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Cultivar description

AAC Prairie barley

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Abstract

AAC Prairie is a hulled two-row spring malting barley (*Hordeum vulgare* L.) cultivar widely adapted to western Canada. It was developed from the cross CDC Kindersley/TR08204 made in 2008 and it was evaluated in the Western Cooperative Two-row Barley Registration Test (2017–2018) as well as the Collaborative Malting Barley Trials (2018–2019) conducted by the malting and brewing industry before being registered in 2021. AAC Prairie's good combination of agronomic and disease resistance traits as well as a desired malting quality profile should make it a useful cultivar for the barley industry.

Key words: malting barley, *Hordeum vulgare* L., cultivar description

Introduction

AAC Prairie is a hulled two-row spring malting barley (*Hordeum vulgare* L.) cultivar developed at the Agriculture and Agri-Food Canada Brandon Research and Development Centre, Brandon (AAFC-Brandon), MB. It received registration No. 9473 from the Canadian Food Inspection Agency (CFIA) on 26 November 2021. Plant Breeders' Rights application No. 20-10399 was posted in the April 2022 edition of the CFIA Plant Variety Journal (CFIA 2022*a*).

Pedigree and breeding methods

AAC Prairie (TR17255, BM0850-029) is a two-row hulled spring malting barley line developed from the cross CDC Kindersley/TR08204 made in the greenhouse in the fall of 2008 at AAFC-Brandon, MB. CDC Kindersley is a cultivar developed at Crop Development Centre (CDC), University of Saskatchewan (Univ. of Sask.), Saskatoon, SK, from the cross SM00490/BM9674D-64 (CFIA 2022*b*). The other parent, TR08204, is an advanced breeding line from AAFC-Brandon with the pedigree TR261/TR251. Both these parents, TR261 and TR251, were elite breeding lines developed at AAFC-Brandon. TR261 was developed from the cross TR236/TR231. TR236 was selected for net blotch resistance (*Pyrenophora teres* Drechs.) from the cross Wpg8419-24-2-1//Oxbow/Manley, where Wpg8419-24-2-1 is a breeding line developed by the AAFC Cereal Research Centre (CRC), Winnipeg, MB, with the pedigree SM80489/CI9214. SM80489 was an advanced breeding line from the CDC, Univ. of Sask. TR231 was developed from the cross Ellice/ND7556. The other parent for TR08204, TR251, was developed from the cross TR229//AC Oxbow/ND7556 where TR229 was from the cross AC Oxbow/Manley. ND7556 is a breeding line with improved spot blotch resistance [*Cochliobolus sativus* (Ito & Kurib.) Drechs. ex Dastur.] from North Dakota State University, Fargo, ND.

Early generations were handled by a modified bulk method. The F_1 generation was grown as a bulk in the greenhouse, and F_2 as a bulk plot in the field at Brandon in 2009. The F_3 generation was grown as a bulk increase in the 2009–2010 winter nursery at Southern Seeds Technology, Leeston, New Zealand. The F_4 generation was grown as two bulk plots in the field at Brandon in 2010, with 405 spikes being harvested and threshed individually from the population. The harvested seeds from the first 300 spikes were planted as a single F_5 hill plot in the irrigated field leaf disease nursery at Brandon in 2011 where spot blotch (*C. sativus*) was the predominant disease. Based on spot blotch resistance and agronomic appearance, 162 lines were selected and grown as F_6 progeny rows in the field at Brandon in 2012. Of these, 49 lines were selected on the basis of height, maturity, lodging resistance, general appearance, and field disease reaction with spot blotch being the predominant disease.

The selected F_7 lines, one of which was BM0850-029, were grown as single plots in a preliminary yield test with repeated checks at Brandon in 2013. In addition to the earlier selection criteria, lines were selected based on yield, heading date, kernel plumpness, test weight, kernel weight, kernel brightness (rated visually on 1–5 scale), hull peeling, and preliminary malting quality analyses (i.e., grain protein

Table 1. Grain yield (kg ha^{-1}) for AAC Prairie (TR17255) and check cultivars from the Western Cooperative Two-row Barley Registration Test, 2017 and 2018, by soil zone type.

