Cutler red spring wheat

Briggs, K. G., Kibite, S. and Kutschera, K. 1991. **Cutler red spring wheat**. Can. J. Plant Sci. **72:** 229–233. Cutler spring wheat (*Triticum aestivum* L.) is a very early maturing, semidwarf, spring wheat with special adaptation to the Parkland region of the Western Prairies, and is suitable for production where early maturity is a prime consideration and where leaf rust rarely occurs. It received registration No. 3356 and is eligible for grades of Canada Prairie Spring (red).

Key words: *Triticum aestivum* L., spring wheat, early maturity, cultivar description

Briggs, K. G., Kibite, S. et Kutschera, K. 1991. **Cutler, nouveau cultivar de blé roux de printemps.** Can. J. Plant Sci. **72**: 229–233. Le nouveau blé de printemps Cutler (*Triticum aestivum* L.) est un cultivar demi-nain très précoce particulièrement bien adapté à la région de la Prairie-parc de l'ouest des Prairies. Il convient bien à la culture aux endroits où la précocité est le critère recherché numéro un et où la rouille des feuilles ne sévit que rarement. Homologué sous le numéro 3356, il est admissible aux catégories du blé roux de printemps des Prairies canadiennes.

Mots clés: *Triticum aestivum* L., blé de printemps, précocité, description de cultivar

Cutler red spring wheat (*Triticum aestivum* L.) was developed at the Department of Plant Science, Faculty of Agriculture and Forestry, University of Alberta, Edmonton, Alberta, Canada. On 24 Jan. 1991 the Food Production and Inspection Branch of Agriculture Canada issued Registration no. 3356 for Cutler, eligible for marketing as a Canada Prairie Spring (CPS) red wheat.

Pedigree and Breeding Method

Cutler is a reselection of the line GP257 (Briggs and Kibite 1985) visually reselected and rebulked on the basis of uniformity for plant type and earliness. It derives originally from an F_2 population of the cross Ciano 'S'/4/Sonora 64/Yaqui 50E5//Gaboto/3/Inia'S' obtained from CIMMYT, selected for earliness and quality type until bulked in F_5, and designated as 70M009002002 in 1979. The reselection from GP257 was evaluated as PT751 in the Parkland 'B' Test in 1986, and in the Parkland Wheat Cooperative Test from 1987 to 1989, for agronomic performance, reaction to diseases, and end-use suitability. The breeder seed of Cutler was established from 304 plant selections made at random from the bulk F_{10} of the reselection, and breeder seed is produced by bulking equal quantities of the 304 breeder lines, which are maintained separately.

Performance and Adaptation

The major strengths of Cutler are its early maturity (average 3 d earlier than Park and Oslo), its average yield advantage over Park of 11%, and its consistent yield-maturity pattern compared to other cultivars in a total of 35 trials in the Parkland region over 3 yr (Table 1). Its average yield was 7% lower than Oslo, the next earliest CPS cultivar. Cutler has a semidwarf stature with good lodging resistance similar to Neepawa. Test weight is similar to Neepawa. Cutler has larger seed size than Oslo (Table 1). The Quality Subcommittee of the Prairie Registration Recommending Committee on Grain indicated in 1990 that "PT751 has kernel and quality characteristics suitable for the red CPS wheat class".

Cutler is very susceptible to bunt and moderately susceptible to loose smut, such that use of a registered seed treatment for these diseases is recommended. In 3 yr of Cooperative 'C' tests it was rated susceptible to leaf rust in 2 yr, and very resistant in the

Table 1. Summary of agronomic performance of Cutler and check cultivars in the Parkland Wheat Cooperative Test 1987-1989

	Yield (kg ha^{-2})	Days to heading	Days to mature	Height (cm)	Lodging score (9 severe)	1000-kernel wt. (mg)	Test weight (kg hL^{-1})
Park	34.0	54.3	104.3	87.8	3.1	32.9	76.5
Neepawa	37.2	56.9	105.0	90.9	2.3	33.3	76.5
Oslo	40.8	54.8	104.8	71.7	1.4	36.4	75.4
Cutler	37.9	54.1	101.5	73.5	2.4	38.0	76.1
LSD[z]	1.70	0.88	1.03	1.63	0.52	1.00	0.50
No. of station years	35	21	23	35	20	35	35

[z]LSD = Least significant differences, $\alpha \leq 0.05$.

third (Table 2). No explanation is available for this variability in these official Cooperative trial rust ratings.

