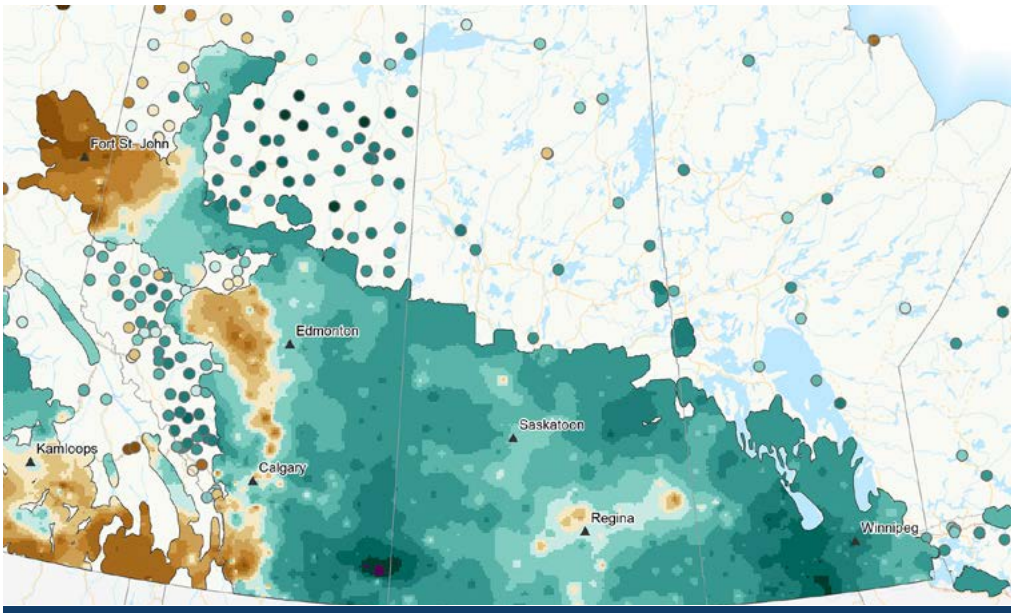


Figure 1.2 Departure from average precipitation (mm) in May 2024.

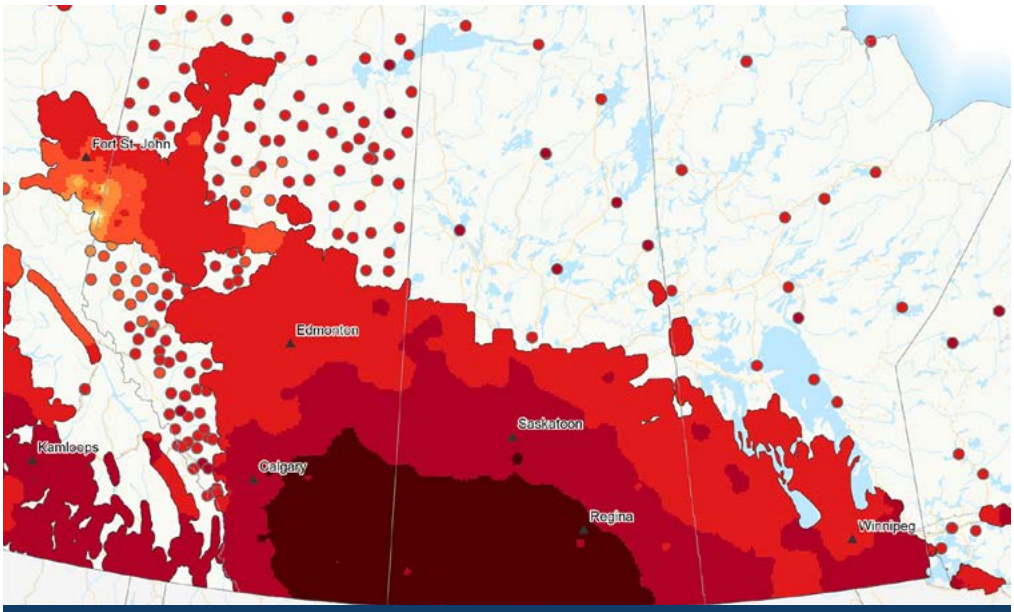


Figure 1.3 Highest temperature (°C) between July 23 and July 29, 2024.

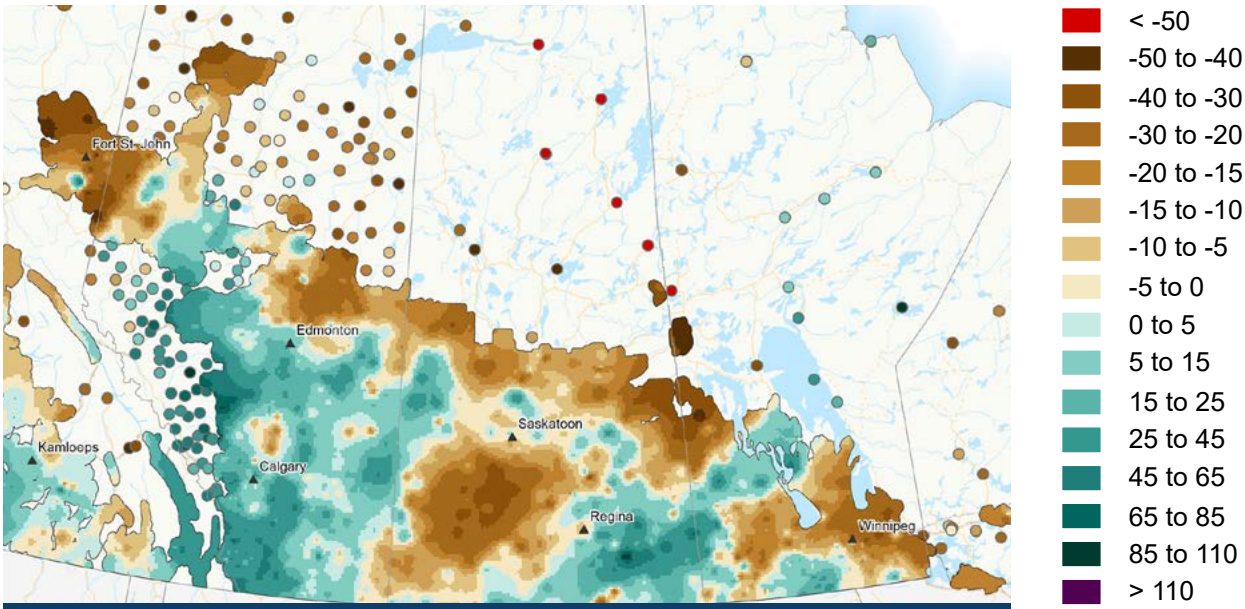


Figure 1.4 Departure from average precipitation (mm) in August 2024.

Part 2: Barley production in 2024

2.1 Annual production statistics

The total area seeded with barley in western Canada was 2.504 million hectares in 2024. This is approximately 13% lower than in 2023 and 7% lower than the 10-year average (2.688 million hectares) (Table 2.1). Barley production in western Canada is estimated at 7.839 million tonnes. This is approximately 10% lower than in 2023 and 7% lower than the 10-year average (Table 2.2). Heat stress during the filling period contributed to a lower than anticipated barley yield (63.1 bushels per acre) and lower than anticipated barley production in 2024 (Table 2.3 and Figure 2.3).

Table 2.1 Area (million hectares) seeded with barley in Canada

Location	2024[1]	2023	10-year average[2]
Manitoba	0.126	0.168	0.153
Saskatchewan	0.936	1.135	1.107
Alberta	1.418	1.552	1.404
British Columbia	0.023	0.027	0.024
Western Canada	**2.504**	**2.881**	**2.688**
Canada	**2.592**	**2.967**	**2.802**

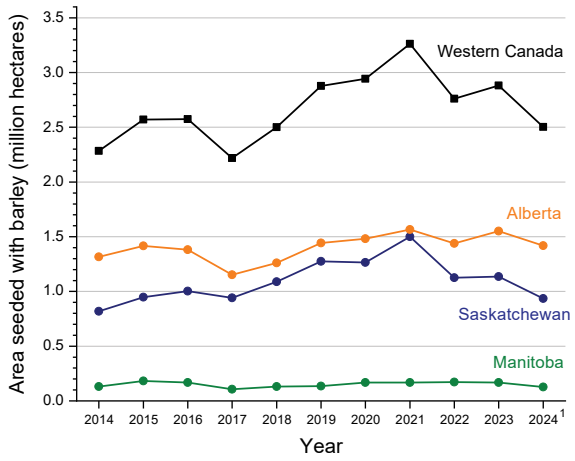


Figure 2.1 Annual comparison of area (million hectares) seeded with barley in western Canada.

[1]Source: Statistics Canada, estimated as of December 5, 2024.
[2]10-year average from 2014 to 2023.

Table 2.2 Barley production (million tonnes) in Canada

Location	2024[1]	2023	10-year average[2]
Manitoba	0.512	0.665	0.546
Saskatchewan	3.035	3.227	3.310
Alberta	4.229	4.721	4.471
British Columbia	0.063	0.064	0.060
Western Canada	**7.839**	**8.677**	**8.386**
Canada	**8.144**	**8.905**	**8.748**

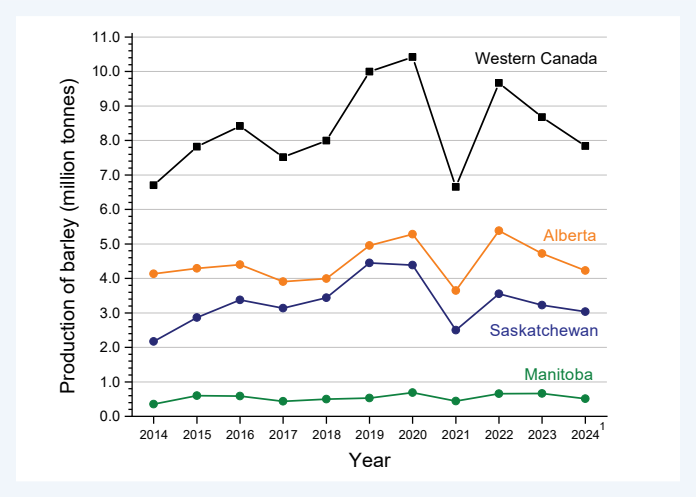


Figure 2.2 Annual comparison of barley production (million tonnes) in western Canada.

Table 2.3 Average barley yield (bushels per acre) in Canada

Location	2024[1]	2023	10-year average[2]
Manitoba	78.3	75.4	71.6
Saskatchewan	64.9	57.4	60.8
Alberta	60.6	62.9	68.2
British Columbia	54.7	55.2	56.6
Western Canada	**63.1**	**61.4**	**65.3**
Canada	**63.2**	**61.2**	**65.0**

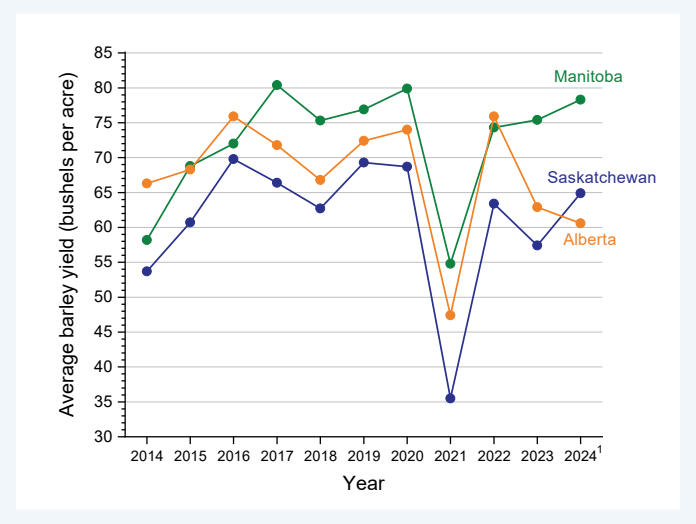


Figure 2.3 Annual comparison of average barley yield (bushels per acre) in western Canada.

[1]Source: Statistics Canada, estimated as of December 5, 2024.
[2]10-year average from 2014 to 2023.

2.2 Distribution of barley classes and varieties

Barley is grown across the Canadian Prairies and is used for malting, food and general purposes (feed and forage). Based on insured commercial acres in 2024, Alberta remained the biggest producer of barley in western Canada, followed by Saskatchewan and Manitoba (Figure 2.4). The distribution of barley classes in each province in 2024 was similar to that observed in 2023 (Figure 2.4). More than 50% of the area seeded with barley in western Canada in 2024 was in Alberta. The area seeded with general-purpose barley in Alberta (31.0%) exceeded that seeded with malting barley (24.0%). Saskatchewan accounted for approximately 36% of the area seeded with barley in western Canada.

