

CDC Chase hard red winter wheat

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Fowler, D. B. 2014. CDC Chase hard red winter wheat. *Can. J. Plant Sci.* **94**: 183–186. CDC Chase is a hard red winter wheat (*Triticum aestivum* L.) that is eligible for grades of the Canada Western Red Winter (CWRW) wheat class. High grain yield potential relative to the grain quality checks, CDC Buteo and Moats, is its primary strength. It has excellent stem, leaf, and stripe rust resistance, and low physiological leaf spot and very susceptible bunt ratings. Except for minor differences, its performance has been similar to that of CDC Buteo and Moats for the remainder of the agronomic characters measured. A suitable combination of grain quality, rust resistance, and grain yield make CDC Chase a good fit for the low to intermediate precipitation regions of western Canada.

Key words: *Triticum aestivum* L., cultivar description, Canada western red winter

Fowler, D. B. 2014. Le blé roux vitreux d'hiver CDC Chase. *Can. J. Plant Sci.* **94**: 183–186. CDC Chase est une variété de blé (*Triticum aestivum* L.) roux vitreux d'hiver admissible aux catégories de la classe « blé rouge d'hiver de l'Ouest canadien » (CWRW). Son principal atout est un rendement grainier potentiel élevé comparativement aux cultivars témoins CDC Buteo et Moats. CDC Chase bénéficie d'une excellente résistance à la rouille de la tige, à la rouille des feuilles et à la rouille jaune du blé. La variété est peu sensible à la tache des feuilles résultant de facteurs physiologiques, mais très sensible à la carie. Hormis quelques variations mineures, sa performance à l'égard des autres paramètres agronomiques évalués ressemble à celle de CDC Buteo et de Moats. La qualité du grain, la résistance à la rouille et le rendement grainier forment une combinaison intéressante qui font de CDC Chase une variété bien adaptée aux régions de l'Ouest canadien qui reçoivent des précipitations faibles à moyennes.

Mots clés: *Triticum aestivum* L., description de cultivar, blé rouge d'hiver de l'Ouest canadien

CDC Chase hard red winter wheat (*Triticum aestivum* L.) was developed at the Department of Plant Sciences, University of Saskatchewan, Saskatoon, SK. The Variety Registration Office, Plant Production Division, Canadian Food Inspection Agency issued registration no.7401 for CDC Chase on 2013 Jun. 03.

Pedigree and Breeding Method

CDC Chase was selected from the progeny of a McClintock/S96-35 cross where McClintock = GN567/Norstar and S96-35 = S86-808/Abilene. McClintock is a registered Canada Western Red Winter (CWRW) wheat cultivar. The F₁ cross was made in the University of Saskatchewan phytotron in 2001. Doubled haploid lines were increased in the phytotron during the winters of 2001–2002 and 2002–2003. These lines were grown in the field at Saskatoon in 2005–2006 as rows in a special nursery inoculated with leaf (*Puccinia recondita* Rob. ex Desm.) and stem (*Puccinia graminis* Pers. f. sp. *tritici* Eriks. & E. Henn) rust where winter survival, straw strength, height, maturity, and disease reaction were evaluated. DH01-28-137 was a row selection made in the fall of 2006. The agronomic performance and disease reactions of DH01-28-137 were assessed in yield trials

grown in Saskatchewan in 2006–2007, 2007–2008, and 2008–2009. DH01-28-137 was then evaluated in the Central Winter Wheat Cooperative (CWWC) registration trials in 2009–2010, 2010–2011, and 2011–2012 and registered for production as CDC Chase in 2013.

Performance

Analyses of variance were conducted using a mixed effects model where cultivars were considered as fixed and location years as random effects. The least significant difference (LSD) test was used to identify significant differences in the mean value of CDC Chase compared with the check cultivars.

High grain yield potential relative to the grain quality checks, CDC Buteo and Moats, is the primary strength of CDC Chase (Table 1). This advantage was particularly evident in Saskatchewan, where its grain yield was significantly higher than CDC Buteo (Fowler 2010), the dominant cultivar grown by farmers in this region (2011 Canadian Wheat Board Variety Survey), and Moats (Fowler 2012), a more recent CWRW release.