		Soil zone			
Cultivar	Class	Black (east)[a]	Brown[b]	Black and grey (west)[c]	Overall
CDC Copeland	Malting	6816	5435	6461	6051
AC Metcalfe	Malting	6910	5092	6260	5853
AAC Synergy	Malting	7573	5619	6607	6363
CDC Austenson	Feed	7463	5867	6425	6406
Champion	Feed	7533	6154	6915	6697
AAC Prairie	Malting	7197	5541	6433	6187
$LSD_{0.05}$[d]		596	290	361	221
No. of tests		7	14	8	29

[a]Black soil zone (east): Brandon (2017) and Rosebank, MB; Indian Head and Melfort, SK.
[b]Brown soil zone: Trochu, Vulcan (2017), and Lethbridge, AB; Hanley (2018), Glaslyn, Saskatoon, Scott, and Swift Current, SK.
[c]Black and grey soil zone (west): Hamiota (2018), MB; Calmar (2017), Lacombe, and Neapolis (2018), AB; Dawson Creek (2018) and Fort St. John, BC.
[d]Least significant differenc (LSD) among cultivar means at the 5% probability level, where each test was treated as one replication.

Table 2. Agronomic trait data for AAC Prairie (TR17255) and check cultivars from the Western Cooperative Two-row Barley Registration Test, 2017 and 2018.

Cultivar	Days to heading	Days to maturity	Height (cm)	Lodging (1–9)[a]	Test weight (kg hL^{-1})	1000-kernel weight (g)	Plump (%)[b]
CDC Copeland	57.4	90.5	79.2	2.6	65.6	46.5	93.1
AC Metcalfe	54.1	90.0	73.7	3.3	67.2	45.4	93.5
AAC Synergy	54.8	90.6	74.0	1.7	66.5	47.9	95.7
CDC Austenson	57.0	91.9	73.8	1.1	67.8	47.6	92.5
Champion	53.2	90.9	73.1	2.4	68.0	50.0	93.7
AAC Prairie	55.3	90.5	72.3	2.4	66.7	46.4	93.7
$LSD_{0.05}$[c]	0.5	0.7	1.5	1.5	0.5	0.9	1.8
No. of tests	29[d]	28[e]	31[f]	4[g]	32[h]	29[i]	30[j]

[a]1 = no lodging; 9 = completely lodged.
[b]Kernel plumpness (%) as determined over a 6/64″ (238 mm) slotted screen.
[c]Least significant difference (LSD) among cultivar means at the 5% probability level, where each test was treated as one replication.
[d]Locations: Brandon, Hamiota (2018), and Rosebank, MB; Hanley (2018), Glaslyn, Indian Head, Melfort (2018), Saskatoon, Scott, and Swift Current, SK; Beaverlodge (2018), Calmar (2017), Lacombe, Lethbridge (2017), Neapolis (2018), Trochu, and Vulcan (2017), AB; Dawson Creek (2017) and Fort St. John, BC.
[e]Locations: Brandon, Hamiota (2018), and Rosebank, MB; Glaslyn, Indian Head (2018), Melfort, Scott, Saskatoon, and Swift Current, SK; Beaverlodge (2018), Lacombe, Lethbridge, Neapolis (2018), Trochu, and Vulcan (2017), AB; Dawson Creek (2018) and Fort St. John, BC.
[f]Locations: Brandon, Hamiota (2018), and Rosebank, MB; Indian Head, Melfort, Saskatoon, Scott, Swift Current, Hanley (2018), and Glaslyn, SK; Beaverlodge, Lacombe, Lethbridge, Neapolis (2018), Trochu, and Vulcan (2017), AB; Dawson Creek (2018) and Fort St. John, BC.
[g]Locations: Brandon (2017), MB; Scott (2017), SK; Lethbridge, AB.
[h]Locations: Brandon, Hamiota (2018) and Rosebank (2017) MB; Glaslyn, Indian Head, Hanley, Melfort, Saskatoon, Scott, and Swift Current, SK; Beaverlodge, Calmar (2017), Lacombe, Lethbridge, Neapolis (2018), Trochu, and Vulcan (2017), AB; Dawson Creek (2018) and Fort St. John, BC.
[i]Locations: Brandon, and Hamiota (2018), MB; Glaslyn (2017), Hanley, Indian Head, Melfort, Saskatoon, Scott, and Swift Current, SK; Beaverlodge, Calmar (2017), Lacombe, Lethbridge, Neapolis (2018), Trochu, and Vulcan (2017), AB; Dawson Creek (2018) and Fort St. John, BC.
[j]Locations: Brandon, and Hamiota (2018), MB; Glaslyn, Hanley, Indian Head, Melfort, Saskatoon, Scott, and Swift Current, SK; Calmar (2017), Lacombe, Lethbridge, Neapolis (2018), and Trochu, AB; Dawson Creek (2018) and Fort St. John, BC.

