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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
WASHINGTON, D.C. 20250

NOTICE OF RELEASE OF 'LOUISE'
Soft White Spring Wheat

'Louise' soft white spring wheat (*Triticum aestivum* L.) (Reg. No. CV-XXX, PI 634865) was developed by the Agricultural Research Center of Washington State University in cooperation with the Agricultural Experiment Stations (AESs) of the University of Idaho and Oregon State University, and the United States Department of Agriculture-Agricultural Research Service (USDA-ARS). Louise was named in honor of Dr. Louise Slade, Kraft Food Fellow, Kraft Foods, who's extraordinary contributions to the advancement of cereal chemistry have greatly expanded our understanding of and ability to improve the baking quality of soft wheat, and Kriquet 'Louise' Kidwell, Dr. Kidwell's beloved niece. Louise was jointly released by the AESs of Washington, Idaho and Oregon and the USDA-ARS in 2005. Louise was released as a replacement for the soft white spring variety 'Zak' (Kidwell et al., 2002) in the intermediate to high rainfall (>400 mm of average annual precipitation), nonirrigated wheat production regions of Washington State based on its superior end-use quality, high grain yield potential, high-temperature adult-plant resistance to local races of stripe rust (caused by *Puccinia striiformis* Westend. f. sp. *tritici*), and partial resistance to the Hessian fly [*Mayetiola destructor* (Say)].

Louise, tested under the experimental designations WA007921, S9800189, and K93581, which were assigned through progressive generations of advancement, is a F4:5 head row selection derived from the cross 'Wakanz' (PI 506352)/'Wawawai' (PI 574538), which was made in 1992. The following modified pedigree-bulk breeding method was used to advance early generation progeny. Bulk seed (30 g) from F1

plants was used to establish an F2 field plot. Approximately 100 heads were selected at random from individual F2 plants, and a 40 g sub-sample of the bulked seed was used to establish a single F3 plot. Seed from the F3 plot was bulk harvested, then a 60-g sub-sample was used to establish an F4 field plot. Single heads from approximately 150 F4 plants were threshed individually to establish F4:5 head row families. Following selection for general adaptation, plant height and grain appearance, seed from 30 to 50 plants within each selected head row was bulk harvested to obtain F4:6 seed for grain yield assessment. The F1, F2, F4 and F5 progeny were advanced in field nurseries in Pullman, WA, whereas F3 progeny were advanced at the Lind Dryland Experiment Station in Lind, WA. Breeder seed of Louise was produced as a reselection, based on phenotypic uniformity, of 1100 F4:11 head rows grown with irrigation in Othello, WA in 2003. Selected head rows were bulked at harvest, resulting in the production of 563 kg of Breeder seed.

Louise is an intermediate height, semidwarf plant. It has lax, tapering, inclined curved heads with white awns and white glumes that are long in length, wide in width with medium, apiculate shoulders, and narrow beaks. Louise has elliptical kernels that are white, soft and smooth. Seed of Louise has a mid-sized germ with a narrow, mid-depth crease, angular cheeks and a medium, non-collared brush.

In greenhouse seedling tests conducted in 2003 and 2004 under a low diurnal temperature cycle gradually changing from 4oC at 2:00 am to 20oC at 2:00 pm (Chen and Line 1992) with wheat stripe rust (caused by *P. striiformis* f. sp. *tritici*) races PST-37, PST-43, PST-45, PST-78 and PST-98, Louise was susceptible to all races indicating that it does not have all-stage (seedling) resistance. However, when tested with races PST-78 and PST-100 in adult-plant stages under a high diurnal temperature cycle gradually changing from 10oC at 2:00 am to 35oC at 2:00 pm, Louise was highly resistant indicating that it has high-temperature, adult-plant (HTAP) resistance (Chen and Line 1995). In field tests conducted in various locations in Washington State from 2001 to 2004, Louise displayed a high level of non-race-specific, HTAP resistance to the primary virulent races in current stripe rust populations in the Pacific Northwest region of the United States, including PST-78, PST-98 and PST-100. On the basis of insect screening trials conducted at the University of Idaho, Louise is partially resistant (65%) to Hessian fly [*M. destructor* (Say)] biotypes E, F and GP. On the basis of pedigree and natural field infestation ratings from Pullman, WA, Louise is susceptible to the Russian wheat aphid [*Diuraphis noxia* (Mordvilko)].