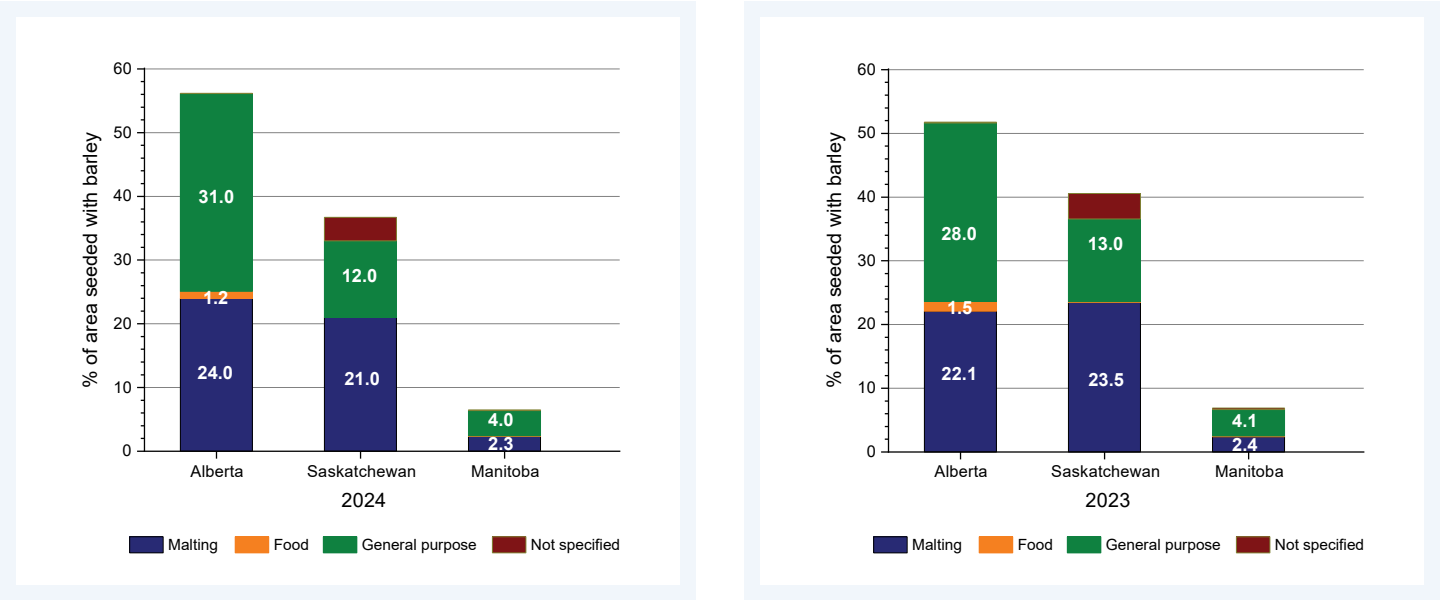


Figure 2.4 Distribution of barley classes in each province as a percentage (%) of area seeded with barley in western Canada in 2023 and 2024. Data based on crop insurance statistics from each province[1].

[1]Source: Saskatchewan Crop Insurance Corporation, Alberta Agricultural Financial Services Corporation, Manitoba Agricultural Services Corporation, British Columbia AgriStability and Production Insurance.

The area seeded with malting barley in Saskatchewan (21.0%) surpassed that seeded with general purpose barley (12.0%). Manitoba remained the smallest producer of barley in western Canada and accounted for approximately 6.3% of the total area seeded with barley on the prairies. AAC Synergy, a malting (M) barley, was the most popular variety seeded in western Canada in 2024 and exceeded CDC Austenson, a general-purpose (GP) barley, for the first time since 2010. The other popular varieties were CDC Copeland (M), Sirish (M/GP), AAC Connect (M), Esma (GP), CDC Fraser (M), Brahma (GP), and CDC Churchill (M) (Figure 2.5). Although initially registered as malting barley, Sirish is seldom selected for malting and is used primarily as general-purpose barley.

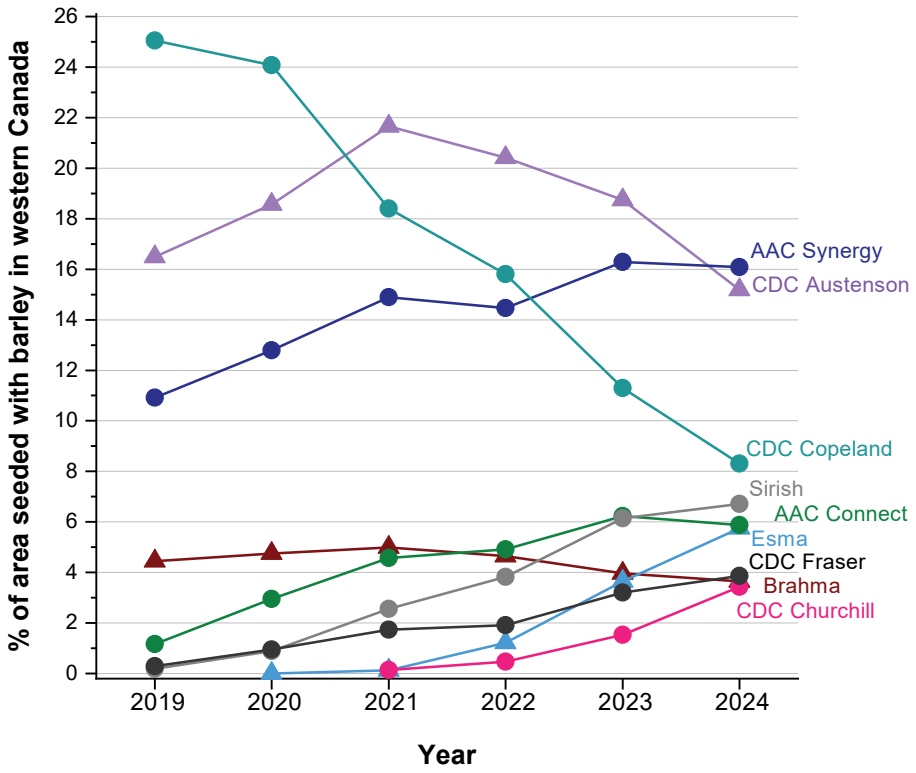


Figure 2.5 Comparison of area seeded with the top barley varieties in western Canada from 2019 to 2024[1].

[1]Source: Saskatchewan Crop Insurance Corporation, Alberta Agricultural Financial Services Corporation, Manitoba Agricultural Services Corporation, British Columbia AgriStability and Production Insurance.

2.3 Distribution of malting varieties

In 2024, AAC Synergy was the most popular variety of malting barley grown in western Canada (Figure 2.6, Table 2.4). The area seeded with AAC Synergy accounted for 33.6% of the area seeded with malting varieties in western Canada. The area seeded with CDC Copeland (17.4%) substantially decreased compared to 2023 (Figure 2.6). The other popular malting varieties in 2024 were AAC Connect (12.3%) and CDC Fraser (8.1%). CDC Churchill is also becoming a popular variety whose acreage increased to 7.1% in 2024 from 3.1% in 2023. The area planted with Sirish, a malting variety registered in 2017, continues to increase, although this cultivar is used mostly for general purpose/feed. The area seeded with AC Metcalfe decreased from 3.7% in 2023 to 1.5% in 2024. The areas seeded with CDC Copper and Bill Coors 100 remained relatively small, 1.1% and 0.6%, respectively (Table 2.4). In 2024, six-rowed cultivars accounted for approximately 2.0% of the total area seeded with malting barley, slightly lower that 2.7% estimated last year. Legacy, Celebration and Tradition remained the top six-rowed varieties (Table 2.4).

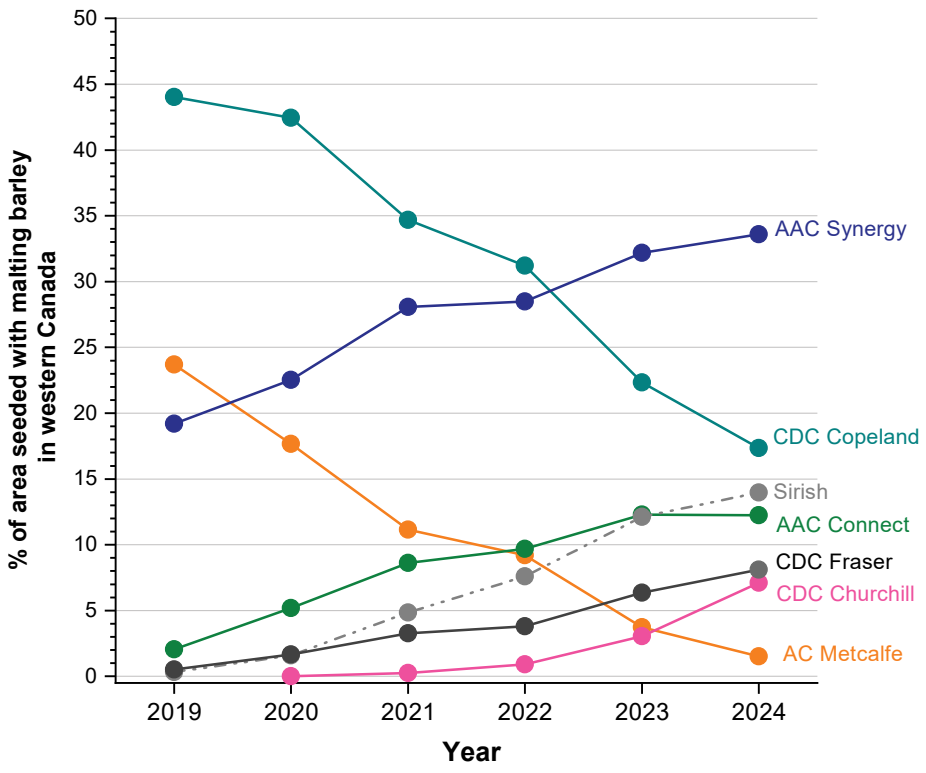


Figure 2.6 Comparison of the area seeded with the top malting barley varieties in western Canada from 2019 to 2024[1].

[1]Source: Saskatchewan Crop Insurance Corporation, Alberta Agricultural Financial Services Corporation, Manitoba Agricultural Services Corporation, British Columbia AgriStability and Production Insurance.

Table 2.4 Distribution of malting barley varieties as a percentage (%) of area seeded with malting barley in western Canada in 2024[1]

Malting barley varieties	Alberta	Saskatchewan	Manitoba	Western Canada
2-rowed				
AAC Synergy	13.07	18.78	1.63	33.60
CDC Copeland	9.08	7.91	0.26	17.36
Sirish	13.36	0.33	0.05	13.97
AAC Connect	3.35	7.15	1.57	12.25
CDC Fraser	3.19	4.63	0.29	8.11
CDC Churchill	4.14	2.56	0.42	7.12
AC Metcalfe	0.64	0.75	0.08	1.53
CDC Copper	0.90	0.06	0.05	1.06
Bill Coors 100	0.60	0.00	0.00	0.60
CDC Bow	0.35	0.07	0.03	0.46
Cerveza	0.23	0.13	0.02	0.39
Newdale	0.07	0.13	0.11	0.31
AB BrewNet	0.28	0.00	0.00	0.28
CDC Goldstar	0.00	0.25	0.00	0.25
Bentley	0.14	0.00	0.00	0.14
CDC Stratus	0.09	0.00	0.00	0.09
Harrington	0.02	0.06	0.00	0.08
Torbellino	0.07	0.00	0.00	0.07
CDC PlatinumStar	0.00	0.05	0.00	0.05
Summit	0.00	0.00	0.04	0.04
AB Dram	0.04	0.00	0.00	0.04
CDC Aurora Nijo	0.04	0.00	0.00	0.04
Other	0.13	0.00	0.00	0.13
Total 2-rowed	**49.80**	**42.87**	**4.57**	**97.97**
6-rowed				
Legacy	0.23	1.10	0.03	1.37
Celebration	0.00	0.12	0.17	0.29
Tradition	0.07	0.00	0.09	0.17
Other	0.17	0.03	0.00	0.21
Total 6-rowed	**0.49**	**1.25**	**0.30**	**2.03**

[1]Source: Saskatchewan Crop Insurance Corporation, Alberta Agricultural Financial Services Corporation, Manitoba Agricultural Services Corporation, British Columbia AgriStability and Production Insurance.

2.4 Distribution of general purpose and food barley varieties

Based on the 2024 insured acreage in western Canada, food (F) and general purpose (GP) barley varieties accounted for approximately 47% of the total area seeded with barley (Figure 2.4). Although CDC Austenson continued to predominate the area seeded with GP barley varieties, it has continued to decrease in acreage since 2021 (Table 2.5 and Figure 2.7). The area seeded with Brahma, Oreana, Claymore, Canmore, and CDC Coalition decreased slightly in 2024 compared to 2023. The acreage of CDC Maverick in 2024 increased from that in 2023. The acreage of several other newer GP varieties, such as Esma, Aldorado, AB Hague, and AB Prime, also increased in 2024 compared to 2023 (Figure 2.7).

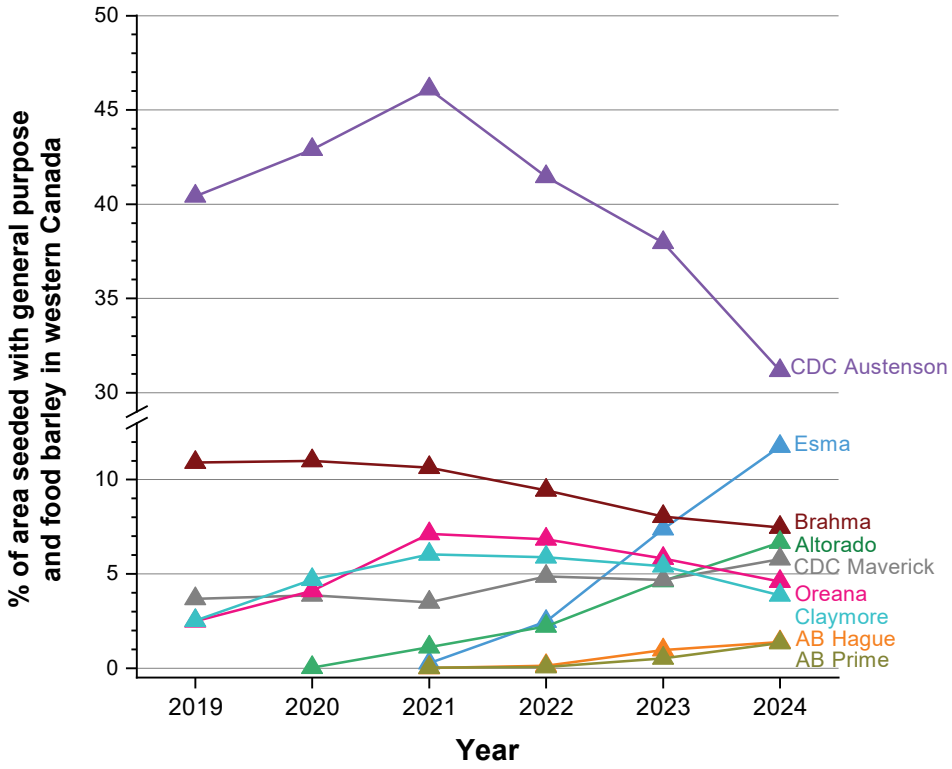


Figure 2.7 Comparison of areas seeded with the top general purpose and food barley varieties in western Canada from 2019 to 2024[1].

