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CULTIVAR DESCRIPTION

AAC Cabri durum wheat

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Abstract: AAC Cabri durum wheat [*Triticum turgidum L.* subsp. *durum* (Desf.) Husn.] is adapted to the durum production area of the Canadian prairies. AAC Cabri has a solid stem that provides protection against the wheat stem sawfly (*Cephus cinctus* Norton). Averaged over four years, AAC Cabri yielded significantly more grain than Strongfield, AC Avonlea, and AC Navigator, but the protein concentration was significantly lower than the high protein concentration cultivars AC Avonlea and Strongfield. AAC Cabri is eligible for grades of Canada Western Amber Durum and has low grain cadmium concentration.

Key words: Triticum turgidum, durum, wheat, cultivar description, grain yield, solid stem, yellow pigment, cadmium.

Résumé : La variété de blé dur [*Triticum turgidum L.* subsp. *durum* (Desf.) Husn.] AAC Cabri est acclimatée à la région de culture du blé dur des Prairies canadiennes. Elle se caractérise par une tige robuste qui la met à l'abri du cèphe du blé (*Cephus cinctus* Norton). Le rendement grainier moyen d'AAC Cabri sur quatre ans dépasse significativement celui des variétés Strongfield, AC Avonlea et AC Navigator, mais sa concentration de protéines est sensiblement plus faible que celle des cultivars AC Avonlea et Strongfield, réputés pour leur forte teneur. AAC Cabri est admissible à aux catégories du blé dur ambré de l'Ouest canadien et son grain renferme peu de cadmium. [Traduit par la Rédaction]

Mots-clés : Triticum turgidum, blé dur, description de cultivar, rendement grainier, tige robuste, pigment jaune, cadmium.

Introduction

AAC Cabri durum wheat was developed at the Swift Current Research and Development Centre (SCRDC), Agriculture and Agri-Food Canada (AAFC), Swift Current, SK. Plant Breeders' Rights, filing application no. 14-8291 was granted on 29 Apr. 2014 and AAC Cabri received registration no. 7590 from the Variety Registration Office, Canadian Food Inspection Agency, on 8 Sept. 2014.

Pedigree and Breeding Method

AAC Cabri (experimental names: DT840, A0423-KB02) was selected from the cross A9918-LX2B/Strongfield made in 2004 at the Swift Current Research and Development Centre, Swift Current, SK. A9918-LX2B is a solid stem breeding line derived from a cross of DT696/9688B-131B, where the solid stem line 9688B-131B is derived from the cross of DT663/W9262-260D1//Kronos. The solid stem line W9262-260D1 is derived from the cross Kyle*2/Biodur, where Kyle (Townley-Smith et al. 1987) is a widely adapted high cadmium uptake, hollow stem cultivar, and Biodur is a low cadmium uptake, solid stem cultivar from Germany. Line DT696 (also known as 9366-BS*1) is derived from a three-way cross DT618/DT637//Kyle. Strongfield (Clarke et al. 2005*b*) is a widely adapted, high yielding, hollow stem, low cadmium uptake, strong gluten, Canadian durum cultivar. The parents were haplotyped with molecular markers linked to *Cdu1* controlling cadmium uptake, and *Sst1* controlling stem solidness (Randhawa et al. 2013).

In 2004, F_1 seeds were increased in the greenhouse and approximately 8000 seeds of the F_2 generation were

