CULTIVAR DESCRIPTION

AAC Proclaim general purpose spring wheat

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Randhawa, H. S., Graf, R. J., Fox, S. L. and Sadasivaiah, R. S. 2015. **AAC Proclaim general purpose spring wheat**. Can. J. Plant Sci. **95**: 1265–1269. AAC Proclaim is a soft red spring wheat cultivar eligible for the Canada Western General Purpose (CWGP) wheat class. Evaluated in 18 trials grown over 2 yr in the General Purpose Wheat Cooperative Registration trial, AAC Proclaim yielded significantly lower than the CWGP checks, AC Andrew and Pasteur, and was 1 and 5 d earlier maturing, respectively. AAC Proclaim was significantly taller than the checks, but had similar straw strength. Test weight was higher than the checks and kernel mass was similar to AC Andrew. Based on visual assessments and deoxynivalenol testing over 3 yr, AAC Proclaim was rated as resistant to *Fusarium* head blight. It also expressed resistance to the prevalent races of leaf rust and moderate resistance to the prevalent races of stem rust and loose smut. AAC Proclaim showed susceptibility to infection by stripe rust and common bunt.

Key words: *Triticum aestivum* L., cultivar description, general purpose wheat, grain yield, disease resistance

Randhawa, H. S., Graf, R. J., Fox, S. L. et Sadasivaiah, R. S. 2015. **Le blé de printemps d'usage général AAC Proclaim**. Can. J. Plant Sci. **95**: 1265–1269. AAC Proclaim est une variété de blé roux tendre de printemps admissible à la classe « blé à des fins générales de l'Ouest Canadien » (CWGP). Évalué à l'occasion de 18 essais répartis sur deux ans dans le cadre des essais coopératifs d'homologation pour le blé d'usage général, AAC Proclaim a donné un rendement sensiblement plus faible que les cultivars témoins de la classe CWGP AC Andrew et Pasteur, mais est parvenu à maturité 1 et 5 jours plus tôt que ceux-ci, respectivement. AAC Proclaim pousse nettement plus haut que les témoins, mais sa paille est aussi robuste. Son poids spécifique dépassait celui des témoins et la masse du grain était similaire à celle d'AC Andrew. Après trois années d'évaluation visuelle et de dosage de la DON, AAC Proclaim a été coté résistant à la brûlure de l'épi causée par *Fusarium*. Le cultivar résiste aux races communes de rouille des feuilles et résiste modérément aux races courantes de rouille de la tige et de charbon nu. AAC Proclaim est sensible à la rouille jaune et à la carie.

Mots clés: *Triticum aestivum* L., description de cultivar, blés d'usage général, rendement grainier, résistance à la maladie

AAC Proclaim is a Canada Western General Purpose (CWGP) spring wheat (*Triticum aestivum* L.) cultivar developed by Agriculture and Agri-Food Canada (AAFC), Lethbridge Research Centre (LRC), Lethbridge, Alberta and released in 2012. It was assigned registration number 7307 by the Variety Registration Office, Canadian Food Inspection Agency on 2013 Jan. 10. AAC Proclaim is well adapted to western Canada.

Pedigree and Breeding Methodology

AAC Proclaim was developed from the cross FHB37/AC Reed (L04056) made in 2004 at the AAFC-LRC in Lethbridge, Alberta. FHB37 (HY611/Ning8331) is an experimental line with improved resistance to FHB developed by the AAFC Cereal Research Centre (CRC), Winnipeg MB, Canada. AC Reed (PT303/Dirkwin//K321/Fieldwin) is a soft white spring wheat cultivar developed by AAFC-LRC (Sadasivaiah et al. 1993). F_1 plants were increased in the greenhouse in fall 2004 and selections were taken from F_2 bulk plots grown in Vauxhall, AB, in 2005. Following selection of heads from space-planted F_3 bulk plots grown in Lethbridge in 2006, F_4 head rows were grown in a contra-season nursery in Lincoln, New Zealand, in 2006/2007. Desirable rows were harvested as a bulk, which was grown in Lethbridge in 2007. Following selection based on plant type, height, maturity and straw strength, F_6 head rows were grown in Leeston, New Zealand, in 2007/2008. Selected rows were harvested individually and grown as replicated yield trials in Lethbridge and Bow Island in 2008. One-meter rows were also planted in a *Fusarium* head blight (FHB), leaf and stem rust disease nursery in Portage La Prairie, MB, in 2008. Based on agronomic performance and resistance to FHB, leaf and stem rust, a line (08PR-920) was evaluated as SWS416 in the Western Soft White Spring Wheat Cooperative Registration trial (SWS Coop) at

