

Registration of 'Hatcher' Wheat

'Hatcher' (Reg. no. CV-971, PI 638512) hard red winter wheat (*Triticum aestivum* L.) was developed by the Colorado Agricultural Experiment Station and released to seed producers in August 2004. Hatcher was released based on its resistance to the original North American biotype, designated as Biotype 1 (D.R. Porter, personal communication, 2004) of the Russian wheat aphid [*Diuraphis noxia* (Mordvilko)], and its adaptation to nonirrigated production in eastern Colorado and the west-central Great Plains. 'Hatcher' was named in honor of the late E.L. "Shug" Hatcher, a former Colorado Wheat Industry leader who farmed near Lamar, CO.

Hatcher was selected from a population derived from a series of crosses and backcrosses completed in 1993: 'Yuma'/PI 372129/'TAM-200'/3/4*Yuma/4/KS91H184/'Vista'. PI 372129 is a Russian wheat aphid-resistant landrace from Turkmenistan that carries the *Dn4* Russian wheat aphid resistance gene (Quick et al., 1991); Yuma (PI 559720) is a hard red winter wheat cultivar released by Colorado State University in 1991; TAM-200 (PI 578255) is a hard red winter wheat cultivar released by Texas A&M University in 1986 (Worrall et al., 1995); Vista (PI 562653) is a hard red winter wheat cultivar released by the University of Nebraska in 1992 (Baenziger et al., 1993); and KS91H184 is an experimental line from Kansas State University (T.J. Martin, personal communication, 2004) derived from a random mating population involving CI 17884 (Wells et al., 1982). Following each backcross with Yuma as recurrent parent, progeny were screened for Russian wheat aphid Biotype 1 resistance in standard greenhouse screening tests (Nkongolo et al., 1989), and resistant plants were used as parents for the next cross. The final cross was made between a Russian wheat aphid-resistant BC₃F₁ plant and an F₁ plant from the cross KS91H184/Vista. Based on visual uniformity and agronomic appearance, Hatcher was selected in 1998 as an F_{4.5} line following advance from the F₂ through the F₄ using the bulk breeding procedure. Hatcher was assigned experimental number CO980607 and evaluated in nonreplicated preliminary yield trials in 1999, replicated advanced yield trials in 2000, replicated statewide variety trials from 2001 to 2004, and the Southern Regional Performance Nursery (SRPN) in 2003 and 2004. Seed purification of Hatcher was done by visual identification and removal of off-type rows among 135 F_{9.11} headrows grown at Yuma, AZ, in 2002 and bulking the seed from rows with uniform appearance. Breeder seed (F_{9.12}) was produced in 2003 under irrigation in Colorado.

Hatcher is an awned, white-chaffed, medium maturity, semi-dwarf hard red winter wheat. Hatcher has medium maturity, 144 d to heading from 1 January, and is 4 d later than 'Prairie Red' (PI 605390) and 1 d later than 'Yumar' (PI 605388) and 'Ankor' (PI 632275). Plant height of Hatcher is short (65.5 cm), and is 1.5 cm shorter than Prairie Red and 4.1 cm shorter than Yumar and Ankor. Coleoptile length of Hatcher (73.6 mm, $n = 8$ observations) is shorter than that of Prairie Red (85.0 mm) and Ankor (77.4 mm) but longer than that of Yumar (62.9 mm). Shattering tolerance of Hatcher is good (3.6 score, 1 = no shatter to 9 = severe shatter, $n = 3$ observations), slightly less than Ankor (2.7 score) but better than Prairie Red (4.1 score) and Yumar (4.2 score). On the basis of evaluations through the USDA Regional Testing Program, Hatcher is moderately susceptible to stem rust (caused by *Puccinia graminis* Pers.:Pers f. sp. *tritici* Eriks. & E. Henn; composite of races QFCS, QTHJ, RCRS, TPMK, and TTTT) and leaf rust (caused by *Puccinia triticina* Eriks.; composite of races MLRT, MFBP, TKBP, TDGT, and KBQT). The rating scale of infection responses in these evaluations consisted of four classes: R (resistant), MR (moderately resistant), MS (moderately

susceptible), and S (susceptible) determined primarily on the basis of the size of uredinia. Based on natural field infection in Colorado, Hatcher is moderately resistant to stripe rust (caused by *Puccinia striiformis* Westend.; 4.3 score, 1 = resistant and 9 = susceptible, $n = 4$ evaluations). Based on cooperative evaluations through the USDA Regional Testing Program, Hatcher is susceptible to both *Wheat streak mosaic virus* and *Barley yellow dwarf virus*, heterogeneous for resistance to the Great Plains biotype of Hessian fly [*Mayetiola destructor* (Say)], and susceptible to greenbug [*Schizaphis graminum* (Rondani)]. Resistance to Russian wheat aphid Biotype 1 in Hatcher is conditioned by the *Dn4* resistance gene. Russian wheat aphid resistance scores for Hatcher (1.9 score, 1 = very resistant to 5 = very susceptible, $n = 12$ observations) in standard greenhouse seedling screening tests using Biotype 1 are similar to other cultivars that carry *Dn4* including Yumar (2.2 score), Prairie Red (2.2 score), and Ankor (1.9 score).