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space planted at 10 cm intervals within a row in an irrigated epiphytotic field nursery in 2005 near Swift Current. Genotypes susceptible to prevalent races of leaf rust (*Puccinia triticina* Eriks.) and stem rust (*Puccinia graminis* Pers.:Pers. f. sp. *tritici* Eriks. and E. Henn.) were planted as disease spreaders every tenth row. Between the spreader rows, five rows of spring planted winter wheat were alternated with four rows of F_2 seed at a row spacing of 23 cm. The winter wheat cultivar CDC Kestrel (Fowler 1997), which is susceptible to leaf and stem rust, was used to contribute to the multiplication of rust inoculum. Spreader rows were inoculated by injecting, with a syringe and needle, a water suspension of leaf rust and stem rust spores into a sample of plants every 3 m. Representative leaf rust races found the previous year were applied (McCallum and Seto-Goh 2006). Stem rust races used were: QTHST (C25), RHTSK (C20), RKQSR (C63), RTHJT (C57), TMRTK (C10), and TPMKR (C53) (Roelfs and Martens 1988; Fetch 2005). Leaf spot diseases developed through natural infection. Individual plants were selected for plant height, straw strength, maturity, and resistance to leaf spot diseases, leaf rust, and stem rust. The F_3 seeds from individual spikes from 322 selected plants were grown in 2 m long rows in a contra season nursery near Lincoln, New Zealand, in 2005–2006. Based on plant height, days to maturity, and straw strength, 159 rows were selected, and the rows were harvested individually to produce the seed used for agronomic and disease trials in Canada. In 2006, the 159 F_4 families, their parents, and other check cultivars were grown in unreplicated 2.74 m^2 four-row plot experiments near Swift Current and Indian Head, SK. The traits grain yield, height, maturity and lodging, and leaf spots based on natural infection were assessed. Concurrently, a portion of the F_4 seed was used for evaluation of lines in a *fusarium* head blight (FHB) nursery at Portage la Prairie, (MB) (Gilbert and Woods, 2006). The scoring for FHB was based on a 1 (low FHB incidence and severity) to 9 (all spikes infected with >90% spikelets infected). Five spikes per F_4 line from within plots grown near Swift Current were selected for plant height, straw strength, and leaf spotting primarily from tan spot [*Pyrenophora tritici-repentis* (Died.) Drechs., anamorph *Drechslera tritici-repentis* (Died.) Shoemaker], and Stagonospora *nodorum* blotch [*Phaeosphaeria nodorum* (E. Müll.) Hedjaroude, anamorph *Stagonospora nodorum* (Berk.) Castell. & E.G. Germano]. The grain quality traits protein concentration, yellow pigment concentration, gluten strength, and volume weight were assessed on grain harvested from field trials. Based on this suite of agronomic, disease, and quality traits, 41 F_4 families were selected. In 2006–2007, 205 F_5 lines (41 F_4 families × 5 heads per F_4 family) were grown in 2 m rows near Leeston, New Zealand and selected primarily on plant height, straw strength, and days to maturity. After selection, 103 $F_{5:6}$ lines were grown in 2007 under dryland conditions near Swift Current, SK, Regina, SK, and Lethbridge, AB, and in an FHB disease nursery at Portage la Prairie, MB. Twenty genotypes were selected based on agronomic performance, disease resistance, and quality traits assessed as described for the F_4 generation. Twenty F_7 genotypes were grown in the 2008 Durum A3 as a two replicate lattice design four-row plot test near Swift Current, Regina, and Indian Head, SK, Lethbridge, AB, and Brandon, MB, to assess agronomic performance as described for the F_4 generation. Check cultivars in the Durum A3 test were AC Avonlea (Clarke et al. 1998), AC Morse, AC Navigator (Clarke et al. 2000), Commander (Clarke et al. 2005*a*), and Strongfield. Remnant seed from the yield trials was used to assess end-use suitability by the Central Quality Lab, Cereal Research Centre, Winnipeg, MB, and included grain protein concentration, yellow pigment, milling properties, gluten strength, and Hagberg Falling Number. Response to loose smut [*Ustilago tritici* (Pers.) Rostr.] was tested with a mixture of races T26, T32, and T33 (Nielsen 1987) under field conditions near Swift Current, SK. Response to leaf rust and stem rust were evaluated in hill plots in a rust nursery near Glenlea, MB, using a mixture of races similar to that in the F_2 rust nursery. Response to leaf spotting pathogens was assessed from within the yield plots under conditions of natural inoculums. Response to *Fusarium graminearum* Schwabe [teleomorph *Gibberella zeae* (Schwein. Petch)] was assessed in an FHB nursery near Portage la Prairie and Carman, MB. Plots at Carman were scored for incidence (%) and severity (%) when a significant differential reaction was observed among checks.