[1]Source: Saskatchewan Crop Insurance Corporation, Alberta Agricultural Financial Services Corporation, Manitoba Agricultural Services Corporation, British Columbia AgriStability and Production Insurance.

Table 2.5 Distribution of barley varieties as a percentage (%) of area seeded with general purpose and food barley in western Canada in 2024[1]

General purpose and food varieties	Alberta	Saskatchewan	Manitoba	Western Canada
2-rowed				
CDC Austenson	14.34	11.87	4.69	31.17
Esma	10.54	0.30	0.93	11.76
Brahma	7.43	0.04	0.00	7.46
Altorado	5.52	1.07	0.08	6.67
CDC Maverick	1.70	3.98	0.07	5.78
Oreana	4.14	0.42	0.03	4.59
Conlon	2.26	0.43	1.26	3.95
Claymore	1.65	1.87	0.34	3.87
Champion	2.28	0.55	0.03	2.86
Canmore (F)	2.30	0.00	0.22	2.52
Xena	2.21	0.20	0.00	2.41
CDC Cowboy	1.01	0.86	0.00	1.86
CDC Coalition	1.54	0.00	0.00	1.54
AB Hague	1.01	0.33	0.05	1.39
AB Prime	1.33	0.00	0.00	1.33
KWS Kellie	1.26	0.00	0.00	1.26
CDC Renegade	0.38	0.54	0.04	0.95
AB Wrangler	0.34	0.22	0.00	0.58
Gadsby	0.28	0.11	0.00	0.39
Ponoka	0.37	0.00	0.00	0.37
LG Diablo	0.34	0.00	0.00	0.34
Other	0.70	0.16	0.12	0.98
Total 2-rowed	**62.92**	**22.95**	**7.85**	**94.04**
6-rowed				
AB Advantage	1.33	1.24	0.16	2.75
AB Cattlelac	0.75	0.20	0.17	1.12
AB Tofield	0.37	0.00	0.00	0.37
Richer	0.00	0.00	0.25	0.25
AB Standwell	0.24	0.00	0.00	0.24
Seebe	0.20	0.00	0.00	0.20
Amisk	0.05	0.14	0.00	0.19
AC Rosser	0.08	0.12	0.00	0.19
Sundre	0.08	0.04	0.00	0.12
Alston	0.10	0.00	0.00	0.10
Other	0.31	0.05	0.00	0.43
Total 6-rowed	**3.51**	**1.79**	**0.57**	**5.96**

[1]Source: Saskatchewan Crop Insurance Corporation, Alberta Agricultural Financial Services Corporation, Manitoba Agricultural Services Corporation, British Columbia AgriStability and Production Insurance. F=Food

Part 3: Annual harvest survey of malting barley

3.1 Sampling and survey methodology

The 2024 malting barley survey is based on varietal composites that represent approximately 1,600,000 tonnes of malting barley selected for domestic processing or export. The grain handling and malting companies involved in the selection process were Cargill Ltd., Canada Malting Co. Ltd., Boortmalt, Rahr Malting Canada Ltd., Richardson International Ltd., Viterra Inc., and Malteurop Canada Ltd. The tonnage included in this survey represents only a portion of the total volume of malting barley selected in western Canada. Some additional samples and varieties (e.g., Sirish) included in this report came from the Canadian Grain Commission's Harvest Sample Program. Samples were received from the beginning of harvest until November 15, 2024.

3.2 Quality of barley selected for malting in 2024

In 2024, the average protein content in barley selected for malting was 12.2%, which was slightly higher than the last year's average (12.1%) and slightly higher than the 10-year average (12.0%) (Figure 3.1). Figure 3.2 shows the average protein content in individual varieties. The average test weight was 64.7 kg/hL, which is lower than the last year's average (65.0 kg/hL) and lower than the 10-year average (66.6 kg/hL) (Figure 3.3). The average 1000 kernel weight was 44.1 g, which is lower than last year's average (46.8 g) and lower than the 10-year average (45.6 g) (Figure 3.5). Kernel plumpness, determined by measuring kernels remaining on a 6/64" slotted screen, was lower in 2024 compared to 2023 for all varieties (Figure 3.7). Kernel length and kernel thickness of barley grown in 2024 were lower compared to last year (Figures 3. 8 and 3.9). Kernel hardness was determined for individual varieties using a single kernel characterization system. The harness index of barley grain in 2024 was higher than in 2023 (Figure 3.10). 2024 barley exhibited excellent average germination energy at 4 mL (99%) (Figure 3.11). In 2024, the average germination energy at 8 mL was 95%, which indicates no water sensitivity (Fig. 3.13). The content of starch and β-glucans in selected malting varieties grown in western Canada in 2023 and 2024 is shown in Figures 3.15 and 3.17. The content of starch and β-glucans in 2024 barley was lower than in 2023 barley. The gelatinization temperature of barley in 2024 was higher than in 2023 (Figure 3.16).

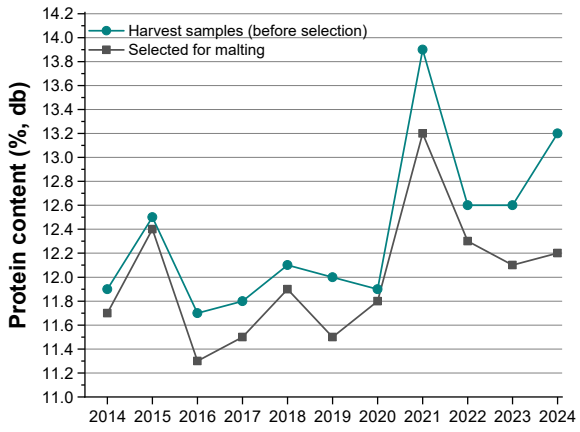


Figure 3.1 Average protein content of barley selected for malting from 2014 to 2024. Values indicate weighted averages based on the tonnage represented by samples.

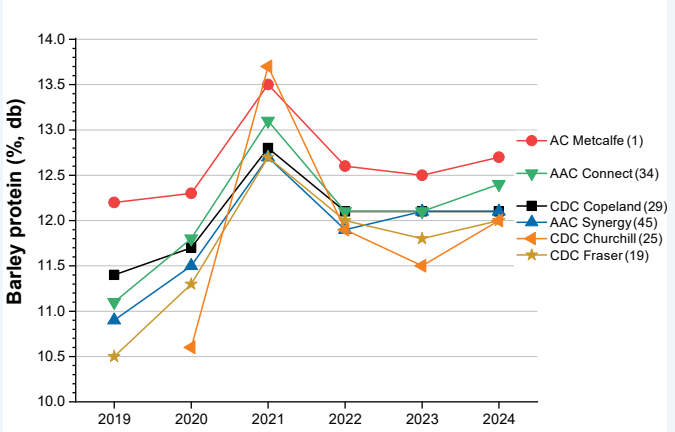
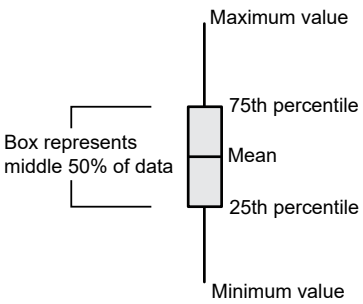
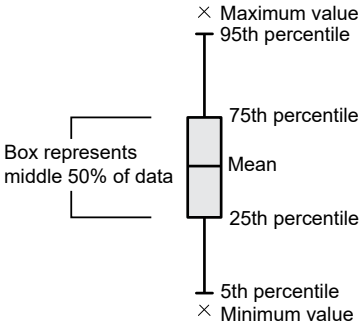


Figure 3.2 Comparison of the average protein content in selected barley varieties from 2019 to 2024. Values indicate arithmetic averages. Sample numbers for each variety are in parentheses.

Box plot explanation





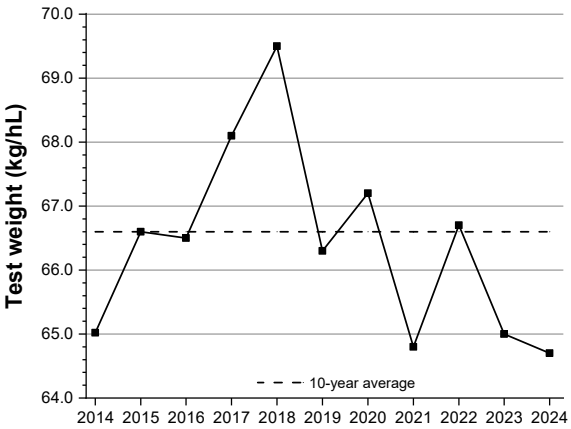


Figure 3.3 Average test weight of barley selected for malting from 2014 to 2024. Values indicate weighted averages based on the tonnage represented by samples.

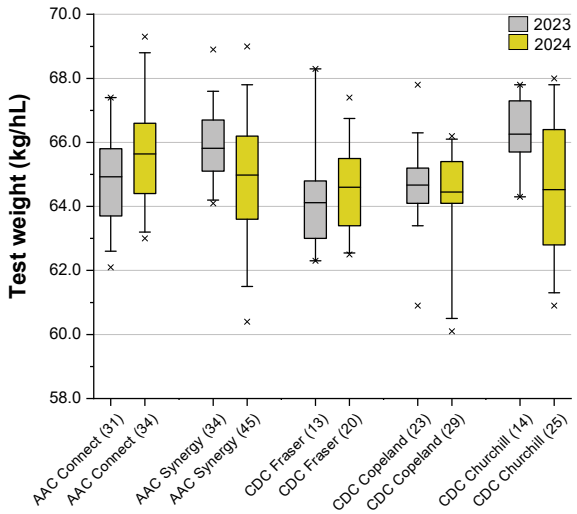


Figure 3.4 Comparison of test weight of barley selected for malting in 2023 and 2024. Sample numbers for each variety are in parentheses.

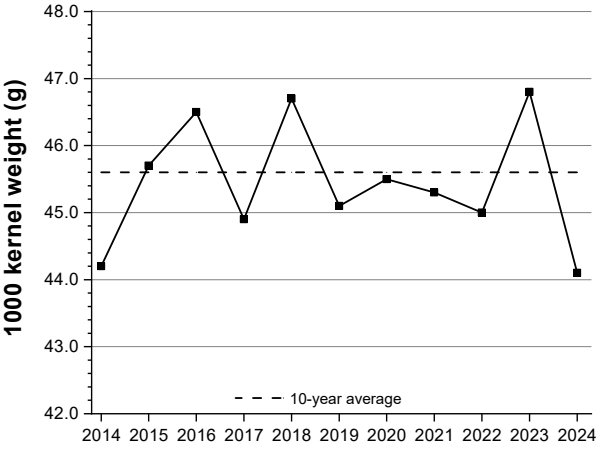


Figure 3.5 Average 1000 kernel weight of barley selected for malting from 2014 to 2024. Values indicate weighted averages based on the tonnage represented by samples.

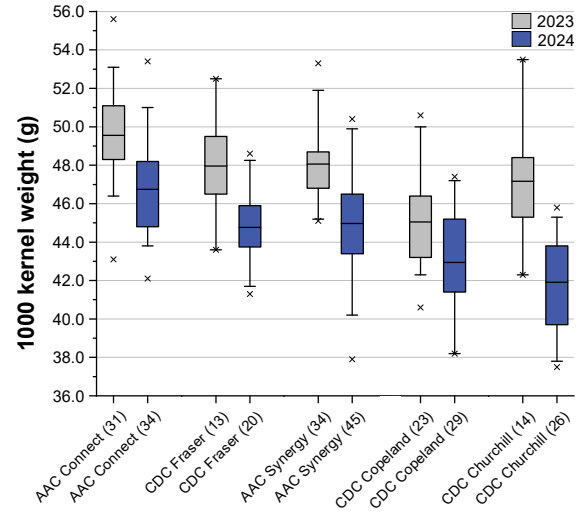


Figure 3.6 Comparison of 1000 kernel weight of barley selected for malting in 2023 and 2024. Sample numbers for each variety are in parentheses.

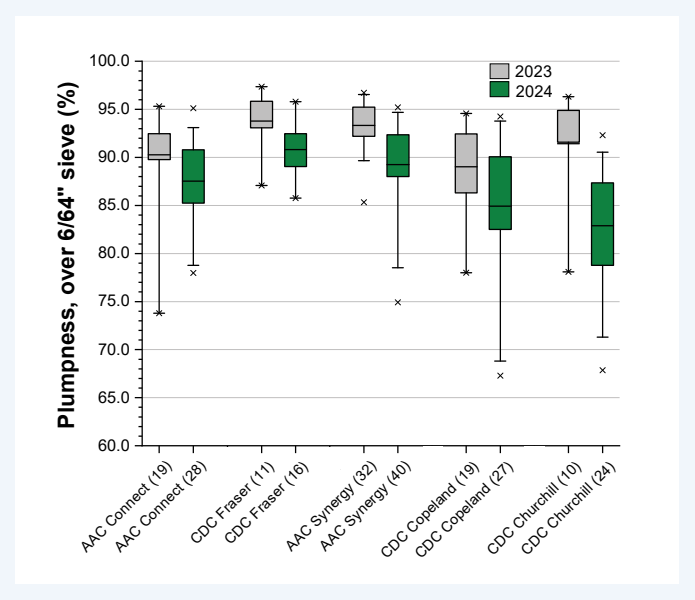


Figure 3.7 Comparison of plumpness of barley selected for malting in 2023 and 2024. Sample numbers for each variety are in parentheses.

