CDC Clair winter wheat

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Fowler, D. B. 1997. **CDC Clair winter wheat.** Can. J. Plant Sci. **77**: 669–671. CDC Clair is a high-yielding, strong-strawed, semidwarf winter wheat (*Triticum aestivum* L.) with good winterhardiness. When grown in western Canada, it has the high grain yield and agronomic performance of CDC Kestrel, but improved grain quality. The grain protein concentration of CDC Clair has been higher than that of CDC Kestrel and similar to Norstar. CDC Clair is eligible for grades of the Canada Western Red Winter Wheat class.

Key words: *Triticum aestivum* L., cultivar description, wheat (winter)

Fowler, D. B. 1997. **Nouveau de blé d'automne CDC Clair.** Can. J. Plant Sci. **77**: 669–671. CDC Clair est un blé d'automne (*Triticum aestivum* L.) demi-nain à rendement élevé et à paille forte, doté d'un bon degré de résistance aux conditions hivernales. Dans l'ouest du Canada, il affiche le rendement élevé en grain et les belles performances agronomiques de CDC Kestrel, avec en plus un grain de meilleure qualité. La teneur en protéine du grain est supérieure à celle de CDC Kestrel et comparable à celle de Norstar. Le nouveau cultivar est admissible aux grades de la catégorie des blés d'automne roux de l'ouest canadien (BAROC).

Mots clés: *Triticum aestivum* L., description de cultivar, blé (d'automne)

CDC Clair is a high-yielding, semidwarf winter wheat (Triticum aestivum L.) that was developed at the Crop Development Centre, University of Saskatchewan, Saskatoon, Saskatchewan. The Food Production and Inspection Branch of Agriculture and Agri-Food Canada issued registration no. 4813 for CDC Clair on 4 October 1995.

Pedigree and Breeding Method

CDC Clair was selected from the progeny of a cross Archer/Norstar made in 1981. The F_1 and F_2 generations were produced in a greenhouse in 1982. All subsequent generations were advanced one generation per year in the field where winterhardiness, height, straw strength, plant and kernel type, and disease reaction were evaluated. CDC Clair originated from a single plant selection that was made in 1986 and later designated as S87-149 (W275). S87-149 was grown as a head row in an irrigation nursery that was inoculated with an epidemic mixture of both stem and leaf rust in 1987. The agronomic performance of S87-149 was further evaluated in yield trials at three locations in Saskatchewan in both 1987–1988 and 1988–1989. S87-149 was then evaluated in the Central and Western Hard Red Winter Wheat Cooperative tests and was subsequently registered for production in Western Canada in 1995. This registration was extended to Ontario and Atlantic Canada in 1997. Seed of 113 head rows selected from S87–149 was bulked in 1993 to produce the original breeder seed of CDC Clair.

Performance

CDC Clair had an average grain yield that was 115% of Norstar and 101% of CDC Kestrel, the dominant cultivars in western Canada outside of southern Alberta during the 5-yr test period considered in this summary (Table 1). The grain yield of CDC Clair was equal to or better than that of CDC Kestrel under dryland and irrigation conditions in Alberta and Saskatchewan. Only in southeastern Manitoba was the grain yield of CDC Kestrel higher than CDC Clair.

Table 1. Grain yield (t ha^{-1}) of CDC Clair compared with Norstar and CDC Kestrel. Data fron the Western and Central Hard Red Winter Wheat Cooperative tests (1992–1996)[z]

	Alberta		Saskatchewan			Southeast	
Cultivar	Southwest	Central	Brown soils	Parkland	Irrigation	Manitoba	Mean
Norstar	3.56	7.07	3.22	3.67	4.64	4.50	4.17
CDC Kestrel	4.15	7.70	3.21	3.92	6.58	5.61	4.77
CDC Clair	4.13	7.88	3.29	4.00	6.71	5.09	4.80
LSD ($P \leq 0.05$)	0.31	0.44	0.24	0.26	0.63	0.48	0.18
No. of tests	8	6	8	20	7	5	54

[z]All means are weighted by the number of tests within a zone. Alberta locations included Lethbridge, Vauxhall, and Warner (southwest); and Lacombe and Olds (central). Saskatchewan locations included Swift Current, Elrose, and Saskatoon (brown soils); Clair, Indian Head, Melfort, Porcupine Plain, and Yorkton (parkland); and Saskatoon and Outlook (irrigation). Southeast Manitoba locations included Carman, Portage la Prairie, and Winnipeg.

Table 2. Agronomic performance of CDC Clair compared with Norstar and CDC Kestrel. Data from the Western and Central Hard Red Winter Wheat Cooperative tests (1992–1996)

Character	Norstar	CDC Kestrel	CDC Clair	LSD ($P \leq 0.05$)	No. of tests
Winter survival (%)	96	95	92	8.9	3
Heading date (DOY)[z]	173	172	171	0.4	25
Maturity (DOY)[z]	217	217	216	0.8	27
Plant height (cm)	112	96	90	1.8	42
Lodging (0–9)[y]	6.7	3.1	3.9	0.89	21

[z]Day of year.
[y]0, all plants vertical; 9, all plants horizontal.

