

AP502 CL winter wheat

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Lazar, M. D., Haley, S. D., Quick, J. S., Johnson, J. J., Peterson, G. L., Stromberger, J. A., Clayshulte, S. R., Clifford, B. L., Pester, T. A., Nissen, S. J., Westra, P. H., Peairs, F. B. and Rudolph, J. B. 2003. **AP502 CL winter wheat**. Can. J. Plant Sci. **83**: 109–110. AP502 CL, a hard red winter wheat (*Triticum aestivum* L. em. Thell.), is adapted for dryland production in the west central Great Plains of the United States. It carries a nontransgenic source of tolerance to imidazolinone herbicides derived by mutation induction with sodium azide. AP502 CL was developed cooperatively by the Colorado and Texas Agricultural Experiment Stations and released to seed producers in September 2001.

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

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Mots clés: *Triticum aestivum*, blé (d'hiver), description de cultivar, tolérance aux herbicides

Breeding Method and Pedigree

AP502 CL was derived from the cross TXGH12588-26*4/FS2 made in 1996 at Amarillo, TX. TXGH12588-26, an unreleased experimental line from the Texas A&M University-Amarillo wheat breeding program, has the pedigree (TAM 105*4/Amigo)*5//Largo and is a sister line to TAM 110 (Lazar et al. 1997). The wheat germplasm line FS2 was developed by BASF Corporation (formerly American Cyanamid) using sodium azide induced mutagenesis of the French wheat cultivar Fidel to obtain tolerance to the imidazolinone class of herbicides (Newhouse et al. 1992).

During the backcrossing program conducted in the greenhouse at Bushland, TX, selection for seedling imazamox tolerance was practiced by application of imazamox herbicide (44.8 g a.i. ha⁻¹) 2 wk after seedling emergence. In March 1997, BC₃F₂ generation seeds were germinated in petri dishes in the presence of an aqueous solution (50 µL L⁻¹) of imazamox herbicide. Seedlings that survived the imazamox herbicide treatment were transferred to petri dishes containing a filter paper moistened with distilled water. Following vernalization in a cold room for 8 wk at 4°C, seedlings were hand-transplanted in May 1997 to a field nursery in the San Luis Valley, CO. Single plant selections made in early September 1997 were planted in BC₃F_{2,3} progeny rows in late September 1997 at Akron, CO. Application of imazamox herbicide (44.8 g a.i. ha⁻¹) was done in the field

in spring 1998 to allow identification of nonsegregating herbicide tolerant progeny rows. AP502 CL was selected as a BC₃F_{2,3} line in 1998 at Akron, CO, and was given the experimental designation CO980889.

Bulk seed increases of AP502 CL were grown in 1999 at Fort Collins, CO, concurrent with unreplicated yield trials in eastern Colorado. Following treatment of the seed increases with imazamox herbicide (44.8 g a.i. ha⁻¹) in spring 1999, 500 single heads were selected at random for generation of breeder seed. Breeder seed of AP502 CL was produced in 2000 near Yuma, AZ, and Brawley, CA, from a composite of approximately 450 BC₃F_{4,5} head-rows selected for plant height and glume color uniformity and tolerance to imazamox herbicide (44.8 g a.i. ha⁻¹) in the field.

Performance

AP502 CL was tested in Colorado Dryland Variety Performance Trials in 2000 and 2001. Averaged over 15 trial locations (seven locations in 2000, eight locations in 2001), AP502 CL yielded 11.0% less than Trego, 5.5% less than Jagger, 5.2% less than Alliance, 1.9% less than Akron, 0.4% greater than TAM 107, and 2.7% greater than TAM 110 (Table 1). Average test weight for AP502 CL in these trials was 6.3% less than Trego, 1.9% less than TAM 107 and Akron, 1.4% less than Jagger, 1.1% less than Alliance, and 0.4% less than TAM 110 (Table 1).

Table 1. Two-year summary of agronomic performance of AP502 CL and check cultivars in the Colorado Uniform Variety Performance Trial (2000–2001)

Cultivar	Grain yield (kg ha ⁻¹)	Test weight (kg hL ⁻¹)	Height (cm)	Heading date (d) ^z
Trego	3028	75.9	72	142
Jagger	2852	72.2	73	137
Alliance	2843	72.0	73	141
Akron	2746	72.5	75	142
TAM 107	2684	72.6	71	136
TAM 110	2621	71.4	72	137
AP502 CL	2695	71.1	70	137
LSD ($\alpha = 0.05$) ^y	389	2.0	6	2
Station-years	15	15	10	3

^zDays after 31 December.^yLeast significant difference (0.05 probability level) based on the cultivar-by-site interaction mean square.

