Registration of ‘Bauermeister’ Wheat

‘Bauermeister’ (J981107, WA007939) hard red winter wheat (HRW) (Triticum aestivum L.) (Reg. No. CV-1002, PI 634717) was released in 2005 by the Agricultural Research Center of Washington State University (WSU) in cooperation with the USDA-ARS. Bauermeister is a semidwarf cultivar adapted to the low- to intermediate-rainfall (< 460 mm average annual precipitation) HRW wheat growing regions of Washington State. It was released for its high grain yield, disease resistance, and excellent quality attributes. Bauermeister is named in honor of Dale and Dan Bauermeister, wheat producers from Connell, WA. The Bauermeisters are strong supporters of WSU wheat research and have cooperated for many years toward the improvement of winter wheat for the low rainfall areas of Washington.

Stephen Jones selected Bauermeister ['TAM200' (PI 578255)/3*'Eltan' (PI 536994)] in the BC2F6. TAM200 (Worrall et al., 1995) is a HRW cultivar and Eltan (Peterson et al., 1991) is a soft white winter (SWW) cultivar broadly adapted to the Pacific Northwest. The original cross and subsequent backcrosses were made in the WSU Wheat Plant Growth Center. Seed from each BC2F3 plant was used to establish a BC2F4 field plot (84 total) at Pullman, WA in 1998. Following selection for general adaptation and seed color, 42 BC2F4 plots were planted. Based on general adaptation, seed color, maturity, resistance to stripe rust (caused by Puccinia striiformis Westend. f. sp. tritici.), grain yield, test weight, and milling and baking quality, 13 lines were selected and planted as BC2F5 replicated plots in two advanced field nurseries in eastern Washington. Using similar selection criteria, 11 BC2F4 lines were planted in five replicated nurseries across eastern Washington in 2001, of which two were advanced in 2002 and tested at 16 eastern Washington locations as BC2F5 breeding lines. In addition, approximately 100 single spikes from each of the two lines were planted as head rows at Pullman, WA for selection of rows that were homoygous for seed color and hardness. One line (J981107) emerged from the field nurseries as superior in grain yield and test weight. All of its 100 BC2F6 head rows were harvested and seed hardness (AAC, 2003, Method 55–31) was determined from a subsample for each head row. BC2F7 seed from the 32 head rows of J981107 that were hard (> 70 single kernel hardness) and red were then bulked and planted in replicated commercial field trials as WA007939. In 2003, approximately 2000 BC2F7 spikes were selected from a pure seed increase of WA007939 at Pullman, WA and grown as individual head rows, under irrigation, at Othello, WA. Those head rows were evaluated and selected for phenotypic uniformity, maturity, and resistance to disease. Non-conforming rows (< 10%) were removed before harvest and breeder seed of Bauermeister was produced from the bulked BC2F7 seed.

Bauermeister is an intermediate height, semi-dwarf HRW cultivar that is phenotypically and agronomically very similar to Eltan for every trait other than its red seed color and hardness. It has an awned, lax spike with long midwidth, white glumes. The kernels are elliptical, red, hard, and midlong, with a mid-wide, mid-deep crease and a mid-sized medium length brush. The germ is mid-wide.