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Abbreviations: **CWGP**, Canada Western General Purpose; **FHB**, Fusarium head blight

11 locations in western Canada in 2009 (Alberta: Bow Island, Diamond City, Edmonton, Lacombe, Lethbridge Dry, Lethbridge Irrigated, Vauxhall; Saskatchewan: Indian Head, Saskatoon, Outlook; Manitoba: Morden). Although this line did not meet the quality requirements for the Canada Western Soft White Spring (CWSWS) wheat class, it had sufficient merit to continue evaluation in the General Purpose Wheat Cooperative Registration trial (GP Coop) as GP80 in 2010 and 2011. It was also evaluated in the Ethanol B test in 2010.

The GP Coop was conducted at 11 locations per year across western Canada (Alberta: Ellerslie, Lacombe, Lethbridge Irrigated; Saskatchewan: Indian Head, Kernen, Melfort, Regina, Swift Current; Manitoba: Brandon, Glenlea, Rosebank). The Brandon site was lost due to flooding in 2010. The agronomic checks were AC Andrew (CWSWS class) (Sadasivaiah et al. 2004), 5702 PR (Canada Prairie Spring Red class) and Pasteur (CWGP class). The criteria used for agronomic evaluation included grain yield, maturity, plant height, straw strength, test weight and kernel mass; disease reactions were assessed for leaf rust (*P. triticina* Eriks. = *P. recondita* Roberge ex Desmaz.), stem rust (*Puccinia graminis* Pers.: Pers. f. sp. *tritici* Eriks. & e. Henn.), stripe rust (*Puccinia striiformis* Westend), FHB {caused by *Fusarium graminearum* Schwabe [telomorph Gibberella zeae (Schwein.) Petch]}, common bunt [*Tilletia laevis* Kuhn in Rabenh. and *T. tritici* (Bjerk.) (Bjerk.) R. Wolff] and several other diseases. Analyses of variance were conducted using a combined mixed effects model for agronomic data with years, environments, and their interactions treated as random effects; and cultivar treated as a fixed effect. The least significant difference (LSD) test was used to identify significant differences from the check cultivars.

Artificially inoculated field nurseries were used to determine the reactions to leaf and stem rust at the AAFC-CRC using the modified Cobb scale (Peterson et al. 1948). Seedling infection reaction type was determined in the greenhouse for leaf rust races MBDS (12-3), MGBJ (74-2), TJBJ (77-2) and MBRJ (128-1) (McCallum and Seto-Goh 2006) and to stem rust races TMRTK (C10), RKQSR (C63), TPMKR (C53) RTHJT (C57), QTHST (C25) and RHTSK (C20) (Roelfs and Martens 1988; Fetch 2005). Severity reaction to stripe rust was recorded based on natural field infection in stripe rust nurseries near Lethbridge, AB, and Creston, BC (Randhawa et al. 2012). *Fusarium* head blight tolerance was evaluated at Glenlea and Carman, MB, in field nurseries that were spray inoculated with a macroconidial suspension and rated using a visual index (% incidence $\times$ % severity/100) as described by Gilbert and Woods (2006). Resistance to loose smut [*Ustilago tritici* (Pers.) Rostr.] was estimated as described by Menzies et al. (2003). Evaluation of common bunt resistance was conducted at the AAFC-LRC using a composite of races L1, L16, T1, T6, T13 and T19, and planting into cold soil (Gaudet and Puchalski 1989; Gaudet et al. 1993).