Other Characteristics

AP502 CL is an early-maturing, semidwarf hard red winter wheat. Average heading date of AP502 CL is about 0.5 d later than TAM 107 and about 4.9 d earlier than Akron (Table 1). Plant height of AP502 CL is short, about 0.9 cm shorter than TAM 107 and about 5.0 cm shorter than Akron (Table 1). Winterhardness of AP502 CL is similar to both TAM 107 and TAM 110.

SPIKES

Spikes of AP502 CL are mid-dense, tapering, inclined at maturity, with mid-long awns; glumes are red, mid-long, and mid-wide; glume shoulders are oblique; glume beaks are acuminate and mid-long.

KERNELS

Kernels of AP502 CL are red, hard, and ovate; cheeks are rounded; brush is mid-sized with no collar; germ size is small; crease is narrow.

DISEASE AND INSECT REACTION

In artificially inoculated field screening nurseries, AP502 CL has shown resistance to stem rust (caused by *Puccinia graminis* Pers.:Pers. f. sp. *tritici* Eriks & E. Henn.; composite of races RTQQ, QTHJ, TTRS, RTHJ, TPMK) and susceptibility to leaf rust (caused by *Puccinia triticina* Eriks.; syn *Puccinia recondita* Roberge ex Desmaz.; composite of races MLRT, MFBP, TKBP, TDGT, and KBQT). Under natural field infection, AP502 CL has shown moderate susceptibility to both wheat streak mosaic virus and barley yellow dwarf virus. In greenhouse seedling screening tests, AP502 CL is resistant to greenbug [*Schizaphis graminum* (Rondani)] biotypes C and E and susceptible to the Great Plains biotype of Hessian fly [*Mayetiola destructor* (Say)] and the North American biotype of the Russian wheat aphid [*Diuraphis noxia* (Mordvilko)].

Table 2. Comparison of milling and bread baking characteristics of AP502 CL and the check cultivar TAM 107 in composite milling and baking tests (1999–2000)

Cultivar	AP502 CL	TAM 107
Test weight (kg hL ⁻¹)	75.6	75.0
Kernel weight (mg kernel ⁻¹)	30.8	30.8
Flour yield (g kg ⁻¹)	649	655
Flour protein content (g kg ⁻¹)	111	122
Flour ash content (g kg ⁻¹)	4.4	4.3
Water absorption (g kg ⁻¹)	611	616
Mixograph mix time (min)	2.1	2.9
Mixograph tolerance (score) ^z	2.0	2.0
Loaf volume (L)	.81	.88
Crumb grain (score) ^z	1.8	2.0

^zMixograph tolerance and crumb grain score scale: 0, unacceptable to 6, excellent.

END-USE QUALITY.

Milling and bread-baking characteristics of AP502 CL were determined from composite grain samples from unreplicated yield trials in 1999 and the Colorado Dryland Variety Performance Trials in 2000. Relative to the broadly adapted check cultivar TAM 107, AP502 CL had higher test weight, the same kernel weight, lower Brabender Quadromat Sr. flour yield (15% temper moisture) and flour protein content, and higher flour ash content (Table 2). In optimized, straight-dough bread baking tests (AACC Method 10-10B; AACC, 2000), AP502 CL had lower bake water absorption, shorter mixograph mixing time, lower loaf volume, lower crumb grain and texture score, and the same mixograph tolerance score compared to TAM 107 (Table 2).

Availability of Propagating Material

Breeder seed maintenance and multiplication and distribution rights of other classes of pedigreed seed have been transferred to Agripro Wheat, 806 N. 2nd Street, P.O. Box 30, Berthoud, CO 80513 USA. AP502 CL has been submitted for US Plant Variety Protection under P.L. 91-577 with the certification option.

AP502 CL was developed with financial support from Colorado Agric. Exp. Stn. Projects 795 and 646, the Colorado Wheat Administrative Committee, Texas Agric. Exp. Stn. Projects H6599 and H8080, and the Texas Wheat Producers Board.

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