PVP Application - Tubbs Soft White Winter Wheat

Exhibit A - Origin and Breeding History

Tubbs is a semidwarf soft white winter wheat derived from the cross 'Malcolm'/'Madsen' made in 1990. Tubbs is an F_3-derived line, which was identified in 1994 as an F_4 headrow and designated as experimental number OR939526 in 1995.

Tubbs (OR939526, PI 629114) is derived from the single cross 'Malcolm'/'Madsen' made in 1990. The original selection was obtained from a single head from an F2 plant identified and selected at the Oregon State University Hyslop Agricultural Research Farm. The initial selection was based on spike size and fertility, maturity, semi-dwarf stature, and reaction to foliar diseases including Septoria leaf blotch and stripe rust (Puccinia striiformis). F3 and F4 generations were advanced through a head to row pedigree breeding method. Selections in the F3 and F4 generation were made at a field research site near Adams, Oregon, based on plant height, maturity, spike size, reaction to stripe rust and the soilborne disease Cercosporella herpotrichoides. A single F4 row was bulked and subsequently given the identification OR939526. In the F5 generation, Tubbs (OR939526) was evaluated in a single unreplicated yield trial. In addition to previous traits, Tubbs was then evaluated and selected for grain yield, grain test weight.

Beginning in the F6 generation, Tubbs was evaluated in mulilocation yield trials in North Central Oregon and the Willamette Valley. In these trials, Tubbs was evaluated and selected for grain yield, yield stability, adaptation, grain quality, and response to major diseases of the Northwest, including Stripe rust, Leaf rust, Septoria leaf blotch, Cercosporella herpotrichoides, Cephalosporium stripe, and Fusarium crown rot.

For each year from the F5 generation through release, Tubbs was evaluated and selected for end-use quality traits in comparison with major varieties Stephens and Madsen. The evaluations were conducted through the USDA-ARS Western Wheat Quality Laboratory in Pullman, Washington. Traits measured include kernel hardness, kernel weight, break flour and total flour yield, flour ash, flour protein, water absorption, cookie diameter, and sponge cake volume.

Tubbs was evaluated in the USDA-ARS Western Regional Uniform Soft Wheat Nursery in 1999 and 2000, the Oregon State-wide Variety Trials in 1999 through 2001, and in the Washington and Idaho State Variety Trials in 2000 and 2001.

In fall 2000, 1,500 heads of Tubbs were threshed, screened for seed color and seed size, and provided to Washington Foundation Seed for production of Breeder seed. These were planted as individual headrows and off-type rows were removed prior to bulk harvest of Breeder seed.

Evidence of Uniformity and stability

Tubbs has been observed to be uniform and stable. From the F5 generation through its release as a variety in 2002, uniformity and stability were evaluated each year in multilocation replicated yield trials. From 1998 to 2001, Tubbs was evaluated in a total of 120 replicated yield trials, including breeding trials in Oregon, USDA-ARS sponsored Regional Nurseries, and State Variety Trials in Oregon, Washington and Idaho.

Tubbs may contain up to 5 red kernels per pound in Breeders, Foundation, Registered, or Certified classes of seed multiplication. Tubbs also may contain up to a total of 1 in 10,000 combined of the naturally occurring variants: plants that are 8 to 15 cm taller or plants with bronze (red or tan) chaff spikes. These variants described are distinct within the variety and are stable and predictable with a degree of reliability comparable to other varieties of the same kind, and within recognized tolerances, when the variety is reproduced or reconstructed, and was originally part of the variety when released.

To further determine variants in kernel color, a phenol staining reaction was determined. It was observed that 38% of the kernels stained are ivory, with 62% being light brown. No brown or brown-black staining kernels were observed.

Exhibit B - Statement of Distinctness

Tubbs is most similar to the commercial varieties Weatherford, Stephens, Madsen, and Malcolm. All are of the soft white market class, winter type, semi-dwarf, awned and have similar levels of winterhardiness.

Tubbs has been shown to have higher grain yield, lower test weight, and lower grain protein concentrations as compared to Stephens, Madsen, and Weatherford. Plant height of Tubbs is greater than that of Stephens and Madsen. Tubbs is earlier maturing, as measured by heading date, than Madsen and Weatherford, but later maturing than Stephens. Kernel weight of Tubbs is greater than Madsen, but not different from Stephens or Weatherford.

Tubbs carries the Pch-1 gene which confers resistance to Psuedocercosporella foot rot. Weatherford and Madsen also carry this gene, but Malcolm and Stephens do not.