

**NEBRASKA AGRICULTURAL EXPERIMENT STATION  
UNIVERSITY OF NEBRASKA-LINCOLN  
DEPARTMENT OF AGRONOMY**

**and**

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

**RELEASE OF CULVER (P.I. 606726) HARD RED WINTER WHEAT**

The Nebraska Agricultural Experiment Station and the Agricultural Research Service, U.S. Department of Agriculture agree to release a new hard red winter wheat variety (*Triticum aestivum* L.) to certified growers. P.I. 606726, also known as NE93554, will be released as 'Culver'. Culver was developed cooperatively by the Nebraska Agricultural Experiment Station and the Agricultural Research Service, U.S. Department of Agriculture.

Culver was selected from the cross NE82419/Arapahoe, which was made in 1987. The pedigree of NE82419 is Trapper//CMN/OT/3/CIMMYT /Scout/4/ Buckskin sib/Homestead. Culver is an F<sub>3</sub>-derived line that was selected in the F<sub>4</sub> generation. Culver was released primarily for its superior adaptation to dryland wheat production systems in southern and central Nebraska and similar growing areas in adjacent states.

Culver is an awned, white-glumed cultivar. Its field appearance is most similar to 'Alliance', although not as yellow-green in color. After heading, the canopy is moderately open and upright. The flag leaf is erect and twisted at the boot stage. The foliage is green with a waxy bloom at anthesis. The leaves are glabrous. The spike is tapering in shape, moderately long to long, and middense. The glume is midlong and midwide to wide, and the glume shoulder is sloping to square. The beak is short in length with an acuminate tip. The spike is usually nodding at maturity. Kernels are red colored, hard textured, and ovate to elliptical in shape. The kernel has no collar, a large brush of medium length, rounded cheeks, midsize to large germ, and a narrow and shallow crease.

Culver was performance tested as NE93554 in Nebraska yield nurseries starting in 1994 and in the Northern Regional Performance Nursery in 1996 and 1997, and in Nebraska cultivar performance trials in 1997 and 1998. In two years of testing in Nebraska cultivar performance trials, it has performed extremely well in the south central and west central districts, while being competitive in the southeast and western sites. In the south central district trials (4 environments), Culver was the highest yielding line (4690 kg/ha; 69.8 bu/a) in the last two years. For comparison, Jagger yielded 4610 kg/ha (68.5 bu/a), Alliance yielded 4510 kg/ha (67.0 bu/a) and Arapahoe yielded 4300 kg/ha (64.0 bu/a) in those trials. In the west central trials (12 environments), Quantum hybrid 7406 (4730 kg/ha; 70.3 bu/a) was the highest yielding line averaged over the past two years followed by Jules (4390 kg/ha; 65.3 bu/a) and Culver (4310 kg/ha; 64.1 bu/a). For comparison, the yields of Jagger, Windstar, Alliance, Niobrara, and Arapahoe were 4260 (63.3), 4240 (63.1), 4160 (61.9), 4160 (61.9), and 4120 kg/ha (61.3 bu/a). In the southeast district trials (4 environments), Culver yielded similarly to Niobrara (3510 kg/ha;

52 bu/a) and 340 kg/ha (5 bu/a) less than 2137, and 130 kg/ha (2 bu/a) less than Nekota. In the western trials (12 environments), Culver was equal in yield to Arapahoe and 70 (1 bu/a) to 270 kg/ha (4 bu/a) less than Alliance, Akron, 2137, Niobrara and Windstar. Culver was tested in the Northern Regional Performance Nursery in 1996 and 1997 (29 environments). It ranked seventh of 16 lines tested at 10 locations in those years, was above the average yield, and 360 kg/ha (5 bu/a) higher yielding than 'Abilene'. In one or both years, it showed superior adaptation for use in the intra-regional production zones of the north-central plains, northern plains and the northern high plains. The main advantage Culver has when compared to most other available wheat cultivars, within its area of adaptation, is its high grain yield and superior leaf rust resistance in dryland production systems.

Other measurements of performance from comparison trials show that Culver is medium in maturity, about 0.5 d later flowering than Arapahoe and 2 d later than Alliance. It has a medium length coleoptile, similar to TAM 107 and Arapahoe, but shorter than Pronghorn. The mature plant height of Culver (83 cm) is similar to Arapahoe, but 2 cm taller than Alliance. Culver has moderately strong straw strength, similar to Windstar and slightly better than Alliance, Arapahoe, and Pronghorn. The winterhardiness of Culver is good to very good, similar to Abilene and comparable to other winter wheat cultivars adapted and commonly grown in Nebraska.

