

Glenavon hard red extra strong spring wheat

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Humphreys, D. G., Townley-Smith, T. F., Czarnecki, E., Fox, S. L. and Brown, P. D. 2005. **Glenavon hard red extra strong spring wheat**. Can. J. Plant Sci. **85**: 655–658. Glenavon hard red extra strong spring wheat (*Triticum aestivum* L.) is adapted to the Canadian prairies. It combines 2 to 6% higher grain yield with improved test weight compared to AC Corinne, Glenlea and Wildcat. It is resistant to moderately resistant to prevalent races of leaf and stem rust, resistant to loose smut, and of intermediate resistance to common bunt. Glenavon is eligible for all grades of the Canada Western Extra Strong wheat class.

Key words: *Triticum aestivum* L., Canada Western Extra Strong, hard red extra strong spring wheat, cultivar description, yield, disease resistance

Humphreys, D. G., Townley-Smith, T. F., Czarnecki, E., Fox, S. L. et Brown, P. D. 2005. **Blé tendre extra fort de printemps roux Glenavon**. Can. J. Plant Sci. **85**: 655–658. Glenavon est un blé tendre roux de printemps qui appartient à la classe Extra Fort de l'Ouest Canadien. Glenavon est adapté pour la production céréalière des provinces canadiennes de l'ouest. Ce cultivar est reconnu pour son rendement en grain élevé et son poids à l'hectolitre supérieur comparé à AC Corinne, Glenlea et Wildcat. Il est résistant ou modérément résistant à la rouille des feuilles et la rouille des tiges. Il est aussi résistant au charbon nu et modérément résistant à la carie commune.

Mot clés: *Triticum aestivum* L., blé Extra Fort de l'Ouest Canadien, blé tendre de printemps roux, description de cultivar, rendement, résistance aux maladies

Glenavon, a hard red extra strong spring wheat (*Triticum aestivum* L.), was developed at the Cereal Research Centre, Agriculture and Agri-Food Canada, Winnipeg, Manitoba, Canada R3X 2M9. It received Registration No. 5015 from the Canadian Food Inspection Agency on 1999 Nov. 26.

Pedigree and Breeding Method

Glenavon is derived from the backcross Glenlea*6/Kitt; where Kitt is a high-yielding, awned, semi-dwarf, bread wheat cultivar developed in Minnesota (Heiner et al. 1976). The final backcross was made in 1976 at the Agriculture and Agri-Food Canada, Cereal Research Centre, Winnipeg, MB. F₁ and F₂ seed were produced in growth cabinets and spikes were taken from shorter F₂ plants. F₃ head rows were grown out in the 1993 Hybrid Nursery at Glenlea, MB. The F₃ rows were selected based on visual evaluation of maturity, height, lodging and disease resistance. F₃ rows of were harvested and sent to the 1993–1994 California Winter Nursery for increase. In California, the F₄ lines were harvested and the F₅ lines were yield tested at Glenlea and Portage in 1994. From this yield test, the lines with the highest yield potential, disease resistance, and acceptable quality were entered into the 1995 CWES 'B' Test and one of these lines was 77E01-C1. 77E01-C1 was subsequently given the designation ES13 and evaluated in the Canadian Western Extra-strong Cooperative Test in 1996, 1997, and 1998.

Area of Adaptation

Glenavon is adapted to the wheat growing areas of the prairie provinces.

Performance

Glenavon had 2% higher grain yield than Glenlea, 4% higher grain yield than AC Corinne and Amazon, and 6% higher grain yield than Wildcat over three years in the Canada Western Extra Strong (CWES) Wheat Cooperative Test (Table 1). This cultivar has maturity similar to Amazon and matures approximately half a day earlier than Glenlea (Table 2). On average, Glenavon is 2 cm shorter than Glenlea and AC Corinne. Glenavon is similar to Glenlea in straw strength. Glenavon has significantly higher test weight than Glenlea, AC Corinne and Wildcat (Table 2). Glenavon has CWES end-use quality and kernel shape. The quality attributes are outlined in Table 4.

As part of the Cooperative Testing, leaf and stem rust reactions were evaluated in an epiphytotic nursery. The leaf rust (*Puccinia recondita* f.sp. *tritici*) races used were those multiplied from field collections made the previous year (Kolmer 1994). The stem rust (*Puccinia graminis* f.sp. *tritici*) races included: QTH, TPM, TMR, RHT, and RKQ. The races of loose smut [caused by *Ustilago tritici* (Pers.) Rostr.] included: T2, T9, T10, and T39 and the races of common bunt [caused by *Tilletia laevis* Fuhn in Rabenh. and *T. caris* (DC.) Tul. & C. Tul.] included: L1, L16, T1, T6, T13, and

Table 1. Average grain yield^z ('00 kg ha⁻¹) of Glenavon and check cultivars in the CWES Wheat Cooperative Test, 1996–1998