concentration, alpha amylase activity, diastatic power, fine grind extract, soluble protein concentration, and ratio of soluble to total protein concentration) conducted at the AAFC-Cereal Quality Lab, Winnipeg, MB. They were also evaluated in field disease nurseries for reactions to spot blotch at AAFC-Brandon and CDC, University of Saskatchewan (Melfort and Saskatoon, SK); stem rust (*Puccinia graminis* Pers.:Pers.) at Brandon and Glenlea; and deoxynivalenol (DON) concentration due to *Fusarium graminearum* Schwabeby harvesting a row from the Fusarium Head Blight (FHB) nursery at Brandon, grinding a 20 g sample and sending a 1 g subsample to AAFC-Ottawa, ON, for analysis using an in-house enzyme-linked immunosorbent assay (Sinha et al. 1995). BM0850-029 and 10 other sister lines were advanced in 2014 to a replicated preliminary yield test at Brandon but they were lost to flooding. In 2014, disease reactions were evaluated for stem rust at AAFC-Morden and FHB via DON concentration at AAFC-Brandon. Additionally, it was assessed for spot-form net blotch (*P. teres* f. *maculata* Smedeg.) at AAFC-Lacombe, AB, and seedling reaction to spot-form net blotch, isolate WRS857; net-form net blotch, isolate WRS858 (*P. teres* f. *teres*); and scald, isolate WRS2275 (*Rhynchosporium commune*, Zaffarano, McDonald & Linde). Due to the flooding, starting with 2015, a new test was implemented, intermediate yield test, grown at two locations. Thus, BM0850-029 and its sister lines were entered in a replicated intermediate yield test grown at Brandon and Lacombe where they were evaluated for the same traits as before plus advanced malting quality analyses (i.e., same

Table 3. Malting quality trait data[a] for AAC Prairie (TR17255) and check cultivars from the Western Cooperative Two-row Barley Registration Test, 2017 and 2018.[b]

Cultivar	Kernel plumpness >7/64″ (%)[c]	Kernel plumpness >6/64″ (%)[d]	1000-kernel weight (g)	Grain protein (g hg^{-1})[e,f]	Germination energy 4 mL (%)	Germination energy 8 mL (%)	Steep-out moisture (g hg^{-1})[e]	Fine grind extract (g hg^{-1})[e,g]	Soluble protein (g hg^{-1})[e,g]	Soluble to total protein (%)[h]
CDC Copeland	71.3	96.2	46.9	11.1	99.2	95.8	43.8	81.3	4.2	37.5
AC Metcalfe	68.8	96.3	45.7	12.2	99.2	95.7	43.8	81.4	4.4	36.6
AAC Synergy	85.1	98.3	49.4	11.6	98.8	93.2	43.4	81.8	4.0	33.8
AAC Prairie	69.3	96.8	46.6	11.4	99.7	96.2	43.7	82.0	4.5	38.9
$LSD_{0.05}$[i]	7.9	1.4	2.0	0.4	1.5	4.6	1.0	0.8	0.4	3.4
No. of tests	4[j]	6	6	6	6	6	6	6	6	6

[a]Malting quality characteristics determined by industry at the micro-malting level using procedures similar to Grain Research Laboratory (GRL), Canadian Grain Commission, Winnipeg, MB (Mather et al. 1997).
[b]Locations (company lab): 2017—Brandon, MB (GRL), Indian Head, SK (GRL), and Melfort, SK (Busch Agricultural Resources, LLC); 2018—Brandon, MB (GRL), Indian Head, SK (Busch Agricultural Resources, LLC), and Saskatoon, SK (GRL).
[c]Kernel plumpness (%) as determined over a 7/64″ (278 mm) slotted screen.
[d]Kernel plumpness (%) as determined over a 6/64″ (238 mm) slotted screen.
[e]Expressed as % by the malting and brewing industries.
[f]On a grain dry matter basis.
[g]On a malt dry matter basis.
[h]Ratio of soluble protein to total protein concentration.
[i]Least significant difference (LSD) among cultivar means at the 5% probability level, where each test was treated as one replication.
[j]Data not collected in 2017 for Melfort, SK (Busch Agricultural Resources, LLC). and in 2018 for Indian Head, SK (Busch Agricultural Resources, LLC); mean of 4 tests.