Abbreviations: CWRW, Canada western red winter; CWGP, Canada western general purpose

Table 1. Grain yield of CDC Chase compared with CDC Buteo, CDC Falcon, Accipiter, and Moats (kg ha⁻¹). Central Winter Wheat Cooperative Registration Trials (2010–2012)^z

| Cultivar | Saskatchewan | | | | |
|------------------|--------------|---------|-------------------------|----------|-------|
| | Alberta | Dryland | Irrigation ^y | Manitoba | Mean |
| CDC Buteo | 7245 | 4277 | 5305 | 4899 | 5159 |
| CDC Falcon | 7671 | 4136 | 5116 | 4837 | 5132 |
| Accipiter | 8004 | 4294 | 5429 | 5046 | 5363 |
| Moats | 7972 | 4303 | 5139 | 5066 | 5316 |
| CDC Chase | 7390 | 4707 | 5637 | 5185 | 5478 |
| LSD ($P=0.05$) | 443.4 | 213.7 | NS ^x | NS | 142.6 |
| No. of test | 5 | 10 | 5 | 9 | 29 |

^zAll means are weighted by the number of tests within a zone. Alberta locations included Lethbridge, Olds, and Lacombe. Saskatchewan locations were Saskatoon, Clair, Indian Head, Melfort, and Saskatoon irrigation. The Manitoba locations were Brandon, Winnipeg, and Carman.

^yStem and leaf rust nursery.

^xNS, non-significant differences.

With the exception of Alberta, the grain yield of CDC Chase was also equal to or greater than those of CDC Falcon (Fowler 1999) and Accipiter (Fowler 2011), the high-yielding Canada Western General Purpose (CWGP) wheat class registration trial check cultivars.

The time to heading for CDC Chase was similar to CDC Falcon, 1 d earlier than CDC Buteo and Moats, and 2 d earlier than Accipiter (Table 2). CDC Chase matured 2 d later than CDC Falcon, 1 d later than Moats, and at the same time as CDC Buteo and Accipiter. The plant height of CDC Chase was 3 cm taller than CDC Buteo and Moats, 10 cm taller than Accipiter, and 17 cm taller than CDC Falcon. It is more susceptible to lodging than CDC Falcon and Accipiter. The winter survival of CDC Chase did not differ significantly ($P=0.05$) from the check cultivars during the trial period under consideration.

CDC Chase has excellent stem, leaf, and stripe (*Puccinia striiformis* f.sp. *tritici*) rust resistance. It has a low physiological leaf spot rating and a very susceptible common bunt [*Tilletia laevis* Kuhn in Rabenh. and *T. caries* (DC.) Tul. & C. Tul.] rating. (Table 3). The Fusarium head blight (*F. graminearum*) ratings were variable for the 2 yr of testing in the registration trials, but the limited data suggest that the reactions of CDC Chase were similar to or better than those of the check cultivars (Table 4).

With the exception of falling number, which was significantly lower ($P=0.05$), and flour color b, farinogram absorption, and remix crumb structure, which were significantly higher ($P=0.05$), the grain quality measurements on CDC Chase were similar to one or both of the CWRW check cultivars (Table 5). This combination of grain protein concentration, milling properties, dough functionality, and baking performance was judged as acceptable for grades of the CWRW wheat class.

Other Characteristics

PLANT. Winter growth habit; coleoptile colour reddish; juvenile growth semi-prostrate; leaves medium green; flag leaf blue green, narrow to mid-wide, short to medium length, intermediate to upright attitude; sheath and leaf blades glabrous; auricles light reddish, glabrous; tillers many; straw medium length, internode hollow, culm neck straight, anthocyanin coloration at maturity absent, stem color light yellow at maturity.

SPIKES. Tapering, lax to mid-dense, inclined, short to medium length, awned; glumes narrow to mid-wide, mid-long to long, slightly pubescent, white; glume shoulders oblique, narrow; glume beak length mid-long to long; shape acuminate.

KERNEL. Hard red.