Cutler is known to possess a high level of tolerance to aluminum when tested in hydroponic solution culture at pH 4.8 (Table 3) using the method described by Briggs et al. (1989). The level of aluminum tolerance is significantly better than for Katepwa or Oslo when assessed by root length index (Table 3). Root growth of Cutler is superior to that of all CWRS cultivars recommended for the Parkland region of northern Alberta, when tested in grey wooded soil of pH 4.8 in greenhouse trials (Briggs and Taylor 1991, in press), but this superior rooting ability has not yet been confirmed under acid soil field conditions.

Description

SPIKE. Tapering, medium density, long, nodding, awned (awns medium long, slightly spreading); medium green colour after heading and yellow at maturity; intermediate number (3) of seeds per spikelet and spikelets per spike; lower glume characteristics — medium length and width, glabrous, white, apiculate shoulder shape, shoulder of medium width, medium wide acuminate beak, with medium basal folds.

KERNEL. Colour medium red; semihard texture; medium size, width and length; ovate shape with rounded cheek; medium length brush hairs covering medium sized brush area, germ size small (less than 1/6th of kernel), oval in shape; medium width and depth of kernel crease; brown staining reaction to phenol.

MATURITY. Three days earlier than Park.

STRAW. Semidwarf stature, similar in height to Oslo, with good lodging resistance similar to Neepawa.

SHATTERING RESISTANCE. Good.

ALUMINUM TOLERANCE. Excellent, superior to all registered Canadian cultivars.

DISEASE REACTION. Resistant to prevalent races of stem rust caused by *Puccinia graminis Pers.* f. sp. *Tritici* Eriks and E. Henn; susceptible to leaf rust caused by *P. recondita* Rob. ex-Desm. f. sp. *tritici*; similar to Neepawa in its tolerance level to common root rot caused primarily by *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem; susceptible to common bunt caused by *Tilletia foetida* (Wallr.) Liro and *T. caries* (DC.) Tul; moderately susceptible to loose smut caused by *Ustilago tritici* (Pers.) Rostr: (Table 2).

PHOTOPERIOD RESPONSE. Insensitive.

END-USE SUITABILITY. Suitable for grades of Canada Prairie Spring (red).

ELECTROPHORETIC BANDING PATTERNS, PAGE AND SDS-PAGE. Characteristic banding patterns of Cutler and Neepawa as determined by the methods of Ng et al. (1988), are shown in Fig. 1. Cutler is unique in having only two

Table 2. Disease reactions of Cutler and check cultivars in the Parkland Wheat Cooperative Test 1987-1989

	Common root rot[z]			Loose smut			Stem rust			Leaf rust			Bunt		
	1987	1988	1989	1987	1988	1989	1987	1988	1989	1987	1988	1989	1987	1988	1989
Park	37*	39*	38*	30[y]	30MR		30	30MS	MR-10MS	100	50S	40MS	-	9.0	-
Neepawa	29	32	31	-	R	-	10	10R	R-MR	40	10MR	40MR-MS	-	15.5	35.6I
Oslo	40**	41**	43**	54	HS	-	10	10R	R-MR	20	10R	5VR	-	18.8	12.6I
Cutler	34	29	33	34	56MS	-	5	10R	5R	20/60	50S	5VR	-	31.0	55.3S+

[z] Disease index, percent (Mean of Saskatoon, Scott and Swift Current in 1987).
[y] Loose smut, stem rust, leaf rust and bunt: Percent infection and type of reaction: VR = very resistant; R = resistant; MR = moderately resistant; I = intermediate resistance; MS = moderately susceptible; S+ = worse than susceptible; VS = very susceptible; HS = Highly susceptible.
*, **Values differ significantly from those of Neepawa at the 95% and 99% confidence levels, respectively.

bands in the ω region of the PAGE pattern, when compared to other Canadian wheats (Bushuk 1990, personal communication). High molecular weight glutenin subunit patterns are similar to those of Laura and Norstar (Bushuk 1990, personal communication).

