

## AC Cora hard red spring wheat

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Townley-Smith, T. F. and Czarnecki, E. M. 2008. **AC Cora hard red spring wheat**. *Can. J. Plant Sci.* **88**: 157–160. AC Cora, hard red spring wheat (*Triticum aestivum* L.), exhibited high levels of leaf rust resistance and was adapted to the southern Canadian prairies. AC Cora produced significantly more grain yield than Neepawa (6.8%), Columbus (6.5%) and Roblin (7.4%), and slightly more (3.0%) than Katepwa. It matured significantly earlier than Columbus, slightly earlier than Neepawa and Katepwa and slightly later than Roblin. AC Cora was similar in plant height and lodging resistance to Katepwa. AC Cora was eligible for all grades of the Canada Western Red Spring (CWRS) wheat class.

**Key words:** *Triticum aestivum* L., cultivar description, grain yield, leaf and stem rust

Townley-Smith, T. F. et Czarnecki, E. M. 2008. **Blé roux de printemps AC Cora**. *Can. J. Plant Sci.* **88**: 157–160. La variété de blé roux de printemps (*Triticum aestivum* L.) AC Cora se caractérise par une grande résistance à la rouille des feuilles et est acclimatée à la partie sud des Prairies canadiennes. AC Cora a un rendement grainier sensiblement plus élevé que Neepawa (6,8%), Columbus (6,5%) et Roblin (7,4%), et légèrement plus élevé (3,0%) que Katepwa. Nettement plus précoce que Columbus, elle l'est légèrement plus que Neepawa et Katepwa, mais un peu plus tardive que Roblin. AC Cora donne des plants dont la taille et la résistance à la verse rappellent celles de Katepwa. AC Cora est admissible aux diverses catégories de Blé roux de printemps de l'Ouest canadien (BRPO).

**Mots clés:** *Triticum aestivum* L., description de cultivar, rendement grainier, rouille des feuilles et de la tige

AC Cora hard red spring wheat (*Triticum aestivum* L.) was developed at the Cereal Research Centre (CRC), Agriculture and Agri-Food Canada (AAFC), Winnipeg, MB. It received registration No. 4021 from the Variety Registration Office, Food Production and Inspection Branch, Agriculture Canada on 1994 Dec. 15.

AC Cora was derived from the cross Katepwa/RL4509 made in 1983 at the CRC, AAFC, Winnipeg. RL4509 is an experimental line developed at CRC from the cross Benito\*6/3/Napayo\*4//Thatcher\*6/RL5406, where RL5406 was the synthetic hexaploid source of the highly effective leaf rust resistance gene *Lr21* (Rowland and Kerber 1974). Heads of F<sub>2</sub> plants selected for disease resistance in an epiphytotic nursery were tested for sprouting tolerance in a rainfall simulator. F<sub>3</sub> and F<sub>5</sub> generations were grown in the greenhouse at CRC. Head rows were selected for disease and agronomic traits in F<sub>4</sub> and F<sub>6</sub> at Glenlea and F<sub>6</sub>-derived F<sub>7</sub> lines were increased in New Zealand. Lines were yield tested in unreplicated trials as F<sub>8</sub> and in two replicate trials at two locations in each of Manitoba and eastern Saskatchewan as F<sub>9</sub>. In 1989, one of these was designated RL4646 and evaluated in the Central Bread Wheat 'B' test at six locations. From 1990 to 1992, it was evaluated in the Central Bread Wheat Cooperative (CBWC) test as BW152. The check cultivars in the CBWC test for the 3 yr were Neepawa, Katepwa, Columbus and Roblin. The

variables measured and the protocols followed in the CBWC test have been described by Graf and Fox (2000). Each year the data were analyzed using the S506 statistical program developed by the Statistical Research Services, AAFC. The LSD values for multi-location and multi-year comparisons were based on the genotype by environment interaction.

During the CBWC testing period, leaf and stem rust seedling infection types were assessed by pathologists at the CRC. Stem rust (*Puccinia graminis* f. sp. *tritici*) races used for one or more years were: QTHST (C25), RKQSR (C63), RTHJT (C57), TMRTK (C10) and TPMKR (C53) (Roelfs and Martens 1988; Fetch 2003). Leaf rust (*Puccinia recondita* f. sp. *tritici*) races used were those multiplied from field collections made the previous year. Field evaluations of both leaf and stem rust reactions, using the same races as for the seedling tests, were measured in an epiphytotic nursery near Glenlea, MB. Reaction to fusarium head blight (caused by *Fusarium* spp.) was assessed in artificially inoculated field tests conducted near Winnipeg, MB. To determine the loose smut [caused by *Ustilago tritici* (Pers.) Rostr.] reaction type, a mixture of the prevalent races T2, T9, T10 and T39 (Nielsen 1987) was injected into florets at anthesis of plants under field conditions. A mixture of the common bunt [*Tilletia laevis* Kuhn in Rabenh. and *T. caries* (DC.) Tul. & C. Tul.] races LI,

L16, T1, T6, T13 and T19 (Hoffmann and Metzger 1976) was used to inoculate the seed planted in mid-April of each year near Lethbridge, AB. Response to leaf spots [tan spot caused by *Pyrenophora tritici-repentis* (Died.) Drechs.; Stagonospora blotch caused by *Phaeosphaeria nodorum* (E. Muller) Hedjaroude; and Septoria blotch caused by *Mycosphaerella graminicola* (Fuckel) J. Schrot. in Cohn] was scored in tests grown near Glenlea, MB. End use quality was evaluated each year on composite samples from several station by the Grain Research Laboratory, Canadian Grain Commission, Winnipeg, MB, using American Association of Cereal Chemists methods.

