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CULTIVAR DESCRIPTION

AAC Viewfield hard red spring wheat

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Abstract: AAC Viewfield hard red spring wheat (*Triticum aestivum* L.) has a grain yield significantly higher than the check cultivars Katepwa and Lillian and is similar to Carberry. AAC Viewfield matures significantly later than Katewpa and Lillian but is similar to Carberry. AAC Viewfield has an awned spike, a low lodging score (indicative of strong straw), and significantly shorter plant stature than all checks. AAC Viewfield expressed resistance to prevalent races of yellow rust and stem rust, moderate resistance to leaf rust and common bunt, and intermediate resistance to *Fusarium* head blight. AAC Viewfield has quality attributes within the range of the check cultivars and is eligible for grades of Canada Western Red Spring wheat.

Key words: Triticum aestivum L., wheat, cultivar description, grain yield, disease resistance, semidwarf.

Résumé : AAC Viewfield est une variété de blé roux vitreux de printemps (*Triticum aestivum* L.) dont le rendement grainier surpasse sensiblement celui des cultivars témoins Katepwa et Lillian, et ressemble à celui de Carberry. AAC Viewfield parvient à maturité nettement plus tard que Katewpa et Lillian, mais à peu près en même temps que Carberry. La variété se caractérise par un épi barbu, une bonne résistance à la verse, signe d'une paille robuste, et est passablement plus courte que les autres. AAC Viewfield résiste aux races communes de la rouille jaune et de la rouille de la tige, résiste modérément à la rouille des feuilles et à la carie, et affiche une résistance intermédiaire à la fusariose de l'épi. Les paramètres qualitatifs de la variété se situent dans la plage des cultivars témoins, si bien qu'AAC Viewfield est admissible au classement dans la catégorie « blé roux de printemps de l'Ouest canadien » (CWRS). [Traduit par la Rédaction]

Mots-clés : Triticum aestivum L., blé, description de cultivar, rendement grainier, résistance à la maladie, semi-nain.

Introduction

AAC Viewfield, a hard red spring wheat (*Triticum aestivum* L.) cultivar, was developed at the Swift Current Research and Development Centre (SCRDC), Agriculture and Agri-Food Canada (AAFC), Swift Current, SK. It received registration No. 7919 from the Variety Registration Office, Plant Production Division, Canadian Food Inspection Agency (CFIA), Ottawa, ON, on 12 Feb. 2016. AAC Viewfield was granted Plant Breeders' Rights certificate No. 5575 by the Plant Breeders' Rights office, CFIA, on 9 Nov. 2017.

Pedigree and Breeding Methods

AAC Viewfield is a doubled haploid (DH) genotype derived from the cross Stettler/Glenn that was made at SCRDC in 2007. The cultivar Stettler (DePauw et al. 2009) derives from a cross of the cultivars Prodigy (Graf et al. 2003) and Superb (Townley-Smith et al. 2010). The cultivar Glenn (Mergoum et al. 2006) was developed from the cross ND2831/Steele. ND2831 (Mergoum et al. 2005) is a hard red spring experimental line developed by the North Dakota State University breeding program from the cross Sumai 3/Wheaton//Grandin/3/ND688. The parents were haplotyped using the molecular markers associated with *Fusarium* head blight (FHB) (Bokore et al. 2017). A total of 706 F_1-derived DH lines (B0763&) were generated between summer of 2007 and spring of 2009 using the maize pollen method (Knox et al. 2000). The '&' was assigned to the cross name to identify lines as

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Table 1. Grain yield (kg ha^{-1}) of AAC Viewfield compared with check cultivars and mean of check cultivars in the Western Bread Wheat Cooperative test, 2012–2014.