Seven lines from population A0423 including A0423-KB02 were tested in the 2009 Durum-B test in an alpha-lattice design with two replications near Swift Current, Regina, Saskatoon, Floral, SK, Lethbridge, AB, and Brandon, MB, using the same check cultivars as in the 2008 Durum A3 test. Response to diseases was measured using protocols similar to that for the A-level tests described above. Remnant seed from the yield trials was used to prepare a composite, using degrading factors as a consideration for suitability for inclusion in the composite, to assess the same end-use suitability parameters as in the Durum A3 test, by the Central Quality Lab, Cereal Research Centre, MB. This procedure identified the line A0423-KB02, which met all of the selection criteria at each stage of selection.

A0423-KB02 was advanced to the Durum Wheat Cooperative Test and evaluated as DT840 from 2010 to 2013. A fourth year of testing was necessitated due to excessively wet conditions and high disease pressure at all trial locations in 2010, resulting in the grain samples being unsuitable for assessment of end-use suitability. The Durum Wheat Cooperative Test was grown as a four row test at up to 12 locations annually in a 6 × 5 lattice design including five check cultivars, with two replications in two repetitions. The check cultivars were AC Avonlea (grown from year 2010 to 2013), AC Morse

Table 1. Grain yield (kg ha^{-1}) of AAC Cabri and check cultivars in the Durum Wheat Cooperative Test, 2010–2013 in Zones 1[a] and 2.

	2010			2011			2012			2013			2010–2013		
	Zone 1	Zone 2	Mean	Zone 1	Zone 2	Mean	Zone 1	Zone 2	Mean	Zone 1	Zone 2	Mean	Zone 1	Zone 2	Mean
AC Avonlea	4466	3607	3895	4312	3700	3823	2947	3008	2991	4312	4363	4348	3963	3684	3768
AC Morse	4907	3746	4133	4245	3876	3949	2723	3352	3162						
AC Navigator	3635	3631	3633	3793	3667	3692	2138	3055	2780	3556	4540	4367	3190	3740	3599
Brigade										4891	5156	5108			
Commander	4307	3767	3943	4164	3940	3983	2794	3302	3152						
Strongfield	4658	3749	4053	4487	3886	4008	2934	3359	3232	4174	4816	4701	4046	3978	4007
Mean of checks	4395	3700	3931	4200	3814	3891	2707	3215	3063	4233	4719	4631	3733	3801	3791
AAC Cabri	4721	4247	4405	5078	4179	4361	3070	3822	3595	4619	4951	4891	4306	4319	4323
$LSD_{0.05}$[b]	446	339	280	908	208	231	473	383	309	670	246	241	332	204	188
No. of tests	3	6	9	2	8	10	3	7	10	2	9	11	10	30	40

[a]Zone 1 (Black Soils): Indian Head (2011–2013), Souris (2010–2012), Brandon (2010, 2012, and 2013), Langdon (2010); Zone 2 (Brown and Dark Brown Soils): Swift Current, Stewart Valley (2011–2013), Saskatoon, Regina (2010–2012), Lethbridge, Vulcan, Moose Jaw, Pense (2013), Scott (2011, 2013), Vanguard (2013).
[b]Appropriate LSD to make comparisons of AAC Cabri to AC Avonlea, AC Navigator, Strongfield, $P \leq 0.05$, includes the appropriate genotype by environment interaction.

