

### Registration of 'Briggs' Wheat

'Briggs' (Reg. No. CV-1005, PI 632970), a hard red spring wheat (*Triticum aestivum* L.) cultivar developed by South Dakota State University (SDSU), was released by the South Dakota Agricultural Experiment Station in January 2002. Briggs was named in honor of Dr. Hilton M. Briggs, past president of SDSU (1958–1975) and a strong supporter of the College of Agriculture and Biological Sciences at SDSU, and the South Dakota agricultural community. Briggs was released on the basis of high and stable yield potential, above average test weight and protein concentration, and resistance to leaf and stem rust (caused by *Puccinia triticina* Eriks. and *Puccinia graminis* Per.:Pers. f. sp. *tritici* Eriks. & E. Henn, respectively). It is an early maturing semidwarf cultivar with an intermediate level of resistance to Fusarium head blight (FHB) [caused by *Fusarium graminearum* Schwabe (teleomorph *Gibberella zeae* (Schwein.) Petch)].

Briggs, tested under experimental designation SD3367, was derived from the three-parent cross 'Pasqua'/'Bergen' (PI 538768)//SD3097 made at SDSU, Brookings. The single cross Pasqua/Bergen was made in the greenhouse in the fall 1991 and the three-way cross in spring 1992. Pasqua [BW63\*2/'Columbus' (PI 496258)], originally tested as BW 114, was developed by Agriculture and Agri-Food Canada. Bergen [MN74103/MN72149/'Era' (CItr 13986)/3/'Angus' (CItr 17744)] was developed by AgriPro Biosciences. SD3097 is an experimental breeding line developed by SDSU from a three-parent cross 'Vratza'/'SD2962'/'SD2999'. Vratza is a Bulgarian winter wheat cultivar and is most likely PI 476794 (= Vratsa). SD2962 (SD2827/3/Burgas2-4/CNO) and SD2999 (SD2922/ND581), the unreleased SDSU experimental lines, were tested in Hard Red Spring Wheat Uniform Regional Nurseries of 1985 and 1987, respectively. The detailed pedigree information could not be traced further. During winter 1992–1993, approximately 30 F<sub>1</sub> seeds of the three-parent cross (Pasqua/Bergen//SD3097) were increased in bulk in a winter nursery at Yuma, AZ. The F<sub>2</sub> seeds harvested in bulk from Yuma were planted in unreplicated yield trials with repeated checks at Aurora and South Shore, SD, during spring 1993 for early generation yield testing. A space-planted nursery with approximately 250 seeds per entry was simultaneously grown at Aurora to facilitate selection of individual plants. On the basis of high grain yield of the F<sub>2</sub> population from the yield trial plots at both locations, 20 individual plants from the corresponding space-planted nursery plot were harvested and grown as independent F<sub>2,3</sub> plant-rows at Yuma during winter 1993–1994. The seeds of individual F<sub>2,4</sub> plant-rows harvested in bulk from Yuma were again evaluated in unreplicated yield trials with repeated checks at Aurora and South Shore during spring 1994. On the basis of the grain yield, test weight, disease resistance, and other agronomic traits, 20 heads from each of the selected population were harvested and grown again as F<sub>4,5</sub> head-rows at Yuma during winter 1994–1995. The F<sub>4,6</sub> lines harvested from Yuma were again evaluated in unreplicated yield trials with repeated checks at Aurora and South Shore during spring 1995. On the basis of grain yield, test weight, disease resistance, and other agronomic traits (heading, height, straw strength, and uniformity), one of the siblings with experimental designation SD3367 was advanced further and was subsequently evaluated in replicated yield trials viz. Preliminary Yield Trial (PYT) during 1996 and Advanced Yield Trial (AYT) during 1997 through 2001. It was simultaneously included in SDSU Crop Performance Testing (CPT) during 1999 through 2001, Uniform Regional Spring Wheat Nursery (URSWN) during 2000 through 2001, and Wheat Quality Council (WQC) trial during 2000.