	Zone 1[a]			Zone 2[a]			Zone 3[a]				
Entry	2012[b]	2013	2014	2012	2013	2014	2012	2013	2014	2013–2014	2012–2014
Katepwa	2845	4486	4453	2825	4172	3359	3689	4667	4118	4025	3716
Lillian	2622	4536	4176	2768	3914	3203	3413	4957	4103	3932	3605
Carberry	2989	4475	4835	2891	4241	3749	4236	5535	4908	4441	4039
Glenn	—	4684	4698	—	4529	3746	—	5352	4692	4482	—
97B64-F9A3[c]	—	4875	4622	—	4935	3714	—	5764	4285	4540	—
Check mean	2819	4611	4557	2828	4358	3554	3779	5255	4421	4284	3787
AAC Viewfield	3718	4416	5215	3146	4670	3932	3705	5631	4342	4580	4189
$LSD_{0.05}$[d]	663	—	—	284	—	—	584	—	—	450	—
$LSD_{0.05}$[e]	—	418	347	—	321	373	—	573	738	—	351
No. of tests	2	2	2	7	7	8	3	3	3	25	37

[a]Zone 1 Locations: Swift Current and Stewart Valley; Zone 2 Locations: Regina, Goodale, Indian Head, Kernen, Lethbridge (2012, 2014), Scott (2013, 2014), Vulcan, and Watrous; Zone 3 Locations: Lacombe, Melfort, Ellerslie.
[b]Means are based on LS means procedure in SAS.
[c]97B64-F9A3 is the pure *Sm1* component of Unity VB.
[d]Appropriate least significant difference (LSD) to make comparisons of AAC Viewfield to Katepwa, Lillian, and Carberry. $P \leq 0.05$; includes the appropriate genotype × environment interaction.
[e]Appropriate LSD to make comparisons of AAC Viewfield to Katepwa, Lillian, Carberry, Glenn, and 97B64-F9A3. $P \leq 0.05$; includes the appropriate genotype × environment interaction.

Table 2. Means[a] for agronomic characteristics of AAC Viewfield compared with the check cultivars in the Western Bread Wheat Cooperative test, 2012–2014.

Entry	Maturity (d)	Height (cm)	Lodging score[b] (1–9)	Test weight (kg hL^{-1})	Kernel weight (mg)	Protein (%)
Katepwa	97.7	105.0	3.5	78.0	32.9	14.5
Lillian	98.2	101.4	3.8	76.9	34.7	15.9
Carberry	101.4	87.1	1.3	79.4	34.5	14.5
Check mean	99.0	97.8	2.9	78.1	33.8	15.0
AAC Viewfield	100.5	82.7	1.4	79.7	32.2	14.6
$LSD_{0.05}$[c]	1.9	2.3	0.7	1.2	1.8	0.4
No. of tests	34	36	19	37	37	37

[a]Means based on LSMEANS procedure in SAS.
[b]Straw strength rated on a scale of 1 to 9, where 1 indicates all plants within a plot are erect and 9 indicates all plants in a plot are lying horizontal.
[c]LSD, least significant difference ($P \leq 0.05$); includes the appropriate genotype × environment interaction variation.

DH and incrementing alpha characters were assigned to each F_1 plant of the cross followed by a numeric character that indicated the specific DH derivative of an F_1 plant. Each subset of DH lines were screened for diseases such as common bunt and leaf and stem rusts and agronomic traits, and seed was multiplied using a contra season nursery prior to entry into replicated trials as described for the development of DH cultivars Stettler and Carberry (DePauw et al. 2011). The DH line B0763&AA016 was in the second subset of DH lines. In 2008, seed of individual DH lines was inoculated with common bunt [*Tilletia laevis* Kühn in Rabenh. and *Tilletia tritici* (Bjerk.) G. Wint. in Rabenh.] races L16 and T19 in a 1:1 ratio (Hoffmann and Metzger 1976). The seed was planted in 1.5-m-long rows spaced 23 cm apart, with every second row planted with CDC Kestrel winter wheat (Fowler 1997), which is susceptible to leaf rust (*Puccinia triticina* Erikss.) and stem rust (*Puccinia graminis* Pers.: Pers. f.sp. *tritici* Erikss. & E. Henn.). CDC Kestrel was used as a secondary spreader of diseases. An irrigated leaf rust and stem rust epiphytotic nursery was established by planting genotypes susceptible to prevalent races of leaf and stem rust in every 12th plot and needle inoculating five plants every 5 m in each row. The leaf rust races used were of representative races found the previous year (McCallum and Seto-Goh 2006). The stem rust races used were QTHJF (C25), RHTSC (C20), RKQSC (C63), RTHJF (C57), TMRTF (C10), and TPMKC (C53) (Roelfs and

Table 3. Response to *Fusarium* head blight and the mycotoxin deoxynivalenol (DON) of AAC Viewfield and check cultivars based on the 2012 to 2014 Western Bread Wheat Cooperative test grown in inoculated nurseries near Glenlea and Carman, MB.