(2010–2012), AC Navigator (2010–2013), Commander (2010–2012), Strongfield (2010–2013), and Brigade (2013) (Clarke et al. 2009). The Durum Wheat Cooperative Test operating protocols are described in the Prairie Recommending Committee for Wheat Rye and Triticale operating procedures (http://www.pgdc.ca/committees_wrt.html). The PROC MIXED procedure in SAS (version 9, SAS Institute Inc. 2003) was used to analyze the data annually and to perform a combined analysis over years, using a mixed model with environments and replications considered as random effects and genotypes considered as fixed effects (Littell et al. 2006). Least significant differences were calculated using appropriate mean squares and degrees of freedom, and differences were declared significant at the 5% probability level.

The Durum Wheat Cooperative Test entries were evaluated in inoculated nurseries near Glenlea, MB to determine the response to leaf rust, stem rust, and loose smut. *Fusarium* head blight was assessed in inoculated nurseries near Carman and Glenlea, MB, Ottawa, ON, and Charlottetown, PEI. Inoculum composition for leaf and stem rust, and loose smut was as described above. Response to common bunt caused by *Tilletia laevis* Kuhn in Rabenh. and *T. tritici* (Bjerk.) G. Wint. in Rabenh. was assessed in a nursery grown near Lethbridge, AB, using a mixture of prevalent races: T-1, T-6, T-13, T-19, L-1, and L-16 (Hoffmann and Metzger 1976; Gaudet and Puchalski 1989). Leaf spot reaction was determined based on natural infection at Saskatchewan and Manitoba locations. Stem solidness of A0423-KB02 and checks was determined from four-row plots grown under irrigation near Swift Current, SK, from 2010 to 2013 by splitting a sample of three stems longitudinally and visually rating them as hollow or solid (Clarke et al. 2002). In 2013, the first five internodes of each of five stems from separate plants were scored for check cultivars and A0423-KB02 using a scheme described by DePauw and Read (1982).

Performance

In four years of cooperative testing, the grain yield of AAC Cabri was significantly higher than the checks AC Avonlea, AC Navigator, and Strongfield (Table 1). AAC Cabri had significantly higher grain yield than AC Avonlea and AC Navigator in both Zone 1 and Zone 2. AAC Cabri had significantly higher grain yield than Strongfield in Zone 2. Averaged over zones, AAC Cabri was significantly later maturing than Strongfield but earlier than Brigade (Table 2). Test weight (kg hL^{-1}) of AAC Cabri was significantly heavier than AC Avonlea, AC Morse, and Commander in both zones, while significantly heavier than Strongfield only in Zone 2. The 1000-kernel weight (g) of AAC Cabri was significantly smaller than Commander and AC Navigator, but similar to the other checks. AAC Cabri had plant height significantly taller than AC Avonlea, AC Morse, AC Navigator, Commander, and Strongfield, while being significantly shorter than Brigade. Straw strength was similar to

Table 2. Agronomic characteristics of AAC Cabri and check cultivars in the Durum Wheat Cooperative Test, 2010–2013.[a]

	Days to maturity[a,b]			Test weight (kg hL^{-1})[a]			1000-Kernel		
	Zone 1	Zone 2	Mean	Zone 1	Zone 2	Mean	weight (g)[a]	Height (cm)[a]	Lodging (1–9)[c]
AC Avonlea	97.1	107.6	105.3	74.6	77.9	77.0	40.4	92.2	2.3
AC Morse	97.1	107.4	105.1	73.6	77.7	76.5	40.6	89.3	1.6
AC Navigator	97.5	108.5	106.1	73.2	79.0	77.4	43.6	79.6	2.3
Brigade	98.9	109.1	106.8	76.1	80.0	78.9	42.4	100.2	2.0
Commander	98.0	107.9	105.7	73.3	78.0	76.7	43.8	78.7	1.9
Strongfield	97.0	107.3	105.0	75.4	79.2	78.1	41.3	90.8	2.8
AAC Cabri	97.5	108.2	105.8	76.1	80.0	78.9	41.2	94.3	2.8
$LSD_{0.05}$[d]	1.0	0.7	0.6	1.1	0.7	0.7	1.0	1.5	0.8
$LSD_{0.05}$[e]	1.1	0.8	0.6	1.2	0.7	0.7	1.1	1.6	0.8
$LSD_{0.05}$[f]	1.6	1.0	0.8	1.8	1.0	1.0	1.4	2.4	1.2
No. of tests	7	25	32	10	30	40	40	40	15