Performance and Adaptation

AAC Proclaim is an awned, medium height, hollow stemmed cultivar with soft red grain suitable for the CWGP wheat class. Based on the 1 yr of evaluation as SWS416 in the SWS Coop (2009), it yielded 93% of AC Andrew ($P \leq 0.05$) (Table 1a). Two years of evaluation in the GP Coop (2010 and 2011) showed that AAC Proclaim yielded 101% of 5702PR ($P > 0.05$), 92% of AC Andrew and 85% of Pasteur ($P \leq 0.05$) (Table 1b).

Based on the 2 yr of evaluation in the GP Coop, AAC Proclaim matured in 105.9 d as compared with 107.3 d for AC Andrew ($P > 0.05$) and 110.8 d for Pasteur ($P \leq 0.05$) (Table 2). A standard height cultivar, AAC Proclaim was 19 cm and 16 cm taller than AC Andrew and Pasteur, respectively ($P \leq 0.05$). AAC Proclaim exhibited good straw strength, presenting a slightly inferior ($P > 0.05$) lodging score (1 = erect; 9 = flat) of 2.1 compared with 1.7 for AC Andrew and 1.4 for Pasteur (Table 2). The test weight of AAC Proclaim (77.8 kg hL^{-1}) was higher than both checks and the kernel mass was similar to AC Andrew but lower than Pasteur.

In 1 yr of disease resistance testing in the SWS Coop and Ethanol B and 2 yr in the GP Coop trials (Table 3a and 3b), AAC Proclaim was rated as resistant to *Fusarium* head blight. During the 3 yr of registration testing, AAC Proclaim had five resistant ratings and one intermediate rating in six FHB nurseries and showed lower deoxynivalenol content (Table 3b). AAC Proclaim was also shown to be resistant to leaf rust, and moderately resistant to stem rust and loose smut (Table 3a). AAC Proclaim was susceptible to stripe rust and common bunt (Table 3a). Overall, AAC Proclaim appears to

Table 1a. Agronomic performance of AAC Proclaim (SWS416) compared with the check cultivars in the 2009 Soft White Spring Wheat Cooperative test

	Grain yield (kg ha^{-1})									
Entry	Irrigated	Dryland	Overall	% of AC Andrew	Maturity (d)	Height (cm)	Lodging (1–9)	Test weight (kh hL^{-1})	Kernel mass (g)	Protein (%)
AC Reed	6785	6666	6731	86	112.5	83.0	2.6	78.2	30.6	11.7
AC Andrew	7838	7821	7830	100	114.2	86.0	2.7	78.7	32.6	11.8
Sadash	7972	7923	7950	102	114.6	88.0	2.6	80.0	34.0	11.8
AAC Proclaim	**7325**	**7192**	**7265**	**93**	**113.3**	**97.0**	**3.5**	**80.9**	**35.0**	**12.4**
No. of stations	6	5	11	11	11	11	5	6	6	6
$LSD_{0.05}$	273	278	195	–	0.5	1.6	0.2	3.3	1.0	0.2

Table 1b. Grain yield (kg ha^{-1}) of AAC Proclaim (GP80) compared with the check cultivars in the 2010–2011 General Purpose Cooperative test

	Zone 1[z]			Zone 2[z]			Zone 3[z]			Zone 4[z]		Western Canada			
Entry	2010	2011[y]	Mean	2010	2011	Mean	2010	2011[x]	Mean	2010[w]	2011	2010	2011	Mean	% of AC Andrew
AC Andrew	2671	5293	3982	3860	5665	4762	6889	8656	7772	3604	7894	4286	6588	5437	100
5702 PR	2980	5164	4072	3126	5171	4148	6507	7061	6784	2579	6155	4146	5737	4942	91
Pasteur	3567	5034	4300	4582	5219	4901	7710	8778	8244	5332	9397	5133	6621	5877	108
AAC Proclaim	**3301**	**4441**	**3871**	**4061**	**4879**	**4470**	**6887**	**6934**	**6911**	**4653**	**6403**	**4497**	**5464**	**4981**	**92**
No. stations	4	2	6	3	3	6	3	2	5	1	1	10	8	18	
$LSD_{0.05}$	515	1009	326	561	462	310	995	1143	520	1344	1124	481	543	232	