Table 4. Additional malting quality trait data[a] for AAC Prairie (TR17255) and check cultivars from the Western Cooperative Two-row Barley Registration Test, 2017 and 2018.[b]

Cultivar	Diastatic power (°L)[c,d]	Alpha-amylase (D.U.)[c,e]	Beta-glucan (mg L^{-1})[f]	Wort viscosity (cps)[c,f]	Friability (%)	Free amino nitrogen (mg L^{-1})	Partially unmodified grains (%)	Malt hull peeling (%)
CDC Copeland	126	70.9	117	1.44	87.7	157	0.2	3.6
AC Metcalfe	151	94.2	169	1.45	72.8	178	1.8	4.4
AAC Synergy	137	84.3	90	1.42	82.4	148	0.2	4.0
AAC Prairie	179	90.9	84	1.42	84.4	176	0.2	3.2
$LSD_{0.05}$[g]	11.2	5.4	40.4	0.0	7.9	18.6	1.8	1.5
No. of tests	6	6	6	6	5[h]	6	2[i]	4[j]

[a]Malting quality characteristics determined by industry at the micro-malting level using procedures similar to Grain Research Laboratory (GRL), Canadian Grain Commission, Winnipeg, MB (Mather et al. 1997).
[b]Locations (company lab): 2017—Brandon, MB (GRL), Indian Head, SK (GRL), and Melfort, SK, (Busch Agricultural Resources, LLC); 2018—Brandon, SK (GRL), Saskatoon, SK (GRL), and Indian Head, SK (Busch Agricultural Resources, LLC).
[c]On a grain dry matter basis.
[d]Degrees Lintner.
[e]Dextrinizing unit measure of alpha amylase activity.
[f]Centipoise, international viscosity units used by the malting and brewing industries.
[g]Least significant difference (LSD) among cultivar means at the 5% probability level, where each test was treated as one replication.
[h]Data not collected in 2018 for Indian Head, SK (Busch Agricultural Resources, LLC); mean of 5 tests.
[i]Data collected only in 2017 for Indian Head, SK, and Brandon, MB (GRL); mean of 2 tests.
[j]Data not collected in 2017 for Melfort, SK (Busch Agricultural Resources, LLC), and in 2018 for Indian Head, SK (Busch Agricultural Resources, LLC); mean of 4 tests.

traits as for preliminary analyses plus friability and wort viscosity), and reaction to covered smut [*Ustilago hordei* (Pers.) Lagerh.], false loose smut (*U. nigra* Tapke.), net-form net blotch and scald in disease nurseries at AAFC-Lacombe. BM0850-029 was grown in a replicated advanced yield test at five locations in western Canada in 2016 (Brandon and Hamiota, MB; Saskatoon and Waldheim, SK; and Lacombe, AB) where it was evaluated for the same traits as in 2015. Malting quality was determined for three locations (Brandon, Hamiota, and Saskatoon—selected based on preliminary assessment for malting suitability of the barley grains) for the same traits as in the previous year plus beta-glucan concentration. Resistance to pre-harvest sprouting was also assessed by determining stirring number with the Rapid ViscoTM Analyser model RVA 4SA (Newport Scientific Pty. Ltd., Warriewood, New South Wales, Australia) using samples from Brandon harvested at the optimum time (physiological maturity, as the head and the peduncle lost their green colour) and later (about 2 weeks later) to induce sprouting, and from Lacombe and Waldheim which were harvested at the normal time.

BM0850-029 was advanced in 2017 as a malting line to the Western Cooperative Two-row Barley Registration Test, where it was evaluated for 2 years as TR17255. TR17255 was also evaluated in the 2018 and 2019 Collaborative Malting Barley Trials conducted at the pilot-scale level by the malting and brewing industry as part of the registration recommending process under the auspices of the Prairie Recommending Committee for Oat and Barley.