Bauermeister exhibits resistance to snow mold (caused by Typhula idahoensis Rems and T. tiksharenensis Imai.) and stripe rust similar to Eltan. Bauermeister was tested for stripe rust in field nurseries with natural infection across Washington State from 2002 to 2004. Stripe rust was well developed in all locations in each of the 3 yr. In most tests, Bauermeister had infection types (ITs) from 0 (no symptom) to 5 (moderately resistant). In a few tests it had IT 5 (moderately susceptible) or mixed ITs, but severity was never greater than 40%. In 2005, Bauermeister was included in an experiment of randomized split-block design with 24 winter wheat cultivars with four replications to determine yield losses caused by stripe rust and responses to fungicide application. The plots were planted on October 24, 2004 and fungicide treated plots were sprayed with 292 mL ha⁻¹ propiconazole (Tilt) on May 19, 2005 when most of the cultivars were at the jointing stage and the susceptible check genotype, ‘PS 279’ had 20% stripe rust severity. Stripe rust severities were recorded three times on 21 May (the jointing stage), 7 June (the early heading stage), and 21 June (the early flowering stage). The area under disease progress curve (AUDPC) was calculated for each replication of each cultivar for fungicide treated and untreated plots. Grain of each plot was measured at harvest on August 15 when the grain was naturally dry. Bauermeister had mean AUDPC values of 438 for the untreated and 100 for treated plots, which were not different from the values of a resistant cultivar Eltan (441 for untreated and 118 for treated plots) and much lower than the susceptible HRW cultivar Hatton, (Citr 17772) (2473 for untreated and 776 for treated plots) (P < 0.06). Similarly, Bauermeister produced a mean yield of 5711 kg ha⁻¹ for untreated and 5913 kg ha⁻¹ for treated plots, which were not significantly different from Eltan (5375 kg ha⁻¹ for untreated and 5644 kg ha⁻¹ for treated plots) but significantly different from the mean yields of Hatton (1881 kg ha⁻¹ for untreated and 4435 kg ha⁻¹ for treated) (P < 0.05). Thus, Bauermeister had a level of stripe rust resistance equivalent to that of Eltan and much better resistance than those of Hatton and other currently grown cultivars (data not shown) in the field. In greenhouse adult-plant tests performed under low temperature cycle (diurnal temperature gradually changing from 4°C at 2:00 am to 20°C at 2:00 pm), Bauermeister showed resistance to race PST-21, intermediate resistance to races PST-41 and 95, and susceptibility to races PST-17, 37, 43, 45, 58, 78, 79, 97, 98, 100, and 105 of Puccinia striiformis f. sp. tritici. In greenhouse adult-plant tests performed under high temperature cycle (diurnal cycle gradually changing from 10°C at 2:00 am to 35°C at 2:00 pm), Bauermeister had resistant to moderately resistant reactions to races PST-37, 43, 58, 97, 98, and 100 of Puccinia striiformis f. sp. tritici. The contrasting reactions of the adult-plant vs. seedling tests indicate Bauermeister has non-race specific high-temperature adult-plant resistance, which has proven to be durable in many wheat cultivars, including Eltan, grown in the Pacific Northwest (Chen, 2005). Bauermeister showed moderate resistance to dwarf bunt (caused by Tilletia controversa Kühn) in tests under high disease pressure with a pathogenic race composite having virulence to the bunt resistance genes Bt1, Bt2, Bt3, Bt4, Bt6, B7, B9, B10, Bt14, and Bt15 in inoculated field trials in 2003/2004. From 2002–2004, visual disease assessments in three inoculated field trials indicated Bauermeister is moderately susceptible to Cephalosporium stripe (caused by Cephalosporium gramineum Nis. & Ika), similar to Eltan, and moderately susceptible to eyespot foot rot (caused by Tapesia yallundae Wallwork and Spooner) slightly better than Eltan. In naturally infested fields, 2002–2004 visual disease assessments show Bauermeister slightly susceptible to powdery mildew (caused by Blumeria graminis (DC) E. Speer f. sp. tritici Em. Marchal) and resistant to leaf rust (caused by Puccinia triticina Eriks.).

Grain yields of Bauermeister typically exceed (P < 0.1) those of HRW cultivars Finley (PI 586757) (Donaldson et al., 2000), Weston (Citr 17772) and Buchanan (PI 532994) (Donaldson, 1993). In 13 rain-fed trials conducted from 2002 to 2004 in the low- to intermediate-precipitation zones (< 460 mm annual precipitation) in Washington, grain yields of Bauermeister, Finley, Buchanan and Weston were 4038 kg ha⁻¹, 3568 kg ha⁻¹, and 3648 kg ha⁻¹, respectively.