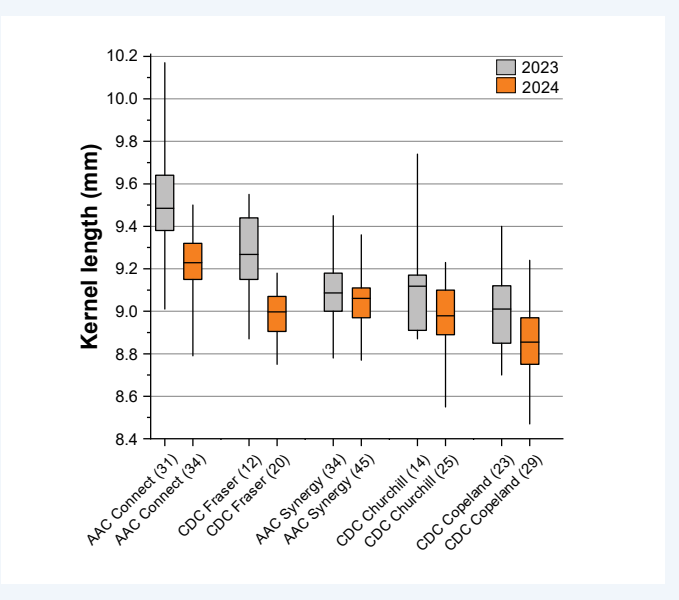


Figure 3.8 Comparison of kernel length of barley selected for malting in 2023 and 2024. Sample numbers for each variety are in parentheses.

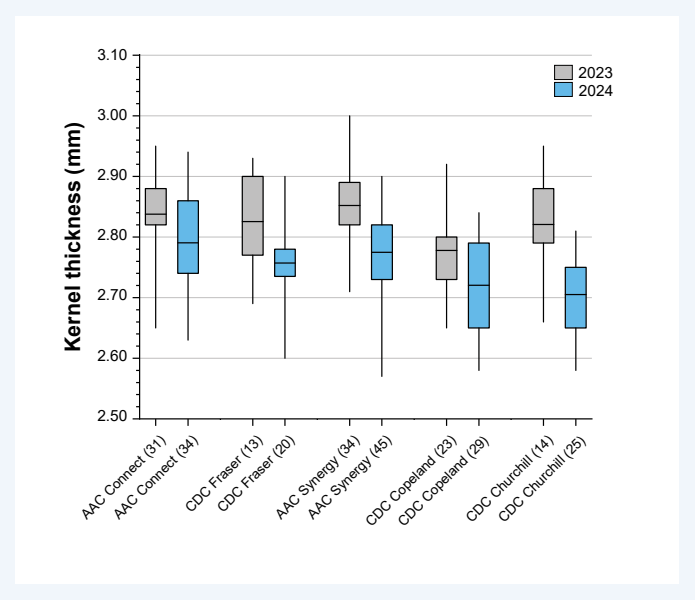


Figure 3.9 Comparison of kernel thickness of barley selected for malting in 2023 and 2024. Sample numbers for each variety are in parentheses

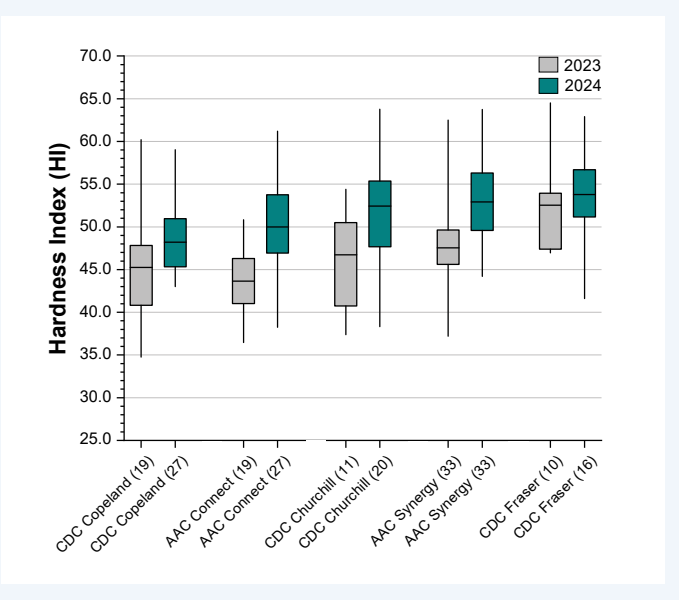


Figure 3.10 Comparison of the kernel hardness index of barley selected for malting in 2023 and 2024. Sample numbers for each variety are indicated in parentheses.

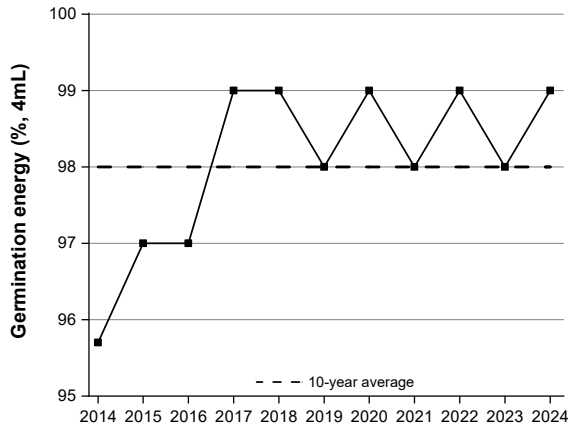


Figure 3.11 Average germination energy (4 mL) of barley selected for malting from 2014 to 2024. Values indicate weighted averages based on the tonnage represented by samples.

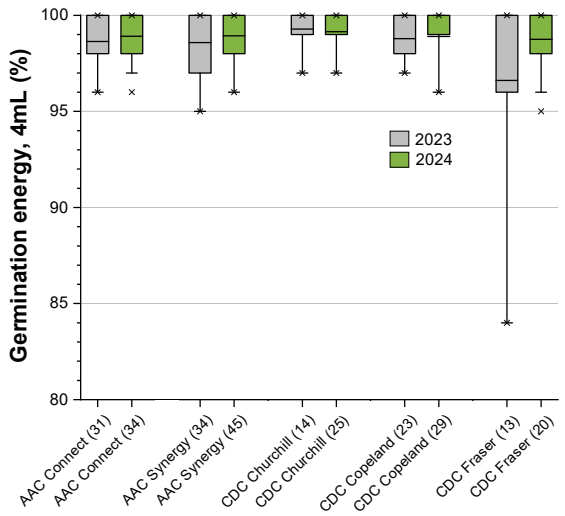


Figure 3.12 Comparison of germination energy of barley selected for malting in 2023 and 2024. Sample numbers for each variety are in parentheses.

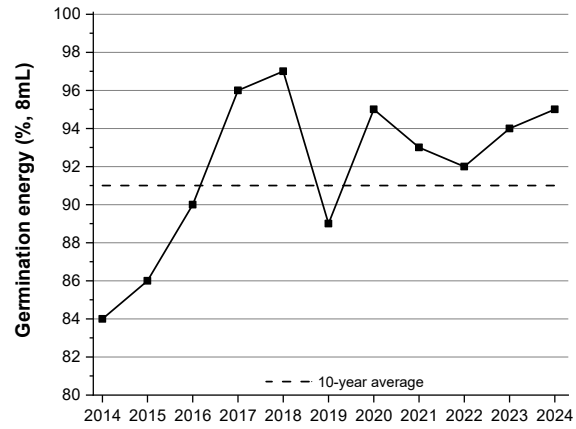


Figure 3.13 Average germination energy (8 mL) of barley selected for malting from 2014 to 2024. Values indicate weighted averages based on the tonnage represented by samples.

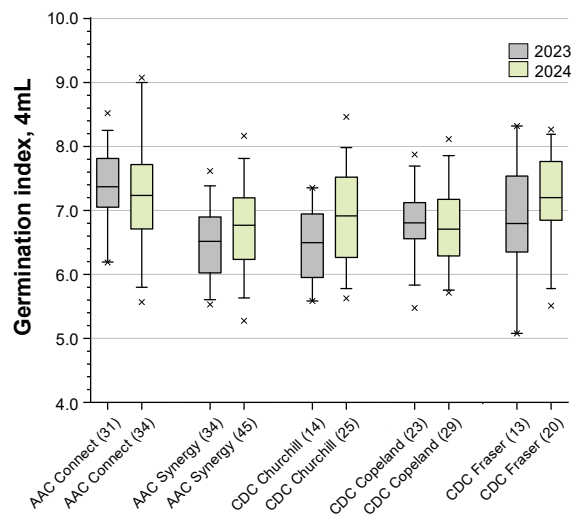


Figure 3.14 Comparison of germination index of barley selected for malting in 2023 and 2024. Sample numbers for each variety are in parentheses.

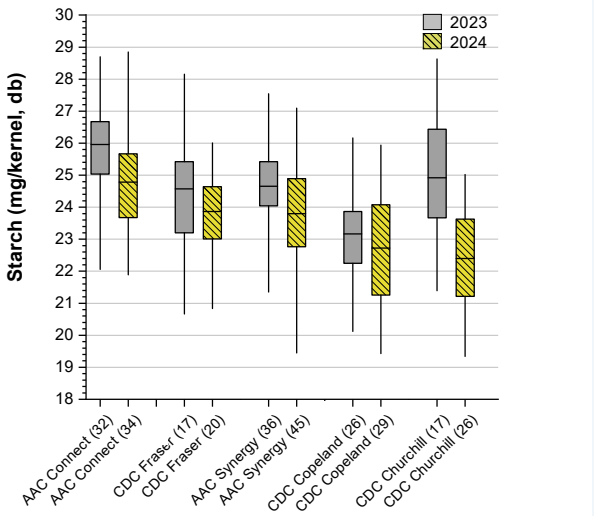


Figure 3.15 Comparison of starch content of barley selected for malting in 2023 and 2024. Starch content is expressed as milligrams per kernel. Sample numbers for each variety are in parentheses.

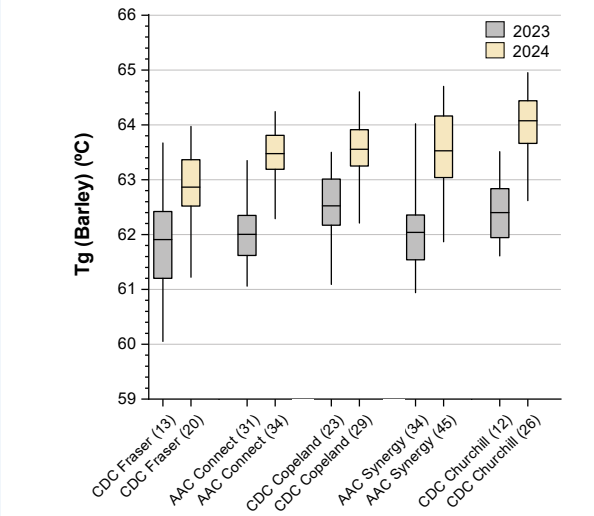


Figure 3.16 Comparison of gelatinization temperature (Tg) of barley selected for malting in 2023 and 2024. Sample numbers for each variety are in parentheses

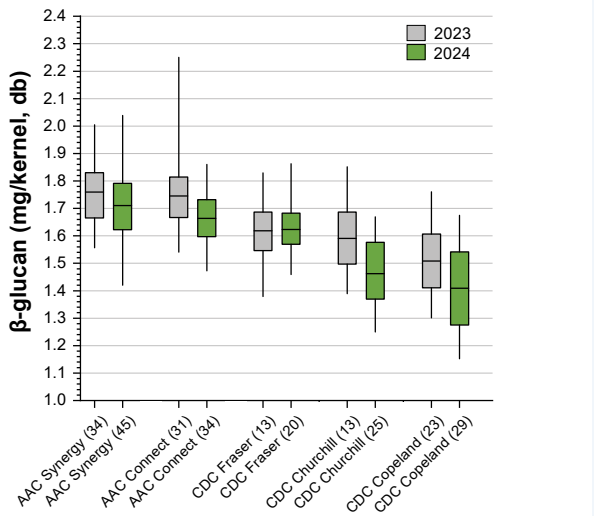


Figure 3.17 Comparison of β-glucan content of barley selected for malting in 2023 and 2024. Beta-glucan content is expressed as milligrams per kernel. Sample numbers for each variety are in parentheses.

3.3 Pre-harvest sprouting

Pre-harvest sprouting can occur when mature grain remains unharvested in the field during prolonged periods of wet weather. One of the enzymes produced very early during germination is α-amylase. Since the level of α-amylase in sound grain is very low compared to that in germinating grain, the content of α-amylase in grain can be used as a marker of germination. Rapid visco analysis (RVA) indirectly estimates the amount of α-amylase in barley by measuring the viscosity of ground barley in water. The viscosity results are expressed in Rapid Visco Units (RVU) which then can be converted to centipoise (cP) (1 RVU = 12 cP).

Barley selectors use RVA to identify sound, moderately and strongly pre-germinated barley, and to manage their supply accordingly. Samples with final viscosity values greater than 120 RVU are considered sound, and the probability that they will retain germination energy after storage is very high. Samples with RVA values of 50 to 120 RVU are moderately pre-germinated while samples with RVA values less than 50 RVU are substantially pre-germinated and have a high probability of losing germination energy during storage. They should be malted as soon as possible. To more accurately predict safe storage time, storage conditions (temperature and relative humidity) and the initial moisture content of the grain must be considered in addition to the RVA values.

This year’s crop was challenged by occasional rainy conditions during harvest in August. The RVA results show that several samples were moderately affected by pre-harvest sprouting (Figure 3.18). The RVA results were higher for barley grown in 2024 compared to 2023. Figure 3.19 compares the RVA results for individual varieties grown in 2023 and 2024. The RVA results stress the need to identify barley with low RVU that should be malted promptly, especially if the moisture content of grain is relatively high. As indicated in the next section of this report, pre-germinated barley malted soon after harvest can produce good quality malt.