Hatcher was tested at 22 trial locations of the Colorado Dryland Uniform Variety Performance Trial (UVPT) during 2001 (eight locations), 2002 (three locations), 2003 (six locations), and 2004 (five locations). Mean grain yields of Hatcher (3118 kg ha⁻¹) were slightly lower than that of 'Trego' (3178 kg ha⁻¹; PI 612576) but higher than those of all other entries tested including Ankor (3011 kg ha⁻¹), Prairie Red (2964 kg ha⁻¹), and Yumar (2943 kg ha⁻¹). Average grain volume weight of Hatcher (748 g L⁻¹) was lower than that of Trego (768 g L⁻¹) but similar to that of Yumar (746 g L⁻¹) and higher than that of Ankor (740 g L⁻¹) and Prairie Red (739 g L⁻¹). Hatcher was tested at eight locations of the Colorado Irrigated Variety Performance Trial (IVPT) during 2002, 2003, and 2004. In these trials, Hatcher (6598 kg ha⁻¹) had a lower mean yield than Prairie Red (7015 kg ha⁻¹) but a higher mean yield than Ankor (6510 kg ha⁻¹). Average grain volume weight of Hatcher (745 g L⁻¹) was higher than that of both Prairie Red and Ankor (723 g L⁻¹). The straw strength of Hatcher in these irrigated trials was moderate (4.6 score, 1 = erect to 9 = flat scale, $n = 9$ observations), and weaker than those of Ankor (3.9 score) and Prairie Red (2.3 score). Hatcher was tested in the 2003 and 2004 Southern Regional Performance Nursery (SRPN). Across locations in the High Plains region, Hatcher was the second highest entry in the trial in both 2003 (seven location mean yield 4697 kg ha⁻¹; 46 total entries) and 2004 (nine location mean yield 3533 kg ha⁻¹; 50 total entries).

Milling and bread baking characteristics of Hatcher were determined from multilocation composite grain samples in 2000, 2001, and 2002 and three single-location evaluations in 2001 ($n = 6$ observations). Ankor and 'Prowers 99' (PI 612420) were used as checks in these evaluations. Values for milling-related variables were generally superior to both Ankor and Prowers 99. Hatcher had higher grain volume weight (761.9 kg m⁻³) than Ankor (732.3 kg m⁻³) and Prowers 99 (749.0 kg m⁻³). On the basis of Single Kernel Characterization System (SKCS) analysis, Hatcher had higher kernel weight (28.5 mg kernel⁻¹) than Ankor (25.2 mg kernel⁻¹) and Prowers 99 (26.3 mg kernel⁻¹); higher SKCS kernel diameter (2.17 mm) than Ankor (2.03 mm) and Prowers 99 (2.11 mm); and lower SKCS kernel hardness index (71.8 score) than Ankor (73.3 score) and Prowers 99 (80.0 score). Hatcher had higher Quadromat Senior flour extraction (685 g kg⁻¹) than Ankor (658 g kg⁻¹) and Prowers 99 (679 g kg⁻¹) and lower flour ash (4.1 g kg⁻¹) than Ankor (4.4 g kg⁻¹) and Prowers 99 (4.8 g kg⁻¹). Values for baking-related variables of Hatcher were generally intermediate between Ankor and Prowers 99. Hatcher (120 g kg⁻¹) had similar grain protein content as Ankor (120 g kg⁻¹) and lower than Prowers 99 (138 g kg⁻¹). In mixograph tests optimized for water absorption, Hatcher had higher water absorption (618 g kg⁻¹) than Ankor (615 g kg⁻¹) and lower

than Prowers 99 (649 g kg⁻¹); higher tolerance score (3.2 score; 0 = unacceptable to 6 = excellent scale) than Ankor (2.2 score) and lower than Prowers 99 (4.0 score); and longer mixing time (3.2 min) than Ankor (2.9 min) and shorter than Prowers 99 (4.0 min). In straight-grade pup loaf baking tests, Hatcher had lower bake water absorption (600 g kg⁻¹) than Ankor (604 g kg⁻¹) and Prowers 99 (633 g kg⁻¹); longer bake mixing time (4.2 min) than Ankor (3.6 min) and shorter than Prowers 99 (5.1 min); smaller pup loaf volume (0.872 L) than Ankor (0.888 L) and Prowers 99 (0.945 L); and lower loaf crumb grain score (3.8 score; 0 = unacceptable to 6 = excellent scale) than Ankor (4.0 score) and Prowers 99 (4.5 score).

The Colorado Agricultural Experiment Station will maintain Breeder seed of Hatcher. Multiplication and distribution rights of other classes of Certified seed have been transferred from the Colorado Agricultural Experiment Station to the Colorado Wheat Research Foundation, 7100 S. Clinton St. Suite 120, Centennial, CO 80112. Hatcher has been submitted for U.S. Plant Variety Protection under Public Law 91-577 with the certification only option. Small quantities of seed for research purposes may be obtained from the corresponding author for at least 5 yr from the date of this publication.

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