Table 2. Agronomic performance of CDC Chase compared with CDC Buteo, CDC Falcon, Accipiter, and Moats. Central Winter Wheat Co-operative Registration trials (2010–2012)

| Character | CDC Buteo | CDC Falcon | Accipiter | Moats | CDC Chase | LSD($P=0.05$) | No. tests |
|-----------------------------|-----------|------------|-----------|-------|-----------|-----------------|-----------|
| Heading (DOY) ^z | 175 | 174 | 176 | 175 | 174 | 0.4 | 28 |
| Maturity (DOY) ^z | 212 | 210 | 212 | 211 | 212 | 0.6 | 24 |
| Plant height (cm) | 92 | 78 | 85 | 92 | 95 | 1.3 | 33 |
| Lodging (1–9) ^y | 2.5 | 1.8 | 1.7 | 2.2 | 2.6 | 0.41 | 13 |
| Winter survival (%) | 88 | 77 | 85 | 90 | 80 | NS ^x | 7 |

^zDay of the year.

^y1, all plants vertical; 9, all plants horizontal.

^xNS, non-significant differences.

Table 3. Leaf, stem, and stripe rust and bunt reactions of CDC Chase compared with CDC Buteo, CDC Falcon, Accipiter, and Moats^z

| | CDC Buteo | CDC Falcon | Accipiter | Moats | CDC Chase |
|--|------------------|------------|-----------|--------|-----------|
| <i>(a) Stem rust</i> | | | | | |
| 2010W ^y | 5MR ^x | 5MR | 5R-MR | Tr-R | Tr-R |
| 2010S | R | R | R | R | R |
| 2011W | 20MR-MS | 20MR | 10R-MR | 5R | 5R |
| 2012W | 20MR | 20MR | 5R | Tr-R | Tr-R |
| <i>(b) Leaf rust</i> | | | | | |
| 2010W | 5R-MR | 15MR | 5MR | Tr-R | TrR-MR |
| 2010S | R | 20MR | R | Tr-R | R |
| 2011W | 10MR | 5MR | 10MR | 5R-MR | Tr-R |
| 2012W | 1MR | 1MR | 1MR | Tr-R | 5MR-MR |
| <i>(c) Stripe rust</i> | | | | | |
| Incidence (%) | 5 | 60 | 58 | 3 | 6 |
| Severity (%) | 4 | 63 | 63 | 2 | 3 |
| Max severity (%) | 5 | 70 | 78 | 3 | 5 |
| Rating | VR | VS | VS | VR | VR |
| <i>(d) Physiological leaf spot (1–5)^w</i> | | | | | |
| 2010S | 2.7 | 2.0 | 1.6 | 1.8 | 1.2 |
| <i>(e) Bunt</i> | | | | | |
| 2010L | 62VS | 34VS | 62VS | 42VS | 63VS |
| 2011L | 61VS | 41VS | 60VS | 31MS | 66VS |
| 2012L | 39VS | 30S | 52VS | 25I-MS | 56VS |

^zLeaf and stem rust data are from artificial infections using epidemic mixtures supplied by Agriculture and Agri-Food Canada (AAFC) in Winnipeg, MB. Stripe rust ratings from an artificially inoculated nursery were taken at three times during the growing season to observe disease progression (D. A. Gaudet and B. Puchalski, AAFC, Lethbridge, AB). Physiological leaf spot data were collected from field evaluations at six trial locations in Saskatchewan in 2010. Common bunt data are from trials inoculated by AAFC staff at Lethbridge, AB.

^yS, Saskatoon; W, Winnipeg; L, Lethbridge.

^xPercent infection and type of reaction: VS, very susceptible; S, susceptible; MS, moderately susceptible; MR, moderately resistant; Tr-R, trace-resistant; R, resistant.

^w1, best; 5, worst; LSD ($P=0.05$) = 0.57.

Maintenance and Distribution of Pedigreed Seed

CDC Chase has been maintained as the progeny from a single doubled haploid line. Seed of this line used in evaluation and selection trials has been produced in special increases to prevent admixtures. Seed originating from these special increases has also been used to

produce Breeder seed. Breeder seed will be maintained by the Department of Plant Sciences, University of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 5A8. Distribution and multiplication of pedigreed seed stocks are handled by Canterra Seeds (2002) Ltd., 201-1475 Chevrier Boulevard Winnipeg, Manitoba, Canada R3T 1Y7.

