



Release of 'ORCF-101' soft white winter wheat

The Oregon Agricultural Experiment Station announces the release of ORCF-101, a soft white winter wheat (*Triticum aestivum L.*) that possesses Clearfield™ herbicide resistance technology. Clearfield™ wheat technologies are owned by BASF Corporation and protected under U.S. Patent law (U.S. Patents 6,211,438; 6,211,439; 6,222,100, and others pending). ORCF-101 is being released for its utility for grassy weed control, adaptation to wheat growing areas of the Pacific Northwest, and acceptable quality for the soft white market class.

ORCF-101 carries a form of the acetohydroxyacid synthetase gene which has been altered through chemical mutagenesis. The altered gene is not affected by Beyond™, an imidazolinone-based herbicide, at normal application rates. When ORCF-101 is used in combination with Beyond™ at the labeled rate, the Clearfield™ technologies provide growers with an effective new tool for control of grassy weeds such as goatgrass, wild rye, downy brome, Italian ryegrass, wild oat, and volunteer cereals.

ORCF-101 is a semidwarf soft white winter wheat derived from the three-way cross 'CV-9804'/'Malcolm'/'OR939481'. CV-9804, also known as 'FS-4', is the donor of the Clearfield trait, developed through mutagenesis of the cultivar 'Fidel'. OR939481 is a selection from the cross 'Stephens'/'Madsen'. The initial single cross was made in spring of 1996 followed by the topcross with OR939481 in 1997; both made at the OSU Hyslop Agronomy Farm. ORCF-101 is an F2 derived line, identified as an F2 plant in 1999 when it was selected from thin-seeded bulk plot at the Columbia Basin Agricultural Research Center after herbicide application. The selection was given the experimental number OR2010051 in 2000, when it was grown in as a single plot at Hyslop farm.

ORCF-101 is adapted to production areas of northeast Oregon, southeast Washington, and Idaho. ORCF-101 carries resistance to strawbreaker footrot (*Pseudocercospora herpotrichoides*) from the parent variety Madsen and has a similar reaction to this important root disease. ORCF-101 has adult-plant resistance to stripe rust (*Puccinia striiformis*) in field situations, with infection intensities similar to Stephens and Madsen and less than 'Tubbs'. It has shown susceptibility to current races of leaf rust (*Puccinia recondita*). ORCF-101 is moderately susceptible to *Septoria tritici*, crown rot (*Fusarium pseudograminearum*) and Cephalosporium stripe (*Cephalosporium gramineum*).

ORCF-101 was evaluated in breeding trials in 2001 and 2002 and in OSU Statewide Variety Trials and Northern Idaho Variety Trials in 2002. ORCF-101 averaged 2 d later in heading than Stephens and 2 d earlier than Madsen. Plant height averaged 1.5 inches taller than Stephens and 0.4 inches shorter than Madsen. ORCF-101 has shown good straw strength under high yield conditions. Winterhardiness of ORCF-101 is expected to be no better than that of the adapted parents Malcolm, Stephens, or Madsen.

Grain yields of ORCF-101 have been very comparable to Madsen and higher than for Stephens in trials for which Beyond™ has not been applied. Over 15 site/years of trials, average yields of ORCF-101 were 95.8 as compared with 95.0 for Madsen and 88.5 for Stephens. When data from 2001 Hyslop is excluded, due to an intense Strawbreaker footrot infection, ORCF-101 averaged 2.3 bu/a higher than Stephens.

Over 10 locations of variety trials, test weight of ORCF-101 averaged 0.5 lb/bu lower than Madsen, more similar to that for Tubbs. However, thousand kernel weight of ORCF-101 (37.7 g) was higher than Madsen (33.3 g) and equivalent to Stephens at 37.6 g. Grain protein content of ORCF-101 has been similar to Madsen, averaging 10.1%, and 0.4 percentage points higher than Stephens.

End-use qualities of ORCF-101 were evaluated by the USDA-ARS Western Wheat Quality Lab using grain samples from 6 or more locations. Comparisons of milling quality, flour yield, protein content, and baking evaluations suggests that ORCF-101 has quality attributes very similar to Stephens, Madsen and Tubbs and is considered as acceptable for soft wheat applications. Milling quality, as indicated by test weight, flour yield, break flour yield, ash content, and water absorption suggest ORCF-101 is not significantly different from Stephens. ORCF-101 has normal amylose starch properties and starch viscosities similar to the checks. Cookie diameters and sponge cake volumes of ORCF-101 were considered acceptable and did not differ significantly from Stephens and Madsen. ORCF-101 may have slight advantage over Tubbs, with lower flour ash and larger average cookie diameter, even though it has slightly higher average grain protein than Tubbs.

Herbicide tolerance of ORCF-101 was evaluated at two locations in 2002. At the OSU Pendleton research site, Beyond™ was spring applied at 4, 6, and 12 oz rates. There was no significant reduction in grain yield for either ORCF-101 or the herbicide resistant parent, CV-9804; rather, grain yield was increased slightly, likely due to improved weed control over the untreated plots. Plots of the check variety Stephens were effectively killed with each herbicide application. There was evidence of crop damage and yield reduction from late-fall applications at the 6 and 12 oz rates. However, these treatments were applied in early December at pre-3 leaf stage and under sub-optimal conditions, conditions outside of the labeled application window. A trial near Athena, OR, conducted under contract by BASF, showed that ORCF-101 had commercially acceptable crop safety ratings and similar tolerance to CV-9804 based on fall and spring applications of Beyond™ at 4, 8, or 16 oz rates. There was evidence of crop damage and yield reduction in ORCF-101 at the spring-applied 16 oz rate. However, yields were still comparable to CV-9804 and there was no evidence of damage in the fall 16 oz treatment. The 16 oz rate represents four times the recommended and labeled use rate for Beyond™.

In fall 2001, approximately 1,500 heads of ORCF-101 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. Foundation seed will be available in August, 2003 through the Washington Crop Improvement Foundation Seed Program.

ORCF-101 will be submitted for Plant Variety Protection with the Title 5 option. ORCF-101 will be release to seed growers only through a non-exclusive licensing agreement that grants permission to produce, sell, and promote seed of the variety. Foundation and Registered seed stocks may be sold only to those granted licenses by OSU. Certified seed stocks may be used to plant a single commercial crop and may not be used to generate seed stocks for replanting. Seed stocks that fail to meet certification standards cannot be sold as seed, nor used as seed.

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