Registration of ‘Ok102’ Wheat

‘Ok102’ (Reg. no. CV-941, PI 632635) is a hard red winter wheat (Triticum aestivum L.) developed cooperatively by the Oklahoma Agric. Exp. Stn. and the USDA-ARS. Ok102 was released in March 2002, primarily on the basis of its resistance to several foliar diseases, excellent milling quality, and desirable dough strength for leavened bread products.

Ok102 was derived from the cross ‘2174’/‘Cimarron’ (PI 536993), performed in 1991. 2174 has the pedigree IL71-5662/‘PL145’ (PI 600840)/‘2165’ and was released by the Oklahoma Agric. Exp. Stn. in 1997. Cimarron has the pedigree ‘Payne’ (Cltf 17717)*2/CO725052 and was released by the Oklahoma Agric. Exp. Stn. in 1990. Ok102 traces to the bulk progeny of a single F2, head row harvested in 1995. The F2 and F3 generations were evaluated and harvested as bulk populations in Stillwater, OK. The head row progeny was selected in 1996 from a non-replicated nursery at Lahoma, OK, for its acceptable winterhardness, plant and head type, heading and maturity date, leaf rust (caused by Puccinia triticina Eriks.), resistance, lodging resistance, grain yield, volume weight, kernel plumpness, and mixograph properties. Subsequent generations were advanced by bulk selling in the field, with roguing of taller varieties each year until 2002. Ok102 was evaluated as OK97508 in replicated Oklahoma performance trials from 1997 to 2001, and in the Southern Regional Performance Nursery (SRPN) in 2000 and 2001.

Ok102 is semidwarf but shorter than most HRW wheat cultivars currently in production. Its mature-plant height (77 cm) is 8 cm shorter than 2174 and ‘Ok101’ (Carver et al., 2003) and 7 cm shorter than ‘Jagger’ (Sears et al., 1997). Lodging resistance on a scale of 1 (highest) to 5 (lowest) is about 2 for Ok102, compared with values of 1 for 2174, 3 for Ok101, and 4 for Jagger. Ok102 shows an intermediate reaction to acidic, aluminum-toxic soil. With a tolerance rating of 3.2 on a scale of 1 (most tolerant) to 5 (most susceptible), Ok102 is more sensitive to Al toxicity than Ok101 (1.3) and Jagger (1.6), but similar to 2174 (3.0). Ok102 breaks winter dormancy relatively late, but its heading date (123 d) is intermediate among current cultivars. Comparative placement of cultivars for date of first-hollow-stem stage is Jagger < Ok101 < 2174 and Ok102. Precise differences are highly year-dependent. Heading date of Ok102 is 2 d later than Ok101 and Jagger, the same as 2174, and 2 d earlier than ‘2137’. This phenological pattern makes Ok102 well suited for winter grazing and grain production in a dual-purpose (graze-plus-grain) management system. Another characteristic that lends Ok102 to dual-purpose production is coleoptile elongation, or the ability to emerge from deeper seed placement. When measured at 15°C in a growth chamber, coleoptile length of Ok102 (8.7 cm) is 2.1 cm longer than Ok101 (short coleoptile), 0.4 cm longer than 2174 (moderately long), and 0.4 cm shorter than Jagger (moderately long). Ok102 has a relatively high seed dormancy rating based on germination tests conducted at 4 to 12 wk post-harvest for seed stored at ambient temperature and germinated at 24–35°C night/day temperature. Seed dormancy is not expressed at 13°C constant storage temperature. This rating is consistent with the high seed dormancy ratings for both parents of Ok102 (2174 and Cimarron).

