

AC Elsa hard red spring wheat

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Clarke, J. M., DePauw, R. M., McCaig, T. N., Fernandez, M. R., Knox, R. E. and McLeod, J. G. 1997. **AC Elsa hard red spring wheat**. Can. J. Plant Sci. **77**: 661–663. AC Elsa, hard red spring wheat (*Triticum aestivum* L.), is adapted to the Canadian Prairies. It combines high grain yield with high grain protein concentration in a short strawed background. It has improved resistance to leaf spots compared with the check cultivars, and resistance to prevalent races of leaf rust, stem rust, loose smut, and common bunt. AC Elsa is eligible for grades of Canada Western Red Spring wheat.

Key words: *Triticum aestivum* L., red spring wheat, cultivar description, yield, protein, disease resistance

Clarke, J. M., DePauw, R. M., McCaig, T. N., Fernandez, M. R., Knox, R. E. et McLeod, J. G. 1997. **Blé de printemps roux vit-reux AC Elsa**. Can. J. Plant Sci. **77**: 661–663. AC Elsa est un nouveau cultivar de blé de printemps roux vitreux (*Triticum aestivum* L.) adapté aux conditions de culture des Prairies canadiennes. Sur un chaume court, il fournit un rendement élevé de grains à forte concentration protéique. Par rapport aux cultivars témoins, il démontre une meilleure résistance à l'égard des taches foliaires. En outre, il est résistant aux races dominantes de la rouille des feuilles, de la rouille noire, du charbon nu et de la carie commune. Le grain du nouveau cultivar entre sur le marché dans la catégorie des blés de printemps roux de l'Ouest canadien.

Mots clés: *Triticum aestivum* L., blé de printemps roux, description de cultivar, rendement, protéine, résistance aux maladies

AC Elsa, hard red spring wheat (*Triticum aestivum* L.), was developed at the Semiarid Prairie Agricultural Research Centre, Agriculture and Agri-Food Canada, Swift Current, Saskatchewan, Canada S9H 3X2. It received regional registration no. 4400 from the Food Production and Inspection Branch of Agriculture and Agri-Food Canada on 7 October 1996.

Pedigree and Breeding Method

AC Elsa was derived from the cross between BW90 and Laura, which was made in 1984. BW90 was derived from the cross BW15/BW38/BW40/RL4353 (Campbell 1984) while Laura is a commercial cultivar developed by DePauw et al. (1988). The F₂ seed was inoculated with common bunt [caused by *Tilletia laevis* Kuhn in Rabenh., and *T. caries* (DC.) Tul.& C. Tul.] and grown as individual plants in a leaf rust (caused by *Puccinia recondita* Roberge ex Desmaz.) and stem rust (caused by *P. graminis* Pers.:Pers. f.sp. *tritici* Eriks. & E. Henn.) epiphytotic nursery. The F₃, F₅, and F₇ generations were grown as head rows in a winter nursery near Brawley, California, to multiply seed for early generation grain yield tests. In the F₄, F₆, and F₈ generations, we screened for quantitative and qualitative traits using early generation screening procedures. We practiced simultaneous selection for grain yield and grain protein concentration. Grain yield was measured by growing replicated trials at two locations. Grain protein concentration was assessed on a composite of the two replicates from each location using near infrared spectral analysis. In these same generations reaction to leaf and stem rust was scored in an epiphytotic nursery near Glenlea, Manitoba. Remnant seed from the

yield trials was used to assess grain quality and kernel characteristics. Selected F₈ lines were screened for reaction to loose smut [caused by *Ustilago tritici* (Pers.) Rostr.] and common bunt. An experimental line, designated as 8404-GJ2B, was evaluated in the Western Bread Wheat 'AII' in 1989; the Western Bread Wheat 'B' in 1990; the Western Bread Wheat 'A' in 1991; the Western Bread Wheat "B" in 1992. It was designated BW685 and evaluated in the Western Bread Wheat Cooperative tests from 1993 to 1995.

While in the Cooperative tests, reaction to leaf and stem rust was measured in an epiphytotic nursery near Glenlea, MB. The stem rust races used were: QTH, TPM, TMR, RHT, and RKQ. The races of leaf rust used were those multiplied from collections made the previous year (Kolmer 1994). Races T2, T9, T10 and T39 of loose smut and races L1, L16, T1, T6, T13, and T19 of common bunt were used for screening. The race designations are those described by Roelfs and Martens (1988) for stem rust, Hoffmann and Metzger (1976) for common bunt and Nielsen (1987) for loose smut. Response to leaf spots was scored following the procedures described by Fernandez et al. (1996).

