

Washington Agricultural Research Center
Washington State University
Pullman, Washington

and

Idaho Agricultural Experiment Station
University of Idaho
Moscow, Idaho

and

Oregon Agricultural Experiment Station
Oregon State University
Corvallis, Oregon

and

United States Department of Agriculture
Agricultural Research Service
Washington, D.C.

**RELEASE OF EDEN (PI630983)
A SOFT WHITE SPRING CLUB WHEAT CULTIVAR**

The Washington Agricultural Research Center, the Idaho Agricultural Experiment Station, the Oregon Agricultural Experiment Station, and the United States Department of Agriculture - Agricultural Research Service announce the joint release of 'Eden', a soft white spring club wheat (*Triticum aestivum* L.). K.K. Kidwell, Washington State University (WSU) Spring Wheat Breeder and Geneticist, selected Eden as an F₅ head row from a cross generated by Dr. C.F. Konzak, WSU emeritus professor, in 1991. Eden was released as a replacement for 'Calorwa' in the intermediate to high rainfall (>460 mm of average annual precipitation), non-irrigated wheat production regions of the US Pacific Northwest based on its high grain yield, excellent stripe rust resistance and superior end-use quality.

Eden, tested under the experimental designations WA007902, S9700431 and K92622, which were assigned through progressive generations of advancement, is a F_{4.5} head row selection derived from the cross 'Wawawai'(PI 574538)/'Calorwa' (PI 566594) made in 1991. Wawawai is a soft white common spring variety and Calorwa is a soft white club spring variety. The following modified pedigree-bulk breeding method was used to advance early generation progeny: bulked 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 F_3 plot; seed from the F_3 plot was bulk harvested, then a 60 g sub-sample was used to establish an F_4 field plot; single heads from approximately 150 F_4 plants were threshed individually to establish $F_{4,5}$ head row families. Following selection for general adaptation, plant height, head type and grain appearance, seed from 30 to 50 plants within each selected head row was bulk harvested to obtain $F_{4,6}$ seed for grain yield assessment. F_1 , F_2 , F_4 and F_5 progeny were advanced in field nurseries at the WSU Spillman Agronomy Farm in Pullman, WA, whereas F_3 progeny were advanced at the WSU Lind Dryland Experiment Station in Lind, WA. Breeder seed of Eden was produced as a reselection, based on phenotypic uniformity, of 1800 $F_{4,10}$ head rows grown under irrigation at the WSU Irrigated Research Farm in Othello, WA in 2001. Selected headrows were bulked at harvest resulting in the production of 1595 lb of Breeder seed.

Eden is an intermediate height, semidwarf plant. It has compact, elliptical heads with white awns and medium length, white glumed spikes. Eden has humped, ovate kernels that are white, soft and smooth. Seed of Eden has a pinched germ with a wide, slightly open crease, angular, offset cheeks and a short, goatee brush.

Eden is resistant to stripe rust (caused by *Puccinia striiformis* Westend. In greenhouse seedling tests conducted in 2001 and 2002, it was highly resistant to races PST-29, 37, 43, 45, 78, and 02-305 (a new race similar to PST-78), which were either previously predominant in the Pacific Northwest or are currently predominant throughout the US. In field tests conducted in various locations in Washington State from 2001 to 2002, Eden demonstrated moderate to high levels of resistance to stripe rust, similar to Wawawai, one of its parents. Based on insect screening trials conducted at University of Idaho and field trials conducted in Walla Walla, WA and Pullman, WA, Eden is susceptible to local biotypes (E, F and GP) of the Hessian fly [*Mayetiola destructor* (Say)]. Based on pedigree and natural field infestation ratings from Pullman, WA, Eden is susceptible to the Russian wheat aphid (*Diuraphis noxia* (Mordvilko)).

Eden was evaluated in replicated field trials under fallow, non-irrigated and irrigated conditions. Grain yields of Eden typically equaled or exceeded those of soft white spring wheat entries in non-irrigated and irrigated field evaluations conducted in Washington, Oregon and Idaho from 2000 to 2002. In 44 tests conducted over 3 years in Washington State, the grain yield average of Eden was 4233 kg ha^{-1} , which was significantly higher than the yield averages of 'Zak' (4099 kg ha^{-1}), and Calorwa (3695 kg ha^{-1}). Based on 14 site years of data from the intermediate rainfall zone (380 to 460 mm average annual precipitation), Eden (4233 kg ha^{-1}) produced significantly more grain than Zak (3964 kg ha^{-1}) and Calorwa (3628 kg ha^{-1}). In the high rainfall zone (>460 mm average annual precipitation), grain yield averages of Eden (5442 kg ha^{-1}) and Zak (5510 kg ha^{-1}) were significantly higher than Calorwa (4905 kg ha^{-1}) based on grain yield averages from 9 site-years.

Based on 44 tests, grain volume weight of Eden averaged 784 g l^{-1} , which was nearly 18 g l^{-1} higher than those of Zak (767 g l^{-1}) and Calorwa (766 g l^{-1}). Thousand kernel weight averages of Eden, Zak and Calorwa were 37.9 g, 50.3 g, and 39.7 g, respectively. The average plant height of Eden was 75 cm, which was 11 cm and 4 cm shorter than

Wawawai (86 cm) and Zak (79 cm), respectively. Eden was 8 cm taller than Calorwa (67 cm). Lodging percentages of Eden when grown with irrigation were comparable to Calorwa (0%), and lower than Wawawai (10%) and Zak (30%). Eden headed 3 d later than Calorwa (162 Day of Year), on the same date as Wawawai (165 Day of Year) and 2 d earlier than Zak (167 Day of Year).

In tests conducted by the USDA-ARS Western Wheat Quality Laboratory (WWQL) in Pullman, WA using grain produced in breeding and commercial variety testing trials in Washington State from 1997 through 2001, protein content of Eden (8.9 %) was consistently lower than the soft white common check Zak (9.7 %), and soft white club check Calorwa (9.4 %). Flour yield of Eden (68.0 %) was significantly higher than Zak (66.0 %) and Calorwa (65.9 %). Flour ash content for Eden (0.32 %) was significantly lower than that for Zak (0.34 %) and Calorwa (0.36 %). Eden had a higher average milling score (87.3) than Zak (83.4) and Calorwa (81.9). Mixograph water absorption of Eden (53.7 %) was significantly lower than Zak (54.9 %) and Calorwa (54.6 %). Average cookie diameter for Eden (9.6 cm) was comparable to Zak (9.6 cm) and larger than Calorwa (9.3 cm), and average sponge cake volume of Eden (1303 cm³) was smaller than Zak (1332 cm³) and Calorwa (1349 cm³) when the baking quality of flour extracted from grain samples collected across production regions were compared.

Foundation seed of Eden 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, and small quantities may be obtained for research purposes by contacting the corresponding author or through the National Plant Germplasm System. U.S. plant variety protection status for this cultivar is pending.



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