Cultivar	1996				1997				1998				Grand mean
	Zone 1 ^y	Zone 2 ^x	Zone 3 ^w	Overall Mean	Zone 1	Zone 2	Zone 3	Overall Mean	Zone 1	Zone 2	Zone 3	Overall mean	
Glenlea	36.1	38.9	50.3	39.6	33.8	38.7	46.2	38.0	45.2	41.3	46.9	43.5	40.3
Wildcat	32.4	37.5	52.2	37.8	28.6	38.9	49.9	36.7	37.0	43.6	49.6	42.4	38.9
AC Corinne	34.9	38.6	50.2	39.0	32.9	37.5	47.5	36.9	45.2	45.5	45.8	42.7	39.5
Amazon	35.1	39.0	48.4	38.9	32.2	36.7	44.2	36.5	45.5	39.9	47.1	43.3	39.5
Glenavon	36.5	40.7	51.7	40.8	34.7	38.9	49.8	38.9	47.1	41.1	46.8	44.0	41.2
LSD _{.05}	5.1	2.4	4.8	2.4	3.4	2.4	9.8	2.3	6.4	2.6	2.2	2.8	1.4
No. tests	5	5	2	12	5	6	2	13	4	6	2	12	37

^zWeighted means – Means are weighted by number of stations in each year.

^yZone 1 locations include Glenlea, Morden, Rosetown, and Elgin, Manitoba and Indian Head, Saskatchewan.

^xZone 2 locations include Regina, Swift Current, Watrous, Elrose and Scott, Saskatchewan and Lethbridge, Alberta

^wZone 3 locations include Ellerslie and Beaverlodge, Alberta

Table 2. Averages for agronomic characters of Glenavon and check cultivars in the CWES Wheat Cooperative Test, 1996–1998

Cultivar	Maturity (d)				Lodging (1–9) ^z	Height (cm)	Test weight (kg hL ⁻¹)	1000-kernel weight (mg)
	Zone 1	Zone 2	Zone 3	Grand mean				
Glenlea	92.7	100.5	112.4	98.1	4.0	103	77.5	40.4
Wildcat	88.3	97.1	107.8	94.2	2.0	91	76.0	36.5
AC Corinne	93.7	101.3	112.9	99.0	3.8	103	77.5	41.1
Amazon	92.3	100.3	112.8	97.9	4.5	102	78.4	41.0
Glenavon	92.3	100.2	112.1	97.8	4.0	101	78.3	40.7
LSD _{.05}	0.9	0.7	3.0	0.5	0.4	0.5	0.4	0.6
No. tests	14	14	3	31	17	34	38	38

^z1 = no lodging, 9 = completely flat.

Table 3. Summary of disease reactions of Glenavon and check cultivars grown in the CWES Wheat Cooperative Tests, 1996–1998

Cultivar	Year	Stem rust ^z		Leaf rust ^z		Loose smut ^z	Common bunt ^z	<i>Septoria nodorum</i> ^{zx}	<i>Septoria tritici</i> ^{zx}	Leaf spots (1997 only)	FHB Index (%) ^y	Tan spot ^z	Common root rot (%)
		% Inf.	Rxn	% Inf.	Rxn								
Glenlea	1996	2	R	5	M	R	12 R–	4.0	5.0	–	51.6	6.7	5.3
	1997	1	R	20	M	0 R	30 I	–	–	9 MS	77	–	9.3
	1998	3	RMR	10	M	0 R	14.5 IR	9.3 MS	9.7 MS	–	26	9.0 MS	10.6
Wildcat	1996	20	MRMS	70	MSS	R	60 S–	5.8	7.7	–	62.5	7.2	5.3
	1997	3	RMR	60	MR-S	0 R	89 S+	–	–	10 S	78	–	8.0
	1998	29	RMR	80	MR-S	–	74.5 S+	10.0 S	10.7 S	–	44	10.0 S	11.5
AC Corinne	1996	2	R	tr	R	R	32 I–	3.0	5.3	–	62.7	7.2	8.0
	1997	1	R	10	M	0 R	22 I	–	–	8 MS	90	–	6.7
	1998	1	R	tr	R	0 R ^w	21.0 I	10.0 MS	9.0 MS	–	30	9.0 MS	4.8
Amazon	1996	2	R	tr	R	R	42 S+	3.3	4.8	–	47.9	7.0	2.7
	1997	1	R	30	M	0 R	30 I	–	–	8 MS	84	–	4.0
	1998	5	R	tr ^w	R ^w	0 R ^w	18.5 I	9.0 MS	9.3 MS	–	32	8.3 MS	3.9
Glenavon	1996	2	R	10	M	R	32 I	3.3	4.5	–	69.4	6.8	6.7
	1997	1	R	30	M	0 R	33 I–	–	–	9 MS	87	–	5.3
	1998	1	R	5	M	0 R^w	24.5 I	10.0 S	10.0 S	–	37	8.7 MS	6.1

^zPercent infection and type of reaction: tr, trace; R, resistant; MR, moderately resistant; M, intermediate resistance, MS, moderately susceptible; S, susceptible.