[z]Zone 1, Brandon, Glenlea, Indian Head, Rosebank; Zone 2, Kernen, Regina, Swift Current; Zone 3, Ellerslie, Lacombe, Melfort; Zone 4, Lethbridge (Irrigated).
[y]Glenlea 2011 yield data were not included in zone 1 means due to high CV.
[x]Ellerslie 2011 yield data were not included in zone 3 means due to high CV.
[w]Lethbridge 2010 yield data were dropped due to high CV. Included for information only.

have excellent adaptation to western Canada and has disease resistance characteristics most suitable for the eastern prairies where stripe rust is less of a concern.

Other Characteristics

Plant characteristics were recorded from experimental field plots grown in 2012 at Lethbridge, AB.

Seedling characteristics

Coleoptile colour: Very weak anthocyanin colouration.
Juvenile growth habit: Erect.
Seedling leaves: glabrous leaf sheaths and blades of lower leaves.
Tillering capacity (at low densities): Medium.

Adult plant pharacteristics

Growth habit: Erect.
Flag leaf: Light green with glabrous sheath and blade. Weak auricle colouration, and auricle margins are glabrous.
Flag leaf attitude: Intermediate.
Upper culm internode: Straight at maturity with weak waxiness. It has a hollow stem with thin walls.
Culm colour: glabrous.

Spike characteristics

Shape: Tapering.
Length: Long, similar to AC Andrew.
Density: Medium.
Attitude: Inclined.
Rachis: Glabrous rachis.
Colour: White at maturity.
Awns: Awned.

Spikelet characteristics

Glumes: Medium length and width; lower glume is glabrous; glume shoulders are square; medium shoulder width; glume beak is acuminate and of medium length, internal imprint of lower glume is absent. Glumes are white in colour at maturity.

Kernel characteristics

Type: Soft, red in colour.
Shape: Oval shape with rounded to slightly angular cheeks.
Size: Medium sized with medium length and medium width.
Brush: Medium-sized with medium long brush hairs.
Embryo: Medium-sized elliptical shape; crease is mid-wide and mid-deep.

Maintenance and Distribution of Pedigreed Seed

Breeder Seed development of AAC Proclaim was initiated in 2010 by planting random head selections taken from a rogued F_6-derived F_9 increase plot grown in Lethbridge. In winter 2010, 80 pre-breeder seed lines

Table 2. Agronomic traits of AAC Proclaim (GP80) compared with the check cultivars in the 2010–2011 General Purpose Cooperative test

	Maturity (d)			Height (cm)			Lodging (1–9)[z]			Test weight (kg hL^{-1})			1000-kernel weight (g)		
Entry	2010	2011	Mean	2010	2011	Mean	2010	2011	Mean	2010	2011	Mean	2010	2011	Mean
AC Andrew	110.9	103.7	107.3	83.0	85.3	84.2	1.9	1.5	1.7	72.2	79.1	75.7	32.2	35.7	33.9
5702 PR	107.5	101.0	104.2	83.7	85.4	84.5	1.8	1.8	1.8	73.3	78.1	75.7	38.3	37.0	37.6
Pasteur	115.3	106.3	110.8	88.7	85.7	87.2	1.5	1.2	1.4	75.8	79.6	77.7	36.5	37.3	36.9
AAC Proclaim	**109.7**	**102.0**	**105.9**	**109.7**	**97.0**	**103.4**	**2.4**	**1.8**	**2.1**	**75.5**	**80.1**	**77.8**	**33.5**	**34.6**	**34.0**
No. stations	10	9	19	11	10	21	6	5	11	11	9	20	11	9	20
$LSD_{0.05}$	2.7	2.6	3.0	3.0	3.2	2.0	1.0	0.6	1.0	1.6	1.2	1.1	2.4	1.8	1.6

[z]1 = erect; 9 = flat.