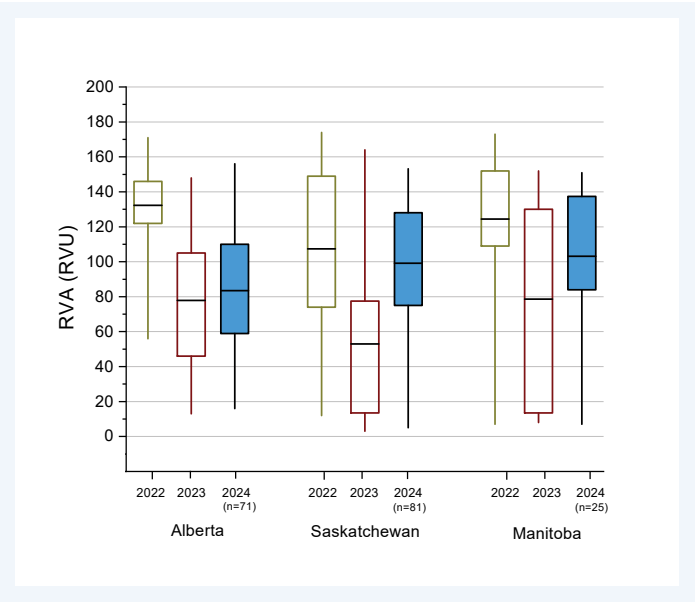


Figure 3.18 Rapid visco analysis (RVA) results for barley selected for malting in 2024 in comparison with previous years. Sample numbers for each variety are in parentheses.

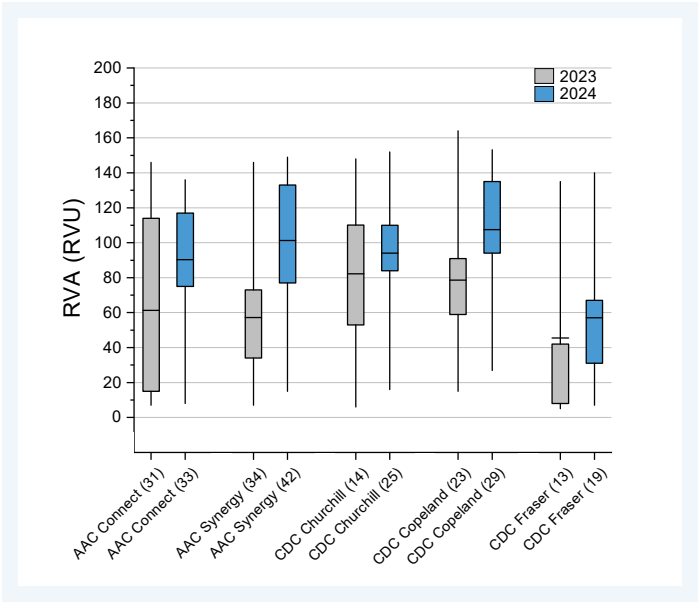


Figure 3.19 Comparison of rapid visco analysis (RVA) results for selected barley varieties in 2023 and 2024. Sample numbers for each variety are in parentheses.

Risk of germination loss in storage	RVA viscosity (RVU)
Low	≥120
Intermediate	50-120
High	<50

3.4 Malting conditions and methodologies

Initial malting trials indicated that barley from 2024 absorbed water relatively easily and quickly during steeping. Several factors contributed to somewhat faster water absorption, including lower test weight, kernel density, plumpness, and smaller kernel size. These factors were, however, counterbalanced by a higher grain hardness and slightly higher protein content in 2024 barley. Consequently, only the second wet steeping cycle was reduced to 6 hours from the 7 hours used in 2023. Like last year, the steeping temperature was 14ºC and the entire germination process (96 hours) was conducted at 15ºC. The kilning steps were conducted according to the same schedules as in 2023. All the analytical methods used to assess barley, malt and wort quality in this survey are listed in Appendix I.

Table 3.1 Comparison of micromalting conditions used with the Grain Research Laboratory Phoenix Micromalting System in 2022, 2023 and 2024

	2022	2023	2024
Steeping, 1st wet cycle	9 h	8 h	8 h
Steeping, 1st dry cycle	14 h	15 h	15 h
Steeping, 2nd wet cycle	9 h	7 h	6 h
Steeping, 2nd dry cycle	14 h	14 h	14 h
Steeping, temperature	14°C	14°C	14°C
Germination	96 h at 15°C	96 h at 15°C	96 h at 15°C
Kilning	12 h at 60-65°C, 6 h at 65°C, 2 h at 75°C, 5 h at 83-85 °C, 2 h at 60°C, 2 h at 40°C	12 h at 60-65°C, 6 h at 65°C, 2 h at 75°C, 5 h at 83-85 °C, 2 h at 60°C, 2 h at 40°C	12 h at 60-65°C, 6 h at 65°C, 2 h at 75°C, 5 h at 83-85°C, 2 h at 60°C, 2 h at 40°C

GRL photo collection: cages with germinated barley during malting.

3.5 Malting quality in 2024: varietal and yearly comparisons

Figures 3.20 to 3.29 compare the average malt proteins, fine extract, malt diastatic power, malt α-amylase, wort free amino nitrogen (FAN), and wort β-glucans values for varieties evaluated annually in our survey since 2019. Values shown in the graphs represent the arithmetic averages and the number of samples from 2024 are in parentheses after variety names.

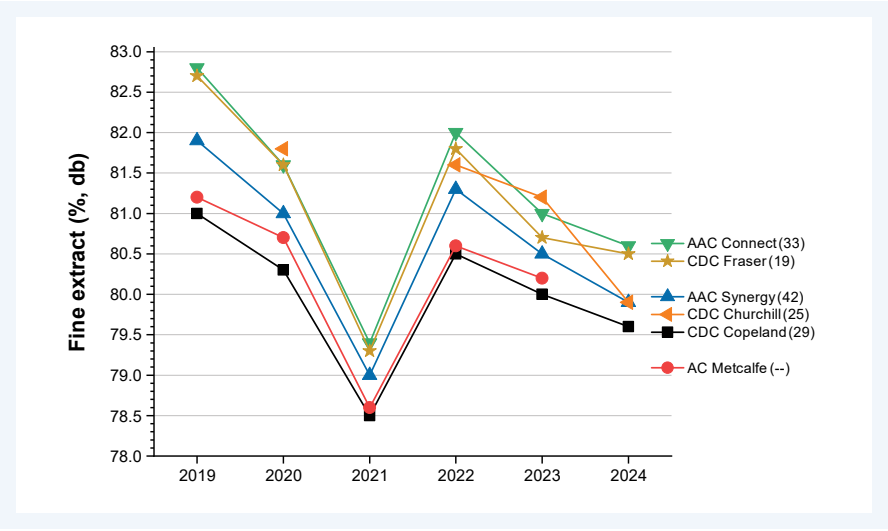


Figure 3.20 Comparison of the average extract levels from the malt of selected barley varieties from 2019 to 2024.

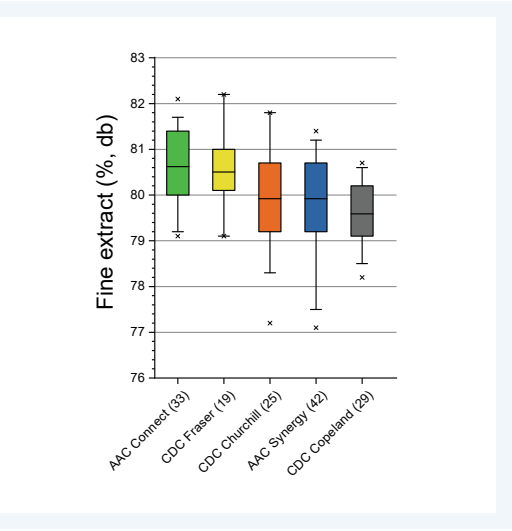


Figure 3.21 Comparison of extract levels from the malt of selected barley varieties grown in 2024.

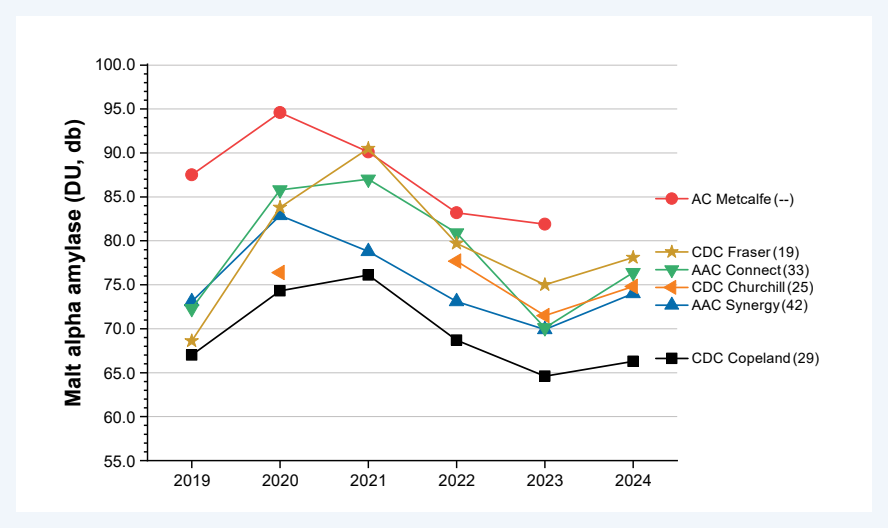


Figure 3.22 Comparison of the average α-amylase in the malt of selected barley varieties from 2019 to 2024.

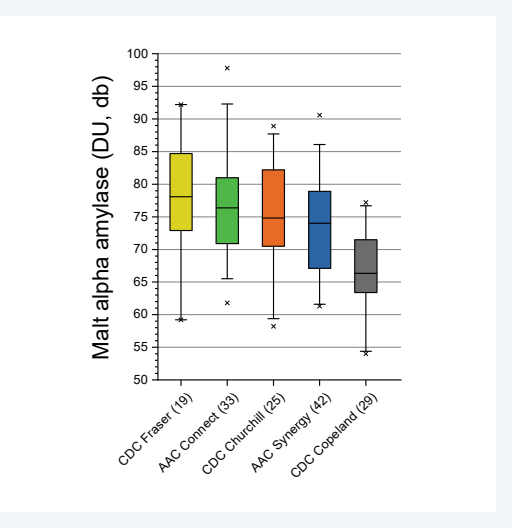


Figure 3.23 Comparison of α-amylase levels in the malt of selected barley varieties grown in 2024.

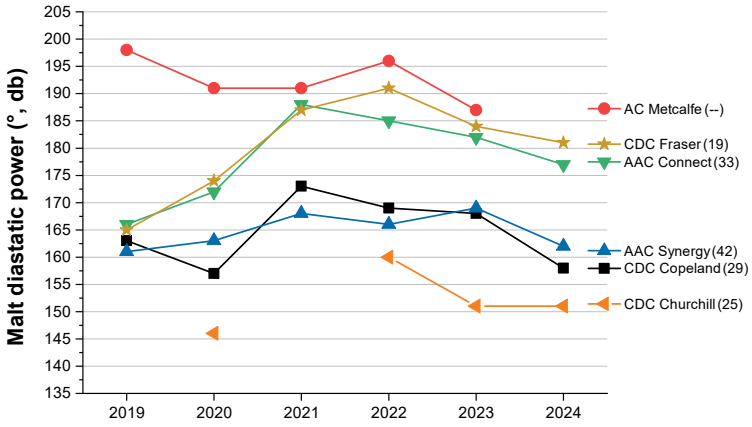


Figure 3.24 Comparison of the average diastatic power in the malt of selected barley varieties from 2019 to 2024.

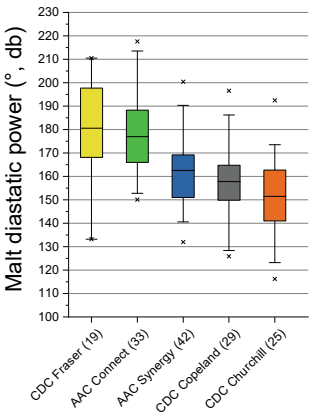


Figure 3.25 Comparison of diastatic power in the malt of selected barley varieties grown in 2024.

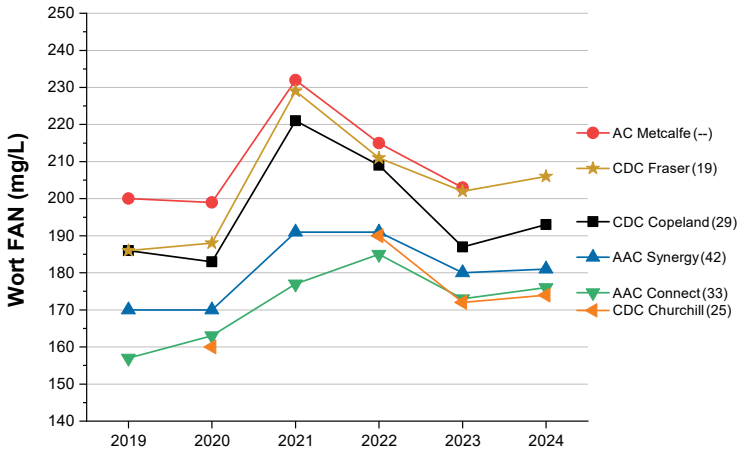


Figure 3.26 Comparison of the average FAN level in wort produced from the malt of selected barley varieties from 2019 to 2024.

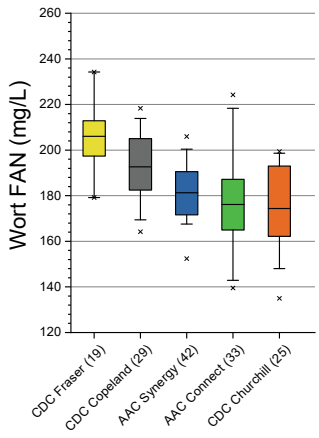


Figure 3.27 Comparison of FAN levels in wort produced by the malt of selected barley varieties grown in 2024.