	Carman—inoculated FHB nursery										Glenlea—inoculated FHB nursery						
	2012			2013		2014					2012					2013	
Entry	Index[a] (%)	Rating[b]	FDK[c] (%)	Index[a] (%)	Rating[b]	Index[a] (%)	Rating[b]	FDK (%)	DON[d] (ppm)	ISD[e]	Index[a] (%)	Rating[b]	DON (ppm)	ISD	Rating[b]	1st Rating	2nd Rating
Katepwa	33	I	16	45	MS	13	MR	5	6	5	16	MS	5	18	I	13	17
Lillian	76	S	23	70	S	51	S	9	16	13	11	I	3	17	I	29	31
Carberry	15	MR	4	21	MR	12	MR	6	10	8	11	I	5	17	I	16	16
Glenn	—	—	—	22	MR	6	MR	6	8	6	—	—	—	—	—	24	21
97B64-F9A3[f]	—	—	—	39	I	21	I	9	16	12	—	—	—	—	—	12	15
AAC Viewfield	26	I	6	34	I	23	I	9	13	10	16	MS	4	21	I	16	9

[a]*Fusarium* head blight disease index = (percentage of infected heads × percentage of diseased florets on infected heads)/100.
[b]Disease response category: R, resistant; MR, moderately resistant; I, intermediate; MS, moderately susceptible; and S, susceptible.
[c]FDK, *Fusarium* damaged kernels of a weight of kernels with *Fusarium* symptoms as a percent of the total sample weight.
[d]DON, deoxynivalenol content (ppm).
[e]ISD, incidence severity DON index = [(0.2 × incidence) + (0.2 × severity) + (0.6 × DON)].
[f]97B64-F9A3 is the pure *Sm1* component of Unity VB.

Martens 1988; Fetch et al. 2015). Two spikes were selected from each of 103 disease-resistant DH lines that matured within a range of acceptable maturity and had strong stems of semidwarf stature. Seed from each spike was grown out in 2-m-long rows near Irwell, New Zealand. From these, 80 DH lines that were comparable with check commercial cultivars for time to maturity, plant height, straw strength, and shattering were selected and harvested as individual rows. In 2009, the 80 DH lines were assessed for agronomic performance by growing them in four-row plots (3 m long) in nurseries near Swift Current and Indian Head, SK, and Morden, MB. Agronomic plots were harvested at maturity and the grain weight of each plot was measured. Seed weight and kernel attributes were measured on the same whole grain sample. Grain protein concentration and volume weight were measured using near-infrared reflectance spectroscopy (Williams 1979) on whole grain of each sample within each location. A subsample was submitted to the Central Quality Lab, Cereal Research Centre, AAFC, Winnipeg, MB, to determine end-use suitability for the Canada Western Red Spring (CWRS) market class. Reaction to leaf and stem rust was assessed in an epiphytotic nursery near Glenlea, MB; response to *Fusarium graminearum* Schwabe [teleomorph *Gibberella zeae* (Schwein.) Petch] was assessed in the FHB nursery near Carman, MB; and response to common bunt was assessed in a bunt nursery near Swift Current. Selected DH lines were screened for reaction to a mixture of races T2, T9, T10, and T39 of loose smut [*Ustilago tritici* (Pers.) Rostr.] (Nielsen 1987). The protocols for assessing these diseases are described in Appendix E of the Prairie Recommending Committee for Wheat, Rye and Triticale operating procedures (Anonymous 2015).