Louise was evaluated in replicated field trials under fallow, non-irrigated and irrigated conditions. Grain yields of Louise typically equaled or exceeded those of soft white spring entries in nonirrigated and irrigated field evaluations conducted in Washington, Oregon, and Idaho from 2002 to 2004. In 51 tests conducted across 3 yr in Washington State, the average grain yield of Louise was 3702 kg ha⁻¹, which was significantly higher than the yield averages of Zak (3232 kg ha⁻¹) and Alturas (3581 kg ha⁻¹) (Souza et al., 2004) and comparable to Alpowa (3668 kg ha⁻¹), (PI 566596) and Nick (3742 kg ha⁻¹) (proprietary variety from WestBred LLC). On the basis of 24 site-years of data from the intermediate and high rainfall zones (>400 mm average annual precipitation), the average grain yield of Louise (4952 kg ha⁻¹) was equivalent to

Alpowa (4905 kg ha⁻¹) and Nick (4831 kg ha⁻¹), and significantly higher than Alturas (4690 kg ha⁻¹) and Zak (4280 kg ha⁻¹).

On the basis of 51 tests, grain volume weight of Louise averaged 757 g l⁻¹, which was significantly higher than that of Zak (750 g l⁻¹), similar to Alturas (756 g l⁻¹) and Nick (763 g l⁻¹), and significantly lower than Alpowa (771 g l⁻¹). Thousand-kernel weight averages of Louise, Zak, Alpowa, Alturas, and Nick were 50.1, 44.5, 44.7, 34.7, and 36.4 g, respectively. The average plant height of Louise was 80 cm, which was 4 cm, 6 cm, 8 cm and 9 cm taller than Zak (76 cm), Alpowa (74 cm), Nick (72 cm) and Alturas (71 cm), respectively. Lodging percentages of Louise (5 to 10%) when grown with irrigation were comparable to Alpowa (5 to 10%), higher than Nick (2 to 5 %) and Alturas (2 to 5%), and lower than Zak (25 to 30%). Louise headed 1 d earlier than Zak [Day of Year (DOY) 168], on the same date as Alpowa (DOY 167), one d later than Alturas (DOY 166), and 2 d later than Nick (DOY 165).

In tests conducted at the USDA-ARS Western Wheat Quality Laboratory in Pullman, WA using grain produced in breeding and commercial variety testing trials in Washington State from 2002 through 2004, grain protein content of Louise (117 g kg⁻¹) was similar to Alpowa and Alturas (116 g kg⁻¹), and lower than Nick (120 g kg⁻¹) and Zak (123 g kg⁻¹). Flour yield of Louise (671 g kg⁻¹) was comparable to Zak (667 g kg⁻¹), Alturas (666 g kg⁻¹) and Nick (665 g kg⁻¹), and significantly higher than Alpowa (640 g kg⁻¹). Flour ash content for Louise (3.6 g kg⁻¹) was similar to Alpowa (3.5 g kg⁻¹) and significantly lower than Zak (3.9 g kg⁻¹), Alturas (3.7 g kg⁻¹) and Nick (3.8 g kg⁻¹). Louise had a higher average milling score (84.0) than Zak (81.4), Alpowa (80.6), Alturas (82.4), and Nick (81.5). Mixograph water absorption of Louise was identical to Zak and Nick (531 g kg⁻¹), slightly lower than Alpowa (534 g kg⁻¹), and significantly lower than Alturas (544 g kg⁻¹). Average cookie diameter for Louise (9.7 cm) was comparable to Zak (9.7 cm) and larger than Alpowa (9.3 cm), Alturas (9.5 cm), and Nick (9.5 cm), and average sponge cake volume of Louise (1305 cm³) was smaller than Zak (1322 cm³) and Alpowa (1362 cm³) and larger than Alturas (1225 cm³) and Nick (1230 cm³) when compared across production regions.

Foundation seed of Louise will be maintained by the Washington State Crop Improvement Association under supervision of the Department of Crop and Soil Sciences and the Washington State Agricultural Research Center. Small quantities may be obtained for research purposes by contacting the National Plant Germplasm System. U.S. Plant Variety Protection status for this cultivar is pending.

References

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8-30-05
Date

Yes the Idaho Agricultural Experiment Station wishes to join in the release of 'Louise' and has signed below.

Henry A. Bush
Director, Idaho Agricultural Experiment Station
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7/25/05
Date

Yes, the Oregon Agricultural Experiment Station wishes to join in the release of 'Louise' and has signed below.

Janice Acyore
Director, Oregon Agricultural Experiment Station
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5/2/05
Date

Yes, the USDA-ARS wishes to join in the release of 'Louise' and has signed below.

Judith B. St. John
Administrator, USDA Agricultural Research Service
Washington, D.C.

8/9/04
Date