Table 5. Pilot-scale malting quality trait data[a] for AAC Prairie (TR17255) and check cultivars, Collaborative Malting Barley Trials, 2018 and 2019.[b]

Cultivar	Kernel plumpness		Grain protein	Germination energy		Friability (%)	Malt protein	Fine grind extract
	>7/64″ (%)[c]	>6/64″ (%)[d]	(g hg^{-1})[e,f]	4 mL (%)	8 mL (%)		(g hg^{-1})[e,g]	(g hg^{-1})[e,g]
CDC Copeland	65.6	93.0	12.2	100	93	81.3	11.9	81.0
AC Metcalfe	68.7	92.8	13.0	98	88	75.6	12.4	80.8
AAC Synergy	76.5	91.5	12.2	99	89	81.4	11.8	81.5
AAC Prairie	66.4	92.4	12.0	99	93	85.5	11.8	82.1
$LSD_{0.05}$[h]	7.5	3.5	0.6	1	6	5.5	0.6	0.7
No. of tests	10	10	10	10	10	8[i]	10	10

[a]Malting quality characteristics determined by industry using procedures similar to Grain Research Laboratory (GRL), Canadian Grain Commission, Winnipeg, MB (Mather et al. 1997).
[b]Locations (company lab): 2018—Brandon, MB (Malteurop Milwaukee), Hamiota, MB (GRL), Saskatoon, SK (Busch Agricultural Resources, LLC), Lacombe, AB (Rahr Malt), and Lethbridge, AB (CMC Calgary); 2019—Hamiota, MB (GRL), Portage, MB (Maltereurop), Lacombe, AB (Rahr Malt), Lethbridge, AB (CMC Calgary), and Neapolis, AB (Busch Agricultural Resources, LLC).
[c]Kernel plumpness (%) as determined over a 7/64″ (278 mm) slotted screen.
[d]Kernel plumpness (%) as determined over a 6/64″ (238 mm) slotted screen.
[e]Expressed as % by the malting and brewing industries.
[f]On a grain dry matter basis.
[g]On a malt dry matter basis.
[h]Least significant difference (LSD) among cultivar means at the 5% probability level, where each test was treated as one replication.
[i]Data not collected in 2018 for Saskatoon, SK (Busch Agricultural Resources, LLC), and in 2019 for Neapolis, AB (Busch Agricultural Resources, LLC); mean of 8 tests.

Table 6. Additional pilot-scale malting quality trait data[a] for AAC Prairie (TR17255) and check cultivars, Collaborative Malting Barley Trials, 2018 and 2019.[b]

Cultivar	Soluble protein (g hg^{-1})[c,d]	Soluble to total protein (%)[e]	Diastatic power (°L)[f,g]	Alpha-amylase (D.U.)[f,h]	Beta glucan (mg L^{-1})[i]	Wort viscosity (cps)[f,j]	Free amino nitrogen (mg L^{-1})	Peeled and broken	
								Barley (%)[k]	Malt (%)[k]
CDC Copeland	5.0	42.3	150	66.1	88	1.43	197	1.8	2.4
AC Metcalfe	5.1	41.2	157	73.4	105	1.43	203	1.6	2.4
AAC Synergy	5.1	43.5	146	72.5	81	1.42	197	1.0	2.1
AAC Prairie	5.5	46.6	180	74.1	74	1.42	217	1.4	2.6
$LSD_{0.05}$[l]	0.2	2.7	13	4.2	21	0.02	12	0.7	1.3
No. of tests	10	10	10	10	10	10	10	8[m]	7[n]

[a]Malting quality characteristics determined by industry using procedures similar to Grain Research Laboratory (GRL), Canadian Grain Commission, Winnipeg, MB (Mather et al. 1997).
[b]Locations (company lab): 2018—Brandon, MB (Malteurop Milwaukee), Hamiota, MB (GRL), Saskatoon, SK (Busch Agricultural Resources, LLC), Lacombe, AB (Rahr Malt), and Lethbridge, AB (CMC Calgary); 2019—Hamiota, MB (GRL), Portage, MB (Maltereurop), Lacombe, AB (Rahr Malt), Lethbridge, AB (CMC Calgary), and Neapolis, AB (Busch Agricultural Resources, LLC).
[c]Expressed as % by the malting and brewing industries.
[d]On a malt dry matter basis.
[e]Ratio of soluble protein to total protein concentration.
[f]On a grain dry matter basis.
[g]Degrees Lintner.
[h]Dextrinizing unit measure of alpha amylase activity.
[i]On a malt extract basis, expressed as ppm by the malting and brewing industries.
[j]Centipoise, international viscosity units used by the malting and brewing industries.
[k]Percentage of peeled and broken barley and malt, respectively, as measured by industry.
[l]Least significant difference (LSD) among cultivar means at the 5% probability level, where each test was treated as one replication.
[m]Data not collected in in 2018 for Saskatoon, SK (Busch Agricultural Resources, LLC), and in 2019 for Neapolis, AB (Busch Agricultural Resources, LLC); mean of 8 tests.
[n]Data not collected in 2018 for Saskatoon, SK (Busch Agricultural Resources, LLC), and in 2019 for Lethbridge, AB (CMC Calgary), and Neapolis, AB (Busch Agricultural Resources, LLC); mean of 7 tests.