The above procedures resulted in the identification of the experimental DH line B0763&AA016, which met all of the selection criteria at each stage of selection. The experimental line was evaluated in the Western Bread Wheat 'A_3' test in 2010, in the Western Bread Wheat 'B' test in 2011, and as BW965 in the Western Bread Wheat Cooperative (WBWC) test from 2012 to 2014. Annually, the WBWC test consisted of 25 experimental lines and five check cultivars grown in a 5 × 6 lattice design with three replications at up to 13 locations per year. The check cultivars were Laura (DePauw et al. 1988) and CDC Kernen (Hucl 2012) for 2012, Glenn (Mergoum et al. 2006) and 97B64-F9A3, the pure *Sm1* component of Unity VB (Fox et al. 2010), for 2013 and 2014, and Katepwa (Campbell and Czarnecki 1987), Carberry (DePauw et al. 2011), and Lillian (DePauw et al. 2005) from 2012 to 2014. The check cultivars were changed to reflect customer requests for a reduced range and increased gluten strength of cultivars eligible for grades of CWRS as part of the Canadian Wheat Class Modernization (Canadian Grain Commission 2015). In 2013, the extensograph instrument was added as a new assay of gluten strength as the farinograph did not

Table 4. Response to *Fusarium* head blight and the mycotoxin deoxynivalenol (DON) of AAC Viewfield and check cultivars based on the 2012 to 2014 Western Bread Wheat Cooperative test grown in inoculated nurseries near Portage, MB, Ottawa, ON, and Charlottetown, PE.

	Portage		Ottawa					Charlottetown						Morden				
	2013		2012	2013		2014		2012		2013		2014		2014				
Entry	Index[a] (%)	Rating[b]	Index[f]	Index[f]	DON (ppm)	Index[f]	DON (ppm)	Index[a]	DON[d] (ppm)	Index[a]	DON (ppm)	Index[a]	DON (ppm)	Index[a]	Rating[b]	DON (ppm)	ISD	ISD Rating
Katepwa	25	I	50	50	7	67	5	48	1	56	7	30	13	60	S	28	20	R
Lillian	32	S	77	73	10	83	16	54	2	58	9	30	18	60	S	46	31	MR
Carberry	17	I	32	35	10	35	16	45	0	59	13	41	18	33	MR	41	27	MR
Glenn	10	MR	—	30	11	27	9	—	—	51	14	31	18	37	I	40	27	MR
97B64-F9A3[h]	20	I	—	43	9	43	13	—	—	56	12	29	14	63	S	49	33	MR
AAC Viewfield	15	I	38	73	8	38	20	48	1	59	21	37	13	32	MR	57	37	MR
CV	—	—	—	19	—	9	—	—	—	—	—	—	—	—	—	—	—	—
$LSD_{0.05}$[g]	—	—	—	13	—	13	—	7	—	—	6	13	—	—	—	—	—	—

[a]*Fusarium* head blight disease index = (percentage of infected heads × percentage of diseased florets on infected heads)/100.
[b]Disease response category: R, resistant; MR, moderately resistant; I, intermediate; MS, moderately susceptible; and S, susceptible.
[c]FDK, *Fusarium* damaged kernels of a weight of kernels with *Fusarium* symptoms as a percent of the total sample weight.
[d]DON, deoxynivalenol content (ppm).
[e]ISD, incidence severity DON index = [(0.2 × incidence) + (0.2 × severity) + (0.6 × DON)].
[f]Percentage of spikes with *Fusarium* head blight symptoms.
[g]LSD, least significant difference ($P \leq 0.05$).
[h]97B64-F9A3 is the pure *Sm1* component of Unity VB.

Table 5. *Fusarium* damaged kernels and DON of AAC Viewfield and checks based on 5 repetitions in the 2014 FHB nursery near Portage la Prairie, MB.

	Fusarium damaged kernels[a] (%)		FHB index[b]		DON content (ppm)	
Entry	Mean	Duncan[c] $_{0.05}$	FHB index	Duncan$_{0.05}$	Mean	Duncan$_{0.05}$
Katepwa	25	d	20	b	17	c
AC Barrie	37	b	17	bc	29	b
Lillian	56	a	42	a	36	a
Carberry	12	f	3	d	9	d
97B64-F9A3[d]	14	ef	8	cd	16	c
AAC Viewfield	28	cd	4	d	18	c

[a]*Fusarium* damaged kernels as a percentage of total sample weight.
[b]*Fusarium* head blight (FHB) disease index = (percentage of infected heads × percentage of diseased florets on infected heads)/100.
[c]Duncan's mean separation test ($P \leq 0.05$) using PROC MIXED in SAS.
[d]97B64-F9A3 is the pure *Sm1* component of Unity VB.

adequately differentiate among medium strong gluten genotypes. The agronomic, disease, and end-use suitability variables measured and protocols followed in the WBWC test are described in the operating procedures of the Prairie Recommending Committee for Wheat, Rye and Triticale (Anonymous 2015). The MIXED procedure of SAS (Littell et al. 2006) was used to perform yearly and multi-year analyses for agronomic data, with years, environments, and their interactions considered as random effects and cultivar treated as a fixed effect. Mean separation tests were performed using Fisher's protected least significant difference procedure.

