

OKLAHOMA AGRICULTURAL EXPERIMENT STATION
OKLAHOMA STATE UNIVERSITY
STILLWATER, OK

and

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
WASHINGTON, D.C.

RELEASE OF CENTERFIELD HARD RED WINTER WHEAT

Centerfield is a hard red winter (HRW) wheat (*Triticum aestivum* L.) cultivar developed cooperatively by the Oklahoma Agricultural Experiment Station (OAES) and USDA-ARS and released by the OAES and USDA-ARS in 2006. Centerfield, suited for the CLEARFIELD(TM) Production System with Beyond(R) herbicide, will be positioned throughout central Oklahoma, especially those areas challenged by Wheat spindle streak mosaic virus and Wheat soilborne mosaic virus. Its range of adaptation is expected to supplement that of Okfield, a related CLEARFIELD cultivar better adapted to western areas of Oklahoma, including the High Plains.

Centerfield originated from the cross, (TXGH12588-105*4/FS4)/2*2174. TXGH12588-105 was eventually released by the Texas Agricultural Experiment Station in 1996 as TAM 110, whereas 2174 originated in the former HRW wheat breeding program of Pioneer Hi-Bred International, Inc., and was named and released in 1997 by the OAES and the USDA-ARS. FS4 was derived by mutagenesis from the French wheat cultivar, Fidel, and was provided by American Cyanamid Co., with ownership subsequently transferred to BASF Corporation. The initial cross with 2174 was produced using a BC3F2 plant (TXGH12588-105*4/FS4) selected in the greenhouse for tolerance to a 2x commercial rate of imazamox herbicide. Centerfield is a BC1F2-derived line currently in the F9 generation (2006-2007 crop year), and it traces to a single BC1F2:3 head row selected at Stillwater, Oklahoma, in 2001. Ownership of the gene which confers tolerance to imazamox resides with BASF. Centerfield was tested as OK03918C in replicated breeder nurseries throughout Oklahoma from 2002 through 2006, in the BASF Qualification Trials in 2005 and 2006, and in the 2005 Hard Winter Wheat Milling and Baking Evaluation Program conducted by the Wheat Quality Council.

Centerfield is an awned, white-chaff, moderately tall semidwarf, with good lodging resistance and straw strength similar to 2174. Tolerance to acidic soils with high aluminum toxicity is above-average. Arrival at first-hollow-stem stage is moderately late, and heading date is intermediate or about 5 days later than the very early cultivar, AP502CL.

Centerfield is resistant to Wheat spindle streak mosaic virus and to Wheat soilborne mosaic virus and should exhibit insignificant losses to these viral diseases. Though susceptible in the seedling stage, Centerfield shows moderate to high adult-plant resistance to wheat leaf rust caused by races of *P. triticina* present in Oklahoma and Texas from 2004 to 2006. It appears to be at least moderately resistant to stripe rust (caused by *Puccinia striiformis* f. sp. *tritici*) in the field. Seedling tests in the greenhouse indicate a susceptible reaction to tan spot (caused by *Pyrenophora tritici-repentis*) and to septoria leaf blotch (caused by *Septoria tritici*) and a moderately susceptible reaction to powdery mildew (caused by *Blumeria graminis* f. sp. *tritici*). Centerfield shows a heterogeneous reaction (46% resistant:54% susceptible) to biotype E

greenbug (*Schizaphis graminum* Rondani). Field ratings in Oklahoma indicate a tolerant reaction to Hessian fly (*Mayetiola destructor*) that is similar to Chisholm, 2174, and Ok102, though its seedling reaction in the greenhouse is heterogeneous. Centerfield is susceptible to Biotypes 1 and 2 of Russian wheat aphid (*Diuraphis noxia* Mordvilko).

Based on breeding trials conducted in 22 Oklahoma environments from 2003 to 2005, Centerfield averaged 3310 kg ha⁻¹ in grain yield; AP502CL averaged 3170 kg ha⁻¹. Restricting yield comparisons to central Oklahoma where Centerfield will be positioned, the respective mean grain yields across 11 environments were 3110 and 2850 kg ha⁻¹. From the same 22 Oklahoma environments, test weight of Centerfield averaged 2.3 lb bu⁻¹ (4.4 kg hL⁻¹) higher than AP502CL.

Across 14 Oklahoma environments from 2003 to 2005, Centerfield averaged 30.8 mg kernel weight and 2.43 mm kernel diameter, compared with 30.2 mg and 2.28 mm for AP502CL. During the severe infection of stripe rust in 2005, kernel size remained constant for Centerfield, whereas kernel weight and diameter decreased about 6 mg and 0.30 mm, respectively, for AP502CL. Kernel texture is moderately hard, based on a SKCS hardness score of 71 for Centerfield and 58 for AP502CL. Centerfield has moderately high wheat protein content (13.0% at 12% m.b.).

Three years of mixograph evaluation produced the following values, with targeted values indicated in parentheses: 4.2 min corrected mixing time (3 to 7 min), mixing tolerance rating of 2.9 on a 0-to-6 scale (>2), mixogram curve width of 13.9 mm at 2 min past peak development (>10.0 mm), and a mixograph stability index of 8.8 (<10.0). From a one-year composite evaluation of nine nursery samples collected statewide in 2005, the USDA-ARS-HWWQL (Manhattan, KS) reported 62.8% flour yield at 0.34% flour ash, 13.1% wheat protein, mixing tolerance rating of 2 on a 0-to-6 scale, 61.9% bake absorption, 3.8 min bake time, 908 cc pup-loaf volume, 70.5 loaf volume regression value, and 2.3 crumb grain score (0-to-6 scale of undesirable to desirable). All scores were similar to the mean of four check cultivars comprised of Okfield, OK Bullet, Deliver, and Endurance, except for lower flour yield and crumb grain score for Centerfield.

Seed of Centerfield has been deposited in the National Plant Germplasm System. Distribution of Centerfield is restricted because it carries the patented herbicide (imazamox) tolerance gene designated Als1. Seed of Centerfield may be obtained through a material transfer agreement with BASF Corporation, the owner of the gene. Authorized seed classes are Breeder, Foundation, Registered, and Certified. Organizations that hold a marketing license with BASF may obtain foundation seed through Oklahoma Foundation Seed Stocks, Dept. of Plant and Soil Sciences, Oklahoma State Univ., Stillwater, OK 74078. The Oklahoma Agricultural Experiment Station will maintain breeder seed. The U.S. Department of Agriculture will have no seed for distribution. Application for U.S. Plant Variety Protection (Title V) will be filed in 2007. Development of this variety was accomplished by Oklahoma State University's Wheat Improvement Team and USDA-ARS: Brett Carver, Robert Hunger, Jeff Edwards, David Porter (USDA-ARS Wheat, Peanut and Other Field Crops Research Unit, Stillwater, OK), Patricia Rayas-Duarte, Art Klatt, Liuling Yan, and Bjorn Martin. Others instrumental in its development and evaluation were Brad Seabourn, USDA-ARS-Grain Structure and Quality Research Unit (Manhattan, KS) and Guihua Bai, USDA-ARS Plant Science and Entomology Research Unit (Manhattan, KS).

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