AC Taber red spring wheat

Knox, R. E., De Pauw, R. M., Morrison, R. J., McCaig, T. N., Clarke, J. M. and McLeod, J. G. 1992. **AC Taber red spring wheat.** Can. J. Plant Sci. **72**: 1241–1245. AC Taber, red-kernelled spring wheat (*Triticum aestivum* L.), resembles Biggar but has improved resistance to prevalent races of leaf rust (caused by *Puccinia recondita* Roberge ex Desmaz.) and common bunt [caused by *Tilletia laevis* Kuhn in Rabenh. and *Tilletia caries* (DC.) Tul. & C. Tul.]. AC Taber also has a higher protein content, better milling quality and more gluten strength than Biggar. AC Tabor is eligible for grades of the Canada Prairie Spring (red) wheat class.

Key words: *Triticum aestivum* L., cultivar description, disease resistance, high yield

Knox, R. E., De Pauw, R. M., Morrison, R. J., McCaig, T. N., Clarke, J. M. et McLeod, J. G. 1992. **Blé roux de printemps AC Taber.** Can. J. Plant Sci. **72**: 1241–1245. AC Taber est un cultivar de blé de printemps (*Triticum aestivum* L.) à grain roux qui ressemble à Biggar, mais avec une meilleure résistance aux races prévalentes de rouille des feuilles (*Puccinia recondita* Roberge ex Desmaz.) et à la carie commune [*Tilletia laevis* Kuhn in Rabenh. et *Tilletia caries* (DC.) Tul. & C. Tul.]. En outre, ses aptitudes meunières sont supérieures et son grain, de meilleure qualité, est plus riche en protéine et possède un gluten plus ferme. Il est admissible aux grades de blé (roux) de printemps des prairies canadiennes.

Mots clés: *Triticum aestivum* L., description de cultivar, résistance aux maladies, rendement élevé

AC Taber, red-kernelled spring wheat (*Triticum aestivum* L.), was developed at the Agriculture Canada Research Station, Swift Current, Saskatchewan, by the South Saskatchewan Wheat Program. On 10 May 1991 the Food Production and Inspection Branch of Agriculture Canada issued registration No. 3435 for AC Taber.

Pedigree and Breeding Method

AC Taber was selected from the progeny of a cross HY320*3/BW553 made in 1984 at the Agriculture Canada Research Station, Lethbridge, Alberta. Resistance to common bunt [caused by *Tilletia laevis* Kuhn in Rabenh. and *Tilletia caries* (DC.) Tul. & C. Tul.] from BW553, whose parentage is Selection No. 70-3524/8*Neepawa, was recombined with the high grain-yield potential of the red-kernelled semidwarf HY320 (De Pauw et al. 1987) using a modified pedigree breeding procedure. The common bunt resistance derives from Selection No. 70-3524, whose parentage is Red Bobs *2/PI 178383; it possesses gene *Bt 10* (R. J. Metzger, personal communication). The F_3 generation of the second backcross (BC_2 F_3) was grown as individual plants in the winter nursery near Brawley, California, and selected for kernel shape and agronomic type. The BC_2 F_4 generation was grown as head rows in 1985 under an irrigated regime near Swift Current and selected for agronomic type, kernel shape and end-use suitability factors of kernel hardness, flour yield, protein content and gluten strength. The BC_2 F_5 generation was grown in the Brawley winter nursery as head rows. In 1986 the BC_2 F_6 generation was grown in two replications near Swift Current and Regina, Saskatchewan, and evaluated for grain-yield potential and agronomic traits. Leaf and stem rust reactions were assessed on plants grown in hill plots in a rust epiphytotic nursery near Glenlea, Manitoba. Kernel characteristics and end-use suitability traits were measured on the selected lines. The selected lines were subjected to two common bunt screening tests: (i) a 1:1 mixture of races L1 and T1 (to screen for the BW553 type of bunt resistance); and (ii) race T19 (to screen for gene *Bt 10*). In addition, the selections were inoculated with loose smut. A line

designated L8474-D2, exhibiting a promising record of performance, was advanced to the 1987 High Yielding Wheat pre co-operative test, where it was evaluated for agronomic performance, reaction to diseases, grain quality, and kernel characteristics. From 1988 to 1990 it was assessed as HY380 in the High Yield Wheat Co-operative tests which were grown on dryland and irrigated regimes. The 130 breeder lines were selected from 133 plant rows grown initially in 1989 and derived from individual BC_2 F_8 plants.