Response to several diseases was assessed in specialized disease nurseries from 2012 to 2014. Stem rust seedling infection types were assessed using races QTHJF (C25), RHTSC (C20), RKQSC (C63), RTHJF (C57), TMRTF (C10), and TPMKC (C53). Leaf rust seedling infection types were assessed using races MBDS (12-3), MBRJ (128-1), MGBJ (74-2), TDBG (06-1-1), TDBJ (11-180-1), and TJBJ (77-2) (McCallum and Seto-Goh 2006). Field evaluations of leaf and stem rust reactions, using leaf rust races representative of those found the previous year and the same stem rust races as for the seedling tests, were measured annually in epiphytotic nurseries near Glenlea, Portage la Prairie, Morden, or Brandon, MB, as described by Bokore et al. (2017). Yellow rust (*Puccinia striiformis* f. *tritici* Erikss.) was evaluated at Creston, BC, and Lethbridge, AB, in 2013 and 2014 in nurseries exposed to natural infection. Reaction to FHB was assessed in artificially inoculated field tests conducted annually near Glenlea, Portage la Prairie, or Carman, MB, Ottawa, ON, and Charlottetown, PE. To determine response to loose smut, a mixture of prevalent races T2, T9, T10, and T39 was injected into florets of plants grown in the field at anthesis and the inoculated seed subsequently grown out and rated in a greenhouse (Menzies et al. 2003). To determine response to common bunt, a mixture of prevalent races L1, L16, T1, T6, T13, and T19 was used to inoculate the seed planted in mid-April of each year near Lethbridge, AB (Gaudet and Puchalski 1989). The race designations are those described by Nielsen (1987) for loose smut and by Hoffmann and Metzger (1976) for common bunt. The protocols for assessing these diseases are described in Appendix E of the Prairie Recommending Committee for Wheat, Rye and Triticale operating procedures (Anonymous 2015).

A sample of grain of BW965 and the check cultivars from each location was submitted to the Canadian Grain Commission each year from 2012 to 2014 to determine grain grade and protein concentration. End-use suitability was determined on a composite sample made up from sites with grain samples representative only of the top hard red spring wheat grades available. The quantity of grain from a location was adjusted to achieve a final composite protein concentration approximating that of the average for the crop that year. A consistent quantity of grain within a location for all experimental lines was used to make up the composite each year. All end-use suitability analyses were performed by personnel at the Grain Research Laboratory, Canadian Grain Commission, Winnipeg, MB, following protocols of the American Association of Cereal Chemists (AACC 2000).

Performance and Adaptation

Averaged over 37 trials in 3 yr, AAC Viewfield yielded significantly more grain than Katepwa and Lillian and was equal to Carberry (Table 1). AAC Viewfield matured significantly later than Katewpa and Lillian and was similar to Carberry (Table 2). Plant height of AAC Viewfield was significantly shorter than all of the checks. AAC Viewfield displayed significantly lower lodging score than all checks except Carberry (Table 2). AAC Viewfield had higher test weight than Katepwa and Lillian (Table 2). The kernel weight of AAC Viewfield was smaller than Lillian and Carberry.

Table 6. Reactions of AAC Viewfield and check cultivars to leaf and stem rust in the 2012 to 2014 Western Bread Wheat Cooperative test grown at various locations.

