

IDAHO AGRICULTURAL EXPERIMENT STATION
Moscow, Idaho

AGRICULTURAL RESEARCH SERVICE
United States Department of Agriculture

Announce the Release of

Boundary
Hard Red Winter Wheat

'Boundary' hard red winter wheat (*Triticum aestivum* L.) was released by the Idaho Agricultural Experiment Station in cooperation with the United States Department of Agriculture, Agricultural Research Service. Boundary is a semi-dwarf wheat adapted to high yield production zones of the Pacific Northwestern of the United States.

Boundary is a selection from a 1986 cross, A86115W, with the parentage A76327W-2-3T-5P /A7457W-13-1-1T-2P. The breeding line A76327W-2-3T-5P was derived from the cross 'Norin 10' / 'Brevor' // 2*'Centana', IDO34 /3/ IDO76, 'Centana'*2 / CI 14106. The breeding line A7457W-13-1-1T-2P had the pedigree: II60-155 / CI 14106 // 'McCall' /4/ 'Kiowa' / UT222a-437-2 // 'Delmar' /3/ SM4 / MT6619. A86115W was advanced in generations by the bulk method through the F₂ and F₃ generations. In 1988, head selections were made in Aberdeen, ID of plants resistant to common bunt (causal organism *Tilletia tritici* (Bjerk) Wint.). Selected F₄ families were planted at Aberdeen in 1989, from which the line A86115W-2 was selected and entered into yield testing in southern Idaho. In 1993, A86115W-2 was identified in advanced trials at Preston and Teton, Idaho as tolerant to snow mold (causal organism *Typhula* spp.). Based on this evaluation, A86115W-2 was advanced to regional testing in 1994 under the designation Idaho 467. Idaho 467 was tested in the Western Regional Nursery from 1994 to 1996 and the Northern Regional Performance Nursery in 1996 and 1997. Breeder seed of Idaho 467 was formed by selecting 100 heads in 1994. The individual heads were pure-lined for two years and progeny tested at Logan, UT. In 1996, 56 seed lots each tracing to individual 1994 head rows, were bulked on the basis of dwarf bunt (causal organism *T. controversa* Kühn) resistance to form breeder's seed for Boundary.

Boundary has a prostrate juvenile growth habit with blue green foliage and no waxy bloom. The flag leaves of Boundary are erect with auricles that are glabrous and green to yellow green in color. The heads of Boundary are dense, clavate, and awnless. Boundary's glumes are long, medium wide, with a squared shoulder shape, and an acute beak. Boundary flowers in approximately 2 d earlier than 'Bonneville' and 2 d later than 'Manning'. Boundary is approximately 20 cm taller than 'Garland' and 5

cm shorter than Manning. At maturity, Boundary has white chaff color. Seed of Boundary is ovate in shape, with rounded cheeks, and a medium long brush. The seed crease is narrow and shallow in depth. Boundary is moderately resistant to dwarf bunt, similar to the cultivars 'Eltan' and 'Fairview'. In 2 yr of Western Regional Testing in Idaho and Washington, Boundary had adult plant resistant to stripe rust (causal organism *Puccinia striiformis*, Westend), but seedling susceptibility to the dominant races of stripe rust. In the same trials, Boundary had resistance to leaf rust (causal organism *P. recondita* Rob. ex Desm. f. sp. *tritici*) and powdery mildew (causal organism *Blumeria graminis* (DC.) E. O. Speer f. sp. *tritici*). Boundary is moderately tolerant to snow mold, similar to Manning.

In southeastern Idaho rain fed yield trials, 1993 to 1996, Boundary had an average yield of 58 bu ac⁻¹ compared with 51 bu ac⁻¹ for Bonneville, 53 bu ac⁻¹ for 'Weston', and 57 bu ac⁻¹ for 'Promontory'. In 7 site-years of testing in north Idaho and Pullman, WA, Boundary had an average yield of 77 bu ac⁻¹ compared with 66 bu ac⁻¹ for 'Wanser'. In 6 site-years of testing in western Montana, the yields of Boundary and Wanser were 107 bu ac⁻¹ and 90 bu ac⁻¹, respectively. In six site-years of southern Idaho irrigated testing, Boundary yielded 110 bu ac⁻¹ compared with 104 bu ac⁻¹ for Garland and 103 bu ac⁻¹ for 'Ute'. Boundary is a stiff strawed cultivar, consistently rated as having the least lodging in comparison to other irrigated and dryland hard red winter wheats. Milling quality of Boundary in 22 site-years of southeastern Idaho trials was similar to Weston. In the same trials comparing Boundary with Weston, Boundary had 63% longer mixing time and 13% better mixing tolerance, but 8% smaller loaf volume than Weston.