Performance

In the Western Bread Wheat Cooperative test, 1993–1995, AC Elsa yielded significantly more than all the checks except Laura (Table 1). In Zone 1, AC Elsa averaged 6.7% more grain than Neepawa, 5.4% more than Katepwa, 8.0% more than AC Eatonia, and 2.6% more than Laura. In Zone 2, it yielded 11.2% more grain than Neepawa, 11% more than Katepwa, 13.3% more than AC Eatonia, and 2.3% more than Laura. AC Elsa matures about 2 d earlier than

Table 1. Agronomic performance of AC Elsa and check cultivars, based on data from the Western Bread Wheat Cooperative test, 1993–1995

Name	Yield (kg ha ⁻¹)			Maturity (d)			Height (cm)	Lodging (1–9) ^x	Test weight (kg hL ⁻¹)	Kernel weight (mg)
	Zone 1 ^z	Zone 2	Mean ^y	Zone 1	Zone 2	Mean				
Neepawa	3270	3910	3800	102.7	105.7	105.3	100	1.9	80.1	32.8
Katepwa	3310	3920	3810	103.3	105.7	105.4	100	1.8	80.0	32.8
Laura	3400	4250	4100	105.0	108.5	108.1	98	2.7	80.3	33.4
AC Eatonia	3230	3840	3730	103.5	107.2	106.7	98	3.2	80.9	33.6
AC Elsa	3490	4350	4200	103.8	106.8	106.4	95	1.9	80.1	33.5
LSD ($P < 0.05$)			133			0.8	1.5	0.4	0.5	0.5
# tests	6	27	33	3	22	25	29	18	32	32

^zZone 1 locations included Swift Current and Stewart Valley, SK. in the Brown soil zone; Zone 2 locations included Elrose, Indian Head, Kernen, Melfort, Regina, Scott, and Watrous, SK. and Acme, Ellersie, and Lethbridge AB. in the Dark Brown soil zone.

^yAll means are weighted by the number of tests within a zone.

^x1, all plants vertical; 9, all plants horizontal.

Table 2. Protein concentration^z and Hagberg falling numbers (FN) for AC Elsa and check cultivars based on the Western Bread Wheat Cooperative test composites, 1993–1995

	1993		1994		1995		Mean	
	Protein (%)	FN (Sec)	Protein (%)	FN (Sec)	Protein (%)	FN (Sec)	Protein (%)	FN (Sec)
Neepawa	12.8	390	13.7	370	13.6	390	13.4	383
Katepwa	12.9	420	13.5	390	13.5	370	13.3	393
Laura	13.0	380	14.0	360	13.8	360	13.6	367
AC Eatonia	13.4	385	13.9	355	14.2	300	13.8	347
AC Elsa	13.2	365	14.3	405	14.1	385	13.9	385
LSD ^y ($P < 0.05$)							0.2	21

^zProtein (13.5% moisture basis) was determined on a whole-wheat basis by the Grain Research Laboratory (Winnipeg, MB) on a composite of 4–7 locations each year used to assess grain quality.

^ySince values for each year represent a single determination on a composite sample, LSD values were calculated only for the means over years by treating years as replicates.

Laura and about 1 d later than Neepawa and Katepwa. It is about 5 cm shorter than Neepawa and Katepwa and 3 cm shorter than Laura. AC Elsa has straw strength similar to Katepwa and Neepawa and greater than Laura and AC Eatonia. Test weight and kernel weight of AC Elsa are similar to the checks. Its protein concentration was equal to that of Laura and AC Eatonia, and greater than that of Neepawa and Katepwa (Table 2). The Hagberg Falling Number values were similar to the better checks: Neepawa, Katepwa, and Laura.

Other Characteristics

SPIKES. Oblong to fusiform, mid dense, mid-long, incline to erect, apically awnleted; glumes mid-wide, mid-long, glabrous, white; glume shoulders primarily square, some rounded, some oblique, and some wanting, mid-wide; glume beak short and acute.