Performance

AC Taber appears to have a grain-yield potential similar to that of Biggar in the agroclimatic zones in which it was tested (Tables 1, 2 and 3).

AC Taber matures about 2 d later than Biggar and 1 d later than Genesis. AC Taber is about 4 cm taller than Biggar and has similar straw strength. It has shorter and stronger culms than Genesis. AC Taber and Biggar have similar test weights and kernel weights. Taber has a slightly larger kernel weight than Genesis.

AC Taber has more resistance to prevalent races of leaf rust (caused by *Puccinia recondita* Roberge ex Desmaz.) and common bunt than do Biggar and Genesis (Table 4). Injection of loose smut [caused by *Ustilago tritici*

Table 1. Agronomic performance of AC Taber compared with Biggar, Genesis and Oslo, based on data from High Yielding Wheat Co-operative tests (1988-1990)

Cultivar	Yield (t ha^{-1})				Maturity (d)	Plant height (cm)	Lodging[x] (1-9)	Test weight (kg hL^{-1})	Kernel weight (mg)
	Zone 1[z]	Zone 2	Zone 3	Mean[y]					
AC Taber	4.06	3.34	4.70	3.80	96.6	70	2.8	78.5	37.9
Biggar	3.80	3.45	4.48	3.74	94.8	66	2.4	78.7	37.3
Genesis	4.03	3.43	4.45	3.80	96.2	80	4.6	78.1	35.7
Oslo	3.52	2.84	4.35	3.31	92.8	63	1.6	77.6	36.0
LSD ($P \leq 0.05$)	0.32	0.20	0.54	0.23	0.7	2	0.9	0.6	0.8
No. of tests	15	22	7	44	34	45	15	42	42

[z] Zone 1, locations in Manitoba and southeastern Saskatchewan; Zone 2, locations in southern Alberta and western Saskatchewan; Zone 3, locations in Peace River and Parkland area.
[y] All means are weighted by the number of tests within a zone.
[x] 1, All plants are standing vertically; 9, all plants are lying horizontally.

Table 2. Agronomic performance of AC Taber compared with four checks, based on data from the High Yielding Wheat Co-operative tests (1989-1990)

Cultivar	Yield (t ha^{-1})				Maturity (d)	Plant height (cm)	Lodging[x] (1-9)	Test weight (kg hL^{-1})	Kernel weight (mg)
	Zone 1[z]	Zone 2	Zone 3	Mean[y]					
AC Taber	4.40	3.74	4.47	4.07	97.7	77	2.5	78.1	37.0
Biggar	4.21	3.94	4.18	4.06	95.5	72	2.4	78.5	36.4
Genesis	4.47	3.92	4.26	4.15	96.7	88	4.4	78.1	35.2
Oslo	3.91	3.30	4.10	3.62	93.2	70	1.7	77.6	35.6
Neepawa	3.64	3.30	3.49	3.44	93.4	87	2.2	77.8	30.7
LSD ($P \leq 0.05$)	0.39	0.26	0.57	0.25	0.9	2	0.9	0.7	0.9
No. of tests	10	16	5	31	26	30	14	30	30

[z] Zone 1, locations in Manitoba and southeastern Saskatchewan; Zone 2, locations in southern Alberta and western Saskatchewan; Zone 3, locations in Peace River and Parkland area.
[y] All means are weighted by the number of tests within a zone.
[x] 1, All plants are standing vertically; 9, all plants are lying horizontally.

