

## AC Avonlea durum wheat

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Clarke, J. M., McLeod, J. G., McCaig, T. N., DePauw, R. M., Knox, R. E. and Fernandez, M. R. 1998. **AC Avonlea durum wheat**. *Can. J. Plant Sci.* **78**: 621–623. AC Avonlea durum wheat is adapted to the durum production area of the southern Canadian prairies. It combines high yield with high grain protein concentration. It has shorter, stronger straw than Kyle and Plenty, and has similar maturity and disease resistance.

**Key words:** *Triticum turgidum* L. var *durum*, durum wheat, cultivar description, yield, protein, disease resistance

Clarke, J. M., McLeod, J. G., McCaig, T. N., DePauw, R. M., Knox, R. E. et Fernandez, M. R. 1998. **Nouveau cultivar de blé dur AC Avonlea**. *Can. J. Plant Sci.* **78**: 621–623. AC Avonlea est un blé dur qui convient à la zone de production du blé dur du sud des Prairies canadiennes. Il réunit les qualités de productivité grainière et de forte teneur en protéine du grain. Sa paille est plus courte et plus forte que celle de Kyle et Plenty, mais il est semblable à ces deux variétés de référence pour la précocité et pour la résistance aux maladies.

**Mots clés:** *Triticum turgidum* L. var *durum*, blé dur, description de cultivar, rendement, protéine, résistance aux maladies

AC Avonlea durum wheat (*Triticum turgidum* L. var. *durum*) was developed at the Agriculture and Agri-Food Canada Semiarid Prairie Agricultural Research Centre, Swift Current, Saskatchewan, by the Arid Prairie Wheat Program. It received registration No.4617 from the Canadian Food Inspection Agency on 18 July 1997.

### Pedigree and Breeding Method

AC Avonlea was selected from the cross 8267-AD2A/DT612 made in 1987. The parent 8267-AD2A derives from the cross DT379/DT367, and DT612 derives from the cross DT367/Medora. DT367 is S017/Wascana//7168, and DT379 is D6676/Quilafen. AC Avonlea was developed using a modified pedigree technique. The F<sub>2</sub> was grown as individual plants in a leaf and stem rust epiphytotic nursery at Swift Current in 1988. The F<sub>3</sub>, F<sub>5</sub> and F<sub>7</sub> generations were grown as head rows in a winter nursery near Brawley, California to produce seed for yield tests. Two replicate F<sub>4</sub>, F<sub>6</sub> and F<sub>8</sub> yield trials were grown near Swift Current and Regina in 1989 through 1991 and selected for agronomic performance, disease resistance, and quality (protein, pigment, gluten strength). Leaf and stem rust reactions were assessed in hill plots in the F<sub>4</sub>, F<sub>6</sub>, and F<sub>8</sub> generations in a leaf and stem rust epiphytotic nursery near Glenlea, Manitoba. The stem rust races used included QTH, TPM, TMR, RHT, and RKQ. The races of leaf rust used were those multiplied from collections made the previous year (Kolmer 1994). Races T26, T32 and T33 of loose smut and races L1, L16, T1, T6, T13, and T19 of common bunt were used for screening of the Durum Cooperative Test entries. The race designations are those described by Roelfs and Martens (1988) for stem rust, Long and Kolmer (1989) for leaf rust, Hoffmann and Metzger (1976) for common bunt, and Nielsen (1987) for loose smut.

AC Avonlea was evaluated in the Durum Western 'A' Test (five locations) in 1992, in the Durum 'B' Test (six locations) in 1993, and as DT 661 in the Durum Cooperative Test in 1994–1996. The 131 breeder lines grown in 3-m rows at Swift Current in 1995, and in 15-m rows near Indian Head, SK in 1996, derive from random plants from an F<sub>6</sub> derived F<sub>11</sub> single plant progeny row.