KERNEL. Colour red, mid-size, mid-wide, mid-long, ovate; cheeks angular to slightly rounded; brush hairs mid-long to long; embryo mid-size, oval to elliptical.

SHATTERING. Resistant similar to Katepwa.

DISEASE REACTION. Resistant to prevalent races of leaf rust and stem, moderately resistant to prevalent races of loose smut, common bunt, leaf spots [caused by *Pyrenophora tritici-repentis* (Died.) Drechs. and *Septoria* spp.], and common

root rot [caused primarily by *Bipolaris sorokiniana* (Sacc.) Shoemaker], and susceptible to fusarium head blight (caused by *Fusarium* spp.) (Table 3).

PHOTOPERIOD RESPONSE. Insensitive.

END-USE SUITABILITY. Based on 3 yr of testing in the Western Bread Wheat Cooperative tests, AC Elsa has higher protein than the checks except AC Eatonia (Table 2). It was rated equal to Neepawa for grain quality and is eligible for grades of Canada Western Red Spring.

Maintenance and Distribution of Pedigreed Seed

The 118 Breeder Lines were selected from F₆-derived F₁₀ random single plants in 1993. They were grown in 3-m rows in isolation near Swift Current in 1994 and again as 15-m rows near Indian Head in 1995. Breeder Seed will be maintained by the Seed Increase Unit, Research Farm, Agriculture and Agri-Food Canada, Indian Head, Saskatchewan, Canada S0G 2K0. Plant Breeders' Rights has been filed. AC Elsa has been released for distribution and multiplication to SeCan Association, 200-57 Auriga Drive, Nepean, Ontario, Canada K2E B8Z.

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Table 3. Disease reactions of AC Elsa and check cultivars, based on data from Western Bread Wheat Cooperative tests 1993–1995

Cultivar	Year	Leaf rust ^z (%)	Stem rust ^z (%)	Common bunt ^z (%)	Loose smut ^{z,y} (%)	Common root rot ^x (%)	Leaf spots ^w				FHB ^u
							SC ^v	Gl	Kr	Reg	
Neepawa	1993	20MR	10R	11R ⁻	9R	3	6.5	7	—	—	—
	1994	30MR	10RMR	14I	6R	22	7.5	—	8.5	—	—
	1995	70MRMS	40RMR-5MS	12I ⁺	8R	0	8.2	—	—	9.3	F
Katepwa	1993	30MR	10R	17I ⁺	4R	3	6.5	6	—	—	—
	1994	30MR	5R	4R ⁺	0R	21	7.3	—	9.0	—	—
	1995	60MRMS	30RMR	2R ⁺	15R	0	8.7	—	—	9.8	F
Laura	1993	5M	5VR	31S	17S	17*	6.5	6	—	—	—
	1994	10M	5R	43S	52S	10	9.0	—	3.5	—	—
	1995	TR	20RMR	24S	82HS	0	9.3	—	—	9.3	VP
AC Eatonia	1993	30MR	10MRMS	2R ⁺	19MS	13	6.3	3	—	—	—
	1994	30MR	15RMR	2R	0MS	14	7.5	—	5.0	—	—
	1995	30M	40MRMS	1R	19MR	0	7.8	—	—	9.3	—
AC Elsa	1993	10R	5R	5R	20MR	8	6.3	6	—	—	—
	1994	30M	5R	8I ⁻	17MR	19	7.3	—	2.0	—	—
	1995	TR	30RMR	6I ⁻	6R	0	7.0	—	—	7.3	VP

^zPercent infection and type of reaction: VR, very resistant; R, resistant; MR, moderately resistant; I, intermediately resistant; MS, moderately susceptible; S, susceptible; HS, highly susceptible.

^yRatings are based on data from current and previous years.

^xPercentage of plants with moderates to large lesions on the subcrown internode; * denotes disease index values, within a year, that differ from those for Neepawa at the 5% significance level using Duncan's multiple range test.

^wRated at the milk dough stage, using a scale of 0–9 (all locations in 1993 and Kernen in 1994) and 0–11 (Swift Current in 1994, and Swift Current and Regina in 1995).

^vSC = Swift Current, SK; Gl = Glenlea, MB; Kn = Kernen, SK; and Reg = Regina, SK.

^uFusarium head blight ratings based on limited data taken from the Manitoba Agriculture Variety Recommendations, 1997; F = fair, VP = very poor.

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