Table 3a. Disease reactions of AAC Proclaim (GP80) and check cultivars based on data from 2010–2011 General Purpose Cooperative test

	Leaf rust			Stem rust			Stripe rust			Common bunt			Loose smut		
Entry	2009[z] Rating[y]	2010 Rating	2011 Rating	2009[z] Rating	2010 Rating	2011 Rating	2009[z] Rating	2010 Rating	2011 Rating	2009 (%)[z]	2010 (%)	2011 (%)	2009 (%)[z]	2010 (%)	2011 (%)
AC Andrew	12.5 MR	33 I	10 R	10 RMR	10 RMR	7 MR	30 MS	15 R	25 I	39 I-MS	22 MS	51 S	100 S	67 MS	44 I
5702 PR	–	0 R	0 R	–	15 RMR	30MS	–	60 S	37 I	–	4 RMR	6 MR	–	43 I	9 R
Pasteur	–	0 R	0 R	–	20 MR	5 MR	–	0 R	18 I	–	39 S	24 I	–	73 MS	28 MR
AAC Proclaim	**3.3 R**	**3 R**	**2 R**	**25 MR**	**20 MR**	**10 MR**	**30 MS**	**80 S**	**47 S**	**64 VS**	**45 S**	**60 S**	**21 MR**	**0 R**	**19 MR**

[z]Disease data from 2009 Soft White Spring Wheat Coop test.
[y]Disease rating: R = resistant, RMR = resistant/moderately resistant, MR = moderately, resistant, I = intermediate in reaction, MS = moderately susceptible, S = susceptible.

Table 3b. Disease reactions of AAC Proclaim (GP80) and check cultivars based on data from 2009–2011 registration tests

	Carman FHB[z]		Glenlea FHB								Charlottetown FHB	
Entry	2009[y] Index	2010 Index	2009[y] Index	2010[x] Index	2010 Index	2011 Index	2010 DON[w]	2011 DON	2010 ISD[v]	2011 ISD[v]	2011 Index	2011 DON
AC Andrew	29 MS	45 S	38 MS	62.5 S	63.7 S	24 S	25.4	4.3	58.2 S	4.6 MS	49	14.7
5702 PR	–	38 MS	–	4.8 R	10.3 MR	11 I	20.1	4.0	25.5 MR	3.7 I	75	14.0
Pasteur	–	31 MS	–	–	39.7 S	12 I	9.3	2.5	41.7 S	3.1 I	59	11.6
AAC Proclaim	**0.5 R**	**3 R**	**9 R**	**2.5 R**	**17.2 I**	**0 R**	**9.4**	**0.4**	**28.2 I**	**0.3 R**	**43**	**8.0**

[z]*Fusarium* head blight.
[y]Disease data from 2009 Soft White Spring Wheat Coop test.
[x]Disease data from 2010 Ethanol B test.
[w]Deeoxynivalenol.
[v]ISD, incedence, severity, DON, is calculated by: $(0.3 \times \text{AVGI}) + (0.3 \times \text{AVGS}) + (0.4 \times \text{DON})$ for a given entry.

were harvested from 100 head-rows that were grown near Lincoln, New Zealand. Based on an examination of seed quality and uniformity, 52 rows were planted at the AAFC Seed Increase Unit at Indian Head. Following the elimination of variant and off-type rows in summer 2011, 41 F_{11} lines were inspected by the Canadian Food Inspection Agency in cooperation with the Canadian Seed Growers' Association and harvested in bulk. The breeder seed of AAC Proclaim will be maintained by the Indian Head Research Farm, AAFC, Indian Head, Saskatchewan, Canada S0G 2K0. Multiplication and distribution of the pedigreed seed will be handled by FP Genetics, 426 McDonald Street, Regina, Saskatchewan, Canada S4N 6E1.

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