	Field leaf rust						Field stem rust							
	2012		2013		2014		2012		2013		2014 Brandon		2014 Morden	
Entry	Severity[a]	Rating[a]	Severity	Rating	Severity	Rating	Severity[b]	Rating[c]	Severity	Rating	Severity	Rating	Severity	Rating
Katepwa	57	MS	70	S	73	S	2	R	1	R	1	R	1	R
Lillian	5	R	18	MR	3	R	3	R	1	R	1	R	1	R
Carberry	8	R	4	R	1	R	5	R	1	R	15	MR	1	R
Glenn	—	—	25	MR	10	R	—	—	1	R	7	MR	1	R
97B64-F9A3[d]	—	—	22	MR	47	MS	—	—	20	I	3	R	3	MR
AAC Viewfield	17	MR	12	MR	5	R	5	MR	3	R	2	R	1	R

[a]Severity is the percentage of leaf area affected by leaf rust; Rating is the descriptive classification of disease resistance/susceptibility based on percent severity, where R (resistant) = 0%–10%, MR (moderately resistant) = 11%–30%, I (intermediate resistance) = 31%–39%, MS (moderately susceptible) = 40%–60%, and S (susceptible) >60%.
[b]Severity is the percentage of the stem infected with stem rust using the Modified Cobb Scale.
[c]Disease response categories: R, resistant; MR, moderately resistant; I, intermediate; MS, moderately susceptible; and S, susceptible.
[d]97B64-F9A3 is the pure *Sm1* component of Unity VB.

Table 7. Reactions of AAC Viewfield and check cultivars to yellow rust, common bunt, and loose smut in the 2012 to 2014 Western Bread Wheat Cooperative test grown at various locations.

	Yellow rust										Common bunt						Loose smut					
	2012		Creston 2013		Lethbridge 2013		Creston 2014		Lethbridge 2014		2012		2013		2014		2012		2013		2014	
Entry	Severity[a]	Rating[b]	Severity	Rating	Severity	Rating	Severity	Rating	Severity	Rating	Infection[c]	Reaction[b]	Infection	Reaction	Infection	Reaction	Infection[d]	Reaction[b]	Infection	Reaction	Infection	Reaction
Katepwa	28	MS	45	MS	60	S	45	S	65	S	26	I	11	R	11	MR	8	R	0	R	4	R
Lillian	0	VR	15	R	10	R	5	R	1	R	31	MS	5	R	3	R	15	R	52	I	9	R
Carberry	3	R	15	R	15	R	5	R	5	R	6	R	1	R	16	I	67	MS	8	R	0	R
Glenn	—	—	15	R	15	R	0	S	50	S	—	—	10	R	25	MS	—	—	23	MR	40	I
97B64-F9A3[e]	—	—	15	R	15	R	45	S	75	S	—	—	1	R	2	R	—	—	38	I	29	MR
AAC Viewfield	2	MR	15	R	10	R	5	R	5	R	10	MR	4	R	11	MR	81	S	75	MS	26	MR

[a]Severity is the percentage of leaf area affected by yellow rust.
[b]Disease reaction categories: R, resistant; MR, moderately resistant; I, intermediate; MS, moderately susceptible; and S, susceptible.
[c]Percentage of spikes with common bunt symptoms.
[d]Percentage of plants with loose smut symptoms.
[e]97B64-F9A3 is the pure *Sm1* component of Unity VB.

Table 8. End-use suitability[a] analyses, using a 74% extraction flour for all flour testing, of AAC Viewfield, check cultivars, and mean of the check cultivars, based on the Western Bread Wheat Cooperative test, 2013–2014.

Genotype	Wheat protein (%)	Flour protein (%)	Protein loss (%)	Hagberg Falling No. (s)	Amylograph viscosity (BU)[b]	Clean wheat flour yield (%)	Flour Ash	Flour yield 0.50 ash (%)	Starch damage (megazeme)
Carberry	13.7	12.9	0.9	398	570	75.2	0.40	79.3	7.7
Glenn	13.6	13.0	0.7	368	805	74.6	0.41	78.5	8.9
Lillian	14.5	13.7	0.8	453	640	75.4	0.47	75.8	7.6
97B64-F9A3[c]	13.3	12.5	0.7	460	963	76.7	0.43	77.8	8.4
AAC Viewfield	13.3	12.7	0.6	410	678	75.5	0.41	78.8	7.6
SD[d]	0.05	0.05	—	15	5	0.34	0.005	0.34	0.08

[a]American Association of Cereal Chemists methods were followed by the Grain Research Laboratory, Canadian Grain Commission for determining the various end-use suitability traits on a composite of 6 to 10 locations each year.