On the basis of 35 AYT location-years, average heading date (day of the year) of Briggs (172 d) was not significantly different than 'Butte 86' and 'Walworth' (PI 630938); was significantly ( $P < 0.01$ ) earlier than 'Oxen' (PI 596770), '2375' (PI 601477, syn. Pioneer 2375), 'Russ' (PI 592785), and 'Chris' (CItr 13751) by 1, 2, 2, and 5 d respectively; and was later than 'Forge' (PI 603952) and 'Ingot' (PI 608755) by 1 d. On the basis of the same 35 AYT location-years, average plant height of Briggs (80 cm) was significantly ( $P < 0.01$ ) taller than Oxen (78 cm) and 2375 (79 cm) but shorter than Forge (81 cm), Walworth (81 cm), Butte 86 (83 cm), Russ (84 cm), Ingot (88 cm), and Chris (95 cm). Similar to that of Walworth and Ingot, straw strength of Briggs is rated fair.

In 38 AYT location-years, the average grain yield of Briggs (2850 kg ha<sup>-1</sup>) was significantly higher ( $P < 0.01$ ) than Chris (1728 kg ha<sup>-1</sup>), 2375 (2354 kg ha<sup>-1</sup>), and Butte 86 (2622 kg ha<sup>-1</sup>) but not significantly different than Ingot (2670 kg ha<sup>-1</sup>), Oxen (2786 kg ha<sup>-1</sup>), Walworth (2788 kg ha<sup>-1</sup>), Forge (2806 kg ha<sup>-1</sup>), and Russ (2830 kg ha<sup>-1</sup>). On the basis of the same 38 AYT location-years, average grain volume weight of Briggs (772 kg m<sup>-3</sup>) was significantly ( $P < 0.01$ ) higher than Russ (742 kg m<sup>-3</sup>), Oxen (747 kg m<sup>-3</sup>), 2375 (751 kg m<sup>-3</sup>), Butte 86 (751 kg m<sup>-3</sup>), and Walworth (755 kg m<sup>-3</sup>), lower than Ingot (789 kg m<sup>-3</sup>), and not significantly different than Forge (764 kg m<sup>-3</sup>).

On the basis of 13 AYT location-years average on milling and bread baking properties evaluated by the USDA-ARS Hard Spring Wheat Quality Laboratory in Fargo, ND, the grain protein content of Briggs (150 g kg<sup>-1</sup>) was significantly ( $P < 0.05$ ) higher than Forge (142 g kg<sup>-1</sup>), 2375 (145 g kg<sup>-1</sup>), Russ (145 g kg<sup>-1</sup>), Oxen (145 g kg<sup>-1</sup>), and Walworth (145 g kg<sup>-1</sup>), lower than Chris (155 g kg<sup>-1</sup>), and not significantly different than Ingot (149 g kg<sup>-1</sup>) and Butte 86 (150 g kg<sup>-1</sup>). Grain ash content of Briggs (16.8 g kg<sup>-1</sup>) was significantly ( $P < 0.05$ ) lower than 2375 (17.6 g kg<sup>-1</sup>), Russ (17.4 g kg<sup>-1</sup>), Ingot (17.4 g kg<sup>-1</sup>), Forge (17.4 g kg<sup>-1</sup>), and Oxen (17.4 g kg<sup>-1</sup>), higher than Walworth (16.1 g kg<sup>-1</sup>), and not significantly different than Butte 86 (17.3 g kg<sup>-1</sup>). Flour extraction rate of Briggs (607 g kg<sup>-1</sup>) was significantly ( $P < 0.05$ ) lower than Oxen (630 g kg<sup>-1</sup>) but not significantly different than 2375 (600 g kg<sup>-1</sup>), Forge (600 g kg<sup>-1</sup>), Russ (603 g kg<sup>-1</sup>), Ingot (607 g kg<sup>-1</sup>), Walworth (607 g kg<sup>-1</sup>), and Butte 86 (610 g kg<sup>-1</sup>). Average loaf volume of Briggs (198.0 mL) was significantly higher ( $P < 0.01$ ) than Forge (189.0 mL), Russ (190.3 mL), Butte 86 (190.7 mL), 2375 (191.0 mL), and Walworth (191.0 mL) but not significantly different than Ingot (195.7 mL) and Oxen (196.0 mL).