[a]Zone 1 (Black Soils): Indian Head (2011–2013), Souris (2010–2012), Brandon (2010, 2012, and 2013), Langdon (2010); Zone 2 (Brown and Dark Brown Soils): Swift Current, Stewart Valley (2011–2013), Saskatoon, Regina (2010–2012), Lethbridge, Vulcan, Moose Jaw, Pense (2013), Scott (2011 and 2013), Vanguard (2013).

[b]All Zone 1 and Zone 2 locations, except Langdon (in Zone 1), Souris in 2010 and 2011, and Stewart Valley (in Zone 2).

[c]Regina (2010–2012), Souris (2010 and 2012), Swift Current (2010), Moose Jaw (2011–2012), Saskatoon (2011–2012), Stewart Valley (2012–2013), Brandon (2013).

[d]Appropriate LSD to make comparisons of AAC Cabri to AC Avonlea, AC Navigator, Strongfield, $P \leq 0.05$, includes the appropriate genotype by environment interaction.

[e]Appropriate LSD to make comparisons of AAC Cabri to AC Morse, Commander, $P \leq 0.05$, includes the appropriate genotype by environment interaction.

[f]Appropriate LSD to make comparisons of AAC Cabri to Brigade, $P \leq 0.05$, includes the appropriate genotype by environment interaction.

Table 3. Grain protein concentration (13.5% moisture basis) measured on grain samples bulked across replications at each location from the Durum Wheat Cooperative Test 2010–2013.

	Protein concentration (%)												
	2010			2011			2012			2013			
	Zone 1[a]	Zone 2	Mean	Zone 1	Zone 2	Mean	Zone 1	Zone 2	Mean	Zone 1	Zone 2	Mean	4 yr mean
AC Avonlea	15.4	13.3	13.8	15.8	12.5	13.2	16.1	15.2	15.5	13.3	13.9	13.8	14.3
AC Morse	14.2	12.7	13.1	15.3	12.4	13.0	15.4	14.1	14.5				
AC Navigator	14.7	12.5	13.1	14.5	12.0	12.5	15.3	14.3	14.6	13.5	12.9	13.0	13.5
Brigade										12.7	12.7	12.7	
Commander	14.8	12.8	13.3	14.9	11.8	12.4	14.9	14.3	14.5				
Strongfield	15.8	13.4	14.0	15.4	12.4	13.0	16.2	14.9	15.3	14.7	13.6	13.8	14.2
AAC Cabri	15.5	13.1	13.7	14.7	12.1	12.6	16.0	14.2	14.8	13.9	13.1	13.3	13.8
$LSD_{0.05}$[b]	0.9	0.5	0.4	0.9	0.4	0.4	0.9	0.6	0.5	1.2	0.4	0.4	0.3
No. of tests	3	6	8	2	8	10	3	7	10	2	9	11	39

[a]Zone 1 (Black Soils): Indian Head (2011–2013), Souris (2010–2012), Brandon (2010, 2012, and 2013), Langdon (2010); Zone 2 (Brown and Dark Brown Soils): Swift Current, Stewart Valley (2011–2013), Saskatoon, Regina (2010–2012), Lethbridge, Vulcan, Moose Jaw, Pense (2013), Scott (2011 and 2013), Vanguard (2013).

[b]Appropriate LSD to make comparisons of AAC Cabri to AC Avonlea, AC Navigator, Strongfield, $P \leq 0.05$, includes the appropriate genotype by environment interaction.

Strongfield, but significantly less than AC Morse and Commander. Grain protein concentration of AAC Cabri was similar to AC Navigator and significantly less than AC Avonlea and Strongfield (Table 3).