Table 3. Agronomic performance of AC Taber compared with check cultivars, based on data from High Yielding Wheat Co-operative tests (1988–1990) grown under an irrigated regime

	3-yr averages (1988–1990)			2-year averages (1989–1990)			
Cultivar	Yield (t ha^{-1})	Maturity (d)	Height (cm)	Yield (t ha^{-1})	Maturity (d)	Height (cm)	Lodging (1–9)[z]
AC Taber	5.01	103.4	81	5.31	104.8	84	1.4
Biggar	4.92	102.0	76	5.28	103.1	80	1.4
Genesis	5.12	102.8	90	5.33	103.5	94	3.9
Oslo	3.99	100.9	73	4.48	101.8	76	1.3
Neepawa				4.11	101.4	93	1.5
LSD ($P \leq 0.05$)	0.54	1.6	3	0.65	2.3	4	1.4
No. of tests	14	10	11	9	5	7	3

[z] 1, All plants are standing vertically; 9, all plants are lying horizontally.

Table 4. Disease reactions of AC Taber and check cultivars based on data from High Yielding Wheat Co-operative tests (1988–1990)

Cultivar	Year	Leaf rust[z] (%)	Stem rust[z] (%)	Loose smut[z,y] (%)	Bunt[z] (%)	Common root rot[x] (%)
AC Taber	1988	5R	20R		7 I	60
	1989	20VR	10RMR	91 HS	9 R	32
	1990	5VR	40MR		6 R	49
Biggar	1988	10R	30RMR			64
	1989	10R	10RMR	87 HS	66 S	38**
	1990	5R	40MR	25 HS	52 S	55
Genesis	1988	10MR	20RMR			64
	1989	30RMR	30RMR	39 MS	64 S	36**
	1990	20RMR	50MR	0 HS	68 S	48
Neepawa	1988	20MR-MS	10R	11 MR	16 MR	29
	1989	5RMR	RMR-TRMS	6 R	36 I	26
	1990	20MR	10MR	2 MR	30 I	50
Oslo	1988	10R	10R		19 S	76**
	1989	5R	10RMR		13 R	31
	1990	5VR	20MR	72 HS	18 I	60*

[z] Percent infection and type of reaction: VR, very resistant; R, resistant; MR, moderately resistant; I, intermediate resistant; MS, moderately susceptible; S, susceptible; HS, highly susceptible.
[y] Loose smut percent infection based on artificial inoculation.
[x] Percentage of the plants with moderate to large lesions on the subcrown internode.
*,**, Values for the same year are significantly different from Neepawa at the 5% nd 1% level, respectively.

(Pers.) Rostr.] inoculum into florets of AC Taber results in a susceptible reaction (Table 4), whereas under conditions of natural infection a lower incidence of loose smut occurs compared with Oslo (Table 5).

AC Taber is eligible for grades of the Canada Prairie Spring (red) wheat class and has shown superior quality compared with Biggar, exhibiting higher protein content, better milling quality, and improved gluten strength (Table 6).

Other Characteristics

SPIKES. Oblong to fusiform, mid dense, mid long, erect to semi-nodding, awned; glumes wide, long, glabrous, white; glume shoulders oblique to rounded, narrow to mid wide; glume beak mid wide, acuminate.

Table 5. Reaction to loose smut in the Natural Infection tests (1989–1990

Cultivar	Rating[z]	87/88	88/89	89/90	Rating[y]
Genesis	HS	0.5	1.5	0.3	MR
Benito	MR	0.1	0.0	0.0	R
Columbus	MS–S	0.0	0.8	0.6	R
HY320	HS	1.0	1.3	3.8	MS
Laura	HS	0.3	0.9	1.6	MR
Oslo	HS	3.3	6.6	7.3	S
Biggar	HS	3.8	1.8	4.3	MS
AC Taber	HS		2.1	4.9	MS

[z] Artificial inoculation.
[y] Natural infection.
Abbreviations are the same as for Table 4. Data provided by J. Nielsen and P. Thomas, Agriculture Canada, Winnipeg, Manitoba.