Performance

The data collected over 2 years (2017–2018) from sites located in AB (Calmar, Lacombe, Lethbridge, Neapolis, Trochu, and Vulcan), BC (Dawson Creek and Fort St. John), SK (Hanley, Indian Head, Glaslyn, Melfort, Saskatoon, Scott, and Swift Current), and MB (Brandon, Hamiota, and Rosebank) as part of the Western Cooperative Two-row Barley Registration Test (https://www.pgdc.ca/committees_ob_pd.html) established AAC Prairie's agronomic performance in western Canada. The malting check cultivars in these trials were CDC Copeland (CFIA 2022*c*), AC Metcalfe (Legge et al. 2003), and AAC Synergy (Legge et al. 2014) and the feed check cultivars were CDC Austenson (CFIA 2022*d*) and Champion (CFIA 2022*e*). An analysis of variance was conducted and the least significant difference derived from these analysis was used to identify significant differences compared to the check cultivars.

AAC Prairie is widely adapted to western Canada, and overall significantly out-yielded the malting check cultivar AC Metcalfe by 6% but was similar to other malting checks (Table 1).

Table 7. Smut and net blotch reactions for AAC Prairie (TR17255) and check cultivars from the Western Cooperative Two-row Barley Registration Test, 2017 and 2018.

Cultivar	Smut (% infected)				Net blotch					
					Inoculated[c]			Melfort[d] (0–9)	Lacombe[e] net-form	Spot-form
	Ustilago nuda[a]	*U. hordei*[a]	*U. nigra*[a]	*U. hordei*[b]	102	MBV25	858			
2017										
CDC Copeland	45.7	5.0	7.5	9.3	2	7	8	0.0	1.5	5.0
AC Metcalfe	0.0	12.5	11.0	12.3	7	8	8	4.5	4.0	5.0
AAC Synergy	69.4	15.0	31.0	22.6	1	2	3	0.0	0.0	3.5
CDC Austenson	62.5	3.5	5.0	0.0	1	8	5	0.0	0.0	3.5
Champion	65.9	20.0	42.0	7.0	7	5	8	0.0	0.0	4.0
AAC Prairie	86.1	12.0	30.0	2.1	2	7	6	1.0	0.0	5.0
2018										
CDC Copeland	33.3	6.0	12.0	6.4	3	3	6	0.0	1.5	4.0
AC Metcalfe	0.0	22.0	24.0	1.7	8	2	7	5.0	1.5	5.0
AAC Synergy	64.0	15.0	35.0	11.0	4	5	5	0.0	0.0	3.5
CDC Austenson	60.0	12.0	3.5	–	3	3	6	0.0	0.0	4.0
Champion	33.3	16.0	38.0	4.6	7	3	7	0.0	2.0	4.0
AAC Prairie	54.5	18.0	40.0	8.1	1	5	5	0.0	1.5	3.5

[a]Infected plants (%) as determined in smut tests conducted at Agriculture and Agri-Food Canada (AAFC), Morden Research and Development Centre, Morden, MB.
[b]Covered smut (*U. hordei*) rating determined at Crop Development Centre (CDC), University of Saskatchewan, Saskatoon, SK, and expressed as % infected plants.
[c]Seedlings inoculated with *Pyrenophora teres* f. *teres* isolates WRS102 and WRS858 (net-form net blotch) and *P. teres* f. *maculata* isolate MBV25 (spot-form net blotch) from AAFC-Morden, MB; 1 = resistant, 10 = susceptible.
[d]Rated for net-form net blotch (*P. teres* f. *teres*) reaction in the leaf disease nursery at Melfort, SK, on a 0–9 scale; 0 = resistant, 9 = susceptible.
[e]Rated for net-form net blotch (*P. teres* f. *teres*) reaction and spot-form net blotch (*P. teres* f. *maculate*) in the leaf disease nursery at AAFC-Lacombe, AB, on a 0–9 scale; 0 = resistant, 9 = susceptible.