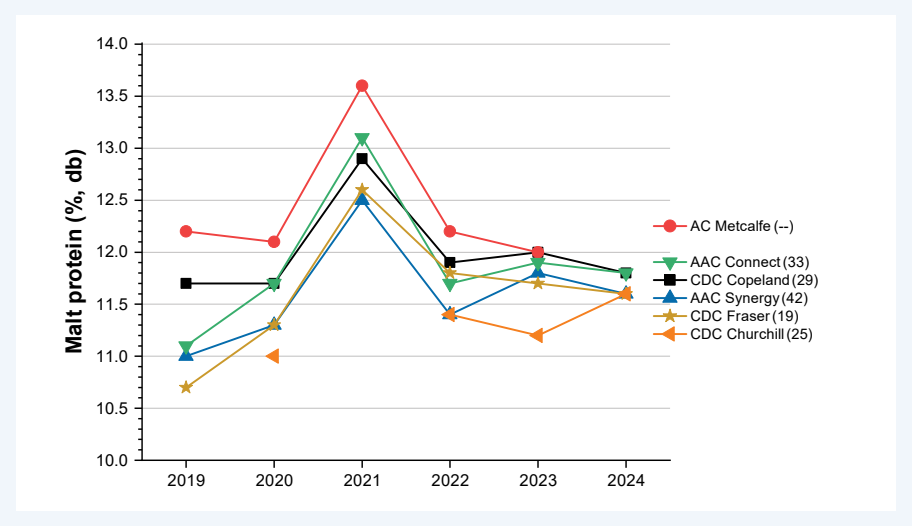


Figure 3.28 Comparison of the average protein concentration in the malt of selected barley varieties from 2019 to 2024.

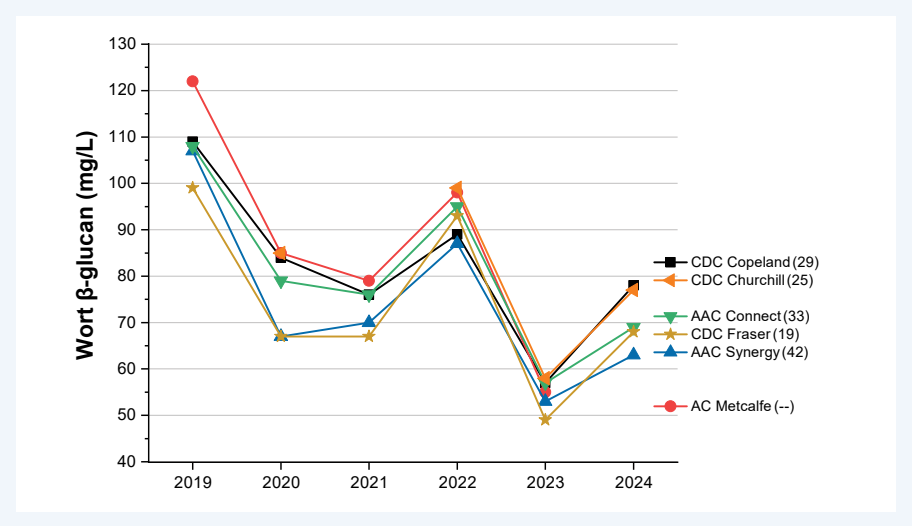


Figure 3.29 Comparison of the average β-glucan concentration in wort produced from the malt of selected barley varieties from 2019 to 2024.

3.6 Highlights of malting barley quality in 2024

- In 2024, the cool, wet conditions at the beginning of the growing season substantially improved soil moisture and gave the barley crop a good start. Excessive heat in July, however, negatively affected yield and substantially affected the physical characteristics and composition of barley grain in 2024.

- The average test weight was 64.7 kg/hL, which is lower than the 2023 average (65.0 kg/hL) and lower than the 10-year average (66.6 kg/hL). The average 1000 kernel weight in 2024 was 44.1 g, which is substantially lower than the 10-year average (45.6 g). Reduced kernel plumpness in 2024 was associated with a lower starch content in the grain. The average level of barley proteins (12.2%) in 2024 was, however, similar to last year's, and only slightly higher than the 10-year average (12.0%).

- Occasional rain in August in parts of Alberta and Saskatchewan caused some pre-harvest sprouting in this year's barley. In the fall of 2024, however, barley exhibited an excellent average germination energy (99%), a high germination index and no water sensitivity.

- The combination of lower test weight, lower grain density, and smaller kernel size in 2024 barley contributed to relatively easy and quick water absorption during steeping and good modification during germination. This resulted in the production of well-modified malt with high friability and ample levels of enzymes (diastatic power and α-amylase), soluble proteins and free amino nitrogen (FAN). Wort from 2024 barley had low levels of β-glucans and very good (low) viscosity values.

- The smaller, lighter and thinner kernels of 2024 barley negatively affected the malt extract. Malt made from 2024 barley produced lower than expected levels of extract with substantial differences in extract levels among different Canadian malting varieties.

Part 4: Quality data for individual varieties

AAC Synergy

In 2024, AAC Synergy continued as the most popular malting barley variety seeded in western Canada. AAC Synergy is a high-yielding variety that is characterized by relatively high kernel weight and plumpness, and relatively low grain protein content. AAC Synergy has shorter and stronger straw than AC Metcalfe and CDC Copeland. It is resistant to spotted net blotch, netted net blotch and spot blotch. AAC Synergy has a desirable malting quality profile with high malt extract, good protein modification, low levels of wort β-glucans, and intermediate levels of starch-degrading enzymes. Overall, AAC Synergy's excellent combination of agronomic traits and malting quality makes it a desirable two-rowed malting barley variety for western Canadian producers and the malting and brewing industry.

CDC Copeland

The area seeded with CDC Copeland continued to decrease in 2024, but CDC Copeland remained the second most popular malting variety seeded in 2024. Its excellent brewing characteristics, combined with protein and enzyme levels that are lower than AC Metcalfe, provide an excellent balance among malting barley varieties.

AAC Connect

The area seeded with AAC Connect in 2024 was similar to last year. AAC Connect, registered in 2016, has excellent agronomic traits and disease resistance. AAC Connect has a very good yield potential, typically 11% higher than AC Metcalfe and 5% higher than CDC Copeland. Compared to AC Metcalfe and CDC Copeland, it has shorter, stronger straw and heavier, plumper kernels. Its maturity date is similar to that of AC Metcalfe. It is resistant to spotted net blotch, surface-borne smuts and stem rust, and moderately resistant to Fusarium head blight (FHB). This variety offers high extract, moderate to high enzymes and relatively low FAN levels, as well as good brewhouse performance and fermentability.

CDC Fraser

CDC Fraser, registered in 2016, is a high yielding variety with shorter, stronger straw and excellent lodging resistance. Its yields are 14% higher than AC Metcalfe and 8% higher than CDC Copeland. Its maturity date is similar to that of CDC Copeland. High kernel weight and plumpness and good resistance to spot blotch and spotted net blotch characterize CDC Fraser. This variety offers high extract, high enzyme activity and high FAN levels.

CDC Churchill

CDC Churchill is a recently registered variety (2019), whose seeded area increased drastically this year. It is a high yielding variety (3% higher than AAC Synergy). Its maturity date is comparable to that of CDC Copeland. It has shorter, stronger straw with good lodging resistance. It is a variety with low grain protein, low to moderate levels of malt enzymes and high extract potential. CDC Churchill is moderately resistant to spot form net blotch and net form net blotch. It is moderately susceptible to Fusarium head blight (FHB).

Newdale

Newdale is an older malting variety that continues to represent a small, but consistent, share of barley selected for malting each year. With good friability and low levels of β-glucan, it performs well in the brewhouse. Its moderate levels of enzymes, soluble protein and FAN make Newdale well suited for all-malt brewing.

AAC Prairie

AAC Prairie is a newly registered (2022) two-row malting barley that is currently in the market development stage. AAC Prairie has a malting profile similar to AC Metcalfe. The western Cooperative and Collaborative registration trials indicated that this variety has moderate protein content, very high enzymatic activity, high FAN levels and low wort β-glucan levels. It has a good yield potential, shorter straw and good lodging resistance. AAC Prairie is moderately resistant to surface-borne smuts, stem rust and net-form net blotch.

Sirish

Sirish is two-row barley with good yield potential, very short plant height and excellent standability. It was registered in 2017. Sirish has excellent plumpness and test weight, and its low height and structure offer great harvestability and easy straw management for both feed and malt producers. Sirish is moderately resistant to scald and common root rot; moderately resistant to moderately susceptible to Fusarium head blight and spot blotch; moderately susceptible to net blotch spot-form; and susceptible to stem rust. Sirish is a European style, low protein variety with a quality profile suited to the craft brewing market. Sirish is characterized by relatively low levels of malt enzymes, low wort β-glucans, low levels of soluble proteins and FAN, and good extract. Currently, Sirish is used primarily for feed.

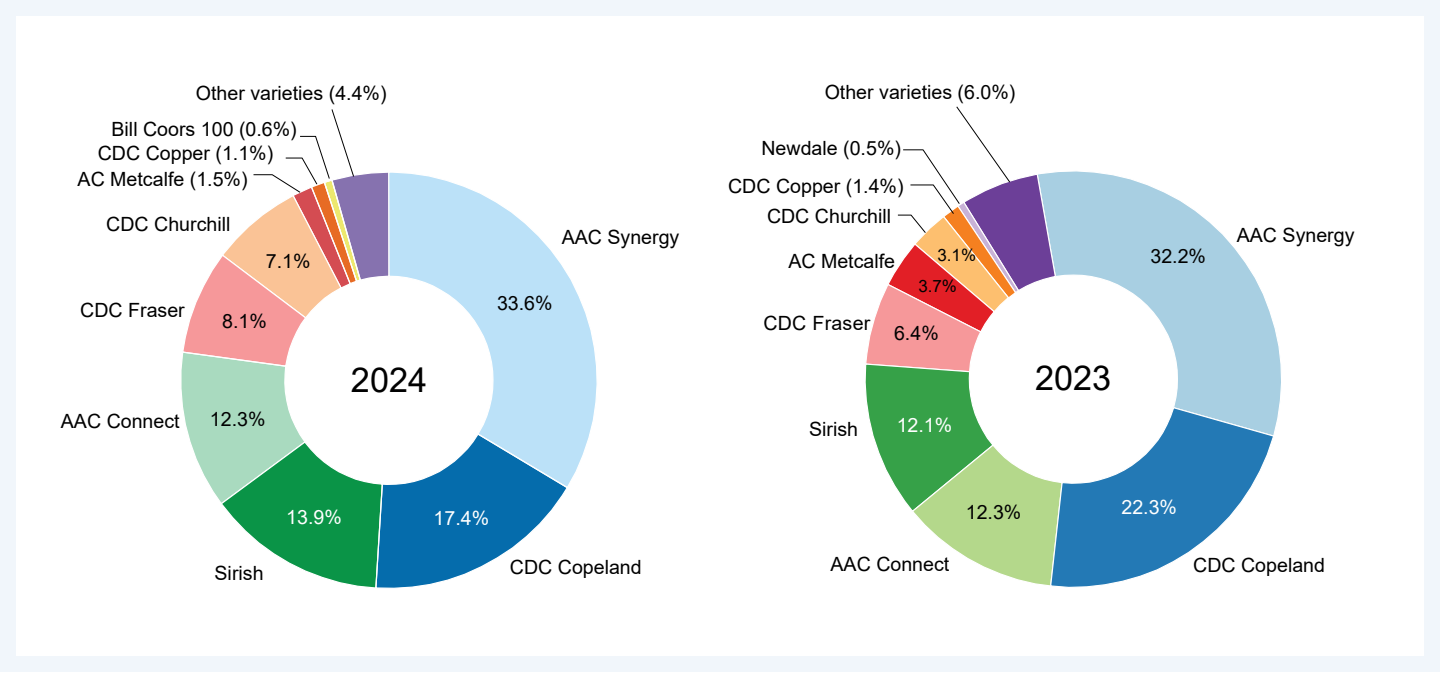


Figure 4.1 Distribution of malting barley varieties as a percentage (%) of area seeded with malting barley in western Canada in 2024 and 2023.

AAC Synergy

Table 4.1 Quality data for AAC Synergy malting barley

Quality parameter	Alberta	Saskatchewan	Manitoba	Western Canada		
Year	**2024**	**2024**	**2024**	**2024**		**2019-2023**
Number of samples	19	22	5	46		-
Tonnage represented by samples (thousands of tonnes)[a]	239	446	5	690		-
Barley	**Avg_w[b]**	**Avg_w**	**Avg_w**	**Avg_w**	**Range**	**5-year avg**
Test weight (kg/hL)	64.9	65.9	65.0	**65.5**	60.4-69.0	66.3
1000 kernel weight (g)	44.4	45.2	46.0	**44.9**	37.9-50.4	47.4
Plump, over 7/64" sieve (%)	57.2	60.4	65.2	**59.3**	29.0-75.0	65.2[d]
Plump, over 6/64" sieve (%)	88.6	90.6	92.2	**89.9**	74.9-95.2	92.1[d]
Moisture[c] (%)	11.7	12.2	13.2	**12.0**	10.7-14.5	12.2
Protein (%, db)	12.0	11.8	11.6	**11.9**	10.5-13.9	12.0
Germination, 4 mL (%)	99	99	99	**99**	96-100	98
Germination, 8 mL (%)	96	95	94	**95**	84-99	91
Malt						
Yield (%)	90.2	90.5	90.1	**90.4**	88.7-92.7	90.5
Steep-out moisture (%)	45.9	45.6	46.5	**45.7**	44.1-47.6	46.2
Friability (%)	80.8	81.7	88.3	**81.5**	90.1-97.5	72.7
Moisture (%)	4.7	4.8	5.2	**4.8**	4.1-6.0	4.9
Protein (%, db)	11.7	11.4	10.9	**11.5**	9.7-13.4	11.7
Diastatic power (°, db)	160	160	150	**160**	132-200	165
α-Amylase (DU, db)	75.7	78.0	70.5	**77.2**	61.3-90.6	76.8
Wort						
Fine grind extract (F) (%, db)	79.8	80.4	80.2	**80.2**	77.1-81.4	80.7
Coarse grind extract (C) (%, db)	79.4	79.8	79.8	**79.7**	76.3-81.4	80.2
F-C difference (%, db)	0.4	0.6	0.4	**0.5**	0.1-1.2	0.5
ß-Glucan (mg/L)	67	73	49	**71**	32-117	76
Viscosity (cP)	1.40	1.41	1.40	**1.41**	1.37-1.43	1.42
Soluble protein (%, db)	4.89	4.83	4.83	**4.85**	4.29-5.22	4.87
Ratio S/T (%)	42.2	42.2	44.5	**42.2**	34.8-49.6	41.7
FAN (mg/L)	186	182	198	**184**	152-206	180
Colour (°)	2.0	2.0	2.2	**2.0**	1.6-2.3	1.9

[a] Indicates weight of selected barley represented in this survey and does not represent weight of commercially selected barley.
[b] Values are weighted averages (Avg_w) based on tonnage represented by samples received.
[c] Moisture values are not representative of new crop moisture levels as samples were not collected or stored in moisture-proof containers.
[d] Indicates the 2023 average.

db = dry basis; DU = dextrinizing units; S/T = soluble protein/total protein; cP = centipoise.