Table 6. Measurements of kernel hardness, flour attributes, gluten strength, and bread-loaf volume for AC Taber and some Canada Prairie Spring check cultivars relative to Neepawa Canada Western Red Spring from High Yielding Wheat Co-operative tests (1989–1990)

	Starch damage (Farrand units)		Flour yield (%)		Flour ash (%)		Flour color Kent–Jones	
	1989	1990	1989	1990	1989	1990	1989	1990
Neepawa	26	33	74.0	74.5	0.41	0.44	−0.8	−1.5
AC Taber	20	27	76.0	76.9	0.44	0.46	−0.7	−0.9
Biggar	19	20	75.7	76.1	0.46	0.47	−0.5	−1.1
Oslo	16	22	76.7	76.6	0.42	0.44	−0.6	−1.0
Genesis	16	22	74.9	76.3	0.44	0.45	−0.5	−1.4

	Farinograph					
	Absorption %		Dough development (min)		Stability (min)	
	1989	1990	1989	1990	1989	1990
Neepawa	63.9	65.1	4.75	4.25	10.0	8.5
AC Taber	58.6	59.5	7.50	5.50	15.0	8.5
Biggar	58.4	58.9	5.25	3.75	9.5	6.5
Oslo	56.8	58.5	6.00	5.25	11.5	8.0
Genesis	59.1	59.7	4.00	3.25	5.5	4.0

	Flour protein (%)		Baking strength index		Remix loaf volume (cm^3)	
	1989	1990	1989	1990	1989	1990
Neepawa	14.4	13.4	99.5	96.0	945	845
AC Taber	12.2	11.4	114.3	102.0	910	755
Biggar	11.8	10.9	109.4	105.0	840	740
Oslo	12.7	12.2	104.7	104.3	870	830
Genesis	11.7	10.8	97.9	94.6	745	660

American Association of Cereal Chemists methods were followed for determining the various end-use suitability traits.

KERNEL. Color red; size mid size to large; shape mid long to long, mid wide to wide, elliptical or ovate; cheeks angular to rounded; brush small with short to mid size hairs; crease mid wide to wide, mid deep to deep; germ mid size to small, ovate to elliptical.

MATURITY. About 2 d later than Biggar and 1 d later than Genesis.

STRAW. Semidwarf stature; about 5 cm taller than Biggar and 10 cm shorter than Genesis and Neepawa.

LODGING. Strong straw, similar to Biggar.

SHATTERING. Resistant, similar to Biggar.

DROUGHT RESPONSE. Moderately tolerant to heat and drought, comparable to Biggar.

DISEASE REACTION. Resistant to prevalent races of stem rust (caused by *Puccinia graminis* Pers.: Pers.), leaf rust (caused by *P. recondita* Roberge ex Desmaz.), and common bunt (caused by *T. laevis* Kuhn in Rabenh. and *T. caries* (DC.) Tul. & C. Tul.); moderately susceptible to common root rot [caused primarily by *Bipolaris sorokiniana* (Sacc.) Shoemaker]; and moderately susceptible to prevalent races of loose smut (caused by *U. tritici* (Pers.) Rostr.) (Tables 4 and 5).

PHOTOPERIOD RESPONSE. Insensitive.

END-USE SUITABILITY. Eligible for grades of the Canada Prairie Spring (red) wheat class.

Maintenance and Distribution of Pedigreed Seed

Breeder seed originating from 130 breeder lines will be maintained by the Seed Increase Unit of the Indian Head Experimental Farm, Indian Head, Saskatchewan, Canada S0G 2K0. Distribution and multiplication of pedigreed seed stocks will be handled by SECAN Association, 200-57 Auriga Drive, Nepean, Ontario, Canada K2E 8B2.

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