On the basis of WQC spring wheat crop results from 2000, several single kernel and bake quality characteristics of Briggs were similar to, or better than, 'Grandin' (PI 531005), the standard check. Single Kernel Characterization System (SKCS) kernel diameter of Briggs was 2.71 mm compared with 2.57 mm for Grandin. Likewise, SKCS kernel weight of Briggs was 34.05 mg, while that of Grandin was 31.1 mg. Falling numbers for Briggs and Grandin were 411.5 and 391.5 s, respectively. Flour protein content of Briggs was 139 g kg<sup>-1</sup> compared with 137 g kg<sup>-1</sup> for Grandin and flour ash content for Briggs was 5.25 as compared with 5.6 g kg<sup>-1</sup> for Grandin. With respect to farinograph characteristics, bake water absorption for Briggs was 626 g kg<sup>-1</sup> with an arrival time of 3.4 min, a peak time of 5.6 min, and a dough stability value of 7.9 min compared with 626 g kg<sup>-1</sup>, 2.7 min, 6.4 min, and 10.2 min, respectively, for Grandin.

Briggs has been consistently resistant to both stem and leaf rust. On the basis of the adult plant evaluation of 2001 AYT entries at the USDA-ARS Cereal Disease Laboratory, St Paul, MN, the field reaction of Briggs was 5R-MR for stem rust compared with 30MR-MS for Russ and 30MR-S for Oxen. On the basis of 2000 URSWN mean scores (five locations) on leaf rust, field reaction for Briggs was 5R compared with

15MS, 30S, and 90S, respectively, for Walworth, Chris, and 'Marquis' (Cltr 3641). On the basis of 6 CPT location-years, leaf rust field reaction for Briggs was 0–10R compared with 40MS-100S for Ingot and tMR-100S for Russ. Likewise, stem rust field reactions for Briggs, Ingot, and Russ were 0, 0, and tR, respectively. When evaluated for FHB resistance with artificial inoculation under automated misting system (Rudd et al., 2001) from 2002–2004 at Brookings (three location-years), FHB disease index (Stack et al., 1997) of 40.6% for Briggs was significantly ( $P < 0.05$ ) lower than 76.0% for 'Wheaton' (PI 469271), similar to 29.6% for 'Granger', and significantly higher than 12.4% for 'Sumai 3' (PI 481542), the resistant check (Glover et al., 2006).

Briggs has semierect juvenile plant growth, a hollow stem, and waxy bloom. It does not produce anthocyanin in the stem and coleoptile. Plant color at the boot stage is green. Flag leaves at boot stage are recurved and twisted. Heads are awned, dense, and tapering with an inclined curvature. The glumes are medium in length and width, have oblique shoulder and acuminate beak, and appear white at maturity. The kernels are hard in texture, red in color, and ovate in shape with angular cheek and medium brush.

Breeder seed of Briggs was generated via a head-row purification process shuttling between Yuma, AZ, and Brookings, SD, from 2000 through 2002. Foundation seed was multiplied and made available to growers before the 2002 growing season by the South Dakota Foundation Seed Stocks Division (Plant Science Department, South Dakota State University, Brookings, SD 57007). Seed classes will be Breeder, Foundation, Registered, and Certified. Briggs has received U.S. Plant Variety Protection (Cert. No. 200300142) under P.L. 910577 with the certification option. Contact the co-author Dr. Karl Glover at Plant Science Department, South Dakota State Uni-

versity for all seed requests. No seed will be distributed without written permission by the South Dakota State University for 20 yr from PVP certificate issue date of 19 Sep. 2003, at which time seed will also be available from the National Plant Germplasm System (NPGS).

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