AAC Cabri was resistant to leaf rust, stripe rust, and common bunt, and moderately resistant to stem rust and loose smut (Table 4). AAC Cabri had intermediate resistance to leaf spots, similar to Strongfield. The FHB reaction and deoxynivalenol (DON) accumulation of AAC Cabri was rated as moderately susceptible (Table 5).

AAC Cabri is a solid stemmed genotype (Tables 6 and 7) that provides protection to cutting by the wheat stem sawfly (*Cephus cinctus* Norton) (Holmes and Peterson 1961, 1962). AAC Cabri has low grain cadmium

Table 4. Summary of disease reactions of AAC Cabri and check cultivars grown in the Durum Wheat Cooperative Test, 2010–2013.

	Year	Stem rust[a]		Leaf rust[a]	Common bunt[a]		Loose smut		Leaf spot		Stripe rust		Root rot
		Rtn[b]	Rxn[a]		Rtn[b]	Rxn[a]	Rtn[b]	Rxn[a]	GL[c]	SC[c,d]	LB[a,b,c]	CT[a,b,c]	Rtn[b]
AC Avonlea	2010	3	R	R	20	MS	51	I	10.0(R)	7.3(I)			0
	2011	20	MR	R	1	MR	27	MR	37.0(MS)	7.8(I)	25(I)		—
	2012	20	MR	R	1	R	37	MR	4.6(R)	8.5(MS)	4(R)		—
	2013	5	MR	R	3	R	19	MR		8.0(I)	5.0(R)	25(MR)	
AC Morse	2010	1	R	R	7	MR	56	MS	19.0(MR)	9.7(S)			14
	2011	10	MR	R	2	MR	70	MS	39.3(MS)	7.5(I)	12(R)		—
	2012	10	MR	R	0	R	69	MS	3.4(R)	9.8(S)	3(R)		—
AC Navigator	2010	2	R	R	2	R	29	MR	36.0(MS)	8.5(MS)			14
	2011	5	R	R	0	R	15	R	49.7(S)	7.8(I)	12(R)		—
	2012	30	I	R	0	R	44	I	12.2(I)	10.0(S)	1(VR)		—
	2013	5	MR	R	1	R	35	MR		9.3(MS)	60(S)	15(R)	
Brigade	2013	1	R	R	1	R	0	R		8.3(MS)	15(R)	15(R)	
Commander	2010	2	R	R	1	R	41	I	28.0(I)	7.7(I)			7
	2011	1	R	R	0	R	9	R	41.0(S)	7.8(I)	16(R)		—
	2012	5	R	R	1	R	71	MS	13.0(I)	9.5(S)	3(R)		—
Strongfield	2010	2	R	R	2	R	52	I	17.0(MR)	7.7(I)			10
	2011	1	R	R	2	MR	26	MR	43.3(S)	7.3(I)	14(R)		—
	2012	15	MR	R	2	R	33	MR	6.6(MR)	7.8(I)	3(R)		—
	2013	1	R	R	7	R	8	R		8.3(MS)	15(R)	5(R)	
AAC Cabri	2010	3	R	R	3	R	20	MR	35.3(MS)	7.0(I)			13
	2011	10	MR	R	0	R	6	R	39.0(MS)	7.0(I)	6(R)		—
	2012	25	MR	R	3	R	33	MR	2.6(R)	8.0(I)	0(VR)		—
	2013	1	R	R	4	R	14	R		7.8(I)	10(R)	5(R)	

[a]Rxn, reaction type; VR, very resistant; R, resistant; MR, moderately resistant; I, intermediate; MS, moderately susceptible; S, susceptible; Checks and AAC Cabri had 0% leaf rust infection in all four years.

[b]Rtn, rating as % infection.

[c]GL, Glenlea; SC, Swift Current; LB, Lethbridge; CT, Creston.

[d]Adult plant, rated mid-grainfill at Swift Current McFadden scale (0 = no symptoms and 11 = severe symptoms; McFadden 1991).

Table 5. Summary of response to *Fusarium* of AAC Cabri and check cultivars grown in the Durum Wheat Cooperative Test, 2010–2013.