### Performance

AC Avonlea yielded an average of 3% more than Kyle, 1% more than Plenty, and 2% more than AC Morse in 3 yr of testing in the Durum Cooperative Test (Table 1). Time to maturity of AC Avonlea was similar to that of AC Morse, Kyle and Plenty (Table 2). AC Avonlea has shorter, stronger straw than Kyle and Plenty. Test weight of AC Avonlea was similar to Kyle and Plenty, and higher than AC Morse. Average grain protein and yellow pigment concentration of AC Avonlea was higher than all of the checks, including the statutory standard Hercules, in 3 yr in the Durum Cooperative Test (Table 3).

### Other Characteristics

**SPIKES.** Clavate to fusiform, mid-dense, mid-long, erect, awned; glumes mid-wide, mid-long, glabrous, white; glume shoulders oblique to square, some slightly elevated; glume beak medium, acuminate.

**KERNEL.** Colour medium amber, mid-long to short, mid-wide, elliptical to ovate; cheeks slightly angular to slightly rounded; brush mid-size to small, short to very short; embryo midsize to small, ovate.

**DISEASE REACTION.** Resistant to prevalent races of common

**Table 1. Average yield (t ha<sup>-1</sup>) of AC Avonlea and check cultivars in the Durum Cooperative Test, 1994–1996**

Cultivar	1994			1995			1996			Grand mean
	Zone 1 <sup>z</sup>	Zone 2	Mean	Zone 1	Zone 2	Mean	Zone 1	Zone 2	Mean	
Hercules	3.88	3.36	3.62	2.68	3.82	3.25	3.66	3.78	3.72	3.53
Kyle	4.11	3.80	3.96	3.19	4.52	3.86	3.79	4.23	4.01	3.94
Plenty	4.43	4.00	4.22	3.10	3.99	3.55	4.12	4.40	4.26	4.01
AC Morse	4.17	4.08	4.13	3.09	4.48	3.78	3.95	4.13	4.04	3.98
AC Avonlea	4.45	4.30	4.38	3.05	4.44	3.75	3.95	4.21	4.08	4.07
LSD <sub>.05</sub>	0.33	0.29	0.19	0.35	0.2	0.22	0.42	0.25	0.28	0.13
No. tests	4	6	10	5	6	11	5	10	31	

<sup>z</sup>Zone 1: Elgin, Glenlea (lost in 1994), Morden, Brandon, Indian Head; Zone 2: Lethbridge, Regina (lost in 1996), Saskatoon, Elrose, Swift Current, Stewart Valley

**Table 2. Averages for agronomic characters of AC Avonlea and check cultivars in the Durum Cooperative Test, 1994–1996**

Cultivar	Maturity (d)	Lodging (1–9) <sup>z</sup>	Height (cm)	Test weight (kg hL <sup>-1</sup> )	1000-kernel weight (g)
Hercules	98.8	2.8	98	79.8	43.8
Kyle	101.5	4.9	105	79.9	42.6
Plenty	101.4	2.5	104	79.5	41.8
AC Morse	101.1	1.8	88	78.5	42.9
AC Avonlea	101.3	2.0	93	79.6	43.4
LSD <sub>.05</sub>	0.5	0.3	1	0.4	0.5
No. tests	25	22	31	31	31

<sup>z</sup>1=no lodging, 9=completely flat.

**Table 3. Summary of percent grain protein concentration (13.5% moisture basis) and average grain yellow pigment content of location composite samples (Canadian Grain Commission data) for AC Avonlea and checks from the 1994–1996 Durum Cooperative Tests**

Cultivar	Protein (%)							Grain pigment ppm
	1994		1995		1996		Mean	
	Zone 1 <sup>z</sup>	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2		
Hercules	13.7	12.6	14.8	12.4	13.2	13.4	13.4	7.4
Kyle	13.9	12.4	14.8	12.7	13.8	13.6	13.5	7.6
Plenty	13.9	12.3	14.4	12.6	13.1	13.4	13.3	8.4
AC Morse	13.9	12.8	14.9	13.4	13.7	14.1	13.8	8.7
AC Avonlea	14.8	12.7	15.5	13.5	14.4	14.4	14.2	8.9
LSD <sub>.05</sub>	0.5	0.5	0.6	0.6	0.8	0.5	0.2	0.1
No. tests	4	6	5	6	5	5	31	3