CDC Copeland

Table 4.2 Quality data for CDC Copeland malting barley

Quality parameter	Alberta	Saskatchewan	Manitoba	Western Canada		
Year	**2024**	**2024**	**2024**	**2024**		**2019-2023**
Number of samples	11	18	3	32		-
Tonnage represented by samples (thousands of tonnes)[a]	105	138	12	255		-
Barley	**Avg_w[b]**	**Avg_w**	**Avg_w**	**Avg_w**	**Range**	**5-year avg**
Test weight (kg/hL)	63.7	64.9	64.4	**64.4**	60.1-66.2	65.4
1000 kernel weight (g)	41.6	42.2	38.4	**41.8**	37.2-47.4	44.3
Plump, over 7/64" sieve (%)	41.7	43.8	30.3	**42.9**	6.1-65.7	50.3[d]
Plump, over 6/64" sieve (%)	82.0	84.6	85.4	**83.5**	67.3-94.2	89.1[d]
Moisture[c] (%)	11.7	12.1	12.0	**11.9**	10.9-16.1	12.1
Protein (%, db)	12.4	11.9	13.2	**12.2**	10.7-13.5	12.2
Germination, 4 mL (%)	99	98	100	**99**	96-100	98
Germination, 8 mL (%)	96	94	95	**95**	88-100	94
Malt						
Yield (%)	90.6	90.4	90.5	**90.5**	88.0-92.7	90.5
Steep-out moisture (%)	45.7	45.2	46.0	**45.5**	44.3-47.0	45.8
Friability (%)	82.7	82.8	80.9	**82.6**	78.2-80.7	76.8
Moisture (%)	4.4	4.6	4.4	**4.5**	3.6-5.8	4.6
Protein (%, db)	12.1	11.7	12.8	**11.9**	10.5-13.0	12.2
Diastatic power (°, db)	157	159	176	**159**	126-197	168
α-Amylase (DU, db)	65.5	67.5	76.7	**67.2**	54.0-77.2	71.6
Wort						
Fine grind extract (F) (%, db)	79.5	80.1	79.1	**79.8**	78.2-80.7	80.0
Coarse grind extract (C) (%, db)	78.6	79.2	78.3	**78.9**	77.4-80.1	79.4
F-C difference (%, db)	0.9	0.9	0.8	**0.9**	0-1.3	0.6
ß-Glucan (mg/L)	83	85	93	**85**	38-129	85
Viscosity (cP)	1.42	1.42	1.44	**1.42**	1.39-1.44	1.43
Soluble protein (%, db)	5.15	4.96	5.19	**5.01**	4.39-5.41	5.08
Ratio S/T (%)	42.6	43.2	42.8	**42.6**	37.6-46.8	41.6
FAN (mg/L)	193	194	191	**193**	164-218	198
Colour (°)	2.0	2.0	2.1	**2.0**	1.7-2.4	2.0

[a] Indicates weight of selected barley represented in this survey and does not represent weight of commercially selected barley.
[b] Values are weighted averages (Avg_w) based on tonnage represented by samples received.
[c] Moisture values are not representative of new crop moisture levels as samples were not collected or stored in moisture-proof containers.
[d] Indicates the 2023 average.

db = dry basis; DU = dextrinizing units; S/T = soluble protein/total protein; cP = centipoise.

AAC Connect

Table 4.3 Quality data for AAC Connect malting barley

Quality parameter	Alberta	Saskatchewan	Manitoba	Western Canada		
Year	**2024**	**2024**	**2024**	**2024**		**2019-2023**
Number of samples	11	19	4	34		-
Tonnage represented by samples (thousands of tonnes)[a]	113	144	4	309		-
Barley	**Avg_w[b]**	**Avg_w**	**Avg_w**	**Avg_w**	**Range**	**5-year avg**
Test weight (kg/hL)	64.3	65.9	65.6	**65.3**	63.0-69.3	66.6
1000 kernel weight (g)	44.5	46.2	46.4	**45.6**	42.1-53.4	48.7
Plump, over 7/64" sieve (%)	30.9	36.3	46.2	**36.4**	7.5-55.9	51.2[d]
Plump, over 6/64" sieve (%)	81.9	86.4	88.6	**85.6**	78.0-95.1	90.8[d]
Moisture[c] (%)	12.4	12.1	13.5	**12.3**	11.1-14.9	12.5
Protein (%, db)	13.0	12.2	11.6	**12.5**	11.1-14.0	12.2
Germination, 4 mL (%)	98	99	99	**99**	96-100	98
Germination, 8 mL (%)	96	94	91	**95**	86-100	93
Malt						
Yield (%)	90.3	89.6	90.6	**89.8**	87.7-92.2	90.4
Steep-out moisture (%)	45.5	45.2	45.4	**45.3**	43.9-48.3	45.7
Friability (%)	84.5	86.0	92.3	**85.5**	73.3-97.8	77.1
Moisture (%)	4.5	4.6	4.6	**4.6**	3.9-5.8	4.9
Protein (%, db)	12.2	11.7	11.1	**11.9**	10.5-13.0	12.1
Diastatic power (°, db)	179	174	165	**177**	150-218	183
α-Amylase (DU, db)	76.7	79.7	80.2	**78.7**	61.8-97.8	82.0
Wort						
Fine grind extract (F) (%, db)	80.1	80.9	81.6	**80.6**	79.1-82.1	81.3
Coarse grind extract (C) (%, db)	79.6	80.4	81.1	**80.1**	78.3-81.4	80.7
F-C difference (%, db)	0.5	0.5	0.5	**0.5**	0.1-1.3	0.6
ß-Glucan (mg/L)	76	72	62	**73**	36-124	82
Viscosity (cP)	1.40	1.41	1.41	**1.40**	1.38-1.43	1.42
Soluble protein (%, db)	5.03	5.06	5.29	**5.05**	4.26-5.53	4.89
Ratio S/T (%)	41.3	43.1	47.4	**42.5**	36.0-51.1	40.6
FAN (mg/L)	178	188	213	**185**	140-224	175
Colour (°)	1.9	2.0	2.1	**2.0**	1.7-2.8	1.9

[a] Indicates weight of selected barley represented in this survey and does not represent weight of commercially selected barley.
[b] Values are weighted averages (Avg_w) based on tonnage represented by samples received.
[c] Moisture values are not representative of new crop moisture levels as samples were not collected or stored in moisture-proof containers.
[d] Indicates the 2023 average.

db = dry basis; DU = dextrinizing units; S/T = soluble protein/total protein; cP = centipoise.

CDC Fraser

Table 4.4 Quality data for CDC Fraser malting barley

Quality parameter	Alberta	Saskatchewan	Manitoba	Western Canada		
Year	**2024**	**2024**	**2024**	**2024**		**2019-2023**
Number of samples	8	7	4	19		-
Tonnage represented by samples (thousands of tonnes)[a]	59	83	7	171		-
Barley	**Avg_w[b]**	**Avg_w**	**Avg_w**	**Avg_w**	**Range**	**5-year avg**
Test weight (kg/hL)	63.8	64.8	64.6	**64.5**	62.5-67.4	65.7
1000 kernel weight (g)	44.7	44.3	42.8	**44.7**	41.3-48.6	47.4
Plump, over 7/64" sieve (%)	58.5	55.0	47.4	**57.5**	47.4-65.8	62.2[d]
Plump, over 6/64" sieve (%)	91.0	89.4	91.4	**90.5**	85.8-95.8	91.1[d]
Moisture[c] (%)	11.6	11.7	13.1	**11.8**	10.5-14.5	12.6
Protein (%, db)	12.0	12.1	13.2	**12.1**	11.1-13.8	11.9
Germination, 4 mL (%)	98	99	100	**99**	95-100	98
Germination, 8 mL (%)	92	91	93	**92**	86-99	89
Malt						
Yield (%)	89.6	89.3	90.3	**89.6**	88.6-92.2	89.3
Steep-out moisture (%)	46.3	45.8	45.7	**45.8**	43.8-47.6	46.9
Friability (%)	87.9	86.6	85.8	**86.7**	80.3-95.3	84.4
Moisture (%)	4.8	4.9	4.9	**4.9**	4.4-5.5	4.9
Protein (%, db)	11.6	11.7	12.7	**11.7**	10.6-13.5	11.8
Diastatic power (°, db)	186	191	191	**188**	133-211	180
α-Amylase (DU, db)	80.3	82.2	83.0	**80.6**	59.2-92.2	79.9
Wort						
Fine grind extract (F) (%, db)	80.5	80.6	79.4	**80.5**	79.1-82.2	81.1
Coarse grind extract (C) (%, db)	80.2	79.9	78.5	**80.0**	78.0-81.7	80.7
F-C difference (%, db)	0.3	0.7	0.9	**0.5**	0.0-1.3	0.4
ß-Glucan (mg/L)	61	72	77	**72**	44-111	76
Viscosity (cP)	1.40	1.41	1.42	**1.41**	1.39-1.45	1.42
Soluble protein (%, db)	5.01	5.10	5.41	**5.09**	4.73-5.43	5.16
Ratio S/T (%)	43.2	43.7	42.8	**43.5**	40.2-49.2	43.9
FAN (mg/L)	200	207	203	**203**	179-234	204
Colour (°)	2.1	2.2	2.1	**2.2**	1.8-2.8	2.2

[a] Indicates weight of selected barley represented in this survey and does not represent weight of commercially selected barley.
[b] Values are weighted averages (Avg_w) based on tonnage represented by samples received.
[c] Moisture values are not representative of new crop moisture levels as samples were not collected or stored in moisture-proof containers.
[d] Indicates the 2023 average.

db = dry basis; DU = dextrinizing units; S/T = soluble protein/total protein; cP = centipoise.

CDC Churchill

Table 4.5 Quality data for CDC Churchill malting barley

Quality parameter	Alberta	Saskatchewan	Manitoba	Western Canada		
Year	**2024**	**2024**	**2024**	**2024**		**2020-2023**
Number of samples	13	7	6	26		-
Tonnage represented by samples (thousands of tonnes)[a]	79	53	12	157		-
Barley	**Avg_w[b]**	**Avg_w**	**Avg_w**	**Avg_w**	**Range**	**4-year avg**
Test weight (kg/hL)	63.5	65.9	66.4	**64.8**	60.9-68.0	67.1
1000 kernel weight (g)	40.2	42.2	42.0	**41.3**	37.5-45.8	46.0
Plump, over 7/64" sieve (%)	31.3	34.8	25.5	**32.7**	15.5-53.4	55.5[d]
Plump, over 6/64" sieve (%)	79.8	84.2	81.1	**82.0**	67.9-92.3	91.8[d]
Moisture[c] (%)	12.0	12.7	14.4	**12.4**	11.0-15.0	11.9
Protein (%, db)	12.1	11.8	12.5	**12.0**	10.8-13.9	12.0
Germination, 4 mL (%)	99	98	98	**99**	97-100	98
Germination, 8 mL (%)	96	91	91	**94**	86-99	89
Malt						
Yield (%)	90.2	90.6	90.4	**90.4**	89.0-92.7	90.7
Steep-out moisture (%)	46.2	45.4	44.6	**45.7**	43.1-47.6	45.6
Friability (%)	83.2	83.4	82.7	**82.9**	67.8-92.0	79.0
Moisture (%)	5.0	4.8	4.9	**4.9**	4.0-6.1	4.8
Protein (%, db)	11.8	11.4	12.0	**11.6**	10.3-13.5	12.0
Diastatic power (°, db)	156	159	156	**155**	116-193	161
α-Amylase (DU, db)	79.4	81.3	76.1	**78.5**	58.2-88.9	78.5
Wort						
Fine grind extract (F) (%, db)	79.5	80.6	79.9	**80.0**	77.2-81.8	80.9
Coarse grind extract (C) (%, db)	79.0	79.9	78.9	**79.4**	76.8-81.0	80.2
F-C difference (%, db)	0.5	0.7	1.0	**0.6**	0.0-1.8	0.6
ß-Glucan (mg/L)	70	72	95	**77**	52-156	85
Viscosity (cP)	1.40	1.41	1.42	**1.41**	1.38-1.45	1.42
Soluble protein (%, db)	4.58	4.84	4.78	**4.68**	4.04-5.34	4.79
Ratio S/T (%)	38.8	42.6	39.9	**40.3**	34.0-43.7	40.5
FAN (mg/L)	178	193	158	**181**	135-199	174
Colour (°)	1.8	1.8	1.8	**1.8**	1.6-2.2	1.9

[a] Indicates weight of selected barley represented in this survey and does not represent weight of commercially selected barley.
[b] Values are weighted averages (Avg_w) based on tonnage represented by samples received.
[c] Moisture values are not representative of new crop moisture levels as samples were not collected or stored in moisture-proof containers.
[d] Indicates the 2023 average.

db = dry basis; DU = dextrinizing units; S/T = soluble protein/total protein; cP = centipoise.

