IDAHO AGRICULTURAL EXPERIMENT STATION
Moscow, Idaho

Announces the Release of

ALTURAS
Soft White Spring Wheat

'Alturas' soft white spring wheat (*Triticum aestivum* L.,) was developed by the Idaho Agricultural Experiment Stations for use by grain producers in the Pacific Northwest of the United States. Alturas is a semi-dwarf wheat adapted to rain-fed and irrigated production at elevations above 1000 m with excellent yield and milling quality.

Alturas was derived from a cross, 'Whitebird' (PI 592982)/ 'Centennial' (PI 537303) made at the University of Idaho, Aberdeen Research and Extension Center in 1989. The cross, designated A89078S was advanced by the bulk method without intentional selection in the F_2 generation. In the F_3 generation, heads were selected from short plants and planted as $F_{3:4}$ headrows in 1993. From these headrows, the selection A89078S-10 was advanced to yield trials in southeastern Idaho in 1994. In 1997, A89078S-10 was designated IDO526 and entered into the Tri-State Spring Wheat Nursery. IDO526 was advanced the next year into the Western Regional Spring Wheat Nursery for two years of testing (1998 to 1999). In 1999, IDO526 was evaluated in the Pacific Northwest Wheat Quality Council and in Idaho on-farm extension trials. In 1999, 200 head selections were grown at Aberdeen, ID and selected for uniform plant type. Seed from headrows that were true-to-type were harvested and planted at Tetonia in 2001 to form breeder seed.

Alturas is most similar in appearance to Centennial soft white spring wheat. Alturas has an unpigmented coleoptile and erect juvenile growth. Alturas has a recurved, twisted flag leaf and an awned, erect, lax head, which is white-chaffed at maturity. Alturas is 85 cm tall, similar to 'Penawawa' and Centennial, yet 3 cm shorter than 'Alpowa' and Whitebird. Alturas is similar in heading date to 'Jubilee', on average in southern Idaho, Julian day 185. Alturas heads 1 d later than Centennial and 1 d earlier

than Penawawa, Alpowa and Whitebird and 4 d earlier than 'Treasure'. Seed of Alturas is soft, white, ovate, and plump, with a kernel type similar to Centennial, but approximately 1.8 mg per kernel larger. Based on field evaluations in Washington and Idaho, Alturas has adult plant resistance to stripe rust [caused by *Puccinia striiformis* (Westend.)], but moderate susceptibility to leaf rust [caused by *P. recondita* (Roberge ex Desmaz.)], and susceptibility to the Hessian fly [*Mayetiola destructor* (Say)]. Alturas has the high-molecular weight glutenin profile of *Glu-A1a*, *Glu-B1f*, and *Glu-D1d*.

In 40 site-years of southeastern Idaho replicated trials from 1995 to 2001, Alturas had a grain yield of 6416 kg ha^{-1} compared to 6388 kg ha^{-1} for Penawawa, 6326 kg ha^{-1} for Jubilee, 6188 kg ha^{-1} for Treasure, and 6119 kg ha^{-1} for Whitebird. In the same trials, Alturas, Penawawa, Jubilee, Treasure, and Whitebird had test weights of 779, 772, 786, 764, and 786 kg m^{-3}, respectively. In irrigated trials, Alturas lodged less than Treasure, but similar to Penawawa and Whitebird. Alturas has a high milling yield. In 9 site-years of test milling with a Quadrumat Senior Mill by the University of Idaho Wheat Quality Laboratory, Alturas had a total flour yield of 652 g kg^{-1}, similar to Treasure (648 g kg^{-1}) and Whitebird (649 g kg^{-1}), greater than Penawawa (603 g kg^{-1}), yet less than Jubilee (661 g kg^{-1}). In the same quality evaluations, Alturas had a cookie diameter of 8.7 cm, similar to Treasure and Whitebird, greater than Penawawa, yet less than Jubilee (8.8, 8.8, 8.4, and 8.9 cm, respectively). The soft wheat quality of Alturas is unusual among soft white cultivars, due in part to the combination of low levels in the flour of damaged starch and pentosans as measured by the Solvent Retention Capacity, yet relatively strong gluten (1). In 9 site-years of irrigated, southern Idaho trials, the sodium carbonate flour-solvent absorptions (correlated to damaged starch in flour) for Alturas, Jubilee Treasure, Whitebird, and Penawawa, were 599, 594, 610, 607, and 637 g kg^{-1}, respectively ($LSD_{0.05}$, 12 g kg^{-1}). In the same evaluations, Alturas, Jubilee Treasure, Whitebird, and Penawawa had lactic acid flour-solvent absorptions (correlated to gluten strength) of 986, 848, 869, 856, 961 g kg^{-1}, respectively ($LSD_{0.05}$, 30 g kg^{-1}). Alturas has an elevated flour hot-paste viscosity relative to wheat cultivars with functional alleles at all three loci of the Granule Bound Starch Synthase enzyme such as Whitebird, Treasure, and Jubilee (1). Alturas has peak Rapid Visco-Analyzer flour viscosity similar to partial waxy genotypes

Centennial and Penawawa and likely carries the null mutation for *Wx-B1* derived from its parent Centennial (1). Alturas has excellent Asian noodle color in evaluations based on industry evaluations. Averaged across five environments, Alturas had a decline in alkali noodle brightness (L*) 24 h after sheeting of 6.3 CIE units, in comparison to 6.2, 6.4, 8.0, and 15.5 CIE units, respectively, for Whitebird, Treasure, Jubilee, and Penawawa.

Seed of Alturas will be maintained by the Idaho Agricultural Experiment Station. Foundation seed may be obtained by contacting the Foundation Seed Program at the University of Idaho, Kimberly Research and Extension Center, Kimberly, Idaho. Plant variety protection is requested for Alturas.

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Director, Idaho Agricultural Experiment Station Date
Moscow, Idaho

1.) Guttieri, M.J., D. Bowen, D. Gannon, K. O'Brien, and E. Souza. 2001. Solvent retention capacities of irrigated soft white spring wheat flours. Crop Sci. 41:1054-1061.