Seed of Boundary will be maintained by the University of Idaho, Foundation Seed Program and may be obtained by contacting the Foundation Seed Director, University of Idaho, Kimberly Research and Extension Center, Kimberly, ID. The final date of authorization will serve as the official date of release.

Director, Idaho Agricultural Experiment Station
Moscow, Idaho

Date

United States Department of Agriculture
Washington, D.C.

Date

Exhibit A. Origin and Breeding History of the Variety

Boundary is a selection from a 1986 cross, A86115W, with the parentage A76327W-2-3T-5P /A7457W-13-1-1T-2P. The breeding line A76327W-2-3T-5P was derived from the cross 'Norin 10' / 'Brevor' // 2*'Centana', IDO34 /3/ IDO76, 'Centana'*2 / CI 14106. The breeding line A7457W-13-1-1T-2P had the pedigree: II60-155 / CI 14106 // 'McCall' /4/ 'Kiowa' / UT222a-437-2 // 'Delmar' /3/ SM4 / MT6619. A86115W was advanced in generations by the bulk method through the F₂ and F₃ generations. In 1988, head selections were made in Aberdeen, ID of plants resistant to common bunt (causal organism *Tilletia tritici* (Bjerk) Wint.). Selected F₄ families were planted at Aberdeen in 1989, from which the line A86115W-2 was selected and entered into yield testing in southern Idaho. In 1993, A86115W-2 was identified in advanced trials at Preston and Teton, Idaho as tolerant to snow mold (causal organism *Typhula* spp.). Based on this evaluation, A86115W-2 was advanced to regional testing in 1994 under the designation Idaho 467. Idaho 467 was tested in the Western Regional Nursery from 1994 to 1996 and the Northern Regional Performance Nursery in 1996 and 1997. Breeder seed of Idaho 467 was formed by selecting 100 heads in 1994. The individual heads were pure-lined for two years and progeny tested at Logan, UT. In 1996, 56 seed lots each tracing to individual 1994 head rows, were bulked on the basis of dwarf bunt (causal organism *T. controversa* Kühn) resistance to form breeder's seed for Boundary. Boundary was closely examined during advanced yield testing from 1993 to 1996. It has been uniform and consistent in its breeding behavior and plant type during this time period.

Exhibit B, Novelty Statement.

The hard red winter wheat that Boundary is most similar is to the Idaho cultivar Fairview. Boundary and Fairview are similar in height, maturity, test weight, plant architecture, milling and baking quality, and dwarf bunt resistance. They are derived from similar genetic backgrounds. Boundary and Fairview can be distinguished based on chaff color and head type. Boundary is a white chaffed, awnless cultivar and Fairview is a bronze chaffed awned cultivar. If other market classes are included Boundary's plant phenotype is most similar to Eltan soft white winter wheat. In particular the open architecture of the plant crown after jointing and the clavate head of Eltan are very similar to Boundary. Eltan is, however, an awned soft white winter wheat and can be distinguished from the awnless hard red winter wheat Boundary.

Exhibit C, Objective Description of Variety

Boundary has a prostrate juvenile growth habit with blue green foliage and no waxy bloom. The flag leaves of Boundary are erect with auricles that are glabrous and green to yellow green in color. The heads of Boundary are dense, clavate, and awnless. Boundary's glumes are long, medium wide, with a squared shoulder shape, and an acute beak. Boundary flowers in approximately 2 d earlier than 'Bonneville' and 2 d later than 'Manning'. Boundary is approximately 20 cm taller than 'Garland' and 5 cm shorter than Manning. At maturity, Boundary has white chaff color. Seed of Boundary is ovate in shape, with rounded cheeks, and a medium long brush. The seed crease is narrow and shallow in depth. Boundary is moderately resistant to dwarf bunt, similar to the cultivars 'Eltan' and 'Fairview'. In 2 yr of Western Regional Testing in Idaho and Washington, Boundary had adult plant resistant to stripe rust (causal organism *Puccinia striiformis*, Westend), but seedling susceptibility to the dominant races of stripe rust. In the same trials, Boundary had resistance to leaf rust (causal organism *P. recondita* Rob. ex Desm. f. sp. *tritici*) and powdery mildew (causal organism *Blumeria graminis* (DC.) E. O. Speer f. sp. *tritici*). Boundary is moderately tolerant to snow mold, similar to Manning.