Table 8. Spot blotch and stem rust disease reactions for AAC Prairie (TR17255) and check cultivars from the Western Cooperative Two-row Barley Registration Test, 2017 and 2018.

Cultivar	Spot blotch			Stem rust[d]				
	Brandon[a]	Melfort[a]	Sask.[b]	Inoc.[c]	Seedling	Field rating—Morden		
	(1–9)	(1–9)	(1–9)	1903	MCC IT	Severity	IR	*Rpg1* marker
2017								
CDC Copeland	6.5	6.3	6.0	9	3–2	5	R	+
AC Metcalfe	4.5	3.0	3.3	8	1-	1	R	+
AAC Synergy	2.5	2.3	1.8	6	12-	5	MR	+
CDC Austenson	3.0	3.0	3.0	8	12-	10	I	+
Champion	4.5	4.5	4.0	8	2–2	50	MS	+
AAC Prairie	3.5	3.0	3.5	7	1-	5	MR	+
2018								
CDC Copeland	2.5	5.5	–	8	–	1	R	+
AC Metcalfe	3.0	3.0	–	7	–	2	MR	+
AAC Synergy	1.5	1.5	–	5	–	5	MR	+
CDC Austenson	2.0	2.3	–	3	–	5	MR	+
Champion	1.0	4.0	–	5	–	10	I	+
AAC Prairie	4.0	1.8	–	7	–	2	MR	+

[a]Rated for spot blotch (*Cochliobolus sativus*) reaction in the irrigated leaf disease nursery at Agriculture and Agri-Food Canada (AAFC) Brandon Research and Development Centre, MB, and Melfort, SK, on a 1–9 scale: 1 = resistant, 9 = susceptible.
[b]Rated for reaction to spot blotch (*C. sativus*) in the Crop Development Centre (CDC), University of Saskatchewan, Saskatoon, SK, irrigated nursery, on a 1–9 scale: 1 = resistant, 9 = susceptible.
[c]Seedlings inoculated with *C. sativus* isolate WRS1903 from the AAFC-Morden, MB, on a 1–9 scale: 1 = resistant, 9 = susceptible.
[d]Reaction to stem rust (*Puccinia graminis*) was determined in seedling tests inoculated with race MCC at AAFC-Morden, MB, where IT = infection type; in inoculated field nurseries at AAFC- Morden, MB, with severity = % infected and IR = infection reaction, where R = resistant, MR = moderately resistant, I = intermediate resistance, and MS = moderately susceptible; and in molecular marker tests at CDC (University of Saskatchewan, Saskatoon, SK), to detect the *Rpg1* stem rust resistance gene where "+" indicates the presence of the gene and resistance.

Table 9. Scald and fusarium head blight disease reactions for AAC Prairie (TR17255) and check cultivars from the Western Cooperative Two-row Barley Registration Test, 2017 and 2018.

Cultivar	Scald			Fusarium head blight			
		Field[b]		Brandon		Morden	
	Inoc.[a] 2275	Edmo.	Laco.	FHB (0–5)[c]	DON (mg kg^{-1})[d]	FHB (0–5)[c]	DON (mg kg^{-1})[d]
2017							
CDC Copeland	S	8.5	5.0	1.3	25.0	2.0	67.7
AC Metcalfe	S	6.5	5.0	2.2	21.5	2.8	79.0
AAC Synergy	S	9.0	5.0	2.0	20.2	2.2	90.0
CDC Austenson	S	8.5	4.0	2.3	27.2	2.3	143.2
Champion	S	9.0	4.5	2.7	24.2	2.8	98.8
AAC Prairie	S	8.5	4.5	1.3	15.4	3.0	66.2
2018							
CDC Copeland	S	7.0	5.0	1.5	16.4	1.7	4.7
AC Metcalfe	S	6.0	4.0	0.8	9.6	1.5	7.9
AAC Synergy	MS	5.5	5.0	1.2	26.0	1.3	8.5
CDC Austenson	S	6.0	4.0	1.7	23.3	1.7	5.0
Champion	S	8.0	4.5	1.3	15.6	1.3	8.9
AAC Prairie	S	5.5	4.0	1.5	10.7	1.3	11.2