		Fusarium head blight											
		Carman		Glenlea		Portage		PEI (Indx[a])		Ottawa	DON (ppm)			
	Year	Indx[a]	Rxn[b]	Indx[a]	Rxn[b]	Indx[a]	Rxn[b]	Early	Late	Indx[a]	Glenlea	Ottawa	PEI	ISD[c]
AC Avonlea	2010	65	S	38	S			86	100	98	41			
	2011			17	MS			55	95	62	4.5			5.0(MS)
	2012	34	I	23	S			60		83	11.1		3.4	24.6(S)
	2013	49	MS	11		21	MS	69		90		7	16.8	
AC Morse	2010	68	S	21	I			75	98	54	38.1			
	2011			25	S			54	90	80	10.5			7.5(S)
	2012	55	MS	24	S			41		88	29.4		3.4	37.3(S)
AC Navigator	2010	59	S	43	S			71	99	90	40.2			
	2011			21	S			54	100	83	11.3			7.8(S)
	2012	66	S	10	I			40		85	33.7		1.3	33.2(S)
	2013	51	MS	9		21	MS	73		73		16.9	16.5	
Brigade	2013	23	MR	7		17	I	48		48		12	15.4	
Commander	2010	61	S	59	S			82	98	53	52.4			
	2011			15	S			27	88	58	13.6			8.4(S)
	2012	79	S	26	S			47		72	42.6		2.3	48.9(S)
Strongfield	2010	61	S	44	S			80	91	72	49			
	2011			15	I			31	80	73	7.7			5.9(MS)
	2012	55	MS	12	I			45		90	12.5		2.4	21.8(I)
	2013	30	I	10		17	I	72		90		8.6	21.8	
AAC Cabri	2010	59	S	45	S			83	98	53	30.9			
	2011			22	S			13	72	40	5.1			5.0(S)
	2012	57	S	28	S			38		27	10.2		3.9	27.5(MS)
	2013	34	I	15		17	I	46		45		16.2	20.7	

[a]*Fusarium* head blight index: [(mean percent incidence × mean percent severity)/100].
[b]Rxn, reaction type; MR, moderately resistant; I, intermediate; MS, moderately susceptible; S, susceptible.
[c]ISD (incidence, severity, DON) is calculated as (0.3 × Avg Incidence) + (0.3 × Avg Severity) + (0.4 × DON) for a given entry.

Table 6. Stem solidness of AAC Cabri and control cultivars determined by splitting three stems longitudinally from plots grown under irrigated conditions near Swift Current during 2010–2013.

	Year	Solidness[a]
AC Avonlea	2010	H
	2011	H
	2012	H
	2013	H
AC Navigator	2010	H
	2011	H
	2012	H
	2013	H
Strongfield	2010	H
	2011	H
	2012	H
	2013	H
AAC Cabri	2010	S
	2011	S
	2012	S
	2013	S

[a]Stem solidness: H, hollow; S, solid.

Table 7. Stem solidness[a] rating of each of five internodes on plants grown near Swift Current, 2013 of AAC Cabri, solid stem hexaploid wheat checks AC Abbey, AC Eatonia, Lancer, and Lillian, solid stem durum check AAC Raymore, hollow stem hexaploid wheat check Glenlea, and hollow stem durum checks AC Navigator and Strongfield.

	Internode 1[b]	Internode 2	Internode 3	Internode 4	Internode 5
AC Navigator		2.7	1.9	1.2	1.0
Strongfield	2.9	2.4	1.7	1.1	1.0
AAC Raymore	5.0	4.8	4.6	4.7	4.9
AC Abbey		2.6	1.9	1.2	1.0
AC Eatonia	3.5	3.0	2.5	1.6	1.1
Glenlea		1.1	1.0	1.0	1.0
Lancer		4.6	3.5	2.3	1.2
Lillian		4.1	4.0	2.5	1.1
AAC Cabri		5.0	5.0	5.0	4.8
$LSD_{0.05}$		0.4	0.4	0.3	0.2

[a]Solidness rated on a 1 (stem cavity hollow and thin walled) to 5 (stem cavity completely filled with pith) scale. Mean of solidness rating based on 10 plants per entry.