<sup>z</sup>Zone 1: Elgin, Glenlea (lost in 1994), Morden, Brandon, Indian Head; Zone 2: Lethbridge, Regina (lost in 1996), Saskatoon, Elrose, Swift Current, Stewart Valley

bunt (caused by *Tilletia laevis* Kuhn in Rabenh., and *T. caries* [DC.] Tul.& C. Tul.), leaf rust (caused by *Puccinia recondita* f.sp. *tritici* Roberge ex Desmaz) and stem rust (caused by *P. graminis* f.sp. *tritici* Pers.: Pers.), highly susceptible to loose smut (caused by *Ustilago tritici* [Pers.] Rostr.) races prevalent in western Canada, and susceptible to leaf spots (caused by *Pyrenophora tritici-repentis* [Died.] Drechs) and fusarium head blight (caused by *Fusarium* spp.) (Table 4).

PHOTOPERIOD RESPONSE. Sensitive

END-USE SUITABILITY. Eligible for grades of the Canada Western Amber Durum wheat class.

#### Maintenance and Distribution of Pedigreed Seed

Breeder seed will be maintained by the Agriculture and Agri-Food Canada Seed Increase Unit, Indian Head, Saskatchewan, Canada S0G 2K0. Plant Breeders' Rights have been requested. Distribution and multiplication of pedigreed seed stocks will be handled by Value Added Seeds Ltd., Box 2000, Lumsden, Saskatchewan, Canada S0G 3C0.

**Table 4. Summary of disease reactions of AC Avonlea and check cultivars grown in the Durum Cooperative Tests, 1994–1996, one test per year except leaf spots**

Cultivar		Stem rust <sup>z</sup>	Leaf rust <sup>z</sup>	Loose smut <sup>z</sup>	Common bunt <sup>z</sup>	Septoria nodorum <sup>x</sup>	Leaf spots <sup>w</sup>	FHB index <sup>y</sup>	Common root rot (%)
Hercules	1994	VR	10VR	R	R+	2.5	7.5	–	20
	1995	5R	TR	MS	R-	–	7.5	64	0
	1996	1R	TR-R	R	R+	7.7	7.8	–	11
Kyle	1994	VR	10VR	S	R+	2.0	7.3	–	28
	1995	TR-R	TR	S	R-	–	9.0	62	3
	1996	1R	TR-R	MR	R+	6.5	8.5	–	7
Plenty	1994	VR	10VR	MR	R+	2.0	6.8	–	28
	1995	TR-R	TR	MS	R-	–	7.7	88	1
	1996	1R	TR-R	MS	R+	5.5	7.5	–	4
AC Morse	1994	VR	10VR	MS	R+	1.5	10.0	–	34
	1995	TR-R	TR	HS	R-	–	9.5	57	1
	1996	1R	TR-R	HS	R+	6.3	9.8	–	3
AC Avonlea	1994	VR	10VR	S	R+	1.5	7.8	–	22
	1995	T-R	TR	HS	R-	–	7.8	75	0
	1996	1R	TR-R	HS	R+	7.7	8.3	–	8

<sup>z</sup>Percent infection and type of reaction: TR, trace resistant; VR, very resistant; MR, moderately resistant; R, resistant; MS, moderately susceptible; S, susceptible; HS, highly susceptible.

<sup>y</sup>Fusarium head blight index: (% infected spikelets × % infected heads)/100.

<sup>x</sup>Septoria nodorum field rating (0 = no symptoms, 9 = severe symptoms).

<sup>w</sup>Adult plant, rated mid-grainfill, 1 location 1994, 2 locations 1995 and 1996 (1 = no symptoms, 11 = severe symptoms).

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