Newdale

Table 4.6 Quality data for Newdale malting barley

Quality parameter	Western Canada		
Year	**2024**		**2019-2023**
Number of samples	4		-
Barley	**Avg[a]**	**Range**	**5-year avg**
Test weight (kg/hL)	**63.2**	59.4-67.0	65.0
1000 kernel weight (g)	**42.6**	41.1-44.1	46.1
Plump, over 7/64" sieve (%)	**44.2**	34.7-44.2	53.7[c]
Plump, over 6/64" sieve (%)	**87.8**	83.6-92.0	91.6[c]
Moisture[b] (%)	**14.2**	14.0-14.4	13.2
Protein (%, db)	**12.5**	12.0-12.9	11.9
Germination, 4 mL (%)	**99**	99-100	98
Germination, 8 mL (%)	**91**	86-97	84
Malt			
Yield (%)	**89.2**	87.8-90.5	90.1
Steep-out moisture (%)	**46.9**	46.0-47.8	46.7
Friability (%)	**86.6**	81.4-91.7	77.4
Moisture (%)	**5.0**	4.8-5.1	5.0
Protein (%, db)	**11.7**	11.7-12.2	11.7
Diastatic power (°, db)	**164**	161-168	162
α-Amylase (DU, db)	**79.2**	78.6-79.7	73.2
Wort			
Fine grind extract (F) (%, db)	**79.5**	79.1-79.8	80.1
Coarse grind extract (C) (%, db)	**78.7**	78.3-79.0	79.5
F-C difference (%, db)	**0.8**	0.8-0.8	0.6
ß-Glucan (mg/L)	**98**	40-155	96
Viscosity (cP)	**1.40**	1.37-1.43	1.40
Soluble protein (%, db)	**4.67**	4.56-4.77	4.67
Ratio S/T (%)	**40.2**	39.3-41.1	40.1
FAN (mg/L)	**161**	152-170	171
Colour (°)	**2.1**	1.8-2.3	2.0

[a] Values represent the arithmetic averages (Avg) of samples analysed.
[b] Moisture values are not representative of new crop moisture levels as samples were not collected or stored in moisture-proof containers.
[c] Indicates the 2023 average.

db = dry basis; DU = dextrinizing units; S/T = soluble/total protein; cP = centipoise

AAC Prairie[a]

Table 4.7 Quality data for AAC Prairie malting barley

Quality parameter	Western Canada			
Year	**2024**		**2023**	
Number of samples	2		3	
Barley	**Avg[b]**	**Range**	**Avg[b]**	**Range**
Test weight (kg/hL)	**66.5**	63.6-59.3	70.5	70.2-71.0
1000 kernel weight (g)	**42.3**	39.6-45.0	49.4	48.2-50.3
Plump, over 7/64" sieve (%)	**48.6**	37.6-59.6	66.5	63.5-69.5
Plump, over 6/64" sieve (%)	**86.5**	82.8-90.2	98.1	98.0-98.2
Moisture[c] (%)	**13.7**	12.6-14.7	12.1	10.9-12.8
Protein (%, db)	**11.7**	11.3-12.0	11.6	10.9-12.7
Germination, 4 mL (%)	**99**	99-99	99	97-100
Germination, 8 mL (%)	**95**	93-97	90	79-99
Malt				
Yield (%)	**91.3**	91.0-91.5	88.8	88.3-89.7
Steep-out moisture (%)	**45.0**	44.1-45.8	45.1	43.8-47.0
Friability (%)	**82.7**	74.9-90.4	85.4	79.9-89.6
Moisture (%)	**4.5**	4.3-4.7	5.6	5.4-5.9
Protein (%, db)	**11.5**	11.0-12.0	11.9	11.1-13.3
Diastatic power (°, db)	**180**	169-191	232	222-248
α-Amylase (DU, db)	**74.3**	73.3-75.3	103.1	96.3-109.9
Wort				
Fine grind extract (F) (%, db)	**80.8**	80.5-81.0	81.8	81.0-82.4
Coarse grind extract (C) (%, db)	**80.0**	79.5-80.4	81.3	80.5-81.9
F-C difference (%, db)	**0.8**	0.6-1.0	0.5	0-0.9
ß-Glucan (mg/L)	**147**	81-213	43	42-44
Viscosity (cP)	**1.45**	1.44-1.47	1.41	1.40-1.42
Soluble protein (%, db)	**5.23**	5.18-5.28	5.32	5.19-5.41
Ratio S/T (%)	**45.7**	43.2-48.1	45.0	40.7-48.2
FAN (mg/L)	**185**	168-202	242	233-253
Colour (°)	**2.3**	2.2-2.3	2.0	1.9-2.2

[a] AAC Prairie is currently being developed for the market and is not yet commercially produced.
[b] Values represent arithmetic averages (Avg) of samples analysed.
[c] Moisture values are not representative of new crop moisture levels as samples were not collected or stored in moisture-proof containers.

db = dry basis; DU = dextrinizing units; S/T = soluble/total protein; cP = centipoise

Sirish[a]

Table 4.8 Quality data for Sirish malting barley

Quality parameter	Western Canada			
Year	**2024**		**2023**	
Number of samples	5		6	
Barley	**Avg[b]**	**Range**	**Avg[b]**	**Range**
Test weight (kg/hL)	**66.1**	65.1-67.2	65.5	64.5-67.8
1000 kernel weight (g)	**46.1**	41.2-48.3	47.8	43.0-50.3
Plump, over 7/64" sieve (%)	**66.4**	51.3-81.7	68.0	67.8-68.2
Plump, over 6/64" sieve (%)	**95.2**	88.6-97.5	97.0	96.8-97.2
Moisture[c] (%)	**13.0**	11.9-13.6	12.9	11.9-13.8
Protein (%, db)	**12.1**	11.4-12.9	11.3	10.3-12.9
Germination, 4 mL (%)	**98**	93-100	98	97-99
Germination, 8 mL (%)	**81**	74-97	71	56-96
Malt				
Yield (%)	**92.9**	92.4-93.4	93.8	93.0-94.3
Steep-out moisture (%)	**45.1**	44.4-45.7	45.0	42.4-46.0
Friability (%)	**84.0**	69.8-90.5	81.5	67.7-91.8
Moisture (%)	**5.3**	5.2-5.5	5.2	4.9-5.7
Protein (%, db)	**11.4**	10.6-12.4	10.6	8.7-12.0
Diastatic power (°, db)	**146**	135-165	135	118-145
α-Amylase (DU, db)	**50.1**	46.7-54.2	50.4	39.3-60.8
Wort				
Fine grind extract (F) (%, db)	**79.9**	78.7-81.1	81.4	80.3-82.9
Coarse grind extract (C) (%, db)	**79.4**	78.1-80.6	80.5	79.1-82.0
F-C difference (%, db)	**0.5**	0.3-0.7	0.9	0.3-1.5
ß-Glucan (mg/L)	**76**	59-95	75	44-199
Viscosity (cP)	**1.40**	1.40-1.41	1.43	1.40-1.51
Soluble protein (%, db)	**4.27**	3.78-4.54	3.85	3.29-4.30
Ratio S/T (%)	**37.4**	34.2-41.9	36.6	29.5-42.3
FAN (mg/L)	**132**	116-141	143	110-158
Colour (°)	**1.8**	1.6-1.9	1.8	1.6-2.0

[a] Samples of Sirish barley were obtained exclusively through the Canadian Grain Commission's Harvest Sample Program.
[b] Values represent arithmetic averages (Avg) of samples analysed.
[c] Moisture values are not representative of new crop moisture levels as samples were not collected or stored in moisture-proof containers.

db = dry basis; DU = dextrinizing units; S/T = soluble/total protein; cP = centipoise

Appendix I - Methods

This section describes the analytical methods used at the Grain Research Laboratory. Unless otherwise specified, results for barley and malt are reported on a dry weight basis (db).

α-Amylase activity
α-Amylase activity was determined according to American Society of Brewing Chemists (ASBC) method MALT 7C by segmented flow analysis, using ASBC dextrinized starch as the substrate, and calibrated with standards that have been determined by method ASBC Malt 7A.

Arabinoxylans
Total arabinoxylan content in grain was determined after acid hydrolysis by gas-chromatographic (GC) analysis of alditol acetates using a flame ionization detector.

Assortment
Grain was passed through a Carter Dockage tester equipped with a No. 6 riddle to remove foreign material. Sorting of grain was conducted using the Pfeuffer Sortimat equipped with two slotted sieves: 7/64 inches (2.78 mm) and 6/64 inches (2.38 mm) x 3/4 inches.

β-Glucan content in wort
β-Glucan content was determined in malt extract by segmented flow analysis using Calcofluor staining of soluble, high molecular weight ß-glucan (ASBC Wort-18B).

β-Glucan content in grain
β-Glucan content was determined in ground barley using the Megazyme Streamlined Method – assay procedure for determination of mixed linkage β-glucan content in oat and barley flour (Association of Official Analytical Chemists (AOAC) Method 995.16, American Association for Cereal Chemistry (AACC) International Method 32-23, International Association for Cereal Chemistry (ICC) Standard Method No 168).

Diastatic power
Diastatic power was determined by segmented flow analysis, using an automated neocuproin assay for reducing sugars that is calibrated using malt standards analysed following the official ferricyanide reducing sugar method (ASBC Malt 6A).

Fine-grind and coarse-grind extracts
Extracts were prepared using an Industrial Equipment Corporation (IEC) mash bath and the Congress mashing procedure from 45°C to 70°C. Specific gravities are determined at 20°C with an Anton Paar DMA 5000M digital density meter (ASBC Malt-4).

Free amino nitrogen (FAN)
Free amino nitrogen (FAN) was determined in fine extract by segmented flow analysis using the official ASBC method Wort-12.

Germination energy
Germination energy was determined by placing 100 kernels of barley on two layers of Whatman No.1 filter paper in a 9.0 cm diameter petri dish and adding 4.0 ml of purified water. Samples were germinated at 20ºC and 90% relative humidity in a germination chamber. Germinated kernels were removed after 24 h and 48 h and a final count was made at 72 h (ASBC Barley 3C).

Kolbach index (S/T)
Kolbach index was calculated using: (% soluble protein / % malt protein) x 100.

Micromalting
Malts were prepared using an Automated Phoenix Micromalting System designed to handle 24 barley samples of 500 g or 48 barley samples of 250 g per batch.

Malt mills
Fine grind malt was prepared using a Bühler-Miag disc mill set to fine grind. Coarse grind malt was prepared with the same mill set to coarse grind. The settings for fine and coarse grinds are calibrated quarterly, based on the screening of a ground ASBC standard check malt sample (ASBC Malt-4).

Moisture content of barley
Moisture content of barley was predicted on dockage-free barley using the Foss Infratec™ 1241 whole grain near-infrared analyzer.

Moisture content of malt
Moisture content of malt was determined on a ground sample by oven drying at 104ºC for 3 h (ASBC Malt-3).

Protein content (nitrogen x 6.25)
Barley protein content was predicted on dockage-free barley using the Foss Infratec™ 1241 whole grain near infrared analyzer. The Infratec™ 1241 performance is checked annually against the reference combustion nitrogen analysis (CNA) method. Annual reference checks for barley protein and malt protein were measured by CNA using a LECO Model FP-628 CNA analyzer calibrated by ethylenediamine tetraacetic acid (EDTA). Samples were ground on a UDY Cyclone Sample Mill fitted with a 1.0 mm screen. A moisture analysis was also performed with results reported on a dry matter basis (ASBC Barley 7C).

Rapid Viscosity Analysis
The degree of pre-germination in barley was determined as described by Izydorczyk (2005) Using RVA to measure pre-germination in barley and predict germination energy after storage. Samples were analyzed using the PerkinElmer RVA 4500 Visco Analyzer using the Stirring Number Program. Final viscosity values are reported in Rapid Visco Units (RVU).

Viscosity
Viscosity was measured on fine grind Congress Mash wort using an Anton Paar Lovis 2000 automated rolling ball viscometer (ASBC Wort-13B).

Water sensitivity
Water sensitivity was determined as described for germination energy, except that 8.0 ml of purified water was added to each petri dish (ASBC 3C, IOB and EBC procedure). The water sensitivity value is the numerical difference between the 4 ml and 8 ml tests.

Weight per thousand kernels
A 500 g sample of dockage-free barley was divided several times in a mechanical divider to obtain one representative sub-sample that weighed 40 g. All foreign material and broken kernels were removed from the 40 g portion and the net weight determined. Kernels were counted with a mechanical counter and the thousand kernel weight was calculated (as is basis) (Institute of Brewing's Recommended Methods of Analysis, Barley 1.3 (1997)).

Wort-soluble protein
Wort-soluble protein was determined spectrophotometrically using ASBC method Wort-17.

Wort colour
Wort colour was determined spectrophotometrically using ASBC methods Wort-9 and Beer-10.

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- Agriculture and Agri-Food Canada's National Agroclimate Information Services Unit provided the weather and climate data.

- Seeding and production figures came from Statistics Canada Table 32-10-0359-01.

- Shawn Parsons conducted barley analyses and micro-malting; Debby Kelly performed malt analyses; Arzoo Sharma, Shin Nam and Cherianne McClure performed various chemical and instrumental analyses.

- Margaret Gowdar and Sarah Ormiston of the Communications and Multimedia Sections of the Corporate Information Services, Canadian Grain Commission.