[b]Internode 1 is basal internode and internode 5 is the peduncle, not enough information to generate LSD for internode 1.

Table 8. End-use suitability[a,b,c] measured on yearly composite samples of AAC Cabri and check cultivars evaluated from 2011 to 2013 Durum Cooperative Tests.

	Cd (mg kg^{-1})	FN (sec)	Test weight (kg hL^{-1})	HVK (%)	Milling Yld (%)	Semo Yld (%)	Semo Ash (%)	Wht Prot (%)	Semo Prot (%)	GI (%)	P/L	W (ergs)	Semo YP (mg kg^{-1})	Pasta Colour 85 °C	
														b*	a*
AC Avonlea	0.21	437	82.5	88.7	75.4	67.7	0.68	13.9	13.0	17	0.37	92	9.08	65.6	4.8
AC Navigator	0.22	457	82.7	85.5	76.5	68.2	0.69	12.9	12.0	64	0.84	185	9.96	66.1	6.3
Strongfield	0.08	432	82.9	91.6	75.6	67.1	0.63	13.7	12.6	58	0.62	164	9.14	64.7	4.9
AAC Cabri	0.06	440	83.3	88.6	75.6	67.1	0.63	13.3	12.1	55	0.50	145	10.22	68.0	5.2
Std. Dev.[d]	0.001	5			0.4	0.4	0.006	0.06	0.05	3	0.04	6	0.04	0.3	0.1

[a]American Association of Cereal Chemists methods were followed by the Grain Research Laboratory (GRL), Canadian Grain Commission (CGC) for determining the various end-use suitability traits on a composite of 8–9 locations each year.

[b]Cd, grain cadmium concentration; FN, Hagberg falling number; sec, seconds; HVK, hard vitreous kernel; Yld, yield; Semo Yld, semolina yield; Wht Prot, wheat protein; Semo Prot, semolina protein; GI, gluten index. Alveograph parameters: P, air pressure; L, extensibility; W, deformation energy; YP, yellow pigment; spectrophotometer colour b* = yellowness; a* = redness on the International Commission on Illumination (CIE) scale. Wheat protein and semolina protein are expressed on a 13.5% moisture basis.

[c]Means are from 2011, 2012, and 2013 durum composites.

[d]Std. Dev. is the standard deviation based on repeated testing of check samples with replicate tests carried out over an extended period of time each season, provided by GRL, CGC.

concentration similar to Strongfield (Table 8). The pasta b* colour of AAC Cabri was desirably high relative to the checks.

Other Characteristics

SPIKES: parallel-sided in profile, mid-dense to dense, erect; off-white at maturity; awns longer than spike, white at maturity.

KERNEL: colour amber; kernel size large, elliptical, short brush hairs.

LOWER GLUME: long length, medium width; glabrous.

LOWER GLUME SHOULDER: very narrow to medium width; slightly sloping shape.

LOWER GLUME BEAK: short to medium length, slightly curved to straight shape.

END-USE SUITABILITY: eligible for the grades of Canada Western Amber Durum wheat market class.

Maintenance and Distribution of Pedigreed Seed

The 98 Breeder Lines originate from random $F_{4:9}$ single plants of A0423-KB02 grown as 120 pre-Breeder-Lines in 3 m long rows in isolation near Swift Current, SK in 2011, as 15 m rows near Indian Head, SK in 2012, and a 0.19 ha plot near Indian Head in 2013. Breeder Seed will be maintained by the Seed Increase Unit of the Research Farm, Indian Head, SK S0G 2K0, Canada.

Distribution and multiplication of pedigreed seed stocks will be handled by SeCan, 501-300 March Road, Kanata, ON K2K 2E2, Canada (https://www.secan.com/).

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