### Performance

Agronomic data are summarized in Table 1. On average, the grain yield of AC Cora was significantly ( $P < 0.05$ ) greater than Neepawa (6.8%), Columbus (6.7%) and Roblin (7.3%) and slightly greater than

(3.0%) Katepwa. AC Cora had similar plant height and lodging resistance as Katepwa and Neepawa. AC Cora matured significantly earlier than Columbus, significantly later than Roblin and similar to Neepawa and Katepwa. The 3-yr average kernel weight of AC Cora was greater than Neepawa and Katepwa, but smaller than Columbus and Roblin. On average, the test weight of AC Cora was greater than Neepawa and Roblin.

AC Cora was resistant to prevalent races of leaf rust, stem rust and common bunt moderately resistant to loose smut, and intermediate resistance to leaf spots (Table 2). AC Cora has improved leaf rust resistance and it is more susceptible to loose smut and root rot than its parent Katepwa.

Based on 3 yr of testing in the Central Bread Wheat Cooperative test (Table 3), AC Cora was very similar to Katepwa in quality, except that it had slightly higher protein content, however, it was lower in protein content

**Table 1. Agronomic performance of AC Cora compared with the check cultivars based on data from the Central Bread Wheat Cooperative test (1990–1992)<sup>z</sup>**

	Grain yield (kg ha <sup>-1</sup> ) Yield (kg ha <sup>-1</sup> )				Maturity (d)			
	1990	1991	1992	Mean	1990	1991	1992	Mean
Neepawa	3663	2953	4064	3542	96.4	91.9	106.9	98.8
Katepwa	3738	3159	4169	3672	96.3	91.5	106.3	98.4
Columbus	3712	2919	4058	3546	99.9	94.4	111.7	102.4
Roblin	3539	3195	3877	3525	94.1	90.1	105.9	97.1
AC Cora	3757	3349	4294	3783	95.3	92.3	106.0	98.2
LSD <sup>y</sup>	212	208	231	123	1.3	0.8	1.3	0.7
No. tests	10	10	9	29	8	9	10	27
	Height (cm)				Lodging (1–9) <sup>x</sup>			
	1990	1991	1992	Mean	1990	1991	1992	Mean
Neepawa	95.1	103.8	100.6	99.8	2.6	3.1	3.2	3.0
Katepwa	95.9	103.9	101.8	100.6	3.3	3.5	3.2	3.4
Columbus	102.1	104.9	107.5	104.9	2.5	2.4	2.8	2.5
Roblin	86.3	98.3	91.4	92.0	1.1	2.1	2.5	1.8
AC Cora	96.2	106.0	101.3	101.2	3.2	3.4	2.9	3.2
LSD	2.9	2.3	2.8	1.7	1.0	0.6	0.6	0.4
No. tests	9	9	10	28	7	7	5	19
	Kernel weight (mg)				Test weight (kg hL <sup>-1</sup> )			
	1990	1991	1992	Mean	1990	1991	1992	Mean
Neepawa	32.9	30.6	34.7	32.7	76.9	80.5	78.5	79.1
Katepwa	34.1	31.9	35.3	33.8	77.2	80.9	78.4	79.4
Columbus	35.6	33.1	38.3	35.7	77.9	80.9	77.3	79.2
Roblin	36.5	33.5	36.4	35.5	76.9	80.2	77.0	78.3
AC Cora	34.2	33.3	36.6	34.7	81.0	79.0	78.7	79.6
LSD	0.9	1.4	1.7	0.7	0.6	0.9	0.9	0.4
No. tests	10	10	10	30	10	10	10	30

<sup>z</sup>Locations in the Central Bread Wheat Cooperative tests included: Brandon, Dauphin, Elgin, Glenlea, Indian Head, Ituna, Kelvington, Melfort, Morden, Portage la Prairie, Saskatoon, Shoal Lake and Regina.

<sup>y</sup>LSD is least significant difference ( $P \uparrow 0.05$ ) based on the mean squares genotype by environment interaction.

<sup>x</sup>A rating scale of 1 to 9 with a rating of 1 indicating all plants in a plot were vertical and 9 indicating all plants in a plot were horizontal.

