AC Pathfinder durum wheat

J. M. Clarke¹, J. G. McLeod¹, R. M. DePauw¹, B. A. Marchylo², T. N. McCaig¹, R. E. Knox¹, M. R. Fernandez¹, and N. Ames³

¹Agriculture and Agri-Food Canada, Research Branch, Semiarid Prairie Agricultural Research Centre, Box 1030, Swift Current, Saskatchewan, Canada, S9H 3X2; ²Grain Research Laboratory, Canadian Grain Commission, 1404-303 Main St., Winnipeg, Manitoba, Canada R3C 3G8; ³Agriculture and Agri-Food Canada, Research Branch, Cereal Research Centre, 195 Dafoe Rd., Winnipeg, Manitoba, Canada R3T 2M9. Received 16 August 1999, accepted 9 November 1999.


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AC Pathfinder was selected from the cross Westbred 881/DT367 made in 1989. DT367 (McLeod et al. 1991) is a line from our program, and Westbred 881 (PI483458) was developed by Western Plant Breeders Ltd. AC Pathfinder was developed using a modified pedigree technique. The F₂ was grown as individual plants in a leaf rust [caused by Puccinia recondita f. sp. tritici Roberge ex Desmaz] and stem rust [caused by P. graminis f. sp. tritici Pers.: Pers.] epiphytotic nursery near Swift Current in 1990. The F₃, F₄, and F₅ were grown as head rows and bulk harvested in a winter nursery near Brawley, California to produce seed for yield tests. The F₆ was grown as single rows at Swift Current and selections were made on the basis of maturity and plant type. Yield trials of 80 F₆ and 43 F₇ lines were grown near Swift Current and Regina, each with two replications, in 1992 and 1993 and selected for agronomic performance, disease resistance, and quality (protein, pigment, and gluten strength). Leaf and stem rust reactions were assessed in hill plots in the F₄, F₆, and F₇ 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 [caused by Ustilago tritici (Pers.) Rostr.] and races L1, L16, T1, T6, T13, and T19 of common bunt [caused by Tilletia laevis Kuhn in Rabenh. and T. caries (DC.) Tul. & C. Tul.] 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, Hoffman and Metzger (1976) for common bunt, and Nielsen (1987) for loose smut.

AC Pathfinder was evaluated for agronomic and quality traits, and for leaf rust, stem rust, and loose smut resistance in the Durum Western ‘A’ Test at five locations in 1994 and in the Durum ‘B’ Test at six locations in 1995. It was evaluated under the designation DT 671 in the Durum Cooperative Test in 1996–1998 for agronomic and quality traits, and for leaf rust, stem rust, loose smut, common bunt, leaf spot [caused by Septoria nodorum and Pyrenophora tritici-repentis (Died.) Drechs] and fusarium head blight [caused by Fusarium spp.] resistance. The 126 breeder lines grown in 3-m rows near Swift Current in 1995, and in 15-m rows near Indian Head, SK in 1996, originate from random plants from an F₆-derived F₁₁ single plant progeny row.
Performance

AC Pathfinder yielded about 1% less than Kyle, averaged over all sites in 1996 to 1998 (Table 1). AC Pathfinder yielded approximately the same as AC Morse and about 3% less than Kyle and AC Avonlea in the main durum growing area (Brown and Dark Brown soil zones, Zone 2). In Zone 1 (non-durum area), AC Pathfinder yielded the same as Kyle, 11% less than AC Avonlea, and 7% less than AC Morse.
Maturity of AC Pathfinder is 1 d earlier than AC Avonlea and AC Morse, and 2 d earlier than Kyle (Table 2). AC Pathfinder has shorter, stronger straw than Kyle. AC Pathfinder has high test weight, similar to Kyle and AC Avonlea and greater than AC Morse.

Other Characteristics
SPIKES. Fusiform to oblong, dense, mid long, erect, awned; glumes mid wide, mid long, glabrous, white; glume shoulders oblique to square, some slightly elevated; glume beak short to mid long, acute.

KERNEL. Colour medium amber, mid-size, mid-wide, mid-long, elliptical; cheeks rounded to angular; crease mid-wide, mid deep; brush mid-size mid long; embryo mid-size.

DISEASE REACTION. Resistant to prevalent race of common bunt, leaf rust and stem rust, highly susceptible to loose smut races prevalent in western Canada, and susceptible to leaf spots and fusarium head blight (Table 3).

PHOTOPERIOD RESPONSE. Sensitive.

END-USE SUITABILITY. AC Pathfinder has grain protein concentration similar to the statutory check, Hercules, and has yellow pigment concentration similar to AC Morse, and stronger, less extensible gluten than the checks as measured by the Alveograph (Table 4). AC Pathfinder is 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 S0G 2K0. Distribution and multiplication of pedigreed seed stocks will be handled by Saskatchewan Wheat Pool, 2625 Victoria Ave., Regina, Saskatchewan S4T 7T9.

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Table 4. Mean grain protein concentration of AC Pathfinder and check cultivars in the 1996, 1997 and 1998 Durum Cooperative Test (determined on individual locations by near infrared reflectance) and mean grain yellow pigment, Alveograph work input (W) and pressure/length ratio (P/L) for the 1996, 1997 and 1998 Durum Cooperative Test quality composites.

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<tr>
<th></th>
<th>% Protein</th>
<th>Yellow pigment</th>
<th>Alveograph*</th>
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<tr>
<td></td>
<td>1996</td>
<td>1997</td>
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<tr>
<td>Hercules</td>
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<tr>
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<td>13.0</td>
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