Table 4. Fusarium head blight reactions of CDC Chase compared with CDC Buteo, CDC Falcon, Accipiter, and Moats^z

| | CDC Buteo | CDC Falcon | Accipiter | Moats | CDC Chase |
|---------------------------|-----------|------------|-----------|-------|-----------|
| <i>(a) Mean incidence</i> | | | | | |
| 2011 | 8.5 | 8.3 | 8.8 | 7.8 | 7.0 |
| 2012 | 3.3 | 5.2 | 4.0 | 5.0 | 4.2 |
| <i>Severity</i> | | | | | |
| 2011 | 3.7 | 4.0 | 6.8 | 7.5 | 3.7 |
| 2012 | 4.2 | 6.0 | 4.7 | 7.7 | 6.3 |
| <i>VRI %^y</i> | | | | | |
| 2011 | 31.3 | 33.0 | 60.3 | 58.9 | 25.2 |
| 2012 | 13.8 | 30.7 | 18.3 | 38.7 | 26.4 |
| <i>(b) DON ppm</i> | | | | | |
| 2011 | 45.2 | 74.3 | 70.5 | 24.8 | 30.1 |
| 2012 | 3.4 | 3.3 | 4.9 | 4.6 | 3.4 |

^z(a) Fusarium head blight ratings supplied by the University of Manitoba, Winnipeg, MB. (b) DON data supplied by the Eastern Cereal and Oilseed Research Centre, Agriculture and Agri-Food Canada, Ottawa, ON.

^yVisual rating index.

Table 5. Wheat and flour analytical data^z for CDC Chase compared to CDC Buteo and Moats

| Character | CDC Buteo | Moats | CDC Chase | LSD ($P=0.05$) |
|--|-----------|-------|-----------|------------------|
| Test weight (kg hL ⁻¹) | 83.6 | 82.7 | 83.3 | 0.64 |
| Kernel weight (mg) | 32.8 | 32.5 | 32.3 | NS |
| Wheat protein (%) | 11.2 | 12.0 | 11.9 | 0.35 |
| Flour protein (%) | 10.4 | 11.2 | 11.0 | 0.28 |
| Protein loss (%) | 0.9 | 0.8 | 0.9 | NS |
| Falling number (s) | 421 | 440 | 398 | 16.0 |
| Amylograph peak viscosity (BU) | 603 | 810 | 568 | 92.4 |
| Flour yield (% corrected to 0.50 ash) | 79.8 | 77.8 | 79.3 | 0.54 |
| Flour ash (%) | 0.41 | 0.45 | 0.42 | 0.011 |
| Flour color <i>L</i> * | 94.8 | 94.7 | 94.6 | 0.13 |
| Flour color <i>a</i> * | 0.33 | 0.41 | 0.41 | 0.040 |
| Flour color <i>b</i> * | 8.4 | 8.6 | 9.7 | 0.23 |
| Starch damage (%) | 6.3 | 6.9 | 6.7 | 0.17 |
| Particle size index (%) | 60 | 57 | 59 | 1.1 |
| Farinogram absorption (%) | 57.6 | 58.2 | 58.8 | 0.56 |
| Farinogram DDT ^y (min) | 5.0 | 5.5 | 7.3 | NS |
| Farinogram stability (min) | 8.5 | 10.7 | 12.3 | NS |
| Farinogram MTI ^x (BU) | 36.7 | 25.0 | 30.0 | NS |
| Remix absorption (%) | 56 | 57 | 58 | NS |
| Remix peak time (min) | 2.4 | 2.8 | 3.1 | 0.35 |
| Remix Whr kg ⁻¹ | 5.2 | 6.1 | 5.7 | NS |
| Remix loaf volume (cm ³) | 793 | 928 | 819 | 35.6 |
| Remix loaf volume unit ⁻¹ protein | 76.4 | 82.7 | 74.6 | 2.7 |
| Remix appearance (1–10) | 8.3 | 8.5 | 8.3 | NS |
| Remix crumb structure (1–10) | 5.7 | 5.7 | 6.0 | 0.05 |
| Remix crumb colour (1–10) | 6.6 | 6.7 | 6.4 | NS |

^zEnd-use quality testing conducted by the Grain Research Laboratory of the Canadian Grain Commission on composite samples from each of the 2010–2012 Central Winter Wheat Co-operative Registration Trials. American Association of Cereal Chemists methods were followed for determining the various end-use suitability traits.

^yDough development time.

^xMixing tolerance index.

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