Culver is moderately resistant to stem rust (caused by *Puccinia graminis Pers. : Pers.*; contains *Sr6* and *Sr24*, and other unnamed resistance genes) and leaf rust (caused by *P. recondita* Roberge ex Desmaz.; similar to Arapahoe and most likely contains *Lr16*), and susceptible to wheat soilborne mosaic virus, Hessian fly (*Mayetiola destructor* Say), barley yellow dwarf virus, and wheat streak mosaic virus. Culver has a moderately low grain volume weight, higher than Alliance, but lower than Arapahoe, Pronghorn, and Rawhide. The milling and baking properties of Culver (NE93554) were determined for five years by the Nebraska Wheat Quality Laboratory. In these tests, Arapahoe and Scout 66 were used as check cultivars. The average wheat protein content of Culver was similar to Arapahoe and Scout 66. The average flour extraction on the Buhler Laboratory Mill for the Culver was similar to Arapahoe, but less than Scout 66. The flour ash content was similar to the check varieties. The average flour protein content was less than the check varieties. Dough mixing properties of Culver were similar to Arapahoe and stronger than Scout 66. Average baking absorption was similar to the check varieties. The average loaf volume of Culver was less than the check cultivars. The scores for the internal crumb grain and texture were good or very good, which were superior to Arapahoe and Scout 66. In comparison to Alliance, Culver had a higher average wheat protein content, baking absorption, and crumb grain score and texture score, while other end-use quality properties are similar to Alliance. The overall end-use quality characteristics for Culver should be acceptable to the milling and baking industries.

In positioning Culver, based on performance data to date, it should be well adapted to most dryland wheat production systems, with average or above average yield potential in southern and central Nebraska and similar growing areas in adjacent states. In these areas, it is a good replacement for Alliance as it has a longer coleoptile, and better leaf rust resistance, grain protein content, and grain volume weight. Culver would also be a good replacement for Arapahoe, as it is higher yielding with comparable disease protection. It is genetically complementary to 2137, Alliance, Jagger, Pronghorn, and Windstar. It is non-complementary to Arapahoe (one of its

parents), Niobrara, and Vista. Like Arapahoe, Culver appears to have an early spring growth pattern more susceptible to drought stress which can reduce yield and yield stability.

The name Culver was chosen in recognition of Moses M. Culver whose farm was purchased on June 25, 1874 by the University of Nebraska as a site for agricultural research and teaching, eventually to become today's University's East Campus. The year 1999 will be the 125th anniversary of this event, marked by the availability high quality Nebraska certified seed of this new variety to wheat producers, resulting from a long-standing commitment to meet the needs of agriculture and the world. East Campus is the home for the Institute of Agriculture and Natural Resources with its associated divisions of research, teaching and service, which is celebrating its 25<sup>th</sup> anniversary.

Culver has been uniform and stable since 1997. Less than 1.0% of the plants were rogued from the Breeder's seed increase in 1997. All of the rogued variant plants were taller in height (10 - 25 cm). Up to 2% (20:1000) taller, variant plants may be encountered in subsequent generations. The Nebraska Crop Improvement Association provided technical assistance in describing the cultivar characteristics and accomplishing technology transfer. The Nebraska Foundation Seed Division, Department of Agronomy, University of Nebraska-Lincoln, Lincoln, NE 68583 had foundation seed available to qualified certified seed enterprises in 1998. The U.S. Department of Agriculture will not have seed for distribution. The seed classes will be Breeder, Foundation, Registered, and Certified. The Registered seed class will be a nonsalable seed class. Culver will be submitted for registration and plant variety protection under P. L. 10577 with the certification option.

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## Approval

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Director, Nebraska Agricultural  
Experiment Station

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date

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Administrator, Agricultural Research Service  
United States Department of Agriculture  
Washington, D. C.

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date

Co-author: Bob Klein (yes), Paul Nordquist (no), Roger Elmore (yes)

Small quantities of seed for research purposes may be obtained from the corresponding author and the Department of Agronomy, University of Nebraska for at least 5 yr from the date of this publication.

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#### References and Notes

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11881 from the Nebraska Agric. Res. Div. Registration by CSSA. Accepted .

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