Forage yield, grain yield, and grain volume weight were determined in replicated variety trials in Oklahoma in 2001 and 2002. Across seven environments, fall forage production (measured by hand clipping at the soil surface in December, Feekes stages 2-4) averaged 2610 kg ha\(^{-1}\) for Ok102, compared with 2710 kg ha\(^{-1}\) for Ok101, 2790 kg ha\(^{-1}\) for 2174, and 2770 kg ha\(^{-1}\) for Jagger. Across 40 site-years representing mostly grain-only trials, grain yield of these four cultivars were 3000 kg ha\(^{-1}\) (Ok102), 2990 kg ha\(^{-1}\) (Ok101), 2920 kg ha\(^{-1}\) (2174), and 3020 kg ha\(^{-1}\) (Jagger). From the same trials, grain volume weight averaged 763 kg m\(^{-3}\) (Ok102), 746 kg m\(^{-3}\) (Ok101), 768 kg m\(^{-3}\) (2174), and 748 kg m\(^{-3}\) (Jagger).

In greenhouse tests, juvenile plants of Ok102 exhibited a susceptible reaction to leaf rust comprised of bulk samples of uredomiospores collected from wheat fields in Oklahoma in spring 1999 and 2000. From 1999 to 2002, Ok102 has consistently shown a resistant reaction to leaf rust in field trials conducted in Texas and Oklahoma, having an approximate rating of 1 (resistant) on a 1 (resistant)-to-9 (susceptible) scale. Hence, Ok102 has adult-plant resistance to wheat leaf rust races currently present in Oklahoma. On the basis of seedling tests conducted by the USDA-ARS Cereal Disease Laboratory, St. Paul, MN, Ok102 is postulated to have Lr3 and Lr24. Their tests also indicate that seedlings of Ok102 are susceptible or have an intermediate level of resistance to five (2001 tests) to seven (2000 tests) races of stem rust [caused by Puccinia graminis f. sp. tritici (Pers.:Pers.) Drechs.], and are moderately susceptible or susceptible to stem rust in the field. Results from field trials in Oklahoma and Kansas indicate Ok102 is resistant to Wheat soilborne mosaic virus (1 on a 1-to-9 scale). Ok102 exhibits an intermediate reaction to barley yellow dwarf virus in the field, similar to the reaction of one of its parents, 2174. On the basis of seedling responses in the greenhouse to populations prevalent in Oklahoma, Ok102 is moderately resistant to tan spot [caused by Pyrenophora tritici-repentis (Died.) Drechs.] and resistant to powdery mildew [caused by Blumeria graminis (DC.) E.O. Speer f. sp. tritici Em. Marchal]. Ok102 produces a heterogeneous response to the Great Plains bio-type of Hessian fly (Mayetiola destructor Say) and is susceptible to Russian wheat aphid (Diuraphia noxia Mordvilko) and to greenbug (Schizaphis graminum Rondani).

The fall growth habit of Ok102 is semierect, which is similar to 2174 but more erect than Ok101 and Jagger. Flag leaves of Ok102 at the boot stage are blue-green, erect, and twisted. spikes are white-chaffed, awned, tapering, middense, and in- clined to nodding (in approximately horizontal position) at harvest-maturity. Kernels are red, hard textured, ovate to el- liptical, and midlong, and they have a midwide, midwide crease, rounded cheeks, and midsized germ.

On the basis of single-kevel characterization system (SKCS) data recorded from 16 breeder trials from 1999 to 2001, means and standard deviations for Ok102 were 29.6 and 7.7 mg for kernel weight, 2.4 and 0.4 mm for kernel diameter, and 76 and 16 for kernel hardness. Values for 2174 were 29.6 and 7.4 mg for kernel weight, 2.4 and 0.4 mm for kernel diameter, and 75 and 16 for kernel hardness index. Hence, physical quality attributes of Ok102 and 2174 are indistinguishable on the basis of SKCS parameters. From 28 site-years in the 2001 and 2002 Oklahoma wheat variety trials, wheat protein content of Ok102 (135 g kg\(^{-1}\)) equaled that of 2174 and Jagger. Ok102 has greater dough strength than 2174 on the basis of