Table 2. Disease reactions of AC Cora and check cultivars based on data from Central Bread Wheat Cooperative test (1990–1992)

	Leaf rust <sup>z</sup>			Stem rust <sup>z</sup>		
	1990	1991	1992	1990	1991	1992
Neepawa	20RMR	20MR	60MRMS	10MRMS	No data	20R-TMR
Katepwa	10RMR	20MR	50MRMS	10MR	No data	20R-TMR
Columbus	10R	10R	5R	20MRMS	No data	40RMR20MSS
Roblin	5VR	5M	TR	TR	No data	20R-TMR
AC Cora	5VR	5R	5R	5R	No data	20R-TMR
	Common bunt <sup>z</sup>			Loose smut <sup>z</sup>		
	1990	1991	1992	1990	1991	1992
Neepawa	3I	2I	13I	2R	7R	–R
Katepwa	7R	3R	9I–	–R	13MR	0R
Columbus	3R	1R	2R–	4MS	86HS	66MS
Roblin	43S	36S	29S+	18MR	6R	19MR
AC Cora	1R–	13R+	5R	17MR	15MR	20MR
	<i>Septoria tritici</i> <sup>z,y</sup>			Root rot		
	1990	1991	1992 Glenlea	1990	1991	1992
Neepawa	S	4	4	33	35	20
Katepwa	S	4	4	35	31	24
Columbus	S	4	4	45	37	31
Roblin	MS	4	4	25	25	22
AC Cora	S	3	4	48	44	39
	Spot blotch <sup>y</sup> ( <i>Cochliobolus sativa</i> )					
		1991	1992			
Neepawa		4	4			
Katepwa		4	4			
Columbus		4	4			
Roblin		3	4			
AC Cora		3	3			

<sup>z</sup>Percent infection and type of reaction: T, trace; R, resistant; VR, very resistant; M, intermediate resistant; MR, moderately resistant; I, intermediate resistant; S, susceptible.

<sup>y</sup>1 (very resistant) to 5 (very susceptible) scale.

than Columbus and Roblin. It was rated equal to the check cultivars at that time for grain quality by the Quality Evaluation Team of the Prairie Registration Recommending Committee for Grain. AC Cora is eligible for all grades of the Canada Western Red Spring wheat class.

### Other Characteristics

**Spikes.** Fusiform to oblong, mid-dense, mid-long, erect to slightly nodding, apically awnleted; glumes are mid-wide to wide, short to mid-long, glabrous, white; glume shoulders are primarily square, although some tending to elevated, mid-wide to wide; glume beak is very short and slightly curved.

**Kernel.** Colour is red, medium size, mid-wide, mid-long, ovate to elliptical; cheeks rounded; brush mid-size with mid-size hairs; embryo mid-size and oval to round.

**Shattering.** Resistant to seed shelling due to wind, assessed three weeks after maturity (data not shown).

### Maintenance and Distribution of Pedigreed Seed

AC Cora consists of a composite of 86 Breeder Lines, developed from single F<sub>11</sub> plants selected at random out of line RL4646 in 1990, grown out as Pre-Breeder Lines in 2-m rows in isolation near Glenlea in 1991, and as 15-m rows near Indian Head in 1992. Breeder Seed will be maintained by the Seed Increase Unit of the Research Farm, Indian Head, Saskatchewan,

Table 3. Averages of end-use suitability<sup>z</sup> traits of AC Cora and check-cultivars based on Central Bread Wheat Co-operative Test (1990–1992)

	Wheat protein (%)	Flour protein (%)	Flour yield (%)	Flour ash (%)	Flour colour <sup>y</sup>	Amylograph viscosity (BU)	Hagberg falling No. (s)	
Neepawa	14.1	13.6	75.3	0.43	-1.3	652	407	
Katepwa	14.0	13.5	75.7	0.43	-1.3	645	417	
Columbus	14.6	14.2	76.5	0.45	-1.2	826	410	
Roblin	15.2	14.6	76.0	0.42	-1.2	560	361	
AC Cora	14.4	13.8	76.1	0.43	-1.5	723	423	
LSD	0.16	0.20	0.53	0.01	0.34	59.8	13.6	
	Farinograph <sup>x</sup>					Canadian Short Process		
	Starch Damage (megazm)	Absorption (%)	DDT (min)	MTI (BU)	Stability <sup>w</sup> (min)	LV <sup>v</sup> (cc)	Time (min)	Absorption (%)
Neepawa	31.3	65.5	4.3	28.3	8.0	2145	6.9	68.5
Katepwa	32.0	65.2	4.6	33.3	9.0	2168	7.1	68.5
Columbus	31.0	67.3	4.8	31.7	8.5	2148	7.4	70.5
Roblin	25.3	66.6	7.8	13.3	15.0	2248	9.2	69.0
AC Cora	31.0	65.0	4.5	33.3	8.0	2195	6.4	68.5
LSD	3.39	0.61	0.32	6.18	-	119.1	0.94	0.64

<sup>z</sup>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.

<sup>x</sup>DDT is the Farinograph dough development time; MTI is Farinograph mixing tolerance index expressed in Brabender Units (BU).

<sup>y</sup>Kent Jones Colour Grade.

<sup>w</sup>Data for 1992 only.

<sup>v</sup>LV, loaf volume.

Canada S0G 2K0. The variety will be added to the OECD list of Cultivars. AC Cora has been released for distribution and multiplication to SeCan Association, 501-300 March Road, Kanata, Ontario, Canada K2K 2E2.

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