^yFusarium head blight index: (% infected spikelets x % infected heads)/100.

^x*Septoria* field rating (0 = no symptoms, 9 = severe symptoms).

^wAssessment made on fewer than 10 plants.

T19. Race designations are described by Roelfs and Martens (1988) for stem rust, Nielsen (1987) for loose smut, and Hoffman and Metzger (1976) for common bunt.

Other Characteristics

SPIKES: Fusiform, lax, long, apically awnleted, white, and nodding at maturity; glumes are wide, long, glabrous; glume shoulders are square and midwide to wide; glume beaks are acute and short.

KERNEL: Colour red, midsize to large, midwide, midlong to long, elliptical; cheeks slightly angular, brush hairs mid-long, brush size medium, embryo midsize, oval.

DISEASE REACTION: Glenavon is resistant to moderately resistant to prevalent races of leaf and stem rust, resistant to loose smut, has intermediate resistance to common bunt and is similar to Glenlea in resistance to Tan Spot, *Septoria nodorum*, and *Septoria tritici* and appears to be

Table 4. Mean end-use quality data of Glenavon and check cultivars as determined from the Canada Western Extra Strong Wheat Cooperative Test (1996–1998)^z

Kernel						
Cultivar	Test wt. (kg hL ⁻¹)	1000-kernel wt. (g 1000 kernel ⁻¹)	Protein (%)	Falling number (s)	Hardness (PSI)	Starch damage (%)
Glenlea	80.7	43.6	13.0	352	50	7.1
Wildcat	79.7	39.8	14.2	337	53	6.5
AC Corinne	80.6	43.9	13.3	353	51	7.1
Amazon	81.2	44.4	13.0	338	50	7.1
Glenavon	80.9	43.6	13.2	367	50	6.9
LSD _{0.05}	0.3	0.8	0.1	10	1	0.5
Years	3	3	3	3	3	3

Flour						
Cultivar	Yield (%)	Protein (%)	Ash (%)	Kt. Jones colour (Farrand)	Agtron colour (AG)	Amylase (BU)
Glenlea	74.6	12.2	0.47	-2.4	74	505
Wildcat	75.3	13.3	0.44	-1.9	71	427
AC Corinne	74.8	12.6	0.46	-2.3	72	540
Amazon	74.6	12.3	0.45	-2.3	73	470
Glenavon	74.4	12.4	0.47	-2.5	75	620
LSD _{0.05}	0.5	0.1	0.02	0.2	1	31
Years	3	3	3	3	3	3

Cultivar	Farinograph				Farinograph (90 rpm)			
	Absorption (%)	Dough development time (min)	Mixing tolerance index (BU)	Stability (min)	Absorption (%)	Dough development time (min)	Mixing tolerance index (BU)	Stability (min)
Glenlea	60.9	7.43	10	25.83	61.4	8.50	26	12.00
Wildcat	63.0	10.53	20	19.50	64.8	7.52	39	6.97
AC Corinne	62.6	6.67	12	30.17	62.9	10.07	16	14.33
Amazon	62.2	7.17	12	25.67	63.6	8.35	30	9.33
Glenavon	62.0	6.33	12	22.17	62.5	7.50	25	11.30
LSD _{0.05}	1.2	1.71	6	3.77	1.6	0.97	8	2.42
Years	3	3	3	3	3	3	3	3

Mixograph				
Cultivar	Development time (min)	Peak height (cm)	Total energy (BU)	Band energy (BU)
Glenlea	5.3	0.183	89.7	59.7
Wildcat	4.2	0.206	99.5	61.7
AC Corinne	5.2	0.202	104.7	74.4
Amazon	4.8	0.189	96.0	65.1
Glenavon	4.7	0.178	88.9	56.7
LSD _{0.05}	0.6	0.030	14.5	11.7
Years	3	3	3	3

^zAmerican Association of Cereal Chemists (AACC) methods were used by the Grain Research Laboratory, Canadian Grain Commission for determining the end-use quality characteristics on a composite of six to eight locations per year.

similar to Wildcat in resistance to *Fusarium* spp. (see Table 3).

END-USE SUITABILITY: Glenavon is eligible for all grades of the Canada Western Extra Strong wheat class (Table 4).

Maintenance and Distribution of Pedigreed Seed

The 207 breeders lines were selected from approximately 250 randomly harvested spikes of a rogued BC₅F₂-derived F₇ increase in 1996. They were grown in 3-m rows in isolation at the Glenlea Field Station of the Cereal Research Centre in 1997 and as 15-m rows at the AAFC Seed Increase Unit, Indian Head, SK, in 1998. Breeder seed will be maintained by the Agriculture and Agri-Food Canada Seed Increase Unit, Indian Head, SK. Distribution and multipli-

cation of pedigree seed stocks will be handled by SeCan Ltd., 200-57 Auriga Drive, Nepean, ON, Canada K2E 8B2.

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