[b]Amylograph viscosity expressed in Brabender Units (BU).

[c]97B64-F9A3 is the pure *Sm1* component of Unity VB.

[d]SD, standard deviation based on repeated testing of Allis mill check samples, and standard bake flour sample with replicate tests carried out over an extended period of time each season, provided by the Grain Research Laboratory, Canadian Grain Commission.

Table 9. Farinograph, extensograph, and Canadian short process analyses[a], using a 74% extraction flour for all flour testing, of AAC Viewfield, control cultivars, and mean of the control cultivars, based on the Western Bread Wheat Cooperative test, 2013–2014.

	Farinograph				Extensograph			Canadian short process (150 ppm ascorbic acid)			
Genotype	Absorption (%)	DDT[b] (min)	MTI[c]	Stability (min)	Area	Rmax	Length	Baking absorption (%)	Mixing time (min)	Mixing energy[d] (Wh kg^{-1})	Loaf volume (cc)
Carberry	65.3	6.6	30	10.8	104	417	19.8	69.0	5.0	11.1	1033
Glenn	67.1	8.6	18	17.8	139	689	17.1	71.0	6.0	13.1	1053
Lillian	67.6	5.3	25	9.3	80	335	18.4	71.5	3.6	7.4	1053
97B64-F9A3[e]	65.7	4.9	28	8.0	87	380	17.9	69.0	4.3	9.6	1020
AAC Viewfield	65.0	7.3	20	14.8	115	494	18.7	69.0	5.1	11.8	1023
SD[f]	0.2	0.4	2.6	1.4	—	—	—	NA[g]	0.2	0.3	45

[a]American Association of Cereal Chemists methods were followed by the Grain Research Laboratory, Canadian Grain Commission for determining the various end-use suitability traits on a composite of 6 to 10 locations each year.

[b]DDT, farinograph dough development time, measured in minutes.

[c]MTI, farinograph mixing tolerance index.

[d]Mixing energy expressed as watt hour per kg.

[e]97B64-F9A3 is pure *Sm1* component of Unity VB.

[f]SD, standard deviation based on repeated testing of Allis mill check samples, and standard bake flour sample with replicate tests carried out over an extended period of time each season, provided by the Grain Research Laboratory, Canadian Grain Commission.

[g]NA, not available.

AAC Viewfield had a grain protein concentration within the range of the checks.

AAC Viewfield tended to have lower FHB symptoms than Lillian and expressed intermediate resistance (Tables 3–5). AAC Viewfield expressed resistance to prevalent races of yellow rust and stem rust and moderate resistance to leaf rust and common bunt (Tables 6 and 7).

Other Characteristics

Spike: parallel sided in profile, medium density, inclined attitude at maturity, medium glaucosity, chaff colour at maturity white to blond, medium length awns.

Lower glume: glabrous with medium width and length.

Lower glume shoulder: medium broadness to broad, elevated shape.

Lower glume beak: medium to short length, slightly curved shape.

Kernel: hard red type.

End-use suitability: In general, AAC Viewfield had quality attributes within the range of the check cultivars (Tables 8 and 9). AAC Viewfield is eligible for grades of CWRS and was retained as a new check cultivar for the WBWC test and the Central Bread Wheat Cooperative test representing a mid-range gluten strength check.

Maintenance and Distribution of Pedigreed Seed

The 63 breeder lines originate from random single plants of the DH line B0763&AA016, which had been grown out as 72 breeder lines in 3-m-long rows in isolation near Swift Current, SK, in 2013 and again as 15 m rows near Indian Head, SK, in 2014. Breeder Seed will be maintained by the Seed Increase Unit of the Research Farm, Indian Head, SK S0G 2K0, Canada. The distribution and multiplication of pedigreed seed stocks will be handled through a license to FP Genetics Inc., 426 McDonald Street, Regina, SK S4N 6E1, Canada. Phone: 306-791-1045; fax: 306-791-1046; web site : https://www.fpgenetics.ca/contact.php; email: info@fpgenetics.ca.

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