Maintenance and Distribution of Pedigreed Seed

Exclusive rights for maintenance of breeder seeder, and for the multiplication and distribution of other pedigreed seed stocks, were awarded in 1990 by the University of Alberta to United Grain Growers, who may be contacted for seed requests at UGG (Seed Division), 7410-120 Avenue, P.O. Box 6030, Station 'C', Edmonton, Alberta, Canada T5B 4K5 (Fax (403) 479-6027).

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Table 3. Aluminum tolerance ratings of Cutler and check cultivars, assessed by the method of Briggs et al. (1989)

	Root length index[z] Aluminum concentration (μM)		Root dry weight index[z] Aluminum concentration (μM)	
	150	225	150	225
Cutler	98.8*a*	97.8*a*	69.0*a*	91.5*a*
PT741[y]	94.3*a*	94.7*a*	68.4*a*	90.7*a*
Oslo	77.8*b*	60.0*b*	63.3*a*	62.3*b*
Katepwa[y]	40.8*c*	45.2*c*	10.3*b*	45.4*c*
SE	4.02	2.98	5.30	2.99

[z] Indices are calculated as a percent of mean performance with aluminum, compared to controls without aluminum (mean of three replicates).
[y] Controls for aluminum tolerance (PT741) and intolerance (Katepwa).
*a-c*Means followed by the same letter within a column are not significantly differently ($P \leq 0.05$), according to Duncan's multiple range test.

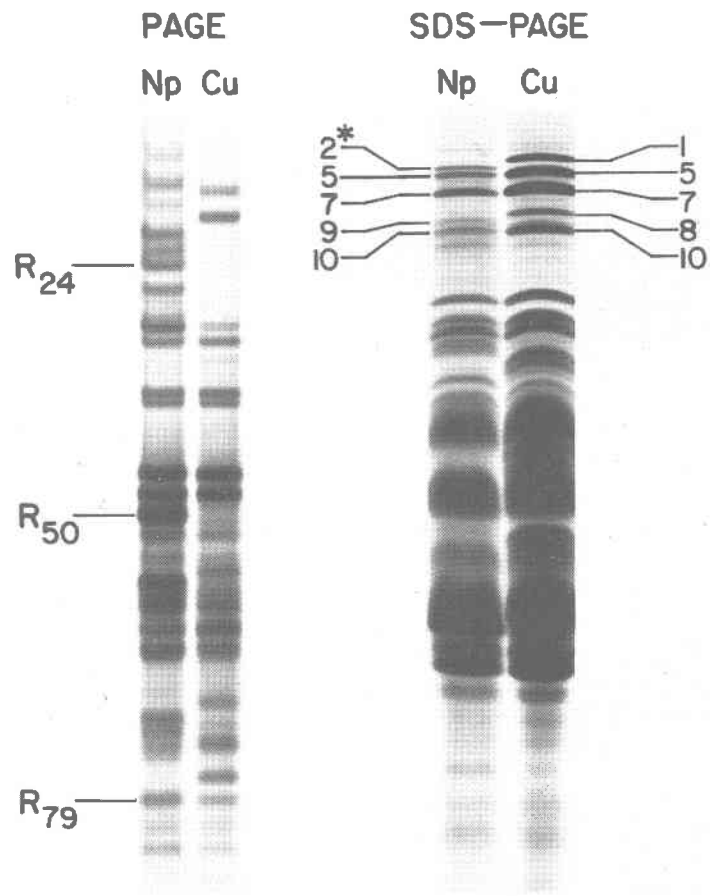

Fig. 1. PAGE and SDS-PAGE banding patterns for Cutler (Cu) and Neepawa (Np) wheat.

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