Table 3. Stem rust reactions of CDC Clair compared with Norstar and CDC Kestrel based on data from Central Hard Red Winter Wheat Cooperative tests. With the exception of 1993, which was from a natural infection at Canora, SK, all stem rust ratings were based on artificial infections at Saskatoon, SK, using epidemic mixtures supplied by Agriculture and Agri-Food Canada in Winnipeg, MB

Year	Norstar	CDC Kestrel	CDC Clair
1992	60S[z]	30MS	35MS
1993	75VS	45S	25MS
1994	65S	15MS	40MS
1995a	60VS	60S	50S
1995b	75VS	20S	60S
1996a	80VS	40S	40S
1996b	90VS	0[y]	20S

[z]Percent infection and type of reaction: VS, very susceptible; S, susceptible; MS, moderately susceptible.
[y]Slow rusting. Plants matured before rust established on CDC Kestrel.

The winter hardiness of CDC Clair was similar to Norstar and CDC Kestrel (Table 2). CDC Clair headed 1 day earlier than CDC Kestrel and 2 days earlier than Norstar and it matured 1 day earlier than both CDC Kestrel and Norstar. CDC Clair had a plant height that was 6 and 22 cm shorter than CDC Kestrel and Norstar, respectively. The straw strength of CDC Clair was similar to CDC Kestrel and stronger than Norstar.

The stem rust reaction of CDC Clair was superior to Norstar and similar to CDC Kestrel (Table 3). Natural and artificial leaf rust infections normally do not develop before leaf senescence starts on properly managed winter wheat in western Canada. Among the 9 inoculated nurseries and the 54 cooperative tests evaluated in this program, leaf rust reactions were only reported for one replicate from a 1992 test grown at Portage la Prairie, Manitoba, and the mean of three replicates from a 1994 tests grown at Saskatoon, Saskatchewan: Norstar (20MS-S, 15S), CDC Kestrel (5 MR-MS, 5S), CDC Clair (30MS, 25S). The following common bunt ratings were reported from 1992 and 1996 trials inoculated by Agriculture and Agri-Food Canada staff at Lethbridge, Alberta: Norstar (8S, 20S), CDC Kestrel (8S, 25HS), CDC Clair 9S, 24S).

CDC Clair is eligible for grades of the Canada Western Red Winter Wheat Class. Its test weight was intermediate and its kernel weight was greater than CDC Kestrel and Norstar (Table 4). The flour yield of CDC Clair was 1.0 and 1.2% lower than Norstar and CDC Kestrel, respectively. CDC Clair had a baking strength index that was significantly higher than Norstar and its physical dough properties were stronger than CDC Kestrel and similar to those of Norstar. The grain protein concentration of CDC Clair was 0.1 and 1.0% higher than Norstar and CDC Kestrel, respectively. The short, strong straw of CDC Clair also allows farmers to adopt nitrogen fertilizer strategies aimed at both high grain yield and protein concentration targets.

Other Characteristics

PLANT. Winter growth habit; coleoptile color green; juvenile growth prostrate; leaves dark green; flag leaf dark green, mid-wide, mid-long, intermediate attitude; sheath and leaf blades glabrous; auricles white with few hairs; many tillers; straw mid-long, internode hollow, culm neck straight, no anthocyanin coloration at maturity.

SPIKES. Tapering, mid-dense, semi-nodding, mid-long,

Table 4. Grain quality of CDC Clair compared with Norstar and CDC Kestrel. Data provided by K. P. Preston, Grain Research Laboratory, Canadian Grain Commission, Winnipeg, Manitoba, from analyses of Western and Central Hard Red Winter Wheat Cooperative test composites (1992–1995). American Association of Cereal Chemists methods were followed for determining the various end-use suitability traits

Character	Norstar	CDC Kestrel	CDC Clair	LSD ($P \leq 0.05$)	No. of tests
Test weight (kg hL^{-1})	82.2	80.9	81.7	0.7	5
Kernel weight (mg)	33.5	33.2	34.5	0.9	5
Wheat protein (%)	12.1	11.2	12.2	0.4	5
Starch damage (Farrand units)	19.9	21.0	21.0	1.2	5
Falling number (sec)	362	365	368	44	5
Flour yield (%)	77.3	77.5	76.3	0.6	5
Flour ash (%)	0.41	0.41	0.43	0.01	5
Flour color (Kent-Jones)	–1.3	–1.2	–0.8	0.4	5
Farinograph					
Absorption (%)	57.3	57.5	59.0	0.5	5
Dough development (min)	5.0	3.5	4.9	0.5	5
Stability (min)	7.4	5.8	6.9	0.8	5
Baking strength index	104.0	105.2	106.7	2.3	5
Remix loaf volume (cm^3)	779	715	784	26	5

awned; glumes mid-wide, mid-long to long, glabrous, white; glume shoulders wanting, narrow; glume beak mid-long to long, acuminate.

KERNEL. Medium red, hard, mid-size, mid-wide, short to mid-long, oval to ovate; cheeks slightly angular to rounded; brush hairs short to mid-long; crease mid-wide, shallow to mid-deep; germ small to mid-size, oval.

Maintenance and Distribution of Pedigreed Seed

Breeder seed originating from 113 breeder lines will be maintained by the Crop Development Centre, University of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 5A8. ~~Distribution and multiplication of pedigreed seed stocks are handled by SeCan Association, 200-57 Auriga Drive, Nepean, Ontario, Canada, K2E 8B2 in western Canada and W.G. Thompson and Sons Ltd., Ailsa Craig, Ontario, Canada, N0M 1A0 in eastern Canada.~~

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