[a]Seedlings inoculated with *Rhynchosporium secalis* (Oudem.) Davis isolate WRS2275 from Agriculture and Agri-Food Canada (AAFC) Morden Research and Development Centre, Morden, MB; S = susceptible and MS = moderately susceptible.
[b]Field ratings for scald (*R. secalis*) reactions on a 0–9 scale (0 = no disease, 9 = susceptible); Edmo. = scald nursery at University of Alberta, Edmonton, AB; Laco. = scald nursery at AAFC-Lacombe, AB.
[c]Mean fusarium head blight (*Fusarium graminearum* Schwabe) reaction rated visually on a 0–5 scale (0 = no symptoms, 5 = susceptible) in irrigated FHB nurseries at AAFC-Brandon, and AAFC-Morden, MB; mean for each year calculated from three replications at each site.
[d]Deoxynivalenol (DON) content determined by the enzyme-linked immunosorbent assay procedure described by Sinha et al. (1995) at AAFC-Ottawa, ON, using a composite sample of three replications for each year at each site.

Data for several agronomic traits for AAC Prairie and the checks cultivars are presented in Table 2. AAC Prairie was similar to malting checks in maturity. It was significantly shorter than two of the malting checks, CDC Copeland and AAC Synergy, while its lodging resistance was in the range of the checks. AAC Prairie had significantly higher test weight than the malting check, CDC Copeland. It had significantly higher kernel weight than AC Metcalfe but lower than AAC Synergy. It had similar kernel plumpness to AC Metcalfe and CDC Copeland but lower than AAC Synergy.

During its second year in Western Cooperative Two-row Barley Registration Test, AAC Prairie displayed a desired malting quality profile (Tables 3 and 4). Its most noteworthy features were significantly lower grain protein and wort beta-glucan than AC Metcalfe, significantly higher diastatic power than all malting checks, significantly higher alpha-amylase than CDC Copeland and AAC Synergy, and significantly higher friability than AC Metcalfe.

During the second year of pilot-scale testing by industry in the Collaborative Malting Barley Trial, a malting profile similar to the above was observed for AAC Prairie as well as a significantly higher fine malt extract than CDC Copeland and AC Metcalfe (Tables 5 and 6). Market development is currently underway for AAC Prairie, with commercial acceptance by the malting and brewing industry to be determined.

Other characteristics

Plant characteristics were recorded from experimental trials grown, in 2019 and 2021, as randomized complete block design with four replicates at Brandon, MB.

- Plant: semi-erect to intermediate juvenile growth, sparse to medium leaf sheath pubescence, medium flag leaf length and width, absent to slightly pubescent flag leaf blade pubescence, absent pubescence on flag leaf sheath, very strong flag leaf sheath glaucosity, purple auricle colour and absent or very sparse auricle pubescence, and low frequency of plants with recurved flag leaves.
- Spike: two-row type, mid-season spike emergence, medium to dense with parallel shape, medium to long in length, V shaped closed cup collar, erect to semi-erect attitude, with medium to strong glaucosity; rough lemma awns longer than the spike with purplish tips; glume awn length is equal to length of glume; first segment of rachis long length with medium to strong curvature; sterile spikelet attitude is weakly parallel to divergent; and the length of the glume and its awn relative to the grain is equal.
- Kernel: covered (hulled), medium length and width, colourless aleurone, long rachilla hair, horseshoe basal marking shape, absent or very weak anthocyananin colouration of the nerves of the lemma, spiculation of inner lateral nerves of dorsal side of lemma is absent, hairiness of the ventral furrow is absent, and the lodicules of the kernel are clasping.
- Quality: good malting quality (Tables 3–6).
- Disease reaction: moderately resistant to stem rust (carries the *Rpg1* gene as determined by molecular marker screening), net-form net blotch, and surface borne smuts; intermediate resistance to spot blotch and FHB, intermediate to moderately susceptible reaction to spot-form net blotch; moderately susceptible to scald; and susceptible to loose smut (Tables 7–9).

Maintenance of pedigreed seed stocks

Breeder seed will be maintained by the AAFC Seed Increase Unit, Research Farm—Indian Head, Box 760, 1 Government Road, Indian Head, SK, Canada S0G 2K0 (AAFC-SIU). Initial breeder seed was produced in 2019 by the AAFC SIU from a bulk of 191 lines derived from F_{13} single plant selections originally made at AAFC-Brandon in 2018 from a seed increase grown from the same seed increase used for evaluation of AAC Prairie in the Western Cooperative Two-row Barley Registration Test. Distribution and multiplication of other classes of pedigreed seed will be handled by Canterra Seeds, 201–1475 Chevrier Boulevard, Winnipeg, MB, Canada, R3T 1Y7.

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